Appendix B to the report of the Commissioners appointed to inquire into the condition of all mines in Great Britain to which the provisions of the Act 23 & 24 Vict. Cap. 151 do not apply, with reference to the health and safety of persons employed in such mines. / Presented to both houses of Parliament by command of Her Majesty.

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COLLEGE OF PHYSICIANS
G. B. Parl. Report
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87/22

APPENDIX B.

TO

REPORT OF THE COMMISSIONERS

APPOINTED TO INQUIRE INTO THE

CONDITION OF ALL MINES IN GREAT BRITAIN

TO WHICH THE PROVISIONS OF THE ACT 23 & 24 VICT. CAP. 151.
DO NOT APPLY,

WITH REFERENCE TO THE

HEALTH AND SAFETY OF PERSONS EMPLOYED IN SUCH MINES.

Presented to both Houses of Parliament by Command of Her Majesty.

COLLEGE OF PHYSICIANS

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FOR HER MAJESTY'S STATIONERY OFFICE.

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APPENDIX B.

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I.

MEDICAL REPORT

By Thomas B. Peacock, M.D., F.R.C.P., Physician to St. Thomas's Hospital, and to the Hospital for Diseases of the Chest, Victoria Park, on the Condition of Miners in West Cornwall.

The following report is the result of observations made during two weeks spent in the mining districts of West Cornwall in July and August 1862. I then visited the Par Consols mine near St. Austell, the Delcoath and United mines in the Camborne and Gwennap districts, the Wendron Consols in the neighbourhood of Helston, the St. Ives Consols near the town of St. Ives, and Botallack, Levant, and Wheal Owles in the district of St. Just. At the same time I took notes of 83 cases of different forms of disease met with in miners in the districts named and in the neighbourhood of Liskeard, and examined upwards of 500 men who were found at work in different mines, or who had formerly been employed as miners.

General Condition of the Miners.

In examining, even casually, a large number of miners, it is impossible not to be struck with the peculiarly delicate appearance of many of them, and especially of the older men and of the boys and young men who have worked under ground only for a short time. Instead of having the bright and clear complexions of the young people employed at the surface, those who labour in the mines have a very pale sallow appearance, and this they seem to acquire even after having worked underground only for a few months. The middle aged men are less unhealthy looking, but those who have long worked in the mines and are verging towards old age have a prematurely old apparance, a stooping gait, and an anxious expression of countenance. They are thin, pale, and sallow, and have peculiarly dingy complexions. For men following a laborious occupation they are by no means muscular, and very generally their pulse at the wrist is feeble. If inquiry be made of them they frequently acknowledge that they are not in good health, complaining of dyspeptic symptoms, want of appetite, qualmishness, sense of weight or flatulency after taking food, sometimes pain at the pit of the stomach, and occasional vomiting of the food, and an uncertain condition of the bowels, either confinement or diarrhœa. Very frequently also they suffer from pains in the back and limbs and failure of muscular power; or from breathlessness, especially on any active exertion, tightness at the chest, chronic cough and expectoration, and palpitation of the heart.

Many of the young and middle-aged men are healthy and robust-looking. Some also are seen, even at advanced periods of life, who state that they have been miners all their lives and are still going under-ground or have only recently ceased to work below, who nevertheless are hale and strong and free from appearances or symptoms of disease. Comparatively few men are, however, found at work who have much passed the middle period of life, and still fewer who under such circumstances appear and report themselves to be in good health.

The facts upon which these statements are made are confirmed by the reports given in the appendix. It will be there seen that in various mines I carefully examined and took notes of the condition of 464 men and boys who were found at work. Of this number 117 were of ages from 9 to 20, and of these 42 appeared and stated themselves to be quite well, 38 were pale or had a worn appearance, 37 were either decidedly delicate looking or complained of some symptoms of indisposition, the proportion of the latter being therefore 31·6 per cent.; 233 of the men were from 20 to 40 years of age, and of this number the proportion of healthy men was larger; the number of the healthy being 112, of the pale and worn 59, and of the decidedly ailing and delicate 62, or only 26·6 per cent.; 114 were between 40 and 63, and of these the healthy were 43, the ailing 62, the latter constituting 54·3 per cent. Altogether of the 464 men examined 197 were healthy, 106 pale or aged looking, and 161 presented symptoms or appearances of impaired health, the ailing thus constituting not less than 34·6 per cent. It will also be seen that of the men who were labouring under different forms of disease 49 were regarded as permanently incapacitated from working again as miners and many of them from performing any active labour, and of these persons the average age was 43, the youngest being 21, the oldest 66 years old. The period during which these men

had worked under-ground varied considerably. The mean period of work before the commencement of their attacks of illness was 28·5 years; one man had however only been able to work for five years, another had been a miner for 53. These facts show a decline of strength and a failure of health at periods of life much earlier than those at which men engaged in out of door occupations at the surface ordinarily become invalided. It would have been satisfactory to have instituted similar investigations as to the state of a considerable number of men employed in similar occupations at the surface in the same districts. This the time at my disposal did not afford me the opportunity of doing. From, however, the limited enquiries and observations which were made I do not hesitate to assert that the condition of the mining population is much less satisfactory in a sanitary point of view than that of men employed in laborious occupations out of doors, as masons, stone-cutters, farm labourers, fishermen, &c., that their capacity for severe labour is exhausted at an earlier period of life, and that their health also fails at an earlier age.

The forms of indisposition which were met with among the miners were the following:—

Diseases of the Miners.

1. *General Debility, Indigestion, Rheumatism, &c.*—I have already alluded to the delicate state of many of the miners and to the frequency with which they complained of dyspeptic symptoms and of rheumatic pains. Generally, however, these affections are not so severe as to prevent their working, but the men are constantly ailing, and on the occurrence of some slight exciting cause, a trivial accident or an ordinary cold, have attacks of severe illness and are laid by for a long time before they are capable of resuming their work underground.

In some cases also the dyspeptic symptoms are very severe. The miner has little appetite; the food which he takes causes flatulency, pain or sickness and vomiting. His bowels are in an uncertain state, often obstinately confined, in other cases relaxed, or passing from one condition to the other. Symptoms of hepatic disorder are not uncommon. Several of the men stated that their illnesses of different kinds commenced with attacks of jaundice, and the ailing men have very frequently a more or less deep bilious tinge of the eyes and surface generally. They suffer also from piles and pass blood by stool, sometimes to such an extent as materially to reduce their strength.

In three cases the dyspeptic symptoms were so severe as to have unfitted the men for work, and in two of the cases there could be no doubt that there was serious organic disease of the stomach and other viscera. These patients were aged 52, 61, and 67; they had worked underground for 36, 50, and 51 years respectively, and had been laid by for 7 months but previously ailing 2 years, for a year and a half but far from well for 6 or 7 years, and for 4 months.

Rheumatic affections of different kinds are, as would naturally be supposed, extremely common among the miners. Generally they take the form of subacute rheumatism or of chronic pains affecting the trunk or limbs, especially the back and loins,—lumbago, or the hips,—sciatica. In few of the cases of disease among the men were some symptoms of this kind absent. In the cases of chest affection pains in the sides, apparently intercostal rheumatism, were common, and occasionally excessive tenderness of the surface was found. Several of the men said that they had formerly had attacks of rheumatic fever, and I met with one case in which mitral valvular disease had supervened on such an attack, and a second in which there had been symptoms possibly of slight rheumatism at the time the cardiac affection commenced.

In one instance a man had paraplegia caused by working with his legs in cold water; a second patient, who also suffered from miners' asthma with mitral valvular disease, had been subject to rheumatism for many years, and after a slight twist of the leg felt something give way in the knee and had not been able to work since. He apparently had a false cartilage in the joint, which on his using any exertion produced irritation. He had worked several years under ground as a miner but had latterly been employed in the "sump shaft." Another man, 45 years of age, who had worked in damp and draughty shafts, was entirely incapable of working from chronic rheumatism.

2. *Slow Fever.*—The miners frequently state that they have suffered from what they call "slow fever." This term they evidently apply to at least two distinct forms of affection. One of these is the ordinary typhoid or continued fever, well known to be generally due to the decomposition of animal matter and consequently to be met with in imperfectly drained houses and districts. This affection I saw both in Camborne and St. Just, and at the latter place found that it had prevailed extensively and fatally. Nor was this surprising when the state of the cottages was considered, for they displayed in many cases all the circumstances which are well known to be conducive to the development and spread of the disease. The other form of affection is one which is clearly due to the occupation of the miner, and of this I met with two very characteristic cases, and the symptoms were frequently described to me by other persons who had suffered from the affection.

The disease usually appears to commence gradually after the miner has been working under ground for some years. It generally occurs after he has been employed in a close end where there has been very imperfect ventilation or great heat, or when he has been working at tribute for some time at a scarcely remunerative rate, so that he has not been able to obtain an adequate amount of wholesome and nutritious food. The patient's appetite first fails, often he experiences an entire repugnance to food and the little which he takes does not agree with him, giving rise to sense of distension, weight or pain, or being followed by retching and vomiting. There are frequently colicky pains in the abdomen; the bowels are confined, and the patient not unfrequently has piles, passes blood by stool, and has pain or tenderness in the region of the liver. He usually also suffers from headache, dizziness, and depression of spirits, rapidly loses flesh, and soon becomes so prostrated as not to be capable of continuing his work. The failure of power is sometimes first experienced in the arms in striking; more frequently, however, there is weakness in the loins and lower extremities, especially experienced in ascending the ladders; and usually there are pains in all parts of the body and particularly in the back and limbs. With these symptoms there is generally some shortness or difficulty of breathing, but rather from weakness than any active affection of the chest. Marked feverish symptoms are also experienced, burning heat in the palms of the hands and soles of the feet, aggravated towards the after part of the day; with extreme restlessness at night, so that the patient obtains no sleep and rises in the morning less refreshed and more prostrated than when he went to bed at night. In one of the cases which I saw there was a peculiar desponding or depressed expression of countenance, and the face was sallow and pale but very unlike the sallow paleness of a person suffering under malarious influence. The sufferer had a peculiar glassy eye, the tongue was thickly furred and the breath offensive; there was some tenderness in the region of the liver and the bowels very much confined. There was no impairment of the resonance on percussion in any part of the chest, but the chest did not move freely and fully with the inspiratory and expiratory acts and the respiratory sounds were very feebly heard. The heart's sounds and action and the pulse at the wrist were also feeble.

This form of affection seems to be very aptly termed "slow," it prostrates the patient, and renders him altogether unfit for work, without being at any time actively ill. He is rather out of condition than ill, and is proportionately long before he recovers his health and vigour. The men state that when they feel themselves a little better they frequently try to resume their work underground, but a few days, or even a few hours, often again prostrates them and compels them to relinquish the attempt. One of the patients to whom I have referred was a man 37 years of age, who had worked as a miner for about 20 years without suffering from his occupation till the occurrence of the attack. When I saw him he had been laid by for 7 months, and though he had two or three times attempted to resume work, he had soon been compelled to give up again. The other patient was a man 38 years of age, who had worked underground for about 25 years. He when seen had been incapable of work for five weeks.

The result of this affection varies. I met with instances in which the men said they had suffered from "slow fever" for several months, 15 or 20 years before, and had entirely recovered from it, and been able to work steadily ever since. In other cases, however, it is only the commencement of a state of indisposition which is never entirely overcome, and ultimately determines one or other of the forms of disease to be hereafter described.

3. *Affections of the respiratory organs.*—By far the most common forms of disease met with among the miners are affections of the respiratory organs, asthma, bronchitis or pneumonia or the two combined, and phthisis or tubercular consumption. Indeed, of 83 cases of disease tabulated in the Appendix, 54 or 65·06 per cent. were of this description.

Miners' Asthma.—The broncho-pneumonic and asthmatic affections are so common as to have received from the miners, and indeed in the district generally, the names of miners' asthma, disease or consumption, and of the 54 cases of disease of the respiratory organs 41 may be regarded as of this description.

The disease is described as varying considerably in its

mode of commencement. In some cases it supervenes after the occurrence of cold or a state of prolonged but slight indisposition, as dyspepsia or rheumatism. In others it occurs suddenly with a severe attack of inflammation of the chest, occasioned by cold taken in the mine or at the surface. When the disease originates in the former mode, it appears to have a special tendency to run into chronic asthma, with increasing difficulty of breathing and impairment of general power. In the latter mode it more frequently is attended by active febrile disturbance and terminates in consolidation of some portion of the lungs, from which the patient never entirely recovers, but is left continually suffering more or less from cough and expectoration, with increasing debility. In the former class of cases, or as I should regard it, in uncomplicated miner's asthma, the physical signs are often very slight in the earlier stages and afford little explanation of the difficulty of breathing, prostration of strength and palpitation, under which the patient labours. On carefully examining all parts of the chest, the only morbid conditions detectable are often the want of full and free expansion, general feebleness of the respiratory sounds, and extreme weakness of the sounds and action of the heart and pulse at the wrist.

In the advanced stages, however, the symptoms of asthma and the signs of emphysema become very marked. The difficulty of breathing is extreme, and is aggravated by any slight exertion, as by ascending stairs or a slight elevation, and it is usually much increased by certain states of atmosphere and when the patient takes cold. Notwithstanding the great effort which is made in breathing the movements of the chest are most imperfect, there is little change of capacity with the inspiratory and expiratory acts, and the respiration is almost entirely abdominal. The patient speaks slowly and interruptedly, and often is not able to count aloud to10 or 12 without drawing a fresh breath. The shoulders are raised, the supra-clavicular spaces much depressed, and the chest covered by large and distended veins. The chest is full and rounded. The resonance on percussion is abnormally clear, and the inspiratory sound is scarcely audible and the expiratory prolonged; or the respiratory sounds, if there be more or less bronchitis, are masked by sibilant and sonorous rhonchi.

The dulness on percussion in the region of the heart is altogether absent or considerably diminished in extent; and the heart's sounds are very inaudible, and the pulsation feeble and visible over a large space in the left side of the epigastrium. The pulse at the wrist is also uniformly weak and often slow.

In the other or complicated form of the disease there are usually evidences of consolidation in some part of the chest, at the upper clavicular, dorsal or lateral regions; indicated by the usual signs, deficiency of resonance on percussion and of the respiratory movements and unduly loud cough and vocal resonance and tubular breathing. Sometimes the whole chest is contracted being narrow across, the supra clavicular spaces are depressed, and the liver and stomach advance to a high level from below. In this condition the resonance on percussion may be only slightly if at all impaired, but the movements of the chest are very imperfect, the vocal thrill is usually exaggerated, and the respiratory sounds are harsh. Large veins are also generally seen upon the surface of the chest.

In both forms of the disease the patients' strength becomes very much reduced, their complexion is very sallow, and they suffer from shortness and difficulty of breathing, much aggravated upon taking any active exercise or when suffering from cold. They have usually a hard cough, often with a husky or hoarse voice, and they expectorate a considerable quantity of secretion, which is generally described as of a deep brown colour. Their appetite is impaired, their food does not agree well with them and their bowels are confined. They often experience palpitation, and the sounds and action of the heart and the pulse at the wrist are very feeble.

The form of the disease in which there is local consolidation in some portion of the lungs, bears a close general resemblance to true consumption, and especially where, as often happens, the voice is husky and the patient expectorates blood. There are, however, features by which it is sufficiently distinguished from that disease. It usually occurs in persons who do not present any hereditary predisposition to phthisis—their parents and other relatives having often attained advanced ages and being quite healthy. It commences at a later period of life than phthisis, indeed in persons who have reached ages at which consumption is by no means of frequent occurrence. It is also much slower and less active in its progress, so that in persons who have been ill for several years the signs often do not indicate extensive or advanced disease. The quickness of pulse, the rapid and extreme emaciation, and the night perspirations so characteristic of true phthisis, are also generally absent or only slightly marked, and there is rarely diarrhœa, indeed the bowels are often obstinately confined.

The course and result of the two forms of miners' disease differ. When the affection takes the asthmatic form, though the patient continues always a great sufferer and unfit for any active occupation, life may be prolonged for many years. I met with instances in which the men stated that they had been in this state for several years, 7, 11 or 12, 20, and 25 or 26 years. Indeed this condition seems to be a kind of imperfect natural cure. Patients several times mentioned that many years before they had been very seriously ill so as to be compelled to give up work, and were stated by medical men to be running into rapid consumption. After having, however, completely laid by for some months, or a year or two, they rallied, and while suffering from symptoms of asthma, recovered a certain amount of vigour, and had continued much in the same state since.

In the form of disease in which portions of the lung become consolidated, the disease seems generally to progress, though slowly, and ultimately to determine some form of disorganization of the lungs. The signs of cavities develop themselves, indicating either considerable dilatation of the bronchial tubes or the occurrence of ulceration in the lung tissues, and the patient's power more rapidly breaks down, so that the affection usually terminates fatally at the most in 7 or 8 years.

The precise nature of these several forms of affection can only be ascertained by a series of post-mortem examinations, and I have had the opportunity of examining after death but one case of miners' disease. In that instance the affection seemed to have originated in bronchitis and pneumonia, leading to collapse or consolidation of the lung, and no tubercle was found in any part of the body. The patient was a man 55 years of age, who had been a miner since he was 13 or 14 years old; he had been laid by ill for three years, though ailing for a greater length of time.

The left lung was found slightly attached to the parietes by old cellular adhesions. It was voluminous, somewhat emphysematous at the edges, of a deep blue or black colour, and sparingly crepitant. The bronchial tubes contained much secretion of a dark brown colour. The right lung was universally attached to the parietes by strong fibro-cartilaginous adhesions. One of the ribs was carious, and an abscess had formed in the situation, containing thick yellow pus, which involved the pleura but not the lung itself. The substance of the lung was of the same colour as the left, and entirely solid [except towards the upper part, where there were several irregularly shaped cavities, which, together with the bronchial tubes, contained a similar brown material to that found in the tubes of the left lung.

The bronchial glands were also very large, hard, and of a black colour. In the bronchus of the right lung, the terminal portion of that of the left, and the commencement of the trachea, the mucous membrane was deeply reddened and studded with small yellowish coloured deposits of lymph. The trachea and larynx were large, but the mucous membrane on the epiglottis and cordæ vocales, though thickened, was free from ulceration.

It will be seen from the tables in the appendix that this form of disease occurred, generally speaking, in persons of midddle age; of 39 patients examined, the mean age at the time was 47 years, and the extremes of age 25 and 63. The average duration of the disease was then four years, but there was a great variety in the cases in this respect, the periods having ranged from 1 year to 25 or 26. The ages at which the patients stated that they had first worked underground ranged from 7, 8, and 9, to 20 and 27 years, and their period of work prior to the occurrence of disease was, on an average of 36 cases, 27 years. From this calculation, however, three cases in which the patient had only worked one year, five years, and eight years, are excluded; and without these cases the periods of work ranged from 11 to 51 years.

Consumption.—Next in point of frequency among the diseases of the miners was tubercular consumption. Of this affection I met with 12 cases in which the disease was advanced, and three others in which it was only commencing. In five cases also classed under the head of miners' asthma, there were detected evidences of consolidation at the upper part of one or both lungs, which might have been tuberculous, but probably was the result of inflammatory action in impaired constitutions. As is usually the case, the instances of consumption which fell under my notice occurred most generally in persons who displayed some hereditary predisposition to the disease, other members of the same family and often persons who had not worked underground, having died of consumption.

The cases of consumption in miners did not differ from the disease as ordinarily seen, except that in some instances the affection occurred at ages at which, under favourable cir-

cumstances, the liability is comparatively small; the disease also was sometimes unusually prolonged. In other respects all the common characters of phthsis were observed—the quickness of pulse, the night perspirations, the tendency to diarrhœa, and the physical signs were those which are commonly detected. In one case the disease displayed a somewhat unusual complication, albuminuria and dropsy. The cases tabulated in the appendix illustrate the remarks here made. The mean age of the 12 patients was 35 years, and the ages ranged from 21 to 52. The duration of the disease averaged 9 to 10 months at the time the patients were examined, the extreme duration being four months and seven or eight years. The ages at which the patients had begun to work underground ranged from 9 or 10 to 21, and of 11 cases the period of work prior to the commencement of the symptoms was 20 years. The extreme periods of work were 14 and 41 years, exclusive of one case in which a person, always very delicate, had only worked five years.

There can be no doubt that the work in which the miners are engaged peculiarly predisposes them to suffer from affections of the chest; but the special form which these affections assume would appear to depend to a considerable extent upon the original constitutional power of the men, and especially upon the existence or absence of any hereditary predisposition to phthisis. When the miner is of healthy constitution, he resists to a much later period the unfavourable influences to which he is subjected, and the diseases which ultimately occur are asthma connected with gradual failure of the power of the heart and lungs, with or without chronic bronchitis; or inflammatory consolidation of some portion of the lungs, which may ultimately terminate in disorganization and ulceration of the tissue. When on the contrary the patient is originally of feeble constitutional power, and especially if predisposed to phthisis, he becomes an invalid at an earlier period, and suffers from true tubercular phthisis. In some cases, however, where the predisposition is only slight, the patient escapes the disease during the period of life in which the tendency is usually manifested, and only sinks under it when under more favourable circumstances he would probably have escaped it altogether.

A case of mesenteric disease, an affection also of tuberculous nature, in a boy 17 years of age, who had gone to work underground at 14 and had worked about a year and a half before his health failed, is also included among the cases examined.

4. *Diseases of the heart, &c.*—From the violent muscular exertion undergone by the miners, both when working underground and in ascending the ladders, I expected frequently to meet with affections of the heart among them, and such proved to be the case. The forms of disease which were observed were not, however, with one or two exceptions, such as are generally occasioned by any violent muscular exertion, as rupture or injury of the aortic valves. The prevalent form of cardiac defects appears indeed rather to be mitral valvular disease, resulting probably from dilatation of the left ventricle and consequent ill adjustment of the valves, so as to render them incompetent to close the orifice.

In four cases patients complained of palpitation of the heart, increased on exertion and incapacitating them from following their employment. In two of these the symptoms were first experienced after severe sprains, and some injury had probably been sustained by the heart, though no signs of valvular or other defect could be detected. In one of the two other cases the heart was apparently dilated, and in the fourth there were marked dyspeptic symptoms.

In four cases there were the usual symptoms and signs of more or less aggravated mitral valvular disease. In one of them the affection had supervened on acute rheumatism; in another the patient had had some pain, redness and swelling of the hands at the time the heart first became affected, which might have been rheumatic. The other cases had no connexion with rheumatism. The ages of the men who were thus affected were 21, 31, 36, and 36; they had first commenced working underground when 13, 15, 16, and 17 years of age respectively, and when examined they had been incapacitated from work for two and a half to three years, seven months, ten or eleven years, and four years.

In addition to these cases, there were others classed under the head of miners' asthma, in which palpitation was a predominant symptom, the heart was dilated, and the action of the mitral valves probably defective. Indeed it will be remembered that in that form of affection, shortness of breath and palpitation were common symptoms, even at an early period, and often existed to an extent altogether disproportionate to any signs of pulmonary disease which could be detected. They were therefore probably connected with some failure of muscular power and dilatation of the cavities of the heart. In the later or more advanced stages of miners' asthma there could be no doubt of the existence of dilatation of the right side of the heart, and the affection probably involved the left side also. The pulsation was generally visible over a large space in the præcordia and to the right of the left false ribs in the epigastrium; the impulse of the heart was feeble, the sounds indistinct, and the pulse at the wrist also weak.

In the only case of miners' disease which I had the opportunity of examining after death, the heart was found somewhat large, and weighed probably about 10½ oz. avoir. The cavities were dilated, but the walls not increased in thickness. The attached pericardium was loose and œdematous, and the muscular substance of the heart pale and flabby. The valves were healthy, but the aorta and pulmonary artery were both considerably dilated, though not otherwise diseased.

A case of aortic valvular disease was met with in a miner 51 years of age, who laboured also under hemiplegia. He stated that he had commenced to go underground at the age of 15, and had always worked in good air, having been employed as a "coacher," or in pushing the trucks along the tramways from the places where the men were getting the ore or driving levels to the shafts. The work was severe and he had been much exposed to cold draughts, but had never had any rheumatic symptoms. The date of the first occurrence of the cardiac symptoms could not be ascertained, but the first attack of paralysis had occurred five years before I saw him.

Another man, 44 years of age, laboured under symptoms of angina pectoris. He had first worked in a mine when 14 years old, and had chiefly been employed in damp shafts, repairing them when "forking out," or being pumped out to be re-worked after having been abandoned. He complained of suffering severe pain at the sternum and in the region of the heart, extending through to the left shoulder blade and down both upper arms especially the left. He was first attacked when walking to the mine one morning; and the pain had since continued to recur, especially on exertion, with such severity that he had been quite incapable of undertaking any employment whatever. It was accompanied by breathlessness, but was unattended by any sense of faintness or insensibility. It usually subsided in a few minutes if he immediately stood still when it came on; and under the rigid observance of rest and freedom from excitement had become less severe and of less frequent occurrence. On careful examination no signs of disease of the heart or aorta could be detected.

5. *Affections of the nervous system and organs of special sense.*—I have already mentioned that in the case of aortic valvular disease the patient had hemiplegia. He had had two attacks of paralysis; of which the first occurred five years before he was seen, since which time he had been unable to work. In the other case the patient had commencing miners' asthma. He was 69 years of age, had worked as a miner from the age of 10, and had been laid by with paralysis for eight and a half years.

In three cases the patients were paraplegic. In one of them a man 50 years of age, who had first worked in a mine at 17 or 18, had been laid by for one year and seven months with loss of power over the lower extremities, which came on after he had been working in cold water. In the second case the patient was 49 years of age; he had first gone underground at the age of 18, and had been paraplegic for six years. In this instance the power of speech was affected and the paralysis was becoming general. In the third case the paraplegia was less complete. It occurred in a man 44 years of age, and was ascribed to a fall in the mine from a height of 24 feet which had occurred seven months before.

I met also with a case of very marked paralysis agitans in a man 52 years of age, who had begun to work as a miner when nine years old, and laboured under very severe miners' asthma. He had been ill and unable to work for seven or eight years.

In addition, however, to these more serious affections, symptoms of nervous disorder are very often complained of by the miners. Deafness is extremely common, and frequently exists to a marked degree in men who have worked several years underground, and this too when they have never sustained any injury from blasts or other accident to which the condition could be assigned.

In the cases of slow fever, miners' asthma, and indeed in almost all the forms of affection to which the miners' are liable, the men very generally complain of suffering from headache, giddiness, noises in the ears, depression of spirits, &c., and these symptoms often exist to a very distressing extent.

6. *Dropsical affections.*—In one of the most marked cases of miners' asthma which was seen, the patient stated that when his asthmatic symptoms were more severe, as during winter or when he took additional cold, his feet and ankles became swollen. He was 49 years of age; had first begun to work as a miner when 14, and had been incapable of

going underground for 20 years, and quite unable to work for 7. In a case of mitral valvular disease in a miner 21 years of age, previously referred to, the lower extremities were œdematous. In three other instances there were also dropsical symptoms, doubtless due to cardiac and pulmonary obstructions. In two cases there was anasarca connected with renal disease. In one of them, a man 21 years of age, hereditarily predisposed to phthisis, laboured under advanced consumption with dropsy and albuminous urine. He had only worked underground for two years and a half. In the other case the man was 29 years of age, had worked as a miner since the age of 15 or 16, and had been in America, where he had drank much and contracted syphilis. In addition to these cases, a man 57 years of age, who was still working underground, stated that three years before he had suffered from a general swelling of all parts of the body. The affection came on after exposure to cold and damp, and was attended by pain in the loins and scanty and bloody urine, and was doubtless renal dropsy. He was laid by in consequence for three months and still suffered from weakness in the loins, though the anasarca had entirely disappeared.

In the fatal case of miners' disease the kidneys were found large and somewhat mottled and the cortical portion narrow, but the tunica propria separated readily and the organs did not appear to have undergone any organic change.

The miners might certainly be expected to suffer from renal affections subject as they are to be exposed to cold and damp, after they have been working hard in hot places and perspiring profusely, and they must be especially susceptible when exhausted by working in close places.

The dingy complexion of the men who have long worked underground, and especially of those who suffer from miners' asthma, is very striking, and though occasionally partly due to affection of the liver, is, in many cases altogether disproportionate to any bilious tinging of the conjunctivæ which may exist. Indeed some of the men who present the sallowness in the most marked degree have peculiarly pale and glassy eyes. I was therefore led to suspect that the sallowness might have some connection with the condition of the supra-renal capsules, and the state of those bodies was carefully investigated in the case of miners' disease which was examined after death. One of the capsules was found extremely atrophied, so that it seemed little more than a mass of condensed cellular tissue. The structure of the other was wholly destroyed, and its substance was converted into a cyst with extremely thin parietes. It remains to be ascertained whether the existence of the disorganization of the supra-renal bodies in this case was merely an accidental coincidence, or whether a similar condition is of frequent occurrence in the miners who present the peculiar dinginess of complexion which has been described.

7. *Diseases of the skin, scrofula, &c.*—The only important skin affections which were noticed were two cases of lepra or psoriasis. The subject of one of these was a man 38 years of age; the other was a boy of about 14. Neither presented any peculiar features. Some of the children had also impetiginous eruptions about the face.

Though both among the men and boys enlargement of the cervical glands and the cicatrices of abscesses were occasionally observed, such were not of by any means of frequent occurrence, and in most cases the affection was stated to have commenced before the subjects went to work underground. Several of the men were much marked with smallpox.

8. The two remaining cases included in the tabular statement of the diseases of the miners were the *results of injuries* which had in each instance been sustained three years before the men were seen. In one case the man was crushed by a fall of stone, and had suffered from shortness of breath and palpitation ever since. In the other intance the man had had his leg broken, and had otherwise been much bruised and shaken. Neither of them had been able to do any work since the occurrence of the accidents.

In several cases the men were found to have sustained more or less serious injuries of the eyes and face in blasting, and several were nearly or quite blind of one eye from this cause.

A large number of the men examined also stated that they had sustained more or less serious injuries and accidents, falls from the ladders, crushes, &c. In some instances also it appeared that accidents of comparatively slight description had, doubtless from the state of health of the miners at the time, been attended with serious symptoms that entailed very prolonged periods of absence from work.

After the evidence which has been advanced as to the sanitary state of the mining population and the enumeration of the various forms of disease met with among the miners, it remains to inquire what are the causes which conduce to their unhealthy condition.

Causes of Disease among the Miners.

Predisposing causes.—Construction of dwellings, drainage, &c.—There can be no doubt that the county of Cornwall is eminently healthy, and there is nothing about the meteorological or geological features of the mining districts which can act unfavourably upon the sanitary condition of the mining population.

In the Camborne and Redruth districts the modern cottages are generally well and substantially built, and are very much better than those inhabited by the agricultural labourers in the midland counties. They contain generally 2 or 3 or 4 or 6 rooms; in the former case being only occupied by one, in the latter by two families. They have usually a small plot of ground in front or behind in which vegetables, potatoes, are cultivated. They are stated, however, not to be generally provided with any system of under-drainage, and the lower rooms have rough cast or concrete floors, so that they must be damp. The upper rooms are also not usually ceiled but open directly to the slated roof, and must be hot in summer and cold in winter. With these exceptions, however, and the want of a larger number of rooms for the separation of the different members of the families, the cottages inhabited by the better class of workmen are exceedingly good. Some of the cottages are, however, the reverse. They are thatched, and consist of only two rooms, the upper one in the slanting roof; and they are not provided with any system of under-drainage and many of them have no privies. This was the case with the house in which Mr. Bankart and myself performed the post mortem examination on John Francis, and in several of those adjoining; and I was informed that many others in Redruth are similarly circumstanced. In Camborne I was taken to a row of thatched cottages, each consisting of only two dark and low rooms, and all of which had no privies and no system of drainage whatever, the inmates throwing everything either into a small back yard or on a common dust heap in the street.

There can be no doubt that this state of things must exercise a very deleterious influence over the whole population. I learn from the resident medical men, that typhoid fever, the unmistakable indication of defective drainage, prevails not unfrequently in the district. Were it not for the general healthiness of the climate and locality, the free exposure from the absence of any high hills to the winds blowing from every quarter, the great facilities for natural drainage afforded by the rocky character of the surface, and the great fall of rain, typhoid fever would certainly prevail extensively.

In other parts of the mining districts, I found the condition of the cottages most defective. At Wendron, they consisted of low buildings with thatched roofs containing 2 rooms. In one which I visited, there were three beds in a small room up stairs, without any window which admitted of being opened. In this room there was a father who was ill and a wife with a little baby in one bed, a married daughter and a baby in the second bed, and the rest of the family consisted of the son-in-law, a daughter about 16, and two sons of 14 and 12. In none of these cottages was there any drainage or privies. The cottages in the St. Just district were also generally most defective. They were small, low, and thatched; contained only two rooms for large families, and the little windows which were provided in the sleeping rooms would rarely open. The floors were of concrete, and there was no underdrainage and rarely any privy, the whole refuse being thrown out on a dust heap in front of the door or into a pool of dirty green water, through which it was necessary often to pick the way to reach the door. This district is elevated and perfectly open to the sea and should be most healthy; but from neglect of all attention to sanitary regulations, at the time of my visit in August, it was suffering from typhoid fever, and I was informed by Mr. Searle, who obligingly took me to several of the cottages, that the disease had been prevailing extensively and fatally for several months.

The defective construction and drainage of the cottages cannot, however, afford any explanation of the condition of the miners, for they are less exposed to such injurious influences than the other members of their families.

The *diet and habits* of the miners have been blamed as causes of their unhealthy state. They usually live upon bread and butter and a kind of pie, the pasty, which they take down with them into the mines. This consists of a paste of flour and water and suet, with a small quantity of meat—fresh meat or pork, and potatoes and other vegetables. It is both an innutritious and indigestible article of food, and may in some degree explain the frequency with which the miners suffer from dyspeptic symptoms, and be connected with the occurrence of the skin affections, lepra or psoriasis, of which diseases cases were met with. There is great reason to believe

that the men, for persons who are engaged in a laborious and exhausting occupation, do not get a sufficiency of nutritious food, more particularly fresh butcher's meat. The miners are, as has been before said, very thin, sallow, and ill nourished, and for men engaged in athletic pursuits are not generally very muscular; and, though their condition may be in part ascribed to the profuse perspiration when they are working in the mines, the deficiency in the quantity of nutritious food is probably influential in its production. It was not easy to ascertain the precise quantity of butcher's meat which enters into the diet of the men, but I met with no one who stated that he got more than half a pound of uncooked meat in a day, and they assert that they only obtain this amount of fresh meat very occasionally. The irregularity with which they get their meals was assigned by one man as a cause of the indisposition under which he laboured.

I have been informed that the men indulge too largely in beer; and this may possibly be the case on the pay days; for the practice of paying in notes, adopted in some instances, almost necessarily drives the men to the public house to get the notes cashed. I however made frequent inquiries of the men working in different districts and of the overseers, and, if not entirely misinformed, conclude that the Cornish miners are not an intemperate race of men, at least when compared with the working population of London and other large towns. I was assured that they rarely drink spirits. I cannot think that their habits in this respect can be blamed as the cause of their unfavourable sanitary condition. The men are also said to be much addicted to smoking, and they excuse this habit with the assertion that it is necessary to smoke in the mine to avoid the injurious effect of the air and of the smoke of the blasting powder. The practice is certainly very objectionable. Other causes which may be blamed for the state of the miners are the absence of fresh air and sun light, the breathing of a deleterious atmosphere, the inhalation of gritty particles, the heat of some of the workings, the violent muscular exertion, and the exposure to sudden chills after working in the mine or on coming to the surface.

Absence of Sunlight, &c.—At all seasons of the year some of the men must be very little exposed to sun light and fresh air. Working as they do in spells of 8 hours, they must even in summer be much in the dark, and in winter can scarcely have any sunlight at all. This will go far to explain the peculiar blanched appearance, the glassy eyes, and pale lips which are constant among the miners, and even in the men who regard themselves as in robust health. This is the more striking from the peculiarly fresh complexions and the healthy appearance of the other portions of the population of the same district. By the politeness of the Rev. Mr. Ellis, I visited, in conjunction with Mr. Temple, the National Schools at Pool, which are attended by a large proportion of miners' children. On the day of our visit, Monday, the attendance was smaller than usual, but in the female school we found 46 infants and 82 girls, and in the boys' school 140 boys; and I have certainly never seen a more healthy set of children collected together. I did not, on close inspection, detect a child with swelled glands or other signs of scrofula, and was informed on inquiry that such were very rare. The older children also, both boys and girls, who are seen working at the surface in dressing the ores, are usually very healthy looking; and the young women who are employed in breaking the ore and picking it before it is crushed and dressed, have remarkably clear, bright, healthy complexions. The married women who are seen in the cottages are also very healthy looking. No contrast can indeed be more striking than that which is presented by the children employed at the surface and those who work in the mines; and the men often have the appearance of being thoroughly worn out and decrepit when their wives, at about the same age, are healthy and young looking.

Deleterious influence of the air of the Mines.—There can be no doubt that the air of the mines, especially in the deeper workings, and at considerable distances from the shafts, becomes extremely impure from the very imperfect ventilation, the deteriorating influence of the respiration of the men at work, and the combustion of the candles which they burn. This cause seems indeed to be by far the most important in determining the unhealthy condition of the miners. The ventilation generally becomes more difficult and defective with the increasing depth of the mines, and the state of the miners is therefore usually found most unsatisfactory in the districts where the mines have attained the greatest depth. The ventilation is, however, most seriously interfered with by the distance of the levels from a shaft, and several of the men complained much of the character of the air which they had breathed in workings which were very near the surface.

Of 45 cases in which the men who were examined assigned specific causes for the failure of their health, in no less than 26 they traced their indisposition to having worked in places where the air was "dead," "bad," "thin," "light," or "poor," as they variously described it, alone or in conjunction with other causes. The miners, however, do not usually speak of the breathing of bad air as directly occasioning the illnesses under which they labour. On the contrary they regard this, and doubtless correctly, as impairing their power and giving rise to a state of general weakness in which they become susceptible to any other morbific influences, and often suffer severely and for a long period from indisposition occasioned by some very trivial exciting cause.

Most persons with whom I conversed on the subject, the miners themselves, the underground captains, and indeed almost every one who had ever worked underground, admitted the frequency with which the air of the mines was impure. I was often told that "all men who went underground had to breathe bad air more or less," and the tables in the appendix afford ample confirmation of the correctness of this assertion. Of 54 out of the 63 fully reported cases of disease amongst the miners, in which the character of the air in which the men had worked is stated, in 38 the men reported that at various times they had worked in bad air; of the remaining 16, 3 stated that the air in which they had worked had never been particularly bad, 8 that it was generally good, and 5 only said that they had always worked in good air. It is possible that had fuller inquiries been instituted the proportion of cases in which the air was defective would have proved to be much greater than this. Of 22 men whom I questioned on the subject, who were still working in mines in the neighbourhood of Liskeard, not less than 18 complained of the character of the air in which they worked.

When not at any great depth and not far removed from a shaft, there is often a very ample supply of fresh air, indeed the men not unfrequently complain of suffering from the draughts of cold air in the shafts and levels; but, when working at a close end driving a level, or getting the "stuff;" or when engaged in sinking a "winze," or cutting a "rise," or driving crosscuts so as to open up the different levels, the men state that the air is often very "dead" or "bad." In such cases they say that their candles cannot be got to burn, except when the wicks are constantly teazed out, or when they are held on one side. Sometimes they stated that the candles could not be got to burn at all, so that they required to be placed some distance behind the part at which the men were at work. In other cases the men said that even lucifers if struck would not set fire to the wood; and more than one miner told me that on going to his work in the morning at a close end, a long way from the shaft, they often could not get their candles to burn at all, and had to take off their coats and beat them about so as to create some little current of air, before the candles could be lighted.

That these statements were not overdrawn I had personal proof in Dolcoath mine, otherwise extremely well ventilated, for in one part where some men were at work sinking a "winze," at about 40 fathoms from the shaft and 190 from the adit, two candles were found burning very badly, and one actually went out while we were looking down.

The work of the kind which has been referred to is chiefly done by "tutwork," and accordingly it is the tutworkers who suffer most from mining. The following amongst others affords a striking instance of the injurious effects of the air which this class of men often have to work in. A man 33 years of age, who had first gone underground when 14 years old, stated that he had been quite well till he worked in a close end, in which the air was so bad that the candles could scarcely be got to burn; the level was 160 fathoms from surface, and the mine was also cold and very wet. Four other men were employed in the same place. All the others were repeatedly laid by; but he continued the work for three months when he became seriously ill, and, though five months had elapsed when I saw him, he had never been well since. Another of the men was also laid by ill at the same time.

The quantity of unconsumed carbonaceous material thrown off by the candles, especially when burning so imperfectly as they are reported to do, and the gases and smoke from the explosion of gunpowder, must further tend to render the air of the mines injurious. The very small movement of air is also attested by what the men very frequently complain of, the slowness with which the smoke from the blastings clears off, or as they term it the length of time which "it lies in the mine."

The excessive prostration of strength, altogether disproportionate to any evidences of actual disease which can be detected, and the affection described by the men as "slow fever" are precisely the forms of indisposition which would *à priori* be expected to be occasioned by slow poisoning from

the continued breathing of very impure air. The asthmatic symptoms also which seem to result from gradual failure of power in the lungs and heart may also be in part fairly referred to the same cause. The frequency of dyspeptic symptoms among the miners is doubtless also in some degree to be ascribed to the impure air which they breathe. Several of the men mentioned that after having been working in very close places for some time, their appetite failed and the food which they took did not agree with them and they became subject to severe pains in the stomach and bowels and sickness, with obstinate constipation or diarrhœa. In the cases of severe dyspepsia or organic disease of the stomach, the patients said that the symptoms had first commenced after they had been working in poor or bad air. Vertigo, headache and other nervous symptoms, with general failure of power, first experienced in the arms and legs in beating the borer and in ascending ladders, with palpitation and shortness of breath, were equally referred to the same cause.

The older men, however, frequently stated that the ventilation of the mines was very much better at the present time than formerly.

Inhalation of gritty particles.—If also the men inhale the smaller particles of granite and other hard and gritty earthy matters which are thrown off from the rock by their tools, such must certainly be serious sources of irritation to the delicate structure of the laryngeal and bronchial mucous membrane and to the substance of the lungs. Several of the men complained of the dryness and dustiness of the mines in which they worked, and one man said that "the dust was far worse than anything else" they had to contend with. So far, however, as I was able to judge I should doubt whether this cause generally acts very unfavourably upon the men, or at least whether it is comparable in its effects to other injurious influences. Portions of the lung of John Francis were subjected to careful chemical analysis by Dr. Bernays, and no siliceous material was detected in them. In the French millstone makers, to whose peculiar condition I have elsewhere drawn attention, there can be no doubt that the sharp particles of siliceous matter which they inhale do find their way into the lungs and become sources of serious irritation; determining, in persons of healthy constitution, broncho-pneumonic attacks which may ultimately lead to disorganization of the lungs, or in persons predisposed to consumption, true tubercular phthisis. The Cornish miners, however, probably like the gunflint makers of Meunes in France, suffer more from the impure air which they breathe than from the inhalation of particles of stone.

Dr. Bernays found that the dark material, contained in large quantity in the lung of John Francis was carbon.

High temperature of some mines.—The great heat of some of the Cornish mines, and, according to the men, especially of those in the killas or clay slate, must also injuriously affect the men who work in them; both directly by exhausting their powers, and indirectly by rendering them unduly susceptible to the influence of cold, to which they may be exposed in other parts of the mine or at the surface.

Some of the workings in the mines are so extremely hot that the men stated that they could not remain in them for many minutes together, but required to go into colder places and bathe in cold water to cool themselves. In these levels the men work with very little clothing on them; some men told me that they wore only their boots and a "dickie" or flannel shirt, others that they worked quite naked; all stated that in such places they were greatly exhausted even by very short periods of work. They especially complained of some of the mines, which were both hot, dry, and dusty. In 5 cases of disease among the miners, the heat of the mines was assigned by the men as the cause of their impaired health.

Violent muscular exertion.—The violent muscular exertion which is undergone by the men when working below, beating the borer or pushing the trucks along the tramways in the levels, or in ascending from the levels to the surface by the ladders where a man-engine or skip is not provided, must also tend much and prematurely to exhaust the powers of the workmen. The operation of beating the borer is generally performed by two men, who strike and hold alternately. Sometimes by three, or by two men and a boy, the former striking while the latter holds. The hammer which is employed is heavy and the strokes are delivered as rapidly as possible. In hot places the men can only make a few strokes in succession without stopping to rest, and under any circumstances they are soon put out of breath and are much fatigued by the work. One man who laboured under palpitation stated that he first suffered when engaged in beating the borer, and the heart had doubtless sustained some injury though no signs of valvular defect could be detected. Sometimes also the men have to work in very constrained positions, and one of them ascribed his illness to having worked in a nearly upright pitch. The work is also objectionable, as calling into action chiefly the muscles of the arms, not those of the whole body.

The men who are employed in pushing the trucks along the tramways, "tramming" or "coaching," have more general exertion, and the labour is more severe; and I have referred to a case in which the aortic valves were probably injured by violent exertion in this way. These men have, however, the advantage of working in good air, though they are much exposed to cold draughts and wet in the levels.

The labour of ascending the ladders, especially when the men have to work at great depths, 100 to 200 fathoms or more, is very severe, and occasions, even in young and active and robust men, great breathlessness, palpitation and quickness of pulse, followed by exhaustion, and especially when the men have been working their full spell in a hot place and perhaps in bad air. The captains state that the younger men are in the practice of racing up the ladders trying who can reach the surface in the shortest time, and assign the breathlessness of the men to this cause. There is, however, no doubt that when an ample amount of time is allowed for the men to come up they are very greatly exhausted by the exertion. On reaching the surface they gasp for breath, cannot speak, and have a palpitating heart and quick pulse. After a short time in robust and healthy persons these symptoms subside, and the pulse is feeble and occasionally slow. In men who are ailing and weak and verging towards old age, the exhaustion and distress occasioned by ascending the ladders by no means so readily subsides; and I met with several miners, working in mines where man-engines were provided, who stated that they would be quite incapable of going underground were they compelled to make use of the ladders.

The violent muscular exertion thus made by the miners are I believe, mainly the cause of the feebleness of the pulse at the wrist, which is so generally a noticeable peculiarity among them, and especially in the men who have attained or passed middle life. The imperfect respiration while beating the borer or ascending the ladders, causes primarily engorgement of the right side of the heart and subsequently of the left side also. This condition, at first only temporary, with the constant repetition of the same causes, comes with the progress of life to be permanent, or in other words gives rise to dilatation of the cardiac cavities. In men employed in athletic pursuits, if they live on the surface and have a sufficiency of nutritious food—as smiths, strikers, &c., the heart generally becomes hypertrophoid and the pulse at the wrist is consequently full and strong. Nothing therefore struck me more forcibly than to find in the miners so frequently the signs of dilatation of the heart—a condition the very opposite of that generally presented by persons following similar laborious occupations.

It has been already stated that the mitral valvular defect which is so common amongst the miners, results apparently from dilatation of the left ventricle; not, as is most generally the case, from disease of the valves originating in rheumatism. I met with only one case of mitral valvular disease which had supervened on acute rheumatism, though it was possible that some slight rheumatic symptoms might have accompanied the commencement of the cardiac disease in a second instance.

It has already been mentioned that only a small number of the miners ascribed the immediate occurrence of their illnesses to the direct effect of bad air, and the same remark applies to the violent muscular exertion which the men undergo; indeed both these causes rather act as predisponents to disease than directly give rise to it. The men often said that they "were worn out by hard work and going underground," and there can be no doubt that the impairment of their health is due to the operation of several causes, of which these two may be regarded as the chief. The men when thus predisposed readily suffer from severe and prolonged attacks of illness on the operation of any of the ordinary exciting causes, often when such are too slight to have seriously affected healthy persons.

I may here remark upon another cause of undue exhaustion of the men in some districts, the distances to which they have frequently to walk to and from the mine. In the Wendron district some of the men said they had to walk several miles in consequence of being incapable of obtaining cottages in the neighbourhood of the mines at which they worked.

Exciting causes.

Cold, damp, &c.—The foul air of the mines, and the violent muscular exertion which the men undergo, may immediately give rise to disease; but the cause most frequently assigned by the men as having occasioned their ailments was cold, taken either in the mine or at the surface. A large proportion of the cases of asthma, both simple and complicated, and several of the cases of consumption and other forms of disease, were stated to have commenced with symptoms of cold and after the miner had been chilled.

Some of the men ascribed their illness to the exposure to "cold damp" in the mine, others to having been chilled on resting in a cold and damp level after they had been working in a hot and close end and perspiring freely, and yet others to their having had to pass through cold water on leaving the place at which they had been working. Some blamed as the cause of their indisposition the cold draughts to which they were exposed in the shafts when wearing their wet underground clothing. Another said he had taken cold from having to wait in the shaft till the expiration of the time for leaving the mine. One traced his attack to exposure to cold and damp on reaching the surface from having to go through the rain to the changing house, another to having had to wash in cold water, and yet others to having put on the clothes in which they had walked through the rain to the mine, and which had not been properly dried.

One man ascribed the failure of his health to having gone to work in a cold mine in the granite after having long worked in a warm one in the killas; another, who suffered from symptoms of angina pectoris, referred his indisposition to having been employed in repairing the shaft of a mine which had been abandoned, and was being reworked, "forked out," and in which the cold water came down upon them and kept them constantly wet. A third, who was paraplegic, said that the symptoms had rapidly come on after he had been working with his legs in cold water, owing to the drainage of the level being obstructed by "attles" or "deads." And a fourth referred his illness to having taken cold from having been employed in repairing the neck of the shaft, when he was accustomed to working in warm levels underground.

The cold and damp to which the men are in various ways exposed, especially the continued working with the feet in cold water, explains the frequency of rheumatic affections among the miners; and it is evident that the warmth of some of the workings and the impurity of the air in others must render the men extremely susceptible to suffer from these causes.

Effects of dressing the ores and other work performed at the surface.

It does not appear that the operations performed at the surface of the mines, the breaking of the ores and dressing, &c., are injurious to the work people employed in them. Indeed, as a general rule, the men who work at the shafts and at the dressing floors, form in their appearance of health and vigour, striking contrasts to the underground miners. At all the mines men are met with who have formerly worked underground, and have given up in consequence of the failure of their health. They not unfrequently state that at the time they ceased working as miners they were thought to be going rapidly into consumption or into the miner's complaint, and that for some months or even one or two years or more, they were incapable of doing any work, that they then got better and were able to do some light work, and are now perhaps quite well or tolerably robust for their age. It thus appears that the surface work acts as a restorative upon the men who have suffered from going underground. Indeed, there is nothing which seems likely to be injurious except the process of roasting to expel the arsenic from the tin ores, and this process is not required to be followed with all the ores.

When the ores require to be exposed to heat for this purpose, it is done in a furnace communicating with long flues, in which the sublimed arsenious acid condenses, and these flues require to be emptied at intervals.

The men who are employed in removing the arsenic from the flues state that they suffer occasionally from eruptions on the skin and pains at the chest and in the stomach and spitting, and that any abrasions or cuts are apt to fester, but I did not in any case hear of more serious effects. In the furnace rooms the smell of the arsenic and the fumes are often very distinct from the feeding of the furnace being carelessly performed, but I did not learn on inquiry that injurious effects resulted to the persons engaged in the work. A man came under my notice who had been employed in preparing pure arsenious acid from the crude arsenic, and who had apparently been much exposed to suffer, but he only stated that he had experienced the symptoms which have been mentioned. One man, aged 45, who laboured under consumption, who had formerly been a miner and had for some years worked at the dressing floors, stated that he thought his illness was caused by the arsenic he had been in the habit of working in, but he did not mention any symptoms which pointed to his having really suffered from the influence of arsenic. The water in the workings of some mines is said to contain arsenic and sulphur derived from the decomposition of the arsenical pyrites which exist in the tin and copper ores; and this "mundic water," as it is termed by the miners, produces irritation and festering if applied to cuts or abrasions.

The young women who are employed in breaking the ores and tending the dressing floors, did not appear to suffer from their occupations, though some of them from about 16 to 20 were chlorotic looking. The proportion of these was, however, probably not greater than it would be among the same number of young women employed in any open air occupation, and was certainly less than in persons leading sedentary lives and residing in towns. Indeed, as a general remark, they were remarkably healthy looking and had fresh florid complexions.

The children, both boys and girls, employed at the dressing floors were generally remarkably healthy in appearance.

Suggestions.

It is scarcely my place to comment upon the management of the mines, but I venture to offer the following suggestions as to matters bearing upon the health of the miners.

1st. That in some districts there is a great want of cottage accommodation in the immediate neighbourhood of the mines, and the cottages which do exist are of the most defective construction, so as to be objectionable both in a sanitary and moral point of view. It is also very desirable that the cottages should have plots of ground attached to them for the cultivation of vegetables, so as not only to aid the miners in producing the necessaries of life, but to furnish them with out of doors occupation during their leisure time. This would render them less susceptible to the injurious influences which operate upon them when underground. We were informed that in the St. Ives district the miners work in the market gardens and assist in landing and preparing the fish, and these occupations are doubtless very beneficial to them.

2nd. That some means should be provided in all mines to convey the men to and from their work underground, in the place of the ladders, which are the all but universal mode employed in Cornwall at the present time. Perhaps on the score of health the skip would be preferable to the man engine, as it would enable the men to pass more rapidly through the cold and draughty shafts, and so render them less likely to take cold in coming to the surface in their mining clothes, after having worked hard below and especially in hot and close places.

3rd. That, if possible, the ventilation of the mines should be improved, and means provided to secure the passage of a current of air, derived directly from the surface and not from other parts of the mines, through all the workings. It is well known that respiration and combustion deteriorate the air to a much larger extent than by the removal of the oxygen consumed, and it is essential to the maintenance of a pure atmosphere and to the levels being kept cool, that a large change of air should be obtained.

4th. That stringent regulations should be enforced to prevent the ventilation and drainage of the mines being interfered with by the accumulation of "deads" or refuse in the workings; such accumulations must materially increase the injurious influences which operate upon the miners.

5th. That the openings of the shafts used for footways should be covered in, and the changing houses situated in connection with them, or at least immediately adjacent to them. I visited mines in which the shafts in very exposed situations were entirely uncovered, and where the changing houses were at great distances from some of the shafts.

6th. That the changing houses should be sufficiently large to afford full accommodation for the whole of the men who have to make use of them; they should be provided with space for drying all the clothes, and with a sufficient supply of warm water to allow the men to wash thoroughly, and even to bathe themselves. In one of the mines visited, the changing house was much too small for the number of men; and from the reports of the men it appears that the supply of water is not always sufficient, and sometimes it is not warmed; and as far as I know in no mine are baths provided. I have also been told that the space for drying is not always sufficient, and that consequently the men on returning from below have sometimes to put on their clothes still wet.

7th. That boys should not be allowed to commence working underground at so early an age as at present. In some of the mines visited the proportion of young boys was large, and both the boys and men questioned often stated that they had commenced working underground at very early ages, 7, 8, 9, 10, 11, and 12. It will be seen from the tables in the Appendix, that of the men examined, 3 stated that they began to work in the mines when 7 years of age, 10 at 8, and 27 at 9 years of age; and not less than 185 or 39·8 per cent. between the

ages of 10 and 13 inclusive; altogether 225 or 48·4 per cent. began to work underground before the age of 14. Of the whole number of men found at work 117 or 25·2 per cent. were only 20 years of age and under. All experience shows that when persons in early life are exposed to injurious influences they suffer from them more severely, and earlier fall under their influence, than if they had attained a more advanced age and greater constitutional vigour. The boys employed in the mines form no exception to this rule, and no greater contrast can be presented than that between the boys working at the surface of the mines, and those at about the same age working underground, and this too when the period during which the latter have been in the mine is only very short. I frequently asked the miners what they thought was the effect of going underground upon boys in early life, and was uniformly told that if they went too young they could not long stand the work. I was also, however, told that if they did not begin mining as boys they never became good workmen. It is generally said that the boys only do "boys' work," but some of the men told me that what was so named was really harder work than that of the men themselves. It is, however, probably the air of the mines which is chiefly injurious, and to this the boys are just as much exposed as the men. If the boys were not allowed to go down before at least 15 or 16 they would probably have attained sufficient vigour to bear up against the injurious influences, and be quite young enough to become efficient workmen.

8th. The processes of breaking the ore and of dressing, in which young women and children are employed, are often carried on entirely in the open air. This may be more conducive to health than otherwise in warm and dry weather, but when it is cold and damp some protection should be provided.

Some of the children employed in these processes are very young, and must be taken from school before their education can properly have commenced. It would be desirable that regulations should be enforced to require a portion of the day, or certain days, to be devoted to attendance at school in the children under a fixed age.

9th. I cannot but think the system of giving pecuniary and medical relief to the men in cases of accident and illness is open to very grave objections. I was told that the relief furnished from the fund stopped out of the men's wages, was only given to the men when suffering from accidents, and that in some mines the medical relief was similarly limited to cases of accidents. The general rule I believe is that medical attendance is provided by the mine both in sickness and accident. In any occupation so injurious to the health of the work people as mining unquestionably is, the claims of the men for pecuniary as well as medical relief are quite as great in sickness as in accident, provided that the sickness results from the work in the mines, and some arrangement should be made by which the men can be equally assisted in both cases.

It struck me also that in districts where there are several medical men engaged in practice, it would be preferable, instead of certain medical men being appointed to particular mines, if the men were left at liberty to employ whatever medical man they chose; he being remunerated at a certain fixed rate from the mine fund. I should be very far from wishing to be understood to express any doubt that the medical men attached to the mines as at present do not zealously and efficiently perform their duty to the men; but I feel sure from remarks made to me by the men, that it would be more satisfactory to them; and to the medical men and the adventurers the change could make no difference. I have been informed that in certain districts an arrangement of this kind exists and is found to work satisfactorily.

10th. Taking into consideration also the early age at which many of the miners become incapacitated, either for work entirely, or for going underground and so obtaining sufficient to maintain themselves and their families, it has occurred to me whether some fund could not be formed in connexion with the mines by which the men should be allowed small pensions in cases of failure of health, after having worked in the same mine for a certain number of years.

At present it is a frequent ground of complaint on the part of the managers and the captains, that the men cannot be got to work long in the same place and are constantly changing from mine to mine. The plan suggested would probably go far to prevent the tendency to change and to keep the men steadily working at the same mines. Certainly it is a very discouraging prospect before a man, that though engaged in a dangerous occupation and likely to be prematurely worn out, he has little chance of obtaining the means of maintaining himself when no longer able to work, and is likely ultimately to come upon the parish.

TABLE of CASES of DISEASE among the MINERS examined in July and August 1862.

	Cases	
Dyspepsia or organic disease of stomach	3	
Rheumatism	1	
Slow fever	2	
Convalescence from fever or inflammation of the lungs	1	
Diseases of respiratory organs:		
Miner's asthma	41	
Abscess in the pleura opening through the lungs	1	54
Consumption	12	
Mesenteric disease	1	
Affections of the heart, &c:		
Palpitation	4	9
Diseases of heart	5	
Diseases of nervous system, Paralysis:—		
Hemiplegia and paraplegia (1 from injury)	6	
Kidney disease and dropsy	2	
Disease of skin	2	
Effects of injury (not otherwise classed)	2	
Total	83	

TABLE of AGES at which the Miners permanently disabled by illness first worked underground.

Years.	
7	1
9	2
9 or 10	2
10	3
10 or 11	1
11	2
11 or 12	1
12	3
13	1
14	4
14 or 15	1
15	6
15 or 16	3
16	6
17	2
17 or 18	1
18	4
20	3
21	1
27	1
	48

TABLE of the periods of work before the failure of health in Miners premanently disabled.

Years.	
5 to 10	5
10 to 20	9
20 to 30	9
30 to 40	14
40 to 50	7
50 to 53	4
	48

Mean period, 28·5 years. Extreme periods, 5 and 53 years.

TABLE showing the AGES at which the Miners' health failed in cases in which they were permanently disabled.

From 21 to 30 years of age	9
„ 30 to 40 „	8
„ 40 to 50 „	14
„ 50 to 60 „	12
„ 60 to 66 „	5
	48

Mean age, 43. Extremes, 21 and 66.

TABLE showing the duration of illness in the above cases.

	Cases.
Under 2 months	3
„ 3 „	3
„ 4 „	3
„ 5 „	1
„ 6 „	5
„ 7 „	3
„ 8 „	1
„ 1 year	6
„ 1 year and 5 months	1
„ 1 year and six months	1
„ 2 years	2

Under 2 or three years	1
„ 4 years	3
„ 5 „	1
„ 6 „	1
„ 6 or 7 years	1
„ 7 years	2
„ 7 or 8 years	2
„ 8½ years	1
„ 10 „	1
„ 11 or 12 years	1
„ 12 years	1
„ 15 or 16 years	1
„ 20 years	1
„ 25 or 26 years	1
28 years	1
	48

TABLE showing the ASSIGNED CAUSES of ILLNESS in the fully reported cases of disease among the MINERS.

	Cases.
Working in damp and draughty shafts	3
Repairing the neck of the shaft in underground clothing	1
Working in cold damp	2
Working in a cold mine in the granite, in which the drainage was stopped	1
Working in cold and damp mine in the granite after being accustomed to a warm one in the killas	1
Got chilled in cold and damp place after working hard, and when sweating	5
Got chilled from waiting in the shaft for the engine to bring him up after working in a warm place	1
Putting on clothes which he had taken off when workingi n the mine, and which were wet	1
Keeping on his flannel when at work, and getting it wet with sweat	1
Got chilled in walking from the shaft to the changing house through the rain, after having been heated from working in a close place	1
Putting on clothes in which he had walked through the rain to the mine, and which were still wet	1
Washing in cold water after coming out of the mine	1
Working in wet and draughty places	1
Working in very wet places	1
Working in wet and hot places	1
Working in bad or poor air, or in close places	8
Working in bad air and getting cold	1
Working in bad air and cold damp	1
Working in bad air and dry and dusty places	1
Working in bad air, and in hot, dry, and dusty places	1
Working in a close and hot place, and in a constrained position	1
Working in bad air and in a wet place	1
Working in bad air and want of sufficient food	1
Irregularity in taking his meals	1
Injured by the arsenic in the tin and copper ores	1
Took cold at the surface	2
Got chilled at the surface when under the influence of drink	1
Worn out by hard work	2
Worn out by hard work and poor air	1
	45

TABLE of the AGES of the MINERS found at work in different Mines in August 1862.

Ages.	Numbers.		Ratio per cent.
11 to 15 inclusive.	23	117	25·2
16 to 20 „	94		
21 to 30 „	147	233	50·2
31 to 40 „	86		
41 to 50 „	76	107	23·06
51 to 60 „	31		
61 to 63 „	7		1·5
	464		

Mean age - - 30·69.

AGES at which the MINERS COMMENCED WORKING UNDERGROUND.

Ages.	Numbers.		Ratio per cent.
7	3		
8	10	40	8·6
9	27		
10	40		
11	35		
12	68	185	39·8
13	42		
14	60		
15	55	115	24·7
16	32		
17	29		
18	18	86	18·5
19	7		
20	17		
21	4		
22	2		
23	4		
24	3	38	8·1
25	1		
26	3		
30	4		
	464		

Mean age - - 14·6 years.

PERIOD during which the MINERS had WORKED UNDERGROUND.

	Numbers.		Ratio per cent.
Under 1 year	6		1·29
1 year	7		
2 years	19		
3 „	16	80	17·2
4 „	18		
5 „	20		
6 „	23		
7 „	21		
8 „	14	100	21·5
9 „	13		
10 „	29		
11 „	13		
12 „	24		
13 „	13	72	15·5
14 „	13		
15 „	9		
16 „	9		
17 „	12		
18 „	9	49	10·5
19 „	10		
20 „	9		
21 „	8		
22 „	9		
23 „	4	38	8·1
24 „	6		
25 „	11		
26 „	5		
27 „	9		
28 „	12	49	10·5
29 „	15		
30 „	8		
31 „	5		
32 „	1		
33 „	5	25	5·3
34 „	8		
35 „	6		
36 „	9		
37 „	2		
38 „	3	24	5·1
39 „	4		
40 „	6		
41 „	5		
42 „	5		
43 „	3	16	3·4
44 „	1		
45 „	2		
47 „	1		
48 „	1	5	1·07
49 „	1		
50 „	2		
	464		

Mean period 16·2 years, or 16·6 years exclusive of those under one year.

TABLE showing the STATE of the MINERS found AT WORK.

Ages.	Number examined.	Healthy.	Pale.	Worn.	Decidedly delicate looking.	Complaining of various symptoms of indisposition.*
Under 21	117	42	36	2	32	5
		35·8 p. c.	89=68·3 p. c.		37=31·6 p. c.	
21 to 40	233	112	45	14	45	17
		48·06 p.c.	171=73·3 p. c.		62=26·6 p. c.	
41 to 63	114	43	8	1	33	29
		37·7 p. c.	52=45·6 p. c.		62=54·3 p. c.	
	464	197	89	17	110	51
		42·4 p. c.	303=65·3 p.c.		161=34·6 p.c.	

* Dyspeptic and rheumatic symptoms, cough, expectoration, difficulty of breathing, palpitation, &c., with more or less marked general appearance of debility or indisposition.

CASE of MINERS' DISEASE examined after DEATH.

John Francis, at 55, under the care of Henry Harris, of Redruth.

He was reported to have worked underground at various mines, Carn Brea, Wheal Bassett, Wheal Buller, Tin Croft, and East Pool, and commenced working when 13 or 14 years of age. At first he did boys'-work, assisting the men, rolling the trucks underground, &c. After he did full men's work he had chiefly been employed at tutwork. His illness was ascribed by his friends to his having worked in damp and wet places and in bad air.

For five years before his death he had been out of health, suffering from difficulty of breathing, cough, and expectoration, and pains in the chest. He continued to work at the mines for three years after these symptoms first appeared, but for two years he had not been able to go underground, and had been employed in a drying room attending to the men's clothes. Latterly he complained of pain in his right side, which prevented his lying on that side, and he had also a swelling of the right thigh. He generally expectorated white matter, but had brought up blood.

His father was a miner, and died of "miners' disorder" after an illness of two years' duration, when 67 years of age. His mother died at the age of 60 of stricture of the œsophagus. He never had any brothers, but had three sisters, of whom one died at 63 of consumption; the other two are alive at 60 and 68 years of age.

He was not a very steady man, having been addicted to drinking. For these particulars I am chiefly indebted to Mr. Harris.

The post mortem examination was performed by Mr. Bankart and myself, about 24 hours after death.

The body was moderately emaciated. The left lung was voluminous, perfectly black on the surface, and adhered by old attachments in the mammary region, and the pleura in the seat of the adhesions was thick, white, and solid. The substance of the lung was very sparingly crepitant, and of a deep blue or black colour. It did not contain any tubercles; a peculiar brown coloured secretion was found in the smaller bronchial tubes. The edges of the lung in front were somewhat emphysematous. The right lung was universally adhered to the parietes by firm fibro-cartilaginous attachments. The third rib was carious, and an abscess existed in that situation which presented externally, and had separated the rib from the pleura. The abscess contained a considerable quantity of thick yellow pus mixed with cheesy matter.

The right lung was of a deep blue colour, and solid everywhere except at the upper part, where there existed several irregular cavities containing brown coloured fluid similar to that found in the bronchial tubes of the left lung. The bronchial glands were large, very solid, and of a deep black colour.

The trachea was considerably wider than natural, but the larynx was free from ulceration. Shortly above the bifurcation of the bronchi, and at the bifurcation and for a short distance along the right bronchus, the mucous membrane was studded with small specks of yellow-coloured lymph. Under these the mucous membrane was not abraded or otherwise altered.

The heart was of large size, and probably weighed from 10 to 10½ oz. avoird. The pericardium was somewhat loose, the cavities large, and the walls moderately thick and flaccid, and the whole organ appeared as if atrophied. The valves were dyed by blood from decomposition, but free from disease. The aorta and pulmonary arteries were both very considerably dilated, but the coats were of natural thickness and free from deposit.

The liver was partially attached to the diaphragm by old cellular adhesions, and its structure was dense, coarse and resistant.

The kidneys were easily deprived of their tunics, and the surfaces of the organs when exposed were smooth. The cortical portion was rather narrow; one of the supra-renal capsules was so completely atrophied as to consist of little more than cellular tissue. The other was converted into a mere cyst with thin walls and with a rough and dark surface in the interior.

The stomach was healthy, and the intestines apparently free from any disease.

The brain was not examined.

Note on the fever cases visited at St. Just with Mr. Searle.

The epidemic commenced in the spring in cottages surrounding the church, the churchyard being raised several feet above the adjacent ground. From this part the disease spread from cottage to cottage up the valley for upwards of a mile. The disease had the characteristic symptoms of typhoid-diarrhœa, tympanitic distension of the abdomen, &c., and Mr. Searle in all five lost patients.

In one case a young woman who was ill near the church, was visited by her sweetheart, who took the disease though residing in an entirely different district. The same young woman was nursed by a sister who came from a cottage about a mile distant, after about a fortnight she became ill, went to her own house, and spread the disease to others there, though no case had previously occurred.

The epidemic had to a considerable extent subsided when I was there; but Mr. Searle took me to two cottages forming one block of building in which there were still cases.

These cottages were situated on an open moor 200 or 300 feet above the sea, exposed in every direction, with a dry, shallow and rocky soil covered with heather, the sea being about 2 miles from it.

In point of situation nothing could have been healthier, yet the state of the cottages was most wretched. They were surrounded by shallow pools of water, covered with green slime, were not provided with any under-drainage or with privies, and all the refuse was thrown out on dust heaps situated in front of the doors and on the south sides of the cottages. One of the cottages was inhabited by a butcher who killed his meat on the spot.

The cottages were built of rough stone and covered with the heavy slabs which are obtained in the district; they consisted of three rooms each, one below and two above, and each had a small window opening N. and S. The floors of the lower rooms were on the level of the adjacent soil, and were paved with slabs of stone; the upper rooms were open to the slanting roof.

The disease first occurred in the cottage of the butcher, and I could not ascertain that there was any reason to suppose that it was imported. It commenced in April, affected four children from 9 to 21 years of age, and ceased in July; all the invalids were out when I called. From this house a young man who visited there at the time took fever, and spread it in his own neighbourhood at a distance.

In the other house the disease appeared also about the middle of April, and two children first attacked were convalescent, but still thin, pale, and very delicate looking when I saw them. They were aged 12 and 5 years, and had been respectively ill four months and nine weeks, so they must have sickened about the 21st of April, and the 5th of June. Their mother, aged 38, had had two attacks, the last seven or eight weeks before, and was pretty well again. Two children were still lying ill in the same bed, but approaching convalescence, one at 14 had been ill two weeks, and the other at 12, twelve days. In both there was the usual flushed face and torpid expression of countenance, though they were capable of being aroused to protrude the tongue; they were both deaf. In each case the tongue was dry and somewhat brown, the skin harsh and dry, and the remains of several characteristic typhoid spots were detected. The abdomen was tumid, and there had been more or less diarrhœa. The pulse was feeble and somewhat quick.

The general condition of the cottages in this neighbourhood was extremely bad. In ——— cottage by Treweller Chapel there were nine persons residing, a son and daughter being quite grown up. It consisted of three small rooms, with little windows which did not open, had a slanting roof above, and was low and thatched, paved with stones below, and with no under-drainage, and no privy.

The state of ——— cottage was much the same, as well as that of several others which I visited in the church town; indeed in answer to special inquiries I found that there was never any under-drainage and seldom any privies to the cottages; and on the inquiry where the refuse was thrown, a heap of rubbish was pointed out lying undisturbed in front or at one side of the door. The cottages at Bosorn, to the S. E. of St. Just church town, were perhaps the worst in the whole district.

MEDICAL REPORT

On the State of the Miners in the Lead Mining Districts of Alston, Nenthead, Allenheads, and Weardale. By Thos. B. Peacock, M.D., F.R.C.P.

REPORT 1.

In the month of September last I visited the mining districts in the North of England, examined about 225 men at work at mines near Alston, Nenthead, Allenheads, and in Weardale, and took full notes of 25 cases of disease among miners in those districts, and at Middleton in Teesdale.

The forms of disease with which I met consisted of affections of the respiratory organs, disease of the heart, chronic rheumatism, general failure of power, dyspepsia, &c. I also found men suffering from various injuries which they had sustained when working in the mines.

1. *Bronchitic affections, Miners' Asthma.*—By far the largest number of cases of disease which fell under my notice were bronchitic affections, emphysema of the lungs, &c., the conditions known in the district as well as in the West of England as "miners' asthma," or "miners' disease or complaint." Indeed this form of disease constituted 18 out of the 25 cases of decided disease, which I have reported in the Appendix. In three of these cases the affection was only commencing, and in the remaining 15 the disease was so far advanced as to have completely incapacitated the labourer from following his usual occupation.

In the former cases the subjects of the disease were 31, 49, and 53 years of age. In one of the cases there were recent signs of pleurisy. In the more advanced cases the men were generally old; the mean age of the 15 being 57·7 years, and the extremes of age 70 and 67, and 44 and 49. In the latter cases, however, the men had been suffering under the disease, in some instances for several years; the period at which their health had first failed being on the average 49·08 years, and the extremes of age 60 and 56, and 34 and 44. It thus appears that they had been ailing on the average nearly 8 years; but in some instances the duration of illness was much more prolonged, having amounted to 18 or 20 years.

From the statements of the men examined, it appears that they became incapable of work on the average at 55·07 years of age, or at the extreme ages of 63 and 46; and the period during which they had worked as miners before becoming so seriously ill as to be entirely unable to work was on the average 40·6 years, and the extreme periods 57 and 28 years.

These calculations indicate that the health of the miners fails from asthma in middle age; but it will be subsequently shown that the men in whom the disease assumes the form of pulmonary consumption are incapacitated for work at much earlier periods. I am also satisfied, from information given me, that the asthmatic symptoms frequently if not generally manifest themselves at much earlier periods than the calculations would indicate. I was repeatedly told that "all miners who have attained middle age suffer in their breathing more or less, and that many of them who are young are similarly affected, though they will not acknowledge it." I met with several men who had gone to work underground at 14 to 16 or 18 years of age, and had only followed the occupation for 8 or 10 years, who said that they had given up working as miners, from being then in some degree affected in their breathing; and I have been assured that many men suffer at 30, and few escape beyond 40 years of age. The men who are getting into years, though they may still be able to work, almost always suffer from difficulty of breathing, either constantly, or in certain states of the weather, or when labouring under cold. Thus, of 24 persons above 50 years of age, whom I found still working in the mines, and who were questioned as to their health, all but eight stated that they were more or less "touched in the wind," or "short in their breath," &c.; and some mentioned that they suffered severely in this way. I feel convinced also that had all the men given a correct account of themselves, the proportion of those stated to be ailing would have been even greater.

That, however, I should not appear to overstate this fact, I may quote from a report made to me by a medical man of great experience in the diseases of miners, Dr. Ewart, the resident medical officer of the London Company at Middleton in Teesdale. "A healthy young man enters upon work in a lead mine; in a few years, more or less, he begins to experience some degree of difficulty of breathing—nothing to hurt him very much as he continues an efficient miner; still, however, 'he is touched in the wind.' Along with this difficulty of breathing there is an increased expectoration of mucus, often tinged, more particularly after leaving work, of a bluish black colour. The difficulty of breathing continues, and generally increases as age advances, rendered worse, perhaps, by an attack of bronchitis now and then supervening. On recovering from these attacks, he again resumes work; or, should it happen that he has no acute attacks, he goes on working with increased shortness of breathing, expectoration and failing strength. His appetite for food is impaired, and what he takes for breakfast is frequently vomited as he walks to his work in a morning. He has great langour, and frequent fits of severe coughing, and evidences of imperfect oxygenation of the blood in the blueness of the lips, &c. He may now have got to 40 or 45 years of age; he is low in health and strength, and is compelled to give up work, and stay at home as a worn-out miner. But even at home his health cannot be restored. He may wander about for some years, incapable of work, from difficulty of breathing and debility; in the summer improving a little, but in the autumn, winter, and spring being very liable to acute disease of the chest producing more copious expectoration of muco-purulent matter, tinged or rather streaked with blue or blackish spots. The poor worn-out miner now soon dies exhausted; that is to say, in a year or two he is cut off by persistent chronic disease of the chest, aggravated by acute or sub-acute seizures now and then taking place."

This report so clearly describes the asthmatic affections of miners that it is not necessary for me to dwell further upon the subject; and I have already fully explained the chief features and course of such affections in my report upon the diseases of the miners in Cornwall. I may, however, remark that while the asthmatic affections of the miners are similar in the two districts, it appeared to me that in the North the bronchitic symptoms were less frequently complicated by disorganization of the lungs, and that the sufferers were less exhausted, and their digestive organs less severely affected, than in Cornwall.

I am not in possession of information relative to the usual duration of life in the subjects of miners' asthma in the lead districts of the North of England. From the statements made to me, however, it appeared that not unfrequently when the miners cease to work underground their sufferings diminish, and, if they have not continued too long, they may ultimately recover so far as to be able to follow some occupation at the surface, and may survive for some years. If, however, their period of work underground has been prolonged, though their breathing when at the surface may be less affected, their strength does not materially return, and for the remainder of their lives they continue incapable of undertaking active work, or of following any occupation at all. In these respects also the condition of the miners in the North entirely corresponds with that of the Cornish miners.

Pulmonary Consumption.—Of this disease I met with four cases. As before mentioned the cases of consumption occured in men at an earlier age than those who suffered from the more decided forms of miners' asthma. The mean age of the patients was 37·5 years, and the extremes of age were 42 and 32. In three of the cases the period at which the health failed was ascertained to have been at the ages of 25, 31, and 35½. The patients had worked as miners for 12, 15, and 20 years before the commencement of the disease. In three of the cases there were evidences of hereditary predisposition; near relatives of the miners, and persons not employed in underground work, having also died of consumption. Indeed the circumstances under which the several forms of disease of the chest occurred among the miners in the North of England were similar to what had been observed in Cornwall. Men originally of feeble power, and especially if predisposed to consumption, falling victims to disease in earlier life, and after a shorter period of work in the mines; while those not so predisposed, and altogether of more robust constitution, resist the injurious influences of the occupation for a much longer period. The former also suffer from pulmonary consumption, while the latter become the subjects of asthma. Of the prevalence of consumption in the general population I am not able to speak, but I saw cases of the confirmed disease in persons who had not been employed in the mines.

3. *Diseases of the Heart and Large Vessels.*—I met with only one case of disease of the heart. In this instance the man was 71 years of age, but, though he had worked as a miner for 40 years, he had not been employed in the mines

for 20 years, and had since followed the occupation of a butcher. He had laboured under the symptoms of disease of the heart for about 12 months before I saw him, and was then dropsical, suffering from difficulty of breathing so severe as to prevent his lying down, and presented the characteristic signs of obstructive and regurgitant disease of the aortic valves. This affection could not, of course, be directly traced to his former occupation as a miner; but he stated that when so employed he had suffered from rheumatism, and probably might then have had some affection of the lining membrane of the heart, which laid the foundation of the subsequent disease. In another case, a man 37 years of age, who reported that he had recently suffered from chronic diarrhœa or dysentery, and was probably becoming consumptive, complained of suffering from palpitation of the heart, especially when using active exertion; and there was reason to suspect that the mitral valve might be in some degree defective. In three other cases, two of advanced miner's asthma and one of general failure of power with indigestion, difficulty of breathing, &c., the patients complained of palpitation; but no disease could be detected on examining the heart. The first case referred to, and possibly the second, constituted therefore the only instances in which decided disease of the heart was met with among the miners in the North of England. I was further assured by several medical men practising in the district that diseases of the heart and great vessels were not of frequent occurrence among the miners.

4. *Chronic Rheumatism.*—A man 47 years of age was reported to have been entirely incapacitated for work for four years, in consequence of suffering from chronic rheumatism. The affection commenced in the shoulders and then passed into the hip. He stated himself to be otherwise well and free from any difficulty of breathing. He ascribed his indisposition to having worked in cold and draughty places, but said that he had never been in workings that were particularly damp or where the air was bad. He first went to work underground when 10 or 12 years of age, and had been employed 31 to 33 years before his health failed.

In several instances, men labouring under other forms of disease complained of suffering from different kinds of rheumatic affection, or stated that they had formerly had rheumatic fever, or pains in different parts of the trunk or limbs.

5. *General failure of power, Dyspepsia, &c.*—The only other case which will be found fully reported in the Appendix is one in which a man, 66 years of age, was permanently disabled in consequence of general failure of power, difficulty of breathing, palpitation, and symptoms of indigestion. He had gone to work underground when about 9 years of age, and had been a miner for about 57 years, and had been unfit for work for two or three months.

In all the forms of miners' disease, symptoms of indigestion were of common occurrence. The men state, that, as a general rule, the miners have small appetites, while the pitmen take much food. Not only also do they frequently complain of want of appetite, but also of flatulency, nausea, and occasionally actual vomiting. The action of their bowels is uncertain; sometimes they suffer from diarrhœa; more frequently from constipation; and they are very liable to colicky pains in the bowels.

6. *Disease of Kidneys, &c.*—In some cases the men stated that they suffered from pains in the loins, and symptoms of gravel, but I met with no case of disease of the kidneys or dropsy among the men.

7. *Injuries.*—Among the cases only cursorily referred to will be found notices of two, in which the men were entirely blind, and were stated to have lost their sight from explosions or "shots" in the mines. I was also informed that there were two other miners in Alston parish, who had lost their sight in the same way. I saw among the men at work several cases of partial blindness and injuries of the face from explosions, and heard of other injuries from falls of rock and in other ways in the mines. Several of the men were extremely deaf.

Causes of Disease among the Miners.

There is a striking uniformity in the causes which are assigned by the miners for the impairment of their health; the answer very generally being, when questioned on this point, that it was "bad air, powder reek, and stour."

"*Bad air.*—The reports of the older men, and of the agents and medical officers, and indeed of almost every one connected with the mines, show that formerly the state of the mines as to ventilation was very much more defective than at present. The most striking accounts of the extremely deleterious effects of the air in which they had to work was given me by men who had been employed in driving the "fossway," extending from Alston to near Nenthead, which was constructed by the Commissioners of Greenwich Hospital some years ago. But, notwithstanding that great improvements have of late years been effected in the state of the mines, some of the workings are still evidently, from the reports of the men, very defective. I was repeatedly told by miners now at work, "that all miners have to breathe bad air, more or less," or that in "all mines there are places where the air is bad." From the Table of the assigned causes of disease in the men it will be seen that in 11 cases "bad air" is stated to have been the source of indisposition, and all but one of those who referred their illness to other causes or did not give any direct answer to the inquiry, stated that they had worked to a greater or less extent in bad air. When questioned as to the reasons which made them regard the air as bad, they frequently stated that the candles could not be got to burn, except when "heeled" or placed on one side, or when the wicks were being continually teazed out, or two candles were placed together. Sometimes, they said, that the candles could not be got to burn where they worked, and had to be placed some distance behind them. Occasionally, they stated, that the air was so bad that the candles would not burn at all, and they could not work in consequence; and they said that this was especially the case in dull days in summer and autumn, and might occur for several days together. A man to whom I spoke on his way home from Burtree Pasture Mine on the afternoon I was there, said that several men had been compelled to leave their work that day; and one of the men who was ailing and had been at work in the "fore end," said the air had been very bad. When asked to describe the effects of the breathing of bad air, the miners mentioned all those symptoms with which my inquiries in Cornwall had made me familiar. They said, that the bad air made them dizzy, sometimes adding, "as if they had been in liquor,"—caused violent headache, and made them feel sleepy, so that they could scarcely keep awake, and took all the power out of their limbs. Sometimes, they said, that they became quite faint; and I was told that the men had occasionally "fits" when working in very bad air, and had to be carried out. Not unfrequently they felt sick, and would vomit violently on coming to the surface; and they suffered from pains in the bowels, constipation or diarrhœa; were much prostrated, and had little or no appetite for their food on getting home.

The mines are generally in this district entered by "day levels," or horizontal shafts, running into the sides of the hills. From these, other shafts are raised or sunk, which open up the different levels and frequently reach the surface, so as to provide for the supply of fresh air through the different workings by a natural process of ventilation. It is chiefly when driving the "fore ends" or "foremost ends," or in the "rises" carried up from the different levels, or the "sumps" sunk from them, that the men are subjected to bad air. For the purpose of ventilating these "close places," air is frequently driven by a fan worked by hand or by water power, or by a water blast, and in some of the mines of Mr. Beaumont exhausting furnaces have been introduced. Of the efficacy of the latter plan, I had very decisive evidence in several cases; being assured by the men that the general atmosphere of the mines was much improved, and by the agents that places were worked which were before scarcely capable of being entered, or in which the men could only remain for a short time.

The "choke damp" or carbonic acid gas, which constitutes the most dangerous element in the workings of the mines, is doubtless partly the result of the combustion of the candles, the respiration of the men, and the explosion of the powder in blasting the rock. The agents, however, state, that it is given off from the strata, and especially the shaly strata or plates, and often escapes quite suddenly into the workings. This account was confirmed by several of the men, especially by one who had worked at the "fossway." He stated they had a bell which they could pull below to give warning if an escape of gas suddenly took place, in which case they were immediately drawn up, and sometimes, nevertheless, very narrowly escaped with their lives.

As I have before-mentioned, "*powder reek*" is also frequently assigned by the men as rendering the air of the mines very injurious to them, and they often complain of the length of time required in some places for the smoke to clear off after the blasts or "shots." Dr. Ewart, to whom I have before referred, ascribes much importance to the deleterious influence of the gases generated by the explosions of powder in the mines, and to the diffusion in the air of the unoxidyzed charcoal. He states, that when a miner is injured by an explosion, the face or hands are thoroughly blackened and remain so partially for life. He also ascribes to the charcoal so diffused in the air and inhaled by the miners, the "black spit" or blackish mucus brought up by the men when they leave their work, and which he states they often continue to expectorate for years after they have ceased to go underground. That this view is generally cor-

rect there can be no doubt; but it is well known that persons labouring under some forms of chronic bronchitis expectorate matter quite as dark, though they have never breathed a particularly smoky atmosphere. In such cases, therefore, the black matter must be excreted by the lungs, and cannot have been inhaled. It is therefore probable that the dark expectoration of the men who have long ceased to work as miners is, in part at least, an excretion, not entirely the carbon formerly inhaled. The candles also, as stated by the men, when burning so badly as they often do, and especially when the wicks have to be teazed out and the candles held on one side or two placed together, give out much dense smoke, and this must further deteriorate the atmosphere.

The "*stour*" or *dust* of the mines is often blamed by the men as a cause of indisposition, and some say that the "stour" is worse than anything else. The mines are chiefly driven in the shales or plates of sandstone and beds of limestone, and much dust is caused by the boring and blasting, and must, when the air is dry, be diffused in the workings and inhaled by the miners. Dr. Ewart thinks that in this respect also the atmosphere of the mines is very seriously detrimental to the men. He has published a case in which, after prolonged indisposition, cough, expectoration, difficulty of breathing, &c., a piece of sandstone as large as a pistol bullet, which had apparently been formed in one of the large bronchi by the accretion of small particles of sand, was expectorated by a miner. After the escape of the mass, the bronchitic symptoms were relieved. One of the men who had a curvature of the spine and stated that he had always been delicate, especially complained that his breathing was affected by the dust of the mines. Judging by the reports of the miners, I am disposed to think that dust or gritty particles, thrown off from the sandy strata in which they frequently work, considerably adds to their sufferings when employed in the mines. I think it probable also, that in this respect the northern mines are more injurious than those of Cornwall, which are generally worked in the harder crystaline rocks, and which, therefore, are probably less dusty. Some of the men especially complained of the dryness of the mines in connexion with the dust. Generally speaking, however, the atmosphere of the mines would appear to be damp; and the men often complained of the cold and damp and thickness of the air in the workings. It will be observed, that one man ascribed his severe rheumatic symptoms to working in cold draughts, and another blamed the cold for his illness. The mines do not appear, however, to be generally very wet, though there is often water in the workings and the men have to work with their feet wet.

Hard work, working too early, &c.—The other causes assigned by the men as probably affecting them were, "slavish work," and "working too hard when he had a good bargain,"—"going to work at too early an age,"—"working at night." One man ascribed his illness to having taken cold, from having to walk a long way to his home, there being no changing house at the mine. Another admitted that he had injured his health from having been a "hard drinker."

Ladder climbing.—I did not in any case find the climbing blamed by the men as having been injurious to them. Indeed, most of the mines, as at Nenthead, are entered by day levels; the men ride to their work in waggons drawn by horses or pushed by their fellows, which remove the waste and ore, and have only to use the ladders when passing between the different levels or up or down short shafts. They have thus not usually to climb more than 15 to 20 or 30 fathoms. In other mines, as in Mr. Beaumont's, at Allenhead and Burtree Pasture, the men are let down and drawn up by machinery moving by water power, and have generally not much climbing when below. It is not, therefore, probable that the little ladder work which they have can produce any very injurious effects.

Temperature of the mines.—The mines are also not apparently so hot as to exercise any injurious influence. When the men are working in very confined spaces, and there are many men at work, many candles burnt, and much blasting, the workings may become hot, but this does not generally seem to be the case. The mines are also usually only worked in two shifts each day, and for four or five days in each week; and thus there is much time for the effects of the blastings to clear off, and for the places to be kept cool. In only two instances did the men complain of the heat of the mines, or state that they regarded them as injurious on that account.

Of the different causes which have been enumerated as probably operating unfavourably upon the health of the miners, I am led to conclude that by far the most influential is the defective quality of the air which they breathe.

COMPARISON between the STATE of the MINERS in the NORTH of ENGLAND and in CORNWALL.

1. *General condition of the miners.*—I was much struck, in visiting the northern mining districts, with the more robust character of the men whom I found at work at the different mines, and the larger proportion of middle-aged and old men among them. On analyzing the reports which I then made, I find that they confirm the impressions formed at the time. On comparing the table of the condition of the men at work with the similar table showing the state of the Cornish miners, it will be found that there are a smaller proportion of young boys, and a larger number of middle-aged and elderly men, employed in the mines in the North than in those in Cornwall. It will further be seen that the state of the men, as judged of by their general condition and appearance and by their own statements, was better in the North than in Cornwall; the proportion of delicate and ailing persons being at all ages less in the North, and especially in more advanced life. On referring also to the ages at which the men permanently disabled by miners' asthma, &c. first went to work underground, and the ages at which their indisposition became so marked as to prevent their pursuing their occupation any longer, it will be seen that the period during which the miners were able to work in the North of England was much greater than in Cornwall. Indeed, the period of work in the North exceeds that in Cornwall by, on the average, 5·8 years. It does not, however, appear that there is the same difference between the periods at which the health of the miners first fails in the two districts;—the men in the North suffering from their occupation, probably at nearly as early an age as in Cornwall; but the affections under which they labour being less severe and less rapidly advancing, they are not so soon disabled.

2. *Diseases of the miners.*—The diseases met with among the miners in the North of England correspond generally with those observed in Cornwall, but present some differences. In both districts the men suffer frequently and severely from symptoms of indigestion, constipation, &c. Miner's asthma is, however, amongst all miners, the form of serious disease which is of most common occurrence, and which appears to indicate the ordinary process of decay in the men who are originally of healthy constitution. Next in frequency also in both districts is pulmonary consumption; this disease being developed at an earlier period than the former, and in men possessed of less constitutional vigour. It appeared, however, to me that miners' asthma was in the North usually a simpler form of disease than in Cornwall and less frequently complicated by the results of inflammation of the lungs occasioning serious disorganization of their tissues. I also found the affection in the North not so commonly complicated with disease of the heart as in Cornwall. Doubtless in all advanced cases of miner's asthma the right side of the heart undergoes dilatation, as in other similar forms of bronchial desease. In Cornwall, however, it was found that the miners labouring under asthma very frequently presented symptoms and signs of imperfection of the mitral valve; a condition not decidedly met with in any case in the North, though it may possibly have existed in one or two instances. Other forms of disease of the heart also occurred among the miners in Cornwall in several instances; and palpitation was a very common symptom in their various ailments. Whereas decided disease of the heart was only once met with in the North, and the affection could in that instance be only indirectly referred to the underground work. Palpitation also was not a frequent complaint in other forms of affection.

What then is the cause of the differences indicated in the condition and diseases of the two sets of men?

1st. *Ventilation of the mines.*—The mines in the North of England are worked by horizontal shafts or day levels, opening from the sides of the hills, sufficiently large to allow of the passage of waggons and horses, and by vertical "sumps" or shafts rising from the horizontal shafts at different levels or sinking into the lower strata. The horizontal shafts sometimes pass entirely through the hills, and the vertical shafts frequently open on the surface above. The mines also are comparatively shallow. They would therefore appear to afford great facilities for natural ventilation. In the mines in Cornwall, on the contrary, which communicate with the surface only by deep vertical shafts, the natural ventilation is more likely to be imperfect. It might, therefore, be supposed that the miners in the North breathe better air than in Cornwall. I cannot, however, think that the more satisfactory sanitary condition of the miners can be ascribed to the mines in the North being generally in a better state as to ventilation

and freer from "choke damp," &c. So far, indeed, as I can judge by the description of the men, I should think that the workings in the Northern mines were quite as frequently the seat of noxious gases as in Cornwall. Indeed I think their reports rather indicated a worse condition of certain parts of the mines in the North than in Cornwall. I have also before stated that, so far as dustiness is concerned, the Northern mines are probably more injurious to the men.

2nd. *Race.—Diet of miners.*—The miners in the North are certainly a more robust race; and it is probable, upon the whole, their diet is more nutritious than that of the Cornish men. Many of them, at least in some districts, as in Weardale, Nenthead, &c., are small farmers; they have plots of ground sufficient to keep a cow, and thus they are able to obtain milk, and probably altogether more fresh animal food than the Cornish miners ordinarily have. I do not, however, think that there is sufficient difference between the miners in the two districts in this respect to explain the differences in their sanitary state.

3rd. *Age at which they begin work.*—Throughout the mining districts of the North of England the miners do not now go to work underground at by any means so early an age as in the West. In none of the mines did I find that boys were allowed to work underground before they are 13, 16 or 18 years at age. The regulations of the London Lead Company are especially judicious on this point. No one is allowed to work underground in the Company's mines regularly till they are 18 years of age; but as, during winter, for three or four months, the climate is too rigorous for the boys employed at the dressing floors to work on the surface, those boys who are 14 years of age are allowed to work in the mines under the superintendence of the older miners during this time, and thus they are gradually inured to the underground work. This arrangement, I am assured by Mr. Carson, the company's medical officer at Nenthead, has very materially conduced to the healthiness of the miners who have come into work since it was adopted. He stated that there is now much less illness among the miners than formerly, and he does not think that, except this regulation and the better ventilation of the mines, there is any other alteration in their condition to which the improvement can be ascribed. When in Cornwall I was much impressed with the early age at which the boys were allowed to commence working underground, and with the delicate appearance which the younger men so soon acquire when working in the mines, and I think that some restriction as to the age at which the boys should commence is imperatively called for. I think also that an arrangement, like that adopted by the London Company, by which the boys would be gradually introduced to the underground work, would be most desirable throughout the mining districts. It does not, however, appear that the longer period of work in the North of England, of the men at present invalided, can be explained by their having commenced mining at a latter period of life than is usual with the Cornish miners. Indeed, most of the disabled men whom I examined had worked underground before the regulation referred to was introduced, and at ages quite as early as is now the practice in Cornwall. I find that on the average they began work when only 14 years of age, and some stated that they first went underground much earlier; the extreme ages at which they commenced being 7 and 18.

The circumstances which are mainly influential in favourably affecting the sanitary state of the men working in the northern mines, appear to be the comparatively short periods in each week during which the men work in the mines, the ready access to the mines without having to climb the ladders to any extent, the natural temperature of the workings, and the length of time during which they are left free.

4th. *Periods of work.* The men in the northern mines are ordinarily required to work for 5 eight-hour shifts in each week, making in all 40 hours of work. They are however allowed, if they so like, to work for longer periods than 8 hours, and a common plan is to work 4 daily shifts of 10 hours each. Thus, as the mines are generally at some distance from the mining villages, they frequently work on Monday, Tuesday, Wednesday, and Thursday; and return home on the Thursday, spending the remainder of the week in working on their small farms or in their gardens, or for the farmers in the neighbourhood. This plan has a double advantage. There can be no doubt that for men who work in the impure air of a mine the greatest possible protection from suffering is for them to be much in the open air when at the surface. The ordinary plan in the district is also for the mines to be worked in only two shifts in the 24 hours, except when driving ends or in cases of emergency. It thus results that the workings are left unoccupied for at least 4 hours in each 24, and entirely for two or three days in each week; an arrangement which allows of the offensive gases generated by the explosion of the blasting powder, and by the respiration of the men at work and the combustion of the candles, being got rid of by natural ventilation. At the same time the workings are so kept cool. In Cornwall the mines are generally worked six days in each week, and often for three 8-hour shifts in the 24 hours.

5th. *Climbing by ladders.*—I have already mentioned that the miners in the North of England have not much climbing by ladders. They, together with their tools, are usually conveyed to their work in waggons drawn by horses or pushed by their fellows, or by "lifts" or "skips" moved by machinery, and have only to climb the ladders for 10 to 20 or 30 fathoms in passing up or down shafts between the different levels. This I cannot but regard as a very important improvement upon the plan, generally adopted in Cornwall, of descending and ascending great depths by the ladders. It is, I believe, mainly to the hurried breathing and violent exertion in using the ladders that the frequency of affection of the heart among the Cornish miners is to be ascribed. The absence of this violent exertion and the hurried breathing so caused, goes far, in my opinion, to explain the better sanitary state of the northern miners, and especially the infrequency of diseases of the heart among them. I believe also that their greater vigour is much due to their being less exhausted than the Cornish miners from being conveyed to and from their work without any material exertion of muscular power.

6th. *Temperature of mines.*—The mines in the North of England do not appear to be generally so hot as to be injurious to the men. I met with only two or three of the men who made any complaint of this kind. The natural temperature of the mines is a great advantage to the men in two ways: they do not become, by any means, so much exhausted by their work, and are not so much tendered by it as to become very unduly susceptible to cold when at the surface. In the mines in Cornwall in which the workings are very hot, the men suffer much when below, and very readily take cold when at the surface. It is, I believe, mainly to this cause that the affections of the chest which occur among the miners in the two districts differ. In the North of England active inflammatory affections being rare and the asthma of a less complicated character; while in Cornwall the men more frequently have active inflammatory affections leading to consolidation and disorganisation of the substance of the lungs.

Effects of Dressing the Ores, Smelting, &c., on the men employed in those processes.

The surface works at the mines in the North of England is entirely performed by men and boys, chiefly the latter. In the London Company's works no boys are employed at the dressing of ores till they are 12 years of age. At Mr. Beaumont's works they commence at 10. I did not on inquiry hear that any of the persons thus employed suffered from the influence of the lead or in any other way from the work.

The London Lead Company have smelt works both at Nenthead and Eggleston, in Teesdale, and there were also smelt works in use at Allenheads. Formerly, I was told by medical men, in all these districts, that the smelters suffered from lead colic, and the same was confirmed by the reports of the men themselves. Sometimes, also, they seem to have had the more severe symptoms of lead poisoning, dropping of the hands, &c., but of late years, since the works have been better ventilated, these forms of lead poisoning have entirely disappeared, though the men still occasionally have colicky pains in the bowels, constipation, &c., and those especially suffer in this way who are employed in emptying the flues. Of 25 men whom I examined at different works, who either were then or had been employed as smelters, 10 stated that they had never had any symptoms of lead poisoning, and the other 15 said that they had formerly suffered to a greater or less extent; and all but five stated that they still occasionally had colic and constipation, though none of them apparently to any serious extent.

I examined the condition of the mouth in the men I have mentioned, and of the whole number 14 displayed the blue line upon the edges of the gums to a greater or less extent, several had their teeth and gums in a very unhealthy state, and some were pallid and anæmic looking. I did not meet with any cases of paralysis from lead. The acting superintendent of one of the mills had apparently had a sharp attack of lead colic.

The men stated that when they entered the flues from the furnaces and the condenser to clear them out at stated intervals, the sulphurous and other gases tried them very much in their breathing, and that occasionally they suffered from pain and confinement of the bowels afterwards. The

flues are, however, by recent improvements, to a considerable extent emptied of their contents, and especially of the lighter and therefore more injurious portions, by currents of water which are continually passing through them, and thus the men are less likely to suffer.

I was told that at Nenthead the exit chimney of the smelt mill was formerly situated at about 800 yards from the furnaces, and in a somewhat lower situation, and at the time the residents in a group of cottages near the chimney suffered from symptoms of dyspepsia, with a tendency to colic. Since the chimney was placed at a further distance of 400 yards, and in a more elevated and exposed situation, this has entirely ceased.

I was assured from the experience of the Benefit Society of the London Company that the smelters were longer lived than the miners, and amongst the men whom I examined were several in very advanced life, and who were yet hale and strong for their ages.

REPORT 2.

Ages of Men at Work at Nenthead, Allenheads, and Burtrie Pasture Mines.

12 to 16 years of age,	4	ratio per cent	1.96	18.13 per cent.
17 to 20 „	33	„	16.17	
21 to 30 „	66	„	32.35	54.4 per cent.
31 to 40 „	45	„	22.05	
41 to 50 „	40	„	19.60	25.48 per cent.
51 to 60 „	12	„	5.88	
61 to 64 „	4	„	1.96	
Total	204	Mean age	31.5	

State of Miners examined at Nenthead, Allenheads, Rodderup Fell, and Burtree Pasture Mines.

Under 21 years of age; Total 41:
Healthy, 36; pale, thin, &c., had sustained injuries, 3;=39. Ratio per cent. 95.1.
Delicate and complaining, 2. Ratio per cent., 4.8.

From 21 to 40 years of age; Total 124.
Healthy, 106; pale, thin, &c., had sustained injuries, 10;=116. Ratio per cent., 93.5.
Delicate and complaining, 8. Ratio per cent., 6.4.

From 41 to 64 years of age; Total 60.
Healthy, 31; pale, thin, &c., had sustained injuries, 1;=32. Ratio per cent., 53.3.
Delicate and complaining, 28. Ratio per cent., 46.6.

Total: Healthy, 225; pale, thin, &c., had sustained injuries, 187. Ratio per cent., 83.1.
Delicate and complaining, 38. Ratio per cent., 16.8.

Forms of Disease among the Miners in the North of England.

Commencing miners' asthma, 3 cases; confirmed and advanced 15, -	18
Palmonary consumption - -	4
Disease of heart - - -	1
Chronic rheumatism - - -	1
General failure of power, asthma, dyspepsia, &c. - - -	1
	25

Ages of Men affected with Miners' Disease.

Mean age of 18 cases, 55.5.
Extremes of age, 70 and 67, and 31 and 44.

Age at which the Health first failed in Men permanently disabled.

Mean age of 13 men, 49.18.
Extremes of age, 60 and 56, and 34 and 44.

Age at which Men permanently disabled became unfit for Work.

Mean age in 14 cases 55.07.
Extremes of age, 63 and 46 and 47¼.

Ages at which the Men permanently disabled began to work underground.

Mean age of 17 men, 14 years.
Extremes of age, 7 and 18.

Assigned Causes of Disease in Men labouring under Miners' Asthma, &c.

Bad air and slavish work - - - -	1 case.
Bad air, powder reek, and stour - -	3 cases.
Bad air, smoke, and damp - - -	1 case.
Bad air - - - - - - -	1 „
Much bad air and beginning to work too soon (at 9 years of age) - - -	1 „
Powder reek and stour (but had also worked in bad air) - - - - -	2 cases.
Bad air and powder reek - - -	2 „
Had been a great drinker (but had also worked in bad air) - - - - -	1 case.
Taking cold (but had worked in bad air) -	1 „
Cold and influenza (but had in worked in bad air) - - - - - - - -	1 „
Working at night and in bad air and powder reek, and getting cold in coming to the surface from there being no changing house -	1 „
The stour and bad air, and working too hard when he had a good bargain - - -	1 „
Had always been ailing, but air of mines made him worse - - - - - -	1 „
Working in cold draughts (never in bad air) -	1 „
No precise cause assigned, but had all worked in bad air - - - - -	7 cases.
	25

Period of work in persons permanently disabled by Miners' Asthma.*

In North of England, 14 cases—
Mean period 40.6 years.
Extremes 57, and 28 years.

In Cornwall, 15 cases—
Mean period 34.8 years.
Extremes 52 and 15 years.

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*I have taken this form of affection alone as indicating the mode of breaking up of the miners when their powers are not prematurely exhausted by accidental diseases

APPENDIX 2.

Brief Notes of Cases of Disease, &c. among Miners in the North of England.

Clitheroe, &c., Alston, Aug. 3, 1863.—No 1, aged 45. "Blinded by a shot," April 29, 1862, at Stone Croft Lead Mine, Northumberland.

Nenthead, Aug. 3, 1863.—No. 2, aged 42. Blinded in blasting, 8 or 10 years ago.

Two other blind men are said to be in the parish of Alston who are blind from injuries in blasting.

No. 3, aged 50, who lost his sight 10 or 12 years ago, and No. 4, aged 30, injured a year ago.

There are several other men who have sustained partial injuries of the eyes in the same way.

Alston, Aug. 5, 1863.—No. 5, aged 35. First went underground when 18 years of age, and worked for 8 years in Mr. Beaumont's mine at Coalcleugh, and then left and went to Australia. He was at the time a little touched in the wind. "All miners suffer more or less at the chest, and many quite as young as he was." "Some parts of the mine were very bad; the candles could only be got to burn by putting two together, and heeling them on one side, and then they gave out much smoke. The smoke also lay long in the mine when they fired a shot. Sometimes for days together the candles could not be got to burn at all, and they could not get in to their work. The bad air made them heavy and sleepy, and took the power out of their limbs, and he had known persons carried out as if dead from working in it." Since his return from Australia he has not worked underground. He is now delicate looking.

Rodderup Fell, Aug. 5, 1863.—No. 6, aged 60. Went underground at 20, and has worked steadily ever since with some short breaks. Latterly his health has failed, and he has been laid by with two attacks of influenza, and has "whiles been bad with his wind." He was incapable of working 12 months ago, and was seen by Mr. Bankart. He is now "a little bad in the wind," but is better than he has been, and he is at work. He is old-looking, and pale and thin.

Alston, Aug. 6, 1863.—No. 7, aged 25. Went to the mines at 19, and worked underground for a year, when he injured his eye and one hand by a blast, and has not worked since. He has recovered his sight, but his hand is much shattered. He has worked as a hostler for 6 years. The mine he worked in was dry and stoury, there were some bad places; "but it was not so bad as some." "Very near all miners are more or less touched in the wind."

St. John's Chapel in Weardale, Aug. 6, 1863. Mr. Hewitson.—No. 8, aged 25. Went underground at 12, and has worked as a miner till he got ill. He has had an attack of gastric fever, with predominant head affection, and is now nearly recovered. He was very deaf before his attack, and continues so.

Ireshope Burn, Weardale, Aug. 6, 1853.—No. 9, aged 45. Went underground at 12, and has worked as a miner ever since, except when away from ill health. He has been out of health at times for the last 3 or 4 years, suffering from inflammation of the bowels. He has been laid by recently for 18 weeks, and is now only just able to return to the mine. His appetite was very bad, and his food did not agree with him, and he had pains in his bowels, and diarrhœa or dysentery. He looks pale and thin and delicate.

Middleton in Teesdale, August 7, 1863.—No. 10, aged 70. He went to work in the mines when he was 10 years of age, and worked regularly for 55 years with little intermission, and always in the Company's service. He never suffered till he had worked 30 or 40 years, or till he was 40 or 50 years of age. He has worked in some very bad places, and for 10 years was always in bad air, more or less. That was when he was from 25 to 35 years old. The candles could scarcely be got to burn from the badness of the air; but he thinks it was not so much the bad air as the dust that hurt him. The last place he worked at was a shaft which they were driving to meet an adit, and he worked at this three or four years. It was not very bad, for they had a blower at the top moved by hand. He left working underground when 56 or 58, or 12 or 14 years ago, and worked at the surface six or eight years. He has not worked at all for six years, and is pensioned by the Company. He is an active hale man for his age.

Allenheads, Aug. 4, 1863. Mr. Hewitson. Cases of fever.—I visited at the School Hill, Allenheads, two patients labouring under fever, apparently typhoid or gastric, and which, from the history given me by Mr. Hewitson, was certainly imported and had spread by contagion.

A young man, a schoolmaster at Fir Tree, about 25 miles from Allenheads, was taken ill with fever, and his sister residing at Allenheads went to nurse him, and was with him about a week when he died. She then returned home, sickened with fever a few days after, and died, after an illness of about a week, on the 26th of July. When I visited the house on the 4th of August there was a sister about 25 years of age, ill in bed, and presenting the usual symptoms of typhoid,—oppression of the brain, prostration of strength, and diarrhœa, with fullness of the abdomen, but without any spots, which had commenced six or seven days before. A brother also, about 20, was evidently sickening, and had been poorly two days. The first sister who died had symptoms of typhoid, but not any of the rose-coloured elevated spots.

Nenthead, Aug. 3, 1863.—Dr. Carson stated that he formerly saw much more of miners' disease than he does at present. Ten or 12 years ago he had always two or three cases of disease in the last stage under his care. Now, he has never at any time more than one or two cases. This difference he ascribes to the better ventilation of the mines, and to the more advanced age at which the men commence to work underground. Formerly they went very young, now they are not allowed to go to the mines before they are 18, though at 14 they work underground during the cold weather in the winter. There is no marked alteration of any other kind in the circumstances of the men; their wages are much the same, and there is no material change in their mode of living.

When at Middleton, 28 years ago, he occasionally saw lead colic among the men, and had seen dropping of the hands, but the men do not now suffer materially, the smelt mill being better ventilated.

The men are generally temperate in their habits, there may be some few who take a pint of ale after they finish their work in the evening, but the majority take none, except on pay nights, and then some may perhaps take too much. They smoke too much. The men live much upon tea and bread. They do not usually get animal food, except a little bacon, but they generally have a good dinner on Sundays. The men, some of them, have gardens and others ground enough to keep a cow, which helps them much, for generally there is a difficulty in getting milk.

There is no changing-house or "shop" at Nenthead, but the men live within a short distance of the mines, and change and wash at home.

Dr. Carson obligingly took me to the cottages inhabited by the various classes of workmen at Nenthead.

The cottages built by the company for the smelters are very good; they are pleasantly situated on one side of the valley with a bank sloping to the Nent, laid out as gardens. The cottages have two large and high rooms, are properly drained and have a yard behind, with a coal cellar, dust bin, and privy. The only objection is, that the rooms are only two in number, and this, for large families, is too few, and was complained of by some of the residents.

In a group of recently built miners' cottages, the company have so enlarged the dimensions as to admit of two rooms on the ground floor and two bed-rooms above.

There are other cottages not belonging to the company, which are defective, and some of them are most objectionable. A portion of these cottages are thatched, have only two small and low rooms, the upper in the slanting roof, and sometimes only reached by a ladder; there is no under drainage, sometimes no privy, and rarely any garden ground. One row was especially defective, the houses being divided across so that there was one tenement in front and another behind, and of course no thorough draught.

The company provide schools, a reading-room, and medical attendance in accident or sickness, and there is a fund in connexion with the mine to which most of the men belong, and which gives relief, temporarily in case of sickness or accident, and permanently when the miner is disabled from following his occupation any longer. There are also clubs in which the men are enrolled.

Mr. T. Millikin.—The levels have for many years been driven 6½ feet high and 4½ feet wide, and they vary in depth from 20 to 100 fathoms. There are a great number of surface ventilating shafts, besides the various levels of the different mines, all communicating with each other, as well as the upper and lower levels of each separate mine. At the western boundary they likewise communicate with Garrigill mines, and at the eastern boundary, with the Coal Cleugh mines. The Rampgill mine, where it communicates with the Coal Cleugh workings, is one mile in length. Ladders are used from the various levels to all the different workings, which will not average 15 fathoms in height.

The mines are, as a whole, dry, and are chiefly worked by blasting.

Artificial ventilation is adopted in all the progressive new openings, such as levels, rises, opening drifts, &c.; this is done by means of trap doors, hand airing machines, and

various other machines, which are carried by water. There are trams laid in the day levels, along which small trucks are pulled by horses or pushed by the men, and when the miners go to their work their tools are placed in the trucks, and some ride whilst others push the trucks.

MIDDLETON IN TEESDALE, MR. BAINBRIDGE.—The required working hours of the miners is 40 hours per week, divided into five daily shifts of eight hours each, whenever the mines are near the residences of the miners, as in the Alston Moor district; but in Teesdale, where the mines are scattered and at a great distance from the miners' residences, then five 8-hour shifts are converted into four 10-hour shifts, and other equivalents of the weekly 40 hours.

It is only in urgent cases, such as the driving the level or drift to its destination, or the completion of communications to the surface, that the men are required to work three 8-hour shifts in the 24 hours. It is in these cases that the ventilating fans and water blasts are used to propel pure air through cast-iron pipes to the points where the men are working. When communications have been effected between drifts and rises and sumps and the surface, reliance is placed for ventilation upon the currents of air passing between the level mouth and the surface shafts.

The men, when working at mines at considerable distances from their homes, live at "mine-shops," provided for the purpose in the immediate vicinity of the mines. These generally contain separate changing, mess, and bed rooms, with a washing room provided with a stream of good spring water, which flows first into a wooden trough, in which the miners place their cans of milk for the purpose of keeping it fresh and cool, and then into a trough for washing. There is also a separate room or pantry for the deposit of the miners' wallets, containing the provisions which they bring with them from home for their support during the week. The ventilation of the sleeping-rooms is promoted by openings in the walls covered by perforated zinc plates, and by a double cylinder passing from the roof into the open air, the inner being longer than the outer, and both so capped as to prevent the entrance of snow and rain, or of too strong a downward current of air.

The beds and blankets in these shops are provided by the company, and are washed by the men.

When in the mines the men wear a flannel shirt and cap, with a vest and trowsers, which are taken off on leaving the mine and hung up in the changing room to be dried by the fire which is kept always burning.

Some of the working miners are small "statesmen" or the sons of "statesmen" whose properties are inadequate to their maintenance, but the larger proportion of them are merely the tenants of the lords of the mines and other landowners in the neighbourhood, and a still larger proportion have not more than a cottage and garden, but there are comparatively few who have not the opportunity of cultivating a garden. The district in which the mines are situated does not afford agricultural employment, but some of the men obtain occasional day's work in the improvement of the meadow and pasture lands.

No women or girls are employed about the mines in any way. The boys must be 12 years of age before passing from the school to the ore dressing floors; and during the suspension of the "dressing" in the depth of the winter, which as Middleton is about 700 feet above the sea, is severe and prolonged, the washer boys who are 14 years of age are placed as labourers with the underground pickmen. They thus get about three months work underground during each year till they are 18 years of age, when they are usually allowed to work regularly in the mines, but in recent years the need for employment of the boys at the ore dressing has been such as to occasion their engagement there up to 20 years of age, which will doubtless contribute to their healthy stamina, whatever may be the effect upon their skill as miners.

The company have schools for their workmen's children at Nenthead and at Middleton in Teesdale where the majority of their miners reside. In the more distant districts and where they have not schools, the company assist the local schools, and allow the parents to select those to which they send their children, on the condition that the company's inspector shall ascertain that the children are efficiently taught.

The reading rooms at Nenthead and Middleton were erected at the company's expense, and the cost of cleaning, heating, and lighting is borne by them. The members attending the room contribute *3d.* monthly towards the purchase of newspapers and periodicals; an exception being made to youths under 18, who only contribute *2d.* monthly. The general management rests with the members themselves. There are also free libraries open to all their workmen, and numerous village and hamlet libraries which the company have aided in establishing, and to the maintenance of which they contribute.

In Middleton there is a very large and beautiful schoolhouse which has recently been erected by the Company. I visited with Dr. Ewart numerous excellent cottages with four large and high rooms, and properly provided with all conveniences, and with back yards and gardens and underdrained, built by the Company for their own people. There are also numerous good cottages built on their own freeholds by the workmen.

In the Company's recently erected cottages a system of ventilation has been introduced which appears to act very efficiently. A tile pipe is extended from beneath the ceiling of the rooms in the wall along the side of the chimney flue, (but without any connexion with it) which has an outlet in the side of the chimney above the roof. The air in this tube becomes rarified by the heat derived from the adjacent smoke flue, and so the impure air from the room is removed.

The Company's benefit society includes all the regular workmen in their employment, together with the agents, clerks, overseers, &c. if they are anxious to become members. The members on entering the society must be in good health, and pay a fine proportioned to their age, and subsequently contribute 30*s.* a year till 65 years of age. From the society they receive 7*s.* a week when entirely laid by from sickness or infirmity, or a less sum if capable of partial occupation. At the age of 65 all contributions cease, and the members are entitled to 6*s.* per week, whether in sickness or health, for the remainder of their life.

The fund also makes a contribution at the death of the workman or his wife, and a small donation to the widows of those who have been upwards of a year members of the society.

The Company provide medical attendance in cases of sickness and accident, and have resident medical men at Nenthead and Middleton, whose duty extends to the families of the workmen (including midwifery), all free of charge to the workmen.

ALLENHEADS.—At Allenheads there is a reading room and school house provided by Mr. Beaumont for the miners, and numerous good cottages, some the property of the proprietor, others built by the workpeople. There is also a school house in Weardale.

MR. BEWICK.—At these and the other large mines belonging to Mr. Beaumont, until recently, the only parts which required artificial ventilation have been the foreheads or foremost ends of particular drifts, which had no through communication, and these have been hitherto almost invariably ventilated by propulsion by means of fans, bellows, water blast, or other adaptation, according to circumstances. Within the last two or three years ventilation by means of exhaustion has been introduced on the Blackett Level (new) Works. At one point on this work the air is extracted from the forehead in metal air pipes five inches diameter, connected with a pair of cylinders having valves similar to Struve's plan. These cylinders are fixed at the surface at the commencement of the level, (which is already driven nearly half a mile and daily increasing,) and are worked by a water wheel eight feet diameter.

At two other places on the Blackett Level exhausting fans on Biram's principal are applied; at one of these two and at the other three forcheads are ventilated. In each of these cases the machines are placed near the top of a vertical shaft or pit, a five inches air pipe being carried from each forehead along the level, up the shaft, and to the machines at the surface, both of which are driven by water wheels.

At another of the shafts on the Blackett Level where there are two foreheads, the fresh air is propelled from the surface by a fan connected with air pipes (5 inches diameter) which pass from the fan down the shaft and to each forehead. This fan is also driven by a water wheel.

The advantage of exhaustion over propulsion or vice versâ, is not yet satisfactorily decided. In narrow airless foreheads propulsion has the advantage of delivering a current of pure air at the place where the miners are occupied, whilst by exhaustion, the fresh air which has passed into the mine to replace the exhausted air, becomes deteriorated before it reaches the workmen. In ventilating a large area, or series of mines, exhaustion is, I think, preferable.

The general ventilation of the older and more extensive mines of Mr. Beaumont is carried out by shafts and levels without the intervention of artificial or machine ventilation, the only exceptions to this are the two furnaces, one at this place and another at the Burtree Pasture Mine in Weardale.

The Allenheads furnace was first lighted in July 1861, and has since continued without intermission, except for repairs, &c.; that at Burtree pasture was commenced in October 1862, and has since been in constant operation, except for about four months in the beginning of this year. Each furnace is in connection with the whole mine, but where the levels are far distant—say, 1 to 1½ miles—the effect is not perceptible. By these furnaces the atmosphere of the

mine is rendered more generally pure. The smoke from the explosion of the gunpowder and other deleterious matters are more quickly carried away, and the men are enabled to work more energetically for a longer time and with less fatigue than they could previously, and in fact, in some places under particular atmospheric conditions, they were, before the furnaces were erected, occasionally unable to pursue their work.

There is only one other furnace that I know of in the Northern Lead Mining Districts, and that is at Fallowfield Mine, near Hexham. The workings are comparatively limited, and it is only occasionally necessary to light the furnace.

Our experience of the furnace for ventilation is highly satisfactory, and its usefulness in ventilating extensive workings underground cannot, I think, be questioned.

The two furnaces and the three machines on the Blackett Level are the only cases of ventilation by exhaustion in this district.

The vertical shaft at this place is 77½ fathoms deep, but it is at 40 fathoms from the surface where the main horse level strikes off into the workings. There are many other shafts and levels connected and communicating with the surface, so that many parts of these mines are naturally ventilated. The different levels are connected by ladders or inclines, but more generally by the former. The men at this place have not to climb much, but at Burtree Pasture mine there is a good deal of climbing. Taking Mr. Beaumont's mines as a whole, there is not a great amount of ascending and descending by ladders; many of the mines are worked by adits, others by vertical shafts at which is erected machinery for winding, by which the workmen are brought to the surface, and with the exception of Burtree Pasture none of these mines can be considered deep, at least they are far short of the Cornish and other metallic mines.

Burtree Pasture mine is worked by day or adit levels, and by vertical and inclined shafts. The main or horse level, from its mouth to the forehead, is a little over two miles in length. In this however are several sumps, communicating with other higher and lower levels, and there are two shafts which communicate with the surface, at the top of one of which is placed the furnace, 96 fathoms above the horse level. The deepest workings for lead ore are 134 fathoms below the horse level, or 230 fathoms lower than the furnace, but not immediately beneath it. The furnace is more especially applied to ventilate that portion of the workings extending beyond the shaft at which it is placed, but it has a beneficial effect over the whole mine, the air being chased or traversed through the various workings by means of trap doors and such like. With the exception of the furnace, and any especial foreheads in which there is not a through communication, there are no artificial means of ventilation at this mine. Generally speaking, when air is forced into a forehead, it is not from the surface, but from the nearest ventilated point (say, in one of the main levels) underground. The maximum distance from the surface, by existing levels and shafts, of any working in this mine, is 785 fathoms.

In this district the levels are generally drifted of an egg-shaped section, the maximum dimensions being 6 to 7 feet high, and 3½ to 4½ feet wide. There are of course exceptions to these dimensions, both in height and width, but these are the usual sizes. The workings for ore are of almost every conceivable size and shape, from 2 to 20 feet wide, and 6 to 60 feet high but generally the veins are from 4 to 6 feet wide, and the ore is worked by headings, roofs, and soles; when a roof working gets to a height beyond reach, a timber floor or "bunding" is fixed, from which the miners continue their operations. When the ore is found in "flats" the height is from 3 to 6 feet, and up to 60 or 70 feet wide on each side of the vein, but the width is exceedingly irregular. In the Burtree Pasture mine, as before mentioned, the men have a good deal of climbing; this is owing to the great depth of the workings, and the want of machinery adapted for winding them down and up the shafts. This will, however, I hope, shortly be obviated by the erection of suitable machinery.

Mr. Beaumont's mines, as a whole, are dry: there are, no doubt, many wet places, but in the Great Limestone, and some other of the most productive strata, there is little water.

Boys are not employed until they are 10 years of age, and then only on the surface in dressing the ores and such like. None are employed in the mines under 13 years of age, and unless they are robust and healthy they must be 15 or upwards. Much depends too on the place of work. Youths of from 13 to 18 are not allowed to commence in the mines unless the place is unobjectionable as regards ventilation, &c.

In connexion with the Allendale mines there is an arrangement for providing medical attendance and medicines to the workmen and their families. Each workman who is a householder pays 5*s.*, unmarried workmen or lodgers 2*s.* 6*d.*, and boys about a day's pay, per annum. The married workmen in addition pay 7*s.* 6*d.* for each midwifery case. These sums, except the last, which is paid in full, are paid by half-yearly instalments at the offices of Mr. Beaumont, and go towards payment of the salary of the medical officer of the district; the deficiency, about 47 per cent., being made up by Mr. Beaumont. The surgeons are appointed by Mr. Beaumont, and receive a quarterly salary; they have to provide medicines, and give personal attendance, in all cases of sickness of the workmen or their families resident within a certain fixed district. The payment from the workmen living in that district is compulsory, but those residing beyond the limits are not required to pay the annual contribution, and do not receive the benefit of the surgeon of the works, except by paying his charges as an ordinary practitioner. The medical officers are, in addition to their salary, allowed any private practice of the district. In *all* cases of accident the surgeon of the works attends without extra pay, and he has also to examine and report on the health of candidates for admission to membership in the benefit societies on the same terms. Non-workmen, members of the benefit society, may have the benefit of the surgeon for themselves, but not for their families, on paying at the same rate as workmen, and on condition that they intimate such to be their desire on *entering* the society. In the Allendale mines there are two districts—East Allendale and West Allendale; and there is a resident surgeon engaged by Mr. Beaumont for each district. In the Weardale district no such arrangement exists.

Quite independent of the preceding, there are benefit or friendly societies in the different localities. Those at Allenheads and in West Allendale were established within the last 17 years; the former in 1850, the latter in 1847; and both are most liberally supported by Mr. Beaumont on the principle that help is given to those that help themselves. The funds are, however, quite distinct, and under the entire control of the members. The tables were prepared by Mr. Neison, and the payments are proportioned to the age of the member on entering, and the amount of "sick pay" or "sum at death" for which he chooses to enter. Membership of this society is entirely voluntary. Mr. Beaumont subscribes aunually in proportion to the amount contributed by the ordinary members, and according to the funds safely and satisfactorily invested at the termination of each year's transactions. Thus, at the end of each year, Mr. Beaumont contributes *five per cent.* on the total amount paid by the ordinary members during the year, and *two per cent.* on the total capital at that time. These sums are guaranteed for periods of five years, and are purely donations. The monies of the societies are invested in the National Debt Office, the local Savings Bank, or on mortgage. Mr. Beaumont derives no direct benefit from, nor has he any control over, the funds.

In consideration of Mr. Beaumont's contribution, non-workmen are admitted members by permission of himself or his chief agent, and on payment of one halfpenny per sixpence or part of sixpence beyond the rates specified in the tables. It is also a condition that a workman, on leaving Mr. Beaumont's service of his own accord or for misconduct, has his contribution to the benefit society increased in the same proportion; but, on the other hand, when a non-workman member enters Mr. Beaumont's service, his payment is reduced to the rates given in the tables.

Except the trustees, all the officers of these societies are elected annually by the members. There is no restriction on their choice, except what is stipulated by their rules, viz., that not less than one-half of the committee shall be chosen from among the honorary members.

The trustees (not less than one-half of whom must be honorary members) are likewise elected by the members, but for life, or until they resign or are disqualified. These societies by special tables provide for annuities to commence on attaining 70 years of age, but not one has been subscribed for.

Similar benefit societies do not exist in Weardale, but the Miner's Lodge of Odd Fellows at St. John's Chapel numbers many members (mostly miners), and has a large capital. There is also a benefit society, the members of which meet at the Miner's Home at Newhouse Office, belonging to Mr. Beaumont, and, although an old society, it has few members, and is not flourishing.

At Allendale Town, too, there is an Odd Fellows Lodge, and a Friendly Society called the Royal Oak or "Private Club," in consequence of its meetings being held in a private house; but these societies, although doing much good, are not in prosperous circumstances.

The majority of the members of all the friendly societies

in these districts are miners, or workmen connected with lead mining, the staple trade of the locality.

The East and West Allendale and the Newhouse Benefit Societies have, by Mr. Beaumont's kindness, the free use of his miners' rooms for holding the monthly or other meetings, and firing and candle-light, gratis, at the respective places.

There is a building society established in the district, the head-quarters of which are at Allenheads. To this the owner of the mines does not contribute, but allows the members the free use of the Miners' room in which to hold their meetings, and at certain places on his property, the members have the opportunity of purchasing freehold building sites at a very moderate rate.

There are no "mine shops" or "changing houses" in connection with the Allendale mines. Most of the miners live near the place, and go home to change. Others who live at a distance change in the cottages adjacent to the mines, and pay the cottager a nominal sum for the accommodation and for drying their mining clothes. In Weardale, where the mines are spread over a larger area, there are several "mine shops" or "barracks," in which the miners live during the five days they are at work each week, carrying their "wallets" and preparing their own food. For these shops Mr. Beaumont provides firing, fittings, and furniture of a rough kind, and each workman finds his own bed-clothes, plates, knives, and forks, &c.

Note, February 23rd 1864.

With reference to the propulsion or exhaustion of air for ventilating close forcheads in mining, from further experience on the Blackett Level Works the two Biram's exhausting fans have been removed and propelling machines substituted. The exhauster on Struve's plan continues in operation, and works satisfactorily. The great advantage in propulsion is the delivery of the pure cool air at the heading where the miners are at work.

MINERS AT WORK.

APPENDIX 3.

AT LONDON LEAD COMPANY'S MINES AT NENTHEAD.

Age of Miner.	At what age he began to work underground.	How many years he worked underground.	Whether he has ever suffered from any serious illness, and is now quite well. If not, of what does he complain.	Condition and Appearance.
38	19	19	No. Yes. But "rather touched in the wind."	Healthy.
32	14	8	No. Yes.	Healthy.
27	19	8	No. Yes.	Healthy.
35	20	13	No. Yes.	Healthy.
50	18	32	No. Yes.	Healthy.
24	18	6	No. Yes.	Healthy.
19	18	1	No. Yes.	Healthy.
29	21	6	No. Yes.	Healthy.
42	18	24	No. Yes.	Healthy.
55	18	37	No. "Middling well."	Healthy.
41	21	20	No. Yes.	Healthy, deaf.
18	Just beginning.	—	No. Yes.	Strong and healthy.
22	18	3	No. Yes.	Healthy.
30	19	11	No. Yes.	Healthy.
31	17	14	Injured by a blast.	Healthy.
19	18	1	No. Yes.	Healthy.
29	20	9	No. Yes.	Healthy.
31	17	14	No. Yes.	Thin and pale.
22	18	2*	No. Yes.	Healthy.
25	19	6*	No. Yes.	Healthy.
28	26	2	No. Yes.	Healthy.
49	18	31	No. Yes.	Rather worn, but fairly healthy for the age.
20	18	2	No. Yes.	Robust.
27	19	8	No. Yes.	Healthy.
41	19	22	No. Yes.	Healthy.
48	17	31	Away for a fortnight with pleurisy, otherwise no illness, and now well.	Healthy.
41	18	23	No. Yes.	Healthy.
30	18	12	Eye injured by blast a year and a half ago.	Healthy.
24	18	6	No. Yes.	Healthy.
27	18	9	No. Yes.	Healthy.
30	18	12	No. Yes.	Thin but healthy.
20	18	2	No. Yes.	Robust.
24	18	6	Suffers from rupture, otherwise Yes.	Healthy.
31	19 Went underground to blow engine at 7.	12	No. Yes.	Healthy but rather pale.
31	18	13	No. Yes.	Healthy.
38	11	27	No. Yes.	Healthy.
35	18	17	No. Yes.	Rather pale and thin.
45	8	37	No. Yes.	Healthy.
52	10	42	2 or 3 years ago ill for 17 weeks.	Fairly healthy for the age.
22	18	4	No. Yes.	Healthy.
44	18	26	No. Yes.	Healthy.
52	9	43	Has suffered from bad colds, and only has "middling" health.	Fairly healthy for the age.
27	18	9	No. Yes.	Healthy.
30	9	21	No. Yes.	Healthy.
43	18	25	No. Yes.	Healthy.
31	18	13	No. Yes.	Healthy.
33	12	21 Was away 4 or 5 years & then returned again.	Suffered from pain in back and kidneys 6 years ago, now well.	Healthy.
21	18	3	No. Yes.	Healthy.
28	19	7	No. Yes.	Healthy.
46	20	26	No. Yes.	Healthy.
32	18	14	No. Yes.	Healthy.
26	18	8	No. Yes.	Healthy.
24	18	6	No. Yes.	Healthy.

* Employed in Mr. Beaumont's mine.

FORMERLY MINERS, NOW WORKING AT SURFACE

Age at present.	Age at which he went under ground.	How many years he worked under ground.	At what occupation now employed.	Whether he has ever suffered from any serious illness, and is now quite well. If not, of what does he complain.	Condition and Appearance.
45	20	10	Foreman of washing floor.	No. Yes.	Very Robust.
50	18	not stated	At washing floor.	No. Yes.	Healthy.
35	not much underground		A Trammer in shafts.	No. Yes.	Healthy.

APPENDIX 4.

AT RODDERUP FELL MINE.

Age of Miner.	At what age he began to work underground.	How many years he worked underground.	Whether he has ever suffered from any serious illness, and is now quite well. If not, of what does he complain.	Condition and Appearance.
30	20	10	No. Yes.	Healthy.
18	just commenced.	½ of a year	No. Yes.	Healthy.
62	15	47	Is a little "touched in breath," but generally enjoys good health.	Fairly healthy for age.
52	13 or 14	38 or 39	Short breathed, and especially when suffering from cold.	Fairly healthy for age.
22	9	3	No. Yes.	Healthy.
30	19 or 20	10 or 11	No. Yes.	Healthy.
21	19	2	No. Yes.	Healthy.
55	24	31	No. Not much "touched in breath."	Healthy.
50	15	35	No "Not much touched."	Healthy.
23	20	3	No. Yes.	Healthy.
42	18	24	No. "Little short in the wind."	Healthy.
18	—	not a year	No. Yes.	Healthy.
39	18	21	No. Yes.	Healthy but pale and thin.
20	—	A year and a half.	Injured by stone in eye.	Healthy.
24	18	6 years.	No. Yes.	Healthy.
23	18	5	No. Yes.	Healthy.
20	18	2	No. Yes.	Healthy.
21	18	3	No. Yes.	Healthy.
35	20	15	No. Yes.	Healthy.
19	12	7	No. Yes.	Healthy.
23	19	4	No. Yes.	Healthy.
34	24	10	No. Yes.	Pale but healthy.
33	18	15	Had misfortune and laid by for 3 months.	Healthy.

WORKING AT SURFACE, BUT FORMERLY MINERS.

56	14	41 Gave up a year ago, now foreman of surface work. "A little short breathed. Worked sometimes in good, sometimes in very bad places.	No. Yes.	Healthy.

APPENDIX 5.

AT ALLENHEADS.

Age of Miner.	At what age he began to work underground.	How many years he worked underground.	Whether he has ever suffered from any serious illness, as if so now quite well. If not, of what does he complain.	Condition and Appearance.
36	15	21	No. Yes.	Healthy.
57	12	45	No. Yes.	Healthy for age.
36	7	29	No. Yes.	Healthy.
43	9	34	No Yes.	Healthy.
53	15	38	No. Yes.	Healthy.
58	12	46	No. Yes.	Healthy.
34	11	23	No. Yes.	Very robust.
38	16	22	No. Yes.	Healthy.
47	14	33	No. Yes.	Healthy.
21	15	6	No. Yes.	Healthy.
33	14	19	No. Yes.	Healthy.
38	15	13	No. Yes.	Healthy.
22	15 or 16	6 or 7	No. Yes.	Healthy.
43	14	29	No. Yes.	Healthy.
18	15	3	No. Yes.	Healthy.
32	14	18	No. Yes.	Healthy.
23	20	3	No. Yes.	Fairly healthy.
36	15	21	No. Yes.	Healthy.
34	14	20	No. Yes.	Healthy.
38	16	22	No. Yes.	Healthy.
19	15	4	No. Yes.	Healthy.
18	8	10	No. Yes.	Healthy.
48	14	34	No. Yes.	Healthy.
27	20	7	No. Yes.	Healthy.
33	14	19	No. Yes.	Healthy.
39	17	22	No. Yes.	Healthy.
39	14	25	Rheumatic fever and rheumatic pains when 20 yrs. of age.	Healthy.
18	12	6	No. Yes.	Healthy.
44	14	30	No. Yes.	Healthy.
34	16	18	No. Yes.	Healthy.
34	15	19	No. Yes.	Healthy.
22	15	7	No. Yes.	Healthy.
27	15	12	No. Yes.	Healthy.
56	19	37	No. Yes.	Healthy for age.
47	15	32	No. Yes.	Healthy.
18	13	5	No. Yes.	Healthy.
37	15	22	Ailing. Shortness of breath, &c.	Not healthy looking.
52	15	37	Poorly in early life, but well since.	Healthy.
40	18	22	Laid by with rheumatics a year ago, now well.	Healthy.
24	17	7	No. Yes.	Healthy.
27	23	4	No. Yes.	Healthy.
19	12	7	No. Yes.	Healthy.
27	16	11	No. Yes.	Healthy.
43	17	26	Inflammation of chest twice within last 4 years, attended by cough and spitting of blood, shortness of breath, &c.	Decidedly delicate looking.
23	14 or 15	8 or 9	No. Yes.	Healthy.
52	10	42	No. Suffers from shortness of breathing.	Worn looking.
44	8½	35½	No. Yes.	Healthy.
64	18	46	No. Yes. Says he has all his life been well.	Healthy for age.
45	19	26	Suffered 3 years ago from sciatica, and still more or less.	Fairly healthy.

APPENDIX 6.

AT Mr. BEAUMONT'S MINE, BURTREE PASTURE, COWSHILL, WEARDALE.

24	12	12	Yes.	Healthy.
20	14	6	No. Yes.	Healthy.
37	11	26	No. Yes. Has had pleurisy and rheumatic attack, and is not so very well now.	Delicate.
37	9½	27½		
35	17	18	No. Yes.	Healthy.
40	17	23	No. Yes.	Healthy.
20	16	4	No. Yes.	Healthy.
23	16	7	No. Yes.	Healthy.
21	16	5	No. Yes.	Healthy.
23	11	12	No Yes.	Healthy.
19	17	2	No. Yes.	Healthy.
46	16	30	Suffers in breath and from indigestion.	Worn.
30	19	11	Suffers "little bit in breath."	Worn, pale, and thin.
38	20	18	No. Yes.	Healthy.
25	8	7	No. Yes.	Healthy.
19	14	5	No. Yes.	Healthy.
16	6	10	No. Yes.	Healthy.
19	10	9	No. Yes.	Healthy.
41	14	27	Short breathed at times.	Worn and pale.
18	10	8	No. Yes.	Healthy.
19	14	5	No. Yes.	Healthy.
42	14	28	No. Yes.	Healthy.
26	18	8	No. Yes.	Healthy.
37	18	19	No. Yes.	Healthy.
57	7½	30½	Little short breathed.	Worn.
21	14	9	No. Yes.	Healthy.
28	18	10	No. Yes.	Healthy.
38	18	20	No. Yes.	Healthy.
26	12	14	No. Yes.	Healthy.
41	15	26	No. Yes.	Healthy.
28	18	10	No. Yes.	Healthy.
21	15	6	No. Yes.	Healthy.
24	18	6	No. Yes.	Healthy.
23	15	8	No. Yes.	Healthy.
17	Just commenced.	0		Healthy.
20	15	5	No. Yes.	Healthy.
25	13	12	No. Yes.	Healthy.
42	12	30	No. Yes.	Fairly healthy.
30	21	9	No. Yes.	Fairly healthy.
37	18	19	No. Yes.	Fairly healthy.
31	21	10	No. Yes.	Healthy.
22	19	3	No. Yes.	Healthy.
46	14	32	No. Yes.	Healthy.
41	20	21	No. "A little touched in the wind."	Healthy.
22	17	5	No. Yes.	Healthy.
20	17	3	No. Yes.	Healthy.
33	12	21	No. Yes.	Healthy.
43	8	35	No. Yes.	Healthy.
21	17	4	No. Yes.	Healthy.
48	20	28	Injured by blast 4 years ago. "A little short breathed."	
45	17	28	Nothing particular. "A little worse in health."	Healthy.
22	10	12	Had a misfortune and was crushed by fall of rock in mine.	Thin but healthy.
24	12	12	No. Yes.	Healthy.
55	14	21	No. Yes.	Healthy.
26	19	7	No. Yes.	Healthy.
20	17	3	No. Yes.	Pale and thin.
38	20	18	No. Little short breathed.	Healthy.
19	12	7	No. Yes.	Healthy.
20	11	9	Stated himself not to have suffered and to be quite well, but was pale, thin, and decidedly delicate looking.	
44	15 or 16	28 or 29	"Nothing particular. A little short breathed."	Healthy for age.
50	15 or 16	34 or 35	"Touched in wind."	Fairly healthy for age.
27	14	13	No. Yes.	Healthy.
18	10	8	No. Yes.	Healthy.
19	10	9	No. Yes.	Pale.
25	10	15	No. Yes.	Healthy.
12	10	2	No. Yes.	Healthy.
21	10	11	No. Yes.	Healthy.
28	10	18	No. Yes.	Healthy.
62	10	52	No. "Little short in breath."	Fairly healthy.
28	16	12	No. Yes.	Healthy.
29	10	19	No. Yes.	Healthy.
19	14	5	No. Yes.	Delicate looking.
23	16	7	No. Yes.	Healthy.
59	10	49	No. Little touched in breath.	Healthy.
36	17	19	No. "Rather short breathed."	Healthy.
61	11 but did not work regularly at first.	50	No. "Breath not so good."	Healthy.
21	16	5	No. Yes.	Healthy.
50	15 or 16	34 or 35	No. "Short breathed."	Healthy.
32	8 Away from the mines for a year.	24	No. Yes.	Healthy.
19	14	5	No. Yes.	Healthy.
23	10	13	No. Yes.	Healthy.
25	10	15	No. Yes. Bronchocele.	Healthy.
49	11	38	No. Yes.	Healthy.
31	18	13	No. Yes.	Decidedly delicate looking.
26	10	16	No. Yes.	Healthy.
18	11	7	No. Yes.	Healthy.
16	15	1	No. Yes.	Healthy.
48	7 or 8	40 or 41	No. "Rather not much touched."	Healthy.
69	10 or 12	48 or 50	No. "A little touched."	Healthy.
25	18	7	No. Yes.	Healthy.
18	11	7	No. Yes.	Healthy.
20	16	4	No. Yes.	Healthy.
16	14	2	No. Yes.	Healthy.
42	9	33	No. Yes. "Not much touched in breath."	Healthy.
35	15	20	"Nothing particular." "A little short breathed."	Healthy.
41	15	26	No. Yes.	Healthy.
55	8	47	No. "A little short breathed."	Healthy.
38	8 or 9	29 or 30	No. Yes.	Healthy.
45	11	34	Had a misfortune; fell down a sump seven fathoms. "Short breathed."	Healthy.
64	8	56	Lost an eye, but not in mines. "Short breathed, but able to work."	Healthy.
20	18	2	No. Yes.	Healthy.

MEDICAL REPORT

On Condition of Miners in North Wales. By Thos. B. Peacock, M.D., F.R.C.P., Physician to St. Thomas's Hospital, and to the Hospital for Diseases of the Chest, Victoria Park.

After being in the mining districts of the north of England, I visited the neighbourhood of Mold in Flintshire. In that district I was informed that the lead mines had been generally closed about 20 years ago, and the men employed in them had either gone to other occupations, left the neighbourhood, or died off. The newly opened mines had not been long in work. There are not therefore, at the present time, many ailing miners to be met with in the district, but the medical men who had been in practice for a sufficient length of time, were well acquainted with the different forms of affection to which the miners are subject, and through them I was enabled to see and examine three men who were suffering in this way. Two of them were old men, 56 and 77 years of age, who laboured under miners' asthma, in its most characteristic form, which they had contracted while working in the former mines. The third case was that of a man 30 years of age, who had been a miner only for two years. He was suffering from a a feverish attack with bronchitis, which he ascribed to having taken cold at the surface, but he was apparently predisposed to consumption and in delicate health before he commenced to work under ground. The particulars of the cases of these men will be found in the Appendix.

At Minera I also examined 100 men whom I found at work. A considerable number of them had, however, only worked underground for a short period, so that they could not be regarded as fairly representing the condition of the mining population. Many of them also spoke only Welsh, and the informatron obtained through others could not be thoroughly depended upon. I have not therefore given the results of the examination of these men. The general impression produced by their inspection was, however, that they are a less robust race and less healthy than the miners in the north of England. Scarcely any of the men had commenced to work underground at a very early age, and many of them had become miners at somewhat late periods of life, and it struck me that those who had commenced only after having attained adult age, were especially delicate looking. As regards the causes of disease among the miners, there was sufficient evidence that they correspond with those which have been shown to operate in Cornwall and the North of England. The recently opened mines are apparently generally well ventilated, though I was informed that in some places and at some times, the air was "dead or rather slackish" and that "choke damp" or carbonic acid gas was occasionally given off from the shaly strata. The defect was reported not however to be such as to prevent the men working, for the candles can always be got to burn, though they require to be sometimes much held on one side, "listed." No artificial system of ventilation is usually employed, except a fan occasionally, in "driving." The men enter and leave the mines as in Cornwall, by vertical shafts and ladders, but the workings are at present not so deep as to make the climbing very injurious to the men, though I was told that the ladders tried the men who were getting into years, and whose breathing was at all affected. Some of the levels are said to be very wet.

The older mines, from the information which was given me by the men whom I examined, must have frequently been in a very defective state. One of the invalided men stated that he was in a mine at Brongwyn on the 4th of September 1854, when 7 men were suffocated by choke damp. He said that the air of the mine was generally good, but became very defective about nine days before the occurrence of the accident, as shown by the candles being with difficulty got to burn, and only burning when they were held on one side. On the morning of the accident the men did not return at the changing time, and he was sent down to see what was the matter. On getting to the bottom of the shaf he found that the "damp" was in the mine, and with difficulty escaped, and was only got to the surface with the assistance of others. "He was not sleepy and knew everything that passed, but had no power in his limbs, could not take hold of anything, trembled all over, and could not stir." He was ill for a fortnight, and then got about again, but had never been so good a man since, his breathing being affected and his limbs weak. He, however, only suffered seriously after he had sustained an injury in 1856. He is now 56 years of age; his health first failed when 46 years of age, but he continued to work underground till two years ago. He confirmed the statement which was frequently made in the north that when the miners work in bad air their appetite fails, and they have pains in the bowels, and on leaving the mine "spit black stuff, or stuff as black as a cherry or bilberry."

Some of the smaller mines in parts of North Wales, which I did not visit, appear to be at present in a very bad state. A man, met with at Minera, a smith who had worked at his trade at different mines, said that at a small mine at Nantfrancon and at other mines in Carnarvonshire, the men suffered very much. "He had seen the men come up after working in such places, as if they were almost dying, and he supposed they might have died if they had remained below much longer. They would throw themselves on the ground quite spent when they first came up, but it would soon go off. The bad air affected them in their heads at first, and it took the power out of their limbs, and after working some time their wind became bad, and they were never fit for hard work afterwards. This was the case with the young men, more or less, but particularly with men who were getting a little into years." One of the medical men residing at Mold mentioned that formerly the miners were subject to lead colic. After special enquiries of practitioners in other lead mining districts, this assertion has not been confirmed. Both in Cornwall and the North of England the miners suffer much from symptoms of indigestion, pains in the stomach and bowels, and constipation or diarrhœa, especially the former. These symptoms are probably due to the cold and damp to which they are exposed, and to working with their feet in cold water. The bad air which they breathe also produces indigestion, and the symptoms have apparently no connexion with lead. In the neighbourhood of Mold, where coal is got on the spot, the ores were formerly in some instances smelted near the mines, and thus the miners may have occasionally worked as smelters, and so have suffered from the influence of lead.

Note in reference to the occurrence of fever in cottages at Maes y Safyn, near Mold.

At the Maes y Safyn mine, near Mold, I found that fever had been very prevalent. At the mine there are some very good cottages, with slated roofs, four large and high rooms; properly provided with privies, and underdrained, and with a passage at the back and a large garden in front. There are also other cottages which are extremely defective. They are small, thatched, huddled close together in rows, and generally consist of only two small and low rooms; the upper one in the slanting roof, and reached only by a ladder; the windows too are generally small, and usually do not admit of being opened.

These cottages are placed upon the side of a somewhat steep and rocky hill, with a rapid descent to a valley in front. Several of them have pigsties; none are underdrained; few are said to have privies, and scarcely any have any garden ground. From the mode in which they are built in two irregular rows, one behind the other, the drainage of the upper row sets down to the lower. At the time of my visit, streams of dirty water from the pigsties and dirt heaps were oozing across the foot paths in different places, and the ground around the cottages must be completely saturated.

There are about 35 to 40 of these cottages, and only 8 or 10 of the good ones; the rent of the former, without any garden ground, I was told was 3*l.* per annum, while the good cottages, with a large piece of garden ground, were only 4*l.* 10*s.* The total population of the hamlet is from 300 to 350.

Shortly before my visit there had been many cases of fever, but they had all recovered. Fever was prevailing in other parts of the district; and it was apparently introduced into Maes y Safyn from Gwernymynnyd, a village about 2 miles off in the road to Mold. It commenced first in a public house on the opposite side of the valley to the cottages; then appeared in the good cottages; and lastly in the bad cottages, and amongst them it continued to prevail for a long time. Altogether I am informed by Dr. Hughes, of Mold, that at least 56 cases of fever occurred, though only one proved fatal. The situation of the hamlet on the slope of a rocky hill in a somewhat shallow valley, affording every facility for drainage, without any elevated hills to prevent ventilation, is certainly a healthy one; but huddled together as the cottages are, wanting in every means of ventilation, and unprovided with any proper drainage, it would be scarcely possible to select a place in which fever would be more likely to arise spontaneously, or, if introduced, to spread.

MEDICAL REPORT

On the CONDITION of the HÆMATITE IRON MINERS in FURNESS, LANCASHIRE, by THOMAS B. PEACOCK, M.D., F.R.C.P.

In the month of March last I visited the district of Furness with the object of inquiring into the condition of the men employed in the Hæmatite Iron Mines. At the Parks Mine, in the neighbourhood of Dalton, I examined 93 men found at work, and at Dalton, visited 13 men who were either labouring under some form of indisposition, or were aged and had been employed in the mines for several years.

The general impression formed of the men whom I examined was, that they were a robust race and as healthy as men who are employed in other equally laborious open air occupations. Only a small number of the men had been engaged at the mines for any considerable length of time, the majority having recently commenced to work underground, and after having previously followed other occupations, most generally agricultural labour. In 13 instances, however, the men had worked at the mines for periods varying from 20 to 30 years, though two of them had been away occasionally. Of these 10 both appeared and stated themselves to be in good health, and though the other three were somewhat delicate looking, they were free from any serious disease; and all of them on inquiry stated that they did not suffer from shortness of breath, cough, expectoration, or other indications of the asthmatic affections which are so common among the miners in other districts. The results of personal observation were confirmed by the information received from others who had ample opportunities of judging, and who stated that the miners were or any healthy as the men employed in agricultural labour, fully as other pursuits.

Through the obliging introduction of Mr. Hall, who, as surgeon to the clubs in which most of the men are enrolled, attends a large proportion of the miners, I was enabled to visit several ailing and aged men. The inquiries which I made did not elicit any information which led me to suppose that the work in the mines exercised a materially injurious influence over the men. Indeed the only cases of sickness which fell under my notice were cases of accident, cold and influenza, disorder of the digestive organs, and scarlet fever,—that disease being prevalent in the district at the time.

Mr. Hall also informed me that he has not in the course of his practice, extending over 35 years, or from the commencement of the period in which the mines have been in active operation, observed among the men any particular tendency to bronchial or other forms of asthmatic affection, or any proof that they suffer at all seriously from working in bad air. He states that the only affections to which the men are liable are common colds, bronchitis, or pneumonia, and rheumatic affections,—diseases which are prevalent in the district generally, but to which the miners are more subject than the rest of the population, from their becoming tendered by working underground and occasionally in damp or wet places. Mr. Cranke, who, from his position as medical officer of the Lindale Moor Mines, has had great opportunities of observing the condition of the miners, in a letter with which he has favoured me, confirms the statements of Mr. Hall.

It thus appears that the mining population in the district of Furness are free from those affections which are so productive of disease and premature failure of power, in the men employed in the tin, copper and lead mines of Cornwall and Devon, the North of England and North Wales; and I have no hesitation in pronouncing them to be in a far better sanitary condition than any other set of miners whom I have examined.

The following circumstances appear to be those to which the more healthy condition of the Furness miners is to be ascribed:—

1st. *The mines are better ventilated.*—The men whom I questioned uniformly reported the ventilation of the mines to be good. The ironstone mines are only shallow when compared with the mines of Cornwall. A mine which is 80 to 100 yards in depth, is usually spoken of in the Furness district as a deep mine. The ore lies in the strata in masses often of great depth and extending over a considerable space, and the strata through which it is reached are generally easily penetrated, so that several shafts are sunk within a comparatively limited space, and the men have never to work at any great distance from an air vent. The drifts or horizontal shafts which are run at different levels to effect the removal of the ore, are of large size, and afford ample space for the passage of air. The various shafts also generally freely communicate, and thus adequate ventilation is generally maintained without the employment of any artificial means.

Formerly, however, when the mining was carried on on a smaller scale, the men had sometimes to work in bad air, and they are still occasionally subjected to the same, but only for a limited time, as in sinking shafts or driving, or when working in the bottoms of the mines, before the levels have been fully opened up by different shafts. That under these circumstances the air is occasionally unusually bad, is shown by the reports given by the men. Thus they state that sometimes the candles burn badly, that they can only be got to burn when held on one side, or cannot be got to burn at all. Under these circumstances the men say they suffer from loss of appetite, sickness, dizziness, shortness of breath, and prostration of strength, but they do not apparently work in air sufficiently bad, and for a period so long as to be materially or permanently injured by it. It is indeed only very occasionally and for a day or two at a time, and chiefly during close weather in summer or autumn, that the general atmosphere of the mines becomes defective. When this is the case an iron pan containing briskly burning wood is let down one of the shafts by a chain and is moved up and down for a short time. In this way an upcast current is usually soon caused in the shaft, and the movement of the air is sometimes assisted by throwing a small stream of water down one of the pumping shafts. It is stated not to be necessary to have recourse to any other method of promoting ventilation.

The ore which is obtained in the Furness district is usually in small or soft masses, and only requires to be worked by the pick, blasting being, in some mines, seldom required. The air of the mines is thus not rendered unwholesome by the presence of the products of combustion, and when "shots" do require to be fired, the ventilation appears generally to be so good that the smoke rapidly clears off. Of the men whom I examined, several had worked in Cornwall, and others in North Wales, the Isle of Man, and Ireland, before going to the Furness mines, and all agreed in stating that the air in the latter was much better than in the mines they had before been employed in.

2nd. *The men have generally only become miners after they are grown up, and have attained their full vigour.* It will be seen by the table in the Appendix that of the men examined at Parks Mine, who had worked underground at the iron mines for periods of one year and upwards, 67 in number, the mean period of commencement of work underground was 24·9 years; the extreme ages being 40 and 34, and 15 and 16 years. Most of these men had previously been employed as farm labourers, some few as quarry men, and others as navvies working on the railways. I specially inquired of the men who had worked in Cornwall what they thought was the effect of the employment of young boys in the mines, and they all stated their belief that it was a main cause of the premature exhaustion and failure of health of the miners, and that it was not necessary in order to make a good miner that the boys should begin to work underground before they are 17 or 18 years of age and are approaching their full vigour.

3rd. *The miners in Furness probably live better than in the other metal mining diltricts.* In Cornwall the miners live chiefly or pastry, bread, potatoes, &c. and get but little fresh animal food and usually only some bacon. This diet may be in part from choice, but the men often say that they cannot afford to purchase fresh animal food. I endeavoured to ascertain the wages of the men with the view of learning how far the last assertion is correct, but from the way in which the miners are paid "according to their bargains," and the deductions to which their earnings are subjected, it is difficult to make out what sums they on the average actually receive. Whatever be the cause, I certainly thought that the Cornish miners did not get so nutritious a diet as men following an occupation so laborious as theirs require.

In Furness the wages of the miners are good, averaging as far as I could learn, from 20*s.* to 25*s.* per week, and though the underground men are paid by the piece, the sums which they earn do not appear to vary much. They also live well, getting fresh animal food, at any rate several times a week, with bread, milk porridge, cheese, potatoes, &c., and they are certainly better nourished than the Cornish miners.

The men who had worked in Cornwall, North Wales, the Isle of Man, and Ireland, all said that they earned better wages and were consequently able to live better in Furness than where they had previously been employed. I was also told, both by the miners themselves and by other persons residing in the district, that the miners live better

than the agricultural labourers; and this was assigned by more than one independent observer as the reason why the miners do not suffer, as they might otherwise be expected to do, from working underground. I thought myself that such of the men as had been only recently taken on at the mines were less healthy looking than those who had been some time employed as miners; though this might be due either to the new men suffering from the occupation, or to the old men having improved in health from the more nutritious diet which they got.

4th. *Dust.*—Some of the men who had worked in other metal mines before going to the iron mines stated as one reason why they suffered less from working in the latter, was that there was less dust, and that the litttle dust which they breathe is not injurious to them. It is probable there is much truth in this remark. One man whom I met with, who had previously worked at the hæmatite mines, said that the men swallow the dust, and when they leave working "spit red," and that the red spit will be brought up when they have colds, even five or six weeks after they have given up working underground. The softer kind of ore is also very unctious, and adheres readily to the skin, and the ochery tinge once acquired is long before it can be got rid of. The iron may therefore very possibly enter the system, and being absorbed into the blood, may counteract the blanching effect which is generally produced by working in the dark. Certainly the Furness miners have not the anæmic appearance which is so characteristic of the men who work in the tin, copper, and lead mines in all the districts which I have visited.

5th. *Temperature—Wet.*—The mines are, as before stated, shallow, and being better ventilated do not become so warm as to interfere with the work of the men. They are, however, so much warmer than the external air that the men complain that they become tendered by working in them. Some of the pits also, and especially those which are old, and the lower workings or "bottoms" of most mines, are often more or less damp and sometimes very wet. It will be seen that both Mr. Hall and Mr. Cranke ascribe the colds and rheumatic affections to which the men are liable to the operation of these causes.

6th. The miners usually enter and leave the mines by ladders or "sties," as they are locally termed; but the mines are not so deep as to make the exertion of ascending and descending any serious labour, and I met with only one man who stated that the ladders tried him, and he was 57 years of age, had been a miner at intervals for 22 years, and was still working underground.

It would be premature to pronounce definitively as to the effect of the iron mining upon the health of the men employed in the work. The mines have not as yet been in full work for a sufficient length of time for any large number of workmen to be brought up as miners. The mines have been chiefly opened within the last 25 years, and there were few men of those whom I examined who had been at work over 20 years; and of those some had not constantly worked as miners. Indeed, the period of work of the 67 men who had been entirely employed in the iron mines averaged only 11·7 years, and the extreme periods of work were 30 and 28 years, and 1 and 2. The mean age of the men will also be seen to be 36·4 years, and the extreme ages 56 and 57, and 20 and 21. It is evident, therefore, that but few of the men have been employed in the mines so long as fully to test the effects of the work, and that they have not generally reached the age at which the miners become ordinarily seriously affected in health and strength. It may, however, safely be concluded, that if the occupation were materially injurious to them, the men would already show signs of failing power and impaired constitutions.

It is possible that the mines, though now so well ventilated, may become hereafter less so. At present they are only shallow, but in some situations the extreme depths of the deposits of ore have not been reached, and it may be necessary to sink much deeper shafts. If so, the facility of ventilation may be lessened, and the character of the air in the lower workings may become defective.

Notes taken in Furness.

Mr. Hall, Surgeon, Dalton in Furness.

March 26, 1864.

There are not at present many ailing miners in the district. Those who have recently been ill have suffered from colds and dyspeptic symptoms, and from scarlet fever, which has been prevalent. The miners do not suffer particularly from any form of disease, and are upon the whole as healthy as the agricultural labourers, or any other set of workmen. They complain a little sometimes of working in bad air, and then suffer at the stomach, but not to any serious extent. They have sometimes to work in wet places the water dripping down upon them, and often ankle deep in water, and under these circumstances have colds and rheumatic complaints.

For the most part, the men have only been employed at the mines for a few years, and after they were grown up, and had been previously employed in agricultural pursuits. Some few of them may have been at the work all their lives; but they also do not appear to suffer more than men who work in the open air, and they are not particular subject to bronchitic or asthmatic affections.

The miners are usually well paid. Most of them work at piece work, and may get from a pound to 25*s.* per week. Others work at the surface on regular wages, and they earn about 18*s.* They live well, usually having fresh meat several days in the week, with milk porridge, potatoes, bread and cheese, and bacon; and many keep a pig.

The cottages inhabited by the miners are generally good. The are built in rows, of rough limestone, and are slated. They usually contain four rooms, and are properly underdrained, and provided with dusthole, privy, coalhole, &c. Many of the cottages have small pieces of garden ground attached to them, but others have none, though many of the miners rent allotments. The cottages are usually inhabited by only one family, but some have two. Some of the older cottages consist of only two rooms, and are very defective. The rent paid varies according to the situation and accommodation from 2*s.* per week, to 2*s.* 3*d.*, 2*s.* 9*d.*, and 3*s.*, paid monthly.

The men are generally in clubs, from which they receive medical and pecuniary relief in cases of sickness; and in cases of injury the proprietors generally provide medical attendance. In some of the mines there are clubs to which the men subscribe, and from which they receive 8*s.* or 10*s.* per week in cases of accident. Medical relief is only provided, however, in cases of accident; except at the Lindale Moor Mine, where a medical man is regularly engaged.

There are large newly erected National Schools at Dalton, which are partly supported by an endowment formerly devoted to the maintenance of a grammar school, partly by the proprietors, and partly by the children's pence. Some of the mine masters stop a portion of the workmen's wages for the support of the schools. There are also other National Schools in the parish, at Lindale, Ireleth, and Newbarns, recently built.

Iron mining has been carried on in the Furness district for many years, but it is only within the last 25 to 35 years that it has become important. When Mr. Hall first knew it, about 35 years ago, the only mine in work was that at Lindale Moor, and it only employed from 40 to 50 men, and often fewer. Now there are 400 to 500 men at work there. Mr. Rawlinson's mine, at Butts Beck, was the next opened; and that gentleman and other mine masters have opened others all around, employing a large number of men.

Mr. George Simpson, the Relieving Officer for the Dalton district, confirmed the report of the state of the miners given by Mr. Hall. He said that the miners were as healthy as the rest of the population, and he was not aware that there were any particular ailments to which they were liable from working underground. Both he and Mr. Hall said that they were generally a steady set of men, though some occasionally took too much ale. Many of them smoke a great deal.

Mr. Cranke, Surgeon, Ulverstone.

Letter dated April 2, 1864.

"I have been employed by the Lindale Moor Company for some years to attend their workmen; and from the experience I have had I conceive their men to be as healthy as the agricultural labourers, except that they suffer more from rheumatism in its different forms, and from chest affections; that is to say, common colds, bronchitis, and pneumonia. These, however, might be obviated by the use of woollen shirts during work, and change of clothing immediately afterwards. The men do not suffer, in consequence of their employment, from asthma and consumption. They are not subjected to the breathing of bad air to any great extent; but the mines are sometimes very wet. There is no dust. I am paid by the Company; and in case of sickness and accident a weekly allowance is granted to the sufferer from a fund in connexion with the mine."

Captain Hoskins, Park Mines, Dalton in Furness.

Went to work underground in Cornwall when only 11 years of age, and worked as a miner for 13 or 14 years. He worked at Wheal Caroline, in the Marazion district, and at East Crofty and at Carn Brea Mines. He never worked

for any length of time in any place where the air was very bad and did not suffer at all from it. He has been at work at the Furness Mines for the last 25 years. He considers these mines to be far better for the men than the Cornish mines. The mines are a mere nothing in depth compared with those in Cornwall, and although the miners inhale a small portion of dust from working in iron ore, it is not injurious to the constitution. In Cornwall the boys go to work much too early. They should not go before they are 18. When they go as early as they often do it is not giving them fair play, for though they say the boys only do boy's work, it is harder work for them than men's work. They must not, however, go to work too late, or they will never make good miners. Many of the men employed here, who have been farm labourers before, were too old for miners. In Cornwall they would be worth almost nothing. But if the boys go at 18 they are generally strong enough for the work, and are quite capable of becoming good miners.

The strata which the shafts have to be sunk through to reach the iron ore consist of clay and gravel, which is provincially termed "pindle." The ore is reached by shafts, which vary from 6 feet 6 inches by 5 feet wide to 14 feet by 8 feet wide. Vertical shafts are sunk so as to be within about 100 yards of each other. The drifts are run at various depths from 20 yards to 100 yards, and they are made 7 feet square. The shafts are of various depths, but they all communicate to the 80 yards level, and the deepest or drainage shaft is 120 yards deep. The men use ladders for access and egress.

The chief part of the ore is so soft as to be worked with the pick, and there is very little kidney ore at Dalton. When reached it is all taken away, and the roof is supported by wood, larch wood being preferred for the purpose; the crush is, however, very great, so that the wood is entirely crushed, and the ground settles. In some places the surface has sunk 30 feet in consequence. The whole space occupied by the mine is about three acres.

The mines are generally dry, and there is not much dust. Occasionally, but not often, in certain states of atmosphere, the air in the shafts stagnates, and cannot be got to move, and candles will not burn, and the men cannot work. When this is the case they let down a fire pan filled with wood, which is burning briskly, by a chain into a shaft, and move it up and down, and this creates an up-cast current. If the air was very bad the fire would not burn, but he never remembers an instance of its not burning. In addition to this it is sometimes necessary to force the current on by throwing a stream of water by the engine which works the pumps for draining the mines, for an hour or two in a day, according to the state of the weather.

There are two changing houses or "drys" at the Parks mine. These are provided with a supply of hot and cold water, and tubs for washing, with frames for hanging up the clothes used in the mine to dry.

No women or children are employed at the surface, as the ore does not require any picking, and is sent as raised to the furnaces.

There is a fund in connection with the mine, which is formed by each man contributing 4½*d.* per week. From this fund the miners receive 10*s.* per week in cases of sickness and accident, and all expenses of medical attendance, &c. in cases of accident.

Captain Hoskins's brother is also employed at Parks mine. He began to work underground in Cornwall when 12 years old, and worked at the Pen, Bertha, Croft, Wheal Neptune, Marazion, and Carn Brea mines. He has worked in bad air, and thinks if he had stayed in Cornwall he could not have lived till now, but would have died of what they call the "miners' consumption." He has now been in Furness for 16 years, and thinks the iron mines more healthy than the mines in Cornwall, and he considers this to be from the Furness mines not being so deep and more free from sulphur and powder smoke.

Statements of ailing and aged Miners, &c.

No. 1. Aged 53. Dalton in Furness.

March 26, 1864.

Went to work at the ironstone mines 16 or 17 years ago (or at the age of 36 or 37). He has worked at Mr. Kennedy's mines at Roanhead for the last 15 years, and at depths varying from 30 to 50, 60, and 80 yards. The men are let down and drawn up in cages drawn by an engine. The shafts vary in size; some are single, and are about 4 feet 6 inches by 6 feet; others are double, or from 6½ by 7 feet. The "roads" or "drifts" in the pit are about 7 feet high and 8 broad. When they get to the ore they take it all away, and prop up the roof with wood. There are several shafts coming to the surface. Generally the air is good, but sometimes there may be a little bad air in places. The smoke is away in a moment, but in some mines it may "lig in for an hour or two," but not when there are several engines at work.

Some of the men go to work at 3 a.m. and leave at 12, and then another batch goes down at 12 and comes up at 8 p.m. They do not often have parties working at night, and only under particular circumstances. The mines require to be pumped, but when the men work it is quite dry. There is not much "stour or dust" in the mines.

Some of the men who work at the surface of the mines have regular wages, and earn about 18*s.* per week. Those who work below are on piecework, and get about 20*s.*, 21*s.*, or 22*s.* a week, and sometimes more. They generally live well. He has cake or bread and cheese and tea at breakfast, and he takes tea with him to the pit. At dinner he gets fresh butcher's meat almost every day, or at least two or three times a week, with potatoes. In the evening he has potatoes and bread, and sometimes bread and milk. Occasionally he has a pint of beer, very rarely any spirit. He smokes about 3 oz. weekly.

He has had to work sometimes for a few days in bad air, but never in very bad, and that was when he first started, and not since he has been at Roanhead. The bad air is shown by the candles not burning well; the flame gets small, and sometimes the candle goes out, and then they have to leave work. The bad air "makes a body dizzy, and "just as if he was drunk and weak, and all of a tremble "in the limbs, and takes away his appetite, and makes him "sick whiles." It does not cause pain in the stomach or affect their bowels.

He has never suffered in the chest particularly, and his breath is good, and he has never anything the matter with his stomach. The dust has sometimes affected his breathing. He is still working underground. He is small, has a stooping gait, and is spare and sallow, but is healthy looking for his age.

No. 2. Aged 72. Dalton in Furness.

March 26, 1864.

Worked as a farm labourer till he was 23 years of age, and has been a miner for 30 years, but has not been constantly at work at the mines, being occasionally off for a year or two when trade was not brisk. He has worked for 11 years at Elliscales for Mr. Ashburner, and for 5 years for Mr. Rawlinson, and before that at Lindale Moor, but he was off occasionally, and cannot say how long he worked there.

The air is very good in cold weather, but sometimes it is bad in close muggy weather, and the wind affects the air in some mines; in his, the air is bad when there is an east wind. When the draught is good the smoke clears away rapidly, but if not you are almost poisoned by it. Sometimes he has worked when the air was very bad, and when the candles went out, "and then he became weak and all of a totter, your limbs would not carry you, and the sweat stands upon the face as big as peas," but they had then been in long enough and had to come out. The last time he was in air as bad as this was two or three years ago, but generally the bad air goes off in a few hours. He had "to give up working in the bottom, it affected his wind, and he now works at top when the air is good." "He believes it is still the same way if there are not proper roads and air vents. They are ill plagued till they get a road, and it may be for a month or six weeks. Sometimes they work both ways and try to meet it."

He gets the same wages as other miners, about a pound a week, and lives well. At breakfast he gets bread and butter, and takes coffee to the pit with him; for his dinner he has meat, fresh or salt, and at night he takes milk porridge. He has taken a good many pints of ale in his time, but little or no spirits, and he smokes. He has never had anything particular the matter with him in his life. "His breath is not good, but may be as good as most men at his age." He has a hard cough and some expectoration. The heart's sounds are flat, but without murmur; the pulse is feeble; tongue furred; appetite "middling," and the food he eats agrees with him; the bowels are regular. He is still in regular work underground, and is hale and strong for his age.

No. 3. Aged 73. Dalton.

March 26, 1864.

Has worked regularly at the ironstone mines for 14 years, and was employed at farm labour before. He first worked at Parks mine, and then went to Mr. Ken-

nedy's, and has been there for the last nine years. "He has almost always been in good air, but he has worked in bad for a chance time for a bit, may be for a fortnight or so." This has not been the case for the last two years. "The candles would always burn, but they burnt dull. The air did not at all affect him, and he has never worked in any very bad air. He earns about a pound a week, and generally gets fresh meat every day. He does not take much ale. His tongue is somewhat furred, pulse quick, does not complain of shortness of breath or any other symptom of indisposition, and is a stout healthy-looking man.

No. 4. Aged 30. Barrow.

March 26, 1864.

Has twice worked at Parks Mine. He first went there when he was a young man and worked ten months, and then left in consequence of the water breaking into the mine and four men being drowned. He afterwards went again for two years, and then left in consequence of a crush occurring and his mate being killed. It was partly his own fault; he was not materially injured; there were only two or three scratches on him; but he was smothered. He does not know that the miners are not as good men as the agricultural labourers, but they look pale. He is in a club in which most of the miners are, and he does not think they suffer more than others. He is also not acquainted with any sick miners, and he must have known it if many of them had been sick; and was not aware that they suffered from coughs, or were bad in their breath, or in any other particular way. They got better wages, and that enabled them to live better, which was favourable for them.

The miners breathe the dust of the ironstone, and when they leave the mines they spit red stuff. When they get a cold they spit red stuff a long time after they have left going to the mine. He did so fully five weeks after he had worked in the mines. The iron ore is of greasy nature, and it gets into their skin, and won't come out even with washing.

Generally the air of the mines is good; but sometimes it is bad, and the candles cannot be got to burn, and the men are unable to work. Sometimes also the candles don't go out but won't burn well, and then if the men continue to work they feel sick and all of a tremble, and have their breath stopped, and lose their appetite; but this is not often the case.

No. 5. Aged 33. Dalton in Furness.

March 27, 1864.

Has been a miner for eight years, and worked as a quarryman before. Since he has worked at the ironstone mines he has been at Mr. Ashburner's mine of Elliscales, and also at Mr. Kennedy's at Roanhead. In the last mine he worked in bad air twelve months ago for six months. It was at the pit bottom gaining the ore. It was 60 or 70 yards underground, and there was only one shaft, and they were driving about 10 or 15 yards from the shaft. The candles only burnt when they were held on one side, and then they smoked very much, and sometimes they went out. He felt "a little short in the wind at times," but he stood it well and did not suffer; but one of three others who worked with him complained one day of being "terribly dizzy." They did not use any artificial ventilation. Now there are two shafts, and the air is good.

Before he went to work at the mines, about twelve years ago, he lost one eye from an injury by a stick, and now he has had an accident by which he has injured the other eye. This accident did not, however, occur at his work in the mines. He has been off work in consequence of this accident some time, and has got out of health, and now complains of dyspeptic symptoms, flatulency, pain in the bowels, difficulty in passing water, &c. His tongue is clean, pulse weak but not quick; bowels regular. He is pale and delicate looking.

No. 6. Aged 3 Dalton in Furness.

March 27, 1864.

First went underground when nine years of age, and works a Roanhead at the present time. He has however been away at the quarries occasionally. He has never worked in bad air. The drift he works in is 26 or 27 yards underground, and the air is good, but sometimes the smoke does not clear away very quickly.

He has always enjoyed good health, except that he met with an accident in firing a shot in a quarry. He has earned various sums while at work as a miner, as little as 16*s.* and as much as 27*s.*, but generally 20*s.* to 22*s.* or 23*s.* per week.

He is now suffering from cold. Has a severe cough but not much expectoration; his appetite is defective, his pulse somewhat quick, and he is prostrated and pale; the bowels are confined except when he takes medicine.

No. 7. Aged 47. Dalton.

March 27th, 1864.

He worked underground for six or seven years, at Elliscales, but for the last 13 years he has been engaged at the surface as an engine-driver. He never worked in bad air except for about four days, and then it was nothing but what he could stand. He thinks that the cause of the failure of his health was his having worked in the pit's bottom where it was warm (but not warmer than an ordinary room) and that tendered him so that he readily took cold when at the surface. "All miners get a little tendered and are not so hardy as men that work out." "Some of the pits are dry and some wet, and the old pits have naturally more wet than the new ones."

He complains that he has been suffering for some time from pains in the stomach, and sickness and vomiting after food; but he is now free from sickness and altogether better, but he still has pain and flatuleney. There is obviously some swelling and hardness in the liver and in the situation of the pyloric end of the stomach, and he is extremely thin and pale, and much prostrated. There are no symptoms of or signs of disease of the lungs or heart.

No. 8. Aged 39. Dalton in Furness.

May 27th, 1864.

A Cornish man. He first went to work underground at "Buckett's" mine between Redruth and Cambourne, near Carn Brea, and while there worked in plenty of bad air, what they call "cold damp." "The candles would sometimes only burn when "heeled," or two placed together, or placed behind them, but he was young then and did not suffer." He has been working at the ironstone mines for 17 years. Since he came here he has not had to work in bad air, except a little at times for a day or two, but never for any length of time. He considers the mines much better for the men than in Cornwall. "His father was a miner and worked in Cornwall for 50 years, and died when he was 67, but generally they can't work in Cornwall after they are 40 to 43 or 44; certainly the ironstone miners are the better men. There is not much dust in the ironstone mines, and they don't swallow it as they do the copper in the Cornish mines."

"Then the mines in Furness are not a tenth part the depth. It is a deep pit that is 100 yards, and where he is now working is only 20 yards. The drifts also are larger and give more air, and that is one of the things the men have in their favour. Here too, the mines all lie together, and they sink many shafts near together, some perhaps as near as 100 yards, others may be 200 or 250 yards apart, and then there are so not many men for each shaft. They could not sink shafts in that way in Cornwall; they could not afford to do it."

"The men also live better in Furness, for they get more money. For the last year he has worked at the surface, and gets 3*s.* per day for a week of six days, though the Saturday afternoon is a holyday. When at work below he got 4*l.* 4*s.* to 4*l.* 10*s.* and might get sometimes as much as 5*l.* per month, according to his bargain, but there is not the uncertainty about the work that there is in Cornwall. He thinks that this country is one of the best for working men."

He first went to work underground in Cornwall to do what they call "boy's work," but that is harder for them than the men's work for them, and going so soon must wear them out very quick. He thinks they would make just as good miners if they went at 16 or 18, as if they went at 10, but it is a great gain to a man to be able to take a son down with him. When he worked in Cornwall there were not so many boys at work as he understands there are now.

Since he has been at work in Furness he has been at Parks Mine. About a year ago he had erysipelas, and has not worked underground since, though he has been quite well and at work at the surface.

His present indisposition is only a cold which he has taken, and he has had a cough and sore throat, and lost his voice, but he is now much better. He is a small dark-complexioned man and is somewhat pale.

No. 9. Aged 57. Dalton in Furness.

March 11th, 1864.

He has been altogether a miner for 22 years. He went underground at 20, and has been away sometimes. When underground he has worked both in good and bad air, but never in very bad; though he sometimes found the candles would not burn but he has never known this for the last 10 or 12 years. He has lately been working for Mr. Ashburner at Elliscales. He has never had anything the matter with him but typhus fever—sometime back. He is still at work but the "sties" or ladders try his breath, though it is not generally bad.

No. 10. Aged 73.

Went to work underground when he was 23 years of age, but has not worked regularly ever since, having been away at times when times were bad and work slack. He has generally worked in "capital air," but about 17 years ago he worked in bad air. He has latterly worked at Mr. Rawlinson's at Cross Gates. He has never had anything the matter with him except that he broke his leg badly. He is very deaf.

No. 11. Aged 59. Dalton.

March 27th 1864.

Has worked as a miner for 10 years, and before that was an agricultural labourer; then they used to get about 12*s.* per week; now they get 18*s.* from the farmers. He had been working at Cross Gates for Mr. Rawlinson, and has sustained a compound fracture of the leg near the knee-joint from the fall of a large piece of rock.

No. 12. Aged 21.

Has worked as a miner for Mr. Ashburner at Elliscales for for 3½ years. He is now just convalescent from scarlet fever.

No. 13. Aged 41. Parks Mine.

March 26th, 1864.

Went to work underground at 18, and worked for 15 years in lead mines in the Isle of Man. When there he was occasionally in bad air; they then felt weak in the arms and legs, and it took away their appetite. They had to use the ladders to get to their work, and he worked at a depth of 195 fathoms. The draught was strong in some parts, but in others it was very slack. There were two shafts to the mine.

He considers himself altogether better off since he came into Furness, and thinks that the ironstone mines are in a better state than the lead mines in the Isle of Man.

Examination of Miners at Work at Parks, Hæmatite Iron Mine, Furness, March 26, 1864.

Age of Miner.	At what age he began to work underground, and previous occupation if any.	How many years he worked underground.	Whether he has suffered from any serious illness, and is now quite well. If not, of what does he complain.	Condition and Appearance.
30	29	1	No. Yes.	Healthy.
37	20	17	No. Yes.	Healthy.
47	30	17	No. Yes.	Healthy.
40	28	12	No. Yes.	Healthy.
52	30 Agricultural labourer.	22	No. Yes.	Healthy.
25	— Agricultural labourer.	2 months.	No. Yes.	Healthy.
35	31 Agricultural labourer.	4	Injured his ankle. Yes.	Healthy.
53	25 Agricultural labourer.	8	No. Yes.	Healthy.
49	31 Working at mines at surface.	18	No. Yes.	Healthy.
40	34 Railway labourer.	6	No. Yes.	Healthy.
30	29 In the army.	1	No. Yes.	Healthy.
56	28 Agricultural labourer.	28	No. Yes.	Healthy.
37	29 Agricultural labourer.	8	No. Yes.	Healthy.
40	30 Agricultural labourer.	10	No. Yes.	Healthy.
44	9 Commenced work in mines in Cornwall. 13 years at work at iron mines.	35	No. Yes.	Healthy.
47	25 Worked first in mines in Flintshire. 15 yrs. at ironstone mines.	22	No. Yes.	Healthy.
42	34 Agricultural labourer.	8 months.	No. Yes.	Healthy.
32	24 Agricultural labourer.	8	No. Yes.	Healthy.
50	24 Agricultural labourer.	6	No. Yes.	Healthy.
31	23 Agricultural labourer.	3	No. Yes.	Healthy.
26	25 Agricultural labourer.	1 year.	No. Yes.	Healthy.
28	19 Agricultural labourer.	9 years.	No. Yes.	Healthy.
24	23 Agricultural labourer.	3	No. Yes.	Healthy.
39	16 Only four years at the ironstone mines.	23	No. Yes.	Healthy.
54	15 First worked for 3 years at lead mines in Ireland; 12 years at ironstone mines.	19	No. Yes.	Healthy.
28	22 Agricultural labourer.	6	No. Yes.	Healthy.
41	18 Worked for 15 years at lead mines in the Isle of Man. Since that at the ironstone mines.	23	No. Yes.	Healthy.
44	23 Agricultural labourer. Away from mines for 2 years.	21	Occasionally from colds. Yes.	Delicate.
47	23 Working for most part at the ironstone mines, sometimes off for a time.	24	Slight accident. Yes.	Healthy.
46	17 or 18	28 or 29	No. Yes.	Aged.
23	16	7	No. Yes.	Healthy.
30	23	7	Laid by a week with sore throat a short time ago. Yes.	Healthy.
48	24 Agricultural labourer.	24	No. Yes.	Healthy.
28	27 Agricultural labourer.	1	No. Yes.	Healthy.
43	31 Agricultural labourer.	12	Was ill for about 8 weeks 2 months ago. Yes.	Healthy.
28	22 Agricultural labourer.	6	No. Yes.	Healthy.
26	20 Agricultural labourer.	6	Colds occasionally. Yes.	Healthy.
23	21 Agricultural labourer.	2	No. Yes.	Healthy.
22	21 Agricultural labourer.	1	No. Yes.	Healthy.
25	— Agricultural labourer.	5 months.	No. Yes.	Healthy.
21	19 Working at the surface before.	2	No. Yes.	Healthy.
25	20 Agricultural labourer.	5	No. Yes.	Healthy.
30	24 Agricultural labourer.	6	No. Yes.	Healthy.
30	21 Agricultural labourer.	9	Slight injury. Yes.	Healthy.
42	30 Agricultural labourer.	12	No. Yes.	Healthy.
22	12 Worked in the tin and copper mines in Cornwall: here only for 12 months, and Wales.	10	No. Yes.	Healthy.
30	20 Postboy.	10	No. Yes.	Healthy.
48	25 Agricultural labourer.	23	No. Yes.	Rather pale.
30	20 Agricultural labourer.	10	No. Yes.	Healthy but thin.
29	Has just begun. Agricultural labourer.		Broke his leg before he came to the mines. Yes.	Healthy.
35	20 Railway labourer.	15	No. Yes.	Thin but healthy.
22	13 Worked in the mines in Cornwall and Devon. Here only for 6 months.	9	No. Yes.	Healthy.
23	18	5	No. Yes.	Healthy.
24	— Agricultural labourer.	1	No. Yes.	Healthy.
29	17½	2½	No. Yes.	Healthy.
23	19 But has not worked regularly.	4	No. Yes.	Healthy.
48	21 Agricultural labourer.	27	No. Yes.	Healthy.
32	27 Agricultural labourer.	5	No. Yes.	Healthy.
35	26 Agricultural labourer.	9	No. Yes.	Healthy.
26	— Agricultural labourer.	3 weeks.	No. Yes.	Delicate looking.
50	28 Agricultural labourer.	22	Had his leg broken. Yes.	Healthy.
38	20 Agricultural labourer.	18	No. Yes.	Healthy.
50	28 Agricultural labourer.	22	No. Yes.	Healthy.
26	— Agricultural labourer.	7 weeks.	Was ill a month ago. Yes.	Healthy.
57	27 Agricultural labourer.	30	No. Yes.	Healthy.
29	27 Agricultural labourer.	2	No. Yes.	Healthy.
54	32 Agricultural labourer.	22	No. Yes. Quite free from shortness of breath, &c.	Healthy.
40	33 Agricultural labourer.	7	No. Yes.	Healthy.
46	40 Worked at a slate quarry.	6	No. Yes.	Healthy.
31	19 Brick maker.	12	No. Yes.	Healthy.
36	23 Agricultural labourer.	13	No. Yes.	Healthy.
31	21 Agricultural labourer not constantly at mines.	10	No. Yes.	Healthy.
35	25 Agricultural labourer.	10	No. Yes.	Healthy, but rather thin.
42	30 A navvy.	12	No. Yes.	Healthy.
38	24 Agricultural labourer.	14	No. Yes.	Healthy.
19	—	2 weeks.	No. Yes.	Healthy.
45	32 Agricultural labourer.	13	Colds occasionally. Yes.	Fairly healthy.
30	—	14 months.	No. Yes.	Healthy.
39	27 Agricultural labourer, worked 2 years in Isle of Man, and 10 at the ironstone mines.	12 years.	No. Yes.	Healthy.
43	30 Agricultural labourer.	13	No. Yes.	Healthy.
40	30 Agricultural labourer.	10	No. Yes.	Healthy.
33	22 Agricultural labourer.	11	No. Yes.	Healthy.
56	30 Agricultural labourer.	26	No. Yes.	Healthy.

Mean age of 67 men who had been employed only in the iron mines and for periods of one year and upwards, 36·4 years.
Extremes of age, 56 and 57 and 20 and 21.
Mean age at which they commenced working underground, 24·9 years.
Extreme ages, 40 and 34 and 15 and 16.
Mean period of work underground, 11·7 years.
Extreme periods, 30 and 28 years and 1 and 2.

DISEASES OF MINERS

IN

CORNWALL,

THEIR FAMILY HISTORY, PERSONAL HISTORY, AND PRESENT STATE, WITH REMARKS.

BY

Dr. PEACOCK, M.D., F.R.C.P.

DISEASES

District .Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, Occupations, state of health and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relations.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
1. Camborne, July 13, 1862; Miners' Asthma and disorder of digestive organs, hepatic symptoms, diarrhœa.	47	- - -	- - -	- - -	16, but worked at the surface for 4 years before.	First worked at tribute at Dolcoath at 180 fathoms below adit for 6 years and then had good air. He then went to East Wheal Crofty and worked at tutwork there for 14 years. While there he worked in bad air at the 64 level for 4 years and 5 months. He returned to Dolcoath and has worked there ever since till he took ill. The air in Wheal Crofty was generally good, but he worked in bad air when sinking winzes and driving ends. He has also worked in shafts where it was very damp and draughty.
2. Camborne, July 13, 1862; Miners' Asthma and Dyspepsia.	40	- - -	- - -	- - -	At 14 or 15, worked at Stamps for 4 or 5 years before.	First worked at North Roskear for 16 months, then went to East Pool, and in both assisted the miners and pushed the barrows with the stuff. The air was bad at the latter mine. He went after, to West Wheal Seton, where he worked for 11 or 12 years. About 12 or 13 years ago he was engaged in driving an adit end at about 25 fathoms from a winze. The place was dry but it was very close, and he suffered very much in it; he felt fulness in the head and stupor, lost his appetite and had weakness in the knees and back in ascending the ladders; he worked at this a year and a half, and then left from want of work. He afterwards went to Camborne Vean but has never been well since, at the latter mine he was also in bad air sinking winzes. It was not hot. He worked 6 weeks and then got ill and was entirely laid by for 8 months, and has not been able to go underground since; since that he has been engaged at surface in landing and drawing up the "stuff" with a horse whim.
3. Camborne, July 13, 1862; commencing Miners Asthma.	25	- - -	Father worked at the surface at mines, and is still living and healthy at 60.	- - -	16	Has chiefly worked at Dolcoath at tutwork, and generally enjoyed good health, till he suffered at the chest from working in a hot place in which also there was much wet, 300 fathoms below the surface. He sweated greatly when down and drank water, and also passed water 3 or 4 times in small quantities.
4. Illogan, July 13, 1862; Phthisis.	36	- - -	Father was a farmer and died of consumption when 40 years old.	Mother living and healthy, had only one sister and she died of consumption.	21, worked at surface before.	He only worked 3 years underground, when he left from suffering at the chest, from working in wet and draughty places, but always had good air; he first felt pain and weakness in the small of his back and in the legs, without either cough, spitting, or beating at the heart. After 3 months he got better, but has never been so strong since. He returned to work, and again failed 7 or 8 years ago, and has had cough and spitting and weakness ever since.

OF MINERS.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory Organs.	Circulatory Organs.	Digestive Organs.	Remarks.
He ascribes his illness to having taken cold from working in draughts and draughty shafts at Wheal Crofty; when he was repairing a shaft, the water came down upon him for hours together as from a "griddle," and he worked there 4½ years. When he worked at Dolcoath he was in good health. His health first failed about 5 years ago, and he suffered from loss of appetite and diarrhœa, and was forced to lay by; he was away some time and then returned, and continued tolerably well till 2 or 3 months ago. His illness commenced with cough and expectoration, and inflammation of windpipe and chest; has never any rheumatic affection, but had cholera 7 or 8 years ago.	Dark complexion, turning grey, very sallow and freckled; stooping gait, highshoulders, lips very pale, eyes glassy.	Has suffered from vertigo but not from headache.	Very short breathed, and has cough, expectoration; some palpitation but less than he has had. The "spit" was dark coloured, but is now pale. Respiration short, 32, chest narrow, fallen in above and below clavicles, very slight movement especially at upper parts, vocal thrill somewhat exaggerated, resonance on percussion somewhat unduly clear, especially at left side, respiration everywhere very feeble, slight sibilus both with the inspiration and expiration on left side, inspiration feeble and expiration harsh and prolonged, respiration especially feeble at right apex, with undue cough and vocal resonance there.	Pulse 112, small and feeble, cardiac dullness natural, cardiac sounds feeble. No anæmic murmur in neck; external jugular on left side distended.	Appetite tolerable, food lies heavy at the stomach; bowels somewhat relaxed, and stools watery. Tongue morbidly red and coated with a thick fur at base. Hepatic dulness extending to nipple and into abdomen.	When working he states that he has earned from 3*l.* 10*s.* to 4*l.*, 4*l.* 10*s.* or 5*l.* per month, and he has a wife and 3 children to support. He rises at about ½ past 4 in the morning and gets underground by 6, having to get his breakfast and walk about a mile. He works underground for 8 hours. His breakfast consists of a cup of tea and bread and butter; he takes also some water and bread and butter underground, when he returns at 2 o'clock he gets his dinner, which consists of a mutton chop and soup and vegetables. He has seldom any beer with it, he thinks he may take about ½ a lb. of cooked meat a day and about a pint of beer, never any spirit unless he is not well.
Assigns the failure of his health to having worked in bad air, and especially at West Wheal Seaton, about 12 or 13 years ago.	Dark complexion, but with light eyes, sallow, spare.	No complaint.	Has spat some blood, not much cough, but occasionally suffers. The sputum is scanty and dark coloured; some shortness of breathing. Respirations 28, very little movement, resonance generally imperfect, vocal thrill natural, no cough res. Respiratory sounds generally feeble, especially at upper part of right side.	Pulse 72, somewhat feeble, cardiac sounds flat and feeble, 1st somewhat rough, no palpitation, no anæmic murmur.	Tongue morbidly red, some prominence in the epigastrium and tenderness on pressure, hepatic dulness natural, splenic dulness also natural, throat relaxed, uneasiness at the pit of stomach, and occasional vomiting of food, bowels always regular.	When working underground he got upon an average about 15*s.* a week, and lived upon bread and butter and a little meat, made in the form of pasty with dough, perhaps not ½ a lb. when cooked, he also takes milk, eggs, and vegetables. He sometimes does not take any beer for 3 weeks together, but on pay days has a little porter and sugar.
Has suffered at intervals at chest but better for last two years, till quite recently.	- - -	- - -	Pains across the chest and throat, but without cough or expectoration, respiration 32, respiratory sounds feeble expansion defective, vocal thrill natural, throat relaxed.	Pulse somewhat quick, 88, and feeble, never spat blood, heart sounds somewhat flapping.	Appetite and digestion impaired, tongue clean, bowels confined.	
7 or 8 years -	Sallow countenance and anxious expression, eyes glassy, stooping gait, phthisical looking and thin.	- -	Complains of shortness of breath, cough, and expectoration, and spits very thick mucus, respirations 20, feeble, dulness on percussion over the right side, very marked below and less so under clavicle, sub. crep. and cough res. over whole side, and less so on left; voice very husky; pat blood 3 years ago.	P. 92 feeble, cardiac dulness not extended, sounds feeble.	Appetite defective, pain at pit of stomach after food, griping pains in abdomen, bowels relaxed at intervals, occasional sickness with cough after taking food, tongue white.	He states that when working he used to get about 3 lb. of meat per week, with potatoes in the form of pasty, he had soup also sometimes, but not milk or eggs. He has not drank spirits, but generally gets a pint of beer on pay days or at other times.

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, Occupations, state of health and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relations.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
5 Camborne, July 13, 1862; Dyspepsia.	67	- - -	- - -	- - -	At 15, and has worked steadily for nearly 52 years.	Has worked in various mines and generally in good air; he was last working in Tolcarne in poor air, and after working for 9 months was taken with an attack of griping and has not been well since.
6. Camborne, July 14, 1862; advanced Miners' Asthma.	57	- - -	- - -	- - -	12, and has worked steadily for 33 years.	Has worked in various mines and generally in good air, sometimes in bad; he gave up after 33 years because he thought he could do without it, and kept a beer-shop. Has not worked underground for 12 years.
7. Camborne, July 14, 1862; Miners' Asthma and commencing Phthisis.	52	- - -	- - -	- - -	At 11, and assisted the men to bring up the "stuff" till 15.	Has worked in different mines, chiefly at tribute and in good air; but when about 20 years of age he had "slow fever."
8. Camborne, July 14, 1862; Hemiplegia.	64	- - -	- - -	- - -	At 11 -	Stated that he had worked in different mines, but for the last 12 years not in any in which there was very bad air. He has, however, worked in dry and dusty mines, and says they are worse than wet mines. He has chiefly worked at tribute, but also at tutwork. He worked altogether for 48 years underground.
9. Camborne, July 14, 1862; Hemiplegia and aortic valvular disease.	51	- - -	- - -	- - -	Worked underground for 15 years, but did not state how long he had given up working and at what age he went underground.	Was employed as a "coacher," in pushing the trucks with stuff along the trams in the levels for 15 years, but never worked in particularly poor air or in close places; indeed "coaching," though harder work than that of miners, is generally done in good air.
10. Camborne, July 15, 1862; marked Miners' Asthma.	54	- - -	- - -	- - -	At 14, and worked for 13 or 14 years underground.	He has chiefly worked at tribute and generally in good air.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory Organs.	Circulatory Organs.	Digestive Organs.	Remarks.
Left work 4 months ago; working in poor air.	Thin and has lost 10 lbs. in weight recently.	- - -	Has no cough or expectoration, respiration feeble, res. on percussion natural.	Heart sounds feeble, pulse somewhat large but very compressible.	Complaining of want of appetite and heartburn, tongue white.	When working he did not get more than 2 lbs. of fresh meat per week, and not much milk, and had to live chiefly on bread and butter, he has taken little or no spirits, but some beer; he does not smoke.
Has been very asthmatic and unable to work for 12 years, and ascribes his indisposition to the irregularity in the times of taking his meals when a miner. His illness commenced with an attack of inflammation of the lungs.	Anxious countenance, pale, very marked difficulty of breathing, stooping gait, has always been temperate.	- - -	Great difficulty of breathing, aggravated at intervals, cough and expectoration, has spat blood several times, respiration puerile and with sibilant rhonchus in all parts. Chest morbidly res. at right side and dull at left.	Palpitation increased on exertion, heart sounds noisy, cardiac dulness extended.	Appetite and digestion defective, bowels regular.	
Gave up working 5 months ago; he worked last in East Pool at a close end where the air was bad. He was well enough while working; but after they had got through into the fresh air he took ill at once. He was taken suddenly 5 months ago with inflammation of the windpipe, and was compelled to lie by, and has not worked since.	Stooping gait, pale, thin, phthisical looking.	- - -	Complains of shortness of breath, cough, and spitting, and has spat some blood; chest very much contracted, very little movement, sparingly resonant especially on right side, and large veins on surface of chest; vocal thrill exaggerated at right side, especially at the apex, less than natural on left side subcrepitation, especially at right apex and more or less over whole chest. Counts to 30.	Heart sounds feeble, pulse 92 feeble. cardiac dullness not extended.	Appetite and digestion weak, sometimes coughs till he becomes sick.	He stated that when working he got about 3 lbs. of meat per week, which was made into a "pasty" with dough. He also took bread and butter, and about a quart of beer in a week, which he had done for 30 years, and never more than a quart at a time.
He was seized with an hemiplegic attack 5 years ago.	Paralysed on left side, and generally weak.	- - -	Breathing somewhat difficult.	No palpitation, heart sounds feeble.		
Had an apoplectic attack 6 months ago, and was left paralyzed in right arm, the leg is painful but not paralyzed; but his speech is so imperfect as to be unintelligible to those who are not accustomed to him. His power of deglutition is not affected. He had a similar fit 5 years ago.	Much stouter than miners generally are. Vacant expression of countenance.	Remains of paralysis on right side, especially of right arm. That arm cool; pains in corresponding leg, but no dragging.	Respiratory sounds and movements natural.	Pulse quick and free from thrill, loud musical murmur heard over the whole front and much of the back of the chest, but most intense at the upper part and the right side of the sternum. The second sound inaudible; has never suffered from rheumatic fever or pains.		
Gave up working underground from failure of health 25 or 26 years ago, and states that he was then thought to be going into consumption; he suffered from extreme weakness, with pain in the stomach and bowels and back, and "heaved up green corrupt stuff." His appetite was good. He had no cough and no expectoration. He was laid by for 4 or 5 months, and went to work at grass after, and has done pretty well since though suffering occasionally, and sometimes unable to work 3 or 4 months at a time. Has been engaged at a shaft in "landing." Has been worse for 3 or 4 years.	Spare, pale, sallow.	- - -	Bad cough with expectoration, and sometimes of blood, once brought up from a pint to a pint and a half at a time. Difficulty of breathing especially at night. Respirations 28. Very imperfect movements of chest, resonance on percussion somewhat unduly clear. Some crepitation at right apex. Throat relaxed.	Pulse 72 feeble. Heart sounds feeble, without murmur.	Complains of pain in the stomach and back, bowels somewhat relaxed, appetite defective, digestion fair.	Has always been temperate in his habits, never exceeded at one time a pint or two of beer, has very seldom taken any spirits. While he worked as a miner he had 4 or 5 lbs. of fresh meat in a week for a family of 6 or 7; sometimes had pork in addition.

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
11. Camborne, July 15, 1862; commencing Phthisis.	37	He has lost brothers in early life.	Father a grassman, living, and in health.	Has lost sisters in early life.	At about 15, and worked for 22 or 23 years.	He has chiefly worked at tribute, and in good air. He was working in North Wheal Bassett when he got ill.
12. Camborne, July 1862; commencing Miners' Asthma; worn out.	47	- - -	- - -	- - -	At 11 or 12, and worked for 35 or 36 years.	Has chiefly worked at tutwork, and has frequently worked in bad air. He last worked in bad air at West Bassett in 30th, and also the 114th fathom levels. The mine was not hot.
13. Camborne, July 1862; advanced Phthisis and albuminuria: Dr. Harris.	21	- - -	Father died of miners disease between 60 and 62; he had worked in a very draughty place, and was ill, and suffered at the chest for 15 months.	Father's brother was a miner and met with an accident which injured his sight, he worked after above ground, and died after being 2 years ailing of an acute illness of 3 weeks duration. Another uncle died of consumption, and 6 of his children died of the same disease. A sister has died of consumption.	At about 16, and worked 2½ years.	He has worked at tribute, at North Roskear, for 2½ years and in good air
14. Camborne, July 15, 1862; Dr. Harris, symptoms of Angina pectoris.	44	- - -	- - -	- - -	at about 17.	He has worked chiefly as a "sumpman," but also as a miner, and when so, at tribute and rarely at tutwork. He has latterly been engaged in "forking out" mines which have been abandoned, and were again in work. In his work he had plenty of air, indeed it has been in draughty places, but it is very wet work, and no clothing would keep him dry. He has latterly been working at a mine at tribute.
15. Camborne, July 15, 1863; commencing Miners' Asthma.	28	- - -	- -	- - -	About 15, and worked as a miner for about 11 years.	Has chiefly worked at tribute, but occasionally at tutwork, and has sometimes worked in bad air and sometimes in very bad, when working in a close end. The mines in which he has worked in bad air, were Wheal Bassett, and Carn Brea, and the latter was the worst.

ISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
Enjoyed good health till March last, except that he had suffered from cold and had cholera 7 years ago. He was then sweating and very hot, and went into a wet place and got a chill. He has been laid by ever since he first got ill, and has tried several times to resume work, but has not been able to do so.	Dark complexioned, fairly muscular, pupils large, lips purple, delicate and phthisical looking, counts to 20, complains of general debility.	- - -	Complains of cough and expectoration, respirations 36, chest imperfectly expanded, especially at the upper part, and on the right side. Some deficiency of the resonance on percussion especially at the right apex, with bronchial respiration, cough and vocal resonance both before and behind; no rhonchus anywhere.	Pulse 92 feeble, and heart's sounds feeble.	Appetite and digestion fair bowels natural.	Has taken a pint of beer once or twice a week, and occasionally a glass of spirits. He has usually had 4 or 5 lbs. of animal food for a family of 3 or 4.
Enjoyed good health till about 7 years ago. When he got ill he was not working in bad air, but ascribes his attack to getting warm with working and then ceasing to work and being chilled.	Dark complexioned, old, looking, and complains of great weakness, rendering him incapable of working. Pale, sallow, very thin, and anxious looking.	Pain and lightness in the head, and occasionally has fallen down before going to work and after coming away.	Shortness of breath, little cough or expectoration, and never spat any blood. Imperfect expansion above and especially on the right side, respirations 32, feeble, especially at right apex, no marked cough or vocal resonance, throat relaxed.	P. 112, feeble, heart's sounds feeble.	- - -	He has not taken any beer for 3 years, and when he took it, it was never more than a pint at a time. He used to get 4 lbs. of fresh meat each week for a family of 7.
He has been ill since November 1860.	Fair complexion with reddish or auburn hair.	- - -	Advanced phthisis, with albuminuria and anasarca.			
Worked steadily as a miner till 6 months ago, and then left from suffering from his present illness. He thinks the dampness of his sump-work injured him, but he did not suffer till after he had given that up, and worked at tribute for 5 years. He has also had a fall of 5 fathoms in a shaft, 14 years ago, but does not think it injured him after the shock was over.	Moderately stout and healthy looking, says he has gained flesh since he has ceased to work underground.	No complaint	No signs or symptoms of disease of respiratory organs.	Complains of very severe pain, which he first experienced when coming out in the morning; the pain is felt behind the top of the sternum, and extends through to the back, and down the arms to the elbows, and especially on left side; when it comes on he has to stop immediately, and after a little while it goes off. He does not feel faint at the time, and has never had any fit or insensibility. The pain is still very severe when it comes on, but he can now "fight it off;" cardiac sounds very loud, no murmur, pulse regular but feeble, equal at wrists, no morbid pulsation or deficiency of res. on percussion.	No complaint.	He has always been a very temperate man, not more than a pint of beer in a week, and a glass of spirit in a month. He has usually about half a pound of fresh meat per day, and has lived chiefly on bread and butter.
Worked steadily and enjoyed good health, till 12 months ago.	Great general weakness, especially felt in climbing ladders; very sallow.	- - -	Complains of tightness across the chest, with cough, but without much expectoration. Pain also in chest, respirations 28, chest generally sparingly res. and respiration feeble. Vocal thrill less distinct on left side. Throat relaxed.	Dyspnœa, especially in climbing ladders; pulse 72, very feeble. Heart's sounds feeble.	- - -	He has rarely taken any beer, not more than 2 quarts in a month. He has usually had about 3lbs. of fresh meat in a week for himself and 5 others.

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relations.	Age at which he first worked under ground.	In what mines he has worked, kind of work, and character of air.
16. July 17, 1862; Miners' Asthma, slight mitral defect, false cartilage in knee joint; general debility.	61	- - -	- - -	- - -	At about 27 years of age; worked as a farm labourer in early life.	He has worked in United Consols and Jewell mines in Gwennap, where it is very hot, especially in the 80, 100 and 200 fathoms levels in United mines. In the lower workings, it is so hot that the men work naked, and though the water is hot, they throw themselves into it. He also had to climb the ladders after working, and was often so exhausted by it, that he could not speak on coming to the surface, and his heart beat violently. They work for spells of 6 hours, but it is so hot, they can only remain in the hot places for an hour or an hour and twenty minutes; they then come out and fire the blast, and wait for ¼ of an hour or 20 minutes till the smoke clears away, and then go to work again. They drink only water when below, and sweat profusely, and pass but little water. They smoke when they are resting after the blast. The mines are also dry and dusty. After working in the mines, they spit quite black stuff, and the smoking helps them to bring it up.
17. Camborne, July 17, 1862; advanced Miners' Asthma, Emphysema pulmonum.	50	He has 6 brothers; 1 of them is working as a miner in America, and 1 is living at Camborne, and was a miner, but is in worse health than he is himself.	Father a miner, and died at 65 of asthma.	Mother died at 65 of natural causes. A sister died of asthma and rheumatism at 30.	At 15 or 16, and worked about 35 years.	He has chiefly worked at tutwork and at Stray Park, and usually in good air; has worked in bad air, and especially for 3 months at Camborne Vean, 12 or 14 years ago, but states that he did not suffer materially at that time. He has been last working at tribute at Stray Park, and in good air.
18. Camborne, July 17, 1862; Miners' Asthma.	33	Brothers who grew up are all living and healthy.	Father worked at mines on surface, and died at 50.	Sisters who grew up all living and healthy.	At 14, and has worked ever since.	He has worked almost always at tutwork driving shafts, and generally in good air. He has worked at North Wheal Crofty and at Stray Park. In the last mine he worked in bad air 5 months ago. It was about 160 fathoms from grass, and a long way down from the shaft, and "the air was so bad candles would not burn except when held on one side and the wick pulled out, and then they made a great smoke, and they would sometimes go out entirely, and good matches would not take light when struck 3 or 4 times over. There were no "deads," but there was no air. The mine was cold and very wet, and they had much wet to go through to get to their work." He worked there 3 months and then had to give up from bad health. There were 4 other men working with him, but all had to give up several times, but he kept on till at the end of 3 months he broke down entirely, and after a time went to another mine, Crane, where he is now on tutwork.
19. Redruth, July 17, 1863; Mitral valvular disease.	31	- - -	Father formerly a miner, but has not been underground for 30 years, and is still living, but discontinued mining from ill health; since that his health has improved.	- -	At about 15, and worked as a miner for 15 years.	Has been for a year and a half in America, and worked in the "Amenable" coppers of Lake Superior, and returned about a year and a half ago. He has chiefly worked at tribute, and worked in foul air before he went abroad.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory Organs.	Circulatory Organs.	Digestive Organs.	Remarks.
He enjoyed good health till 20 years ago, when he got sciatica and was laid up for 15 months, from taking cold. After that he has not suffered in the same way, but has not gone underground since. He has since worked as an engineman at the "sump shaft." He is now suffering from an affection of the knees which came on suddenly from his spraining himself very slightly in stepping aside to avoid some persons when he was walking. He felt something crack in his knee, and has been incapable of walking much since.	Pale and thin, and very weak. Never had rheumatic fever or rh. pains.	Suffers from lightness of head.	Chest narrow and contracted, movement slight, vocal thrill feeble, res. on percussion impaired, respir. somewhat harsh, dyspnœa on exertion.	Suffers from palpitation, increased on exertion, first sound prolonged at the apex, and second sound somewhat ringing. Cardiac dull space extended.		He states that he has always lived temperately, having only had a pint or 2 pints of beer once or twice a week, and sometimes not at all for a month. He generally took it on pay nights, when he had to go to the public house to get his note cashed; sometimes also he took a little brandy or gin. He has had about 2 lbs. of meat per week in the form of pasty. He has also taken milk, but chiefly br ..d and butter.
Has not been able to do anything for 3 months, but was ailing; short breathed and very liable to take cold before that. His first attack came on after washing one morning at 3 o'clock in cold water, when he came from the mine.	Face very sallow, expression of countenance anxious; eyes pale; lips livid; stooping gait. He has never had rheumatism or any serious disease, but about 20 years ago fell 12 fathoms, but did not suffer after he had got over the immediate effects. Dark complexioned.		Complains of shortness of breath, cough, and spitting. The spit was at first sometimes quite black. It has also been sometimes bloody, but is now white. Respirations 36, short and imperfect; large veins on chest, movement very imperfect. Vocal thrill fair at right but defective on left side. Respiration attended with subcrepitation on the right side, and especially at the upper part; no marked cough resonance; very feeble on left side; counts to 18; throat relaxed.	Pulse 88 very feeble; heart displaced downwards; cardiac sounds extremely feeble; does not suffer from palpitation.	- - -	He states that he has always lived regularly; has taken a quart of beer once or twice a month, and sometimes a little spirit. He has had about 3 lbs. of fresh meat per month, and has lived chiefly on bread and butter, and milk, and eggs.
He is still working, but says that he suffers much at the chest, and ascribes his illness to having worked in bad air 5 months ago.	Spare, sallow, with stooping gait. Has a scar from an injury of the shoulder 5 years ago.	- - -	Respirations 28, irregular and laboured; chest sparingly resonant on percussion; very defective movement, and vocal thrill very feeble; sonorous rhonchus with inspiration and expiration in all parts, and especially in dorsal regions; counts to 20.	Pulse 72, very feeble; cardiac dulness somewhat extended. Heart's sounds feeble. States that he has had much ladder work, having to go up and down from 150 to 200 fathoms; now has 150.	Appetite and digestion bad. Bowels regular.	He states that he has always been temperate, and has taken a pint of beer once, twice, or three times a week, sometimes a little spirit. He has usually got about 2 lbs. of butcher's meat per week. He smokes, for it helps to get up the "corruption."
Has not been able to work for 7 months. His health failed before he went to America, but he got worse while there, when working at a 15 fathom level. Three months after he vomited blood.	Fair condition. He states that he had swelling and erysipelas of the hands before he got ill, but denies having had decided rheumatic fever or swelling of the ankles.	- - -	Dyspnœa encreased on exertion.	He labours under symptoms of disease of the heart, and there is a slight systolic murmer, audible chiefly at lower part of sternum and about the middle and on the right side of that bone; more feeble at the upper part of the sternum, second sound flat. Pulse quick, somewhat vibratory; palpitation and vomiting of blood.		

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
20. Redruth, July 17, 1862; Miners' Asthma, with slight mitral valvular disease.	49	He has 2 brothers, miners, both of whom are living and healthy.	Father a miner and died at 49 of miner's complaint, after having been ill for 6 years.	Father's brother also a miner, and killed by a fall of stuff. Father's father a miner, and died between 70 and 80 of old age. He left work 10 years before his death, though not from any illness at the time. Mother died of dropsy at 60. Father's sister died of asthma at 70.	At 14, and worked steadily till he gave up, 20 years ago. He has worked as a miner 15 years.	He has chiefly worked at tutwork, and has "worked in very bad air, when the candles could not be got to burn unless placed about 9 feet behind where they were working, or by teazing out the wick, and holding the candle on one side, and then there was a great smoke, and when he came up, what he spat was as black as ink." About 5 years before he left working underground, he had inflammation of the lungs with blood spitting, which came on when he was working in "poor air" and "cold damp," and he has never been well since. He worked at the 5 consolidated mines, copper; he worked at the different levels, from the adit to the 160 to 210 fathoms. The mines were dry, and dusty, and hot, but he has also worked in cold and wet mines.
21. Redruth, July 17, 1862; Miners' Asthma; passed blood by stool.	42	Brothers all living except one, who was killed.	Father a miner, died at 65, and worked till 4 or 5 months before his death.	- -	At 20, and was engaged at the dressing floors before.	Has chiefly worked at tutwork, and has worked in bad air.
22. Redruth, July 17, 1862; Phthisis, without family predisposition; acquired by working in bad air.	32	The family originally consisted of 11, of whom only 6 besides himself grew up. One brother was a miner and died at 39, after an illness of 5 months; four others are miners and living, but one is very ailing and "was given up five years ago as in a decided consumption," but after a time he passed a large worm and got much better, and is now able to work a little at surface.	Father a mechanic, and living at 81.	He has several paternal uncles living and healthy, a brother of his mother was a miner, and died of cholera. Mother living at 74, he has a sister living, a maternal aunt is living at 70, and 2 paternal aunts between 50 and 60.	At 9 or 10; at first he drove a machine for blowing air to the men 50 or 60 fathoms from the surface; became full miner when about 12.	He was last working at tutwork at a "rise" in New Clyjah mine at 40 fathoms from the adit (the adit running from 28 to 40 fathoms,) and about 100 from the shaft, "in very bad air, where, indeed, they got no air but what was blown to them, and only a puff now and then. When first they went in the morning the candle could not be got to burn, and they took off their coats and beat the air about and then went into the level, and after a time returned, when the candles could be got to burn, but only by holding them on one side; sometimes the lucifers could not be got to take." He worked in this place for 3 months, and then they sank a "winze" to join the rise for a month, and after that for a month they drove straight on; altogether they had worked 5 months when he was taken ill with pain in the side. He continued to work for a fortnight, and then knocked off entirely.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
He has been entirely laid by for about 7 years, but ceased working underground 20 years ago from failure of health from working in poor air, and cold damp and wet. He had then been ailing for 5 years. He also states that the ladders tried him and the exposure after being heated; soon after he left work he had dropsy, he still finds his feet occasionally swell when he is suffering from cold. When he first left working underground he was told he was in an advanced consumption, and for about 9 months he was very ill and nearly confined to bed. After another 12 months he was able to work on the roads, and he has done light work, since, till 6½ or 7 years ago.	Stooping gait; dark complexioned; sallow; anxious looking. Height 5 ft. 6¾ in. Formerly weighed 9 stone, but now only 6 st. 14 lbs.; eyes pale.	Complains of headache.	He complains of shortness of breath, and pain on the left side, increased on exertion, and cannot draw a full breath. He has also a very bad cough and much spitting, especially in the morning; it is yellow or dark coloured, and very difficult to get up. Respirations 28; very imperfect expansion, and especially at upper part of chest; large veins on surface of chest sinking in above the clavicles; very slight movement; respiration chiefly diaphragmatic; vocal thrill very imperfect, especially below; chest sparingly res. on percussion above and at the right apex, both before and behind; deficiency of the res. on perc. also, low down at the left back and side; loud sonorous and sibilant rhonchus in all parts of chest, and especially at upper part of right side, both before and behind, and at lower part of left side and back, where also there is some subcrepitation. Cough res. undue at right apex, and increased vocal thrill there.	Pulse 80, very feeble; cardiac dullness increased in extent. Palpitation at all times, but much aggravated on exertion; cardiac pulsation visible to the left of the zyphoid cartilage. The first sound of the heart is noisy and prolonged, attended with a slight murmur. The second sound flat.	Appetite very defective, and bowels confined; digestion fair; hepatic dullness extending nearly to the nipple; tongue furred.	He states that when working as a miner, he used to take about 3 quarts of beer per week, and sometimes more on pay-days. He also sometimes took spirits. He had about 2½ pounds of fresh meat per week, and took it with bread and potatoes, in the pasty.
His health failed 3 years ago. He ascribes his illness to having taken cold when sweating from working in a hot place, in coming through cold water on his way to the shaft. He had previously been working in bad air where the candle would not burn without being held on one side, and sometimes without being placed behind him; occasionally the candle went out, and the lucifers would not take. He was first seized when in bed one morning with a violent shivering and symptoms of bronchitis, and was laid by for 8 months.	Facelivid, high shouldered; anxious countenance.	-	-	Has not spat blood, chest narrow and contracted, and especially above, and very little movement with the respiratory acts, vocal thrill slight. Chest everywhere sparingly resonant, but especially on the right side. Loud inspiratory and expiratory sounds both before and behind, no rhonchus, but some cough; res. at right apex both before and behind. Counts only to 6 or 12. Breathing and cough not worse during last 6 months.	Heart's sounds somewhat noisy.	Has passed much blood by stool, and has had much pain in the bowels.	He was a teetotaller for some years before he got out of health. He took about a pound of meat per week, and lived chiefly on bread and butter.
Left working underground 17 months ago, and was quite well and strong a month before that. He ascribes his illness to having worked in very bad air in a "rise," and afterwards in a "winze" and "close end. He was first taken with a pain in the right side, shortness of breath, cough and spitting, and occasionally of blood, and he has got worse ever since.	Height 5 feet 6, weighs now 6 stone 14, before his illness weighed 8 stone 4. Pale and moderately stout, not much sweating at night. Has lost his right eye "by a stone flying against it."	-	-	Chest wide, respiratory movements imperfect on right side. Respiration chiefly diaphragmatic; vocal thrill natural. Some falling in at right apex, with dulness on percussion over a large space there and bronchial respiration and subcrepitation without marked cough res., but with exaggerated vocal thrill. Sputum muco-purulent and bloody. Signs less marked at left apex. Respirations 32. Cavernous sounds at right upper mamary region. Counts to 24.	Some little palpitation, and especially when in bed. Pulse 120.	His appetite is "middling, but he cannot get proper food." Bowels confined. Digestion fair.	When working he used to get about 2 lbs. of fresh meat per week, and spent about a shilling a month in beer, chiefly on pay days. He states that "as far as he knows none of his family had anything the matter with their chests, except they were miners."

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL.	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
23. Redruth, July 17, 1862; Paraplegia, from cold.	50	- - -	- - -	- - -	At about 17 or 18, and worked at surface for 5 years before that.	- -
24. Redruth, July 17, 1862; commencing Miners' Asthma	46	He has two brothers miners, one in California, the other in Australia.	Father was a farmer, and died at about 70.	Mother living, and above 70.	At about 18	He has been almost always engaged in working at tribute, and never worked in poor air for the last 20 years; but before that worked for 3 months in bad air at Carn Brea.
25. Redruth, July 17, 1862; probably Interlobar Pleural Abscess on left side, opening through the lungs.	48	- - -	- - -	- - -	At about 15 or 16.	He has chiefly worked at tribute and never in bad air for the last 10 or 12 years.
26. Camborne, July 19, 1862; slight Cardiac disease, probably mitral, sequence of rheumatic fever.	36	The family originally consisted of 12, and only 5 are now living, 1 brother died at 26, the others died in early life.	Father a miner and died after an injury at 53.	Sister died at 23.	At 17 -	Has chiefly worked at tutwork in sinking: hafts and generally in good air. He last worked in Great Wheal Vor; part of the shaft was very wet and cold. He has worked at a depth of 335 fathoms and had to climb the ladders all the way.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
Has been entirely laid by for 1 year and 7 months, but has been ailing for 7 years. He ascribes his illness to having worked 7 years ago in a level where there was a great quantity of water. It was a tin "mine, in the granite and very cold, and the adit was stopped up and the levels by "deads" or "attles," so that he was half-leg deep, and was not using much exertion at the time. He worked for 7 hours, and then when he came out felt as if he had been beaten with sticks, and in 2 or 3 days his limbs became dead and numby and he was hardly able to move them, but could feel a little." He got worse for year.	- - -	Lower extremities, and especially the left, very numb, and very little power of moving them; arms not affected; great weakness also in the loins. Has also had difficulty of passing water and stools, but is now better in those respects.	Respiratory sounds feeble.	Heart's sounds natural.	- -	Health otherwise good.
Gave up work about a year ago. He states that 12 years ago he had inflammation of the chest brought on by putting on after working, the clothes in which he had walked to the mine in the rain, and which were still wet. He has never been quite well since, and readily takes cold. Has never had rheumatic fever.	- -	He suffers from difficulty of breathing, but has no cough or expectoration. Surface of the chest, especially on the left side, tender to the touch, very little movement, vocal thrill feeble, respiratory sounds very feeble. Dulness on percussion and absence of respiratory sounds at the lower part of the left side, some deficiency of the res. on percussion and of respiration at the upper parts of chest.	- - -	Fluttering at the heart, cardiac pulsation visible to the right of the false ribs in the epigastrium. Heart's sounds extremely feeble.		
Left work 12 months ago in consequence of suffering from pain in the left side and shoulder. The pain commenced suddenly; he went to bed quite well on Sunday night and was taken ill at 5 o'clock on Monday morning. The pain was followed rapidly by shortness of breath, cough, and expectoration, and he was nearly confined to his bed for 6 or 7 months. After 6 or 7 weeks he spat a quantity of matter which came up suddenly after a severe fit of coughing; he usually lay on the left side, and if turned over on the right side he immediately became nearly choked by the cough. At first what he spat was bloody and very offensive and then it declined in quantity and became trifling about 4 months ago, and he has greatly improved in health since.	- - - -	- - -	Respirations 28, general impairment of expansion in all parts of chest and deficiency of res. on percussion and of respiration, especially in left lower lateral and dorsal regions. Deficiency of resonance and of respiration also in right dorsal region, counts to 30.	Pulse 88, cardiac dulness natural, heart sounds noisy, pulsation very visible to right of false ribs in the epigastrium.		
Had quite good health till 4 years ago, except that 12 years ago he had an inflammatory fever, from which, however, he entirely recovered; he has been unable to work for 6 weeks. He ascribes his illness to having put on, after working hard and getting heated, the clothes which he wore on entering the mine and which were wet from having been left in a wet place when he began to work.	Great debility	- - -	He complains of shortness of breath, increased on exertion; dry and hard cough, spitting scanty, sometimes black, never bloody. Respiration 24, very little movement, deficiency of res. on percussion on right side, and very feeble respiration.	First sound of heart prolonged, pulse 72 feeble.	Want of appetite.	

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
27. Redruth, July 17, 1862; Phthisis, family predisposition.	30	All his brothers are living.	None of his relatives have been miners, 2 of his father's brothers were masons and died of consumption.	His father is living and healthy. A sister died young. Mother living and healthy. An aunt of his father's side died of consumption.	At about 15	He stated that he had for the most part worked at tribute and in good air. But he worked in poor air driving an end at West Bassett.
28. Camborne, July 19, 1862; Mitral valvular disease and dropsy. Dr. Harris.	21	Never any brother.	Father a miner aged 47, and healthy.	Mother living and healthy; 6 sisters all living and healthy.	At 13, and has been a miner for 8 years, but did boy's work for the first 2 years.	He has chiefly worked at tutwork driving ends, and has worked in poor air where the candles would not burn, and the smoke after blasting lay about for from 2½ to 3 hours. The air was very bad when he went to work in the mornings. He has never sustained any severe injury or had rheumatic fever. He has worked at Camborne Vean, Wheal Frances, and Wheal Harriet, and last at North Crofty.
29. Camborne, July 19, 1862; advanced Phthisis, with hereditary predisposition. Dr. Harris.	44	Has 2 brothers both living and healthy, at 37 and 40 and both miners; one retired; the other still going underground.	Father was a farmer's labourer and died at 26 of consumption.	His grandfathers and grandmothers lived to 78 or 80. Mother died from effects of an injury at 60. A paternal aunt living at 64. 2 maternal aunts and uncles now living about 60.	Went down at 17, and worked regularly till he was 35. Became a captain 9 years ago.	Has worked chiefly at tribute and generally in good air, but has worked in a little bad air but not for many years.
30. Par, July 1862; Dyspepsia, slow fever.	37	Brothers all living.	Father, a miner, was killed in a mine when 30 years of age.	Mother living, sisters all living.	Went down at 16, and worked at grass after he was 7½.	He first worked at Par Consols at tutwork, in driving an end and there had good air; he left in 9 years and went to Fowey Consols, and has latterly worked chiefly as a tributer and generally in good air.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
He thinks his health failed from working in bad air and getting cold. After leaving West Basset he tried another mine, but could not get on. He was first taken with sickness and vomiting in the evenings after returning from work, then got cough and expectoration and afterwards spat some blood and his health became affected. Has been away from work upwards of 12 months.	Tall, thin, flushed countenance, large pupils, very phthisical looking. Suffers from night perspirations.	- - -	He complains of a dry hard cough and expectoration of thick and heavy matter. Respirations short and quick; some deficiency of resonance on percussion at the right apex and chest, elsewhere morbidly resonant, and inspiration harsh and expiration prolonged. Bronchial respiration and cough res. at right apex.	Pulse not much quickened.	Bowels much relaxed and have been so for some time.	
His health began to fail 2½ or 3 years ago with beating at the heart and bad breath, but he had no cough or spitting. He was working at the time at North Crofty at 160 under the adit. He first felt the palpitation 15 or 16 months ago when "beating the borer," he also felt it in coming up the ladders, he had to come up about 190 fathoms and used to stop about twice in coming up and was very much out of breath, and his heart beat violently at the time. His present illness commenced with swelling of the ancles and increased palpitation, and he has not been able to do any work for 6 months. The immediate cause of his illness he however thinks was cold taken in walking through the rain from the shaft at North Wheal Crofty to the changing house, a distance of 200 yards.	Face flushed and lips livid, extremities cold, livid, œdematous.	- - -	Respirations short and hurried, and respiratory sounds very feeble.	Cardiac dulness considerably extended. Loud systolic murmur, heard most intensely at the apex and followed by a ringing second sound. Pulse very feeble.	- - -	Is not aware that any of his relatives died of heart disease.
He ascribes his illness to having got cold when underground only 2 or 3 fathoms. He changed his clothes all but his flannel, and thinks he got a chill on coming to the surface from his flannel being wet, he has been suffering ever since. Worked very hard while a miner.	Dark complexioned, sallow, and lips very livid, voice husky. He complains of night perspirations.	- - -	Pleuritic effusion on right side, large cavern at right apex.	Pulse small, quick and feeble	Bowels at present regular, but he has suffered from diarrhœa.	His habits have always been regular, and he has got a sufficiency of food. This patient has since died.
He enjoyed good health till after last Christmas when his health failed, as he thinks from having been doing very badly and consequently he could not get sufficient to live upon. The air was light but not bad, the candles would burn well enough, he continued to work till 5 months ago, when he was taken with pain in the bowels, and the food lay heavy at his stomach, and he vomited sometimes; he gave up and was at home for 3 months; lately he has been suffering from "slow fever," he has several times tried to work but cannot go on, and is extremely weak, but for the last 2 weeks has been able to go about a little.	Pale, very sallow and extremely languid looking, icteroid tinging of conjunctivæ, pains in the loins. He complains of burning in the palms of the hands and in the soles of the feet, along the limbs and at the top of the head; he feels weary and cannot sleep well, and when he awakes is not refreshed by the sleep he gets, and feels worse on rising than when he went to bed, he feels better some days than others, but without any regularity.	No headache	No cough or expectoration except in the morning, and no difficulty of breathing; has pains about the chest, especially at night, respirations 32, percussion and respiratory sounds natural.	Fluttering at the heart; pulse feeble 72, heart sounds flat.	Very little appetite and the food does not agree, lying heavy and being sometimes vomited and followed by pain in the stomach; bowels confined, only acted upon by medicine; tongue red at the tip and dorsum and furred at the back, very offensive breath, some tenderness to the touch at the lower part of the right side in the region of the liver.	

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked under-ground.	In what mines he has worked, kind of work, and character of air.
31. Par, July 19, 1862; Palpitation.	27	- - -	- - -	- - -	At about 15	Has worked at tribute, chiefly at Fowey Consols.
32. Par, July 19, 1862; marked Miners' Asthma and debility.	58	A brother, a miner, died at 58, another also a miner, at 50, and a third is living but very ill at 50.	Father, a miner, was killed at 41.	Grandfather was a miner and lived to 70.	At 16, and worked for 42 years.	Chiefly at tribute and in very warm mines, the air light and the workings very dusty.
33. Par, July 19, 1862; Palpitation and general debility, worn out.	62	Of 5 brothers all were miners and died at 58, 56, 54, 50, and 40.	Father a miner, and died at 62 of miner's asthma.	Mother died of decline at 62, 1 sister living at 70, 3 sisters died 61, 58 & 28; the last died in child-birth.	At 10 and did boy's work till 15 after which he worked as full miner for 37 years.	He has worked at tribute nearly all his time, when his health failed he was working at 160 fathoms from adit, and in a warm, dry, and dusty place; he worked 12 years in the last mine.
34. Par, July 19, 1862; Phthisis, predisposition not ascertained.	33	Two brothers living, one a soldier, the other a miner.	Father a miner, living and healthy, but was not bred to it.	Grandfather was a farmer and died an old man. One sister living.	At 10 and worked 21 years.	He has worked for the last 14 years at the Fowey Consols, and has worked in poor air where the candles would not burn, and in places that were very hot.
35. Camborne, July 1862, August 10 1862; marked Miners' Asthma. Victoria Park Hospital.	27	- - -	Father, miner, died of consumption at about 50, he being the only member of his family who was a miner.	4 uncles, none of whom are miners, are alive, from 30 to 40 years of age. Grandfather was a miner and worked till he met with an accident by which he was killed when nearly 70.	10 or 11, and was first employed in "washing" for his father.	Worked first at Tin Croft for about 7 years, and was a tributer, and worked in good air. He then went to Condurrow and worked there about a year at tutwork, and suffered from "cold damp" and poor air. Then he went to Great Wheal Seaton and worked both at tutwork and tribute a long way from the shaft and 130 fathoms from surface. The candles would not burn at all, except by continually picking out the wick with a pin and putting the candle on the side when there was smoke enough to choke them; sometimes they would go out entirely, and they could only see by putting the candles 2 or 3 feet behind them. He worked there for 4 years; from 6 to 12 months before he gave up, began to suffer. He had pains in the heart and shortness of breath, especially felt in climbing the ladders and beating the borer; then beating at the heart increased on exertion, weakness in the legs and pains in the calves, pain in the head, sickness at the stomach, and an entire loss of appetite. He also could not sleep at night, and felt heavy and stupid in the morning and more tired than when he went to bed at night. These symptoms have continued more or less ever since, but he is better than he was.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
Was well till after he had worked 5 or 6 years, when after working in damp and poor air, 38 fathoms from adit, his health failed, and after 3 years he had to give up; he suffered from beating at the heart, pain at chest, and could not climb the ladders; he was away 2 years, got better, and has returned to work a year ago, but still suffers.	- - -	- - -	Shortness of breath, but the respiratory sounds are natural.	Suffers from palpitation, no murmur.	- - -	
Enjoyed good health till 12 years ago, when he was laid by for a month; after that he resumed his work and continued at it till 8 years ago, when he again failed and was away 2 years, and then again returned; he has been now laid by 2 months, and ascribes his illness to hard work, and especially to having worked in a cold damp mine in the granite, after having been in a warm one in the killas; he also says the climbing the ladders injured him; he is getting gradually worse, and suffers especially in winter.	Pale and anxious expression of countenance, extremities cold.	Complains much of want of sleep at night.	Respirations 24, loud and prolonged respy. sounds and sonorous rh. in all parts, very little movement, res. on per. morbidly clear; cough violent and much expectoration but never of blood; his difficulty of breathing and other symptoms are aggravated in paroxysms.	Pulse 92, feeble, heart's sounds very feeble.	Appetite and digestion very bad, bowels regular.	
Worn out by prolonged work, and recently has had to give up work.	- - -	- - -	Breathing and respiratory sounds fair.	Palpitation, heart's sounds somewhat harsh and prolonged.	- -	Is allowed by the parish 2s. per week, and has no other means of support.
Has been incapable of work since Christmas, lost his voice about 18 months ago, and his health failed before that; he suffered from shortness of breath; ascribes his illness to working in poor air and hot places.	Has lost much flesh and strength, and is thin, pale and phthisical looking, and very weak.	- - -	Cough and expectoration and has spat blood; consolidation at left apex, cavern at the right; voice very feeble and husky.	Heart's sounds noisy.	Appetite and digestion good, bowels relaxed.	
Unable to work for about 2 years, but ailing for a year before; and he thinks his illness was brought on by having to work in a nearly upright pitch, and with hand over hand, and in a close end; and this he did for 4 or 5 years. It was also very hot, so that he worked naked to the waist; the place was very dry, and there was "a terrible lot of dust and no air at all."	Dark complexioned, dark hair, and grey eyes; somewhat small and spare. Throat red and relaxed. Height 5.9½ Weight 9, 10½ Suffers from night perspirations.	No complaint	Not at present any cough or expectoration, but suffers from shortness of breath, pains across the chest, and has spat much blood. Respirations 32. Chest narrow, very little movement, vocal thrill somewhat defective on left side. Undue sensitiveness to touch. Sparingly resonant on percussion in all parts. Respiratory sounds feeble, but without rhonchus. No undue cough resonance.	Pulse at wrist and sounds of heart feeble, 112. Palpitation increased on exertion.	Appetite fair and food agrees well. Has passed blood by stool. Tongue clean but white.	He states that he has chiefly lived upon bread and butter and some meat, perhaps 3 or 4 lbs. of meat per week for himself, wife, and 3 children, with milk, eggs, and cabbage. He sometimes takes ale or porter, about 5 or 6 pints per month, but never spirit; he does not smoke much. He also gets fish occasionally.

District, Date, and Disease.	Present Age.	FAMILY HISTORY. Ages, occupations, state of health, and cause of death of brothers.	FAMILY HISTORY. Age, occupation, &c. of father.	FAMILY HISTORY. Ages, occupations, &c. of other relatives.	PERSONAL. Age at which he first worked underground.	PERSONAL. In what mines he has worked, kind of work, and character of air.
36. Par, July 1862; commencing Phthisis. Hereditary predisposition. August 30, 1862. Victoria Park Hospital.	27	A brother working at surface, living, between 30 and 40. One brother never underground died of decline at 19.	Father a miner, died at 45 of decline.	Father's brothers never miners, and all died young. Mother's brother living, a miner, at 60, and the others lived to a good age. Mother's father was an old man when he died. A sister living between 30 and 40. Mother died of decline at 50. 3 sisters died of decline.	13, worked at stamps before.	Worked first at Pennance Wood, a tin mine, "now knocked" for 1 year. Then went to Paine Mill, a tin and copper mine, for another year, and after that went to Fowey Consols copper mine, where he has worked ever since. He has never worked in bad air, but has worked in very warm places. This was in the 240 fathom from the adit, at an end a long way from a shaft. In this place they could only wear thin shoes and a cap, and nothing on the body. He has also worked in a very hot winze 180 from the adit and 20 or 30 from the draught, but the draught came from below and was warm. At this place they could only remain in half an hour, and then had to go out and throw water over themselves. There were other workings in the mine, as a winze driven off from Buddlas shaft, in which it was so hot that the people working could not remain in for more than 5 or 10 minutes at a time. The mine is dry, but not dusty. The deepest level now worked is 270, but they were working at 300, of which the ore is now exhausted.
37. Commencing Miners' Asthma. August 1862.	39	Had no brothers who grew up.	Father killed at 50, was a miner all his life. His injury was followed by abscesses in his limbs, and he gradu- fell away.	Father had no brothers; mother had two, both miners, and both died at about 40. Father's father was killed at Ding Dong at an early age. He was a miner all his life. Mother's father was a tin dresser and lived to upwards of 70. Has 2 sisters aged 45 and 38.	At 12, and was occupied as a "roller" till 16, and then became a full miner.	Worked at tribute at Darlington 9 years, copper. Then at Wheal Margaret 2 years, tin. Then at Wheal Reeth Consols, tin. He now works there at the 140 fathom level. Generally has had good air, but has worked in some close places.
38. Mesenteric disease - August 1862.	17	- - -	Father living at 42, a "shaft man," ailing.	Mother's brothers all living and healthy. Father's only brother was a miner, and died at 36 of miners' disease, having been ill 7 years. One uncle, miner, killed. Mother's grandfather miner and died about 70. Mother living and healthy. Mother's sisters all living.	At 14, assisted his father.	Wendron Consols, tin, 25 fathoms. Crahe Downs.
39. Halwin; advanced Miners' Asthma. August 1862.	58	One brother, a miner, died at 56; ailing for some time, and died worn out by mining.	Father miner, and lived to 80.	Several uncles miners, and all died about 50 to 60. One at 54 of miners' decline.	- - -	He first worked at Porkellis, till the mines were given up about 1825, and then went to Tresavean Gwennap, and still lived at Hallwin, Wendron, walking 4½ miles to the mine and then back. When at mine had to use ladders to 230 fathoms, and the workings were very hot.
40. Halwin; Miners' Asthma, paralysis of speech and partial paraplegia; commencing general paralysis. August 1862.	49	Had two brothers miners, both of whom were killed.	Father miner, and died at 77.	- - -	Worked first underground at 18.	Worked at Wheal Lovel (tin) 7 years; worked also at Tresavean, and had to walk 3 miles to the mine.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
When taken ill he was working at tribute at 180 fathoms, and that was warm but not very hot; he wore drawers and a "dickie," and the air was good. He ascribes his illness to having taken cold from getting warm with work and then being detained in the shaft waiting for the engine to bring them to the surface when they had finished working. They might have used the ladders, but the man-holes were awkward, too small for large men. 16 weeks ill.	Thin, pale, and worn, large boned, fair complexioned; voice husky; weak, and has suffered from night sweats. Height 5 ft. 8½ in., weight 10 st. 2 lbs.	No headache or other symptoms.	Cough and expectoration, and has spat some blood. General deficiency of resonance on percussion at the upper part of chest, with some cough, resonance there.	Pulse somewhat quick and feeble, palpitation of the heart and sounds somewhat rough at apex.	Appetite and digestion good, and bowels regular. Tongue large with white fur and a transverse fissure.	
Has been ill 3 weeks, and says he took cold from working at grass in underground clothing, repairing the neck of the shaft. Has always had to climb ladders.	Moderate height and spare, fair complexioned and with curly hair, thin, delicate looking. Has no pains in the limbs.	Complains of slight pains in the head occasionally.	Tightness across the chest and shortness of breath, audible wheezing, cough, and spitting. Has never had hæmoptysis; chest somewhat narrow, little movement, vocal thrill feeble, sparingly resonant; very feeble respiration.	Palpitation on climbing the ladders; action of heart feeble, sounds at apex somewhat noisy, pulse at wrist feeble, quick.	Appetite fair and digestion generally good; bowels have been confined, but are now relaxed by medicine.	
A year and five months, commenced with slow fever and symptoms of cold, cough and expectoration and perspirations at night; not been confined to bed except for a day or two at a time.	Very much emaciated.	-	No cough or expectoration now but has had. Chest contracted, deficient in res. especially above and on right side, and quite dull low down on the same side. Resp. harsh; never spat blood.	Pulse feeble and quick.	Abdomen large and tender, and pain on right side. Diarrhœa. Stools usually 3 or 4 times daily, sometimes only once. Very little appetite, digestion deficient, tongue furred.	
Worn out by hard work, ailing for several years and not able to do any work for four. Illness commenced with cough, spitting, shortness of breath, and some spitting of blood occasionally; returned to Wendron C. when the mines were re-opened, and had worked there for about 8 years before he laid by, but he was never well from before he left Tresavean, and could not have continued to work there.	Very greatly emaciated, pale and thin, old looking than his age.	Some little headache occasionally.	Difficulty of breathing and loud wheezing. Much cough and expectoration, and it is occasionally bloody. Deficiency of res. on per. at each apex, especially the left. Some cough res. there, and wheezing in all parts of the chest.	Pulse quick and feeble. Heart's action irregular and sounds flat, but no murmur.	Appetite fair, has constant diarrhœa and night sweats. Tongue clean and moist.	
Assigned his illness to working in cold damp, but has also worked in poor air 86 from adit. Ill 6 years.	Thin and pale	Intelligence somewhat impaired, and cannot talk intelligibly. Loss of power of movement to a considerable extent, and impaired sensation in lower extremities. Never any fall or fit.	Does not suffer from cough or expectoration, but has done so. Has now loud wheezing at chest and rhonchus on auscultation.	Heart's sounds and pulse very feeble; has spat blood.	Appetite and digestion fair.	Living in a very bad cottage; 2 rooms, the upper slanting to roof, 2 small windows incapable of being opened, 9 persons sleeping in the room; himself and his wife and a baby, a married daughter, son-in-law, and baby, and 2 boys nearly grown up, and a girl.

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
41. Porkellis; commencing Miners' Asthma, with consolidation at upper part of chest. August 1862.	41	Seven brothers all living, of whom six are miners.	Father miner, and died at 71.	Mother 73, died.	Twelve, and entered into concern at 16.	Tresavean 21 years, and had 4 miles to walk to the mine; then Wendron Consols for between 2 and 3 years; working last at Bassett and Grylls at 40 fathoms. Tin.
42. St. Just, Mr. Searle; Albuminuria, anasarca; after syphilis, and in a man who has lived too freely. August 1862.	29	Two brothers living and healthy at 32, 25.	Father miner, and died in Cuba at an early age.	Mother's brother a miner, and alive at 60, another a tailor at between 50 and 60. Father's father died between 70 and 80, a tin dresser. Does not know anything of his mother's father. Mother living, between 60 and 70; 1 sister died young; 1 sister living at 28.	Fifteen or sixteen, working at surface before.	Worked first at Botallack and was in good health; he went then to Cuba and afterwards to Michigan. He was away 2 years and 8 months; worked in Michigan at 10 fathoms and 50 fathoms from the surface, there they only have ladders, and the air was bad; cold damp. At Botallack he worked at the 100 level under the sea, and the air also was bad. He worked last at Higher Botallack, and after 3 months took ill. The effects of the bad air were lightness of the head, bleeding at the nose, sick stomach, but no chest symptoms except shortness of breathing.
43. St. Just, Mr. Searle; slow fever, commencing Miners' Asthma, mitral valvular disease. August 1862.	38	- - -	Father day labourer, alive and healthy at 70.	Father's brothers, 3; 2 miners, and all 3 died early. Mother's brothers all day labourers, and all dead. Mother's father a labourer, and died at 80. Does not know anything of father's father. Mother died at 68.	At 9 years old went to work at grasswork, and at 13 went underground, became a tributer at 17.	Worked at Balleswidden for 17 or 18 years at tribute; had tolerably good air. Worked in poor air at Trehaney at the 80 level sinking a winze; the air was very bad and the candle would not burn, and had to give up after a month, but from the impossibility of getting the candle to burn, not that he was ill. Worked also in poor air at Balleswidden. He was working at Botallack when he got ill, at the 160; hot and dry, but not much dusty; was 1 year and 10 months at Botallack.
44. St. Just, Mr. Searle; advanced Miners' Asthma. August 1862.	63	1 brother a smith, living. 7 brothers miners; 6 died at 50, 50, 60, 66, 66, and 70, 1 living at 69.	Father, blacksmith, died at 70.	Mother died at 80.	Went underground at 15 or 16.	Worked first at Wheal Owles for 2 or 3 years, then became captain and kept a public house, still however continuing to go underground. Worked last at Levant, and there for 15 years, at 130 and 150. Had poor air in different mines, the candles would not burn and the smoke lay long in them. The air in Levant was dry, dusty, and hot.
45. Treweller Chapel; recovering from Pleuropneumonia of right lung, or from "Typhoid." August 1862.	24	- - -	- - -	- - -	12, worked before at stamps, at Levant for 2 years before.	Had poor air in Botallack at the 60 for 5 months, but did not suffer.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
Ascribed illness to working in cold damp and poor air. Ailing at intervals for some time, but worse for 2 or 3 years, and now laid by.	Thin and pale, and has become more so very recently.	Headache occasionally.	Shortness of breath and cough and expectoration, never spat blood, pains across chest; chest narrow, sparingly res. especially above and on the right side, and impaired movement. Cough res. above; no rhonchus, but feeble respiration.	No palpitation, heart's action and pulse feeble, sounds of heart flat.	Appetite defective, digestion fair, but pains in stomach and bowels occasionally. Tongue clean.	
16 weeks, but ill before, and ailing for 6 years since his return from America. He assigns his attack to cold damp; the candles would not burn and the smoke of gunpowder lay in the mine. In America he worked in a Native or Amenable copper mine. Ascribes his last attack to cold taken after working in a close end; but he had when in America a syphilitic sore, and secondary symptoms occurred 6 months ago.	Very pale, dropsical in abdomen and lower extremities.	No headache	Slight shortness of breath, little cough; but before he had a severe cough and much expectoration; never had hæmoptysis. Deficiency of res. on per. in the lower and posterior part of the chest, with deficiency of respiration and subcrepitation.	Sometimes a little beating at the heart. Pulse 96 very feeble, heart displaced upwards, noisy sounds.	Appetite and digestion good, tongue clean, bowels confined, abdomen distended.	Addicted to habits of intemperance; drinking much, both spirits and beer, and smoking.
Was well till 5 weeks ago.	Complains of weakness, cannot sleep at nights, and sweats profusely; very pale and thin and feeble. Has lost much flesh recently.	No headache	Shortness of breath, cough, and expectoration, but less than before; chest narrow and contracted; vocal thrill very feeble. Very feeble inspiration and slightly prolonged expiration. Harsh breathing posteriorly. General deficiency of resonance on percussion. Can count to 20.	Perhaps a murmur at the apex of the heart, certainly the sounds somewhat prolonged. Pulse very slow, 64, and extremely feeble.	Appetite and digestion fair, but complains that he cannot get a sufficiency of nutritious food; seldom animal food; breath affected; bowels regular.	No privy to the house; altogether wretched; 1 room below and 2 above; inhabited by himself, his wife and 3 children; no drainage of any kind.
Ailing for 5 or 6 years, and gave up a year ago. Ascribed his illness to getting chilled when heated and sweating.	Thin, pale, aged, great efforts to breathe; has fallen away much in last year; rheumatic pains especially in shoulders, white hair and partly bald.	Headache -	Suffers from shortness of breathing, cough, and expectoration, worse if he takes cold; he never spat blood, but thinks he vomited some, 20 years ago. Audible wheezing, wide chest, but perfectly flat, arched back, very little movement, somewhat unduly resonant, very feeble and weak, especially on left side, where the respiration sounds are almost inaudible, expiration prolonged; counts to 12; depression above the clavicles.	Beating at heart, increased by exertion, ascending a hill, or going upstairs. Pulse very feeble but not quickened, heart sounds somewhat noisy, but action feeble.	Appetite and digestion good. never passed blood by stool, tongue white, abdomen tumid.	Acknowledged to have drank too much when a publican.
Always delicate, but laid by 3 weeks and in bed 2, now getting pretty well again. Ascribed his illness to exposure to cold when under influence of drink.	Pale and thin	Eyes glassy	Had an attack apparently of palpitation, pain in left side, shortness of breath, cough, and expectoration, but did not spit blood. Chest generally sparingly res. There is now general deficiency especially at upper parts and low down at right side, with defective breathing.	Natural -	During his illness his bowels were relaxed and confined; now has a good appetite and digestion, and bowels are regular.	Wretched cottage, 3 rooms; 8 persons living in them, including a grown son and daughter. No drainage. The man acknowledged to being addicted to habits of intemperance, drinking much ale, porter, brandy, and rum, but said he had not drunk much for 2 months before he got ill.

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
46. Treweller Chapel, Hemiplegia of right side with Chronic Asthma. August 1862.	69	- - -	Father a miner and died at 82.	- - -	At 10 years of age.	Worked all his life underground till he was taken with the first fit; in bad air at Wheal Carne.
47. St. Just; Phthisis; no apparent predisposition. August 1862.	45	6 brothers all living as far as he knows, but 2 in America, all older than himself, all miners.	Father a farmer, lived to 75.	Father had 4 or 5 brothers, farmers, who lived to be between 60 and 70. Mother had no brothers. Does not know ages and occupations of grandfathers. Mother alive at 90. 1 sister living at 30, and healthy. An aunt on mother's side is living at 80.	20, at surface of mines before.	Worked for 3 or 4 years in different mines in St. Just and St. Ives parishes. For the last 25 years he has been a tin dresser and ascribes his illness to having caught cold in his work from exposure. He also thinks the arsenic with the tin and copper ores has done him harm.
48. St. Just; advanced Miners' Asthma. Paralysis agitans. August 1862.	52	- -	Father, miner, died at 41 from injury followed by chest symptoms.	Father's father was a smith and died at about 60.	At 9 years of age.	Has worked in Balleswidden and in Boscean, and has been in poor air, but has generally been in the shafts.
49. St. Just; Obstinate dyspeptic symptoms threatening organic disease. Jaundice, contracted chest, and suspicion of heart affection. August 1862.	52	- - - -	Father, miner, died at 63.	Mother died at 83.	At 15 years of age.	Worked in bad air at Balleswidden 11 or 12 years ago, and then at the 70 level, had bad air also at the sea level at Park Noweth, but was then young and did not suffer, also at Wheal Cock at the 90 had bad air. Was working at Balleswidden when he was taken ill, and then had good air. When suffering from the bad air he felt difficulty in ascending the ladders, lightness of head and weakness of legs, but no shortness of breath or beating at the heart.
50. St. Just; advanced Miners' Asthma with consolidation at right apex. August 1862.	62	- - -	Fatheraminer, died at 56 of stomach complaint which continued many years, and he gave up mining and went to farming.	Mother died at 82.	At fourteen, not underground for 15 or 17 years.	Worked in Balleswidden and Crowns 30 years ago, in both had bad air; the mine was hot and there was much smoke, but he did not suffer being young. He worked last at Balleswidden, but the mine is different now, there is very good air in it.
51. St. Just; advanced Miners' Asthma. August 1862.	57	- - - -	- - - -	- - - -	At between 9 and 10 years of age.	Worked in Balleswidden 25 years and had good air there; then went to Bosweddan, where it was very close; the candles would not burn, this was at 85 level; also he worked at bottom level which was very bad; while working in poor air he suffered from shortness of breath, weakness in body and limbs, cough, spitting and brought up black and thick spit; after ceasing to work in the close places he got better.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
8½ years ago had a fit brought on by cold, taken in coming home from Penzance, and was left without the use of the right side. Had another fit about 4 years ago.	- - -	- - -	Very asthmatic, wheezing in all parts of chest, and cough, and expectoration, and shortness of breath.	Heart sounds natural.		
He worked in poor air in Balleswidden, but only for a month. He has been ill for 6 months; his attack commenced with pain in right side; ascribes his illness to having taken cold from exposure after work.	Pale, thin, and emaciated, night perspiration, great debility.	Headache -	Tightness across chest, pain, cough, and expectoration, never spat blood; expectorates less than before and it is white matter, he has less cough. Dulness on percussion at upper parts of chest, especially at right apex, cav. rh. at right apex and bronchitic respiration at left apex, bronchitic rh. in other parts of chest.	No beating at heart, but quick and feeble pulse.	Defective appetite and digestion, bowels usually relaxed 3 or 4 times daily. Tongue furred.	
Had peritonitis 7 or 8 years ago and has never been well since, being laid by frequently. His present illness commenced with great shortness of breath, and that was followed by a violent cough and something seemed to break and he "brought up a large black mass, and after that a quantity of spit as black as ink," and he has continued to bring this up since.	Pale, thin, and aged looking. Paralysis agitans in head, trunk, and limbs.	No headache	Very narrow chest and very slight movement, chest somewhat dull in all parts, wheezing in all parts, subcrepitation in right mamary region, but without marked cough reson.; never spat blood.	Pulse very feeble, no palpitation, heart's action feeble but sounds noisy, especially at apex.	Appetite and digestion both very defective, bowels regular, suffers from flatulency.	
7 months; illness began with jaundice 2 years ago, and then he was in good health.	Pale and thin and old looking.	No headache	Does not complain of chest symptoms, but his chest is very narrow and contracted and deformed. There is also general deficiency of resonance on percussion, with little expansion and harsh breathing; never spat blood.	Does not complain of palpitation, but the first sound of the heart is noisy at the base, but without murmur.	Appetite defective, and his food lies heavy, and he suffers from flatulency but does not vomit. Bowels torpid. Fulness and tenderness in epigastrium, pain after eating, passes matter by stool.	
He left working underground 15 or 16 years ago being then ailing and thinking his health would not stand it any longer; he has been seriously ill 5 months and ascribes his attack to having taken cold at surface; he has latterly been a "stuff" manager at surface.	Thin, pale, and old looking.	No headache	Chest narrow, contracted, and sparingly resonant; slight vocal thrill and subcrepitation at upper part of right side and in lower dorsal regions; spat blood many years ago, but not since he came to surface; cough and expectoration.	Pulse and heart's action and sounds feeble.	Appetite and digestion impaired; bowels confined.	
Laid by 4 years; ascribed his state to general breaking up of power from hard work and poor air.	He complains of weakness and general breaking up and shortness of breath; thin, pale and old looking.	Nothing -	Shortness of breath, cough and spitting, and occasionally of black matter, ordinarily greenish and yellow, viscid and muco-purulent; contraction of chest, very little expansion, and great impairment of resonance on percussion, harsh breathing, suffers from rheumatic pains in different parts of body.	No complaint of palpitation; hearts' sounds noisy.	Tongue clean; appetite and digestion impaired; bowels variable, confined or relaxed.	

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
52. St. Just; Obstinate dyspeptic symptoms, chronic inflammation or organic disease of stomach. August 1862.	61	Has two brothers living, both miners, aged 53 and 55.	Father was a miner, and died of consumption at 67.	Father's brothers were grassmen, and lived to 70 and upwards. Mother died of decline at 67; one sister living and healthy, aged 63 or 64.	At 9 years of age; when about 20 years of age he left, and was away for about 5 years, engaged in assisting to erect a beacon on the Wolf rock.	About 15 or 16 years ago he worked in very bad air at the 20 level in St. Just United; after he had worked for some time his health failed, he became very nervous, and his food did not agree with him and he was compelled to give up working. He did not do anything for 12 months, and then did a little farming work for another 12 months, after which he again went underground, but he has never been the same man since; he last worked at Bosweddan, and had done so for 6 or 7 years before he gave up. The air was not good, but not so bad as he had been in before.
53. St. Ives, Mr. Rosewall; commencing Miners' Asthma, with consolidation at the right apex. Phthisis, hereditory predisposition. August 1862.	26	A brother living, a miner.	Father miner, died of phthisis at 51.	Father's brothers miners died at 40 and 50. Mother's brothers were all miners, and are all dead. Mother died of decline.	At 18, engaged in farm work before.	First worked in Wheal Providence, tin; afterwards at W. Margery, copper; and was working in the latter when taken ill. He never worked regularly in poor air, but it was very damp where he worked; he has also worked at West and East Carradon, and was first taken ill in the bottom, which was very wet; the working was 50 fathoms from the adit, and about the same distance from the shaft.
54. St. Ives, Mr. Rosewall; advanced uncomplicated Miners' Asthma. August 1862.	61	He has 5 brothers, of whom 4 are living at 54, 56 or 57, 42 or 43, and 40. 1 died at 61.	Father, miner, died at 49 of decline, from working in poor air.	Mother died at 70.	At 14, worked at stamps before.	Worked in St. Ives parish all his life and chiefly in St. Ives Consols. He worked also at Wrey Consols, and had bad air there, but did not suffer from it; at Trelyon Consols, where the air was poor, at 20 fathoms, the candle would not burn, and required to be set on one side and put behind the workmen. He was working tutwork there, but has chiefly worked at tribute, and was so employed at St. Ives Consols when taken ill.
55. St. Ives, Mr. Rosewall; commencing Miners' Asthma, with Bronchitis. August 1862.	59	- - -	Father, miner, killed at Dolcoath.	Father's brother, miner, died between 60 and 70. Mother's brother a miner, died at 70. Mother died at 91.	12, engaged in farm work before.	Worked in many different mines during his life; was in poor air in Dolcoath at the 150 where he worked 12 months; at E. Wheal Crofty at 90, 2½ years; at North Roskear at 40, 3 years. This was 30 years ago, and he did not suffer from any of them, but then went to S. Roskear at 50 from the adit, and then he suffered after working for 6 months; experienced weakness and pains in the stomach, chest, and head, but not lightness of head or shortness of breath; was ill 4 years. When taken with his present illness he was working at Wheal Margery and had tolerably good air at 70 fathoms.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
His health was giving way for the last 6 or 7 years, but he has been entirely laid by for a year and a half.	Very old looking for his age; pale, thin, anxious expression of countenance; nearly confined to bed.	No complaint	He has no shortness of breathing or cough or expectoration, and there is nothing detectable in the chest.	Pulse very feeble.	For 3 months has had severe pains in the stomach and in the left side and back; the former increases on taking food, and he has vomited almost every meal and within a few minutes of the time of swallowing it. He had some dyspeptic symptoms before, he has never vomited or passed blood, the bowels are very much confined; the abdomen is somewhat full and tender in the epigastrium, shrunken elsewhere.	
Six months, but was laid by 12 months ago for 3 weeks, with cold, he however got quite well before his present attack. He ascribes his illness to having taken cold from working in a very wet place, 100 fathoms from the adit and 50 from the shaft. His illness commenced with pain in the right side, shortness of breath, cough and expectoration; he has several times spat some blood and once fully a pint.	Pale and thin, and much wasted within the last year; dark complexioned, sallow; complains of great weakness in the back and loins, formerly had night perspirations, not now.	No headache	Voice husky, pain in the right side extending up to the right shoulder and across the chest. Cough during the day only slight, but severe every morning and evening; not much expectoration, at first it was black but is not so now; chest narrow and contracted and imperfectly expanded, very little movement, feeble vocal thrill, especially at left side.	Pulse 80 feeble, hearts' sounds and action very feeble; respirations 24, general deficiency of res. on percussion especially above and at right apex; very feeble respiratory sounds everywhere and especially at right apex, and with undue cough res. and the heart's sounds loudly conveyed.	Appetite and digestion good, bowels confined, tongue clean.	
He never suffered at all from working underground, and never till his present illness from any cause except from intemperance. He ascribes his attack to having taken cold from working at the surface at Werms Downs in the wind and rain, repairing the neck of the shaft. He has been ill 12 months. Illness commenced with pain at the right side, and after 4 or 5 months cough and expectoration came on and he spat blood in considerable quantity, and he has never been well since.	Old looking, sallow, and pale, and dark complexioned. Complains of perspirations at night with fits of coughing, but generally sleeps well.	General nervous tremor, but no complaint of headache, &c.	Very great shortness of breath, cough, and expectoration, but not much, and what he spits is not now bloody. Chest narrow, contracted, and shrunken; depression above the clavicles and large veins on the chest; very little movement, and extremely feeble respiration, vocal thrill rather exaggerated, no rhonchus in any part.	Pulse 100 and feeble, reduced by digitalis, heart's action and sounds very feeble.	Appetite and digestion good, bowels regular and have been so all along.	Had worked in 150 fathom level and 200 from shaft, and it was extremely warm.
He has been ill 4 years, suffering from weakness and pains in the chest. He cannot ascribe his illness to any obvious cause, but thinks he has been breaking up from over work. He still goes underground, but gets gradually worse.	Dark complexioned, pale, aged, very evidently asthmatic.	- - -	Complains of pains across the stomach, shortness of breath, and husky cough, no hæmoptysis at present, but spat some little blood a year ago, he has not now any expectoration. Somewhat defective expansion, general deficiency of res. on percussion, and feeble respiration in all parts, with rhonchus, feeble vocal thrill.	Pulse feeble, heart's sounds feeble, cardiac pulsation visible over a large space and in the epigastrium; counts to only 9.	Appetite and digestion good, bowels confined, tongue clean.	

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
56. St. Ives, Mr. Rosewall; Hypertrophy of Heart and commencing mitral valvular disease. August 1862.	36	- - -	Father worked an engine and afterwards went abroad	Father had not any brothers who were miners. Mother's brothers were miners and went to Cuba and United States, and died there. Father's father a miner, and died between 70 and 80.	At 16, worked at stamps before.	Worked in various mines, and latterly in St. Ives Consols.
57. St. Just; Miners' Asthma and general debility—worn out. August 1862.	62	- - -	- - -	- - -	At 7 years -	Has worked in various mines in St. Just parish, Wheal Owles, Levant, and Balleswidden. The latter had only one shaft then, and the air was very bad and he worked there for years. The mine is now a very good one, but this was many years ago. He worked also in Park Noweth when he was 22 years of age in repairing the shaft, and of 9 men employed with him only 3 are living; they were sinking the shaft, and below the level of the pump, and had to bring up the water in a bucket, and were constantly up to the waist in water and were much chilled.
58. Bodmin Land, Liskeard, Aug. 24, 1862; commencing Miners' Asthma.	53	- -	-	- - -	At 17; farm work before. Has chiefly worked at tribute.	Has worked for the last 15 years at South Caradon, and, except for a period of 13 months has been all along in very good air; but before that time, worked for 3½ years in East Caradon and had very bad air, and was frequently laid up for a short time in consequence. He suffered from pains flying about different parts of the body, but especially in the heart, stomach, and head, and had little appetite, and the food which he took did not agree with him; he has never been thoroughly well since that time. The mine was then a new one, and he was working a long way from the only shaft. Now they have several shafts, and the air is good.
59. Redruth, Aug. 23, 1862; general debility; Rheumatic pains; commencing Miners' Asthma.	60	-	-	-	At 17 years of age.	Worked at first in Dolcoath, where the air was rather close sometimes; has since worked at different times and in different mines, in a good deal of bad air and in cold and damp, but did not suffer much at the time for he was young. His health failed first about 10 years ago, he then had inflammation of chest and liver and fever, and became jaundiced. He went away for four years, doing some farming work, and then got better and went to West Frances, but could not do much; while there he was suddenly taken ill when underground, and has not been able to do anything since four years in February last.
60. Bodmin Land, Liskeard; commencing Miners' Asthma; dyspepsia; deafness. August 24, 1862.	45	- -	- -	- - -	At 8 years of age.	Has worked in the different mines; in those of the Caradon district for the last 7 years; 4 or 5 years ago he worked in Mark Valley for a twelvemonth, and the air was very bad.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
Ailing 10 or 11 years, and was working in Consols when he first got ill. He was not working in particularly bad air, but was sinking a winze about 25 yards from a shaft. He first suffered from beating at the heart and could hear his heart beat, and any one else beside him could have heard it, the beating came on gradually, and he has not had rheumatic fever or any kind of accident. He first felt the palpitation when ascending the ladders. He drove the engine on the surface for 3 or 4 months, and then had to give up entirely.	Dark complexioned and sallow, stout, and robust looking.	- - -	Chest very flat in front, very slight respiratory movement, imperfect res. on percussion, and feeble respiration every where.	Complains of beating at the heart, weakness of stomach, and lightness of the head. Pain in the region of the heart, pulse feeble, cardiac dulness considerably extended, vibration sound with systole, but no distinct murmur.	Appetite and digestion good; bowels regular.	The two men who worked in St. Ives Consols stated that the air in the mine was generally good, but in some of the levels away from the shaft it was very close and extremely hot, so that they could not wear any clothing at all except thin trousers and boots; and some parts could hardly be worked at all. The mine is generally dry.
Knocked off work 4 years ago; ascribes his illness to having worked in very wet level.	Aged and infirm.	Nothing -	Shortness of breath, cough, and expectoration; has spat some blood; breathing attended by loud wheezing, and bronchitic rhonchi in all parts of chest. Sputum very viscid.	Heart's sounds noisy and weak, pulse feeble.	Nothing.	
Has been ailing more particularly for four years; suffering from cough, expectoration, shortness of breath, and beating at the heart; but has continued to work at the mine, though frequently laid by; now unable to work for 3 days.	Very pale and thin, and anxious looking.	No complaint.	Cough, expectoration, and shortness of breath; chest narrow and contracted, and somewhat morbidly resonant, especially on right side. Respiratory sounds very feeble, and defective movement. Never spat blood.	Beating at the heart; heart's sounds somewhat prolonged and harsh at the apex.	Appetite and digestion impaired; bowels regular.	
4 years entirely laid by. Complains of pains in the hands, wrists, knees, and ankles, and in the back and chine.	Very weak, thin, pale, very sallow, and with sunken head, and worn looking.	No complaint.	Much cough and expectoration, but has never spat blood; wheezing in all parts of chest, with forced inspiration; res. on per. somewhat too clear; does not complain of shortness of breathing.	Heart's sounds and action, and pulse at wrist feeble.	Appetite good; digestion fair; tongue furred; has passed blood frequently by stool, and has prolapsion of the rectum; bowels confined and relaxed at intervals.	
Ailing for 2 years, but still working.	Worn looking, thin, and pale.	Very deaf -	Complains of shortness of breath, and tightness across the chest; the respiratory sounds are very feeble.	Heart's sounds rough at apex.	Appetite defective.	

District, Date, and Disease.	Present Age.	FAMILY HISTORY.			PERSONAL	
		Ages, occupations, state of health, and cause of death of brothers.	Age, occupation, &c. of father.	Ages, occupations, &c. of other relatives.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
61. Bodmin Land, Liskeard, August 24, 1862; commencing Miners' Asthma.	52	- - -	- - -	- - -	At 14 years of age.	Has worked in different mines. About 5 years ago worked in Wheal Wrey lead mine, and the air was "very bad," and he suffered in consequence. He has also worked in "bad air" in West Caradon, and in air which was "not good" in South Caradon; is now working at East Caradon, and the air there is not "very good"; when he worked in bad air he suffered at the chest.
62. Liskeard, August 24, 1862; advanced Miners' Asthma.	39	3 brothers living, at 46 a miner, at 36 a miner, at 27 policeman; 2 sisters living, at 50 and 42.	Father a farmer living at 72, but paralytic. Father's father died of consumption at between 40 and 50; mother's father died at 80. Father's mother died at 70; mother's mother died at 80; mother died at 71, of some chest complaint.	Father's brother a farmer living at 60, but somewhat delicate; mother's brother a smith, suffers from asthma.	At 20; was employed in farm-work before.	Worked at different mines in the neighbourhood of Liskeard, both copper, iron, and lead. Worked last in West Caradon, and had done so for 5 years, when he became too ill to go on, after having been ailing for 2 years. He has chiefly worked at tribute, and has worked in some bad air. He felt the effects of the bad air in the chest and bowels; he had shortness of breath, pain in the left breast, cough, and frothy expectoration. His appetite and digestion were impaired, and he had pains in the head, and loss of power in the limbs.
63. Liskeard, August 24, 1862; Miners' Asthma and Consumption.	28	A brother a mine agent, living at 36.	Father miner died at 60; was injured by a fall, and gradually fell away afterwards.	Father's brother living at 75, a clerk at a mine; another brother died from drinking. Died about 70 years of age. Never had any sister; mother living at 73 and healthy.	16	Worked for 5 years in the Bedford United, and did not suffer at all till 2 or 3 months before he left. He was then working in a "rise" where the air was very bad; the candle would not burn unless it was held on one side; it was 12 fathoms below the adit, and that was at a depth of 15 fathoms, and the "rise" was very far from the shaft. Of 4 men who worked with him, 1 broke down in about a week; 2 others in about 2 weeks, but the fourth and himself stood it out, though they had to be away for a day or two. The work was completed in about a month, but he and another have never been able to do anything since, underground.

HISTORY.	PRESENT STATE.					
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.	Remarks.
He is still going to mine, but has been ailing for the last two years, and ascribes his illness to having worked in foul air.	Very aged looking, gray, and somewhat bald; pale, thin, and with a stooping gait.	Suffers occasionally from headache.	Complains of cough and expectoration, but has never spat blood. Has also shortness of breathing; chest narrow, contracted, and unduly resonant in some degree. Respiratory sounds harsh.	Heart's sounds feeble; pulse slow and very feeble.	Appetite and digestion defective; bowels regular.	
He has been ailing for several years. He first felt weakness in his limbs in climbing, and got so ill that he was not able to go underground, and remained at surface, acting as an agent. He then after 3½ years got better, and went underground for a year, when he became too ill to work; has not been underground now for 4 years, or able to do anything.	Dark complexioned, and very sallow. Complains of being very weak, and is thin and worn looking, with an anxious countenance; voice husky. Had formerly night perspirations, but does not suffer at present.	No complaint.	Complains of shortness of breathing, cough, and expectoration, and has several times spat blood; he is better now than he was when he first gave up, and than he is in cold and damp weather. Respirations 20; counts to 6 or 8. Chest rounded, and the intercostal spaces filled out; res. on per. unduly clear; very little movement; great effort made to fill the chest, with little effect; wheezing in all parts of chest.	Heart's sounds noisy, but without murmur; no material palpitation; pulse 84, jarring.	Appetite and digestion impaired; bowels confined.	
He has not been underground for 7 years, and ascribes his illness to having worked in bad air. Its effects commenced with headache, loss of appetite, wasting, weakness and pains in the limbs and swelling of one ankle; he also spat blood and phlegm since he went underground. He has been a watchmaker and jeweller, and has kept a school, but got so ill last winter, that he had to give up all work. Thinks he took cold from putting on a damp shirt, after working.	Very nervous and weak; suffered much from night perspirations in the spring, but is better in that respect now; pupils large; he cannot work from shortness of breath.	No complaint.	Not much cough, but has expectoration, and occasionally of blood; pain in the left breast; chest moderately expanded, but flat above; fairly res. on per.; respiration feeble above, harsh below, both before and behind; never spat much blood at a time; counts to 16 or 20.	Pulse somewhat quick and feeble; heart's sounds noisy.	Appetite and digestion good, and bowels regular; tongue clean.	

DISEASES OF MINERS IMPERFECTLY REPORTED.

Age of miner.	At what age he began to work underground, and previous occupation, if any.	How many years he worked underground.	Whether he chiefly worked at tribute or tutwork.	History.	Nature of illness and general condition.
58	1. 18 Dolcoath, July 13, 1862. Palpitation, dyspnœa.	- - -	- - -	Gave up working from ill health, about 28 years ago, and has worked at surface since.	He suffered from palpitation, and for 3 years was not able to do anything, he then got better and was able to do light work at the surface, but suffers at intervals. He also complains of pains and tenderness in his legs. Resonance on percussion impaired, but respiration fair; heart's sounds noisy but without murmur. Dark complexioned, fairly nourished.
38	2. 18 Dolcoath, July 13. Phthisis.	- - -	- - -	Worked underground till 4 months ago, and then gave up from his health failing.	Complains of pains in the front of the chest and the surface is tender to the touch; pain and weakness also in the loins; some deficiency of resonance on percussion at right apex, with feeble breathing and cough; res. there. Heart's sounds noisy but without murmur, pulse feeble and quick. Thin, pale, sallow, anxious, and phthisical looking, eyes glassy.
57	3. 17 Dolcoath, July 13. Formerly Albuminuria and Dropsy.	- - -	- - -	Still going underground.	3 years ago had dropsy and swelling of the limbs and was laid by for 3 months; he still suffers from weakness in the loins and thighs, but has a strong arm and is able to work. Heart's sounds noisy, pulse quick and weak.
45	4. 30 Camborne. Rheumatism.	- - -	Shaftman working in wet and draughty places.	- - -	Suffering from rheumatic pains in loins and right side of chest, respiratory sounds feeble, some prolongation of systolic sound at apex of heart.
35	5. 18 In Truro infirmary.	17	Working at tribute at Balleswidden.	- - -	Psoriasis.
22	6. 15 Camborne, July 15, Dr. Harris. Effects of injury.	- - -	Worked 4 years underground, and then had his arm broken by a fall of ground and was much crushed in the body. Since that he has had spitting of blood and has not been able to do anything for the last 3 years.	Weak and suffering at the chest, especially from palpitation.	There is some deficiency of the resonance on percussion at the right apex, but no undue cough or vocal resonance. He has considerable palpitation, and the heart's sounds are noisy. Sallow and thin.
32	7. 11 Clifford and United, Aug. 23, 1862. Commencing Miners' Asthma.	- - -	Tutwork - -	Suffering from palpitation.	Has had 2 attacks of "slow fever," one 5 years, the other 6 months ago; chest full and rounded and respiration harsh; heart's sounds feeble; has not spat blood. Pale and thin.
35	8. 10 Clifford and United, Aug. 23, 1862. Commencing Miners' Asthma or Phthisis.	- - -	Both - -	Spat some blood at Christmas.	Complains of pain in the side, shortness of breath, and beating at the heart, has no cough or murmur. Pale and thin.
44	9. 15 Clifford and United, Aug. 23, 1862. Commencing Miners' Asthma.	- - -	Tutwork - -	Had typhus fever 10 years ago, has suffered for 3 or 4 months from cough and spitting, but has never spat blood, or suffered from palpitation.	Very worn and ill looking; breathing harsh.
44	10. 15 Clifford and United Mines, Aug. 23. Miners' Asthma.	10	Tribute. Worked in foul air in Kea Park (the candles would not burn), and got a chill followed by rheumatic fever, and has not been able to go underground since, now 19 years ago. Is now working at surface.	Has suffered since he had rheumatic fever at the chest, and still does so severely, occasionally.	Breathing short and very feeble respiratory sounds; cough, but not much expectoration; sounds and action of heart feeble, and pulse at the wrist also feeble. Appetite and digestion good, and bowels regular.

Age of miner.	At what age he began to work underground, and previous occupation, if any.	How many years he worked underground.	Whether he chiefly worked at tribute or tutwork.	History.	Nature of illness and general condition.
38	11. 12	22	Had a bad hurt 3 years ago, his thigh being broken and his head cut, and has never been well since.	Now suffers from weakness and pains in the back and limbs.	
	Clifford and United Mines, Aug. 23. Effects of injury.				
44	12. 17 working at surface before.	27	Both tutwork and tribute, about equally.	Ailing, but still working; had inflammation of lungs 2 or 3 years ago.	Pains about the chest and beating at the heart, especially felt on exertion; harsh respiratory sounds; some prolongation of first sounds of heart at apex, perhaps a murmur.
	Clifford and United Mines, Aug. 23. Palpitation, dilatation of heart.				
39	13. 14 stamps before.	25	Chiefly tribute -	Ailing and unable to work for 4 months.	Two years ago, when working with a pick, he over reached himself and felt something give way on the right side of the chest, and brought up about a pint and a half of blood, and has suffered ever since. Complains of shortness of breath, cough, and expectoration. At the time the hæmoptysis occurred he was away for a week; and again a year ago he was laid by; has now been unable to work for 4 months. No marked signs of pulmonary or cardiac disease.
	Clifford and United Mines, Aug. 23. Commencing Miners' Asthma.				
51	14. 16	35	Tutwork chiefly -	Caught cold from working in warm places and then going into cold places. Has been laid by for 3 weeks.	Complains of cough and spitting, but has never spat any blood, and has no palpitation of the heart. General deficiency of the resonance on percussion at the upper part of the chest, with feeble respiratory sounds; heart's action and sounds feeble, and pulse at the wrist feeble. He is very deaf.
	Clifford and United Mines, Aug. 23. Miners' Asthma.				
44	15. 18 surface before.	26	Tribute - -	Fell away 24 feet 7 months ago, and was severely hurt in the head and back; has not been able to work since; was quite well before.	Heart's sounds noisy and harsh; very weak in the back, stooping gait, walks with feeble step; no appearance of injury to spine, and no loss of sensation in lower extremities.
	Clifford and United Mines, Aug. 23. Partial Paraplegia from injury.				
46	16. 12	- - -	- - -	Working at surface for 15 or 16 months.	Suffers from weakness in the stomach, expectoration and cough; the expectoration is especially in the morning and is frothy; has never spat any blood. Tongue morbidly red, appetite defective, digestion fair, bowels regular; some palpitation; respiratory and percussion sounds impaired, especially at left side; heart's sounds feeble. Sallow and spare.
	Dolcoath, July 13. Miners' Asthma and Dyspepsia.				
52	17. 14	- - -	- -	At surface for the last 10 months.	Very readily takes cold and suffers from shortness of breath, cough, and expectoration; on palpitation, appetite and digestion delicate, bowels confined; feeble respiration, and resonance on percussion somewhat unduly clear; heart's sounds and pulse feeble. Sallow and spare.
	Dolcoath, July 13. Miners' Asthma and general debility.				
28	18. 14	- - -	- -	At surface for last 7 months.	Two years ago took cold from working in water, and had typhus fever, and has never been well since. Suffers from shortness of breathing, cough, and expectoration of dark matter, but never of blood; appetite and digestion fair, but bowels relaxed; pulse small, feeble, and quick; resonance on percussion impaired at each apex and harsh, and with undue cough, res., especially at right. Thin and sallow.
	Dolcoath, July 13. Threatened Phthisis, diarrhœa, debility.				
16	19. 13	- - -	Rolling and assisting the men.	- - -	Eruption of psoriasis on all parts of body.
	Calvadnack, Psoriasis.				

MINERS AT WORK AT WENDRON CONSOLS MINE, 18th AUGUST 1862.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness and of what character.	Condition and Appearance.
34	16	18	Both -	Has had nothing serious the matter with him since he worked underground.	Healthy looking, but sallow and pale.
41	16	25	Tutwork -	Nothing - -	Healthy.
26	16	10	Both -	Nothing - -	Healthy.
21	13 full man's work at 16 or 17.	8	Tutwork -	Nothing - -	Healthy.
23	14	9	Both -	Nothing - -	Healthy.
21	17	4	Tutwork -	Nothing - -	Healthy.
20	13 full man's work at 18 and grass work 2 years.	7	Tutwork -	Complains of shortness of breathing and cough.	Delicate looking.
37	25 farm work before.	12	Both -	Nothing - -	Healthy.
25	13 man's work at 15.	12	Tutwork -	Complains of dyspeptic symptoms.	Thin, but fairly healthy.
19	15 man's work at 16.	4	Tutwork -	Nothing - -	Healthy, but thin.
30	16 man's work 17.	14	Both -	Had typhus in 1857	Thin, but fairly healthy.
24	17 man's work 19.	7	Both -	Nothing - -	Healthy.
22	15 man's work 20.	7	Tutwork -	Nothing - -	Healthy.
22	17 man's work 18.	5	Both -	Nothing - -	Healthy.
19	16 man's work 17.	3	Both -	Nothing - -	Healthy, but marked with small-pox.
18	16	2	Both -	Nothing - -	Healthy, but pale.
22	20	2	Tutwork -	Nothing - -	Healthy.
25	18	7	Tribute -	Had a fall, otherwise nothing.	Healthy, but pale.
18	15 still doing boy's work.	3	Tutwork -	Nothing - -	Healthy.
63	20 surface work at mines before.	43	Tribute -	Laid by with inflammation of lungs 10 weeks when 25 years of age. Suffers now from shortness of breath and cough and expectoration.	Fairly healthy for the age.
42	16 grass work before.	26	Tutwork -	Nothing - -	Healthy.
53	13	20	Tutwork and Shaftman.	Nothing - -	Healthy.
27	19	8	Tutwork -	Nothing - -	Healthy.
24	11 first blew an air machine. Full miner at 15.	13	Tutwork -	Nothing - -	Healthy.
40	20	20	Shaftman -	Nothing - -	Fairly healthy.
32	15	17 7 or 8 years in Australia.	Both - -	Was ill when abroad	Healthy.
28	17	11	Tutwork -	Nothing - -	Healthy.
42	15	27	Tutwork and pump and shaftman.	Nothing - -	Pale, thin, and delicate looking.
41	24 farm work before	17	Tutwork -	Nothing - -	Healthy.
55	20 grass work before	35	Both - -	Nothing - -	Fairly healthy
20	15 16 full miner.	5	Tutwork -	Nothing - -	Healthy.
47	20 stamps before.	27	Both - -	Has had brain fever and has been ailing for some time with cough and expectoration.	Pale, thin, and very delicate looking.
31	17 stamps before.	14	Both - -	Nothing - -	Aged looking and thin.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
62	15	42 stone cutter for 6 years.	Tribute -	Nothing - -	Healthy.
36	16 streaming before.	20	Both - -	Has had inflammation of lungs and ailing since.	Somewhat delicate looking.
21	14 took concern 16.	7	Tutwork -	Nothing - -	Healthy.
33	16 full miner at 23.	17	Tutwork -	Nothing - -	Healthy.
39	17	22	Tutwork -	Nothing - -	Healthy.
34	10 took into concern 15.	24	Both - -	Nothing - -	Healthy.
38	30 stampsand streaming before.	8	Both - -	Nothing - -	Healthy.
40	17 or 18	23	Both - -	Nothing - -	Healthy.
26	14 full miner 16.	12	Both - -	Inflammation of chest.	Fairly healthy.
19	13 full miner 18.	6	Tutwork -	Nothing - -	Healthy.
18	12	6	Tutwork -	Nothing - -	Pale.
17	- - -	3 or 4 months	Tutwork -	Nothing - -	Sallow and pale.
23	19	4	Both - -	Nothing - -	Pale.
26	15 full miner 19.	11	Both - -	Inflammation of chest.	Thin and somewhat delicate looking.
24	14 full miner 16.	10	Chiefly tutwork	Nothing serious -	Pale and somewhat delicate.
19	- - -	3 months	Tutwork -	Nothing - -	Healthy.
30	11 took concern 18.	19	Tutwork -	Typhus 9 years ago	Thin, but fairly healthy.
Calvadnack. 17	14	3	Tutwork -	Pain of side -	Healthy.
Calvadnack. 29	18	11	Tutwork -	Nothing - -	Pale.
26	17 full miner 19.	9	Tribute -	Nothing - -	Healthy.
26	11	15	Tribute -	Inflammation of chest 12 years ago.	Healthy and robust.
28	18	10	Both - -	Nothing - -	Healthy.
20	15 full miner 17.*	5	Both - -	Nothing - -	Healthy.
18	17 worked at stamps before.	1	Tutwork -	Nothing - -	Healthy.
19	14 took into concern 17.	4	Both - -	Nothing - -	Healthy.
19	11 14 man's work.	8	Tutwork -	Nothing - -	Healthy.
19	16	3	Tribute -	Nothing - -	Healthy.
54	15	39	Shaftman -	Has been ailing 3 or 4 weeks.	Worn and thin.
37	17	20	Tutwork, stone mason part of time.	Laid by 2 years ago for 5 weeks with inflammation of chest.	Very delicate looking.
22	10 man's work 16.	12	Tutwork -	Nothing - -	Healthy.
55	15 a farmer for 14 years since that.	26	Tutwork -	Nothing - -	Worn, but healthy.
54	26 farm work before.	28	Tutwork -	Ailing a little at times.	Worn.
53	24 streaming before.	29	Tutwork and shaftman.	Nothing - -	Fairly healthy for age.
45	16	29	Tutwork -	Nothing serious -	Fairly healthy.
45	15 in Australia for 4 years.	30	- - -	Nothing serious -	Fairly healthy.
25	15	10	Tutwork -	Nothing - -	Very healthy looking and robust.
25	18	7	Both - -	Nothing - -	Very healthy looking.
33	18 grass work before.	15	Both - -	Nothing serious -	Healthy.
40	20 stamps before.	20	Both - -	Suffering occasionally from diarrhœa and shortness of breath and beating at heart.	Delicate.
16	12 rolling and assisting men.	4	Tribute -	Nothing - -	Pale and sallow looking.

* Worked at farm-work 6 months from not being able to get work.

Age of miner.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
15	12 assisting men.	3	Tutwork -	Nothing - -	Healthy.
20	14	6	Tutwork -	Nothing - -	Healthy.
39	15 grass work before.	17	Both - -	Nothing - -	Sallow, but fairly heathy.

MINERS AT WORK AT LEVANT MINE, 19th AUGUST 1862.

20	19 filling trucks.	1	- - -	Nothing -	Healthy.
18	9 14 full miner.	9	Tribute -	Inflammation of left side a year ago.	Healthy.
22	12 17 full miner.	10	Both - -	Nothing -	Healthy, but thin.
39	12 17 full miner.	27	Both - -	Inflammation of chest a year ago.	Healthy.
22	11 17 full miner.	11	Tutwork -	Nothing - -	Healthy.
40	12 18 full miner	28	Both - -	Nothing - -	Healthy.
42	17 19 full miner.	25	Tutwork -	Nothing - -	Thin, pale and worn looking.
29	10 18 full miner.	19	Tribute -	Nothing - -	Healthy.
20	10 full miner 17.	10	Tribute -	Laid up with rheumatism several years ago, has not had any shortness of breathing and beating at heart since.	Healthy.
16	14	2	Boy's work -	Nothing - -	Pale and thin.
26	9 full miner 18.	17	Tribute -	Nothing - -	Healthy.
14	10	4	Boy's work -	Nothing - -	Pale.
44	10 full miner 14.	34	Tribute -	Nothing - -	Worn and short breathed, but no cough or expectoration.
18	10 man's work at present.	8	Tribute -	Nothing - -	Healthy.
13	10	3	Boy's work -	Nothing - -	Somewhat delicate looking.
46	12 full miner at 18.	34	Tribute -	Nothing - -	Worn looking.
21	9 full miner at 14.	12	Tutwork -	Suffering from cold	Pale and thin.
14	9	5	Nothing -	Boy's work -	Healthy.
16	12 doing man's work.	4	Tribute -	Nothing - -	Healthy.
25	13 full miner at 18.	12	Tutwork -	Nothing - -	Healthy.
45	11 18 miner's work.	34	Tribute -	Nothing - -	Worn for the age.
11	- - -	10 months.	Boy's work -	Nothing - -	Somewhat sallow looking.
16	13	3	Boy's work -	Nothing - -	Healthy but sallow.
17	11	6	Boy's work -	Nothing - -	Healthy but sallow.
40	11 full miner at 17.	29	- - -	Nothing serious -	Worn.
45	9 full miner at 17.	36	- - -	Nothing - -	Healthy, but sallow and thin.
18	12 or 13 full miner at 16.	6	Boy's work -	Had fever and inflammation of lungs after being 5 months underground, 4 or 5 years age.	Thin and pale; suffers from cough and expectoration, but has never spat blood.
18	10 full miner at 15.	8	- - -	Has suffered from headache, cough, and expectoration.	Pale and thin.
31	12 full miner at 16.	19	Both - -	Has lost an eye in blasting.	Healthy.
29	14 full miner at 20.	15	Both - -	Nothing serious -	Thin and pale; marked with small-pox.
35	10 full miner at 17.	25	Both - -	Nothing - -	Healthy looking and robust.
19	9	10	Tribute -	Had a slow fever before he went underground, nothing since.	Thin and sallow.
15	14	1	Boy's work -	Nothing -	Sallow, but healthy.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
18	11	7	Boy's work -	Has had fever attended with diarrhœa, sickness, and pain of head.	Pale, sallow, and very delicate looking.
38	15	23	- - -	Was hurt and laid up by cold, cough, and expectoration, and was away 3 or 4 years, better now.	Thin and pale.
25	11 full miner at 18.	14	Tutwork -	Hurt his leg in rolling.	Rather thin, but healthy.
21	12	9	Tutwork -	Nothing - -	Healthy.
45	15	30	Both - -	Ailing - -	Pale and rather delicate.
34	16	18	Both - -	Nothing -	Pale, but healthy.
51	11	40	Both - -	Suffers from cold -	Pale and thin.
14	12 tramming till 14.	2	Both - -	Ailing - - -	Pale and delicate looking.
26	10	16	Tutwork -	Nothing - -	Pale, but healthy.
16	12	4	Tutwork -	Nothing - -	Healthy.
50	20 at surface before.	30	Both - -	Rheumatic pains -	Healthy.
19	13	6	Both - -	Nothing serious -	Healthy.
42	14	28	Tribute -	Two attacks of inflammation of the side; one last Christmas, the other 2 or 3 years ago.	Thin, pale, and old looking.
23	18 stamps before.	5	Tutwork -	Nothing - -	Healthy, but sallow.
31	20 grass before.	11	Tutwork -	Injured by blasting, and lost an eye.	Pale and thin.
15	13	2	Tribute -	Nothing - -	Pale, thin, sallow, and decidedly delicate looking.
16	11	5	Boy's work -	A stone fell on his hand, and he was laid by for 2 days.	Pale and sallow.
11	- - -	2 months	Boy's work -	Nothing - -	Healthy.
26	9	17	Both - -	Had a fall and broke his shoulder. Had slow fever last summer and was laid by for a month suffering from weakness, entire loss of appetite, sickness of stomach, pain of head, heat and sweating at night, and tremblings. Better at one time than another, but without any regularity; bowels not relaxed; not confined to bed, but not able to work.	Healthy, but thin.
32	11	21	Tribute -	Complains of lightness of head and weakness of stomach.	Sallow, but fairly healthy.
26	12	14	Tutwork -	Nothing - -	Thin and sallow.
18	16	2	- - -	Complains of pain in the head.	Thin and sallow.
24	10 full miner at 16.	14	Tribute -	Nothing - -	Pale, but healthy.
20	12 full miner at 16.	8	Both - -	Nothing - -	Healthy.
21	15 or 16	6	- - -	Nothing - -	Healthy, but sallow.
17	10 12 man's work.	7	Tribute -	Nothing - -	Pale, sallow, and thin.
21	9½ man's work at 16.	12	Both - -	Nothing serious -	Healthy.
14	9	5	Boy's work -	Nothing - -	Sallow.
60	13 or 14	47	Both - -	Nothing serious -	Very worn and aged looking, and suffers from shortness of breath, but without cough or expectoration, or beating at heart.
29	12 full miner at 16.	17	Tribute -	Nothing - -	Very thin.
16	12	4	Boy's work -	Nothing - -	Healthy.
32	20	12	Chiefly tribute	Nothing - -	Healthy.
33	15 full miner at 18.	18	Both - -	Nothing - -	Healthy.
45	21	24	Tribute -	Inflammation of chest twice. Pains in limbs and lumbago, and suffers from shortness of breath.	Worn.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
16	11 full miner at 15.	5	Tribute -	Cut of ankle, but nothing serious.	Healthy.
33	13 full miner at 15.	20	Tribute -	Blasted when working at Ding Dong 15 years ago, and sight injured.	Healthy.
13	8	5	Boy's work; assisting men.	Nothing but a slight cut.	Sallow and thin.
21	10 full miner at 17.	11	Tutwork -	Nothing - -	Healthy.
18	8 man's work at 10.	10	Tribute -	Nothing - -	Sallow, but healthy.
48	12 man's work at 15.	36	Tribute -	Nothing material -	Healthy.
54	12 man's work at 16.	42	Tribute -	Hurt by a shot 18 years ago; nothing since.	Thin and pale.
24	13 man's work at 17.	11	Tribute -	Nothing serious -	Healthy.
22	21¾ stamps before.	¼ of a year	Tribute -	Nothing - -	Healthy.
16	9	7	Boy's work -	Nothing - -	Healthy, but sallow.
18	9 man's work at 17.	9	Tribute -	- - -	Healthy.

MEN EMPLOYED AT SURFACE; LEVANT, AUGUST 1862.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
71	Yes -	9	34 or 35	Both at Levant and Botallack.	27 years ago.	Worked at surface since. Doing nothing for last 2 years.	- -	Suffers from cough and spitting and shortness of breath, does not suffer from palpitation or pains in the limbs.
56	Yes -	8	32	- - -	16 years ago.	Became captain.	- -	Suffers from asthma, but less than when he came to the surface. He stated that he was only one of a hundred of those who started with him as miners; the mines then had only one shaft; they had always to go up and down by ladders, and had to work in close places in which the candle would not burn. He with eight others had once to work in a very wet and bad shaft and only one beside himself is now living.
52	No -	-	- - -	- - -	- -	- - -	- -	Healthy.
71	Yes -	15	21	Worked at tribute in Gwennap; away for 2 or 3 years.	35 years ago.	Became an agent.	Yes -	Healthy looking.
21	No -	-	- - -	Smith -	- -	- - -	Yes -	Healthy looking.
32	Yes -	20	7	Now sawyer	- -	- - -	Yes -	Healthy.
43	Yes -	19	13	Now sawyer	- -	- - -	Yes -	Healthy.

MINERS AT WORK AT ST. IVES CONSOLS MINE, 20th AUGUST 1862.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
37	30 previously engaged in farm work.	7	Trammer	Has not suffered -	Healthy.
46	13 working at stamps before.	33	Both -	Nothing - -	Healthy.
28	16 at stamps before.	12	Both -	Nothing serious -	Pale and thin.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
39	14 at stamps before.	25	Both -	Nothing - -	Healthy.
21	9½	12	Both -	Nothing - -	Healthy, but pale.
13	11 at stamps before.	2	Boy's work before he worked at the mine, but nothing since.	Had fever - -	Healthy, but pale.
14	12 at stamps before	2	Boy's work -	Nothing - -	Pale and thin.
37	15 at stamps before.	22	Both - -	Nothing - -	Healthy, but pale.
28	18 farm work before.	10	Chiefly tutwork	Nothing - -	Healthy.
57	15 at surface before.	42	Tribute -	Has suffered from pains in body and limbs.	Pale, but fairly healthy for age; very deaf.
32	22 stamps before.	10	Tribute -	Nothing but colds occasionally.	Healthy.
26	14 stamps before.	12	Both; has worked in the mines in North and and South America for zinc, silver, copper, and cobalt.	Nothing - -	Healthy.
32	14 stamps before.	18	Both -	Nothing - -	Healthy
28	15 stamps before.	13	Tutwork. -	Nothing - -	Healthy, but pale.
20	17 stamps before.	3	Tribute -	Nothing - -	Healthy, but pale.
29	24 at farm work before.	5	Tutwork -	Four months ago had "slow fever."	When ill thinks it was caused by his having taken cold, he felt weakness in the limbs and body, entire loss of appetite, and diarrhœa; he did not suffer from headache, cough, or expectoration, and was only a day or two in bed.
21	14	7	Both -	Nothing - -	Healthy.
16	14 working at the frames before.	2	Tutwork -	Nothing - -	Healthy, but pale.
18	15 at stamps before.	3	Tribute; worked as a smith 12 months ago for one month.	Nothing - -	Healthy, but pale.
27	16 at stamps before.	11	Both -	Nothing - -	Healthy, but pale.
52	14 at surface before.	38	Both - -	Nothing - -	Pale and thin.
34	14 surface before.	20	Tribute -	Has suffered from colds, but is never in good health.	Has suffered from difficulty of breathing, cough and expectoration, but has not experienced palpitation; pulse feeble; delicate looking.
20	14 at surface after 10.	6	Tribute -	Nothing - -	Delicate looking.
51	16 at surface before, but has worked as a miller for 4 or 5 years.	31	Tutwork -	2 attacks of inflammation of chest, 18 months and 12 months ago.	Still suffers from shortness of breathing (counts to 30).
56	13 from 11 at stamps.	43	Tribute -	Has suffered at different times.	Thin and pale.
22	17 worked at surface before.	5	Tutwork -	Nothing - -	Healthy.
46	16 or 17 at surface before.	29 or 30	Both - -	Has suffered from cold.	Pale and thin.
53	13 at surface before. Has farmed a little, when out of core.	40	Tutwork	Has had 3 or 4 attacks of illness.	Dropsy when 17; pale and worn.
54	12 at surface before.	42	Both - -	Nothing - -	Says he feels himself old; but is fairly healthy for the age.
59	14 at surface before.	45	Tutwork -	Has had 3 attacks of rheumatic fever	Suffering from rheumatic pains, and has some shortness of breath; no beating at heart; delicate.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
38	16 at surface before.	22	Both - -	Has had 2 attacks of inflammation of lungs, and readily takes cold.	Thin and pale.
36	15 at surface before.	21	Tribute -	Had severe cold and fever 6 years since, but says he is now well.	Very pale and thin.
42	21 surface before.	21	Tutwork -	Nothing - -	Very healthy.
51	11 at sea 4 or 5 years, 20 years ago.	36	Both - -	Nothing - -	Healthy.
23	13	10	Tribute -	Nothing - -	Healthy. Marked with smallpox.
42	14 at surface before.	28	Both - -	Nothing - -	Thin and pale.
33	26 shoemaker before.	7	Tribute -	Nothing - -	Pale, but healthy.
25	19 at farm work before.	6	Tribute -	Nothing - -	Very pale, thin, and delicate looking.
22	14 at stamps before.	8	Tutwork -	Typhus fever some months ago.	Healthy.
22	19 engaged in the dressing floors.	3	Tutwork -	Nothing - -	Has spat blood before he went into the mine, but not since. Pale, thin, and delicate looking.
50	15	35	Both - -	Lost an eye by an accident.	Very pale, thin, and worn.
23	13 stamps before.	10	Both - -	Nothing - -	Very pale.
25	13 stamps before.	12	Both - -	Nothing - -	Pale, but healthy.
44	10	34	Tribute -	Nothing - -	Worn and pale.
18	12 at a rope-walk before.	6	Tribute -	Nothing since, but fever before he went to mine.	Pale, but healthy.
22	16 stamps before.	6	Both - -	Nothing serious -	Pale, but healthy.
33	12 stamps before.	21	Both - -	Nothing - -	Pale, but healthy.
23	17 at stamps before.	6	Tutwork -	Nothing - -	Pale, but healthy.
30	14 at stamps before.	16	Both - -	Nothing - -	Pale, but healthy.
18	12 stamps before.	6	Tutwork -	Nothing - -	Pale, but healthy.
17	15 at dressing floors before.	2	Tutwork -	Nothing - -	Pale, but healthy.
62	14 at surface after 8.	48	Both - -	Not lost 4 cores from illness in his life.	Short breathed, but tolerably well and healthy for the age.
60	16 or 17	44	Both - -	Slow fever several times.	Worn, but fairly healthy for the age.
18	14 at surface before.	4	Tutwork -	Nothing except a fall.	Pale, but healthy.
18	16 stamps before.	2	Tutwork -	Nothing - -	Pale, but healthy.
45	17 stamps before.	28	Tutwork -	Nothing - -	Thin and pale.
28	14 at surface before.	14	Tribute -	Fever 4 years ago, but nothing else.	Pale, but healthy.
22	11	11	Both - -	Nothing - -	Pale and thin.
46	15 farm work before.	31	Tutwork -	Nothing - -	Pale, but healthy.
24	18 farm work before.	6	Tutwork and tramming.	Nothing - -	Healthy.
24	15 at surface before.	9	Both - -	Had an injury, but nothing else.	Pale, but healthy.
27	15 at stamps before.	12	Both - -	Nothing - -	Pale, but healthy.
31	16 surface before.	15	Both - -	Nothing - -	Pale and thin.
34	18 at farm work before.	16	Tribute -	Nothing - -	Somewhat pale, but healthy.
47	18 at school before.	29	Both - -	Nothing - -	Pale, but healthy.
37	18 at stamps before.	19	Both - -	Nothing - -	Pale and thin.
33	14 at school before.	19	Both - -	Slight accident, but nothing else.	Pale and thin.
36	20 shoemaker before.	16	Tutwork -	Slight accident, but nothing else	Pale, but healthy.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
44	16 at stamps before.	28	Both - -	Has had fever 2 or 3 times, but is now tolerably well.	Pale, but healthy.
33	15 stamps before.	18	Tutwork -	Slow fever and inflammation of chest 2 or 3 times.	Healthy looking.
52	18 stamps before.	34	Tutwork -	Nothing - -	Thin and pale.
31	12 stamps before.	19	Both; has been 3 years in Michigan.	- - -	Healthy, but pale.
23	14 at frames before.	9	Both - -	Nothing - -	Thin and pale.
45	16 farm work before.	29	Tribute -	Nothing serious -	Thin and worn.
19	14 at stamps.	5	Tutwork -	Nothing - -	Healthy, but pale.
22	14 stamps before.	8	Tribute -	Nothing - -	Thin and pale.
17	12 stamps before	5	Tutwork -	Nothing - -	Healthy, but pale.
24	15 farm work before.	9	Both - -	Nothing - -	Healthy, but pale.
16	10	6	Boy's work -	Nothing - -	Healthy, but pale.
18	11 stamps before.	7	Both - -	Nothing - -	Very pale.
41	11 stamps before.	30	Tutwork -	Nothing - -	Healthy, but somewhat pale.
56	15 farm work before.	41	Tribute -	Nothing - -	Fairly healthy looking for the age.
23	13	10	Tribute -	Nothing - -	Healthy, but pale.
35	12 stamps before.	23	Tribute -	Nothing - -	Healthy, but pale.
29	13 stamps before.	16	Both - -	Nothing - -	Healthy, but pale.
46	18 at frames before.	28	Both - -	Has had injury, but nothing else.	Pale and thin.
54	13 stamps before.	41	Both - -	Nothing - -	Healthy, but pale.
38	12 stamps before.	26	Both - -	Nothing - -	Healthy, but pale.
22	15 at surface from 11.	7	Both - -	Nothing serious -	Healthy, but pale.

MEN EMPLOYED AT SURFACE, ST. IVES CONSOLS, Wednesday 20th August 1862.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
36	Yes -	18	5	Worked in some foul air.	13 years ago.	From failure of health and being appointed agent.	Fairly healthy.	Recovered his health after being 6 months at surface.
47	Yes -	10	32	Worked in some foul air.	5 years ago.	Became captain.	Yes.	
33	Yes -	11	15	Has worked in America, worked in foul air.	4 years ago.	Became captain.	Yes.	
51	Yes -	25	Worked for 9 months as trammer.	Working at stamps.	- -	- - -	Yes.	
62	Yes -	In early life.	5	- - -	- -	- - -	Yes -	Fairly healthy for age.
68	Yes -	17	43	- - -	8 years ago.	- - -	- -	For 10 years together never off his core, but was shaftman all his life; short breathed, but fairly healthy for the age.
23	Yes -	13	18 months	Now a sawyer	- -	- - -	- -	Healthy.
79	Yes -	14 or 15	5 or 6	A smith -	- -	- - -	- -	Healthy.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
21	No	-	-	Working at stamps since 11 or 12.	-	-	-	Healthy.
32	No	-	-	Working at stamps.	-	-	-	Healthy.
51	No	-	-	Engine driver	-	-	-	Healthy.
40	No	-	-	Carpenter	-	-	-	Healthy.
54	No	-	-	Sawyer	-	-	-	Healthy.
54	No	-	-	Smith	-	-	-	Healthy.
51	No	-	-	Smith	-	-	-	Healthy, but pale.

MINERS AT WORK AT WHEAL OWLES, ST. JUST, 21ST AUGUST 1862.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
22	16 working at farm work before.	6	Tutwork	Nothing but a little lightness of head.	Healthy.
19	7	12	Both	Nothing	Healthy.
17	12 at surface before.	5	Tutwork	Nothing but fever 12 months ago.	Somewhat delicate looking.
28	12 at surface before.	16	Tutwork	Nothing	Healthy.
16	12 at school before.	4	Tribute	Nothing	Healthy.
17	15 at grass work before.	2	Tutwork	Nothing	Healthy.
36	18 stamps before.	18	Kibble and skip filler.	Nothing	Healthy.
37	18 tin dressing before.	19	Kibble and skip filler.	Nothing	Healthy.
13	11 stamps before.	2	Boy's work	Nothing	Healthy.
40	12 stamps before.	28	-	Nothing but a broken leg.	Healthy.
44	8	36	Been 6 years in Australia.	Nothing	Healthy.
44	18 farm work before.	7	At farm work for 19 years.	Nothing	Very worn looking.
21	11 at school before.	10	Tribute	Nothing	Healthy.
28	13 stamps before.	15	Tribute	Nothing	Healthy.
37	12	25	Tribute	Has been injured, but nothing else.	Healthy, but very aged.
32	10	22	Both	Nothing	Healthy.
30	21 drove machine on surface for 8 years before.	1	Tribute	Nothing	Healthy.
17	10	7	Tutwork	Nothing	Pale, thin, and delicate looking.
19	15 helping smiths before.	4	Tribute	Nothing	Healthy.
49	10 stamps before.	39	Both	Has had rheumatic pains and fever, but nothing else.	Much worn for age.
48	14 or 15 farm work before.	34	Both	Suffering from shortness of breath, cough, and expectoration. In Australia 6 years and returned 2 years ago, and was ill while there.	Very asthmatic.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
40	10 stamps before.	30	Tribute -	Lost an eye from a fall.	Somewhat delicate and aged.
18	14 stamps before.	4	Tribute -	Nothing -	Healthy.
19	15 stamps before.	4	Both - -	Nothing except scrofulous abscesses of neck, which came when he began to work underground.	Cicatrices of abscesses in neck.
22	12 at stamps before.	10	Tribute -	Nothing - -	Healthy.
22	9	13	Tribute -	Nothing - -	Healthy.
18	10 stamps before.	8	Tribute -	Nothing - -	Healthy.
19	9 stamps before.	10	Tutwork -	Injured, but nothing else.	Pale, but healthy.
20	- - -	4 months	- - -	Nothing - -	Healthy.
19	13 farm work before.	6	Tutwork -	Nothing - -	Healthy.
50	12 at stamps before.	38	Tutwork -	Nothing serious -	Healthy.
20	14	6	Tribute -	Nothing - -	Healthy.
42	13	29	Tutwork -	Nothing - -	Healthy.
29	17 stamps before.	12	Tutwork -	Nothing - -	Healthy.
17	7	10	Boy's work -	Nothing - -	Pale, but healthy.
22	12 at stamps before.	10	Tutwork -	Nothing - -	Thin and delicate.
28	14 or 15 labouring before.	14	Tutwork -	Nothing - -	Healthy.
24	17	7	Tribute -	Nothing - -	Healthy.
19	9	10	Both - -	Nothing - -	Healthy.
22	10 farm work before.	12	Tribute -	Inflammation of lung 5 months ago, and again a fortnight ago.	Delicate.
25	15	10	Both - -	Has formerly suffered from palpitation, but not at present.	Healthy; no murmur.
21	8½	13	Both - -	Brain fever 18 months ago.	Healthy.
17	15 at surface before.	2	Tutwork -	Nothing - -	Healthy.
21	10	11	Tutwork -	Nothing - -	Healthy.
18	9	9	Boy's work -	Pains at left side and palpitation.	Pale and thin; somewhat noisy sounds of heart.
16	14	2	Boy's work -	Nothing - -	Healthy.
26	13 farm work before.	16	Both - -	Nothing serious -	Healthy.
20	12	8	Tutwork -	Nothing - -	Healthy.
46	10	36	Both - -	Nothing - -	Healthy.
49	12 farm work before.	37	Tutwork -	Has had 2 attacks of rheumatism, the first 20 years and the other 10 years ago. No murmur or palpitation.	Aged.
45	16	29	Both - -	Scrofulous abscess in the neck.	Cicatrices of abscesses of neck. Aged.
40	23 farm work before.	17	Labourer -	Injury of leg, &c.	Somewhat delicate.
18	16 at stamps before.	2	Labourer -	Nothing - -	Thin and pale.
31	At 10 for a time, but not regularly till after 14, at stamps before.	21	Both - -	Has had 2 accidents, and had rheumatic fever when 20 and 21 years of age.	Still suffers from palpitation, and there is some prolongation of the systolic sound at apex.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
25	24 at farm work before.	1	Nothing -	- - -	Thin, but healthy.
16	12 at stamps before.	4	Boy's work -	Nothing - -	Thin and pale.
15	14 stamps before.	1	Boy's work -	Nothing - -	Thin and pale.
24	14 stamps before.	10	Tutwork -	Nothing - -	Thin and worn.
25	17 stamps before.	18	Tutwork -	Suffers from shortness of breath, cough, and spitting, but never of blood.	Delicate looking.
48	17 at surface before.	31	Both - -	Took a violent cold 18 years ago, and this was followed by slow fever and he was ill 7 months, ascribed his illness to cold draughts, not bad air.	Thin and pale.
47	20 shoemaker before.	27	Both - -	Nothing - -	Somewhat delicate.
30	15 surface before.	15	Both - -	Nothing - -	Healthy.
28	15 at surface before.	13	Both - -	Nothing - -	Very robust, marked with smallpox, which he had at 14 or 15.
18	9	9	Tutwork -	Nothing - -	Abscess in neck 3 years ago. Thin and pale.
17	9	8	Both - -	Nothing - -	Pale, but healthy.
21	15 stamps before.	6	Both - -	Nothing - -	Healthy, marked with smallpox, which he had at 8.
40	16 farm work before.	34	Both - -	Nothing - -	Healthy.
30	9	21	Tutwork -	Nothing - -	Healthy.
31	12	19	Both - -	Nothing - -	Healthy,
63	13 dressing floors before.	50	Tutwork -	Nothing - -	Healthy.
35	13 stamps before.	22	Tutwork -	Nothing but fever 16 years ago.	Healthy.
22	18 stamps before.	4	Labourer -	Nothing - -	Healthy
23	17 stamps before.	6	Tutwork -	Nothing - -	Healthy.
15	9	6	Boy's work -	Nothing - -	Pale, but healthy.
22	12 stamps before.	10	Both - -	Fever years ago, but nothing else.	Healthy.
45	35 worked at farms before.	10	Kibble filler and tributer.	Nothing but a hurt	Somewhat delicate.
19	12 stamps before.	7	Boy's work -	Nothing - -	Healthy.
22	9	13	Tutwork -	Nothing - -	Pale, but healthy.
35	30 farm work before.	5	Tutwork -	Nothing - -	Pale, but healthy.
14	12 stamps before.	2	Boy's work -	Nothing - -	Healthy.
48	15 at farm work before.	33	- - -	Nothing - -	Healthy.
57	17	40	Both - -	Nothing - -	Healthy.
45	9	36	Both - -	Fever twice, 14 and 10 years ago.	Healthy.
35	12 farm work before.	23	Both - -	Suffers from indigestion.	Thin and pale.
14	12 stamps before.	2	Boy's work -	Nothing - -	Pale, but healthy.
13	10 stamps before.	3	Boy's work -	Nothing - -	Healthy.

MEN EMPLOYED AT SURFACE AT WHEAL OWLES.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
60	Yes	14	2	A smith	44 years ago.	-	Yes	For the age.
29	Yes	11 or 12	6 months	A smith	17 years ago.	-	Yes	
46	Yes	14 stamps before.	12 years	-	38 years ago.	From injury by which he lost the sight of an eye.	Yes	Working at stamps since.
20	Yes	10 helping carpenter before.	3½ years	-	6½ years ago.	Suffered at the chest, but got better afterwards.	Ailing	Still asthmatic.
45	Yes	20	7	-	18 years ago.	Appointed agent.	Yes	Healthy.
71	Yes	18 at stamps before.	20	-	33 years ago.	-	Has had nothing serious the matter with him.	Healthy for the age.
38	Yes	14	6	First worked a machine and afterwards became captain.	18 years ago.	-	-	Healthy.
18	No	-	-	A smith	-	-	-	Healthy.
40	No	-	-	A smith	-	-	-	Healthy.
18	No	-	-	Works a machine at surface.	-	-	-	Pale and thin.
16	No	-	-	Drives machine at surface.	-	-	-	Very healthy.
15	No	-	-	Drives machine at surface.	-	-	-	Very healthy.
15	No	-	-	A smith	-	-	-	Eruption of impetigo on face.
36	No	-	-	A labourer at surface.	-	-	Ailing	Thin and pale.
47	No	-	-	Engine driver.	-	-	-	Healthy, but thin.

MINERS AT WORK AT BOTALLACK MINE, 21ST AUGUST 1862.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
33	15 worked at stamps before.	18	Both	Nothing	Healthy.
26	16 worked at stamps before.	10	Tribute	Nothing	Pale, but healthy.
52	12 at frames before.	40	Both; was 3 years in America and returned 4 or 5 years ago.	Nothing	Pale, but healthy.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
22	10	12	Both - -	Palpitation of heart 2 years ago. -	Pale and thin, marked with small-pox which he had when 10 years old; no murmur.
14	11	3	At boy's work	Nothing - -	Pale and thin.
30	17 at farm work before.	13	Tutwork -	Nothing - -	Pale, but healthy.
17	14 at stamps before.	3	At boy's work	Slight accident, but nothing else.	Thin, but healthy.
24	12 stamps before.	12	Tutwork -	Fell away and was injured, but nothing else.	Healthy.
24	11 at stamps before.	13	Tutwork -	Nothing - -	Healthy.
16	8	8	Both - -	Had a severe fall, but nothing else.	Pale, but healthy.

MINERS AT WORK AT DOLCOATH AND BOTALLACK, JULY 1862.

61	16 or 18	41 or 43 Dolcoath.	- - -	He stated quite healthy.	Fairly healthy for the age.
80	15 to 20	60 to 70 Dolcoath.	- - -	Stated himself to be healthy.	Very deaf and has lost an eye and his sight is very defective; working till within the last few weeks and then gave up unwillingly.
46	- - -	— Botallack.	- - -	Laid by 12 or 14 years ago from working in a close place.	Delicate, pale, and sallow.
29	15	13 or 14 Botallack.	- - -	Ailing - -	Pale and delicate looking.
42	18	24 Botallack.	- - -	Lost an eye -	Pale and complaining of dyspeptic symptoms, flatulency, sickness, &c.
24	16	8 Botallack.	- - -	Nothing - -	Healthy.
35	15	20 Botallack.	- - -	Palpitation -	Still suffering from palpitation, and perhaps a murmur at apex.
62	10	52 Botallack.	- - -	Nothing serious -	Fairly healthy for age; still working.
69	9	60 Botallack.	- - -	Nothing serious -	Fairly healthy for age; still working.
35	15	18 Dolcoath.	- - -	Suffering from dyspeptic symptoms, had dropsy 3 years ago and was ill 3 months, still weak and especially in loins, and pains there.	Pale, sallow, defective appetite.
57	- - -	40	- - -	- - -	Still working.
29	14	15	Tribute, Camborne.	Never suffered except from colds and an accident.	Very deaf from accident, but otherwise healthy.

MEN EMPLOYED AT SURFACE, BOTALLACK, JULY 1862.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
50	Yes -	10	21	When about 19 years of age he worked in a damp end and suffered from difficulty of breathing, in consequence, left work for 2 months and took to weaving flannel and then went underground again, but continued ailing for 2 or 3 years. He continued well till he was about 30 when he took cold from checked perspiration and was laid by for some months, and not quite well for 3 or 4 years.	19 years ago.	Became agent	Yes -	Fairly healthy.
65	Yes -	18	40	- - -	6 or 7 years ago.	Came to work on surface.	He states so.	
46	Yes -	17	9	- - -	20 years ago.	Became agent	Was till recently.	Pain in chest.
42	Yes -	12	16	- - -	14 years ago.	Became agent	Yes -	Healthy.

MEN EMPLOYED AT SURFACE, DOLCOATH, JULY 1862.

46	Yes -	12	33	- - -	15 or 16 months ago.	From failure of health.	Still suffering.	Shortness of breath, cough, and expectoration; sallow and thin. Working at surface.
52	Yes -	14	36	- - -	Nearly 2 years ago.	From failure of health.	Still suffering.	Shortness of breath, cough, expectoration, and failure of power in limbs; sallow and spare. Working at surface.
28	Yes -	14	13	- - -	17 mths. ago.	Failure of health.	Still suffers.	Shortness of breath, cough, expectoration, and weakness of stomach. Working at surface.
58	Yes -	18	12	- - -	Gave up 28 years ago.	Failure of health.	Still suffers.	Palpitation. Working at surface.
38	Yes -	18	19	- - -	14 mths. ago.	Failure of health.	Still suffers.	General debility and palpitation. Working at surface.

MINERS AT WORK CLIFFORD & UNITED MINES, GWENNAP OR ST. DAY
23D AUGUST 1862.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
35	11 worked at stamps before.	24	Tutwork -	Nothing - -	Healthy.
54	12	42	Tribute -	Nothing - -	Worn, but fairly healthy.
57	16 at farm work before.	41	Tribute -	Nothing - -	Worn, but healthy.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of character.	Condition and appearance.
54	14 at stamps before.	40	Both - -	Has twice suffered from cold at chest; once 10 years ago and again 5 months ago.	Pale and worn.
38	12 at stamps before.	26	Tribute -	Nothing - -	Pale, but healthy.
19	12 at farm work before.	7	Tribute -	Nothing - -	Healthy.
39	12 at dressing floors before.	27	Tutwork -	Nothing - -	Thin and worn.
45	15 at stamps before.	30	Tribute -	Nothing - -	Healthy.
31	10	21	Tutwork -	Nothing - -	Healthy.
36	14 at stamps before.	22	Both - -	Nothing - -	Healthy.
28	11 at dressing floors before.	17	Tutwork -	Nothing - -	Pale, thin, and delicate.
38	14 at stamps before.	24	Tribute -	Nothing - -	Healthy.
18	13	5	Tribute -	Nothing - -	Thin and pale.
39	14 stamps before.	25	Tribute -	Serious hurt of back, but nothing else.	Healthy.
41	13 at stamps before.	28	Tribute -	Nothing - -	Healthy.
43	14 at stamps before.	29	Tribute -	Nothing - -	Very worn.
29	15 at dressing floors before.	14	Tribute -	Nothing - -	Healthy.
43	7 full miner's work at 17.	36	Tribute -	Subject to headache	Very worn looking for age.
27	8	19	Tribute -	From 2 or 3 months ago, but nothing else.	Pale, but fairly healthy.
17	13	4	Tribute -	Nothing - -	Thin, but healthy.
20	10	10	Both - -	Nothing - -	Healthy.
46	15 at dressing floors before.	31	Tribute -	Sprained his ankle, but nothing else.	Pale, but healthy.
35	15 at farm work before.	20	Both - -	Nothing but cold -	Pale, but healthy.
44	17 at surface before.	27	Both - -	Inflammation of lungs 2 or 3 years ago.	Pains about the chest, cough, and expectoration, and especially when suffering from cold; beating at the heart; respiration harsh; some prolongation of systolic sound at apex.
19	16 at farm work before.	3	Tutwork -	Nothing - -	Pale, but healthy.
35	15 at floors before.	20	Tutwork -	Nothing - -	Healthy.
24	12 farm work before.	12	Tutwork -	Had low fever with diarrhœa 4 years ago, and was confined to bed; has never been so well since.	Healthy.
47	17 at floors before.	30	Both - -	Has had slow fever twice, 5 years and 6 months since; was not confined to bed in the 2d occasion, but had diarrhœa and was ill 2 months; complains of palpitation; chest full and rounded, and respiration harsh; pulse and sounds of heart feeble; never spat blood.	Pale and thin.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
32	11	21	Tutwork -	Nothing - -	Pale, but healthy.
42	13	29	Tutwork -	Nothing - -	Thin, but healthy.
45	9	36	Tutwork -	Nothing but fever about 9 years ago.	Pale and worn.
28	13	15	Tutwork -	Nothing but colds	Pale, but healthy.
54	14 farm work before.	40	Tutwork -	Nothing - -	Healthy.
23	10 stamps before.	13	Tutwork -	Nothing but colds	Pale, but healthy.
28	14	14	Tutwork -	Is blind of an eye from ablast; has also had fever recently and was confined to bed, and is still weak.	Delicate looking.
43	12	31	Tutwork -	Nothing but colds	Worn and somewhat delicate.
19	15 at farm work before.	4	Tutwork -	Nothing - -	Pale and sallow, and somewhat delicate.
40	12 at floors.	28	Tutwork -	Nothing - -	Thin and sallow.
48	23 at surface before.	25	Fills kibbles -	Nothing - -	Worn and somewhat delicate.
17	14 at stamps before.	3	Tutwork -	Nothing - -	Thin and pale.
24	8½	16	Tutwork -	Nothing - -	Thin and pale.
51	16 at stamps before.	35	Tutwork -	- - -	Very delicate looking. Caught cold 3 weeks ago from working in very hot places where he was unable to wear his shirt and then going for relief into a cold place; has still cough and expectoration but has never spat blood, no beating at the heart, general deficiency of resonance on percussion at the upper part of the chest with feeble breathing and feeble sounds of heart; deaf.
25	12	13	Both - -	Nothing - -	Pale, but healthy.
61	11 at floors before.	50	Tutwork -	Nothing but colds, experiences shortness of breathing; cough and expectoration when suffering from cold.	Fair for age.
47	13 stamps before.	34	Tutwork -	Nothing - -	Worn, but healthy.
48	15 floors before.	33	Tutwork -	Nothing but slight injury.	Thin and pale.
55	12 at floors before.	43	Tutwork -	Slightly injured, but nothing else, and has taken cold occasionally.	Worn.
25	12 at stamps before.	13	Tribute -	Nothing - -	Healthy.
25	8	17	Both - -	Nothing - -	Healthy.
47	12 at surface before.	35	Tutwork -	Nothing - -	Thin and worn.
21	9 at stamps before.	12	Both - -	Nothing - -	Healthy.
25	14 at stamps before.	11	Tutwork -	Nothing - -	Healthy.
20	12 stamps.	8	Both - -	Nothing - -	Thin, but healthy.
17	12 at stamps before.	5	Tutwork -	Nothing - -	Thin and sallow.
23	11 worked before in a stone quarry.	12	Tutwork -	Nothing - -	Thin, but healthy.
44	18 at surface before.	26	Tribute -	Had a fall of 24 feet 7 months ago and pitched on his head and injured his back, was much shaken and has not been able to work since; heart sounds noisy and harsh; weakness of back; quite well before.	
43	14 at surface before.	29	Both - -	Has had injury of his right hand; states he is tolerably well, but very much worn.	

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
15	14 at floors before.	1	Boy's work -	Had smallpox, but nothing else.	Thin and pale.
18	13 at floors before.	5	Tutwork -	Nothing - -	Thin and sallow.
16	13 at floors before.	3	Both - -	Nothing but smallpox.	Sallow, but healthy.
61	12 at surface before.	49	Both - -	Suffers from shortness of breath, cough, and expectoration, and very readily takes cold.	Old for the age.
22	12 at floors before.	10	Tutwork -	Nothing - -	Thin, but healthy.
44	13 at farm work before.	31	Tribute -	Nothing - -	Healthy.
27	9½ full miner's work at 15.	6	Tribute 4½ years in Cuba.	Nothing - -	Pale and thin, and always so; fair.
61	20 farm work before.	41	Tutwork -	Nothing - -	Worn, but healthy.
49	20 at surface before.	29	Tribute -	Nothing - -	Healthy.
38	13 at stamps before.	25	Tribute -	Nothing - -	Healthy.
25	14	11	Tribute -	Nothing - -	Healthy.
41	12 stamps before.	29	Tribute -	Nothing - -	Worn, but healthy.
36	14 at stamps before.	22	Tutwork -	Nothing - -	Worn, but healthy.
38	14 farm work before.	24	Tribute -	Nothing - -	Healthy.
35	10 full miner at 14.	25	Both - -	Spat some blood last Christmas and has pain in the side, shortness of breathing, and beating at the heart; no cough and no murmur.	Pale and thin.
26	12 at farm work before.	14	Both - -	Nothing - -	Healthy.
28	14 stamps before.	14	Tutwork -	Had typhus from 8 years ago.	Healthy; marked with smallpox.
40	13 at farms before.	27	Tutwork -	Nothing - -	Healthy.
22	10 full miner at 15.	12	Tutwork -	Nothing - -	Healthy.
20	14 at stamps before.	6	Tutwork -	Nothing but smallpox a year ago.	Pale, but healthy.
29	14 at stamps before.	15	Tribute -	Nothing - -	Pale and thin.
38	11 at stamps before.	27	Tribute -	Nothing - -	Thin, but healthy.
50	11 stamps before.	39	Tribute -	Had inflammation when a boy, but nothing since.	Worn, but healthy.
44	15 at farm work before.	29	Tutwork -	Had his leg broken but nothing else.	Pale, but healthy.
45	10 full miner at 16.	35	Tutwork -	Nothing - -	Thin and delicate looking.
32	10	22	Both - -	Had slow fever with diarrhœa 2 years ago but has not otherwise suffered.	Thin and pale.
50	12 at surface before.	38	Tutwork in the Brazils for 5 years.	Nothing - -	Healthy for the age.
22	14 or 15 farm work before.	7	Tutwork -	Suffered from fever when working at Wheal Damsel, and has also had a sun stroke, and suffers from fullness of head and beating of heart; no murmur.	Thin and pale.
46	13 working at surface before.	33	Tutwork	Nothing but colds	Healthy.
15	10 stamps before.	5	Boy's work -	Nothing - -	Pale, but healthy.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork.	Has he had any illness, and of what character.	Condition and Appearance.
39	22 at surface before.	17	Tutwork -	Nothing but slight colds.	Thin and pale.
50	17 at floors before.	33	Tutwork -	Inflammation of chest and lungs 15 years ago and weakness and palpitation since; some cough and spitting but no shortness of breathing except when suffering from cold; no murmur.	Very worn.
54	19 at fan work before.	35	Tutwork -	Had inflammation of chest 10 years ago but no symptoms since.	Worn.
45	20 surface before.	25	Both - -	Has suffered from cold occasionally, but is now tolerably well.	Fairly healthy.
39	14 at stamps before.	25	Tribute -	Health failed 2 years ago.	Shortness of breathing, cough, and expectoration; decidedly delicate.
40	13 at stamps before.	27	Tutwork -	Nothing - -	Healthy.
22	10 at stamps before.	12	Tribute -	Nothing - -	Healthy.
54	17 at farm work before.	37	Tutwork -	Nothing intemperate.	Healthy.
38	15 at surface before.	28	Tutwork -	Nothing but colds	Healthy.
27	14 at stamps before.	13	Tutwork -	Had slow fever 12 months ago but was able to get all the time.	Thin and pale.
45	16 at stamps before.	29	Tutwork -	Nothing - -	Worn, but healthy.
44	15 at stamps before.	29	Tutwork -	Had typhus fever 10 years ago; now has suffered for 3 or 4 months from cough and spitting, but has never spat blood, and occasionally has beating at heart.	Very worn and ill looking.
27	12 at stamps before.	15	Tutwork -	Nothing - -	Pale, but healthy.
30	12 at floors before.	18	Tutwork -	Nothing but an injury.	Worn and thin.
29	13 stamps before.	16	Tutwork -	Nothing - -	Healthy.

MEN EMPLOYED AT SURFACE IN CLIFFORD AND UNITED MINES.

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
51	Yes -	16	8	Tutwork -	37 years ago.	Became a labourer at the surface and did not suffer from being underground.	Yes -	He states quite healthy and appears so for the age. When he first gave up going underground he went to an arsenic manufactory and was employed in preparing the pure arsenic from the rough drug. The flues of the furnace were cleaned out once a week, the fires were put out on the Saturday night, the men went into the chambers on the Monday morning; they had to go in by a man-hole and to go fully 18 feet from the opening, and the flues were then sometimes so hot that they could only remain for 5 or 10 minutes at a time. From 10 to

Age.	Whether he ever worked underground.	If so, at what age he began to work underground.	How many years he worked.	What he chiefly worked at, Tribute or Tutwork, and character of air.	When he gave up working underground.	Why he gave up working.	Whether now quite well.	If ailing, how does he suffer.
						15 tons of arsenic were removed each time the flues were emptied. He did not suffer at the time from griping pains, sickness, or diarrhœa, nor did his hair fall off, nor was his condition at all impaired, but he had a burning sensation occasionally at the pit of the stomach and across the chest, and spitting, and blotches appeared upon the face and body. If there were any places which were scratched they festered.		
44	Yes -	15	10	Tribute -	9 years ago.	Had worked in very bad air in Kea Park, the candles would not burn and he suffered at the chest. He took cold and had rheumatic fever, and has not been able to go underground since.	He still is occasionally very bad, but is at present better.	He suffers from shortness of breath and cough, but has very little expectoration, and the respiratory sounds and resonance are feeble; the heart sounds and pulse also feeble; appetite and digestion good, bowels regular.
38	Yes -	12	20	- - -	3 years ago.	Injured by a fall, had his thigh broken and was cut and bruised very badly, and has never been well since.	No -	He suffers from pains in the back and limbs and weakness, and is quite unable to work, but there is no evidence of injury to the spinal column.
19	No -	- -	- - -	Works at crushers.	- -	- - -	- -	Thin, but healthy.

MINERS RESIDING AT BODMIN LAND, AND LISKEARD,
examined in their own Cottages, 24th August 1862.

Age of miner.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork, and character of air.	Has he had any illness, and of what character.	Condition and Appearance.
29	10 at first occupied in rolling.	19	Tutwork: has worked in poor air, especially in South Carradon and Wheal Hooper, but did not suffer at the time.	Has not suffered, and is well.	Healthy looking.
25	12	13	Tutwork: has worked in poor air at Wheal Hooper for 2 months, and suffered in the head and stomach. Has also worked in poor air at East Caradon.	Has suffered, but is well.	Fairly healthy looking.
25	15 engaged in farm work before.	10	Tribute: has worked in rather poor air in Fowey Consols 2 years ago, and was laid by 2 months in consequence.	Suffering from palpitation of the heart.	Delicate looking; action of heart unduly powerful, but no murmur.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork, and character of air.	Has he had any illness, and of what character.	Condition and Appearance.
36	8	28	Both: never worked in materially bad air, but has suffered a little from it across the stomach.	Has suffered, but is now well.	Fairly healthy looking.
23	Has only just began to go underground, and was previously engaged in farm work.	- - -	- - -	Has not suffered, and is well.	Delicate looking.
34	10	24	Both -	Injured one eye and lost another by an explosion in South Caradon.	Healthy looking.
29	12	17	Both: worked for a short time in poor air in South Caradon.	Has not suffered and is well.	Pale and thin.
27	16 or 17 working at floors before.	11	Chiefly tribute, in South Caradon: worked in Wheal Ray which was not bad air, but the mine was dry and cold, and he suffered from the dust.	Has suffered at the chest, and is now asthmatic.	Complains of cough and expectoration and shortness of breath, and is pale and delicate looking.
35	26 engaged in farm work before.	9	Trammer -	Suffering from rheumatic pains in different parts of body, but healthy before he went to mine.	Delicate looking, pale and thin.
15	10	5	Both: has always worked in good air.	Has not suffered and is well.	Healthy looking.
42	30 engaged in farm work before.	12	Tutwork: has worked in poor air, and for 2 months in very bad air at West Caradon, 5 or 6 years ago.	Has had inflammation of the bowels and a stoppage, but he thinks it had nothing to do with his working underground.	Very delicate looking,
18	8	10	Tutwork: works at Craddock Moor, the air of which is "not so very well."	He has never suffered, and is now well.	Healthy looking.
48	12	36	Tribute: has been in Michegan. Has latterly worked in South Caradon, of which the air is not so bad. He however states that "all miners suffer from poor air, more or less."	Ailing and complaining of dyspeptic symptoms.	Pale, worn and aged.
50	11	39	Tribute: has been in Tenessee and Illinois. Suffered when he worked in Carn Brea when 24 years of age, and was then laid by for 8 months. Thinks he ultimately got quite over it. He has chiefly worked at tribute, and the "tributors get good air if it is to be got."	Has suffered and still complains of dyspeptic symptoms.	Decidedly aged and worn.

Age.	At what age he began to work underground.	How many years he worked underground.	What he chiefly worked at, Tribute or Tutwork, and character of air.	Has he had any illness, and of what character.	Condition and Appearance.
42	10	32	Both; but has also been engaged in working the pump. Worked in bad air in Gonemana some years ago, and suffered in some degree from it. He has also worked much in wet and cold shafts.	Has suffered from asthmatic symptoms and chronic diarrhœa, and states he is weak and delicate, which he ascribes to having to walk 3½ miles to the mine, and sometimes getting wet, and then having to put on his clothes wet after he has done working. There is a "dry" at the mine, but sometimes the man who has charge of it is not able to dry all the miners' clothes.	Pale, worn, and decidedly delicate looking.
29	20 drove engine before.	9	Tutwork: worked in bad air in West Caradon last Christmas.	Has not suffered, and is well.	Pale, sallow, and delicate looking.
20	11	9	Tutwork: worked in poor air in Mark Valley for 12 months and suffered in consequence from shortness of breath and tightness across the chest.	Injured by fall in legs and side.	Asthmatic and infirm.
37	23 engaged in farm work before.	14	A trammer: has worked a little in bad air at West Caradon.	Never suffered, and is now well.	Healthy looking, but pale.
17	15 worked at floors before.	2	Both: worked in bad air in Mark Valley, and felt it in his head.	Is now well -	Healthy looking.
21	11	10	Both: worked in very bad air in 65 level in Okle Tor near Calstock.	Has an eruption on the skin, and suffers in head and chest.	Delicate.
28	14	14	Tutwork: worked in bad air 14 or 15 years ago, and suffered in the legs and side.	Is now well -	Healthy looking.
22	9	13	Tutwork: worked in bad air in South Caradon, and lost his appetite, and became weak in consequence.	Is now well -	Pale, but healthy looking.
17	10 or 11	7	Tutwork -	Has never suffered, and is well.	Pale, but healthy looking.

DISEASES OF MINERS

IN

THE NORTH OF ENGLAND AND WALES,

THEIR FAMILY HISTORY, PERSONAL HISTORY, AND PRESENT STATE; WITH REMARKS.

BY

THOMAS B. PEACOCK, M.D., F.R.C.P.

DISEASES

Name.	Present Age.	FAMILY HISTORY.		PERSONAL	
		Ages, occupations, and state, &c. of brothers and sisters.	Ages, occupation, &c. of father and mother.	Age at which he first worked under ground.	In what Mines he has worked, kind of work, and character of air.
1. Alston, August 3, 1863; Mr. Arnison. Advanced miners' asthma.	67	2 brothers, miners, and died of miner's disease at 40 and 45.	Father a miner and died of miner's disease at about 63, but had left mining and worked at farm labour for 7 or 8 years before his death.	3 months before he was 7 years of age.	He states that he has worked at several different mines in the neighbourhood of Alston, and sometimes in very bad air, where candles could only be got to burn by being held on one side or set behind him, and sometimes they would not burn at all. He worked lastly in very bad air at Nents Berry Green 10 or 12 years ago.
2. Clitheroe, Alston, August 3, 1863; Mr. Arnison. Advanced miner's asthma, with consolidation of upper parts of lungs.	55	A brother, a miner, died at 53 of miner's complaint, and a sister at 30 of consumption.	Father was a tailor, but he does not know at what age or of what complaint he died. He is ignorant also of the age at which his mother died, or of the cause of her death.	First went underground when 16 years of age.	He has worked in several mines in the neighbourhood of Alston, more particularly at Blaygill. He has also worked in Hartley Burn Colliery. When at Blaygill, he worked in 1836 in very bad air. They had indeed no air but what was blown to them from another part of the mine by a small machine. They were working at the low level 700 fathoms from the entrance. There was much water, and the candles would only burn when held on one side. The heat was also so great that they could scarcely wear any clothing. After they finished the level they worked in a rise, and got air when they got through to another level. There were 6 of them employed in the work, and they worked night and day for 3 years. While working 2 or 3 of them were taken ill, and one was seized with a fit from working in the bad air. All of them but himself are now dead. When working in bad air he lost his appetite, and his breathing was very bad.
3. Alston, August 3, 1863; Mr. Arnison. Obstructive and regurgitant disease of aortic valves; dropsy.	70, latterly a butcher.	Had 3 brothers, all miners; one died at 52, of some lingering disease; one 60 suddenly, probably from cardiac disease; one killed at 50 by rock falling upon him.	Father a miner, and died at the age of 60. Cause of death not known.	At 10 years of age.	He worked in Mr. Beaumont's mines at Allenheads. He suffered from rheumatic pains, chiefly in hip joints, when working in the mines many years ago.
4. Nenthead, Aug. 3, 1863; Mr. Carson. Advanced miners' asthma, with consolidation.	50	He has 4 brothers living, at from 42 to 61 years of age, and one brother died at 50 of miner's complaint. All were miners. 2 sisters living at 63 and 54.	His father was a miner and died of miner's complaint when between 50 and 60 years of age. Mother died at 62.	At 18, and has worked steadily since.	He has always worked for the London Lead Company, and has worked in bad air. "Indeed all miners have to work in bad air more or less."
5. Nenthead, August 3, 1863; Mr. Carson. Commencing miner's asthma. Living in his own cottage, with a small piece of garden.	49	He has a brother, a miner, living, and 2½ years younger than himself. He has lost a brother a miner at 45 by miner's complaint. He had 3 sisters; 1 died at 26 in childbirth, 2 are living at 55 and 42.	His father was a miner, and died of consumption after having brought up much blood. His mother took cold in washing, and died in consequence.	First went to work under ground at 15.	He has worked in a great deal of bad air at Beaumont's mines, and has also worked in bad air at West Allen. He has not worked for the London Company. Lately he has worked in good air. He goes a mile under ground, but there is an opening all through. He knows when the air is bad, by the candles not burning well or going out; and this is often the case when they go in the morning. Sometimes they cannot get in for 2 or 3 days together. The mines are now generally well drained, but they were not so formerly. The bad air affects him by taking away his appetite. He does not get sick and vomit, but he has had headache and dizziness, singing in the ears, and loss of power over arms and legs. Some of the mines are wet, and some dry, and some places are very hot.

OF MINERS.

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.
He has never been well since he worked at Nents Berry Green 10 or 12 years ago. He was compelled to give up working entirely 4 years ago.	- - -	- - -	Breathing very much affected, and suffers from cough and spitting. Signs of emphysema and chronic bronchitis.		
His health broke up so that he was not able to do any work upwards of a year ago; but his health had been failing 9 or 10 years before. He ascribes his illness to working in "bad air and slavish work;" and says that he had a fit when working in Blaygill in 1845.	- -	- - -	Breathing very bad and cough, but not much spitting. General contraction of the chest, and falling in at each apex, with bronchial respiration heard at the apices.	Heart sounds natural.	Appetite and digestion fair, and bowels regular.
Gave up working as a miner 20 years ago, but had had rheumatism, and worked in bad air. He worked as a miner 40 years. The cardiac symptoms have arisen within the last year.	Anasarcous, and especially œdema of lower extremities.	- - -	Breathing so difficult that he is incapable of lying down. Respiratory sounds everywhere harsh.	Loud double murmur heard at the base of the heart. The first murmur becoming louder and more prolonged at right side of upper part of sternum; the second sound louder on left side of lower part of that bone. Pulsation of carotids and of radials. Pulse large, full, rapidly disappearing (regurgitant).	
4 years ago he gave up work, but has been ailing more or less for 16 years. He suffered from shortness of breath, cough, and spitting, and has occasionally spat some blood.	Sallow and thin, eyes glassy.	- - -	Breathing very short, and can only count to 10. Cough and expectoration, and occasionally brings up dirty matter. Chest much contracted, especially above, and movements very defective. Deficiency of the resonance or percussion at the right apex, and bronchial respiration at the right apex, and sibilant and sonorous rhonchus to be heard in all parts of chest.	Pulse feeble and quick. The systolic sound of the heart at the apex somewhat grating.	Appetite and digestion impaired.
He first began to suffer with an attack of influenza, which he had 13 years ago; and though still working has suffered more or less since, and has been off for 3 months at a time, suffering from shortness of breath, cough, spitting, and has occasionally spat blood.	Eyes pale and glassy, and hair light coloured, but complexion very sallow.	- - -	Chest narrow, but full and rounded, morbidly resonant in front, and respiratory sounds feeble. Fallen in above the clavicles. Vocal thrill impaired, and especially at the right side Movements of the chest not materially impaired. Counts rapidly to 20.	Heart sounds flat.	Appetite and digestion impaired; bowels regular.

Name.	Present Age.	FAMILY HISTORY.		PERSONAL	
		Ages, occupations, and state, &c. of brothers and sisters.	Ages, occupations, &c. of father and mother.	Age at which he first worked under ground.	In what Mines he has worked, kind of work, and character of air.
6. Nenthead, August 3, 1863; Mr. Carson. Miners' asthma, and curvature of the spine.	44	1 brother, a pitman, is living; and 2 others who were miners died at 51 and 45; the latter vomited much blood.	Father a miner, and died of miner's disease when 51. Mother died of paralysis at 67.	Went under ground when between 7 and 8 years of age.	Has worked all his life under the London Lead Company. When he first went to the mines the air was very bad, and often they could scarcely keep awake, they became so sleepy when working in it. He never worked where the candles could not be got to burn, but often where they required to be held on one side.
7. Nenthead, August 3, 1863; Mr. Carson. Miners' asthma.	51	He has lost a brother, a miner, at 54. He has his only sister still living at 57.	Father was a miner, and died worn out between 60 and 70. His mother died about the same age, with water on the chest.	First went under ground when 18 years old.	He has often worked in bad air. Sometimes the candles won't burn at all, at others they burn very badly, and the miners are almost suffocated. He has worked for the "Governor and Company" all his life.
8. Nenthead, August 4, 1863; Mr. Carson. Chronic rheumatism.	47	He has a brother, a miner, 40 years of age. Of his sisters 2 died early. He has 3 other brothers, who are living and healthy, from 36 to 41.	His father was a miner, and died of miner's complaint and rheumatism at 50. His mother died at 60 of dropsy.	First went under ground at 10 or 12 years of age.	Has always worked under the London Company, and generally in good air, and never in very bad or damp places; but has worked a good deal in draughts.
9. Allenheads, August 4, 1863; Mr. Hewitson. General failure of power, and asthma and dyspepsia.	66	Brother, a miner, died at 30, and a sister at 21. He does not know of what complaints.	Father was a miner, died at 30.	At 9 years of age.	Has worked in the mines at Allenheads, and constantly since he commenced working till he gave up.
10. Allenheads, August 4, 1863; Mr. Hewitson. Chronic bronchitis and emphysema, "miners' asthma."	56	Has a brother, a washer, aged 36; and brother at 51, a miner; 3 sisters living and healthy at 40 to 58 years of age. Has lost 2 brothers, miners.	Father a miner, died at 77 years of age. Mother living at 77.	At 9 years of age. He says he thinks the cause the miners suffer so much is that they go underground too soon. They should not go before 17, 18, or 20.	After commencing he worked steadily till he gave up. He says that the mines are not so bad as formerly, but there are still bad places in all mines, and the men have to work in bad air both in driving the levels and getting the ore. When that is the case the candles will not burn, or burn very badly. The effect of the bad air is to make them suffer from headache, and very dizzy, and so sleepy that they would willingly lie down and go to sleep. Often they are sick, and heave up on leaving the mine. He had never known any one have any kind of fit. The air did not affect his breathing, or make his heart beat.
11. Allenheads. Mesenteric disease and tuberculous ulceration of bowels; commencing phthisis; hereditary predisposition.	32	He has 3 brothers living, all miners, aged 26, 28, and 36. He has a sister living and healthy at 38, but has lost 2 by consumption at 18 and 40.	Father died at 53 of consumption brought on by mining.	Went underground first when 17 years of age.	Worked in the mines at Allenheads. When sinking the shaft at Breckon Hill some chance times the air was very bad; the smoke did not clear off; the candles burnt to a certain extent, but it was with a great deal of work to keep spreading the wicks and heeling the candles; and then it got so dark that they could not see two fathoms above them. He went to work at the shaft when it was 18 or 19 fathoms from the surface, and continued until they had got to 58 or 60. It was worked day and night at 6-hour shifts, and he worked at it for 4½ years. There were 12 men employed upon the working, and many of them suffered. The wet was always falling, and kept them drenched for the whole shifts of six hours, and he had pains in the back from it. While engaged in this did not feel altogether right, but might have taken cold; but he continued to work, and went afterwards to Allenheads mine, and worked in Henry's vein at 100 fathoms. That was at times only middling as to air. The level was ventilated by a furnace at the top, and that did a great deal of good. But some chance days it was very bad; the candles would not burn, and the men were "drove to leave work." The weather, he thinks, affects the mines. If a dull day, the air in the mine is dull. While working here he got worse, brought up his food, and lost his appetite, and his bowels were very costive, but after a time he had diarrhœa. This is about 16 weeks ago, and he has got a little better since, especially for the last 3 weeks.

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.
He has had a curvature of the spine, and has been weakly all his life, but thinks the mine has made him worse, and this he ascribes to breathing the dust. The air is now far better than when he commenced working as a miner, for the levels are opened up so that one working opens into another. He has been out of the mines for 7 years, employed as a labourer at the surface.	Complains of general weakness; complexion very sallow, conjunctivæ tinged with bile.	- - -	Shortness of breath, cough, and some spitting, but has never spat blood. Counts to 12. The movements of the chest and the resonance in percussion are not materially impaired; but the respiratory sounds are everywhere harsh.	Heart's sounds somewhat loud.	Appetite and digestion bad. Bowels relaxed, but he has never passed blood.
Has been laid by for 2 years, and ascribes his illness to having worked in bad air, and to the dust and powder "reek" in the mines, and this is when they are far from a shaft.	Thin and sallow; eyes glassy.	- - -	Chest narrow and prominent in front; dullness in percussion at upper parts on both sides, especially the right; and bronchial respiration and loud cough resonance there; respiration elsewhere harsh.	Pulse feeble; heart sounds natural.	He complains of having a bad appetite, and that his food does not digest. Bowels regular; tongue large, flabby, and furred at the back.
Was first taken 4 years ago with pains and stiffness in the shoulders, and then the left knee became affected and was left stiff; and he now is quite lame in the hip, and unable to work.	- -	- - -	His breathing, he says, is good, and he complains only of the rheumatic affection.		
Gave up work last Midsummer from failure of health, and ascribes his illness to working in bad air.	Much prostrated and aged.	Sense of fullness in the head and dizziness.	Suffers from difficulty of breath, cough, and spitting, but has never spat blood.	Complains of palpitation of the heart.	Appetite and digestion very much impaired, and occasionally has diarrhœa.
			These symptoms are all less severe at the present time.		
Gave up working 6 years ago, but his health was broken 7 or 8 years before that; and he ascribed his failure of health to having worked in much bad air and in bad places, and that he began work too soon.	Sallow and aged looking.	- - -	He complains of much difficulty of breathing; and during the spring suffered so much from his breath that he could not lie down, but he has never had any swelling of his ankles or body generally. Emphysema of the lungs and chronic bronchitis.	Suffers from palpitation. Heart sounds somewhat loud; pulse feeble.	
His health first failed 7 years ago. He took cold in May, and had an attack of influenza, and spat some little blood; was away from work 16 weeks, and then got "all right again." He has now been ill 16 weeks. He ascribes his illness to having been sinking a vertical shaft at Brecken Hill. It was very wet, and the air bad at times.	Sallow, thin, and pale; eyes glassy, and pale and pupils very large.	- - -	Has some little cough and spitting, but has never spat blood. Deficiency of resonance or percussion at each apex, especially the left. The clavicles project, and the chest falls in much beneath them, and especially on the left side. The respiratory sounds are somewhat bronchial at the upper part of the chest, and the cough and vocal resonance is exaggerated, and all these signs are most marked in the left side. Respirations 20 in the minute.	Pulse quick, and feeble.	Complains of pain in the stomach and bowels. Has a fair appetite; and does not now throw up his food or suffer from wind, but has constant diarrhœa. Stools 3 or 4 times daily, but without any blood in them. His tongue is morbidly red, and covered with patches of brown fur.

Name.	Present Age.	FAMILY HISTORY.		PERSONAL	
		Ages, occupations, and state, &c. of brothers and sisters.	Ages, occupations, &c. of father and mother.	Age at which he first worked underground.	In what mines he has worked, kind of work, and character of air.
12. Alston, August 5, 1863. Advanced miners' asthma; Emphysema and chronic bronchitis.	65	He has never had any brother. He has lost one sister when young, and 4 are living,—"some older, some younger than himself," but all healthy.	Father a miner, and died at 65 of miner's complaint. His mother died of consumption when quite young.	Went to work underground when 9 years of age.	First worked at Blaygill, and continued there for 4 or 5 years. The mine was very bad. He then went to work for the Company at Nenthead in different mines. In some places they were very bad. "The candles burnt badly, and many a day they could not get in, for the candles went out." He was in very bad air in a damp which went into the 4-fathom limestone. He worked for the Company all his life after he went to Nenthead. In the leading vein the air was, as "a rule, very bad," "when they fired the stour and reek was great and hung about and would not clear off."
13. Alston. August 5, 1863. Chronic bronchitis and emphysema, advanced miners' asthma.	70	- - -	Father was a smelter and died between 70 and 80. Mother died at 73. He never had a brother, but had one sister, who died 4 years ago at 70.	Went underground at 15.	He first worked at Cross Fell. There were about 100 men employed, and they worked in from a level, and then up, and again below. Some places were close, some wet, and some very dry, and the dry places were the worst. Indeed what tried him was the "stour and powder reek." He worked here 5 years, and then went to washing; worked on the surface in various ways for 5 years, and that was a great advantage to him. After this he went to the Nent Foss level, and was employed under the Hospital in sinking a vertical shaft from the surface to the level. This was 53 fathoms deep. And when that was done he went on working at the level, and drove about 700 fathoms. The air here too was very bad. In the shaft and level, on certain days, and especially in autumn, for a week together, it would be so bad with "choke damp" that they could not work at all. The damp rose suddenly at times, and they had a bell to give warning at the surface, and then they were drawn up directly. The candles would only burn when put two together and heeled, and sometimes not at all. The matches would sometimes not strike, and the holes would not fire. He did not feel this, for he was young then. After working 15 or 16 years he went to Nenthead, and worked under the Company at sinking a vertical shaft into a level, and then when they got to the level drove in, and here he worked about 8 years. Here the air was not anything like so bad, for they had a "water blast." He had, however, very bad air in Long Cleugh, which he afterwards went to. There he worked in a level a mile and a half long with only one vertical shaft. Here the candles burnt badly, and the mine was "hot, dry, and stoury." It was this that broke him up; he took cold, and his health gradually broke up. He had the windy gravel, and passed his water badly, and had pains in the loins. His appetite failed; and miners' appetites are not good; not like pitmen's. He was forced to keep his bowels very open. His breathing also got touched, and he had beating at the heart. In three years he got so bad he could not work at all. When he gave up underground he got better, and is now much the same, except that he suffers much more in bad weather.
14. Near Rodderup, Alston, August 6, 1863. Miners' asthma, lapsing into consumption; hereditary predisposition.	42	He has a brother, a miner in Australia, aged 32. He had a brother killed in a mine; lost another by water in the head at 19 years of age; and another, a miner, died of consumption at 44. He has two sisters living and healthy at 25 and 30, and has not lost any.	His father was a miner, and died at 49 of "miner's bad breathing," and worn out. His mother died at 49 of dropsy.	First went to work underground when 18 or 19 years of age.	He went to work at Rodderup Fell Mine, and continued to work there till 8 years ago, when his health became so bad that he was no longer capable of working underground. Since that he has taken to farm work, having a small farm. He has worked in some very bad places. At one time he worked at the leading level 600 fathoms from day, and there were only two sumps to the level. Sometimes the candles would not burn at all, and at others burnt very badly, and only when heeled on one side, and the powder reek would not clear away. The air would be good and bad in a yard or two; and sometimes for two or three days together they could not get in to work at all. He worked three years at this place, and did not suffer materially himself, but other men used to complain of their heads aching, and he had known them become sick and vomit when they got into the fresh air. After this he went to another place in the mine, and was employed in getting ore, and that "length was very fair."

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system	Respiratory organs.	Circulatory organs.	Digestive organs.
He left work 14 or 15 years since, and was a little touched in his breath 5 or 6 years before that. "Many a man who goes as a miner is touched in the breath when quite young, but he won't say so." He was quite well when he first went to work at Neuthead, and he ascribes his illness to the "powder reek and stour in the mines."	Aged and feeble.	- - -	Suffers from cough and expectoration, but is now much better than he usually is in winter and bad weather. The resonance on percussion is abnormally clear in the front of the chest; and breathing laboured with wheezing in all parts of the chest.	Heart sound somewhat flat; pulse feeble.	He complains of an entire want of appettte.
His health was good till about 18 years ago, when he began to fail in breath, especially if he took cold; and this increased till he got so bad that he could not go on. This is now about 10 years ago. He ascribes his illness to "nothing in the world else than powder reek and bad air." Climbing, he thinks, did not much affect him. "He had only about 35 fathoms of it at any time—up and down. When his wind failed, however, then he felt it." He states that he has generally been regular and steady in his habits.	- - -	- - -	He has very short breath and cough, and a heavy spitting, but is now better than usual. In winter and bad weather he suffers sadly. He has never spat blood. Chest full and rounded; the resonance on percussion abnormally clear; the breathing generally harsh and sibilant and sonorous rhonchus in all parts of the chest. Can only count to 5 or 7.	Pulse somewhat full and jarring; heart's sounds natural.	Tongue clean, appetite poor, digestion fair, bowels regular.
He ceased working underground about 8 years ago, but he was "touched in the wind," but otherwise well for 3 or 4 years before he was compelled to give up. He was first taken suddenly ill with cold, and brought up blood, and had a bad cough and spitting. About 4 years he was taken much worse, and brought up more blood, and he has been suffering in the same way and getting worse ever since. He has not been able to do any work for some time, and suffered much in the last winter and spring. He ascribes the failure of his health to the "bad air and powder reek" of the mines.	Thin, tall, sallow, and pale; very weak. He occasionally suffers much from night perspirations.	- - -	He complains of cough and spitting, and is very short breathed. Chest everywhere contracted, and very slight expansion or movement with great effort. Vocal thrill everywhere exaggerated, especially under the clavicles. Contraction very marked under the collar bones; and the resonance on percussion diminished there, and especially on the right side; resonance moderately clear in the mammary regions. Loud bronchial respiration, and undue cough and vocal resonance at the upper parts, and especially on the right side, and respiration elsewhere harsh. Expectoration massive, muco-purulent, copious. Resparations 36 in the minute. He is only capable of counting aloud to 11.	Pulse 116 and feeble. Heart action weak; sounds loud.	No appetite, and occasional vomiting of the food taken. Bowels not relaxed.

Name.	Present Age.	FAMILY HISTORY. Ages, occupations, and state, &c. of brothers and sisters.	FAMILY HISTORY. Ages, occupations, &c. of father and mother.	PERSONAL. Age at which he first worked underground.	PERSONAL. In what mines he has worked, kind of work, and character of air.
15. Killhope Foot, Weardale, August 6, 1863. Slight miners' asthma; dyspepsia. On being asked whether he knew of any other man who was ill, he said that the neighbourhood was very "populous, and chiefly occupied by miners, and there was sure to be some of them bad, never without some bad, and both old and young but particularly old."	63	He had 6 brothers who were miners, and all are now dead; some died in early life, others were older than himself. He had 4 sisters, and they are all dead, and lived to be middle-aged.	His father was a miner, and died worn out by hard work. His mother was an old woman when she died.	He began to work underground when 7 years of age.	He has worked all his life in the mines in the neighbourhood, and has been at different times both in good and bad places. He last worked at Mr. Beaumont's mine at Burtree Pasture. He has worked in very bad places, but never in places where the candles would not burn, but he has worked where they required to be "sadly heeled" to get them to burn, and when working in those places he used to feel it in his breathing.
16. West Black Dean, August 6, 1863. Commencing miners' asthma; slight pleurisy.	31	- - -	- - -	Commenced working underground at 17.	Has worked always in Mr. Beaumont's mines, and sometimes in places where the air was good, sometimes where it was bad, but never where it was so very bad, except at Clints; there the candles would not burn sometimes, and the air would set in very bad, and they could not say when it would set in so. He worked there three years.
17. Chapel in Weardale, August 6, 1863; Mr. Hewitson. Miners' asthma.	67	He had 5 brothers, 4 of whom were miners and went as a soldier, and all are dead. His sisters also are not living.	His father was a miner, and died at 65, broken down with work. His mother was a middle-aged woman at the time of her death.	Commenced to work underground when 11 years old.	He has worked in Mr. Beaumont's mines all his days. "Every miner suffers more or less from dust, bad air, and powder reek, but he had been more favoured than some, and never worked in any very bad places, and there are few at his age that are not touched in the wind."
18. Chapel in Weardale, August 6, 1863; Mr. Hewitson. Advanced miners' asthma. He states that he was a very good man up to 53. "Many miners suffer in their wind by they are 30, if they begin young; and there are few at 40 who are not affected, and if he gets beyond that without suffering, if he gets ill he breaks up at once."	57	He had 2 brothers who were miners, and they died at 57 and 56 of miner's complaint. He had 3 sisters; 2 are living at 55 and 60, and the other died at 61.	His father was a miner, and was a very temperate man, though he was a publican, but he went to the election at Durham and got drunk, and was never well after. He died at 55; he was not touched in the wind before that. His mother died of old age at 82.	First worked underground when 18 years of age.	He has worked about Chapel all his life, and always in Mr. Beaumont's mines. He has worked in places where candles would hardly burn when heeled on one side, and many a time has had to come home because they could not keep a light at all. Sometimes the air was so bad that it almost made him fall, and "catched his breath and lodged there so that you could not get it coughed up." Sometimes it makes them sick and throw up, and causes headache and dizziness. Their "limbs become all of a dodder, and whiles they could not stand." Sometimes in coming up they would cough and bring up black spit, and then get easier. He never brought up blood. He has not had much climbing, and does not think that hurt him.
19. Weardale, August 6, 1863; Mr. Hewitson. Miners asthma.	54	- - -	Father, a miner, died at 74, worn out. Mother died at 76.	Went to work underground when 19, but was not regularly in; only in winter, and then out in summer, at first.	He has worked in the neighbourhood all his life, as at Burtree Pasture and Sedling, "and has been in bad and good places, much as all other miners are." Where he worked the air was fairish; the candles would always burn, but there are places in the fore end driving 2 miles from day, where they sometimes cannot work at all. He went in by a level, and then down a shaft about 90 fathoms. "All miners over 40 suffer more or less, though some may escape till a little later."
20. West Black Dean, August 6, 1863; Mr. Hewitson. Miners' asthma.	53	- - -	Father was a miner, and died at 57 of consumption contracted by sleeping in a damp bed. Mother died of liver disease at 66.	He first went underground when 14. "Not so young as many."	He has worked in the mines at Burtree Pasture, Breckon Syke, Killhope, Elm Ford, and Level Gate, in this neighbourhood, all his life, and when young in very bad places, but lately he has never been in any bad places, though some are very dusty.

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.
He considers that he was a "fair man" till 3 or 4 years ago, and thinks he has himself to blame for his illness, for he was a hard drinker when at the mines. He has not been able to work for the last month.	- - -	- - -	He is touched a little in the wind, and has some cough and a little spitting. The chest is fairly resonant on percussion, but the respiratory sounds are harsh. He is capable of counting aloud to 20.	Pulse very feeble. Heart's sounds somewhat noisy.	He has only a middling appetite. He complains of pain in the belly and wind, and is very qualmish, but does not throw up. Tongue very red and ragged, and in places covered with a thick fur. Bowels very confined.
He states that he worked steadily till 10 weeks ago. He ascribes his illness to cold, and has had cough and spitting and shortness of breath, but has not spat blood.	Pale, sallow, and thin.	- -	Still complains of cough, spitting, and difficulty of breathing, and pain in the left side in drawing a full breath. Some deficiency of the resonance on percussion, and of respiration at the lower part of the left side.	Pulse feeble -	Loss of appetite, but the food which he takes agrees with him. Bowels regular.
He left working underground about 14 years ago, and was not much the worse for it then, and he then worked as a labourer above, but has given up working for the last 4 years. He ascribes his failure to the infirmities of age, and to two attacks of cold and influenza that he has had.	Pale, thin, and sallow.	- - -	He complains of cough, spitting, and shortness of breath, and pains in the sides, but he has never spat blood. He is much worse sometimes than now, and especially in bad weather. Counts aloud to 30. Chest defectively resonant at the right apex, and abnormally clear elsewhere in front.	Pulse 92, feeble	Appetite and digestion very poor; bowels confined; tongue clear.
He worked steadily as a miner till he broke up. It will be 4 years next February, but he had been ailing for years before that. "Before he was as good a man as was, and ailed nothing in the world." He thinks he suffered from having "worked a good deal at night, together with bad air and powder reek." He has worked both in dry and wet mines. He also got cold from being heated in the mine, and then coming to the surface. There was no changing house. Since he gave up working has had several attacks of influenza, and then his breathing is very bad, but he is much better just now. He can tell when the weather is going to change.	Sallow, pale, and thin, and very old looking.	- - -	Complains of cough, spitting, and shortness of breath. Counts aloud to 20. Respirations 16 in the minute, very laborious, and almost entirely abdominal, the thoracic movements being very imperfect. Chest narrow and contracted, fallen in both above and below the clavicles, so that the clavicles project very much. Vocal thrill generally exaggerated. Chest generally sparingly resonant all over, both in front and behind. Respiratory sounds feeble in front of heart, and stridulous posteriorly.	Pulse 96, feeble and slow. Heart's action feeble, and sounds loud, and somewhat prolonged at the apex.	Appetite middling, and food lies heavy; tongue ragged and furred; bowels regular.
He has been laid by 2 years, and found his wind getting bad for 8 years before that. What he thinks hurt him was the dust and reek.	Sallow, pale, and thin.	- - -	Complains of cough and spitting, of being touched in the breath, and is very bad in winter, but just now is very well for him. He has never spat blood. Signs of emphysema and chronic bronchitis.	Does not suffer from beating at the heart. Heart's sounds somewhat loud.	
He has worked at the mines up to the present time. His health, however, failed 3 years ago, and he had cough and spitting and was off "16 weeks a year last April, suffering from a liver complaint and bad breathing." He is now much better than he has been.	Sallow, pale, and thin.	- - -	Complains of cough and spitting, and shortness of breathing. He has never spat blood. Counts aloud to 24. The resonance on percussion is impaired at the left apex, and the respiration is there bronchial, and the cough resonance increased.	Pulse feeble. Complains of palpitation. Heart ssounds somewhat loud.	Tongue much furred; appetite and digestion impaired; bowels regular.

Name.	Present Age.	FAMILY HISTORY. Ages, occupations, and state, &c. of brothers and sisters.	FAMILY HISTORY. Ages, occupations, &c. of father and mother.	PERSONAL. Age at which he first worked under ground.	PERSONAL. In what mines he has worked, kind of work, and character of air.
21 Ireshope, August 6th, 1863; Mr. Hewitson. Commencing consumption, perhaps mitral disease. Diarrhœa or dysentery. Hereditary predisposition.	37	He has lost 2 brothers, both miners, by consumption; one at 20 had only worked a short time; the other was 47. He has no brother living. He has also lost a sister by consumption in early life, and has 3 others living.	His father was a miner, and died at 68 of miner's complaint. His mother died at an early age of consumption.	Worked underground first when between 10 and 11 years of age.	He has worked all his life in the mines in Weardale, and is now working at Burtree Pasture. In some places the mine is very bad. The candles sometimes will not burn, unless held on one side. They feel the bad air in the chest, and get sleepy, and have headache, and some men say that it takes all the strength out of their limbs. He has been working today in the fore-end shaft, and felt very much oppressed with it.
22. Middleton in Teesdale, August 7, 1863; Dr. Ewart. Advanced miners' asthma	57	He had 2 brothers miners. One, a miner all his time, died at 64 of miner's complaint, but he stood it well. Another, not a miner, at 64. He has 2 sisters living, one at 50, the other at 62.	His father died at 68. He was not latterly a miner. Having been very asthmatic. Had to give up many years before. His mother died as 64, and her breathing was very bad.	Went underground when 14 years of age	He has worked all his life in the mines in the neighbourhood, and has worked in different bad places when the candles would not burn for want of air, and they had to come out; and many times he has worked when the candles would only burn when "heeled." This has been the case throughout his time, more or less, but not so much so for the last few years, and he thinks the mines are better than they used to be. Indeed, if they were not, he could not stand it. The bad air and powder reek, and the two together, bring many down, and he considers that he stood it unusually well. The effects come on gradually. They begin to feel it about 30, some before. He first felt it about 30.
23. Middleton in Teesdale, August 7, 1863; Dr. Ewart. Advanced miners' asthma.	61	He has had 3 brothers. 1, a miner, is living at 62; 2, also miners, are dead; one at 22 pleurisy, & one at 44 worn out and with bad breath	His father was a miner, and died at 77, and was "not much touched in the wind," "worn out." His mother died at 82.	First went underground when 15 years of age.	Always worked in the neighbourhood, and for the Company. He has worked in bad places, and sometimes in very bad places, and this happened from time to time till he gave up. He had known that they had had to leave their work because the candles could not be got to burn. The bad air affected his breathing, and caused coughing, and sometimes spitting, but he never spat blood. It took away his appetite, and caused headache, made him sleepy, and took the power out of his limbs.
24. Middleton in Teesdale, August 7, 1863; Dr. Ewart. Miners' asthma (lapsing into phthisis), with consolidation at the upper parts of chest.	39	His 2 brothers were miners, and died at 43 and 45 years of age, "touched in the breath." 3 sisters are living, 35, 42, and 47; and 1 died at 40 suddenly.	Father was a miner, and died of the same complaint as his own. Mother alive at 76, & healthy.	First went underground when 18 years old.	He has worked in some bad places, and some very bad, from the air and "stour after blasting." Sometimes the air was so bad they could not get in to work at all. The effect of this was to make him quite weak in his limbs, and feel weak at the chest. It causes cough, but no material spitting, and no blood. Their appetites also fail, and sometimes their food does not agree with them.
25. Middleton in Teesdale, August 7, 1863; Dr. Ewart. Miners' asthma.	49	He has one bother, a miner, living and healthy at 51; one, also a miner, died at 40, but was then engaged in a coal pit. He has a sister living and healthy at 46, and 1 died at 25 after her confinement.	Father was not always a miner, but drove the donkeys in the levels, and afterwards worked in mines. Mother died when he was young and at an early age.	First went to work underground during winter when $7\frac{3}{4}$ old, and regularly when he was 16.	He began to work under "the Duke," but has now for long worked under the Company. He has worked in all sorts of places, good and bad, and wet and dry, and some very bad. There is bad air, both in fore-ends and rises, but he has taken more hurt from rises than anything else.

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.
Has worked pretty regularly since he first went underground till December 1861, when he had inflammation of the bowels, since which time he has been ailing, though now better and able to work at the mine. He ascribes his illness to having worked in very bad air, and to the dust in the mine, and powder reek.	Delicate-looking, thin, and pale.	- - -	He suffers from shortness of breath, cough, and expectoration; and the chest is defective in resonance above, but there are no marked signs.	Suffers from palpitation of the heart, and there is some prolongation perhaps a murmur at the apex.	He has a poor appetite, and his food does not agree with him. He suffers from pain in the bowels, and has occasionally attacks of diarrhœa or dysentery.
He worked steadily till he gave up going underground a year and a half ago, and has entirely ceased work for a year. He gave up because he could not bear the cold of going backwards and forwards to and from the mine. He ascribes his state to the bad air and powder reek.	Sallow, thin, and pale.	- - -	Complains of shortness of breath, and some cough and expectoration. Chest narrow and contracted, and very little movement. Vocal thrill impaired at the left side. Chest generally sparingly resonant. Respiratory sounds short and harsh. Respirations 20 in the minute. Counts aloud to 15.	Pulse 80 feeble. Heart's sounds loud at the apex. Pulsation visible to the right of the left false ribs.	Appetite fair, but digestion bad. Bowels very much relaxed generally, but he does not pass blood. Tongue clean.
Worked steadily, with the exception of being away 2 years, till a year and a half ago, but his health began to fail 7 years ago.	- -	Nervous trembling in trunk and limbs.	Complains of shortness of breath, cough, and spitting. Chest contracted, and very imperfect movements. Vocal thrill generally defective. Clavicles very projecting. Resonance on precussion natural. Respiration short and harsh. Respirations 32 in the minute. Counts with some effort to 20.	Pulse 72, very feeble. Pulsation of heart visible to the right of the left false ribs. Jugulars much distended. Heart's sounds short and, grating, especially at the base.	Appetite defective, bowels regular.
Worked steadily till he got completely out of health, and no longer able, 40 weeks ago, but his health was failing before. He also had attacks of illness before.	Pale, thin, and sallow.	- -	Complains of cough, spitting, and shortness of breath. Chest narrow, and especially above; sparingly resonant on percussion everywhere, and very dull and increased vocal thrill over large space at the right apex where the respiration is bronchial, and there is loud cough resonance, and subcrepitation, both before and behind. Some deficiency at the left apex, and respiration somewhat bronchial. Counts to 12. Respirations 28 in the minute. Voice feeble. Has never spat blood.	Pulse very feeble 96. Heart's sound somewhat loud.	Appetite defective, bowels regular.
Worked steadily till he gave up. He began to fail after 45 or 46, and gradually got worse till a year and a half ago, when he had to give up entirely. He was taken worse suddenly with a faint, and fell on his back. His breath has been affected and he has not been able to work since. He ascribes his illness to the "stour and the air," and says that he hurt himself by "working too hard when he had a good bargain."	Lame from dislocation of knee when a boy. Very old-looking for the age. Face turgid. Hair very gray.	- -	Cough, expectoration, and difficulty of breathing. Chest everywhere sparingly resonant, and decidedly dull in percussion at the left side. Vocal thrill natural. Respirations short, and sounds generally harsh. Breathing very short. Counts only to 7 without drawing a fresh breath. Respirations 40 in the minute.	Pulse 120 and feeble. Heart's sounds loud at the apex.	Appetite not good. Bowels regular.

DISEASES

Name.	Present Age.	FAMILY HISTORY. Ages, occupations, and state, &c. of brothers and sisters.	Ages, occupation, &c. of father and mother.	Age at which he first worked under ground.	PERSONAL. In what Mines he has worked, kind of work, and character of air.
1, Minera, Denbighshire, North Wales, August 26, 1863; slight Miners' Asthma, emphysema, and dilated heart.	77	Had 8 brothers, some went to America, and were miners. He believes they are all dead, but none died in this country. He has lost his oldest sister, but two others are living & healthy.	Father a miner and died of fever at 75. Mother died at 80.	At 15 years of age.	He has worked in different mines in the neighbourhood, and formerly in some places where the air was bad, where candles would only burn when held on one side; and where the air was sometimes so bad that they had to come away from not being able to work at all. He has not worked in bad air since he came to Minera. He worked at Llyn y Pandie and Pen y Fron. When in the bad air it made him light in the head and dizzy, as if he had been drinking, but did not then affect his limbs or breathing. He has, however, suffered at times at the chest, and with bad breathing since.]
I did not hear of any sick man at Minera, except this man and another, who was 35 or 36 years of age, and had had spitting of blood, &c. This man I could not see, as he was at work in the mine.					
2. Maes y Safyn, Mold, August 27, 1863; Miners' Asthma, Chronic bronchitis and dilatation of heart. Dr. Hughes, of Mold.	56	He has had 4 brothers, one is living and healthy at 63; 3others are dead; 2 elder and 1 younger than himself. They died 6 or 8 years ago. All were miners. He had 3 sisters, all of whom are dead. One died in childbirth, at 24; the other two were above 40.	His father was a miner, and died when he was young. He does not know at what age. His mother lived to 57.	At 17 years of age.	Has worked at various mines in the neighbourhood all his life till he gave up, and was last working at Maes y Safyn, but before worked at Llyn y Pandie, Pen y Fron, and at Pant y Mwyn. Some ten years ago he was working at Brongwyn mine under Captain Pillows, near Maes y Safyn when an accident occurred with choke damp and several men were killed. He had worked at the mine a year before the accident had occurred, and the air was generally good then. There were two shafts, one 80, the other 60 yards deep, and a level between them of about 80 yards, and they kept a furnace near the top of one of the shafts to draw the air, and they "blowed" it from the other. There was no day level to the mine, and only the two shafts. The furnace was an open brazier, with coals burning in it, and was put about 12 yards from the top of the shaft. On the morning of the accident, there was no wind, and the "fire drawed down." There was not much water anywhere, and it was quite dry where the men worked. The men went up and down by ladders and steps. The air was generally good till about nine days before the accident, when the men began to suffer in their breath, and the candles did not burn well, and could only be got to burn when held on one side. The outbreak of the choke damp was quite sudden. It was the morning shift, and the men were long in coming up, and several others went down to see what was the matter, and when they got down they found the "choke" was in the mine. He was one of the men who went down, and when he got down to the bottom of the 80 yards shaft he felt the "damp," and had to come up again. He got up part of the way, and then he could get no further, and they had to send down men to get him up. It was two hours before he could be got up. He says he was not sleepy at the time, but knew everything that passed, but had no power in his limbs, and trembled all over, and could not take hold of any thing or stir. He was ill for a fortnight after, and then got about again, but was never so good a man as before. His breath has been bad ever since, and his limbs weak. Seven men were killed (according to another miner six men and a boy, the son of one of the men, who had gone down with his father). After this the mine was stopped, but they began to work it again in six weeks. When working in bad air he says the "miners have not so good an appetite, but he never vomited his food, or saw others do so; sometimes they had pains in the bowels. On coming up after working they cough and spit black stuff, "as black as a cherry or billberry." He did not go again to the mine where the accident happened, but worked after at Maes y Safyn. There the air was good, but the mine was very wet.
3. Maes y Safyn, August 27, 1863, Bronchitis, threatened phthisis; probably predisposition.	30	Has three brothers, miners, all healthy. Some of the family died young. No sisters.	Father a miner, still living and healthy at 70. Mother died at 44 of illness brought on by cold of 3 years' duration.	First went to work underground when 28 years of age. Was employed as a carter before.	Has worked during two years in Maes y Safyn mine. The mine is generally dry, in some places wet. Not much dust anywhere. It is chiefly worked by "shooting." The air is generally good, but there is a place or two rather "dead." The air is "slackish." The candles always burn, but require a little listing.
The cottage in which this man resided was built of stone, thatched, and on the hill side, in a pine wood. Two rooms, low; upper in roof. Proper privy, but no drainage.					

OF MINERS.

HISTORY.	PRESENT STATE.				
Duration and assigned cause of illness.	General condition.	Nervous system.	Respiratory organs.	Circulatory organs.	Digestive organs.
He worked steadily till three years ago, when he was compelled to give up from failure of strength and shortness of breath, and it tried him both when at work and on the ladders.	Aged, but fairly healthy looking.	- - -	Complains of cough, spitting, and shortness of breath. Chest somewhat unduly resonant on percussion, and the respiratory sounds harsh.	Pulse somewhat full and vibratory. Heart sounds loud.	
He ceased working two years ago from his strength failing, and especially his limbs, so that he was not able to go up and down; and at the same time the Company working Maes y Safyn was changed, and he did not work under the new Company. He was lame in the hip, and his breathing was bad, and he had a cough and spitting. He first began to fail after the accident, and about 8 years ago he had an injury of the hip, and then he got rheumatism, and it settled in the hip, and he became lame, and after that his wind failed. He thinks his health failed from working in damp and cold. The air was generally good that he worked in at Maes y Safyn, but the mine was very wet. Some of the "flat ground" took great effect on his health. He was, however, in a "misfortune" 10 years ago, and has never been well since.	Worn and aged for his age.	- - -	Complains of cough, spitting, and shortness of breath. Breathing very short and frequent. The chest is much contracted, and deficient in resonance on percussion, especially above. The respiratory sounds are generally harsh, and attended with sibilant and sonorous rhonchus in all parts.	Pulse large and vibratory. Heart sounds loud, and especially at the base.	Appetite and digestion natural.
Has been confined to bed for a week, and ailing for a month, and ascribes his illness to having taken cold. Was always delicate, but has never spat blood. He thinks he took cold on the surface.	Pale, thin, and decidedly delicate looking, much prostrated.	- - -	Complains of cough, spitting, shortness of breath, and pains in the chest. Chest fairly resonant on percussion, but bronchitic rhonchus in all parts.	Pulse quick and feeble.	Appetite very defective. Tongue furred. Bowels regular.

II.
MEDICAL REPORT

On the Condition of Miners in Cornwall.

By James Bankart, F.R.C.S., of Guy's Hospital.

To the Right Honourable Lord Kinnaird.

My Lord,

Having been requested by you to visit Cornwall, for the purpose of examining the miners employed there, I now lay before you the result of that inquiry.

I visited Cornwall in July last, and spent thirty-five days in the different districts of Camborne, Redruth, St. Agnes, Penzance, Helston, Liskeard, and in Devonshire, in Tavistock and its neighbourhood. During this time I examined carefully upwards of 150 miners affected with various complaints. I also visited many of their houses, and saw a great many other men under different conditions, viz., as they came up from underground, on leaving work, and as they went to work, also during their work both underground and at the surface. Having descended one of the deepest of the mines (310 fathoms), I had an opportunity of judging of their means of descent and ascent in this and in nearly all the mines in these districts, as well as of the nature and peculiarities of their occupation. I had also in conjunction with Dr. Peacock the opportunity of making a post mortem examination of the body of a miner who was said to have died of what is called "miners consumption" or "miners complaint." The men are as a class, pale, thin, and sallow. This appearance is rendered more striking by contrast with the women and children, who are fresh coloured, stout, well developed, and in every respect a healthy looking class. The women are mostly employed at the surface, and their healthy appearance and colour are referable to their constant employment in the open air, and exposure to the sun. The children, of whom I saw a considerable number, present a very healthy appearance, and out of the number seen in the houses which I had occasion to visit, there were but two or three which were suffering from scrofulous diseases.

The unhealthy look of the men increases in proportion to their years, to the length of time they have been employed underground, and to the nature of their work during that time, and is especially evident in men beyond about 35 years of age. In those cases where men over that age present a fresh colour and healthy appearance, it generally happens either that they have left the mine some time, or that they have been working at the surface for a length of time, and have been exposed to the influence of the sun and fresh air.

During the time that I was in Cornwall it was remarkably fine warm weather, and this will account for a circumstance to be again referred to, viz., the small proportion of acute disease met with.

The cases which I examined were taken indiscriminately, and for an introduction to many of them I was indebted to the kindness of the medical men living in the districts, especially to Mr. Vincent and Mr. Hutchinson, of Camborne, Mr. Hitchins and Mr. Harris, of Redruth, and Mr. Couch, of Penzance.

Of these cases diseases of the respiratory organs and heart form a large majority. There is also large class, in which the men present but little evidence of disease beyond a sallow, anæmic, and unhealthy appearance, and who are nevertheless incapable of following their occupation. These men seem to be broken down in health, prematurely old, and debilitated from a number of causes which cannot well be separated from one another, so as to give to each its precise share in producing the ill effect.

Of the diseases of the respiratory organs, chronic bronchitis, and broncho-pneumonia and emphysema, form the largest proportion, and these occur in all stages from simple emphysema as a result of repeated attacks of bronchitis, to more or less consolidation and disorganization of the lung, the result of extensive disease of all the pulmonary tissues.

In the case of the post mortem examination to which I have referred, there was evidence of old inflammation of all the tissues of the lung, which was firm, solid, and black, and in portions cavities had been formed by its disorganization, whilst the pleura was converted into a thick white fibrous mass. No tubercular disease was found. The history in this case, so far as could be ascertained, was that of an attack of "miners complaint" in its severer degree.

Besides these cases, there are a few of tubercular phthisis, which present the ordinary symptons of that complaint. This disease does not appear to be very common, probably not so much so as in most other towns and districts of proportionate population. There is an explanation of the erroneous impressions that have been formed as to the large proportion of tubercular consumption amongst miners. It is as follows:—The complaint from which they commonly suffer, and from which they know themselves that they mostly die, is termed by the men "miners complaint" or miners consumption, and the medical men, in making out certificates of death, have entered the cause of death as miners consumption, or simply consumption, and this, in the hands of the Registrar, probably has been construed into tubercular phthisis.

The most numerous cases which, as I have said, are chiefly bronchitis and broncho-pneumonia and its results, are generally accompanied by more or less dilatation of the heart, anæmia, and general prostration of strength; they result from a combination of causes which it is difficult to isolate.

The history of these cases is almost always the same. Usually the man has worked some time in impure air before he feels any ill effect from it, or nothing beyond a little headache, when he has commenced work young and healthy; after a short time he experiences more or less headache, often severe, feels "sick at the stomach," his breath becomes a little short, and he cannot climb to grass so well, from a feeling of weakness in the legs and knees. He has, besides, palpitation of the heart, at first on climbing, afterwards both when at work and when climbing. If he continue to work in bad air these symptoms increase, and at last he is obliged to give up work for a time, and with rest and exposure to the fresh air at the surface for a few days, he recovers sufficiently to resume his work. This state of things is in many cases often repeated, the symptoms gradually increasing in severity, the attacks of illness becoming longer and more severe, the cough in the intervals continuing, and the breath becoming gradually shorter. At the same time dilatation of the heart goes on, expressed by the men as "going over to the right side." In many cases sudden severe attacks of pulmonary inflammation supervene upon this condition, probably from exposure to cold, after leaving work, heated and fatigued. The man is now confined to the house for months, and often finds himself after it quite incapable of working or climbing from palpitation of the heart and shortness of breath. This state of things is exemplified in many of the accompanying cases.

The younger the person exposed to these unfavourable influences, the more they appear to suffer, and several cases show that by early avoidance of the exposure to the effects of bad air, perfect recovery of health and appearance may be attained.

The acute attacks of illness usually occur in the winter, whilst in the warm summer weather those suffering from bronchitis and heart affection are relieved, and are then comparatively comfortable as long as they remain quiet. This was the case in many of the men examined, but they were in such a condition that an acute attack of bronchitis from whatever cause would in all probability be fatal to them.

The causes of the chief part of the diseases of miners are referable to the following:—

Hereditary tendency appears to bear but a small share, the women being remarkably healthy, and the children also up to the time when they commence work underground. That the chief causes are referable to the nature of their occupation is evident from the corroborative testimony of so many men, and in it many causes are combined in producing the ultimate mortality, and cannot be sufficiently isolated to have the exact share given to each, although the way in which each tends to produce the result may be pointed out.

1. *Age of commencing work underground.*—The average age at which the men examined commenced work underground, taken from 124 cases, was a fraction over 14 years. This includes several who commenced work comparatively late in life, from 20 to 30, and no less than 29 who commenced working underground between the ages of 8 and 11 years, several of them being as early as 8 years, and so unfit were they for it, that they had to be fastened round their fathers' waists by ropes during the time of climbing the ladders. The strain and fatigue of climbing alone must produce injurious effects on frames so immature as these, but still greater evils wou'd arise from continued

deprivation of sunlight, and from working in an atmosphere, the best example of which could be scarcely called pure, and fitted for the requirements of the body in the state of rapid growth and development. These cases also show that although boys usually work underground in the best ventilated parts of the mine, yet that many of them worked in an atmosphere positively unfit for respiration and suffered severely in consequence.

There is a great inducement for men to take their children underground with them before they are fit, as they help to increase the father's earnings, and it is very desirable that the children should be protected from the effects of the thoughtlessness of their parents, and that they should have the advantage of working above ground as long as possible.

2. *Defective ventilation.*—This appears to be one of the great causes of illness amongst miners, as gathered from the statement of the men themselves, more than 68 per cent. of whom give definite accounts of having worked in what they call "bad air," and of having suffered in consequence, many of them repeatedly and severely, the symptoms being in nearly all the cases similar.

When it is stated that their only test of the air being bad is that their candles will not burn except when placed horizontally, it may be fairly inferred that work is largely carried on in an atmosphere unfit to maintain the body in a state of health, but which only reveals its influence ultimately by the effects of insidious disease, and the gradual deterioration of general health resulting from defective nutrition. The statement of one man is to the effect that he worked in a level where they had artificial ventilation by means of an air pipe, and yet that the air was so bad that the candle would not burn except in the air pipe, and to fire the blast they were obliged to light it with a tobacco pipe, because the candle would not burn near it. This occurred only a year and a half ago; but it must be stated that the statements made by the men extend over a good many years and may not accurately represent the state of things at the present time. The quality of the air varies with the nature of their work. The tutwork men are employed in driving levels, in sinking shafts, and in rising to reach other levels, and consequently they work in the blind extremities of levels where the air has little or no circulation, except when artificial means are employed. These men suffer most from the effects of impure air. The tributers are employed in the open levels, and have the benefit of the best air in the mine and consequently do not suffer to the same extent.

The composition of "bad air" must be determined by chemical analysis, and it would be difficult to separate the effects of individual constituents. The causes of its impurity may be referred to exhaustion of oxygen, by respiration of the men, by the combustion of their candles, and explosions of gunpowder, also by the large quantity of decaying timber in the mine, and to exhalation of carbonic acid and other gases by the same agents, and to the suspension of solid particles of powder and candle-smoke.

3. *Climbing.*—The greater portion of the men go to and from work underground by means of ladders; in some few only of the mines is any mechanical assistance employed. The amount of time occupied by this process is very considerable, and is not only taken from their working time, but is occupied in a manner exhausting to the body, and their capability of working is diminished thereby. Besides the loss of time entailed by this process, climbing operates injuriously on the men in several ways. It powerfully excites the action of the heart, which is in many cases already over-distended from the effect of defective respiration, and whose capability of increased action is diminished in like proportion, and it eventually results in dilatation of the organ. The effect of this is seen in the remarkably feeble pulse and impulse of the heart found in nearly all the men examined.

Another injurious effect is, that the men come to the surface exhausted beyond what they would be from their work alone, and in a state of perspiration, and are thus suddenly exposed to the cold blasts of winds both in summer and winter, and have to walk through the open air for a variable but often considerable distance in their wet clothes before they reach the changing house.

These are conditions which are most favourable to the production of acute pulmonary affections, and it is not surprising that in winter these diseases should be prevalent.

4. *Exposure to Cold.*—This is a cause to which they are exposed in many instances in common with other labourers, but there are some conditions under which they are peculiarly exposed to this evil, and which do not appear to be necessary accompaniments of their occupation.

The chief of these is that just now mentioned in reference to climbing, where the miner suddenly comes up heated and tired into the open air in all seasons and weathers, and is exposed to this weather during his passage from the mouth of the mine to the changing house. It certainly appears probable that if the changing houses and baths, where they exist, were contiguous to the shaft which they come up, that a great deal of risk of exciting acute disease would be avoided.

Most of the mines are wet, and the miner works with his clothes for the most part wet through. The men employed in the shafts are more exposed to the combined influence of wet and cold than others, and they appear to suffer most from rheumatic affections. In some small mines the men have to walk in and out of the mine through the adit. One man attributes his illness directly to having to walk a distance of 100 fathoms through 20 inches of cold water to and from his work.

Besides these causes of disease, accidents take a considerable share in disabling men temporarily and permanently. Amongst these accidents,—falling away from the ladders, the falling of stones upon them, and the breaking of machinery, take their share; but the most distressing kind of accident is that arising from explosion of gunpowder, either from carelessness of the men or from the use of improper tools. By these explosions many men lose their sight, or even their lives, and the number of blind men in the towns, and of men with their faces marked with gunpowder, testifies to the frequency of these accidents, and to the narrow escapes of some of the men. The use of iron tools instead of copper seems to be an obvious cause of many of these explosions.

Their houses are for the most part substantially built, but not drained, and are close and ill ventilated. In accordance with this I was informed by the medical men that fever is not uncommonly found in them. Some other facts present themselves in the statements made by the men, which have an indirect influence on their health.

Payment of wages is made in notes usually, and to get these changed the men have to resort to the public-house, where they would not otherwise have gone there; and this is said by them to lead to the formation of habits of intemperance.

When a man commences work at a mine he works two months, and is then paid one month's wages, the other month's wages being kept in hand by the employer. They have subsist money advanced to them by the mine to a variable amount during their two months' work. Not having ready money to buy with, they contract debts with the shopkeepers, and consequently buy at a dearer rate than they would do with ready money. All miners employed on men's work have a sum, varying at different mines from 3*d.* to 9*d.* per month, deducted from their wages for the club, and similar sums for the mine doctor, and the barber. In case of accident they are attended by the surgeon, and receive an allowance from the club; but in case of illness without a "visible hurt" they get nothing from the club as a rule. A youth taking man's wages has a deduction made for the barber, although he may have no beard, and may never require shaving.

Although the result of this inquiry does not enable me to state the proportion or amount of disease present amongst miners, it is sufficient to show the chief diseases to which they are subject, and the causes to which those diseases are mostly referable; and amongst these it is evident, that although many depend upon causes to which they are exposed in common with men following other occupations, yet that others, and these the most dangerous to which they are exposed, are preventible causes, and for the most part not necessary accompaniments of their occupation.

JAS. BANKART.

10, Trinity Square,
February 4th, 1863.

Table of Cases of Disease among Miners examined in July and August, 1862, by Mr. Bankart.

Diseases of respiratory organs:			
Bronchitis, broncho-pneumonia, emphysema, and pleurisy			50
Miners' disease			40
Phthisis			12
Affections of heart:			
Valvular	5		
Muscular, &c.	11		16
Affections of abdominal viscera			11
Affections of nervous system:			
Paraplegia			2
Rheumatism			5
Effects of injury or previous illness			6
Disease of skin			1
Cases not classed			7
Total			150

Table of Ages of 148 Men examined.

10 years to 20 years	2
20 „ 30 „	22
30 „ 40 „	27
40 „ 50 „	39
50 „ 60 „	39
60 „ 70 „	16
70 „ 80 „	3
	148

Mean age, 44·35. Extremes, 13 and 75.

Table of Father's Age at time of Death.

20 years to 30 years	1
30 „ 40 „	6
40 „ 50 „	16
50 „ 60 „	17
60 „ 70 „	19
70 „ 80 „	10
80 „ 90 „	2
	71

Mean age, 55·63. Extremes, 28 and 86.

Table showing the Assigned Causes of Father's Death.

Miners' disease		15
Decline		10
Chest complaint		5
Disease of lungs, after 10 years' illness		2
Accidents in the mine	14	
Falling away from the ladders	2	16
Palpitation of heart		1
Bursting of a blood vessel		1
Apoplexy		1
Asthma		1
Typhus fever		2
Dysentery		1
		55

Table of Ages at which Miners now suffering from Illness first worked underground.

Years.		Years.	
8	3	16	15
8 to 9	2	17	10
9	8	18	8
9 to 10	1	19	2
10	5	20	3
10 to 11	1	21	1
11	10	21 to 22	1
11 to 12	2	22	1
12	8	23	1
13	8	25	1
13 to 14	1	26	1
14	15	30	3
14 to 15	4	40	1
15	19		
15 to 16	2		137

Table showing the Kind of Work at which the Miners examined were employed.

Tutwork	33
Tribute	10
Tutwork and tribute	42
Do. chiefly tutwork	7
Do. chiefly tribute	2
Employed in the shafts	4
Burning tin	2
5 years and more at the surface	5
	105

Table showing the Duration of Illness in 140 Cases.

	10 days	1	
	8 weeks	1	
	2 months	2	Total of 6 months
Under	4 „	4	and under 16
	5 „	4	
	6 „	4	
Under	7 „	3	
	8 „	1	Total of 6 months
	11 „	1	to 1 year 11
	1 year	6	
	1 „ and 1 month	1	
	1 „ 2 „	2	
	1 „ 4 „	1	
	1 „ 6 „	4	Total 1 to 2 years 21
	1 „ 8 „	2	
	2 years „	11	
Under	3 „	12	
„	4 „	7	
„	5 „	9	
„	6 „	5	Total 2 to 8 years 49
	7 „	6	
Under	8 „	10	
	9 „	6	
	10 „	1	
Under	12 „	5	Total 8 to 15 years 19
	13 „	3	
Under	15 „	4	
Over	15 „	2	
	16 „	1	
	20 to 30 years	20	Total over 15 years 24
	40 „	1	
		140	140

Table showing the Assigned Causes of Illness in 114 Cases.

Working in bad air	43
Do. and exposure to cold	13
Do. and powder smoke	2
Do. and cold-damp	1
Do. and intemperance	1
Do. and injury from lifting heavy weights	1
Do. and getting wet	1
Do. and exposure to changes of temperature	1
Do. and falling down a "stope"	1
Exposure to cold	20
Do. after working in a hot mine	2
Do. and intemperance	1
Do. in changing his clothes after sweating	1
Do. and wet	1
Working in cold-damp and exposure to cold in the shaft	1
Working in cold water	5
Walking through 20 inches of cold water for a distance of 100 fathoms, to and from work	1
Climbing	2
Climbing deep ladders and working in hot mines	1
Putting on wet clothes after leaving work	1
Partly working in very hot mines, and partly taking cold at chapel	1
Working in a dry and dusty mine	2
Taking cold going home from the mine	1
Exposure to fumes of arsenic and sulphur	2
Exposure to great heat and fumes of arsenic	1
Lifting heavy weights	2
Falling away from the level	1
A blow	2
Over work	1
An attack of fever and inflammation of the lungs	1
Taking cold (not referable to mining)	1
	114

Detailed Statement of Health, General History of Occupation, Place of Employment, Cause of Illness, Present Condition, &c., of various Miners in Cornwall.

By J. Bankart, F.R.C.S.

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
1. Camborne; Miners' disease; July 1862.	27	- - -	- - -	- - -	12	Tutwork and tribute.	He first worked at Tincroft mine, where the air was good, and there was a comfortable changing house. He remained there 6 years in good health, on tribute. Afterwards worked at Condurrow for a year and a half in a level where there was cold damp. Afterwards at Great Wheal Seaton 5 or 6 years, 130 fathoms from surface, 160 from any shaft or winze. Worked naked to the waist, as it was very hot. The air was very bad. The candle would only burn when placed horizontally, and a ¼ in stuck through it. Worked 6 or 8 months in that level without anything being done to alter it There were 6 men working there, and they all complained of it. An air machine was then put in, but the air that was blown in was not sufficient to move the flame of the candle. "It did more harm than good, for they put in 16 more men; and we were all working in a space of 5 fathoms, 11 at night and 11 during the day." It was always hot, and there was so much powder smoke that they sometimes could not see, and they had to beat the smoke out with their jackets. Worked under those conditions for 12 months. Worked 5 or 6 years in that end altogether, and nothing was done to it.
2. Camborne; Phthisis; July 1862.	51	Dead, aged 50.	Father a miner, and died of miners' disease.	- - -	Between 14 and 15.	Tutwork -	At first only went under ground with the captains, being employed in a countinghouse. "We went into good air." Afterwards worked at Dolcoath and Stray Park for several years. Worked at North Roskear 15 or 16 years, in one level 7 or 8 years. The air was good, but it was very hot. It was 130 and 216 from adit. Worked naked all but his trowsers, and sometimes completely naked. Thinks he lost 2 quarts of sweat a day. "I was in my youthful days, and did not mind it; but I think I feel it now." Then worked at Carn Brea 8 years. Air very good, and not hot. Average wages 3*l.* a month.
3. Camborne; Emphysema; July 1862.	50	- - -	- - -	- - -	17	Tutwork and tribute.	Worked in various mines in good air, and always had good health. At West Wheal Seaton he worked in a very bad place, sinking from the adit to the 18 level. "There could not be a worse place, we could not carry a light." Since then, has worked at Kedavoosn for 12 months in "tolerable" air, 1 month in a close place. Has worked at Tolcarne for the last 3 or 4 years, and is still working there.
4. Camborne; Miners' disease and Phthisis; July 1862.	38	- - -	- - -	- - -	9	Tutwork and tribute.	First worked at North Roskear for 4 years. "It was pretty good air for underground air, but we never expect good air under ground." Then several years at Carn Brea, six months in very bad air. "It was not deep and there were no winzes. We were about 100 fath. from shaft, and 60 from any air. The candles went out, and the smoke did not get away, but I was young then and did not feel it." Then worked in different parts of England, on railways and in the coal mines for 4 or 5 years. Met with an accident at North Roskear from some rotten planking giving way, by which he fell down 60 ft. into another level. He was confined to his bed for some time and unable to work for 3 or 4 months. Worked several months in bad air "rising" for ventilation, at Condurrow mine. Left this mine and went to Tincroft, where the air was good at first, but afterwards very bad. Worked in a level 90 from adit, 60 from any circulation, without any pipes, sollars, or air machine. Six men were working there. "that was the first place I began to fail in, from bad air as I thought. Sometimes I could hardly get to grass, almost dragging away to sleep as I went along the levels and climbed the ladders." When working there he got 5*l.* 10*s.* a month on tutwork. Complained several times about the air, and at last left the mine. Worked in several mines after that for a short time. The last one was Tincroft, where he worked until 18 weeks ago. Worked one month there in bad air. "Nothing did me so much harm as the one month in that place."
5. Camborne; Bronchitis, and injury to back. July 1862.	45	Dead, 50	A miner, died from miners' complaint.	- - -	19	Tutwork and tribute.	Worked in various mines. At Carn Brea worked in bad air in 90 fathom level, 50 or 60 from any draught. The candles did not burn well, and had to be turned on their sides. Did not feel any ill effect from it. He worked here early in life. Worked 6 years in Dolcoath. In the level 230 fathoms below adit, and 50 from any draught, he worked in bad air. It was a hot close place, and he used to work naked all but his trowsers. This was the last place he worked at, and has been at home 5 months. There is a good dry at Dolcoath, but says he used frequently to take cold in coming out of the mine.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Used to feel sick and drowsy when working in cold damp at Condurrow. Had lightness in the head, trembling, and pain in the legs when climbing. When at Great Wheal Seaton had palpitation of the heart from the bad air, "not from climbing." Felt the climbing the heaviest at that time. "They were 10-inch staves, and I could hardly lift one leg before the other." Had pain in the head, felt sleepy, was "bad at stomach," palpitation of the heart, and throbbing pain over the eyes. "I have been ill ever since, and have been off work for 2 years." Never had any cough. Spat up a cupful of blood 18 months since, dark in colour; also passed blood by stool, but not black. Never had any cough when he spat up blood.	Working in bad air and powder smoke.	Thin, sallow complexion. Deficient motion of chest. Respiratory murmur defective, with slight crepitation at left apex. Tenderness under the clavicles on pressure, also over the surface of the chest when but lightly touched. Chest somewhat deficient in resonance. Voice sounds natural. Respirations 25 (before being at all disturbed). Heart sounds feeble, but regular; impulse feeble, and somewhat diffused. Pulse 78, much increased by exertion. Tenderness on pressure over the liver. No ædema of extremities. Hands cold and clammy. No cough or expectoration. Profuse perspirations by day and night.	States that he never drank to excess. The other men employed with him complained of the same symptoms. When asked why he was so foolish as to work in that bad end, he replied that work was slack, and he was loth to turn out. He got 50s. to 3l. a month. At that time had 3 or 4 lbs. of animal food for himself and family, 4 in number. Gets nothing from the club, because he has no visible wound. They get a shilling each from the union. The house is close, and not drained.
Has been ailing about 3 years. Felt himself failing for 8 or 9 months before he left the mine. Had shortness of breath and heaviness on the chest. He did not spit much, "sometimes black and green, sometimes like clots of blood." Has been losing flesh for 6 or 8 months. Spat blood three months ago. It continued for a fortnight. Has not been able to lie on his left side for 6 or 8 months.	Partly working in a very hot mine, and partly to taking cold one day at chapel.	Thin sallow complexion, long black hair, long thin hands. Motion of chest limited to the right side. Loud vesicular murmur over right chest, except at apex behind, where there is deficient murmur, some dulness, and an arterial murmur. The rest of right side resonant on percussion. Left side more or less dull all over it; very dull at upper part, except just below clavicle, where there is tympanitic resonance over a small space. Respiration tubular and cavernous at apex, with bronchophony. Heart sounds very feeble. Pulse 120 small. Respirations 32; in sitting posture tolerably easy. Expectoration greyish, flocculent, purulent.	Has never received anything from the club. Used to drink to excess sometimes, "but I was not a drunkard." "We used to go to the publichouse to get our notes changed, and I believe that is a great evil to the present day."
Was home ill for some months after working in bad air at West Wheal Seaton, 14 years ago. At that time he had cough and shortness of breath. States that the feeling of fatigue in climbing was extreme when working in bad air, but never at other times. Has been subject to cough, and takes cold very easily since that time. When he takes cold he spits up "black and greenish stuff," and sometimes slightly streaked with blood. Says he has been losing flesh for a year or two.	Working in bad air.	Complexion somewhat sallow, but otherwise a tolerably healthy looking man for a miner. Body in good condition. Chest resonant on percussion, vesicular murmur normal, slight crackling and prolonged expiration and whistling in front. Heart sounds normal.	Gets 3 lbs. of meat a week for the family (wife and 4 children). Says he is much less liable to take cold when he lives well.
10 years ago had inflammation of chest, and was ill 4 or 5 weeks. 4 or 5 years ago felt weakness in the legs on climbing, tightness at the chest, slight cough with expectoration of "black stuff," shortness of breath, giddiness and a feeling of drowsiness when the work was over. At that time he was working in bad air. 13 months ago, had a return of the same symptoms while at work in bad air and spat up about a table spoonful of blood He has never since been so well as he was before that. 10 weeks ago had a return of the same symptoms without hæmoptysis. He has been unable to work since.	Working in bad air and intemperance.	Sallow complexion, hands and feet cold. Has cough, but without very much expectoration. Spittle greenish, not frothy, floats in water in lumps. A month ago had profuse perspirations in the night, but not so much at present. At that time he expectorated more than now. Has lost 24 or 25 lbs weight during the last 12 months. Dulness on percussion, tubular breathing and creaking new-leather sound over the right lung, as far down as the middle of the scapula before and behind. Below that and on the left side respiratory murmur normal, expiration being slightly prolonged at the left apex behind. Tactile vibration increased over right apex. Respirations 32, pulse 96. Bowels confined.	States that it often strikes very cold on coming into the open air in their pit clothes, and they often have some distance to walk to the changing house.
First complained, 5 or 6 years ago, of pain in the head, weakness in the legs and knees, shortness of breath, sickness at stomach, palpitation of the heart, and pain in the back. He was then working in bad air at Dolcoath. Says he strained his back 7 months ago. He was able to walk, 3 or 4 weeks after the accident, but has lost the use of his legs twice since, but only for a day or two. Has been losing flesh for 6 or 7 months. During this time he says he has been spitting up black stuff, but he had left the mine 3 months before he began to do so. Spat up a teaspoonfull of dark frothy blood about a month ago.	Bad air, and injury from lifting heavy weights.	Chest resonant on percussion, movements normal, slight mucous crepitation at right apex posteriorly, in other parts, nothing abnormal detected.	Has been intemperate in his habits. He has a wife and 11 children, and receives 28s. per month from the mine club.

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
6 Camborne, Dilated heart, July 1862.	45	Dead	Died of disease of the lungs after 10 years ailment.	- - -	17	Employed chiefly in the shafts for the last 13 or 14 years "forking" mines.	Has generally worked in the best air in the mines, being employed in the shafts. Has sometimes worked very hard, being obliged to go up and down a shaft 9 or 10 times a day, the distance being from 100 to 120 fathoms each way, and the ladders almost perpendicular. This would occur about once a week for 13 or 14 years, at other times he had only to go up and down once or twice during the day. The time occupied in climbing was about 20 minutes, but he says it would have been much better for him if he had taken an hour to do it. For the last five years he has not had to go up and down above once a day.
7. Crowan; old disease of heart, pneumonia, recent bronchitis; July, 1862.	53	84, alive.	Formerly a miner, but ceased working for 20 years, now a farmer in good health.		15		Has worked chiefly at South Wheal Bassett mine. He has received a good many injuries during his work. 17 years ago he was cut about the head, wrist, and abdomen, from the accidental explosion of a hole. He was at home for 12 months in consequence of having an attack of erysipelas. 10 years ago he received a blow on the head, and says his skull was fractured by a falling kibble. Ill 4 months. 7 years ago a piece of rock fell upon his shoulder; he was in the Truro infirmary 13 weeks, and away from work 12 months.
8. Illogan; dilated heart; July 1862.	58		A miner.	- - -	17	Tutwork and tribute.	Has worked at several different mines but chiefly in good air, till about a year and a half ago. Worked at North Roskear in the 70 level, where it was very hot, and where the men mostly worked naked; the air was good, and he had good health. He last worked at Camborne Consols about 7 or 8 years. The last year and a half in bad air in the 50 fathom level and 40 from draught. The air was cool, but the candles would not burn upright.
9. Illogan; Phthisis; July 1862.	38	63, alive.	A miner "in tolerable health for an old man"	Two sisters and his mother have died, cause of death unknown, one sister was an infant, the other about 18. Thinks his mother died of old age, worn out, age 61 or 62. "This is considered a good age in this part."	16	At first on tutwork, afterwards tribute.	Has worked since he was 16 years old, at Carn Brea mine. Worked for 3 months in bad air in a rise at the back of the 90 level. The candles would not burn properly. Did not feel any ill effect from it. also worked in very bad air in the 66 level "driving an end" for 6 months. The candles would not burn. Felt ill effects from it, and removed in consequence. Afterwards went on tribute, and worked generally in good air. Has been away from work 9 months.
10. Illogan; Pleuritic effusion; July 1862.	42	Dead.	Miner, died from an accident in the mine.	- - -	14 or 15.	- - -	The first 7 years worked at Cooks Kitchen and South Roskear, in good air, afterwards worked for 20 years at Carn Brea. "I have worked in close and dry places, also in dusty places where there was mundic. I could not prevent myself inhaling some of the dust."
11. Illogan; Chronic pneumonia; July 1862.	51	47 Dead.	Miner, died of a chest complaint.	- - -	13 - -	Both tutwork and tribute; chiefly tribute.	Worked at Carn Brea at first, then at Dolcoath, where there was some bad air. Afterwards went to Tincroft; worked here 12 years, part of the time in a shaft where the air was very bad indeed. Here "my knees were so weak I could hardly hold myself up, and my head seemed splitting all abroad. I was obliged to tie it up." Afterwards was a mine agent, employed at Pedhandrea, where he had to repair a calcining machine. Has never been well since then, 4 years ago.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
His illness has been gradually coming on for some years, and gradually increasing in severity up to the present time. It now quite prevents him from working, although he looks and says he feels quite well when he is quiet. He has been away from work 6 months with pain in the chest. The pain which he describes as a pressure on the breast bone comes on upon any exertion, such as walking up hill. He can walk a short distance, when suddenly the pain comes on and he is obliged to stop. He then usually has pain down the inner side of both arms, and his heart beats rapidly. After standing still a short time the pain leaves him, and he then feels quite well again, and can move about as usual. During the last month before he gave up work, he was often obliged to stand still on the ladders for 2 or 3 minutes owing to sudden attacks of pain in the chest, in this case preceded by shortness of breath. After standing still a short time the feeling would leave him, and he was then able to continue the ascent. He had no feeling as if he were going to die, and felt himself quite safe on the ladders during the time. He had a cough after taking cold about a month before the pain in the chest, but it went away, and has not returned.	Climbing.	A stout, healthy looking, muscular man. Chest freely moveable, respiration normal. Heart sounds distinct, both sounds double, and the first clearer and sharper than natural. Pulsation regular at the present time, easily excited by walking across the room, but not becoming irregular. Impulse feeble, diffused, extending to epigastrium, where the sounds are very distinct. Extent of dulness on percussion increased. No murmur to be heard. 2d sound heard distinctly some distance along the course of aorta. Pulse 104, small, soft. Respiration 20, easy, regular.	His living has usualld been good. He usey to drink freely from 18 to 25 years of age, but has not done so since. Used to drink beer.
Says he had inflammation in the left side, 11 months ago. He had copious black expectoration, and was unable to lie down in bed for a week. He was laid up for 13 weeks, and since then has constantly had fluttering of the heart, and "has never felt himself the same man since." Never had rheumatism. Has lost 20 lbs. during the last 6 months. Six days ago he got wet in going to the mine, and after he had done work he put on his wet clothes. In the evening he felt poorly, and he has been getting worse up to now. Has been at home three days.	Putting on wet clothes after leaving work.	Complains o nortness of breath, with expectoration of a little thin frothy mucus. Has "weakness in pit of stomach," loss of appetite, fluttering of the heart, and a feeling of weakness in the limbs. Tolerably muscular. Chest resonant on percussion, slight dulness under the left clavicle; vesicular murmur heard loudly all over chest; under left clavicle breathing somewhat tubular, and expiration is prolonged down the upper half of left chest anteriorly and posteriorly. Mucous crepitation to a slight extent over both bases behind. Cough comes on occasionally of a spasmodic kind and accompanied by the expectoration of a little thin mucus. Heart sounds distinct; the 1st is followed by a tail, scarcely a murmur. Pulsation irregular in frequency and force, impulse less than natural and diffused, not much impulse at epigastrium. Pulse 60, small, feeble, intermittent and irregular.	This case shows the necessity of having proper drying places for the men's clothes, and the result of neglecting the precaution of drying them before putting them on on leaving work.
First felt weakness in the legs, in climbing about 6 months ago. He used to have headache, "but that is so customary that we don't take notice of it. For 3 months before he gave up work, he felt shortness of breath so that he had to give up work and sit down for a time, and to stand still on the ladders when climbing. He then had "beating of the heart." Was obliged to give up work in consequence.	Working in bad air.	Complains now of shortness of breath and palpitation of the heart on making any exertion, and weakness. Feels tolerably well, and his breathing is easy when sitting quietly at home. Appetite good, but cannot get food now he is out of work. Respiratory murmur rather increased at left apex, no other abnormal sound detected. Heart at the present time beating regularly. The sounds are very bright, especially the 2nd. Area of dulness increased. Considerable pulsation in epigastrium.	He gets nothing from the club.
Felt weakness in the legs, and heaviness on the chest when working in bad air. Had pleurisy 3 years ago, and was laid up about 3 months, and has had a cough ever since. Has never spat any blood. 12 years ago, says he had inflammation of the chest and slow fever, but after 3 months illness he got quite well again. Used to sweat a good deal, but has not done so for 6 months. Has been steadily getting worse, and now has a general weakness, shortness of breath, and a cough.	- - -	Fingers clubbed, skin hot, limbs wasted. Chest shallow anterio-posteriorly, motion defective in left side. Dulness on percussion, mucous crepitation, and increased resonance of voice in left infra-clavicular space. Mucous crepitation over the whole of left lung posteriorly, except just at the base. Right lung, mucous crepitation at apex behind, slight dulness on percussion in front. Heart sounds distinct, impulse diffused over a circle about 4 inches in diameter, of which the nipple is the centre. Pulse 128, regular, compressible; respiration 34, variable, shallow. Cannot speak many words together. Tongue injected with a white streak down the centre. Bowels not at all loose.	
Felt shortness of breath in climbing about 5 months ago for the first time. Was working then in the adit level. He went to a funeral at this time and caught cold. Had "slow fever," and inflammation of the lungs. Says he has lost 20 lbs. during the last 4 months.	Exposure to cold.	Prevented working by weakness, loss of appetite, and shortness of breath. Has now a little cough, but without expectoration except a little in the morning. Dulness on percussion, and loss of vibratile thrill (tactile) on the right side below a line extending round the chest an inch above the nipple. Tubular breathing and slight œgophonic modification of voice over the same part. The remaining portion of both lungs clear, respiratory murmur being somewhat puerile. Heart sounds not very distinct, impulse forcible, extending to epigastrium; action regular, but quick.	
Four years ago he had to go into a calcining machine to repair it; and though the fire had been out two days, it was so hot that he fainted twice. He could only remain in the furnace three quarters of an hour at a time, and then go in again after resting. This continued three or four days. (Arsenic is here separated from the tin in large quantities.) He had a pain and inflammation in the throat, faintness and weakness in the limbs. No looseness of bowels or pain in the stomach. Says he has had a bad cough and difficulty of breathing ever since; profuse perspirations in the morning, and expectoration of white frothy mucus. Never spat blood. Has not been subject to sweating for the last 3 or 4 months, and is now much better than he was 6 months ago.	Exposure to great heat and the fumes of arsenic in repairing a calcining furnace.	Sallow icteric complexion, muscles flabby, but tolerably well covered with fat. Has not lost flesh for six months, though he did lose a good deal previously. Chest, dulness, flattening, loss of motion in left side anteriorly, and in upper half posteriorly. At apex bronchophony and cavernous respiration, below that, mucous crepitation over upper half anteriorly and posteriorly; vesicular murmur at base, tubular breathing between. Over right lung there is puerile respiration, and behind at base fine mucous crepitation. Heart sounds clear, second sound double, impulse and area of dulness diffused. Pulse small, easily compressed, regular. Laryngeal inspiration, which he noticed 4 years ago. It has not increased, and he has never lost his voice. Subject to diarrhœa when he takes cold, the looseness being preceded by pains in the stomach.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
12. Amelebra; general ill health; July 1862.	38	56 Dead -	A farm labourer. Paralysis.	- - -	15 - -	Tutwork.	Worked in various mines but at first usually in good air. First worked in bad air in Wheal Kitty in a cross cut, where he worked 11 or 12 months, but without any ill effect. Afterwards worked 6 or 7 months in poor air in 220 level at Wheal Ruth. It was very hot. He worked in other levels above that where the air was dead. When he was taken ill he was working in a winze below the lowest level.
13. Lugeven: chronic pneumonia, July 1862.	63	72 Dead -	Butcher, old age.	- - -	13 to 14 -	Chiefly tutwork.	Worked in bad air for 6 months in Tincroft in the adit level. No ill effect from it. Worked 20 years or more at Gea. Two or three years in the 60 level in bad air, and two or three years in the 100 level, in bad air. "The greater part of the 20 years I worked here I worked in bad air. I complained to the agent, and so did others, but no notice was taken." I last worked in the Durla adit. There was bad air there, and I suffered more from that than from anything else.
14. Camborne; old inflammation of bowels; July 1862.	56	51 Dead.	Miner, palpitation of the heart.	Two sisters, his wife, two daughters, and a son died of lung disease, and a daughter is now ill with the same disease. Length of illness in most of them about 2 years. Ages, son 18, daughters 11 and 14, wife 44, daughter now ill 23. The son was a miner, and had been at work 6 or 7 years, sometimes in bad air.	16	- - -	- -
15. Camborne; Chronic bronchitis and emphysema, &c.; July 1862.		Dead -	Miner, killed by an accident.	- - -	17	- - -	Has been working at grass for 5 months. Ceased working under ground at that time in consequence of ill health. Has worked in close places, and then used to feel weakness in the legs.
16. Illogan; Chronic pneumonia; July 1862.	63	- - - - - -		Has a son who is now in the last stage of phthisis.	18	Tribute and tutwork.	Worked in various mines, but usually in good air until he went to Wheal —, where the air was very bad in the adit level, in which he worked 4 months, and suffered greatly from it. Afterwards went to Wheal Raven, where he worked 18 months in the 18 level. The air was very bad there, and he worked in bad air about 12 months. "I have been at Carn Brea about 20 years and am there now. I worked in bad air in the 105 level. I worked there 2 years. We had no machine." Worked also in very bad air in a winze at the bottom of the 20 level. Worked there 6 months. Has been working at the surface for 5 years.
17. Camborne; rheumatism; July 1862.	42	- - - - - -		Lost a brother from an accident, another died with dropsy, and a sister in a decline.	26	Worked at first on tutwork, afterwards as a kibble filler, and was then employed in the shaft.	Before commencing mining, he worked as a farm labourer. Worked 9 years at Carn Brea on tutwork, where the air was good, afterwards worked 6 months in the adit level, where there was cold damp, and from which he felt ill effects. After being at home for a time he went to Camborne Vein as a kibble filler for 12 months. Worked here in the shaft; was taken ill here, and has not worked at mining since. Has since worked on the roads.

History and Duration of Illness.	Cause which he refers his Illness.	Present Condition.	Remarks.
Felt a little weakness in climbing in the knees when working in the bad air. Had not been working in the winze many days when he had pain in the bowels, and general weakness, also shortness of breath for about a week, with a little cough. He left off work, but in a few days felt better, and went to work again. He then injured his knee by striking it with a piece of iron. There was very much discoloration both above and below the knee, though the blow was not very severe. Did not give up work for a fortnight, when it became more painful. He became then generally ill and took to his bed, where he remained three weeks. After this he got up and was better, but has never been able to go to work again.	Bad air.	Has a sallow complexion, and appears generally out of health, but no disease detected about him.	
Ill effects of working in bad air have shown themselves gradually At first he had pain in the head and weakness in the knees in climbing. During the last 4 or 5 years he suffered severely with shortness of breath, singing in the ears on coming to grass, and a feeling like a "stone at the chest," a "tightness or hardness just above the breast bone," and pain at the pit of stomach.	Bad air.	Has shortness of breath, "hardness of stomach," palpitation of heart. If he goes ten steps faster that he ought, he says his heart beats as if it would come out of his body. Has lost 40 or 50 lbs. in the last 2 or 3 years. Chest, dullness and flattening under right clavicle, breathing tubular, no crepitation, respiration puerile behind at right apex, wheezing, and prolonged expiration over front of right chest. Heart's sounds normal and regular at present, impulse felt over considerable extent of chest, and dulness somewhat increased. Cough, but little expectoration. Skin cool and soft.	
Was quite well until 2 years ago, when he had occasion to work under ground from Thursday until Sunday without any opportunity of changing his clothes, which were frequently wet, and allowed to dry upon him, and in consequence of this exposure he took cold. He had pain in his shoulders and arms, and his joints were somewhat swollen; he was feverish, no perspirations, and had some pain and inflammation of the bowels, which confined him to bed for 6 months. The bowels were then very much relaxed, and remained so for 4 or 5 months. He was leeched and had blue ointment rubbed into the abdomen, and had turpentine stupes applied. The pain came on at intervals of about ½ of an hour, and lasted for a minute or two; when going away he says the pain was of a griping character, and the bowels at the time were drawn up into knots. He states that he passed membraneous tubes from the bowels, described by the surgeon who attended him as lumps of gelatinous matter. No tenderness. For the last 18 months he has been subject to occasional severe pain in the bowels, with nausea, without diarrhœa, but with tympanites, and usually relieved by a small quantity of gin. He has never worked in lead in any way.		Bowels regular in their action. He is a healthy looking man, with florid complexion, contrary to the common appearance of miners. Abdomen soft and natural to the touch. Body fat, heart sounds not very clear; 2nd sound double, otherwise normal.	Lives well, having meat every day, which will in some measure account for his florid complexion and good condition of body.
Five months ago he had tightness in the chest, and wheezing in the windpipe, cough, shortness of breath, and palpitation of the heart, and was unable to lie down in bed. The difficulty in lying down still occasionally comes on. He says he has not breath in the morning to walk any distance.		Complains now of shortness of breath and wheezing. Occasional slight cough, without expectoration, weakness and sinking at the pit of stomach. Appetite tolerable. States that he has lost flesh during the last 6 months. Chest rounded, and resonant on percussion. Mucous crepitation, with wheezing inspiration and expiration at base of both lungs behind. Prolonged wheezing expiration at base and anterior edge of left lung. Heart's impulse extends over to the right side, being forcibly felt in the epigastrium. Pulsation irregular in frequency and force, and occasionally intermittent.	Lately he has been living well.
When working at adit level at Wheal —, felt weakness in the legs on climbing, "my chest felt loaded, I had difficulty in breathing, a bad headache, and a little cough. I spat a good deal, it was dark but not black." When working at Wheal Raven, was very ill from the bad air, and it was thought he would not live. Had "a pain under the ribs on the right side and round to the back bone." Had a bad cough and spat up a great deal. It was dark expectoration. "I had no stomach to eat anything." Felt the usual ill effects of bad air when at Carn Brea, both in the 105 and in the winze at the bottom of the 20 level, "I came to work at the surface because I had shortness of breath and weakness in the stomach." Had an accident to his hip 3 years ago by which one leg is shortened about 2 inches.	Bad air -	Subject to dyspnœa on any change in the weather. Complains now of weakness and shortness of breath. He is 63, and says "that is the age of two men." He cannot exert himself in any way without palpitation of the heart and dyspnœa. At other times he feels well. Dulness, loss of motion, and tubular breathing under right clavicle anteriorly, mucous crepitation over the corresponding portion posteriorly. The rest of chest gives normal respiratory sounds. Heart sounds not clear, 1st sound double, impulse not increased, action regular when he is quiet, but on walking across the room it becomes much quickened and irregular. Pulse small, unequal, compressible.	
"When working in the cold damp at Carn Brea, sometimes when I came up from under ground my limbs would tremble, and I felt sometimes very cold and sometimes in a great heat; at times I felt quite giddy and light-headed, as if I had been drinking." Left the mine, and after being at home for some time I got better, and afterwards worked at Camborne Vein. From here I was laid up with pains in my limbs, and was at home about 2 years. I have been ailing about 11 years."	Working in cold-damp, and exposure to cold in the shaft.	Has effusion into both wrist-joints and œdema of both legs, and a chronic abscess on his left arm. Heart sounds normal and feeble. Respiration healthy. Was unable to procure any urine for examination, probably it would be found to be albuminous.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
18. Curginven; July 1862.	46	66 Dead.	A miner; Miners' decline.	- - -	18	Tutwork and tribute, but chiefly the former.	Worked at Terwonys cliff 8 or 9 years, the lowest level being the 70. The mine extends under the sea, and was cold and wet, and the water in the mine was salt. There was cold damp here, and the air was bad, so that a candle could scarcely burn; there was only one shaft for a long time. They could scarcely carry a candle into the adit when the wind was north, but when south the air was better. "I did not feel any ill effect from working in that bad air. Afterwards worked in Wheal Basset 9 or 10 years. It is a copper and tin mine. Worked in poor air for 2 years in the 100 fathom level. I know the air was bad because the candle would not burn. I was ill here and left the mine in consequence, and afterwards took care of a dry for 6 months. This is 18 months ago, and I have not been to work since."
19. Camborne; Broncho-pneumonia; July 1862.	58	- - -	- - - -	- - -	23	Employed in burning the tin ore.	"First worked at Wheal Vor for nearly 20 years, not much under ground. I worked at the burning of the tin. A great deal of sulphur and arsenic came from it. The ground where I was would be covered with arsenic as if it had been sprinkled with flour. I had heartburn and gasping for breath. I left Wheal Vor and went to Cook's Kitchen. I was 6 years there, and had the same employment. I was taken ill there. I was afterwards employed at Carn Brea for 7 or 8 months, and after that worked on the roads."
20. Penrenton; Chronic bronchitis and emphysema, pleuritic effusion, disease of stomach; July 1862.	59	Dead -	Died from an accident.	Mother died suddenly, and two sisters died in decline.	19	- - -	First worked at Tresevian for 22 years in the 250 level. The air was good but very hot, and he often worked naked, and his boots used to be wet through with perspiration. Then went to Trethesollel mine for 12 years. Air good in 136 level. Afterwards went to Constantine mine, and from there to Wheal Henry, where he worked 16 or 17 years. Worked in the 60 level. The air was good and the candle would burn, but there was cold damp.
21. Camborne; Contraction of right side, with displacement of heart, and emphysema; July 1862.	51	63 Dead.	A miner; died from miners' complaint, after being at home 12 months.	- - -	15	Tutwork, afterwards on tribute.	Worked at Dolcoath for 15 years. "In a general way there was good air there, but sometimes I worked in poor air. I felt my health suffer during that 15 years." From there went to Carn Brea, and from there to Cook's Kitchen, at both places on tribute and in good air. Wages there averaged 5*l.* a month. Then went to North Roskear for 10 years, 9 years on tutwork. Worked in 120 level. It was very hot, the air tolerable, but not very good. Then worked at Great Wheal Seaton 3 years, in good air on tribute. "I have worked at Cook's Kitchen for 5 years, and am there now. I am now unable to go under ground, and have been at home 9 weeks."
22. North Brea; Emphysema; July 1862.	46	- -	- - -	- - -	15	Tutwork and tribute, and afterwards employed in the engine shaft.	Worked in many different mines, and usually in good air, and enjoyed good health until he went to Condurrow. Was there 6 years in the engine shaft. "I was taken ill there, and after staying away 3 weeks and then attempting to work again, was at last obliged to give it up."

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Has had headache ever since he commenced mining. At Wheal Bassett felt qualmish in the stomach while at work, never vomited, but felt sick; sometimes used to feel weakness in the knees on climbing the ladders; no cough, but sometimes a pain in the breast, giddiness and lightness in the head, singing in the ears; never had any cough or expectoration. "Sometimes my heart used to beat harder on climbing, and sometimes I felt a sensation of drowsiness, or as if I should have gone to sleep if I had stopped working a bit."	Bad air -	Complains of giddiness. Says his head feels as if it were too full. Ringing in the ears, pain in the back of the head and down the back and round his loins. No cough or palpitation. Feels a fluttering in the legs. Says he has a sensation as if a cord were tied round him, and often he has pain under the right side of his ribs. Pulse 64, full, firm. Tongue large, pale, clean. Pupils normal, and contract normally under stimulus of light. Conjunctiva injected. Complexion rather florid.	
Complained of gasping for breath and heartburn when exposed to the fumes of arsenic at Wheal Vor, and was afterwards laid up with probably some inflammatory affection of lungs when at Cook's Kitchen. Has been now 4 years at home.	Exposure to the fumes of arsenic and sulphur.	Says that he feels as if everything had gone out of his body excepting his heart. Has palpitation of the heart, "and weakness across the stomach and loins." Sometimes has "lightness in the head." Expansion of chest limited to the upper part, the lower ribs sinking in on inspiration, and intercostal spaces depressed. Under right clavicle there is dulness, tubular breathing, and loss of vesicular murmur. Posteriorly puerile respiration at both apices. Large mucous crepitation over lower half of both lungs behind, and on the right side in front. Heart's impulse increased in extent towards epigastrium, not increased in force. Pulse 104, compressible.	Has had 17 children, 9 of which are dead. Has now 6 at home, and has only 1 bedroom.
Taken ill when working at Wheal Uny. Felt ill for 3 or 4 months before giving up work. Had a "crushing pain in the breast bone." "My feet went cold first. I had a little cough, but without shortness of breath at first, but that came on afterwards, and before I left, my breath was so short that I could scarcely get up the ladders."	- - -	Has great pain and tenderness on pressure over the stomach, and the epigastric region is swollen. Has had a feeling of nausea and tenderness over the stomach for 2 or 3 weeks. Nausea and pain in the stomach after meals, and is always "urging," but does not vomit. Cannot lie down on his back without severe pain in right hypochondrium. Emaciated, and has sallow complexion. Fine crepitation, but resonance over upper part of right lung in front, coarser crepitation and cooing expiration over apex behind. Dulness on percussion, tubular breathing, absence of vesicular murmur, absence of tactile vibration over base of left lung, before and behind. A pleuritic rub heard about three inches below the nipple on same side. Heart's impulse very feeble. Pulse irregular in volume, small, compressible.	
"When working in a close end at Dolcoath I used to feel pain in my head. Occasionally I felt shortness of breath in climbing the ladders, and I very often felt a weakness in the knees. I have not been well for 2 years. I began to fail about 2 years ago. I found that when I was climbing, or beating the borer, I could not work so long as I could before. I then felt a pain in my left breast. In climbing the ladders my heart used to beat a great deal. I used to expectorate a great deal of black stuff, but during the last 4 weeks I have had no cough."	Thinks his illness is produced by a cold.	My breath is now very bad. Cannot get up stairs without difficulty. Has general weakness. Dulness on percussion, deficient vesicular murmur, and creaking prolonged expiration heard over right lung behind; over left lung puerile respiration, and resonance on percussion, as much so at the ordinary seat of heart's dulness as elsewhere. Dulness on right side from 4th to 6th ribs, and from nipple to right of sternum. Impulse scarcely to be felt at all, but most distinctly about 2 inches below the right nipple. 2nd sound heard most distinctly between 3rd and 4th ribs, just to the right of sternum. Neither sound is clear; impulse regular, but very feeble. Right side of chest moves but little, and lower ribs and intercostal spaces sink in on inspiration. Lower part of right side much flattened.	He says "all miners spit up black, whether well or ill, especially when working in a smoky place."
When employed in the engine shaft, "I was round the nose of the lift, and word was sent to us to come up to the 80 fathom level as they were going to send down a piece of timber; and we came away very quick, sweating, and the kibble never came, and I was left standing there. I felt the cold go through me and I could not feel any heat in my body. I came up and warmed myself by the fire. I went to work afterwards for about 3 weeks, then I felt ill again and staid away 3 weeks, and then went to work again 2 days, but was obliged to give it up and I have never been since. I had weakness all over my body. I went into the Truro Infirmary. I was said to have inflammation of the heart, and they told me there was no cure or me, for that my lungs were affected."	Exposure to cold.	Prolonged cooing inspiration and expiration. Respiratory murmur generally deficient. Shoulders permanently raised, and chest rounded. Body in good condition. Heart sounds clear, impulse more forcible than natural. Pulse full but irregular in volume.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
23. Redruth; Bronchitis, Emphysema; July 1862.	60	Dead 60	A miner; decline.	Grandfather also a miner.	- - -	Tutworkand tribute; partly in engine shaft.	Worked during first 5 or 6 years at Wheal Gorland, then at Gwennap Consols, 12 months in the 250 level; the air was very hot, and we worked nearly naked. The candle burnt well. Afterwards worked in South Wheal Buller, in Poldice, and South Tolgus, generally in good air. At South Tolgus worked in the engine shaft. Wheal Uny is a wet cold mine, and there is tin water there. Has never worked in much poor air.
24. Illogan; Old Pneumonia; July 1862.	68	Dead	Miner.	- - -	15	The last 10 years on tribute.	Has been a miner since 15 years old. Formerly worked in bad air at Carn Brea, 20 years ago in the 80 level. Worked there 6 months and suffered from it. Worked in bad air in Wheal Agar in sinking a shaft from the surface. Has not worked for 12 months.
25. South Tolgus; July 1862.	59	-	-		- -	- - -	- - - - -
25a. Redruth; Mitral valvular disease; July 1862.	49	Dead	A miner; died of miners' disease after 6 years' illness.	Grandfather was a miner.	14	- - -	- - - - -
26. Redruth; Phthisis; July 1862.	32	81 Alive and in good health.	A mechanic.	- - -	9	- - -	"I have been working under ground 14 or 15 years." Worked 5 months in bad air in Wheal Elijah. That was the last mine he worked in, and he has now been at home 17 months. The bad air was in the 40 level.
27. Redruth; Miners' disease; July 1862.	42	- - -	- - -	Has a son aged 15 now ill with similar symptoms to his own.	- - -	- - -	Has been working for 6 months at Elijah and Wentworth mine. Worked in bad air so that the candle would not burn, and felt ill in consequence. Then he went into another part where the air was good, but then felt worse than before.
28. Redruth; Mitral disease; July 1862.	31	Between 60 and 70. Alive.	Formerly a miner, but gave it up 30 years ago, from ill health.	-	16	- - -	Worked in foul air in Tincroft about 1½ years ago, and has since worked in foul air in America.
29. Camborne; bronchitis; July 1862.	75	- -	- -	- -		Tu work -	Was a farm labourer until he was 40 years old, when he took to mining, at which he has worked for 30 years. Has not worked for the last 2 years, because he could not see.

History and Duration of Illness.	Causes to which he refers his Illness.	Present Condition.	Remarks.
"I have been ill more or less for 20 years, but have been at work under ground until 2½ years ago. Was first laid up with shortness of breath and pain in the right side. Was ill 8 or 9 months, and have had repeated attacks since. Two and a half years ago was laid up with pain over the hip, a stoppage in the water, difficulty of breathing, and somelittle palpitation of the heart. Was ill 9 or 10 months."	Exposure to wet and cold	Complains of weakness, shortness of breath, palpitation, and wasting. Has no diarrhœa; sweats a good deal in the morning, and spits up white froth. There is wheezing expiration and inspiration all over the chest, which is very resonant on percussion. Heart sounds feeble and regular. Pulse small and compressible.	Pays 6*d.* to his club, 6*d.* to the doctor, and 3*d.* to the barber.
Was well up to one year ago. Was then taken ill with pain in the left side and shoulder. Had a cough and "no breath." Expectorated rusty sputa, and had fever with typhoid symptoms, and the chlorides were absent from the urine. He spat up suddenly a quantity of bloody greenish matter, and the expectoration continued 6 or 7 weeks. It was preceded by severe pain in the side and dyspnœa. It occurred about 2 months after the original illness; during that time there was crepitation with typhoid symptoms. (For the foregoing history I was indebted to the medical man who attended him, Mr. Hitchins of Redruth.)	- - -	Contraction of side. Absence of respiratory murmur and dulness at lower portion of left side, corresponding to seat of original disease.	He is intemperate in his habits.
Six years ago had inflammation of the lungs, but recovered and was quite well until 18 weeks ago, when he took cold and had a bad cough. He then had tightness in the chest, and spat up whitish thick sputa, and had some palpitation of the heart. The cough lasted 6 weeks and then went away. He says miners generally cough and spit up something. He is now prevented working by weakness, and has trembling, and his hand is not steady. Eleven weeks ago had shivering, occurring repeatedly for 4 or 5 weeks. Has not had it much lately. At that time lost flesh considerably, but has recovered it since.	- -	Complains of a sensation of cold down his back and legs, and at the back of the head, like cold water running over the part. Has emphysema, general dulness of chest, and absence of respiratory murmur in right infra-clavicular space, and irregular inspiration at the base of right lung.	
Has not been well for 20 years. Was taken ill with inflammation of chest. Has had inflammatory fever two or three times, and has been as he is now for 7 years. Had dropsy 2 years ago, and at that time the surgeon who attended him says his urine was not albuminous.	- - -	Pain in the left side, shortness of breath, a fluttering of the heart, general emphysema of the lung. Loud, rough, systolic murmur over the mitral. Says he has never had the rheumatic fever.	
Never had a day's illness till about 16 months ago, and was then taken ill with pain in the right breast, bad cough, expectoration of dark slimy sputa, which has continued ever since. First spat blood 12 months ago, and has continued to do so ever since at intervals of 5 or 6 weeks. It comes on with very little cough, "as if something breaks in my throat." Has brought up, he says, nearly a quart of blood, mixed with spittle during a day and night, and it continues for some days and then gradually ceases. Began to spit blood again this morning. No diarrhœa. Sweats a great deal at night. Appetite good.	Working for 5 months in poor air in Wheel Elijah.	Expectoration rusty with admixture of blood. Cavernous respiration with bronchophony heard 2 or 3 inches below the clavicle, immediately below the clavicle large mucous crepitation. The same heard behind, over the right apex.	
Has been ill 2 months, and has given up work 5 weeks. Usually had good health before 2 months ago. He was working in bad air and was taken ill with pain in the head, alternately trembling with cold and flushing with heat, qualmishness and difficulty of climbing the ladders, pain in the right side. Kept his bed for 3 weeks.	Working in poor air.	Is now much improved in health. Complains of weakness chiefly, but has pains in the head if he does more than he ought. Has had no dyspnœa. No evidence of disease in examination of chest again into good air than during the time they are actually working in poor air. Another man who was working with him was taken ill at the same time. He has a son ill now who has been working under ground 18 months, aged 15. He has general weakness and pains between the shoulders, arms, and knees.	This agrees with statements of other miners, that they feel the ill effects of working in bad air more when they get
When at work in Tincroft, had headache, soreness and tightness of the chest, and trembling in the legs in climbing the ladders. Had then a little palpitation, but this chiefly came while working in foul air in America since that time. Never had rheumatism, but 18 months ago had swelling of the hands, which were not red, and without much pain. No other joints or limbs affected. Palpitation of the heart came on chiefly about 15 months ago, with pain in the chest. Has had more or less palpitation since then, and it is now his chief trouble.	Working in foul air.	At the present time he has no difficulty of breathing, and says he feels as if he could run if his heart would let him. Has pains in the left shoulder and breast when the palpitation comes on. Lungs resonant on percussion, respiratory murmur normal. A faint mitral murmur accompanies the 1st sound of the heart. Body in tolerably good condition.	
Had good health until about 2 months ago, when he took cold, and his breath has been very short ever since. Has cataract in both eyes, which has prevented him working for the last 2 years.	Took cold, not referable to mining.	Healthy looking old man. Breathing rather laboured and wheezing, shoulders being raised. Mucous crepitation, with slight cooing inspiration and expiration at base of left lung. Has a cough and spits a great deal.	One of the few men above the middle age with healthy looks; no doubt referable to his not having worked underground for 2 years.

Number; District: Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
30. Chycarne; Dilated heart; July 1862.	46	45 Dead.	A miner at the surface. Killed by an accident.	- - -	14 to 15.	- - -	Worked as a miner since 14 or 15. Worked 4 or 5 years at South Wheal Buller, 4 years at Carn Brea, and 6 or 7 years at Tincroft. Worked in bad air there for 6 or 8 months, in the 72 level. Then went to Dolcoath for 12 months, and afterwards worked at Condurrow for 11 years. Worked in bad air there for about 3 months, at different times, for about a month at a time. There was bad air in the 10 level, and in the 20 level. Did not suffer at that time. Has been working at grass for 2½ years.
31. Buckingmill; Consolidation of lung; July 1862.	32	60 Alive and "in tolerable good health for an old man."	A miner still working under ground.	Lost a sister about 3 months after her confinement; she was thought to be in a decline.	17		
32 Treskilleard; Destruction of lungs (Tubercular?); July 1862.	26	57 Alive, and laid up with two bad legs, which were injured by working in cold water. "They are in wounds which won't heal."	A miner	- - -	16	Tutwork for 2 years, since then driving a steam machine at surface.	Worked underground for two years at South Basset mine. It is 8 years ago. Worked in the 40 level under adit. "The air was hot and bad, and the powder smoke lay very heavy. I was quite well when I went down first. I was taken ill there with weakness in the legs, shortness of breath, and tightness in the chest. I worked a month after I first felt ill, and then was obliged to give up, and was laid up for 7 months." Since that time has worked at the surface, but for the last 7 months has been laid up again with the same complaint, "The place where I worked was draughty and cold. I caught cold, and it brought on slow fever. I recovered from the fever, but the cough remains."
33 Camborne; Dyspepsia; July 1862.	47	71 Dead	A miner. Apoplexy. Worked under ground till 6 months before his death.	- -	14	He has been working the engines above ground for 5 years.	Worked under ground for 8 years, and during the next 16 years at the surface. Then worked under ground again for 5 or 6 years, and the last 5 years at the surface, where he still works.
34 Redruth, Paraplegia; July 1862.	50	- - -	- - -	-	18 Till that age he was a farmer.	- - -	"I was working in Wheal Margaret, in the adit level, in cold water, 7 years ago, from which time I date my illness." 30 years ago was thrown from a horse and hurt in the loins, but there does not appear to be any connexion between this accident and his present illness.
35 Redruth; Post mortem on a case of miners' disease; July 1862.	Both lungs adherent to the chest; left lung was voluminous, had limited adhesions in the mammary region; the upper part was tough, dark in colour, fleshy, and contained but little air; in other parts healthy and crepitant except in some places, where it was emphysematous. Right lung universally adherent to the chest, so that it had to be cut out. It was covered with a layer of dense white material on the outside. A portion of one rib was destroyed, absorbed, and replaced by the same dense, white, fibrous material; a portion of it was hard and rough, lying in contact with pus which oozed out of the mass when the sternum was removed. The lung itself was dense, firm, solid, almost black, had numerous cavities excavated in its substance at the upper part, and a blackish brown serum oozed from all parts of it. The cavities were all filled with the same material, and the bronchial tubes were rough and covered with nodular deposit of lymph, and contained dark grumous fluid in the left lung, but in the right, pus. Larynx healthy, trachea dilated, heart pale, flabby, free from fat, œdematous on external surface of right ventricle, cavities somewhat dilated. Aorta and pulmonary artery dilated, valves healthy. Lining of aorta smooth, and free from deposit. Liver rather small, and indurated. Spleen and pancreas healthy. Right kidney not apparently diseased. Left kidney mottled, coarse, firm, whitish. Capsules soft, easily torn, and atrophied. No clots in pulmonary artery. Left lung almost black on the surface under the plura. No tubercle anywhere.						

History and Duration of Illness.	Causes to which he refers his Illness.	Present Condition.	Remarks.
Had good health until 3 years ago when he had inflammation in the left side, and was ill for 6 weeks. Says he has had rheumatism, but has never been laid up with it. Had shortness of breath at the same time as the pain in side. Six months ago he was ill again, and was considered by the surgeon who attended him to have abscess in the liver. He brought away a quantity of matter by the bowels at that time.	- - -	Now complains of shortness of breath. Has palpitation of the heart sometimes, and indigestion. Respiration is normal, but his heart is very irregular both in its frequency and force of its impulse.	
Was never ill until 4 years ago, when he had "slow fever" and was ill 4 weeks, but walked about all the time. It came on with sickness and pain in the head; no cough, a general weakness. Was again ill seven months ago from taking cold in the engine shaft, and "although I continued to work, felt a little cough, and had pain in the left side. After that I had a pain in the right side, which continued until 5 weeks ago, when I gave up work." Has lost flesh for 2 or 3 weeks, but has recovered it somewhat during the last few days.	Taking cold in the engine shaft, though he had been ill before that attack.	Complains of shortness of breath. Has cough but no expectoration. No pain. Has profuse perspirations in the morning. Body emaciated, face thin, eyes dark and sunken, sallow complexion. Chest very resonant in front, but dull behind between the scapulæ, and in that part vocal resonance is increased, and downwards from that spot respiratory sounds are almost tubular in some portions. Vibration normal, skin hot and dry, pungent. Heart sounds normal. Considerable impulse in epigastrium.	
First was laid up with the usual effects of working in bad air described in the previous column, but recovered after 7 months' illness since that he has been exposed to cold and laid up again with similar symptoms for the last 7 months, but is somewhat better now than he was a short time ago. Has a cough, and expectoration is white and frothy; never spat blood.	Working in bad air in the first place, and afterwards from exposure to cold in a draughty engine house.	Shortness of breath, "weakness of stomach." Body not extremely emaciated though thin. Tolerably healthy looking in face, with some colour, not flushed. Chest resonant all over right side in front, and behind except at base. Tubular breathing bronchophony, loud creaking and cooing with inspiration, and prolonged expiration heard under left clavicle. On right side prolonged creaking expiration, down the edge of sternum, and behind large moist crepitation at the base. Heart sounds normal.	Tolerably healthy appearance of face coincident with 8 years' work above ground, although the man is in an advanced stage of disease of the lungs.
Gave up work under ground because he was always ailing and catching cold.	- - -	Has a sallow unhealthy look, but his body is fat and in good condition. Feels a pain in pit of stomach when taking a deep breath. Has had nausea and lightness in the head lately. Pain on pressure in the epigastrium. Heart sounds normal. Chest resonant, prolonged emphysematous expiration in front.	
Illness came on from working in cold water 7 years ago. When he came out of the water, he had pains all over his body and limbs, which lasted 3 or 4 days, but he went to work again in a dry place, and about 6 months afterwards felt his legs "going dead" below the knee. They used to feel as if they were going to sleep, and gradually got worse for 5 or 6 years when he went into the Truro Infirmary. When he went there he says he could scarcely move one leg before the other. Both legs were affected alike; he had good feeling, but they felt always as if they were cold, and with an occasional stinging sensation. Was in the infirmary 2 months, and by then his legs felt warmer, but he felt weakness in the back. Has been at home 12 months. Two years ago had incontinence of urine, and when he felt a desire to go to stool he was obliged to go at once. About a year and a half ago he went to Penandrea mine, and was exposed to wet and cold attending to the stamps. Afterwards his limbs were in a tremble, and he has not been able to work since. Never had any pain in the back.	Working in cold water.	Can now walk across the room with the aid of a stick, but unsteadily. Has been in his present state about 6 months; but, if anything, gets a little weaker. No affection of upper limbs. Has 5 children, aged 12, 10, 8, 6, and 3½. At one time he used to drink a good deal of beer (3 or 4 quarts), but not for many years.	
The history of this case as far as could be ascertained was that of an ordinary case of miner's disease, in its severest form; and in many points, as in the expectoration of blood in considerable quantity, simulating tubercular consumption.			

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working underground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
36. Redruth; Chronic bronchitis, July 1862.	64	28 Dead.	A miner; died from an accident.	- - -	16	Tutwork and tribute.	First worked in Cook's Kitchen in 130 level in good air. Then in Consols (Gwennap) for 3 years, in 110 level. The air was "slight," very slight in some parts. On tutwork. Then he went to Tolgus Downs, for 6 or 7 years in different levels, on tribute, air generally good, but not always. Then to Carn Brea about 12 years, deepest level 100 fathoms. "The air was tolerably good for miner's air. Damp cold air usually on the granite, worse than on the killas." Has been away from work 14 or 15 years.
37. Camborne; Miners' disease; July 1862.	21	48 Alive.	A miner in good health.	Grandfather was a miner, and was 80 yrs. old when he died.	8	Formerly a miner, now a railway porter.	Worked under ground for 8 years. Worked in bad air in Fowey Consols 4 years ago, for about 12 months. In the back of the adit, in the 40 level, and in the 240 level there was bad air. Afterwards took a situation as gentleman's servant, and lately has been employed on the railway as a porter.
38. Camborne; Injury to heart; July 1862.	24	49 Dead.	A miner, miners' disease, with pain in the side.	- - -	15		Worked under ground until 7 months ago at West Wheal Seaton.
39. Tuckingmill; Miners' disease; July 1862.	21	45 Alive.	A miner, in tolerable health.	- - -	11	Tutwork.	"I first worked at South Tolgus in the 50 level, employed in blowing in air to two other men; air good; worked there 4 months. Then worked at grass for 3 years. After that worked at Copper Hill for 6 or 7 months in 60 level; good air part of the time, but dead and close 100 fathoms from shaft. During the last 2 or 3 months that I worked there the air was bad, so that the candle would not burn except when inclined. Did not feel any ill effect from that. Then worked at grass 5 or 6 months. Then worked 3 months at South Wheal Basset in adit level on tribute, air good. Then at North Wheal Basset for 2½ years in 50 level. Air close, but we had a machine blowing to us. The candle would not burn. We had hard work to carry in a candle lighted, although we had an air machine. I worked 4 months in that foul air, and then went to the 40 level, 50 from shaft, to sink a winze. It was rather cold. The air was very dead and close, and the candle would only burn when inclined. Then worked 3 weeks at grass, at Wheal Seaton, and then went to West Wheal Basset, where I work now. I have worked in the 70, 80, 90, 114 levels, and now in the 104. Very bad air in the 70. Sometimes I was there for 3 or 4 hours before we could carry a light into the end where I worked on tutwork. We had to give up that end on account of the bad air, and work in another place. Since then a shaft has been sunk near the end, so that men can work there again. Air very close in the 80, candle inclined, air rather cold. Air good in other levels but there was cold-damp, it being a granite mine in general. Tin and copper."
40. Redruth; Miners' disease; July 1862.	49	73 Dead.	A miner, but worked at grass for 8 or 10 years before his death.	- - -	14	- - -	- - -
41. Redruth; Chronic broncho-pneumonia; July 1862.	70	- - -	- - -	- - -	20	Chiefly at surface, in the "dry."	Did not work under ground many months. Worked at Wheal Vor in the East. "I gave it up on account of the bad air."

History and Duration of Illness.	Causes to which he refers his Illness.	Present Condition.	Remarks.
Was taken ill whilst working at grass with violent pain in the kidneys, extending into the groin, sickness, and followed by sudden relief. After this he passed a calculus. He has now a large collection of calculi that he has passed of all sizes up to a bean. First felt his breath short 2 or 3 years ago; and now he has not "breath to travel," and it is much worse in the winter.	- - -	Expectoration white and frothy. Has had a rupture on right side for many years; but he says it came from working in a constrained posture, and not from climbing.	
Worked under ground for 4 years before feeling any ill effect from it, and then he lost his appetite, had shortness of breath, and could climb the ladders. Had sores on the head and glands in the neck swollen. Was at home about 2 months and had medical advice. Was recommended not to go to work under ground again. Went to work again under ground, and continued to do so for 4 years with occasional attacks of illness, being sometimes under ground and sometimes at surface. When ill had a bad cough with expectoration of "black corruption" and occasionally blood. Had pain in the left side and shortness of breath. Lost flesh very much. Got better when he stayed above ground.	Working in bad air.	Has had very good health since leaving the mine, but still feels difficulty of breathing, and has a cough if he gets at all wet. Had palpitation of the heart, while climbing the ladders, and he still feels it a little at times. Fresh healthy colour in face, is stout and strong in body, and seems in good health. Chest generally resonant except at lower part of left lung in front. Emphysematous crackling over front of right lung near sternum; tubular breathing over a limited space at 3d or 4th left costal cartilages. Heart sounds normal, impulse natural. Pulse tolerably full, soft.	
Whilst lifting a heavy load of rock, he sneezed, and felt something give way in his chest (about the middle of sternum) with a sensation as if stabbed with a penknife. The pain remained 10 or 15 minutes, and then ceased, but comes on now if he exerts himself. Was quite well before this occurred; but since then has had palpitation of the heart, so that he cannot work for the pain. Has had nothing else the matter with him.	Lifting a heavy weight.	Feels weakness, pain in the breast at times, palpitation of the heart under any excitement. When quiet feels in tolerable health, with the exception of being rather weak. Heart easily excited and beats violently after walking across the room. Impulse forcible, and accompanied by a flapping noisy sound near the apex. The two sounds are distinct, and no murmur detected with either.	
First complained when working in North Wheal Basset, in 40 level, of pain in the head, weakness in the legs, and generally of the body, sickness on entering the mine in the morning, so that he was obliged to give up work for a time, shortness of breath, heaviness in the chest, and palpitation of the heart on climbing. Sometimes he used to race up the ladder with the other men, and then his heart used to beat very much. "There was a covering over the manhole, but we had to go 200 fathoms to the changing house in all weathers." I was laid up for about 3 weeks at this time, and then went to work again in the same mine." Was home ill 4 or 5 weeks when working in the 70, same symptoms as before. Has not been laid up in that way since, but has had sore throat, and pains about the body and chest when he exerts himself. Has had pains in the chest the last few days; sometimes has weakness, and dimness of sight, and lightness of the head.	Working in bad air.	Has a little cough, with white frothy expectoration, black after working in a dry close place. They have 1½ pint of water for two persons during 8 hours work. Muscles flabby, face and body rather thin, pale, sallow complexion, dark about the eyes. Slight increase of vocal resonance over right apex behind, with dry creaking inspiration. In other parts normal resonance, but dry creaking in places. Heart sounds feeble, but distinct. Gets 60s. a month (good pay); his father gets 60s. They are 6 in family, and they generally have about 4lbs. of meat a week for the six.	He had to walk a distance of 400 yds. in all weathers from the mouth of the shaft to the changing house, and that after racing up the ladders against other men. He nearly fainted during the examination, and says that he has done so at times before.
"I had good health until about 8 months ago, when I went under ground into a winze where there was poor air and cold damp. I got within 5 feet of the bottom when I broke the "damp" and my candle went out. I lost my speech, felt a choking sensation and trembling in the limbs. I came to grass and went home. I felt very bad and my bowels were all in a tremble. I sent for the surgeon. I was ill 4 months before I was able to go to work again. I had pain over my chest, no cough, palpitation of the heart, pain in the limbs, weakness and shortness of breath. I have now been working 4 months, the first month at grass."	Bad air and cold damp.	"I now feel palpitation of the heart when I climb, and shortness of breath, otherwise I feel pretty well." He has a tolerable colour in the face, and says he is in as good condition as ever he was. Deficiency of respiratory murmur, generally over the chest. Right infra-clavicular space duller than the other, and respiratory murmur more deficient there than elsewhere, prolonged creaking expiration behind.	
Has never been quite well since he was hurt about 20 years ago, when he fell down on some iron and hurt his shoulders and side. Was laid up for 3 years. Was salivated in the Truro Infirmary; the surgeon then told him his liver was hurt. Has frequently taken cold whilst employed at the dry. Used then to have shortness of breath and cough. Has not been able to go backwards and forwards, for 5 months, to work, on account of shortness of breath, pain and weakness in the limbs. I have a little cough sometimes, and spit up a little frothy matter.	- - -	Body wasted, chest resonant on percussion generally, but right apex is dull before and behind. There is tubular breathing and prolonged expiration, and the resonance of voice is increased. Heart sounds regular, 2nd being double.	

Number ; District ; Disease ; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
42. Vobleath; Old pleurisy; July 1862.	32	54 Alive and in good health.	A miner -	- - -	10	- - -	Worked under ground until 12 weeks ago.
43. Redruth; Pleurisy; July 1862.	46	70 Dead.	Farm labourer.	Mother is alive, aged about 70. Grandfather died about 90. No history of phthisis in the family.	18	Tribute, 2 months only on tutwork.	Worked at Carn Brea in bad air for 2 months in the 18 level. Never worked in bad air except then. Has been laid up for 12 months, but during the last 2 months has worked at grass.
44. Redruth; Debility following previous illness; July 1862.	47	74 Dead.	A miner for 59 years.	Grandfather a miner, died at 90, was blind for 30 years before his death from an accident in the mine.	15	Tutwork chiefly, and principally worked in the engine shaft.	Has not worked much in bad air. Worked in a little in Carn Brea in the 100 level. Has been away from work a year and eight months.
45. Redruth; Dyspepsia and hæmorrhoids; July 1862.	34	36 Dead.	A miner died in a decline after 10 years' illness.	Mother alive and well.	17	Tutwork and tribute.	Worked 7 years at Carn Brea in 26 level, 2 years at East Pool in 90 and 48 levels, then went back to Carn Brea for 3 years. Whilst working here had an attack of fever, and was laid up for 4 months. The air was good in these mines. Then went to America for 5 years.
46. Camborne; Miners' disease; July 1862.	34	60 Alive.	A miner in good health.	Grandfather died aged 75. Has 3 brothers alive. One brother died of miner's disease, aged 16, after working under ground 4½ years.	9	Tutwork -	Worked first at East Wheal Crofty 2 years, and then went to North Roskear for 5 years. He worked 9 months in bad air in the 60 fathom level, and felt bad effects from it: "I felt my windpipe choked up and heaviness in my breathing just as I feel now." Then went to West Caradon for 7 years. There was cold-damp in the 104 level; worked there 6 months, and then went to 180, where the air was good. Then worked in the 80, where the air was very bad. "I worked there 17 months. I felt bad effects from it. I felt pain in my breast and body, shortness of breath; and I am suffering from it now. I am still working."
47. Camborne; Eczema; July 1862.	40	- - -	- - -	- - -	- - -	Chiefly in a tin burning house. Only 12 months under ground.	Worked under ground for 12 months 5 years ago, but it did not agree with him; so he left it, and worked at grass since then. During the last 4 months has worked at a tin burning house at Luny. "I have to burn the tin in the furnace, as it contains mundic and arsenic. I have felt when at work a feeling of nausea coming on several times during the day. The poison comes out of the furnace when we are working the tin with the rake, and settles on the handle and on our hands like hoar frost. It gets into our mouths, and has a nasty bitter taste, and produces a feeling of sickness."

History and Duration of Illness.	Causes to which he refers his Illness.	Present Condition.	Remarks.
"Had good health until 7 years ago, when I was taken ill with inflammation in the side. I had been working in bad air for about 2 months before that. I was taken ill suddenly whilst going home from market, with pain in the side and trembling of the limbs. I was in bed for 3 or 4 weeks with cough and expectoration of yellowish thick matter. I then went to work again, but have never been thoroughly well since. I have been laid up 2 or 3 times since then, for a week or two at a time."	Exposure to cold, after working in bad air.	Now complains of weakness and shortness of breath, some pain in left side and shoulder occasionally, palpitation of the heart under any emotion, or if anything comes suddenly upon him, perspirations at night. Chest flattened below on left side, where it also sinks in on inspiration, and there is loss of respiration there. The other portion of same lung is somewhat deficient in respiratory murmur and prolonged expiration is heard in some parts. Heart sounds normal.	
Has not been well for 10 or 12 years. Was taken ill with inflammation in the side and slow fever. At that time had pain in the chest, with expectoration of a little black stuff, but about 18 months afterwards he spat up about ½ a pint of pure blood, of a bright red colour, mixed with mucus and frothy. It ceased gradually in the course of a day or two. Was home at that time 6 or 8 months. Since then has been laid up at intervals with affection of the chest. Yesterday week he spat up a mouthful or two of blood, preceded by pain in the side, no cough, but which ran out of his mouth after some little exertion and accompanied by a feeling of sickness. It was hours after dinner, but he did not bring up any food.	- - -	Has now pain in the left side and fluttering of the heart and shortness of breath, no cough. Light complexion, florid healthy look. Pulse full, slow, compressible, regular. Chest resonant on percussion except at base of left side, where there is dulness, absence of respiratory murmur, or breathing sound of any kind. Tenderness over the whole of left side of chest, and has a pain in breathing, which is irregular and catching. Heart sounds faint, but regular and distinct.	
"Was quite well until 20 months since. I then worked in cold water for about 3 hours. I then had shivering, soreness in the limbs, pain in the right side. I was laid up for 12 months before I could get out. I had cough, no expectoration, never spat blood. I have not been able to work since from weakness in the stomach. I have had rheumatic pain in the shoulders for 2 months, but it is better now." Lost flesh considerably, but says he has recovered it lately since he has been out. Has had "beating of the heart" ever since he was ill, 18 months ago.	Working in cold water.	Shortness of breath, no cough, general weakness, and tenderness in epigastrium on pressure. Has a tender periosteal swelling on right index finger, which has come by itself. Sallow complexion. Chest normally resonant throughout. Respiratory murmur not quite so loud as usual. Heart sounds somewhat indistinct, but no murmur detected. Impulse regular, but rather feeble.	
About 12 months ago he first complained of pain in the pit of the stomach, and at the same time passed blood by stool. Has had a recurrence of the pain and hæmorhage several times since. No nausea or sickness, has loss of appetite, and is afraid to eat anything for fear of bringing on the pain. Is always easier when his stomach is empty. Pain resembles cramp, and comes on violently for a time and goes away again.		Sallow leaden look, complexion pale, no line on gums; bowels generally confined, says, he almost always passes blood on going to stool. Nothing abnormal detected about the heart or lungs. Has an anemic appearance as from loss of blood, and says he has no strength. Tongue clean; pulse full and firm, unlike a person who has lost much blood.	
Had good health until 9 years ago. Was then taken ill with pains in the body, fluttering of the heart, cough with expectoration of black sputa. Had been working about 2½ years in bad air, in a warm mine with cold-damp as well. "I came up the ladders very hot and very much fatigued. The first two of these ladders I could climb very well, but after that, cough would come on, with shortness of breath, fluttering of the heart, and weakness in the knees." After taking cold going home from the mine, "I had shivering, felt stupid and drowsy, with nausea." Was at home 9 weeks at that time, and has never been thoroughly well since, and has been at home "times out of number," for 2 or 3 weeks at a time since then. At these times he had pain in the chest, shortness of breath, not much expectoration.	Taking cold on going home from the mine. "After coming to grass I had 200 to 300 yards to walk to the changing house, and afterwards about 2½ miles home, and I think I caught cold in coming home."	Sallow complexion, sunken features, especially about the eyes, which have a dark areola. He can count 25 slowly without taking breath. Has fluttering of the heart in climbing or working, and pain in the right side on beating the borer. Body not much wasted, muscles tolerably firm, no extra fat. Chest expands tolerably at upper part not much below. Resonant on percussion, respiratory murmur less than natural, and expiration is prolonged with creaking sound at both apices before and behind, otherwise the sounds are normal. Heart sounds very feeble, though clear, impulse slight. Pulse small, soft and compressible.	
"I am now suffering from a bad leg, which came on first like a little excoriation in front of the instep, and with continual working it has spread all up the leg. I felt it first about 6 months ago, and have been working ever since."	Irritation from his work.	Has chronic eczema of both legs.	

Number; District; Disease; Date.	Age.	Father's Age, and whether dead or alive.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
48. Camborne, Miners' disease; July 1862.	21	43 Alive, but working at grass on account of an accident.	A miner.	- - -	8	Tribute and tutwork.	"When I first went under ground, my father used to sling me round the waist with a rope, the other end of which was fastened round his own, on going down, and the same coming up, the first day, but after that, he used to put me up before him, so that he could catch me if I fell. Worked several years in Tincroft, Wheal Seaton, North Wheal Crofty, and Trefina mine, where I had to clear away a "choke" and was slung with a rope round my waist in case the ground should give way. Had my leg broken here by a kibble falling on it, and was laid up 3 months. I am now sinking a shaft at Dolcoath."
49. Whendron; Chronic broncho-pneumonia, July 1862.	58	- - -	- - -	- - -	- - -	- - -	- - -
50. Camborne; Bronchitis and emphysema, miners' disease; July 1862.	27	Dead.	A miner, killed by the accidental explosion of a hole.	- - -	13	Tutwork and tribute.	First worked at Trefina in the 14 level on tutwork for 2 years. Air was rather close but not so bad as in some places; it was a cold mine, in granite. Then went to Dolcoath, where he has worked ever since, 12 years. Worked first in 170 on tribute, for 12 months, air good; then in 42 level, where the air was closer and colder, being away from shaft 40 fathoms; then in the 210, in good air, for 2 or 3 years. (The "man engine" was then put in.) Since then has worked in the 250 level on tutwork; good air, but warm.
51. Camborne; Mitral valvular disease; July 1862.	20	46 Alive.	A miner, in good health.	- - -	13	Tutworkand tribute.	First worked at North Roskear, 3 years, in 160 level, 140 from shaft; air good, but a great deal of powder smoke. Then at Camborne Vein, 8 months, good air. Then at Wheal Maxwell, 3 months, in adit level, on tribute, 60 from shaft, air very bad, candles would not burn upright. Then at North Wheal Crofty, 2 years, 130 level. Then at West Francis, in 80 level, tutwork, air very bad (120 from shaft), candles would not burn, and a great deal of powder smoke. Then went to Wheal Harriet for 8 or 9 months, in 30 level, air good, but a little smoke. "I then felt the effect of working in poor air in the previous mine." Left that 9 or 10 months ago, and then worked at North Crofty 3 months, and the last 6 months at grass till a day or two since, when I was obliged to give it up for want of breath.
52. Camborne; Pleurisy; July 1862.	44	- - -	A miner.	-	16	Tutwork and tribute.	Worked at Wheal Tremayne, on tribute chiefly, for 7 or 8 years, on tutwork for a short time in 10, 20, and 30 fathom levels, in bad air, about 2 years altogether. Then at Lady Hill, 2 years; air slight but not decidedly bad. Worked at several mines after that for a short time in each. Then went to a little granite mine called Carn Camborne; it was very cold, and here he caught a severe cold. The air was not bad but there was cold-damp. Then went to North Roskear, but had to give up after 5 days in consequence of his cold, and left work for 3 months, and then attempted it again but was obliged to give up. Has not worked since. At that time could not climb more than one ladder at a time owing to shortness of breath.
53. Liskeard; Pleurisy, dilated cart; July 1862.	50	- - -	Not a miner.	- - -	11	Tutworkand tribute.	Worked first in Gwennap Consols, for 9 years, and then went to Fowey Consols, a very deep hot mine. Worked there for 18 years, and in a great deal of bad air, in 55 and 200 levels. "I worked naked all but my shoes and cap for 10 years." Used very often to take cold, and suffered when working in those levels from palpitation of the heart, so that I was obliged to give up work." Then worked at Trebern Mine (lead) for 6 years, not much bad air there. After that at Trelawney (lead) mine until last September. Has not worked since.
54. Liskeard; Chronic bronchitis and emphysema; July 1862.	63	Dead.	A miner, and killed in the mine.	- - -	12	Tutwork -	When he first went under ground he says he could hardly climb the ladders. First worked at Gwennap United for 12 months and then at Consols, 2 or 3 years on boy's work; "No particularly bad air." Then went to the Ashbourn mines in Devonshire on tutwork, for about 6 years. Worked in bad air 50 fathoms from surface about 5 or 6 months. The adit is 10 fathoms here. Then went to West Caradon on tutwork for 5 or 6 years. No bad air. Then went to Wheal Mary Anne, a lead mine, for 7 or 8 years. Worked in very bad air in the 90 level for 6 months. "I was ill from that, and have never worked since;" that is 5 years ago.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
"Two or three days after commencing to sink a shaft at Dolcoath I lost my appetite, and I have sometimes pain in the side so that I can hardly breathe. I have palpitation of the heart, but that I have had for 5 or 6 years, when I am climbing; sometimes I feel as if my heart would jump out of my body, and I can hardly speak. My head opens up and swells, and I have ringing in my ears when I climb. Sometimes if we are late in giving up work we have to climb hard for fear of being caught in the engine when she stops. One day about a month since the engine ceased working when we were about up to adit, and then we had to climb the rod of the engine to grass. During the last few days I have had a cold, and a little cough.	Climbing.	Chest resonant on percussion, the left infra-clavicular space being not quite so resonant as the right, and there respiratory murmur is not so distinct and is accompanied by slightly prolonged expiration. Heart sounds are regular, easily excited; 2nd sound remarkably clear, no murmur.	
Ill 22 years. "About 22 years ago I was taken ill with shortness of breath, tightness in the chest and pain between the shoulders and in the right shoulder. I have never been well since. Have had cough all the time with expectoration of white frothy mucus. Have spat blood at times, but I do not think as much as a teaspoonful at a time."	Climbing deep ladders and working in hot mines.	Dulness in left infra-clavicular space, with tubular breathing, and crepitation over the whole of right chest in front.	
About 2 years ago was laid up with inflammation in the chest, having complained some time before he gave up. There was not much smoke. He got quite well after it, and went to work again. About 6 weeks ago, had a return of the cough, which has continued up to the present time.	Thinks it came on from "a cold."	Complains of weakness; has a bad cough, with expectoration of thick white mucus, sometimes black when he has been working under ground. Not much perspiration. Has tightness in the head, and sickness sometimes with the cough in the morning. Has had giddiness and headache occasionally for the last 2 or 3 years. Chest generally resonant on percussion, but has not much motion even on deep inspiration. Deficiency of respiratory murmur and creaking inspiration over the greater part of the chest. No crepitation. Voice sounds natural. Heart sounds clear but feeble. Pulse, slow, small, compressible. Skin cool and soft. Face thin and sallow. Eyes dark and sunken. Muscles flabby.	
Has had palpitation of the heart and shortness of breath as long as he can recollect, and never could climb without dyspnœa. After working in poor air, had pain in the stomach, sickness with vomiting of a little blood with the food; had also pain in the bowels and diarrhœa; had also weakness in the knees on climbing. No history of rheumatism.	- - -	Face congested, puffy, conjunctiva clear, lips dark. Feet are generally cold, he says. Legs œdematous. Pulse 104, so small as hardly to be felt. Heart has a double see-saw murmur, with a vibratile thrill felt by the hand. A double impulse, one with systole and another with the diastole, the latter being accompanied by thrill felt by the hand. Systolic murmur heard distinctly in the back. Action of heart tumultuous, area of impulse and dulness much increased. 1st sound scarcely heard, 2nd sound distinct.	
While working in bad air at Wheal Tremayne he was under the doctor's hands for a long time. Had pain in the shoulders and back, and a load on the chest, so that he could not breathe. When in Carn Camborne, his feet and legs were always cold, and though he worked hard, yet he could never sweat. Then he had a bad cough and shortness of breath. Never spat as much as a teaspoonful of blood at a time. Used to sweat at night when he was worse than at present, but has not done so during the last fortnight.	- - -	Respiration 24. Pulse 120 compressible. General deficiency of respiratory murmur over chest. Dulness on percussion. Absence of tactile vibration, loss of vesicular murmur, and œgophonic modification of voice at lower part of left chest behind and in front. Motion of left chest much less than of the right. Heart sounds normal. Bowels rather confined than otherwise.	
Illness came on gradually for 8 months before he gave up work. Had pain in the right side and shortness of breath. It gradually increased until he was obliged to give up. Was then confined to bed for 4 or 5 weeks. First spat blood in August (several spoonfuls), and several times since then has done so. It was fresh coloured and frothy, sometimes dark.	- - -	Has pains in lower part of right side in front, and soreness behind the sternum. Has a feeling as of cold water running over the legs, weakness, but little cough or expectoration, and that is yellow and thick. Palpitation of heart at times. Bowels very much confined. Irregular motion of walls of chest, which do not expand freely, the motion being restrained. Vesicular murmur over both lungs, faintly at the apices. At base of both lungs in front is a dry creaking, pleuritic rub. Heart sounds distinct, but its action is irregular. Respirations 22, easy. Gums have a red, but no blue line. Pulse 76, small. Body thin, but not emaciated.	
After working in bad air 5 years ago, he felt very cold after coming home one day, and after that was seized with shortness of breath, pain under the left breast, and a bad cough. Expectoration copious but difficult to get up. His breath was almost stopped. Has had the complaint upon him ever since.	Working in bad air.	Body thin, but not emaciated. Chest resonant on percussion, all over it. Respiration clear and puerile at the apices. Prolonged cooing inspiration and expiration over lower part of both lungs before and behind. Large moist crepitation over both bases behind. Heart sounds clear and regular.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
55. Liskeard; Chronic bronchitis; July 1862.	54	- - -	- - -	- - -	15	Tutwork and tribute.	First worked at Hurlun mine, near Gwinear. Worked there 14 years, on tribute chiefly. Not much bad air, but a little cold-damp. Then worked 2 years at Wheal Providence, and afterwards at Wheal Fortune, near Marazion, for 3 years. Worked in some bad air there, but not much. Then went to St. Ives Consols for 6 years. There was a good deal of poor air there. There was bad air in the 140 level, where he worked for 10 months. Felt ill effects from that. After that worked in several different mines for a short time, and then went to Wheal Trelawney for 8 years. Worked 3 or 4 months in bad air in the 108 level, and suffered from it in a similar manner to the former attack, but did not leave off work. I now belong to Wheal Mary Anne. There is no bad air there.
56. Liskeard; Chronic broncho - pneumonia; July 1862.	42	63 Dead.	A miner, died of "decline."	- - -	14	Tutwork and tribute.	Worked at Treburgatt, Tregargatt, St. Minver, Mulberry, and East Caradon mines for different spaces of time, and then went to South Caradon on tribute for 12 years, where he worked in bad air for 2 months in the 30 fathom level. Then went to West Caradon on tutwork for about a month. "The air was so very bad there that I could not stand it." The candles would not burn. Then returned to South Caradon for 3 years. Has not worked in a mine for 10 years, owing to ill health.
57. Liskeard; Miners' disease; July 1862.	36	76 Dead.	A sawyer -	Grandfather died at 96.	20	Tutwork -	Up to 30 years of age was a farm labourer, and never knew what it was to have a day's illness. First worked at West Caradon, for 3 years. Worked in bad air in the 17 level for 3 months. The candles would not burn upright, and other men were laid up from working there. Was ill in consequence. Then went to Wheal Mary Anne for 3 years. Not much bad air, but a great deal of powder smoke in the 110 level. "I worked there till 16 months ago, when I was taken so ill that I could not work, and I have not worked at anything since."
58. St. Cleer; Pleurisy; July 1862.	20	51 Alive.	A miner -	- - -	11	Tutwork and tribute.	First worked at West Caradon for 7 or 8 years, the latter part of the time on tribute. No bad air where he worked. Then went to South Caradon for 12 months, and afterwards went back to West Caradon, where he worked for 4 years; air good. Since then has worked at Cradockmoor. The air is good, but there is a great deal of smoke in 72 level.
59. St. Cleer; Miners' disease; July 1862.	51	- - -	- - -	- - -	15	Tutwork chiefly.	Worked first at Fowey Consols for 15 years in the 150 and 180 levels. The air was very hot and very bad. No ill effect from it. Then went to South Caradon, 5 or 6 months in bad air in the 35 level, 6 or 7 months in bad air in the 50 level and 2 years in the 70 level, also in bad air. Did not feel any ill effect from it at that time except weakness in the knees on climbing. "We generally feel that after working in bad air." Then worked at Wheal Phœnix 7 years. At the bottom of the 90 there was bad air, also in the 100 level. In these two levels he worked about 4 years or more. Then went to West Caradon on tribute, air good. Then went to Cradock Moor on tribute, and worked 9 months in bad air in the 30 level. "I knocked up there, and have never worked since." That is 3 or 4 years ago.
60. St. Cleer; July 1862.	54	45 Dead.	A miner. Miners' decline.	Grandfather was a miner.	14	- - -	Says he has worked in bad air in almost every mine he has been at. Caught a bad cold at West Caradon, which gave him lightness in the head. He has not worked under ground since.

History and Duration of Illness.	Causes to which he refers his Illness.	Present Condition.	Remarks.
After working in bad air in St. Ives Consols had tightness in the chest, pain and lightness in the head, "sickness at the stomach," with loss of appetite, bad cough, shortness of breath, expectoration of blackish frothy sputa, like as if powder smoke were mixed up with it. Similar symptoms accompanied another attack of illness when working at Wheal Trelawney.	Working in bad air.	Complains of tightness in the chest and jumping of the limbs when going off to sleep at night. Has cough with expectoration. Chest very resonant on percussion, respiratory murmur clear everywhere. Heart sounds clear and regular. Body not emaciated.	Has a wife and 5 children. Gets 50s. a month at his work.
Says he caught cold in coming away from work in a hot winze, having at the time only a thin suit of clothes on. He was very ill for 2 years, and has never been well since. He was told by a surgeon, 9 years ago, that his left lung was diseased.	Exposure to cold after working in a hot mine.	Has "pressure on the chest," a bad cough, sickness, (brought on by coughing,) and shortness of breath. Expectoration copious, clear or darkish in colour, frothy, and sometimes streaked with blood. Says he has lost his voice during the last 2 years, and he now speaks with a rough, hoarse voice. Bowels regular. No perspiration. Left side of chest has but little motion, right side moving freely. Left side very much flattened under clavicle, dull on percussion. Tubular breathing, and bronchophony heard as low as the nipple. Behind, there is respiratory murmur with mucous crepitation. Mucous crepitation in right infra-clavicular space. The rest of chest resonant, and normal vesicular murmur is heard over it.	
When at West Caradon "I had pain in the head on left side, shortness of breath, and vomited blood several times, about a pint each time." At Wheal Mary Anne, he complained of shivering, weakness in all his limbs, cough, and severe pain in the side. Had expectoration of thick yellowish mucus, sometimes streaked with blood. Has had shivering fits for some months. They generally come on about 12 or 1 o'clock, lasting 1½ hour, and followed by half an hour of profuse perspiration. The house he lives in, he says, is in a high and dry situation. About 6 weeks ago he passed blood with his water, preceded by severe pain in the loins; but since then has had no pain.	- - -	Complains of pain in the left side, weakness, "sinking at the pit of the stomach," not much cough or expectoration, shortness of breath, and sometimes a good deal of palpitation of the heart. Says he has lost flesh a good deal lately, but his body is not at all emaciated. No evidence of local disease of any kind to be detected.	
Had fever 4 or 5 years ago. Last night was taken with pain in the right side. Has been poorly a day or two, rather feverish. Has a little cough, and spits up thick white frothy mucus. Had no cough before last night.	- - -	Still has pain in the side on breathing, but not so bad as it was. Tongue tremulous, flabby, covered with a little creamy fur. Skin rather hot. Pulse 84, small, compressible. Respiration shallow. Urine highly coloured. Bowels regular. Respiratory murmur clear and distinct. Chest resonant. A limited pleuritic rub is heard over lower part of right lung in front, and the motion of the chest is there somewhat restrained. Heart sounds clear and regular.	
Had inflammation of the lungs about 30 years ago, but since then has had good health until 3 or 4 years ago. Was then taken ill with pains in the left side, which came on gradually. Brought up about a cupful of dark blood at that time, and shortly after it was seized with a cough. Since then has coughed up a little blood at times. Has had also palpitation of the heart and general weakness. Has not spat blood for the last 3 weeks.	Thinks it came on from working in poor air.	As long as he is quiet, he says he feels pretty well, but directly he begins to move about he is "done" directly, from palpitation of the heart, and shortness of breath. Spits a good deal of white frothy mucus in the morning, but not much during the day. Has pain and weakness across the loins. Loss of motion, slight dulness on percussion, flattening, and respiratory murmur with mucous crepitation at left apex in front, large mucous crepitation over apex and base of same lung behind, tenderness on pressure and loss of respiration at extreme base. Opposite the middle of scapula, there is prolonged cooing inspiration and expiration on the same side. On right side there is puerile respiration at apex, elsewhere respiration is clear. Heart sounds clear and regular. Says he has lost 30 lbs. weight during the last 4 or 5 years. Appetite good. Sweats profusely, but not at night. Pulse small and very compressible. Face pale, but not emaciated.	
Has had a discharge from both ears ever since he was a child. It becomes worse when he has a cold, and he then becomes deaf and has a headache. Complains of giddiness and lightness in the head when he lies on his left side or back. Can only lie on his right side, as otherwise he feels as if everything were tumbling away from under him. Feels giddy if he looks upwards or turns his head round, and sometimes has fallen down, feeling as if he had been drinking.		Nothing to be seen by examination of the ears. Has no discharge from them now, but complains of headache over forehead, and left side. Pulse firm, full, artery being tortuous. Pupils act freely, sight good. Tongue pale, clean. Heart regular in action and impulse. First sound not so defined as usual, t no murmur.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
61. St. Cleer; Miners' disease; July 1862.	47	- - -	- - -	- - -	15	Tutwork -	"First worked at Fowey Consols; in some places the air was bad. Worked in bad air at West Caradon, also at Gonamena. Worked in very bad air at South Caradon, and was ill in consequence for 2½ years. Then went to East Caradon, where I am now working the engine."
62. St. Cleer; Chronic broncho-pneumonia; July 1862.	44	33 Dead.	A farmer, died from typhus fever.	- - -	17	Tribute -	Worked first at Wheal Darlington on tribute for 6 or 7 years, occasionally in bad air. There was bad air in all the levels where it was far from ventilation. Then went to the Brazils where he worked in a gold mine for 2 years. Says that the mine was there well ventilated, and that the men do not suffer there in the same way that they do here. Was then in very good health, though he used to drink freely (rum). Afterwards he worked at Wheal Friendship, Wheal Darlington, Devon Consols, and the Bedford United Mines. In the last he worked 12 months, and the whole time in bad air. Was then about 31 years old. Since then has kept a public house.
63. St. Cleer; Disease of kidneys; July 1862.	50	62 Dead.	A miner, died from consumption.	Grandfather a miner, died about 60.	9	Tutwork and tribute.	First worked at Mixton mine (copper), in Staffordshire, for 2 years. Then at East Crinnis, in Cornwall, 9 years. Afterwards worked at Pembroke mine and Charlestown United about 11 years. Then went to Bodmin, in Lanlevet Consols, for 4 years. Worked in good air in the mines for the most part. Then went to West Caradon, for 5 years, 12 months in bad air in the 50 level. Then to Wheal Massey, at Bodmin, for 3 or 4 years. A little bad air in the 20 level. Then to South Caradon for 5 years, bad air, in the 34 level for 4 months. Then went to West Caradon on tribute for 1 year. The air was middling. Was laid up there, and has not worked since. This was 14 months ago.
64. St. Cleer; Miners' disease; July 1862.	54	40 Dead.	A carpenter, died in a decline.	- - -	20	Tutwork -	First worked at East Crinnis, for 8 years. 12 months in bad air in the 80 level, and 2 years in bad air in the 70 level. Then went to Fowey Consols for 8 years, in bad air for about 3 years in the 22, 100, and the adit levels. Then went to Trewaddock mine, for 6 months in very bad air, in the adit level. Felt ill effects from it, but not much. Afterwards worked in the coal mines in Wales, and then in the Box Tunnel, where the air was bad for 9 weeks. Then went to Fowey Consols for 5 years, in bad air almost all the time. Since then has worked at Wheal Blanen, at Fistone mine (bad air for 15 months), Wheal Colding, East Wheal Rowe, Copper Hill, and West Caradon, where he is working now, in good air.
65. Camborne; Flat foot; July 1862.	16	- - -	- - -	- -	- - -	He has never worked under ground, being employed at the stamps.	Has worked at the tin stamps since he was 7 years old. Worked at Luny mine and Cook's Kitchen for 2½ years, since which time he has worked at Dolcoath until 2 months ago. When at work he has to stand in mundic water, that comes from the stamps, all day, and in winter he says it is very cold.
66. Tuckingmill; Sprained back; July 1862.	27	50 Alive.	A carpenter	- - -	15	Tutwork and tribute.	First worked for 4 months at North Roskear and Carn Brea, and then went to West Seaton for 12 months, and worked during 2 or 3 months in bad air in the adit level. After that, worked in the 50 level, where the air was good, but the mine was wet and cold. Then went to Camborne Vein, where he had an accident and knocked out some of his teeth by falling away from the ladder about 3 fathoms. Then went back to Wheal Seaton, where the air was good, but there was a great deal of powder smoke.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Had good health until 5 years ago, when he worked 10 months in bad air, and was taken ill in consequence. It came on gradually with shortness of breath, weakness in the legs, and palpitation of the heart. Then had pain in both sides, chiefly in the right, so that he could not lie down in bed. No cough at that time. Had lightness and giddiness in the head, so that he could not stoop without danger of falling. About 2 years ago he brought up a table spoonful of bright pure blood, preceded by a little tickling in the throat. It continued "for two or three times spitting," and then ceased, and recurred at intervals in a similar manner for a month or two. Had no cough during this time and looked well, but was not fit for anything on account of shortness of breath. Has now been at work 8 months, and feels pretty well, except when he exerts himself, when he has shortness of breath and palpitation of the heart.	Working in bad air.	Has a colour and healthy appearance in the face. Body in good condition. Says he lives well, having about 3 lbs. of meat a week. Pulse 64, very small and feeble, and the beats are unequal in force, but regular in time. Respiration 22, easy. Heart sounds feeble, impulse feeble, but regular. Lungs apparently healthy, respiration being clear and bright.	
Was quite well 4 years ago. Then caught cold and was seized with a bad cough. Had difficulty of breathing, "apparently from something in the throat," thickness of voice and a tickling cough. When the winter came on he was very much worse, and then had profuse expectoration of yellowish green mucus, not frothy. Has had a cough ever since, worse in the winter and improving in the summer. During the last 2 months his cough has been better, expectoration more frothy and whiter in character. Never spat pure blood. No perspirations night or day. Dusing the last winter has lost flesh more than at any other time.	Exposure to cold, and intemperate habits.	Complains of weakness and shortness of breath, a little cough and spitting. Pale sallow look, with sunken features. Chest has the left side flattened under the clavicle, where there is a loss of respiratory murmur, and a creaking sound is heard, with mucous crepitation. There is loss of motion in the whole of that side, large crepitation over the whole of the lung before and behind, and opposite the scapula there is tubular breathing, and bronchophony. Respiration over the right lung is somewhat puerile, and the side is resonant and moves freely. Heart beats very rapidly, but no abnormal sounds detected, impulse feeble but regular. Pulse 144, compressible.	
When taken ill at West Caradon, had pain across the loins, shortness of breath on any great exertion, but no cough. When the pain came on, he had to pass water a great many times during the day. Urine was clear and frothy. Says he has passed a great deal of urine in the day, but it varies a great deal. At Plymouth Hospital he was told that when the water abated he would recover his strength. Says that his urine became thick on boiling it 3 months ago. Sometimes he is puffy about the face and body.	Thinks it is from over work.	No œdema of legs. Has pain in the back, and still passes water very frequently, and a great deal of it. Has not lost much flesh. Tongue moist and clean, fissured. Appetite good. Says he cannot work on account of weakness and pain in the back. Healthy look in the face. No opportunity of examining his urine.	
Has been failing in health for the last 12 months, having had good health before that. It came on with a feeling of weakness in the chest, lightness in the head, shortness of breath, and weakness in the legs. No palpitation of the heart. The symptoms have gradually increased, but he still continues to work in the 116 level, and says he finds it is too deep for him to come up.	Working in bad air.	Has a little cough, no expectoration except in the morning. Sweats a great deal in the morning when going to the mine, but not at night. Has a failing appetite. Not lost much flesh, but feels weak. Pale, sallow, wasted face. Muscles flabby. Respiration 18, easy, shallow, diaphragmatic. Pulse 60, very feeble and small. Chest very resonant; there is a remarkable absence of respiratory sounds of any sort, especially at the upper part. The chest walls move very little even on deep inspiration, which is mostly performed by the diaphragm. Heart sounds feeble, clear, slow.	
Has had a bad foot about 13 months. It came on suddenly when at work, with pain across the front of the ancle joint. He continued to work until 2 months ago, although his foot was painful and stiff, and sometimes swollen. It is always painful when he stands upon it, but when at rest it is easy. He gave up work for a fortnight once before, and it then got better, but returned on going to work again.	Standing for a length of time in cold water.	Foot is tender, and when struck underneath it gives him pain in the joint, also when he stands on it. The arch of the foot is diminished, there is no swelling, and no other evidence of disease. No wound.	
Thinks he injured his loins by "heaving the coach," and by weighing ore, which is very heavy work (3 cwt.), as he has felt weakness in the loins ever since (2 years ago). He has been at work since, but has had to give it up occasionally on account of pain in the loins. Complains of occasional pain in the back, extending round to the abdomen. He says his stomach then gets tender and he cannot stoop.	Lifting heavy weight.	Says he is very well except the occasional pain and weakness in the back, which prevents him doing as much work as he used to do. Is a married man (7 years), and has 3 children.	Says he has been getting 4*l.* and 5*l.* a month ever since he has worked as a man, and about 4 years ago he had a "good start" and built himself a house for about 100*l.*

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working underground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
67 Camborne, pain in left arm, July 1862.	60	55 Dead.	A miner -	- - -	15	Tutwork.	Worked first in Marbeck mine in Durham. It is a lead mine. Worked there 4 years in bad air, and was afterwards obliged to work at grass in consequence. Had shortness of breath, and giddiness when going to and from the mine. Then worked at a lead mine in Cumberland in good air for 1½ year. Then went to Wales for 18 months in a lead mine. Then worked in a lead mine in the Isle of Man for 2½ years, in tolerably good air. Then came to Sheppard's mine in Cornwall, a lead mine, for 15 months, when she stopped. Then worked for 9 years at East Wheal Rose, a wet mine, 100 level the deepest, and bad air in several levels. Was ill there, with sickness, lightness in the head, weakness in the knees, and head-ache. Worked in the Mount mine for 9 years in bad air, with the same ill effects. This was 7 or 8 years ago. It was in the 50 level, and the candle would only burn when almost horizontal. Then came to Camborne to Crane mine. Air bad in 60 level. Worked there only a month when he was taken ill.
68 Camborne; Synovitis of knee-joint; July 1862.	48	- - -	- - -	- - -	- - -	- - -	- - - - - -
69 Camborne; Emphysema and old bronchitis; July 1862.	39	Alive and in good health.	A miners -	- - -	12	Tribute for the most part, some short time on tutwork.	First worked at the United (Gwennap) mines for 13 years, in some very hot places, though the air was "pretty good." Worked a good while in the 208 level. Was obliged to give up for 3 or 4 years after working in that level, being laid up with rheumatic fever which prevented him doing hard work for 3 or 4 years, though he was only in bed for 8 weeks. Then worked above ground for 3 years and then went to East Wheal Seaton in 100 level, good air. Then went to West Wheal Seaton on tribute for 18 months. Air "close and muggy" but cold. Had tightness in the chest, but continued to work. Then worked at East Grantfell for 2 years and 11 months. Good air, but very wet and cold. Works there still.
70 Camborne; Emphysema and injury to loins; July 1862.	24	Dead	A miner, he was killed by a kibble falling upon him.	- - -	13	Tribute and tutwork.	First worked at Tincroft for 7 or 8 years on tribute, in 133 level chiefly. No bad air there. Then went to Dolcoath for 4 years, and is there now. Worked there on tutwork in the 220 level. There is too much air there, there is a draught, and the air is good.
71. Illogan; Chronic bronchitis and emphysema; July 1862.	49	70 Dead.	A miner, but did not work underground for 20 years before his death.	A brother, also a miner, died in a decline, aged 33; he was a drunkard. Another brother died from an accident. Two sisters are dead, one aged 53; neither of them had much cough. Mother was 70 years old at death.	10	Tribute at first, afterwards both tribute and tutwork.	First worked at Cook's Kitchen for 9 years, in some bad air in the 42 and 29 levels. Did not suffer from that, except a little tightness on the chest. Then went to East Wheal Crofty for 7 years. Worked in one place where the air was very bad, for 3 months. "It was in the 60 level I think." "I thought I should have died in consequence." Also worked in the 42 level in bad air for 2 or 3 months. It was very close and hot, but he did not suffer "so much as before" from it. Then worked 17 or 18 years at Tincroft, chiefly on tribute. Bad air in the 60 level for 5 or 6 months. Was ill in consequence, with the same symptoms as before, but did not give up work. It was 40 or 50 fathoms from shaft where he worked. Worked 4 or 5 months in bad air in the 120 level, with the candle horizontal, and felt ill effects from it, but continued to work. Then went to Carn Brea for 2 or 3 years, and after that worked at surface until a fortnight ago, when he was laid up. Worked in bad air in the 18 level for 3 or 4 months on tribute, but "I found it was killing me, and I gave it up in consequence."
72. Camborne; Emphysema; July 862.	46	- - -	- - -	- - -	- - -	- - -	Was discharged from the army 15 years ago with pain in the legs. Was in the army about 2 years. Worked under ground in Ireland for about 2 months, and since then has worked at surface.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Had good health until 7 or 8 years ago. Was then working in a very wet mine, and sometimes he had to go up to his waist into cold water to ring to the engine man to work the engine faster. He had to do this when quite hot from working, and used to shiver with the cold. Was then taken ill with shivering, pain in the limbs, fever, and was ill for 5 months with inflammation in the wind pipe. He recovered and was well until 5 months ago, when he again had inflammation of the chest, with cough, shortness of breath, and expectoration of frothy mucus. This continued about 3 months and then went away. At this time he felt pain in the shoulder and left arm coming on gradually.	Working in cold water.	Complains of a "dead burning pain" down both sides of left arm and shoulder and the same side of the neck. It is always present, sometimes being worse than at others. He says it is so bad that he cannot use his arm. Nothing detected about chest, neck or arm, except slight wasting of the left scapular muscles. The arm is as fleshy as the other. Muscles are tender when touched, no heat of skin, no difference of sensation in the two sides. He is an old looking man for his years, is thin, but has a tolerably healthy look in the face.	
8 weeks ago he had a blow on the outside of the right knee. It was not painful at the time, but during the next week it began to swell and became very painful. He still continues to work.	A blow.	The joint is freely moveable. There is a small amount of thin fluid in the joint, and it is tender on manipulation.	
For 4 months he has had tightness in the chest and difficulty of breathing, and if he works hard he "gets all in a flutter inside," has some palpitation, and weakness all over the body. He works now in the shaft, where the air is good if anywhere.	Working in hot and cold mines.	Has a tolerably healthy look in the face for a miner. Has a little cough, no pain, nor expectoration. Dry emphysematous crackling heard towards the upper part of the left chest in front, otherwise respiration is clear. Heart sounds regular. First sound not very distinct, and rather prolonged. Second clear. Impulse feeble. Pulse 60, tolerably full, compressible. Respiration 21, easy.	He gets 3*l.* 15*s.* to 4*l.* a month, and has a wife and 1 child. They get about 9 lbs. of meat a week for the family.
Had good health until about 18 months ago, when he fell away from the level, about 3 fathoms, and injured his back. A board slipped away from under his feet. Has not been well for long at a time since then, but has been home for a short time, and then has gone to work again. Has pain in the loins whenever he takes cold, so that he cannot work. Has had also griping pain in the bowels for the last 3 or 4 months. No diarrhœa, but bowels open regularly. Says he finds his breath very short if he walks up hill.	Falling away from the level.	Has a cough at night, but no expectoration. Chest resonant on percussion, but respiratory murmur is rather deficient, and cooing sounds accompany the expiration in various parts. Heart's action normal. Tenderness on pressure over the lower part of spine and muscles in the loins. No weakness of legs. Body well nourished and in good condition.	
When working at East Wheal Crofty he says: "I could hardly breathe, had weakness all over me, very bad headache whilst at work, sometimes I was sick, had a little cough, but not much expectoration, and palpitation on climbing. I was laid up for 3 months, and was very weak for some time afterwards. I think the climbing hurts me very much. I have heard my heart beat sometimes when climbing regularly so that I thought it would come out of my mouth." Used to sweat a great deal, but has not done so for a month or two. He expectorated half a cupfull of blood about 3 months ago, and again a fortnight ago. It came on with a little tickling cough, and after a mouthfull or two it ceased.	Working in bad air.	Complains of tightness in the chest, difficulty of breathing, bad cough at night, expectoration of a good deal of dark thick tenacious mucus. He has always been thin, but for the last 2 months has lost flesh. Has had looseness of bowels occasionally, but not at the present time. Body thin, arms wasted, face sunken; chest deficient in motion; right supra-clavicular space is depressed more than the other. The sound on percussion is flat on and under the right clavicle, and vocal resonance is increased there. Respiratory murmur is heard all over the chest, but it is accompanied by rhoncus and prolonged whistling expiration. There is also large mucous crepitation over the base of both lungs.	It is said that men need not work in the levels where there is bad air unless they like. Here is the answer of this man when asked why he worked in the 42 level when the air was bad, at East Wheal Crofty. He says, "I went there because, when poor men want bread, they must go where they are put, and they (the masters) will not tell you beforehand whether the air is good or not."
Says he has been ill for 7 years with pain in the chest, difficulty of breathing, bad cough, and spitting up phlegm mixed with blood.	- - -	Chest rounded, and tympanitic. Emphysematous respiration.	He is an Irishman.

Number; District; Disease: Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
73. Camborne; Irritation of rectum; July 1862.	46	Alive -	A farmer -	- - -	30	Tutwork and tribute, latterly employed at the surface.	First worked at Tincroft for 8 or 9 years in 120 and 140 levels. The air was bad in the 120 level, and the candles were placed horizontally. He worked in that bad air for 12 months, and sometimes used to feel lightness in the head, but did not take any notice of it. Then worked for 3 years at Cook's Kitchen in good air. Then went to Camborne Vein for some months, and then to West Wheal Seaton, where the air was good, but where there was a great deal of powder smoke. No ill effect from it. He then worked at several mines for a short time, and came to Dalcoath about 7 or 8 years ago, where he has been working ever since. His business now is to keep the frames in order, and to do the carpentering work. Says he does not work in any way in arsenic, but when he has been near the burning houses it makes him ill, with sickness in the stomach and difficulty of breathing.
74. Illogan; Irritation of rectum; July 1862.	42	70 Alive -	A miner, but chiefly employed at grass.	- - -	15	Tutwork and tribute, chiefly the former.	Worked first at Carn Brea for 15 or 16 years. Air good. Lowest level was 90 fathoms. After that he worked at Wheal Tehiddy and Wheal Uny for a few months. Air good. Then worked at East Carn Brea for 5 years in the 40 and 26 levels. The air was very close in both levels. They had a machine blowing air to them, but even with that the candles would hardly burn. Worked in bad air about 12 months. He used to feel sick, and had tightness on the chest, but not much cough. There was a good deal of powder smoke. The last level he worked in (26) was very wet, and he thinks he took cold after sweating. This was 5 months ago, and he has not worked since.
75. St. Day; Miners' disease and pleurisy; July 1862.	13	Dead -	A miner, but died in Brazil from dysentery.	- - -	11	Tutwork -	First worked at Wheal Spenser for 6 months in the 50 level. The air was very bad there, and he worked in bad air for 2 months. He knew it was bad air because the candles would scarcely burn. The powder smoke was so thick that it made him cough and affected his breath. Says he could not climb because of his breath. It was between 50 and 60 fathoms from shaft, and there was no winze. They were sinking a winze when he left, on account of ill health. The water they had to drink came out of the granite between the 50 level and grass. He was home for 5 weeks at first, and then went to work again in another mine (Wheal Damsel) for 7 days. There was bad air there in the 50 level. He was obliged to give up after 7 days, and has not worked since.
76. Kenyon; Miners' disease; July 1862.	45	55 Dead.	A farmer -	- - -	17	Tutwork -	First worked at Wheal Vivian for 6 years, and then at Pendardemour for 18 months, then at Beeralston and East Wheal Rose for 3 or 4 years. Air good in these mines. Then worked an adit level for a gentleman at Curlands for 5 years. Sometimes the air was not very good. Then went to St. Austell at East Crinnis for 12 months, in 110 level. Good air. Whilst there he had slow fever, and was ill for 6 months, but only ceased work about 6 weeks. Then he came back to East Wheal Rose for 6 months, in 110 level. Air not very good, and he worked in it for 2 months at 30 fathoms from the shaft. Then worked at the Great Consols (Gwennap) for 3 months, in 140 level. Good air. Then at Wheal Clifford, a hot mine; so that after 3 months, he says, "I could not stand it any longer, it was too hot." Good air. Then worked at Wheal Spenser for 3 months, in 50 level. Air bad there, the mine being a granite one. He knew the air was bad from the weakness of his legs, so that he could hardly climb the ladders; sometimes he had a little pain in the head and cough, but that would go away again. He says, "The air was bad all through that mine, and many men have lost their lives there from working in poor air." Afterwards worked at grass for some months, and then went to East Wheal Damsel, where he was taken ill. He worked there for 3 months, 6 fathoms from the surface, in bad air. The candle would not burn. He only worked in bad air 4 days, when he was taken ill. He stayed at home a fortnight, and then went to another mine, North Scurvy, for 3½ months, out of which he worked 3 weeks in poor air in the 40 to 50 winze. He was poorly all the time at this mine, and has not worked since (10 weeks ago).
77. Kenyon (Kenven?); Miners' disease, Dyspepsia; July 1862.	51	69 Dead.	A miner, and died of miners' disease.	- - -	11	Tutwork -	First worked at Wheal Poldice (Gwennap) for 13 or 14 years), and in a good deal of bad air. The worst was in the 60 level, where there was also cold damp. Felt ill whilst at work there, but did not give up work. Then went to Consols, where he worked for 11 years in very good air. After that he worked 3 months in the United Mines. There was no bad air, but it was very hot. Then came back to Consols for 6 years, in good air. Then he went to Wheal Busy for 3 months in the 70 level, where the air was very bad, "and that place done me up." He was taken ill, and remained at home for 8 days, and has never been able to work since.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Has been complaining for 3 years. First had a gathering under the armpit, which was more than a year before it healed. Since then he has complained of pain in the stomach and bowels, but without either sickness or purging. His bowels are usually confined, and he passes "a quantity of stuff like white of egg, sometimes mixed with blood;" also he complains of tenesmus. Never vomits his food.	- - -	Complains of a good deal of pain in the pit of the stomach, and has a feeling of sickness in the morning. Feels weak, so that he says he cannot do anything. He is stout, with a fresh healthy colour, and looks as well as any one. No disease detected about him. No tenderness on pressure at pit of stomach. Urine pale, contains mucus, becomes thicker on boiling, but clears again to its former amount on adding nitric acid, with effervescence.	He seems inclined to make the most of trifles. His complaint, if it can be depended upon, is such as might be caused by the influence of small quantities of arsenic, but there is no positive evidence of this.
Five months ago he was taken ill "with pain in the back way of privates" and was obliged to stop away from work. A month afterwards had outward piles and lost blood. They got well, but he has passed blood frequently since. Says he has lost 20 lbs. in weight during the last 5 months.	Taking cold after sweating.	Body thin, face emaciated, eyes sunken. His bowels are rather confined, and he passes blood by stool. Has constant tenesmus. Urine highly coloured, no difficulty in micturition. Has a burning heat, a stabbing pain in the rectum. Stools he says are slimy and mixed with corruption. Tongue clean. Sometimes he is feverish, but this is variable.	The mine he worked is a tin and copper mine, but chiefly copper. The water they had to drink was carried down to them from the adit, and also from there to the men at grass to drink.
When working at Wheal Spenser, he says he had pain in the head whenever he went into the level, was "sick at stomach," and lost his appetite, and had shortness of breath. Afterwards at Wheal Damsel he had the same symptoms. First he felt a pain in the left shoulder and side, then had sick stomach and headache, and shortness of breath. He managed to climb, but with great difficulty at last. Had weakness in the legs on climbing, and palpitation of the heart, both when at work and when climbing. At this time his legs had large red spots on them, which were swollen and tender. These lasted about 3 weeks, and then disappeared. This was about a week after giving up work.	Working in bad air.	Now complains of general weakness, but feels better when lying down. Has a little cough, but no expectoration, except in the morning. Has no pain. Appetite now pretty good. He has a pallid, sallow complexion. Pulse small, quick, compressible. Tongue pale, clean. Chest resonant on percussion; respiration clear and free, except at base of left lung, where there is some loss of respiratory murmur, dulness on percussion, and pleuritic rubbing behind. Heart sounds clear and regular.	He used to earn 25s. a month when at work, but gets no allowance now he is ill. He had no deduction from his wages for the club because he worked as a boy. This is a good specimen of this common disease of miners in its earliest stage.
When at Wheal Spenser he had the usual effects of working in bad air, but recovered from them. At Wheal Damsel he was taken ill with "hardness in the bowels, the belly being swollen." No pain or diarrhœa. The same week he had weakness in the legs, and then pain in the right side under the ribs. Then came on shortness of breath, and a cough with expectoration of white and green frothy sputa, which has continued ever since.	Working in bad air.	Has cough, shortness of breath, and weakness in the limbs. Never spat up any blood to speak of. Chest expands freely, and is resonant on percussion, respiration being clear and natural. Heart sounds normal and regular. Pulse small and soft. Has but little expectoration. Body in tolerable condition. No perspirations. Face sallow and pallid. General weakness, but no local disease detected.	The mine in which he suffered most is the same one, and the same level, as in the previous case (75).
When working at Wheal Poldice in bad air he had sickness, but did not give up work. When at Wheal Busy, where his last attack came on, he says, "I felt my inside all trembling, and was sick at stomach. I then had a severe pain in the pit of the stomach." He has never worked since. This is 7 or 8 years ago.	Working in bad air.	He now complains of a feeling as if his inside was all in a flutter, and a sensation like a stone over the top of the breast bone and at the pit of the stomach. Has no cough, and his breath is not affected. Has a good appetite, but often brings up his food again shortly after taking it. He has a tolerably healthy look, though his features are rather sunken. Body has no superfluous fat. Skin soft and cool. Chest resonant, freely moveable, and respiration heard all over it. Inspiration and expiration rather coarse at both apices, and base of right chest. No crepitation or increase of vocal resonance. Heart sounds clear, regular. Pulse full and firm. No tenderness over the abdomen.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
78. Kenwen; Bronchitis and Emphysema; July 1862.	73	67 Dead.	A miner, and died of miners' complaint from "poor air, powder smoke, and that like."	- - -	10 to 11	Tutwork -	Worked under ground until 6 months ago. He worked at Wheal Garland, Wheal Busy, and the Solitary Mines for many years, and generally in good air. The last 20 years he has worked at the United (Gwennap) Mines, and the last eight years in poor air and powder smoke in the 18 level. "They took pity on me, and put me there, because I was an old man."
79. Chacewater; Consolidation of right lung; July 1862.	49	53 Dead.	A miner, died of miners' complaint.	- - -	16	Tutwork -	Worked first at Gwennap Consols, and remained there for 28 years. He says, "I worked with my father, just before he died, in bad air, in the 120 level. Six of us worked there. It killed him (the father), and I was ill at the time. Three others were also ill, and the sixth man died, so that out of the six men two died, and the other four were ill for some time." This was 28 years ago. About 7 or 8 years ago he worked in the 60 level in bad air, was home ill for 3 or 4 weeks, and felt it for some months afterwards. Since then he has worked in close places, but has not been laid up. He has not worked under ground for 2 years.
80 Camborne; araplegia; July 1862.	61	75 Dead.	A miner.	- - -	12	Tutwork and tribute.	First went to Dolcoath and worked there 20 years, in good air. Chiefly employed in the 155 and 160 levels, but has worked as deep as 190 fathoms for some months. This was before the man engine was put in. Since then he has worked in several mines, usually in good air. The last mine he worked in was West Wheal Seaton, when he was taken ill, 14 months ago.
81 Camborne; Imperfect recovery after an accident and pleurisy. July 1862.	31	Father died at 46 years of age of miners' decline.	A miner	- - -	18	Tutwork -	Worked at Carn Brea for 3 years in the 60 level. The air was bad, the candles were obliged to be put on one side to make them burn. Had poor air nearly all the time he worked in that mine, and he says he would have left it before but he had no other place to go to. At last he was obliged to give it up, and then he went to West Wheal Basset, where he worked 5 or 6 months in good air, in the 60, 70, and 100 levels. Then he went to Cook's Kitchen, where he has worked for the last 6 years, but has not been under ground for 11 months. He states that he has been temperate in his habits. His living has not been very good. Wages 50s. a month. Has three in family. Since the accident he has had 30s. a month from the club.
82. Illogan; Consolidation of right lung (Phthis ?); July 1862.	54	72 Dead.	A miner	- - -	14	Tutwork and tribute.	First worked at St. Agnes for 2 years in good air. "There is scarcely any poor air at the mines at St. Agnes." Then worked for about 7 years at Wheal Basset, Wheal Music and Redgate Mines. Then went to Wheal Kitty on tribute for 10 months in the 50 level. "The air was not particularly good where I worked, which was about 90 fathoms from shaft. The candle would not burn except when inclined." He felt no ill effect from it. Then he went to United Hills for 7 or 8 years, on tutwork, in 60 level, in good air. Then worked at West Wheal Basset, for 8 months in 90 and 100 levels. Air not good, the candle would not burn upright. Then worked at Wheal Greybird for 3 years, in very bad air, in the 30 level, for 2 months, but did not feel ill until he had left it about 5 months. He was then working at Burncoose where the air was good and the mine dry.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Since he has worked in the United Mines he has had a cough and a burden on his chest, so that he can hardly breathe, and he has never got rid of it. He has also a rattling in his chest.	Working in poor air and powder smoke.	Says he feels pretty well in health, except the rattling in his throat, which is so bad that he says his wife won't sleep with him unless he can get rid of it, because she cannot get any rest. Chest rounded and tympanitic. Nothing detected beyond some prolonged emphysematous crackling.	
Seven or eight years ago he was taken ill with cough, shortness of breath, and weakness in the legs. No pain, and but little expectoration. Eight months ago he got wet whilst at work, and was taken ill with cough and shortness of breath. He continued to work until 7 weeks ago, when he had inflammation of the chest, from which he says he is now recovering.	Working in bad air, and at last getting wet whilst at work.	Body thin, hands wasted. Skin pale and thin, with some increase of heat, but not burning. Pale, sallow, leaden complexion. Has a cough without much expectoration. Soreness in the chest after coughing. Chest.—Sternum prominent and rounded. Right infraclavicular space is flattened, its motion is diminished, and it is dull and tender on percussion. There is loud bronchial breathing and bronchophony at the same spot, but no mucous crepitation. Behind, there is complete absence of any respiratory sound, even on coughing, except an occasional dry creak. The rest of the chest is resonant, and respiration is heard over it. Heart sounds are normal. Pulse soft and compressible. Cough is spasmodic, dry, and harsh. Sputum whitish, and but little of it. No sweating or diarrhœa.	
First complained of pain in the left breast, shoulder, and pit of stomach. The pain in the stomach and breast has never left him entirely. It was a pricking or burning pain. It is worse when his stomach is empty. About 12 months ago his legs became painful and then numb. It increased for a fortnight, at the end of which he could not feel anything that touched him below the knees. He could not move them himself, but they would often jump without his being able to stop them. The flesh about his body became numb, but not his arms. Had difficulty in making water and it became thick and offensive. It never ran away from him. He continued like this for 6 months, when sensation began to return, first in the toes and then gradually came up the legs. Power of motion then returned. He improved for about 3 months, but since then his condition has remained stationary. He cannot account for his illness in any way. Never had any injury to his back, and he never stood in cold water or in a draught for any time that he is aware of.	—	Sensation in legs is now good, and he can stand for a minute or two when he holds by something, but cannot walk. Legs wasted, muscles flabby. Arms thin, but not wasted to the same extent as the legs. He had palpitation and cough before he left the mine, but since he has been in bed, they have both left him. No disease detected about chest or abdomen. There is a swelling of the upper part of abdominal muscles simulating a tumor, and this he says is painful. He says also he has a feeling as if something were tied round his stomach. Bowels regular, though they have been much confined.	For some months this man had to climb 380 yards by ladders on leaving his work, 310 and 320 yards being his daily amount of climbing for some years.
When at Carn Brea he had lightness in the head, loss of appetite, and was so weak and his legs trembled so much that he could hardly work at all, and he could scarcely climb the ladders. He has had shortness of breath for the last 2 years. Eleven months ago he fell down "a stope" about 10 fathoms and broke several of his ribs and his left shoulder, and was badly cut on the head. He was in bed for 6 weeks, but was not able to do any work for 8 months after it. Since the accident he has had pain in the left breast on drawing breath, and the shortness of breath has increased. He still complains of lightness in the head, which he says is worse in hot weather than in cold.	Working in bad air in the first place though his present condition is due to his accident.	Body in good condition for fat. Face is sunburnt and has a healthy look. There is considerable prominence of the ribs and inferior angle of scapula of the left side and the spine is somewhat curved towards that side. Wasting of the scapula muscles and thickening about the body of the scapula, probably from an old fracture. Chest generally resonant on percussion, and respiratory murmur normal. There is a creaking pleuritic rub heard at the lower part of left chest in front. Heart sounds normal and regular.	
After he had left Wheal Greybird about 5 months, where he had been working in bad air, he began to have shortness of breath. He was then loaded at the chest, and when he went underground he was always in a cold shiver, and a cold sweat used to run off him. He continued to work for 2 months longer and was then laid up. He had at this time lightness in the head, shortness of breath, and pain across the front of the chest, and was very weak. He has been unable to work since. This is about 2½ years ago.	Working in bad air.	He says, "I have no pain except a little in the arms, but my complaint is nothing but weakness, and my flesh is wasting away." Has a bad cough and spits up a quantity of blue slaty-coloured sputa, in the morning. His breath is short, so that he cannot get up hill. Height 5 feet. 6 in., weight 9 st. 8 lb. Vital capacity (spirometer) 110 cubic in. Motion of chest limited; there is resonance generally over it. Sound over right apex being rather flatter on percussion, than over the left. Mucous crepitation over the greater part of right upper lobe, before and behind, breathing and coughing being accompanied by a ringing metallic sound. There is also tubular breathing at the same infraclavicular space. A whistling noise at the termination of the inspiration heard generally over both lungs; expiration is not much prolonged. Heart sounds normal, regular. Skin cool, moist, supple. Bowels have always been regular. Not subject to sweating. He says about 6 months ago he did sweat a good deal for a few nights, but not since. Face pale. He says he has lost 40 lbs. in weight in the last 2½ years.	—

Number; District; Disease. Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working underground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
83. Camborne; Emphysema; July 1862.	41	59 Dead.	A miner, died of miners' disease after 2 years illness.	- - -	8 to 9	Tutwork and tribute.	First worked under ground at Gwennap Consols for 7 or 8 months, and after that worked at surface until he was 15. Then went to Fowey Consols for 3 years in good air, and then back to Gwennap for 10 years. It was very hot in the 208 level, but the air was good, though not enough of it. They had an air machine. He had good health here, but he believes that it injured him. They used to come out of the hot ends and plunge into a stream of cold water to cool themselves. He always had a cold and cough, worse than at present. Then he went back to Fowey Consols for 2¼ years, in good air in 230 level. He was taken ill, after working here 2 years, with inflammation in the windpipe. It was from coming out of a hot mine and stopping to talk on the landing places. Since then he has worked at Dolcoath about 9 years, in 230 and 240. No bad air in this mine.
84. Camborne; Chronic bronchitis; July 1862.	57	45, Dead.	A miner, died in a decline.	- - -	14	Tribute -	Worked for 30 years at Dolcoath on tribute in good air. Then went to South Roskear for 2½ years, in 116 level, good air. Then worked at Condurra for 6 months, in 100 level. Air not very good there, and he says his breath was not so good as when working in good air, but he was not very bad; he lost his appetite. Then went back to Dolcoath, where he has been about 14 years, chiefly as a timber man.
85. Baldieu; Heart disease; July 1862.	48	- -	A husbandman.	- -	18	Timberman and on tutwork, principally employed in the shaft.	First worked at Great Consols for 10 or 12 years, in good air, then for 12 years at East Wheal Rose, in good air, but it was damp and cold in 100 level. Then went to Penwhealdarva for 3 years in the sump shaft, in good air. Then at North Jane for 2 years, in 20 level, in good air. Says he took cold here, being down in the mine from Saturday to Sunday night. He got wet and cold, and felt shivering afterwards; since this time his illness has been gradually coming on.
86. Baldieu; Old pleurisy; July 1862.	57	50, Dead.	A miner, died from fever.	- -	9	Tribute at first, afterwards tutwork.	First worked at Consols for 20 years, deepest levels 188 and 200. Air very hot in some places, but not bad. Then went to Wheal Maid for 7 years (now knocked). Then to Poldice for 2 years, in good air. Then to East Wheal Jane, 3 years in good air. Then to Penwhealdarva, 2 years, good air. Then worked at Nangiles for 5 or 6 months, in 18 level, good air, but wet and cold. Then at North Jane 2 years. Air not very good. The candle sometimes would not burn. It was a wet, cold mine. He worked 20 fathoms from grass. They used to send the men down in a kibble, and they used to get out through the adit, walking through water for 40 or 50 fathoms, and then they had half a mile to go to the changing house, from where they came out of the mine. They had to walk this in their wet clothes and in winter.
87. Key; Asthma, July 1862.	34	41, Dead.	A miner, died from the effects of an accident in the mine.	- - -	- - -	- - -	Worked 8 years in the St. Day United Mines at Gwennap, but latterly has been working in a silver mine in Mexico. The mine in Mexico was dry and dusty. He has never worked in bad air.
88. Kenwen; Dilated heart, &c.; July 1862.	60	64, Dead.	A miner, died from an accident in the mine.	- - -	15	Tutwork and tribute.	Worked first at Wood mine, Kenwen, for 7 years, in good air, in 20 level. After that worked in a gold mine in Brazil for 5 years, in good air. Then went to Great Consols for 16 years, a deep, hot mine, though the air was generally good. Then went to Naples for 2½ years, exploring some mines. Then he came back to Poldice for 2 years on tribute, in good air. The last mine he worked in was Creedbraws. It was a shallow mine. He worked in the 36 level under adit for 7 or 8 years. The air was good. There was no engine, and the water collected in the level, and he had to walk through it for 100 fathoms to and from work. It was about 20 inches deep. Thinks that was the cause of his taking cold.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
During the 9 years he has worked at Dolcoath he has been ill 4 months from inflammation in the windpipe, from taking cold in coming out of bottom of the mine where it is hot, to the top where it is cold, and sometimes from going into cold water to repair the pump.	Thinks he was injured by working in bad air some years ago, but his illness latterly has depended on exposure to changes of temperature.	Feels a little tightness in breathing in the morning, but nothing to speak of. Face thin. Body in good muscular condition, but not much fat on it. Chest resonant, respiration natural, but with prolonged whistling expiration over the base of both lungs posteriorly. Heart sounds normal.	
About 8 years ago he received a blow on the head from a stone. He did not feel anything from the blow, but in about a fortnight dropsy came on, first in hands and face, then in legs. He had dropsy for 3 months, and was unable to work; he then got better, but has never been well since. During the last 3 years he has been unable to work much from shortness of breath; has had a cough in the winter, but has not any now except a little in the morning.	A blow on the head (!)	No œdema of body or ankles. Says he is easy when sitting down, but his breath goes all at once when he begins to move about. He has a tolerably healthy look in the face. Chest resonant on percussion, respiration clear over the upper part of chest, mucous crepitation over lower part of lungs behind, where there is loss of respiratory murmur, but no dulness. Heart sounds regular and distinct, point of impulse is nearly in the medium line and near the bottom of sternum. No impulse felt in its usual situation. The sounds are heard most distinctly at point of impulse. Urine somewhat cloudy from mucus, not albuminous. Face dark and congested, lips dark in colour. Some copper-coloured spots over the body, and brownish discoloration of the iris.	
He was never ill before 4 months ago, when he took cold. He had a violent cough which lasted more than a month. Then his face and neck began to swell, and his breath became short. His legs were not swollen and he had no palpitation of the heart. Then he found he could not climb, and was obliged to give up work.	Exposure to cold.	His principal trouble is shortness of breath. Has a troublesome cough at night, but not during the day. Not much expectoration. Face congested, rather puffy under the eyes, which are watery. Says his urine was very highly coloured a fortnight ago. Never had rheumatic fever, but has had rheumatics in his arms. Veins over the chest and neck are large, and he says when the swelling first came on, the veins in the neck were bigger than his finger. Pulse 118 soft, small. Respiration 32, easy, but deep. Respiratory murmur heard over both lungs, chest resonant on percussion. Heart sounds very feeble. 2nd sound comparatively loud, 1st sound scarcely audible. Scarcely any impulse. No murmur. The interval is much shortened. Hands cold and blue.	
12 years ago he had inflammation of the lungs, and was ill for 3 months, but after he recovered he says he was as well as anyone, but his breath was never so good as it was before. 1½ years ago was taken ill with shivering, pain in the right side, followed by cough. He was at home for 6 months. Since then "he has never been half the man he was before." His breath has been very short since this last illness, and he has not been under ground since.	Exposure to cold.	Complains now of shortness of breath. He feels a weakness and a little pain in the right side sometimes where the inflammation was. He has a healthy complexion from exposure to the sun. Chest generally resonant, but somewhat deficient in resonance at the base of both lungs in front, where there is also a double pleuritic creaking sound. Heart's impulse increased in force, especially towards the epigastrium. Its action is regular, and there is no murmur. Respiratory murmur is very distinctly heard all over the chest.	He had an allowance of 36s. per month from Wheal Jane, for 6 months.
Felt no ill effect from working in mines in England. When at work in Mexico he was seized with tightness on the chest and shortness of breath, so that he was obliged to give up work. He had no pain or cough. He used to drink salt water to make himself sick, and then he was well enough to work on the following day. He ceased work for 6 months, then went again to the same place, but was obliged to give it up from the same complaint. This is 17 months ago.	Working in a dry and dusty mine.	He now feels shortness of breath, if he exerts himself, and if he takes cold, it goes to his chest. He is stout and looks well. Nothing abnormal detected about either lungs or heart.	
Has been ill 4 years, and has been away from work for 2 years. Was taken ill with weakness, pain and deadness in the legs and shortness of breath. It came on gradually. No pain, but a fluttering at the pit of the stomach. His appetite continued good, and he had no sickness. He could not get up the ladders, and so was obliged to give up work.	Walking through cold water to and from his work.	Complains of weakness and shortness of breath. Has no cough, except when he takes cold. Body not wasted. Face thin. He looks about 70 years of age instead of 60. Chest resonant, general deficiency of respiratory murmur, but no abnormal sounds. Heart sounds are regular and distinct. There is considerable impulse in the epigastrium, but not much in the normal seat of impulse. No murmur. Pulse 68, full, but compressible.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
89. Key; Miners' disease July 1862.	56	64, Dead.	A miner, died of decline.	- - -	- - -	Tutwork and tribute.	First worked at Keatbraws, Kenwen, for 5 years in the adit level, in good air. Then at Poldice for 3 years, in good air. Then at North Wheal Busy for 8 or 9 years, in good air. Then he worked in several small mines for a period of 3 years. Then went back to Keatbraws on tribute for 6 years, in good air. Then worked at South Francis in the 36 level for 4 months. The air was slight. He was taken ill there, and left in consequence. Then he went to Penwhealdarva for 3 or 4 years on tutwork and tribute. The air was very bad in the 20 level, 50 from shaft. He was laid up for 2 months in consequence of that. He worked again in the same level in better air afterwards when they had made a communication with another level. Then went to Nangiles for 10 months, and after that to North Jane for 2 years in good air. Then went back to Keatbraws, but after working 2 months he found his breath was so short that he could not climb the ladders.
90. Kenwen; Chronic bronchitis; July 1862.	60	63, Dead.	A miner, died in a decline.	- - -	11 to 12	Tutwork -	Worked first at Wheal Andrews for 3 or 4 years. Then at Nangiles for 2 years at surface. Then worked at Woodmine for 20 years, in good air generally. Then went to Wheal Busy for 3 or 4 years. Worked in bad air in the 50 level sinking a winze, also in sinking a shaft under the adit level. In the 90 level also the air was bad sometimes. He was taken ill whilst at this mine. Then worked 3 years at Consols, but was obliged to give give it up, and then worked for 6 or 7 years at the surface. Then he went under ground at St. Day United for 3 or 4 years. Not bad air in general. The last 4 years he has worked at Wheal Jane.
91. Kenwen; Dyspepsia; July 1862.	57	86, Dead.	Used to work at the surface.	- - -	14	Tutwork -	First worked at St. Day United for 8 or 9 years, in good air. Then went to Wheal Ramoth for 4 years in the adit level, 14 from grass. The air was very bad, "so that we could scarcely keep our candles alight when the wind blew from the North." He wastaken ill here, after working about 3 months, with shivering pain in the limbs and jaundice. He was at home 2 years, and afterwards he had a pain across the stomach, which has recurred at times ever since. Then he worked at Wheal Providence for 5 months in good air. Then went to Wheal Tehiddy for 1½ years, generally in good air, but there was poor air for a month in the 20 level; since then he has worked at Creedbraws, Great Consols, Rose in Vale Consols, St. Day United, and Fowey Consols, for a few months at each place, generally in good air.
92. Kenwen; Miners' disease; July 1862.	48	41, Dead.	A miner, died from consumption.	- - -	18	Tribute	First worked in Woodmine for nearly 4 years in good air. Then went to St. Day United for 10 years, in good air. Then to the United mines for 8 years, in good air sometimes, but 2 years in very bad air in the adit level. Sometimes the candles would not burn at all, and it was a very wet place, and there was cold damp there. Then he went back to St. Day United, and worked at the surface for the 8 years, since he has left the United mines. He has not been under ground during that time. Has not been able to work for 3 years from beating of the heart, and he has had relief from the parish during that time.
93. Kenwen; Pleuritic effusion; July 1862.	54	48, Dead.	A miner, died in a decline.	- - -	11	Tribute and tutwork.	First went to St. Day United for 2 or 3 years. No bad air there. Then went to Poldice for 14 or 15 years. Worked 3 months in bad air in the 34 level. Then worked at Consols 15 years, about a month in bad air in the 120 level, and another month in bad air in the 100 level. Felt ill effects from it. After that he again went to the 120 level and worked there nearly 12 months, where the air was bad. He says, "I worked there when I could not carry a light, and a man who worked with me died, I believe from the effect of the air. I felt shortness of breath, choking in the pipes, pain in the side, and weakness in the legs." Then he went to Creedbraws for 12 months, in good air. Then back to Poldice for 3 or 4 years. This was the last place he worked at.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
When at work at South Francis in bad air he lost his appetite, had general weakness, shortness of breath, and soreness when he drew his breath. He was again ill when at Penwhealdarva with weakness and shortness of breath. He says, "I did not give up work there, because when we are getting a little bread we do not like to give it up, for we might then be out of work for some time. This is the way that men injure themselves."	Working in bad air.	Complains of pain in the right side under the ribs, when he draws a deeper breath than usual. He has also shortness of breath, weakness and loss of appetite. He has no cough. No disease detected about the chest. Pulse 80, tolerably full, soft. Face thin and sallow. He has a look of premature old age.	
At Wheal Busy he was taken ill with shortness of breath so that he could not lie down in bed. He had pain in the chest, cough with expectoration of white frothy mucus. He was at home for 2 or 3 weeks at a time, and then at work again; for a space of 2 or 3 years. After working at the surface for 6 or 7 years, he got better, but had a return whenever he took cold.	Working in bad air and exposure to cold.	He can scarcely climb the ladders at the present time, though he still goes underground. Has shortness of breath, weakness, and sometimes pain in the right side. Very little cough or expectoration, chest generally more resonant than normally. Whistling inspiration and prolonged expiration heard over the greater part of the chest. Behind there is some dulness, with tubular breathing and mucous crepitation about the middle of scapula on the right side. Heart sounds normal. The lower ribs as well as the supra-clavicular and supra-sternal spaces sink, on inspiration. There is but little respiratory murmur at the base, but it is loudly heard at the apex of both lungs. Face dark and congested.	
Was taken ill whilst at work at St. Day United mine. He says, "After coming up the mine one day, and having a pint or two of beer, I was sick; the next day the sickness returned, and I vomited about a pint of blood. Afterwards I took cold and had a cough, and since then I have felt weakness in the pit of the stomach and in the legs."	- - -	Has no cough or shortness of breath. Tongue cracked and covered with a brown fur. Loss of appetite. Pulse full and not very easily compressed. He has a florid spotted complexion, as from intemperance. He is an old looking man, and says he used to be very pale. Says he has not been in the habit of drinking much, but has been tipsy on a time.	
When working in bad air in the United mines he had pains in the left side, and between the shoulders, weakness in the limbs and faintness, and feeling of always being tired. (He says one of his fellow workmen died soon after he came to work there, and evidently regards his death as the result of working in bad air.)	Working in bad air.	He complains of fluttering of the heart, weakness, "rising in the stomach" and sickness, head ache, and says his limbs get sleepy. Chest resonant, deficiency of respiratory murmur, no abnormal sounds. Heart's action at the present time is regular and the sounds are normal. Pulse regular, soft, and compressible. Face sallow, thin, with sunken features. Body in fair condition.	
When at Consols, felt ill effects of bad air; had pain in the left side and pit of stomach, and weakness of the legs on climbing, and shortness of breath. He strained his side whilst at Consols, carrying ore, and had inflammation there. He strained it again at Poldice in rolling ore. Had pain at the time, and a day or two afterwards spat up a clot of blood, and several times during the day. He fainted the next day whilst going to St. Day.	- - -	Complains of pain in the side and in stomach, has no cough or expectoration; weakness in the legs and loss of appetite and sometimes fluttering of the heart. Chest.—There is dulness on percussion, absence of vibratile thrill, loss of respiratory murmur, with modification of voice at the lower half of left chest behind. A pleuritic rub heard about the level of inferior angle of the scapula, and in front on the same side. Elsewhere resonance is normal, though the respiration is everywhere catching in character. Heart sounds normal.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
94. Key; Miners' disease; July 1862.	55	- - -	Father worked as a miner when young, but gave it up before he grew up.	- - -	15 to 16	Tutworkand tribute.	First worked at Consols for 15 or 16 years. "Can't say that I never worked in any air that hurt me. I never felt any ill effects from it." Then worked at Carnon mine for 10 months, it was bad air there all through. The candles would not burn except when sideways. Did not feel any ill effect from it. It was 16 fathoms from surface and 40 or 50 from shaft, under the sea. Then went back to Consols for 2 or 3 years, in good air. Then went to Wheal Barron for 5 months, in good air. Then to Baldiew for 2 years, in good air. Then back to Consols for 2 years, in good air. Then to Creedbraws for 11 months. "I could not complain of the air there." Then went back to Consols for 2 or 3 years. "No bad air to affect me," some places not very good, but he did not feel any ill effect from it. Then went to Wheal Henry for 17 months, in bad air all the time, in the 70 level. He felt headache and weakness in the legs in climbing, but nothing else. Then went to Wheal Barron, in very bad air in every level, the candles would go out even close to the shaft; "It was the worst mine for air that I saw in my life." He did not feel any ill effect from it. Worked there nearly 8 years, the last 1½ year the air was good because another level was driven at the side. He has not worked since. This is about 3 years ago.
95. Carnwinnen; Pleuritic effusion; July 1862.	52	- - -	- - -	- - -	11	- - -	He continued to work until 7 months ago, when he was obliged to give up from weakness and shortness of breath. He only worked 12 months underground at first and then remained at the surface for 3 years. Then went to Condurrow for 2 or 3 years, and from there to Stray Park. Some places at Condurrow had not good air, but it was generally good at Stray Park. Then went to East Wheal Crofty for 7 or 8 years, sometimes in very bad air. In some places the candle would hardly burn. He felt ill effects from it, "but it wore off." Worked a short time at Cooks Kitchen and then gave up working under ground.
96. Carnwinnen; Bronchitis and consolidation of the right apex; July 1862.	42	- - -	- - -	- - -	10	Tutwork -	Has worked at Dolcoath ever since he went underground. Worked in bad air for 3 years in the 190 level. The air at the time was very bad. He says, "I was working there with my son, and whilst he was turning the borer for me he would faint, and I was obliged to carry him out of the level and pour water over him. We were 40 fathoms from any draught." He had to fit a shaft where it was very wet, and he thinks that gave him cold. At another time he had to wait 4 hours in a cold level after working in a hot place, and he thinks he took cold from that also.
97. The Beacon, Camborne; advanced phthisis; July 1862.	21	Alive.	A miner, in good health.	Four brothers and sisters under 3 years old have died, three of them with inflammation on the chest. His mother's father was a miner, and died in a decline. His father's father is alive, aged 82.	15	Tutwork -	First worked at South Condurrow for 6 weeks on boy's work. Then he went to North Roskear on tutwork, where he has worked since with the exception of 3 weeks at Tolcarn, and a fortnight at Wheal Harriet. He worked in bad air during the 3 weeks at Tolcarn, in good air at Roskear, but it was very hot there in some places. He has been at home now 4 months and a week. He says he took cold by working in the shaft, which was very wet. He used to work 6 or 7 hours in his wet clothes.
98. Camborne; Dyspepsia; July 1862.	62	63 Dead.	A miner, died from a chest affection.	- - -	9	Tribute -	Has been chiefly employed in the shaft, and on tribute. Never worked in much bad air. "The shaft men generally drink a good deal of spirits, but not so much now as they used to do, and what they now drink is chiefly beer." He used to drink freely of beer and spirits, but has left it off for 12 years. He has continued working till the present time, but he does not go deep under ground now.

History and Duration of Illness.	Cause to which he refers his illness.	Present Condition.	Remarks.
There is no account of any illness until he takes cold 3 years ago whilst working at the surface. He says this was followed by a slow fever, and he has not been able to work since from weakness.	Exposure to cold at the surface.	Has a little cough, expectoration of thick darkish sputa, weakness, and sinking at the stomach. No pain. Face emaciated, features sunken, darkness around the eyes, sallow complexion. Chest resonant, nothing abnormal detected. Heart normal.	This is an example of the apparent impunity with which some men will continue to work in impure air until some slight cause disables them, which, under other circumstances, would be quite insufficient to produce the same effect. This man, though he worked for a length of time in very bad air, seemed not to suffer from it, and now scarcely attributes his condition at all to its effect, though the result shows that his health has given way under it, so that a comparatively trivial cause has been sufficient to disable him.
Was quite well until about 12 months ago, when he found his breath getting short. He had no pain or feeling of illness of any sort, and it came on quite gradually. The only thing he felt was shortness of breath, which has gradually increased. He has lost flesh rapidly during the last 12 months.	Cannot account for it in any way.	Body thin but not emaciated, pale sallow complexion. Skin soft and rather hot. No appetite. Pulse 104, small but firm, Respiration 28, easy. Expectoration thin, white, and frothy, very little cough, and that of a spasmodic character. Chest perfectly dull on the left side, before and behind. There is complete absence of vocal vibratile thrill, absence of respiration. A little tubular breathing heard near the upper part of scapula, close to the spine. Modification of voice over the same side. There is very little motion in the chest, none of the left side, respiration being performed almost entirely by the diaphragm. Complete resonance and puerile respiration over the right side and as far as the left side of the sternum. No bulging or contraction of side. Heart sounds normal.	
He was quite well 5 years ago, but soon after that he began to fail a little, he lost his appetite. After working in poor air he was exposed to cold. This was followed by diarrhœa. The next day he had pain in the chest in the right side, and a cough, of which he had had a little before, increased. The expectoration was white and frothy. He has had the cough ever since, and the expectoration has now become bluish, rather thick, less frothy, and sometimes yellowish. Has had diarrhœa frequently, but always used to have loose bowels. He has lost flesh a good deal, but his strength varies very much.	Working in bad air and afterwards being exposed to cold.	Now complains of weakness, cough in the morning, but without much expectoration. Not much pain now except when he exerts himself. He sweats a great deal, especially at night. Chest resonant on percussion, but there is some dulness under the right clavicle and some loss of motion at the same spot as compared with the other. Vocal resonance is somewhat increased, and respiration is almost bronchial. Loud respiration over the chest generally and no abnormal sounds. Heart sounds clear and regular.	
He caught cold about 5 months ago, and then had pain in the left side, cough, shortness of breath, and lost his appetite. It was a dry cough at first, but he has been spitting white thick mucus since then, and lately somewhat yellow. He used to sweat profusely about 3 or 4 o'clock in the morning, when he was first taken ill, but has not done so for 6 weeks. Never had any diarrhœa. His appetite had failed him for 3 or 4 months before took cold.	Exposure to cold	Great emaciation of body, sunken eyes and cheeks, of a very phthisical aspect. Light complexion, with long light air, grey eyes. Tongue red, with a little fur, skin pungently hot. Fingers clubbed. Chest, dulness on percussion, loss of motion, and flattening over the left side, mucous crepitation, absence of respiratory murmur at apex before and behind, tubular breathing rather below the apex, and about the middle of scapula behind, below that mucous crepitation. Puerile respiration over right lung with mucous crepitation at the apex. Pulse small, soft, compressible.	This is a case of ordinary tubercular consumption, with its usual characteristics, the disease going on quietly (as evidenced by his failing appetite for 3 or 4 months) until he took cold, which set it going in its most acute form, with probable death in a few weeks.
Has had a pain in the left side under the ribs for 10 or 12 years. It varies in severity. He has been at home for 4 or 5 months at a time in consequence of it. Never had much cough except when he takes cold. It is a burning pain, and his legs heat and burn like fire, and he has a pain under his left shoulder blade.	- - -	He is a stout, healthy-looking man, with florid complexion. His diet is chiefly bread and butter and milk. He says meat does not agree with him, the pain is always worse after taking it. Nothing abnormal detected about him. Abdomen fat and flabby. Conjunctiva yellowish. Bowels regular. Pulse soft and compressible. Appetite good.	His former habit of drinking sufficiently accounts for his present condition.

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
99. Redruth; Miners' disease; July 1862.	52		A miner in early life, but afterwards a farmer.	-	16	Tutwork.	First worked at North Downs for 12 months, at good air, and then went at East Wheal Damsel for 2 or 3 years, in good air. Then worked at Poldice 4 or 5 years in good air. Then went to Wood mine for 2 or 3 years in the 80 fathom level. The air was bad there, and the candle would sometimes hardly burn. Felt ill effects from it. Then went to North Bassett, where he has now worked nearly 17 years. Has worked in a quantity of bad air there. The worst air he ever worked in was in the 40 level. The candle would scarcely burn and he could hardly breathe, and when he came into fresh air his legs would tremble so that he could hardly stand. He worked in that place for 2 or 3 months. After that he worked in the 70 level, 100 from shaft, for 2 years. "That done me up, and I was never worth anything after that." When he came to climb the ladders he felt so weak he could scarcely get up. During the last 4 or 5 years he had been working at the surface at the same mine.
100. Redruth; Acute phthisis; July 1862.	21	58, Dead.	A mine captain. He had a bad cough and shortness of breath for some time before his death.	Mother has been dead 11 years, died after a short illness. She had king's evil in the neck. Six sisters have died, the eldest was 10 years of age. They were subject to gatherings and disease of the bones.	15	At first he went under ground with the captains, but afterwards worked at Tutwork.	First worked at Dolcoath in the 230 level for 1 month, but was not strong enough for the place. It was very hot, but the air was good. Then he went to Cook's Kitchen for 12 months in the 230 level in very good air. "It was a long way to climb, and the ladders were very steep, and the staves worn out with rust. Sometimes they would break in our hands, and in some places there would be two or three gone together. They were 10 and 12 inch staves (chiefly 12 inch). It was not hot. We used to drink the water that ran down the side of the lode. They would not send the key down for us two only, unless the kibble was coming, because it was so deep. Never felt any ill effect from drinking the water, although we could taste the mundic." Then he went to Portobello, but after working there 12 months "she knocked." Then he came back to Cook's Kitchen, for 9 months at surface, and in putting in the man engine. Then worked at the burner's yard at Dolcoath for 6 months. Then worked a short time at Trefina, which is wet and cold, and at Tihiddy, and then went to Wheal Buller for 6 months in the 70 level. It is a comfortable mine to work in, no bad air. He was taken ill there.
101. Redruth; Chronic bronchitis and emphysema; July 1862.	48	60, Dead.	A miner, died of miners' disease.	- - -	16	Tutwork -	First worked at Tyburnhale for 6 or 7 years, in good air, mostly in the engine shaft. Then went to South Towans for 6 or 7 years, when "she knocked." There was good air in the engine shaft where he worked. Then went to East Wheal Rose for 13 years, in good air, 8 years in the engine shaft. Then worked at Poldice for 10 months, in good air. Then he came to Copper Hill for 7 months in the 54 level. The smoke lay on the ground, but the air did not appear to be bad. Then worked at West Wheal Damsel, which was a bad air mine, in the 60 level for 12 months. The air was bad there. He then worked at Wheal Cubitt as a pitman, not regularly under ground, for 10 months. Then worked at South Scurvy as a pitman, working mostly in the shaft. He took cold here, and was laid up for 14 days, and has not been to work since. This is about a year ago. His wages were from 3*l.* 10*s.* to 3*l.* 15*s.* per month.
102. Gwennap; Miners' disease; July 1862.	49	49, Dead.	A miner, and died of miners' disease.	- - -	15	Tutwork and tribute.	Worked first in the United mines for 5 years in good air. Then went to Penstrethel for 4 years in good air. Then worked at Consols for 12 years, in good air, in the 140 and 188 levels. Then went to Tolcarn, for 2 years. The air was very "slight" there in the 10 level under adit, where he worked 12 months, and in the 40 level, where he worked 6 months, also in the engine shaft where he also worked for 6 months. He felt no ill effect from working there. He then went to East Tolgus for 9 months, where the air was pretty good, but where there was a good deal of smoke. He then went to West Tolgus for 9 months. The air was close and hot, but good. The candle would burn pretty well, but it will do so, even when the air is poor, when placed against the "foot wall" but not against the "hanging wall." He then went to East Wheal Bassett, for 2 years. There was very bad air in the 60 level. There was only one shaft to this mine (6 years ago), and they were 120 fathoms from the shaft. He says he was quite well there. He then went to Cuba for 2 years, where he worked in some slight air. He was then at home for 6 months, as he did not feel well, and then went to Wheal Louisa for 9 months, in the shaft, 25 fathoms from surface, in good air. He was tolerably well there, but did not feel so well as he had been before. He then went to America, where he stayed 14 months, and worked in poor air. Then he worked at Wheal Moyle in Gwennap, for 3 months. The air was good there, in the 30 level.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
When he first worked in bad air in Wood mine, 20 years ago, he had loss of appetite, weakness, pain in the chest and side. He says, "on coming up the ladders my heart would beat so that I could hear it, and the men above and below me would ask whose heart it was beating. They could hear it 4 or 5 fathoms above or below. I have often heard other men's hearts beat at the same distance. I think I could mention a score of my companions who are now dead of miners' complaint whose hearts could be heard beating. A man's heart cannot be heard unless he is ill, and only when they have come out of bad air to climb. It sounds as if some one was beating on their breasts with his fist." When working at North Bassett in the 70 level, he says he had shortness of breath, beating of the heart, head-ache, loss of appetite. He was then taken with inflammation on the chest, and was confined to bed 6 weeks, and was at home nearly 2 years. The expectoration was slate coloured at first, after 4 or 5 days it became red and viscid, and afterwards yellow, and then gradually ceased. He spat blood for a day or two during the first few days. During the last 4 years he has been laid up occasionally for weeks together. 2 or 3 months ago he was laid up for 3 weeks with pain in the right side, and a cough, with no expectoration to speak of. Since then he has improved in health, but has never got strong.	Working in bad air.	"If I get to work now for 5 minutes I am done up with weakness, trembling of the limbs, and shortness of breath. I have constantly palpitation of the heart, so that I cannot walk fast or work." Sunken features, has lost flesh considerably, and does not recover it. Sweats a great deal on any exertion, but not at night. Chest moves freely, respiratory murmur clearly heard over the whole, except at the base of left chest. Here there is dulness below the angle of scapula, loss of vibratile thrill, loss of respiratory murmur. Heart's sounds are faint, but regular, impulse very feeble, extent of dulness not increased. Skin moist and supple. Pulse 92, soft and compressible.	He says, "when I was at work in this bad place I had better wages (3*l.* 10*s.* and 4*l.*) because other men would not work there. I should think a score of men worked in that place and left it after a short time because they could not stand it. A great many of them are now dead. The men might have been weak men for all I know, but anyhow they have died since."
When at work at Wheal Buller he found that he had a cough in going to the mine in the morning, and when he came to beat the borer he was taken with a pain in the right side. The pain continued all day, and when he left work he had to climb very slowly because it made his breath so short. He had to carry 10 borers up with him (¾ cwt.) He stayed at home two days and then went to work again for one day. He then had advice, and has not worked since. This is about 14 weeks ago. The cough became much worse when he was seized with pain in the side, and it has never left him. The first day he stayed at home he spat up a little blood. The expectoration has always been much the same in its character as it is now, greyish yellow, purulent, in masses remaining separate in the vessel.	No cause assigned.	He has light brown hair, and brilliant grey eyes, sunken features, with a flushed cheek on one side. A month ago he had early morning perspirations, but not lately. Body and arms much emaciated. Skin hot. Chest long, shallow. Motion of right upper part of chest limited. Right infra-clavicular space dull, more so than the left, which is also dull. There is mucous crepitation over the whole of the front of the right lung, with tubular breathing and bronchophony at the apex; behind, crepitation at apex, puerile respiration below. Left lung has mucous crepitation, bronchial breathing, and bronchophony at apex in front; below and behind there is puerile respiration. Never had diarrhœa. Pulse 136, very feeble. Respiration, 38, deep. Heart sounds clear, rapid.	
When working at Wheal Damsel, 2 or 3 years ago, in bad air, he says, "I got loaded on the stomach and spat up powder smoke and that sort of stuff; my breath was short, and my heart beat a little, I had no pain." When employed at South Scurvy he took cold by working in very cold water, he worked 13 hours in cold water in one day. The same evening he was taken with shivering, and on the following morning he had shortness of breath, a cough, and expectoration of white froth. He had no pain. He was confined to his room for 14 days and then got better, but has not worked since.	Exposure to cold by working for 13 hours in cold water.	He has now shortness of breath, and at times a pain in the left shoulder, and in pit of the stomach when he takes cold. Has a little cough in the morning, with but little expectoration. Body thin but not emaciated. Not subject to sweating. Chest resonant on percussion, and moves freely. The resonance extends over the normal seat of heart's dulness. Respiratory murmur rather deficient in loudness over the right side. At the right apex behind, and at the base of both lungs there is a cooing sound at the termination of a full inspiration, and the expiration is prolonged and of the same character. Heart's sounds are feeble. He has a sallow complexion.	
Four years ago he had fever and ague in Cuba, and was in hospital 8 or 9 days, and after he came home he did not go to work for 6 months as he did not feel well. He seems never to have been quite well since this time. He has never appeared to suffer much from the effects of bad air though he has worked in a good deal. Seven months ago he took cold. He says he came up from under ground sweating, and changed his clothes in the boiler house, where there was a strong draught. He then had pain in the side, a little cough without expectoration, but no shortness of breath. He was bled for inflammation in the side. He was ill in bed for 5 weeks, and has never worked since, from weakness and pain across the stomach. About 3 months ago he spat up about half a wine glassful of blood, and he has often spat up blood since then. It comes on with a little tickling cough.	Exposure to cold in changing his clothes after sweating.	Complains of pain in the pit of the stomach, and weakness. Chest resonant on percussion. Respiration clear, but faint, and somewhat catching and irregular. Heart sounds normal. Pulse quick, moderately full and compressible.	He states that at Wheal Moyle the mine doctor was a druggist and not a qualified medical man, and that he was a relative of the captain of the mine. If this be true, it shows that the system under which the surgeon to the mine is appointed, is not the best for the men.

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed. Quality of Air, &c.
103. Redruth; Aortic valvular disease; July 1862.	43	53, Dead.	A miner, died of miner's complaint	- - -	18	Tribute.	Worked last at Carn Brea in the 26 level, 35 fathoms from shaft, down 8 fathoms in the winze. There was very bad air there. He worked a fortnight there, and then was taken ill. He has not worked since. This is 2½ years ago.
104. Crowan; Ascites; July 1862.	20	48, Alive.	A miner -	- -	15	Tutwork -	First worked at South Wheal Francis, on boy's work for 4 years at grass. Then went under ground at Wheal Ennis in 30 level on boy's work, in good air. Then to Whendron Consols on tutwork for 3 years, in 25 level and 40, in good air. Then went to Whendron United for 8 months on tutwork, in 30 level. Good air, but a good deal of powder smoke. Then went to West Wheal Francis, where he worked about a fortnight in the 70 level. The air was good enough. It was a tin mine. He was taken poorly soon after going there. The ladders were very easy to climb. Has been away from work about 10 days.
105. Camborne; Rheumatism; July 1862.	27	55, Dead.	A farm labourer.	- - -	- - -	Employed in the shaft, to fill the kibbles.	He worked until 3 months ago, when he gave up, owing to weakness and pain in the back. The last 2 years he has been working at Dolcoath in a very cold place, filling the kibbles in the shaft, and he thinks he took cold from that.
106. Liskeard; Miners' disease; August 1862.	28	55, Alive.	A miner -	- - -	8	Tribute and tutwork, but lately on tribute.	First worked at Wheal Providence with his father on tribute for 3 or 4 years. Then went to Wheal Knott on tribute and tutwork for a year or two. Then came to Wheal Trehern on tutwork for 3 or 4 years, in the 45 and 50 levels. The back of the 45 was very warm and dusty, but the air was not bad. He then went to Wheal Mary Ann for about 12 months on tutwork in the 90 level, the air was slight and there was cold damp. Then went to Wheal Trelawny for 2 or 3 years in the 107 level. The air was warm and not good, the candles sometimes would not burn. He used to look white and pale, and sometimes had a little shortness of breath. He was laid up poorly for a day or two occasionally, but never suffered for long. Then went to Cuba, where he worked 3 years and 5 months in the Cobra mines. He had very bad air there, and was ill with pain in shoulders, beating of the heart, but was not laid up any time from it. Then he went to America, to the Rockland mine for 14 months, in good air. Then came back to Wheal Trelawny, where he is working now. He has been there about 12 months on tribute in the 140 level.
107. Bodminland; Miners' disease; August 1862.	27	52, Alive.	A miner -	- -	17	Tutwork -	First worked at Wheal Gill for 2 years in the 26 level, air good. Then went to Wheal Trehern for a week, and then to Wheal North Trelawny for 2 years in the 25 level. There was a little poor air there, but he had good health. Then went to Wheal Ray for 6 or 7 years in the 12, 30, 40, 70, and 100 levels. There was bad air in the 30, 70, and 100 levels, and the smoke was very thick. He was ill there, and has not been to work since This is 12 months ago.
108. Bodminland; Damaged health from his occupation; August 1862.	37	60, Dead.	A miner -	-	11	Tutwork -	First worked at North Roskear on tutwork for 3 years, in the 20 level, in good air. Then went to Redmoor, for 10 or 11 years, in the 100 and 110 levels and others. There was bad air in the 90 level where he worked for 15 months, he was home in consequence for 6 or 7 weeks. Then worked at Holmbush for 2 or 3 years on tutwork, in the 100 level; there was bad air there for 6 or 7 months, and then he found he "could'nt stand it any longer," he found himself failing, and had shortness of breath. Then he went to Mark Valley Consols on tutwork in the 50 level. The air was very bad, and there was cold damp for 7 months. The candles would not burn up to the end of the level. They had an air pipe in with them, and they were obliged to keep the candle in the pipe to keep it burning. They used sometimes to fire the fuse with a tobacco pipe, because the candles would not burn sufficiently to fire it, and the fuse was not long enough to reach the candle in the air pipe. Says he did not feel much ill effect from it besides headache and weakness in the knees. This was about 1½ years ago. They had good air after that, and he worked there for 12 months, and then stayed at home for 3 months with pain in the chest, and abscesses in the neck; for the last 2 months he has been at work again.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Says he was quite well before 2½ years ago. He was then taken ill whilst working in very bad air, with his heart beating very loudly as if it would jump out of his body. He had worked in bad air before and had had pain in the head from it, but not much, as he was a tributer. He first felt the beating of the heart when walking and then when he climbed the ladders, and it increased so much that he could neither go up nor down.	Working in bad air.	Pale, sallow complexion. Body thin, but not emaciated. Skin sweating. Heart:—There is a loud double see-saw murmur heard distinctly over the aortic valves and up the course of the aorta. Impulse forcible, diffused. Pulse full, sudden, splashing.	
When working at Whendron Consols, he had inflammation in the left side, from cold, and was laid up about 3 weeks, with pain in the side, and cough; but without expectoration, shortness of breath, or difficulty of lying down. At Wheal Francis he was gradually taken poorly with loss of appetite, general weakness, and a little shortness of breath. He had cough, with but little expectoration. Eleven days ago his body began to swell, and his ancles began to swell about 3 or 4 days since. Face has never been swollen even in the morning.	Exposure to cold.	Pulse 92 soft, compressible, irregular in frequency and force. Chest resonant on percussion respiration clear and healthy. Heart's sounds clear, but irregular in its action. Abdomen is evenly swollen, not tense, fluctuating, containing fluid in peritoneum. He has no pain or tenderness on pressure; no enlargement of viscera detected. Large veins course over the surface of abdomen. A little œdema about the ancles. Urine not albuminous. Face rather dark and congested. Tongue clean, healthy. He says he has been steady in his habits, and not in the habit of drinking.	
He has not been quite well for 12 months. He first felt stiffness and pain in his back, so that he could not straighten himself in the morning. He became gradually weak and had shortness of breath.	Exposure to cold.	He walks with his head stiff and bent forward, and says he cannot turn it round or put it back on account of pain. There is a slight amount of tenderness on percussion over the spine in the back and neck, no pain on striking the top of the head, but it hurts him if his head is twisted round far. It can be rotated freely to a limited extent without pain.	
He came back from America, because he was ill there, with beating of the heart, weakness and pain in the shoulders and shortness of breath. He was at home for 12 months before he was able to work under ground. Last week, he says, he spat up about a teaspoonful of blood, with a very slight cough.	Working in bad air.	Has lightness in the head, pains over his body, and beating of the heart at times. Pale sallow complexion, with dark areola round his eyes. Body in pretty good condition, but not fat. Lungs apparently healthy. Heart sounds normal.	An instance of the early age at which a father will expose his children to the influence of under ground air and want of light, in order to increase his own earnings. There is no evidence as to the condition of the air when this child of 8 years of age was first taken under ground by his father.
He was failing for 2 years before he gave up. He had headache, weakness, pain in the side and stomach, a feeling of chilliness, and inability to climb the ladders during the last few months from shortness of breath.	Working in bad air.	Has now pain in the side and stomach, nausea, shortness of breath, no cough. He had cough at first and he vomited a small cupfull of blood, just before he gave up work. Has beating of the heart when he goes up hill. The weakness, pain in the right side, and shortness of breath prevent him working. Chest moves freely, resonant on percussion respiratory murmur is clear but faint. Heart sounds normal, impulse feeble. Pulse small and compressible. Skin cool and soft. Body in good condition, he says he has picked up flesh lately, and is gradually getting stronger.	He receives 8s. a week from the parish, for four persons. He gets nothing from his club because he has "no "visible hurt."
When he first worked in bad air in Redmoor mine, he was ill for 6 or 7 weeks with pain in the chest, bad cough with expectoration, pain in the limbs, and weakness in the legs in climbing. Since then he has worked in a great deal of very bad air, but without being disabled from work. His health, however, has been impaired, and for some time he has been the subject of abscesses.	Working in bad air.	He has shortness of breath, and at times pain pain in the chest. He is thin, with a pale sallow complexion. There is great enlargement of the glands of the neck on both sides, some of which are suppurating, and there are several scars where others have opened. Chest apparently healthy. Heart sounds normal.	He says the average pay of the men lately has been 47s. per month.

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
109. Bodminland; Dyspepsia; August 1862.	48	60, Dead.	A miner, died of a lung complaint.	- - -	11 to 12	Tutwork -	First worked at Wheal Knott for 2 or 3 months, in the adit level, in good air, and then at Wheal Hope, in the 50 level, in good air for several months. After this he stayed at home at a farm for several years. Then went to Wheal Union for 6 months in 70 and 50 levels. Then worked at Great Wheal Fortune, Wheal Mabley, and Ninnis Wheal Virgin for 3 or 4 years, in good air. Then he went to Buckler's mine for 2 years on tutwork in the adit level, and in the 50. There was poor air and cold damp in the adit level. They were about 200 fathoms from draught, and had pipes with a waterfall, but the water was not sufficient. He felt no ill effect from it besides losing all the hair off his head (!). It was a cold place. Then went to Fowel Consols for 12 months on tribute in 160, 50, and 80 levels, the air was good but very hot. Then went to Buckler's mine for 12 months, from there to Mark Valley, Redmoor, and Holmbush, in the latter he worked 7½ years in the engine shaft in good air, but it was very hot under the 120 level.
110. Bodminland; Chronic rheumatism; August 1862.	51	48, Dead.	A miner; died with asthma.	- - -	11	Tutwork and tribute.	First worked at North Roskear for 12 or 15 years, on tribute chiefly, in 100 and 120 levels; the air was "not generally bad." Then he went to America for 2 years, where he worked in good air, then went back to North Roskear for 12 months in 130 level. The air was close, and there was a good deal of smoke. Then to South Caradon in the engine shaft for 6 years. Air middling, but a good deal of wet and sometimes cold. Then to West Caradon on tutwork for 6 years in the engine shaft, air good but wet and cold. Then he went on tribute in the same mine for 12 years, in the 80, 100, and 110 levels. Air close in some places. Works now at the surface, but has not done much these 2 years.
111. Bodminland; Miners' disease; August 1862.	26	66, Alive.	A miner -	- - -	8½	Tutwork -	First worked at Goginnen mine in Wales with his father, in the 40 level. They walked down an incline into the mine. The air was not bad there. He worked there 3 years. Then he went to Penrhew mine on tutwork in the 20 level for 12 months. The air was so bad that they could only work two in "a pair." He felt ill effects from it. Then he went to Llanvirknock for a year and a half on tutwork and tribute in the the 20 level. Air good there. Then went to Frank Mills for 2 or 3 years on tutwork and tribute, in the 30, 40, 60, and 84 levels. There was bad air all through that mine. In the 84 level they were 250 from shaft, and there was only one shaft in the mine. Then went to East Caradon where he has worked about 10 months on tutwork in the 50 level in bad air.
112 Bodminland; Miners' disease; August 1862.	56	30 to 40, Dead.	A miner, but died abroad.	- - -	10	Tribute at first and afterwards on tutwork.	He was slung by a rope when he first went underground. He first went to the United Gwennap mines, and worked there for 20 years; the deepest level was the 120. Did not work in much bad air there. Then came to Wheal Trelawny in 55 level for 12 months. Air close, but not bad. Then went to Wheal Trehern for 3 years in bad air in the 55 and 112 levels. Then came to West Caradon for 3 or 4 years on tribute in some very bad places, the worst he ever worked in in this country. In the 17 level it was very bad; this is the last place he worked at. He has not worked for 2 years.
113. St. Agnes; Chronic bronchitis; July 1862.	46	62, Dead.	A miner, died of miners' consumption.	A sister aged 54 died, who had a cough, and lost her voice for some time before she died.	15	Tutwork and tribute.	First worked at Wheal Leisure for 5 years in good air, in the 46 level. She is now "knocked." Then went to St. George for 4 or 5 years. Worked one month in bad air in the 10 level. He did not feel any ill effect from it, but a young man who worked with him was ill in consequence, and never worked afterwards. Then worked a month at East Wheal Rose, in good air. Since then he has worked at Carn Brea, Polberro Consols, and Saint George, and then came to Wheal Trevornance, where he worked until he gave up work about 18 months ago.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
13 years ago he had inflammation of the testicle, and was salivated for several days, and he has never had good health since. Directly after he was salivated he had liver complaint, with pain in the right side, and was ill about 2 years more or less. Ever since then he has had pain in the pit of the stomach, sometimes sickness and sometimes rising of sour water into his mouth. Occasionally he has been unable to keep anything in his stomach, for a week together.	- - -	Pale, sallow, sunken features. He is thin, but says, he has not lost much flesh. Has a dark areola around both eyes. Tongue pale and tremulous, covered with a little white fur.	
Has had pains in his limbs for 5 years, but about 2 years ago his knees and ancles and shoulders became swollen, and they have continued so ever since, but vary a good deal.	- - -	Says he is prevented from working by pains in his limbs, and swelling and stiffness in his joints. Has effusion into both knee joints, the right one being the largest. They are not tender on pressure. It goes, he says, from one joint to another. When he gets up in the morning he can scarcely move, but it goes off after half an hour's walk. He is a tolerably healthy-looking man. Tongue pale and tremulous. Says he has lost flesh considerably of late, but complains of nothing else than the pain and swelling in his limbs and joints.	
When at Penrhew in bad air, he had pain in head and stomach, lightness in the head, and was laid up for about 3 months. He was laid up for about 6 months after leaving Frank Mills, with pain in the head, back, and limbs, and he has never got rid of it, and suffers from it at times very much still. He now works at the surface, looking after the engine.	Working in poor air.	Has now loss of appetite, shortness of breath when under ground, not much cough, but has pain and trembling in the limbs. Sallow anæmic appearance, pearly white conjunctiva. Body thin, but not emaciated. Chest healthy.	
He felt himself failing for some months before he gave up work, and could not climb; and during the last 2 months that he worked he got so much worse, that being unable to get up the ladders he was obliged to give it up. This is 2 years ago.	Working in bad air.	Complains of shortness of breath, want of strength, trembling in the limbs, tightness in the chest. He has no pain, and no cough. He is thin in the face, and looks much older than he says he is. He says "56 is a brave age for a man in this country." Chest is rather dull at both apices, tubular breathing and increased vocal resonance over the left. Respiratory murmur is deficient, and inspiration is catching over the right. Behind, there is puerile respiration about the middle of the scapula on both sides, loudest on the left. Elsewhere respiratory murmur is normal. Heart sounds normal. Impulse feeble. Body thin, more wasted than his face. Not subject to perspirations. Has laryngeal breathing.	
He had "inflammation in the chest and pipes" several times. At one time he was at home 19 weeks, and 10 weeks at another time. About 2¾ years ago he broke his thigh, and he had not been at work again long before he was taken with bronchitis. He has been ailing for 4 or 5 years. His voice has become husky and thick for 6 months.	Exposure to cold.	Says he has a cough, with frothy expectoration, and his breath is very short. Has no pain except on coughing. Feels very weak, and has a very bad "appetite for meat." Has lost 20 lbs. weight during the last 2 or 3 years, but not much during the last 6 months. Rounded chest, prominent sternum, resonant on percussion. Behind on the right side there is diminished respiratory murmur, with large mucous crepitation; on coughing the expiration is prolonged with a cooing sound. On deep inspiration there is rhoncus, followed by prolonged musical expiration. At the extreme base, little besides mucous crepitation is heard. In the left lung the air enters freely and respiratory murmur is heard distinctly all over it. No difference in the percussion sound on the two sides. Heart sounds feeble but distinct. Pulse 100, soft and compressible. Face sallow and emaciated. Tongue clean. Not subject to sweating.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
114. Peterville; July 1862.	59	40, Dead.	A miner, killed by a fall from the ladders.	- - -	16	Tribute and Tutwork.	First worked at Fowey Consols for 2½ years. The air was generally good, sometimes a little flat when the wind was south. Then went to Landtiglis for 4 months. Then to Ligarthick for 2 years, in the 20, 30, and 40 levels; the air was generally good, but it was bad in the 40 for a week or two. Then worked at some iron works in Monmouthshire, where he worked in bad air for a month. The candles would not burn well and there were no safety lamps there then. There was a good deal of fire damp. They were in the mountain about a mile, and there was only one airway, and they worked about a ¼ mile from it. "There was always poor air there, and then the fire-damp would not go off; but if once the fresh air had come in, the fire-damp would have exploded." He had good health there. There was no climbing. Then went to Wheal Bise at St. Just for 12 months. He worked in the 100 level for 10 months. The air was very bad there, 180 from shaft. The other 2 months he worked in the 110 level where the air was not so bad, but not good. Then came to Polbrene for 4 years in the 30 and 40 levels. The air was tolerably good there, except when the tributers left the "deads" in the level, when the air was close in the ends.
115. Camborne; Consolidation of lung; Hypertrophy of heart; July 1862.	50	56, Dead.	A miner, killed by the explosion of a "hole."	- - -	11	Tutwork and tribute.	First worked at Ternevoor mine for 8 or 9 months, and then went to Wheal Golden for 3 or 4 years. He worked in close places in the 30 level as a boy. Then went to Polbrene; there were close and smoky places in the 20 level. Did not feel any ill effect from it then. Then went to Wheal Prudence for 7 years in the bottom level (70) in very close poor air. He was ill for some time. Then went to Wheal Coach for 2 or 3 years on tutwork and tribute. It was a bad granite mine; he worked in the 40 and 50 levels. The air was very bad. The candles would burn when on the side. Used to feel very weak in the knees and legs on climbing and was obliged to stop at every ladder almost for breath. Was not laid up then for long, but several times for a short time. Then went to Wheal Kitty for 3 years on tribute in the 55 level. It was a very sulphury poor place, with mundic. The air was very smoky and poor. The candles would melt with the heat, and it was also wet. Was laid up for some months while working there, with the same symptoms as before. Then got a little better, and went to work for about 10 months at Polberro Consols. The air was good there, and too much of it. It gave him cold.
116. St. Agnes; Rheumatism; July 1862.	25		- - -	- - -	14	- - -	The last mine he worked at was Wheal Quoit, a very cold, wet, and draughty mine. He worked about 30 fathoms below surface. He was taken ill there about 6 weeks ago.
117. St. Agnes; Chronic bronchitis and emphysema; July 1862.	63	60, Dead.	A miner, died from an injury.	- - -	25	Tutwork -	Before the age of 25, he was at sea. About 23 years ago he went to work at Wheal Coates for 4 years. During the last 12 months of this time he worked in poor air in the 70 level. It was a granite mine, cold and wet, the air was very bad, the candles would scarcely burn. It was about 60 or 70 from shaft. He was taken ill there. He was laid up about 12 months. Has worked at several mines since, but not in bad air.
118. St. Agnes; Old inflammation of lung; phthisis (?) July 1862.	55	- -	- -	- - -	17	Tutwork and tribute.	First worked at Wheal Bassett for 8 years. There was a little bad air at times, and he felt pain in the head and weakness in the knees in climbing. Then went to the United Hills for 15 years. Not much poor air there. Then went to Wheal Basset, and worked 4 years above the adit, sometimes in bad air, perhaps for 5 or 6 months altogether. Then he came home and worked at his own place. This is 12 years ago, and he has not worked at a mine since.
119. Trithell and Gulvall; Old bronchitis; August 1862.	38	40, Dead.	A miner killed in the mine by a stone falling upon him.	- - -	13	Tribute.	Has worked all the time, except about 3 years, at Ding Dong mine, and had very good health until 2 years ago, when he worked 3 or 4 months in the 40 level in bad air. After about a month he felt ill effects from it, but continued to work there for 2 or 3 months. He then went to another part and worked for 12 months, when he found he could not climb the ladders any longer, and had shortness of breath. He has been working at grass about 3 months.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
When working in bad air at St. Just, he was ill with pain in the pit of the stomach, shortness of breath, and weakness in the knees. Four years afterwards, when working in bad air he says he did not feel any ill effect from the air, but his breath was always getting shorter. He has had inflammation on the chest 7 or 8 times.	- - -	His chief trouble is weakness and shortness of breath, so that he cannot go up hill, and can scarcely lie down at night. He has swelling of the legs, which pit on pressure, and he sweats a good deal at night. Tongue clean, skin cool and moist. Pulse 100, full and compressible. Bowels usually rather relaxed. Chest generally resonant. Heart's dulness displaced downwards and inwards about 2 inches. Resonance at the ordinary seat of heart's dulness. Dry crepitation over right apex in front and behind, where there is increased resonance of voice. No bronchophony or tubular breathing. Respiration somewhat puerile. Heart sounds normal. Says he cannot lie upon his left side, but he can on the right.	
When at work at Wheal Prudence he was ill with shortness of breath, general weakness of body, and weakness in the knees. Had pain in the right side, head-ache, "sick stomach," but a tolerable appetite. Several times he has been ill since then, with the same symptoms. 4 years ago he thinks he took cold at Polberro Consols. Illness came on by degrees, and his breath got so short that he could not climb or work. He does a little work now out of doors, but his breath is too short for him to do much. He has spat a little blood.	Working in bad air, and exposure to cold.	Has not much cough, and spits up only a little white frothy mucus. Chest on right side at upper part, is dull on percussion (but not very) before and behind. At the same part respiratory murmur is heard, but not very loudly, and there is prolonged expiration and increased vocal resonance; no tubular breathing or bronchophony, no crepitation. This condition extends as low as the middle of the scapula behind, and to just above the nipple in front. Respiratory murmur over the rest of that lung is normal. Over the left lung there is puerile respiration extremely loud, but no other abnormal sound. Heart's impulse is diffused and forcible; the sounds are clear, the 2nd being remarkably distinct. No murmur, pulse full and rather hard. Body thin, but not emaciated.	
Has had pains flying about his joints for 7 or 8 months, but always had good health until 2 months ago. One Thursday evening after leaving work he complained of being very cold, on the Saturday following he had pain in the shoulders and shortness of breath, and felt faint and feverish. About a fortnight afterwards he had pain in the left side, which moved about, lasting about half an hour at a time. He had no cough. About this time he noticed palpitation of the heart coming on occasionally for an hour or so. This was accompanied by shortness of breath. About a fortnight ago his heart began to beat irregularly.	Exposure to cold.	Complains of weakness, and pains still flying about him. Has fluttering and palpitation of the heart on walking or on any excitement. Says he cannot walk because his breast is so tight. Appetite middling. Heart's sounds are clear, impulse very feeble, action easily excited, and occasionally irregular.	
Always had good health until he worked at Wheal Coates, 23 years ago. He was taken ill there with pain in the breast, shortness of breath; he had "a heavy load on the stomach," bad cough with expectoration of white frothy mucus (sometimes black), and weakness in the legs. He has had repeated attacks of the same complaint since, though he has not worked in bad air.	Working in bad air.	Complains of shortness of breath, when he moves about, but he is pretty comfortable when he has no cold, and his breathing is easy when he is quiet. He is a old-looking man for his years.	
6 years ago he went to Truro, and in going he caught a bad cold. He had "slow fever," and "inflammation," and was very bad for 9 months. About 2 years ago he first spat up blood, and has done so ever since, with an occasional interval. Has had a bad cough, but it is now better. He had a blow on the left side 3 years ago, and has had pain there ever since, but he had pain there before the blow.	Exposure to cold.	Has shortness of breath so that he cannot work, a cough with expectoration of bluish thick tenacious mucus, sometimes mixed with blood. Chest resonant on percussion, respiration clear, but different in character at the two apices, that at the left apex being brighter than the right, and at the left respiration is rather irregular, and catching. He says blood comes up if he exerts himself or has a violent fit of coughing. Heart sounds are regular and clear, no murmur.	
After working about a month in bad air he had shortness of breath, pain in the right side, and cough, but without much expectoration. He continued to work in bad air for 2 or 3 months longer, and then went into good air for 12 months, when he found the shortness of breath had increased so much that he was obliged to give up.	Working in bad air.	Still has shortness of breath if he exerts himself. Has no cough now. Says he has recovered his strength pretty well since he has been "at grass." Sweats a good deal when he moves about, but not at night. Chest resonant, respiration normal. Pulse feeble and compressible.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
120. Gulvall; Old bronchitis; August 1862.	62	- - -	- - -	- - -	14	- - -	He has worked the greater part of his time at Ding Dong mine and in a great deal of poor air. Worked in poor air 40 years ago in the 60 level, 36 from shaft, and felt ill effects from it. Since then he has worked in poor air places with gradually increasing ill effects. Worked last in poor air, 2 years ago in the 20 level, 30 from shaft. He found he could not come to grass, and then he gave up underground work, and has since worked at grass. He could not bear the smoke of the candles at last.
121 Ding Dong, Chronic broncho-pneumonia; August 1862.	53	35, Dead.	A miner, killed by falling away from a shaft.	- - -	12	- - -	He has worked nearly all his time at Ding Dong mine. Has worked in a great deal of poor air in the 40 level, not far from the shaft, without ill effect, also in the 60 level for 12 months without ill effect. 9 years ago he worked in poor air in the 30 level for 9 months. He was ill in consequence, but continued to work under ground for 4 years after that. The last month that he worked underground was in poor air. This was 4 years ago. He was then very unwell and was persuaded by the captain to stay above ground. He now belongs to "the dry," but is not able to do any hard work because of weakness and shortness of breath.
122. Ding Dong; Bronchitis and emphysema: August 1862.	47	62, Dead.	A miner	- - -	13	- - -	He first worked at Ding Dong, and with the exception of a year and a half at Bottallack, he has worked there ever since. Has worked in bad air in the 50 level. It is a dry and cool mine, and there is a good deal of dust. There is not much mundic in the mine. When he worked in poor air he could not work "so strong or so long" as in other places. He had occasion to work at the surface for a little time, and he found his health so much improved he would not go under ground again. This is 3 years ago. He now works at grass.
123. Redruth Highway; Dilated heart; August 1862.	50	- - -	- - -	- - -	9.	Tutwork and tribute.	First worked at Treskerby on boy's work, for 4 or 5 years in different levels; the deepest was the 50 level. The adit level here was 50. Then went to Poldice on tutwork for 3 years in the 20 level. He worked in poor air there, but says, "I felt no ill effect from it, as I was young then." Then went to Ting-tang mine for 6 months in the 90 level. Air rather close. Then to North Downs for 8 or 10 months in good air. Then to Wheal Seaton for 6 years. Worked in close air there for some months in the 20, 40, 60, and 80 levels. Felt ill effects from it, and was laid up for months together, and has never been well since. This is 26 years ago. He used to climb fast when he was young. Then went to Wheal Buller for 3 years, in the 13, 30, and 60 levels. There was very close air there all the time except for 7 months in the 13. Was laid up several months. Then went to Copper Hill for 12 months, in the 60 level, in tolerable air. Then went to Tincroft for 3 years in the 70 level. Worked in bad air there, and also in good air for 8 or 9 months out of that time whilst on tribute. Felt no ill effect from that mine. Then came back to Copper Hill for 12 months in the 60 level. The air was very close there. Was home ill 2 or 3 months out of the time with similar symptoms to those he had had before. Then went to Australia for 6 years. He did no good there, and he says he thinks men do better in Cornwall. Then went back to Copper Hill for 7 or 8 months in the 50 level. The air was very close, and he was laid up several times for a few days. Then went to Penandrea for 7 months on tribute, in 40 level. There he thinks he laid himself up, for he has never been able to work under ground since. He had to come out of the "pitch" sweating and to walk through cold water. He took cold from it, and in the evening he had a "chill," but continued to work for 2 or 3 days longer, when he found he could not climb the ladders for beating of his heart, and he has not been underground since. This is 1½ years ago.
124. Tavistock; Phthisis; August 1862.	43	30, Dead.	A miner, died from an accident.	- - -	14.	Tribute and tutwork.	First worked at Whea Franco for 18 months in 24 and 50 levels, from the surface. Worked in no bad air, but plenty of smoke, and there was only one shaft. It was a very hard footway to climb. Then worked at Wheal Friendship, Wheal Betsy, Wheal Marquis, and at Great Devon Consols. Worked in bad air in Wheal Friendship on tribute about 20 years ago, in the 150 and 170 levels. "I knew it was bad air by its effects. The candle gives a very dull light so that you can hardly touch or look at it without its going out." Felt ill effects from it. There was bad air in Wheal Betsy, and there was plenty of powder smoke, but he says he did not work in bad air. He then went to Wrixhill on tribute for 2 years in good air. Then went back to Consols in 70 level; plenty of powder smoke, but no bad air. Then went to Australia, where he remained 4 or 5 years. He had good health then. Then worked at Poldice in good air, then 1 month at Anderton mine in bad air and cold and damp. Then worked at Wheal Craby for 6 or 7 months on tribute in the back of the 12 level, not in bad air. Sometimes there would be a strong current of air, at other times none at all, and they had to fetch the timber from a level where there was a very strong current of air, and in that way he caught cold, but did not give up work for 2 or 3 months, but at last he was obliged to give up, and he has not been able to work for 15 months.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Had shortness of breath 40 years ago, but got rid of it. It was from working in poor air. Since then shortness of breath has come on very graduually from repeatedly working in poor air places. He had a cough when he gave up working underground, but it has left him since he has worked at grass.	Working in poor air.	Now he has nothing to complain of except a little shortness of breath, when he travels quickly. Slight deficiency of respiratory murmur is the only thing abnormal detected on examining the chest.	
He first felt ill effects from working in bad air about 9 years ago. He then had shortness of breath, a cough, and his heart used to beat a good deal on climbing. He continued to work under ground for 4 years, with increasing shortness of breath and cough, and becoming weaker.	Working in bad air.	He has not much cough now except in the winter when he takes cold. Chest:—Right side rather less resonant than the left, respiratory murmur is deficient, and there is crepitation all over that side. At the apex in front there is tubular breathing. On the left side respiration is puerile. Heart sounds normal. Body thin, and he says he has "not picked up any lately."	
Has not been well for 6 or 7 years. Shortness of breath came on gradually with a little cough, no pain, and but little expectoration. He first felt it in climbing. He then had fluttering of the heart as well as shortness of breath. He says he was then working in the 40 level where there was good air, but a good deal of dust.	Working in a dusty place.	He is a tolerably healthy-looking man, not emaciated. Chest resonant, mucous crepitation heard at the apex and base of right lung in front. Behind over the apex there is dry creaking sound, with prolonged expiration. The rest of the chest gives healthy respiration. Heart sounds are feeble. Says he feels well, and has not lost much flesh.	
26 years ago after working in bad air he had "beating in the heart," burning in the stomach, and shortness of breath. He was laid up for some months, and has never got rid of the palpitation of the heart. At Wheal Buller he says he had headache, pain in the stomach, and weakness in the limbs in climbing. He was cupped on the chest in several places about 12 years ago, when he says he was ill with sharp pain in the chest. At that time he was home only a few days, and he had no palpitation of the heart at that time. It is not more than 2 years since that came on badly. He took cold about that time, and has been much worse since then.	Working in bad air, but latterly from exposure to cold.	His heart beats very much if he moves about or goes up rising ground. When the palpitation comes on he gets dizzy in his head, and his sight gets dim. Has a burning in the right shoulder and stomach. Chest resonant on percussion, whistling noise with inspiration over the front of chest. Heart very irregular in its action, sounds very distinct, the 1st sound being very sharp. No murmur detected. Impulse feeble, diffused, and accompanied by a thrill which can be felt over the apex. Impulse and the seat of dulness lower down in the chest than normal, and the extent of the dulness is increased.	Wages 50*s.* to 3*l.* per month. Has nine young children.
20 years ago he felt ill effects from working in bad air. Headache, aching in the legs, palpitation of the heart when at work, but especially on climbing. He was not laid up for any time then. During the 2 years he worked at Wrixhill he suffered from pain in the side. About 18 months ago after taking cold he was taken ill with cough and spitting of dark tenacious mucus, and pain in the right side. He continued to waste and become very much reduced, and then was obliged to give up work. Used to have night sweats a good deal at one time, but has not now.	Exposure to cold.	Now complains of weakness, but says it is not so bad as it was. Has had a husky voice ever since he took cold. Has cough and expectoration of slaty-coloured mucus. Not much shortness of breath except when he walks up hill. Dulness, tubular and cavernous respiration, and bronchophony under the right clavicle. Respiration elsewhere is clear and free. Body thin, skin rather hot. Appetite good, tongue clean, bowels rather confined.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
125. Tavistock; Chronic bronchitis; pneumonia; (Phthisis?); August 1862.	43	- - -	A quarryman.	- - -	16	Tutwork and tribute, chiefly tutwork.	First worked at Curgreen for 12 months; a shallow adit level, a lead mine, good air. Then went to Wheal Lupus, for 8 or 9 months in 70 level. The air was "dead." "The candles would burn tolerably well, but we used to feel drowsy and sleepy when we stopped a bit." Then went to Wheal Friendship, in 150 level, for 2 or 3 years. The air was good, but the powder smoke lay dead. Felt weakness in climbing, and shortness of breath, and aching of the legs. Then went to Wheal Betsy for 9 months, in 90 level. Air not bad, but plenty of powder smoke. He felt the same ill effects there. Then to Great Devon Consols for 2 months in 90 level, air slight. Then to Vergis Lady, in 70 level, for 5 or 6 months. No bad air, but powder smoke was thick. Then went to the Devon and Courtney copper mines in the deep adit, 70 from surface. There was no shaft and no ventilation (13 years ago). The air was very bad. He was taken ill there. Worked in it 9 months till he could not work there any longer. The deep adit was being driven to meet the shaft, but it was not finished for the men could not work in it. Then worked at grass for 12 months, and then went to the William and Mary mine, in 20 level from surface. Air very good. Then to the Devon and Cornwall in middle adit (no shaft) for nine months between 200 and 300 from the month. The air was very bad and the powder smoke lay dead. Was ill for 6 or 7 months afterwards. Then went to Devon Great Consols for 5 or 6 years, 63 from grass, air good, but very hot, and there was a great deal of cold-damp. He used to have to send down timber, in his under-ground clothes, and then to go down to where it was very hot, and then after returning to grass he had to walk 300 or 400 yards to the changing house, exposed to all weathers in winter. This is 3 years ago. He thinks he caught cold here. He had a cough for 6 or 7 months before he gave up, but at last he could not climb 2 fathoms without stopping, and then he was ready to sink out of the ladders for want of breath. Has not been at work now for nearly 3 years.
126. Tavistock; Chronic bronchitis and emphysema; August 1862.	59	70 to 80, Alive.	A miner, but employed at the surface.	- - -	14 to 15	Tutwork and tribute.	First worked at Wheal Crebar for several years on wages. Air pretty good. Then at Barkle Hill for 5 years, in the 24 and 34 levels, also in the 60 level where the air was not particularly good. Then went to Wheal Rose for 3 or 4 years, in good air. Then to Wheal Franco for 8 or 9 years, in the 44 to 34 rise, where the air was very bad, and it was "a terrible bad place for powder smoke," 100 from shaft. He worked there for 2 or 3 months, and was laid up for 6 or 7 months afterwards, and the other 3 men who worked with him were all home ill at that time. Two of the men are since dead. Then went to Wheal Friendship for about 8 years in the 150 level chiefly in good air. Then went to Wheal Maria for 14 or 15 years. When he first went there, there was bad air in the 15 level for 6 months, and he was ill afterwards for several months. Since then he has worked at the surface. He used to go under ground but not to work; now he cannot go under ground on account of his breath. He has not been able to climb above 2 fathoms at a time for 14 years.
127. Tavistock; Mitral valvular disease of the heart; August 1862.	39	64, Dead.	A farm labourer. He occasionally worked at the mines.	- - -	15 to 16		First worked at Langston for 5 or 6 years, a manganese mine, now "knocked." Then went to Wheal Friendship in good air for 2 months. Then to Buttspill for 2 months. Air not very good, but no ill effects from it. Then to South Yew for 2 months. Then worked for some months at grass at Woodman's mine. Then went to Wheal Maria, and worked there 5 or 6 years, sampling ore, but not underground. Has not worked for 13 years.
128. Tavistock; Bronchopneumonia; tubercular (?); August 1862.	61	Dead -	A sailor died from chest disease.	- - -	9 to 10	Tutwork and tribute.	First worked at Old Crinnis mine for 5 or 6 years on boys work, in the 30 level. The air was very bad there and they were obliged to carry the candle sideways when they went into the level. "There was warm-damp there, which we consider does not do so much harm as cold-damp." He was in that level about 1½ years, but did not feel any ill effects from it. Then went to East Crinnis where he worked 3 or 4 years on tribute in the 50 level in good air. Then came to Boddle Hill for 17 years in the engine shaft. There was some bad air there, and what there was, was very bad. Some places were so bad that the men could not get into them to work. The candle would not burn in them. Then went to Ivy Bridge and Liskeard for a short time, in good air. Then came to Wheal Maria (Great Devon) where he worked 14 years on tribute chiefly, but some tutwork. Worked in very bad air there in the 40 level about 60 or 70 from shaft, (14 years ago). "It shortened my breath a little but did not lay me up, and I did not think anything of it." Then went to Wheal Emma for 12 months. The air was bad there in the 20 level, 40 or 50 from draught. He continued to work there for 5 months. "I was getting 9l. and 10l. a month because so one else would work in it, and the agent wanted it cleared away to make a shaft meet the draught." He then worked 7 or 8 months on tribute and was then obliged to give up altogether. He has not worked for 2 years and 3 months.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Thirteen years ago he was ill from working in bad air. First felt shortness of breath and cough, and he had a very loud beating of the heart. "They could hear my heart beat the length of this room (6 yards) and they would ask what noise it was. There was no climbing there, and it was the same walking or working." He was laid up for 9 months with pain in the right chest, and cough, but no expectoration. Was ill about 3 years afterwards with the same complaint, and laid up for 6 or 7 months. Seven months ago, he spat up about three pints of blood all at once. He continued to spit blood for 9 days afterwards, and then the expectoration became thick again like matter. About 3 months ago he again spat blood for a fortnight, bright in colour, and in large quantity at first. It occurred again in about a week, and again a day or two after. He was very weak afterwards, not being able to turn in bed. He has gained flesh and strength since.	Working in bad air and exposure to cold.	Pain between the shoulders, and in the chest on conghing, sometimes in the left side so that he can hardly breathe. Has cough and expectoration which is greyish, flocculent and lumpy, like the sputa of the phthisis. No sweating. No diarrhœa. Skin cool and soft. Pulse soft and compressible. Face tolerably fat, with a healthy complexion. Chest, general decrease of resonance over the right chest, where there is mucous crepitation (except at the apex where respiration is clear and as good as the other side). Left side rather dull in front, below, respiration distinct with mucous crepitation, and at apex dry crackling, with prolonged wheezing expiration; behind respiration clear and almost puerile. Respiratory murmur on the right side behind is distinct.	A marked instance of the injurious arrangement for changing clothes.
After working in bad air 14 years ago he had shortness of breath, cough and expectoration of white frothy mucus. Since then he has been unable to climb, and has always had shortness of breath.	Working in bad air.	Now he has shortness of breath, but not much cough or expectoration. Feels tolerably well when he is sitting down. Healthy looking complexion from working at surface, but he looks old. Body thin, chest very resonant all over it, rounded and not very moveable. Crepitation over both bases behind. Whistling noises all over the chest and prolonged expiration, with cooing and whistling sounds chiefly over anterior part down the sternum and over the position of the heart, where it is quite resonant. Heart sounds normal, faint. Pulse small, weak, skin cool. Respiration labouring, with prolonged wheezing.	
Thirteen years ago he was taken ill with fever and inflammation of the lungs. He was in bed 6 weeks, and he has never worked since. At that time he says he was insensible for some time, and had pain all over him, but has never had rheumatism that he is aware of. He has never had much climbing. He never had palpitation of the heart before his illness.	An attack of fever, and inflammation of the lungs.	Complains of weakness, soreness in the chest, pain in the back and legs. Has a little cough, and a little thick expectoration, headache, and palpitation of the heart. Chest resonant, respiration healthy. Heart:—1st sound indistinct, and accompanied by a murmur in axilla, not heard elsewhere. Impulse very sudden, felt most distinctly about 2½ inches below the nipple, but also from there down to the edge of the ribs. In the epigastrium there is considerable impulse. There is dulness over the same extent of surface. Its action is somewhat irregular and occasionally intermittent. Pulse very small, quick, and compressible.	
Three years ago after working in bad air, he was taken ill with a bad cough, and spat blood for about 3 months at intervals. He has lost flesh very much for 2 years.	Working in bad air.	Now complains of weakness and shortness of breath, sinking in the chest, palpitation of the heart on going up hill. Sweats a good deal in the mornings. Fingers clubbed at the ends. Pulse quick, small and weak. Chest has but little motion, respiration being chiefly abdominal. Right side is duller than natural especially at the apex, there is deficient respiratory murmur, and mucous crepitation over the front, also behind, where the expiration is prolonged and of a bronchial character. At the base behind, respiration is clear and puerile. Left side is very dull all the way from the clavicle to the edge of ribs within the line of the nipple, except a small piece near the shoulder where it is not normally resonant; behind there is dulness, prolonged loud expiration with some mucous crepitation as low as the inferior angle of scapula, below that, resonance and puerile respiration. Vocal resonance is increased over the front and upper part of left chest behind. Heart sounds are very distinct, 2nd sound double and heard all over the left side anteriorly where the dulness extends especially at the upper part near the inner end of right clavicle. Impulse feeble, but can be seen and felt over the greater part of the same portion of chest, clearly seen two inches above the nipple; action regular, quick and feeble. Expectoration thick, yellow; not much of it. Body thin.	Habits not very temperate. Says he paid 9*d.* a month for 12 months to the club and 9*d.* for the doctor. He was attended by the mine doctor, but received nothing from the club because he had "no hurt."

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
129. Tavistock; (?); August 1862.	36	77. Dead.	A miner -	- - -	16	Tutwork and tribute.	First worked at Wheal Friendship for 12 years, in the 150 level, and in the 220 level. There was bad air in the 220, where he was "driving" from one shaft to another. He only worked there a fortnight. There was warm-damp there also. He did not feel any ill effect from it. Then went to Wheal Anne for 4 years, in the 28 level. The air was very bad there. He worked in it for 2 years, and was ill in consequence. The air pipes were brought in to within 2 fathoms of the end, but still the air was bad. He did not give up work. Then went back to Wheal Friendship for 12 months, in good air. He was hurt by the explosion of a hole aftsr being there a few months, and afterwards worked at grass. He has not worked for 8½ years.
130. Tavistock; Dyspepsia; August 1862.	63	- - -	- -	- - -	- - -	- - -	He has not worked for 4 years.
131. Tavistock; (?); August 1862.	33	- -	- - - -	- - -	13	- - -	He worked at Wheal Friendship for 5 years in the 150, 160, 200, and 40 levels. The adit is 40 undergrass. He used to climb very fast for 12 months, "like most youngsters," and used to feel exhausted, and had no breath when he reached the top. He never worked in bad air. He has not worked under ground for 18 years.
132. Tavistock; Miners' disease; August 1862.	31	38. Dead.	A miner, died suddenly from the bursting of a blood vessel.	- - -	16	Tutwork -	First worked at Wheal Maria for 8 or 9 years. Did not work in much bad air there. There was a little in the 28 level, where he worked for 2½ years. He was at home several times during that time with pain in the head and limbs. It went off after 3 or 4 days. He then went to Wheal Russell for 3 years, in the 55 level from grass. There was no adit, as it was level with the river. It was the worst air he ever worked in. The candles would not burn. He worked in it for 12 months, and was then laid up for 5 months, and afterwards worked at grass for 10 months. This was 3 or 4 years ago. He then went to East Wheal Russell, where he has worked ever since. There is bad air where he is working at the present time. He says he cannot leave it because he has a family and cannot afford to give up work. He is now working in the 88 level from grass, in a rise about 100 from shaft, 35 from a winze, and has got about 2 fathoms to get to the next level.
133. Tavistock; Old bronchitis, and emphysema; August 1862.	35	- - -	- - -	- - -	14	Tutwork and tribute.	First worked at Wheal Friendship for 8 years in the 70, 112, 170, and 190 levels. No bad air there, but a great deal of powder smoke. Then went to Virtuous Lady for 2 months, in the 40 level, but the air was so bad that he gave it up. The candles would not burn upright. He felt no ill effects from it. Then he went to Wheal Courtney for 12 months, in the 30 level, part of the time, and 8 months sinking a shaft. The air was good in the 30 level, but in the shaft it was very bad. They had a fire machine. It was bad even with that, but before that they could not work at all. He has been drawn up sometimes almost lifeless. He was ill for some time after it with shortness of breath, not much cough, and headache. He always felt tired and weary, even when at work there, and had pain in his legs when climbing. Since then he has been at Wheal Maria for 10 years. It has been very hot indeed during the last 3 years, and the air has not been particularly good. He has been sinking the shaft, which is now 212 fathoms below the surface. It is very hot at the bottom, and in coming up it is very draughty.
134. Beeralston; Miners' disease; August 1862.	52	- - -	? - - -	- - -	12	- - -	Worked at Ockle Tor for 12 months, in poor air and powder smoke in the 56 level, 200 from shaft and 30 from winze. There is only one shaft. There was cold damp there. He was laid up two or three times during the winter. It was hot where he worked, but not so hot as some mines he has worked in. He has been away from work about 6 months.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
When working at Wheal Anne in bad air, he had fluttering of the heart and pain in the limbs, shortness of breath, and weakness of the legs in climbing. Whilst working at Wheal Friendship at grass, he was taken ill suddenly with weakness, so that he could hardly get home; he got rapidly worse, and kept his bed for 12 months. He had pain in all his limbs for 12 months, and could not move, but he does not remember his joints being swollen. He had fluttering of the heart, and sometimes could not lie down in bed. This is about 8½ years ago, and he has not been able to work since from shortness of breath and fluttering of the heart.	- - -	Chest resonant, respiration feeble and shallow. Heart sounds at the present time are regular, clear, and distinct, the 1st being rather more so than usual. No murmur or irregularity about it. Impulse feeble; no increased extent of dulness. He says the fluttering of the heart comes on whenever he walks quickly, or upon any excitement. It seems to flutter and stop. He has sharp pain in the chest and shoulders at that time. He then loses his senses for about 3 hours, and does not feel well for days afterwards.	
He was quite well 5 years ago. About 4½ years ago he first complained of pain across his loins. He had also weakness, but continued to work for 4 or 5 weeks, when he was obliged to give up. His legs feel dead, but the right is the worst and the weakest. He says he had not worked in a wet or cold place for 7 or 8 years before it came on. Before that he had worked in some very wet places. He has headache at times, and pain in the shoulders, but feels pretty well above his waist.	- - -	Urine contains a large quantity of lithates and lithic acid (red sand). Chest normal. Tenderness on pressure over right hypochondrium. No pain or tenderness about the back. Sometimes he has pain in the stomach after meals, and "rising" afterwards. He cannot take much animal food, as he feels uneasy after it.	
He felt pains all about him, and palpitation of the heart, and shortness of breath, for months before he gave up work. Then he caught a severe cold on the chest, which lasted for several months. He then stayed at home for 2 years, with dropsy in the chest and bowels, but no swelling of the legs. He was blistered over the heart numbers of times. He was at home 5 years, and then went to work at grass, where he has been ever since.	- - -	Chest normal. Heart's action is quick and excitable. He is agitated and acts like an hysterical girl, and breathes in an irregular sighing manner. Flinches when touched. He is a healthy looking man, with large grey eyes and large pupils. Unmarried.	
When working at Wheal Russell 3 or 4 years ago he had shortness of breath, weakness, and spitting of blood. He was failing for several weeks, being languid, and had headache, so that he used to tie his head up with his handkerchief. He had not much cough, but spat up a little mucus, streaked with blood. He has been ailing about 4½ years; when he works he shakes all over; not so much when working in good air, but even then he cannot work so well as he used to do. He has shortness of breath when he climbs. Last week he spat up about a table spoonful of bright red blood. Says he has lost flesh for 3 years, but not much lately.	Working in bad air.	Healthy colour and appearance. Body not at all thin. He sweats a good deal when at work, but not much at other times. Has a little cough and expectoration when he hurries, not much at other times. Chest resonant, general deficiency in intensity of respiratory murmur, but no actual disease detected besides that.	An instance of a man continuing to work in bad air at the present time, "because I have a family, and cannot afford to give up work."
He was taken ill about a year and 8 months ago. He got a chill in looking after the pump engine. He then had a bad cough, and had to give up work after a time. He was at home for 12 months with cough, weakness, loss of flesh, great expectoration of a yellow, slaty, and green colour, sometimes streaked with blood. He is now much better, and has been at work again about a week.	Exposure to cold.	His voice is hoarse (he lost his voice directly he took cold), and sometimes he has soreness on speaking. Has a bad cough, with expectoration, chiefly in the morning. No sweating now. Never had any diarrhœa. Chest resonant, respiration healthy, slight crackling expiration at each apex, no increase of vocal resonance or crepitation. Heart sounds normal.	
Says he was taken ill with shortness of breath, which came on whilst he was at work in the mine. He had a cough, which has never left him. This is about a year and a half ago. About a month ago he spat up about a teaspoonful of blood with a cough. He had spat blood several times before that, the first time about 3 months ago. Since he has given up work he has had palpitation of the heart. His wife says he has been gradually failing for several years.	Working in bad air, and exposure to cold in going to and from the mine.	Sunken emaciated features, dark areola around the eyes, pale and sallow complexion. Chest generally resonant. There is limited dulness over a space about 4 inches in diameter on the right side in front and behind, about the middle of the chest. Resonance above and below it. There is tubular breathing at the same spot, and mucous crepitation. On the left side there is prolonged emphysematous crackling over the upper part of chest behind. Heart's dulness increased downwards, impulse feeble, no murmur. Pulse sharp, small, and very compressible. Expectoration (he says) is quite black, sometimes frothy. It has become black since he left the mine (?)	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
135. Beeralston; Contraction of side after old pleurisy; August 1862.	50	76, Alive.	A mason -	- - - -	22	Tutworkand tribute.	Before he went under ground he worked as a farm labourer. First worked at Gunnislake for 2 years. There was very bad air there, in the 90 level. He did not feel any ill effect from it. Then he went to Holmbush near Callington for 6 months; not much bad air there. Then worked in Cowey's mine (South Tamar) for 4 or 5 years. There was very poor air there. He felt shortness of breath and loss of appetite several times there, but never knocked off work. Then he went to East Wheal Russell for 2 years. There was poor air there. He nearly lost his life there by going up into a rise about 10 minutes after they had fired "a hole." He felt lightness in the head, and then became insensible. His comrade was so also, and they both fell down the rise into the level, about 19 feet. He cut his head, but did not injure himself much. He was ill for a week after that, being weak and unnerved, and felt as if he had no strength left in him. He had shortness of breath, but no cough. This is about 5 years ago, and he has never been so good a man since as he was before. Then he went to Gordon Mine for 3 years in the 36 level and the 24. He worked in a great deal of poor air there, and in wet places.
136. Beeralston; Dysenteric diarrhœa, miners' disease; August 1862.	24	60, Alive.	A miner -	- - -	10	Tribute and tutwork.	First worked at Wheal George on boy's work for 3 years, in different levels; the deepest was 40. There was good air there. Then he went to Wheal Calmedy to drive a level into the side of a hill, where there was no shaft. The air was very bad, and there was a great deal of powder smoke. Worked there 12 months, and was laid up several times during that time. Then went to several small mines for a few months, chiefly at grass work. Then he went to Wheal Franco on tribute for 6 months, in the 80 level, in a rise between the 70 and 80. There was very bad air there, and when they went to work in the morning the cold damp would settle all over the top like a cloud. A candle would go out instantly when put into it, and they could not breathe in it. They used to "break it" by firing a bag of powder in the place. They used to climb very fast, partly because the shaft was so wet that they got "half drowned," and partly because the kibble was sent down the same shaft, and sometimes the chain would break and cut through the boards into the ladder shaft. They generally used to get out of the way when the kibble was coming down, but it was very cold and wet standing in the levels to wait for it. Then he worked on the railway for 12 months, and then went to North Wheal Roberts for 12 months, in good air. Then went to East Lady Bertha on tutwork for several months, sinking a grass shaft about 6 fathoms deep, but the air was so bad they could hardly keep a candle burning. He felt very unwell most of the time with headache, but did not knock up work, and at last they put in a windfall, which improved it a little. Then came to Gordon Mine on tribute for several months, in good air. Then he went on tutwork in the same mine, in very bad air, and in wet and draughty places. He was laid up frequently during that time for 3 or 4 weeks together. Then worked at grass for 3 months, and then went to the Devon and Cornwall United for several months on tribute. This is the last place he worked at, and he has been away from work about 6 months.
137. Beeralston; Dilated heart; August 1862.	30	53, Dead.	A rope maker.	- - -	16	Tribute -	First worked at North Yew (now "knocked") about 3 months. "The air was so bad there that we could not keep a candle alight sometimes. It did not affect me much; the other men complained of headache." He had violent beating of the heart in this mine, and the last day he was obliged to be helped up with a rope because of palpitation of the heart and weakness. He had felt himself failing for some time before that. Then went to South Yew at grass for some time, and has not worked under ground regularly since. He has been working at Lady Bertha for 5 years, and has been occasionally under ground for a day or two.
138. St. Cleer; Miners' disease; August 1862.	50	80. Dead.	A farmer.	- - -	20	Tutwork and tribute.	Up to the age of 20 he was a farm labourer. Then went to work at Wheal Kitty for 12 months, filling the kibbles. Then went to St. George for 4 or 5 years in tutwork in the 60 to 90 levels. No bad air. Then went to Budanick mine for 12 months on tribute in 52 level, in good air. Then he came to Clinnagan mine for 12 months in the 40 level. There was some bad air there. There was very bad air in the 50 level. He did not feel any ill effects from it. Then he went to South Caradon for 3 or 4 years on tribute in the 50 and 80 levels. Middling good air, but the candle would not always burn well. No ill effects from it. Then went to West Caradon for 14 or 15 years, chiefly on tribute, in the 38 and 116 levels. The air was very bad in the 116 level. He was taken very ill there. He worked in that level about 2 months, and then worked at grass for a day or two, when he was taken ill. He was at home for 8 months, and then went to work again in the same mine, but in good air. He worked for 2 or 3 days, but was obliged to give up again, and did not work again for 6 months more. Wages for self and son 50s. He has 9 in family.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
He felt ill for a good while before he gave up work, with shortness of breath and difficulty in climbing the ladders. At last, however, he was obliged to give up work in consequence of catching a bad cold. He then had pain in his right side, which he has never got rid of. He lost flesh rapidly for 8 or 9 months, but since then he has not lost much. He had great palpitation of the heart for some time before he left off work, and since then he has felt it at times, and even now his heart sometimes flutters very much he exerts himself. For 2 years after he was taken ill he says he was unable to lie on his left side. If he turned over on that side in his sleep he became almost insensible and unable to breathe. During the last year he has been able to lie upon that side, but even now he cannot do so if he takes cold.	Working in bad air and exposure to cold.	He has now shortness of breath, pain in the right side, and general weakness. Has cough when he takes cold, but not much at other times. Expectoration is then thick, white, sometimes dark. Chest dull over both apices in front, right side moves but little, and there is more or less dulness all over it. There is also deficiency of respiratory murmur, and what there is is distant, feeble, irregular, and catching. Left side moves freely; has normal respiratory murmur over it, though more dull at apex in front than normal. No increase of vocal resonance on either side, and tactile vibration is felt all over both sides. Heart's sounds clear; impulse feeble. Pulse very small, feeble, and compressible. Pale sallow complexion; pearly conjunctiva.	At the last mine he worked at, Gordon Mine, there was no "dry" or changing house besides the smith's shop.
Says when working in bad air at Wheal Franco he suffered dreadfully with headache, pains in the limbs and all over him, bad cough and spitting. He had palpitation of the heart very much, chiefly when climbing; but he thinks it was the powder smoke and bad air that caused it. This was about 6 years ago. Again 3 years ago he felt similar ill effects from working in bad air. When at Gordon Mine about 2 years ago, he says he was very unwell, had heartburn, sickness, pain in the head, and bowel complaint, which latter has continued nearly ever since. He had also shortness of breath and palpitation of the heart. Six months ago he was taken ill coming away from the mine, though he had felt ill before he left. The air was good, but it was draughty and wet. He had stiffness and cold shivers, pain in the limbs and side, and bowel complaint. The bowel complaint was very bad then, and he has had it very much ever since. He has tenesmus and griping pains in the stomach, and passes a great deal of slime, with great pain in passing his motions.	Working in bad air, and exposure to cold.	Has still shortness of breath, pain all over him, palpitation of the heart on exertion. Says he has not lost flesh very much. Chest apparently healthy. No tenderness on pressure over abdomen. Body stout, well nourished. Tongue clean, natural. Pulse slow, small, feeble.	
After working in bad air at North Yew, he was laid up for 2 years with beating of the heart. He afterwards went to work again, but he never got rid of it entirely. About 2 years ago he was laid up again with palpitation of the heart for a fortnight, when he went to work again, but only worked one day, and then was laid up altogether. It is only lately that he has been to work again a little at grass.	Working in bad air.	Occasionally feels palpitation of the heart, and complains of general weakness, which prevents him doing man's work. Heart's action at the present time is regular, sounds clear, impulse normal, extent of dulness somewhat increased. He says palpitation comes on very often after a full meal. He suffers from wind in the stomach, and is much blown up after taking food.	
About 3 years ago he says he took cold after working in bad air, and had vomiting and purging for 4 days. He has never been well since, though he has continued to work at the mine at intervals.	Exposure to cold after working in bad air.	Pain in the pit of the stomach and chest and between the shoulders. Weakness across the loins. Has not lost flesh for 2 years. He sweats very much, but not more at night than by day. Tongue pale, with slight creamy fur. Chest, nothing wrong detected. Body in good condition, good appetite.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
139. St. Cleer; Miners' disease; August 1862.	36	77	A miner -	- - -	12	Tutwork -	First worked at Wheal Providence, for a few months, blowing an air machine. Then went to Dolphin Bridge for a few months, filling the kibbles, in good air. Then he worked at grass for 4 or 5 years, and afterwards went to St. Ives Consols for a year or two on tutwork in the 60 level. The air was not bad there. Then worked at grass for 6 months, and then went to West Caradon about 3 months on tutwork in the 60 level. Air tolerable. Then went to Wheal Speed for a year or two in the 50 level. The air was not good, but he did not feel any ill effect from it. Then went to Ballenew for 5 or 6 years, (part of the time at grass,) in the 10 and 14 level from grass. The air was dead, and there was a good deal of smoke. He was ill after working there, and was laid up for five months. He then went to work at Wheal Venter for some months in a shallow level. The air was not very good, and it was a smoky place. Then worked at Wheal Conqueror for 3 months. The air was not very bad there. Then he worked 7 months at Clarkenwater, sinking the shaft. The air was not bad, but it was a wet place. He caught cold there and was at home a week. Then went to South Finnicks, East Crowndale, and St. Ives Consols, each for a week or two, The air was not bad at the latter place, but the smoke "lay a good deal." Then worked at South Finnicks for 2 or 3 years in the shaft from the 60 to 100 level. The air was bad, and they had a blowing machine. There was cold damp also. Then he came back to Gunner-main for 2 or 3 years, in the shaft part of the time, and in a "cross cut" in the 80 level during the remainder. They had very poor air there, and a great deal of smoke, but he did not take much notice of it at that time. Then went back to South Finnick shaft. The air was not good, but not very bad. Then went to Caradon Consols for 6 weeks in the 50 level, and at surface. Then went to West Caradon for a month in the 140 level. Was taken ill there, and then worked at the surface for 3 months, and then went into the 17 level in a rise. The air was not very good, but he worked there for several months. Then went back to South Finnicks in the 100 level. Air not very good during the last month. He was taken ill there, and has not worked since. This is 16 weeks ago.
140. Gunnermain; Miners' disease and recent pleurisy; August 1862.	41	54, Dead.	A miner up to the age of 50, when he was taken ill, but left the mine, and afterwards lived till 54.	- - -	12	Tutwork and tribute.	First worked at Wheal Rock 4 or 5 years on wages, in different levels; the deepest was 60 fathoms. Did not work in bad air there. Then went to Bean mine for 10 years in the 100 and several shallow levels. He worked in a great deal of bad air there. "It was a bad air mine, and killed scores of men." The air was bad in all the levels. They could not work hard or long in the same place, and the candles would not burn except when inclined. It was a granite mine and full of timber, "which eats the air." He felt faint whilst in the air, and when he came out, had headache, trembling of the limbs, and could not climb for weakness in the legs. He worked at these two mines for a good many years. "We cannot always choose where we will work when we want money." Eight years ago he came to South Caradon, where he has worked ever since. He worked on tribute in most of the levels. There was bad air and cold damp in the 22 level. He worked in that place about 4 months, and injured himself a good deal, "in fact I have never recovered from it." He knocked up work there because the air was so bad. He worked on very well until they had an air machine, and then when the air was blown in he was laid up with inflammation of the lungs. He went to work again after 3 or 4 months, and 7 months ago he took cold at the dressing floors, and has not worked since.
141. St. Cleer; Catarrh; August 1862.	28	- - -	- -	- - -	21	Tutwork -	First worked at South Caradon for 8 months in good air, and then went to Caradon Consols, where he worked in the shaft for 6 months in bad air. He was ill for 3 weeks, and two or three times besides for a short time each. Felt weakness, shortness of breath, and headache. Then went to Wheal Marshall for 3 months, on tutwork, in the 35 level. The air was bad, but he was not unwell there. Then he went to Mark Valley for 12 months, in the 65 level. There was too much air there, causing a draught. He was home bad during that time with "slow fever" for 2 or 3 weeks. Then he went to West Caradon, where he has worked ever since, about 4 years. Worked for 2 years in poor air in the 155 level, but did not feel any ill effect from it besides a little headache, and pain in the thighs on climbing; but he has been home sick for 2 or 3 days at a time, and then got to work again. He has been working in very good air for 11 months in the 155 level. There is a good draught there.
142. Challacut; Miners' disease; August 1862.	48	- - -	A farmer -	- - -	16	Tutwork and tribute.	First worked at Hurland mine for 2 years, on tribute, in the adit, 17 and 30, levels. Worked for 3 or 4 months in bad air, the candle being inclined on one side. He did not feel any ill effect from it. Then he worked at Mabley mine, for 12 months, in the 17 level. The air was bad there for 3 or 4 months. He was taken ill there. Then went to Wheal Providence for 4 or 5 years, 3 years in the engine shaft and in the 17 and 30 levels. No bad air. Then he went to Buckler mine for 12 months in the 17 level. No bad air. Then came to Caradon Consols for 7 or 8 months in the adit, a cold and wet place. They changed their clothes in an old outhouse; no fire or "dry." Then went to West Caradon for 20 years, on tribute chiefly, in the 50 level mostly, also in the 104. Worked in bad air for a fortnight or so at times, but not for long. During the last 4 months he worked in the 17 level, a very cold place, as the draught was so strong that the candles would scarcely keep alight, and they used to take matches to light them. He has been away from work about 14 months.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
Eight years ago he worked in bad air, and used to feel lightness in the head and sickness at the stomach; he then took cold at the surface, and had fever and inflammation in the side. He was laid up nearly five months. Six years ago, whilst working at South Finnicks in bad air, he was home ill several times during the course of 2 or 3 years, with pain in the head and stomach, weakness in the knees, and shortness of breath and cough. Two or three years ago he worked in the same mine for several months, and was home ill several times during that period for a week or two. When he left the mine he was at home ill for 5 weeks, with pain and lightness in the head, pain in the left side, sickness at stomach, and weakness. He was again taken ill at the same mine 16 weeks ago. He was working in a wet place and took cold; he felt shivering for a day or two, and then gradually got ill, had pain in the head, sickness at stomach, bad cough, but not much expectoration, shortness of breath, sweating and weakness in his limbs.	Working in bad air and at last exposure to cold.	Now complains of weakness of body, shortness of breath, pains in the chest, worse sometimes than at others. Not much cough, but what there is, is of a spasmodic character, and not accompanied by much expectoration. Pale sallow complexion. Body thin, but not emaciated. Chest resonant on percussion; diminished respiratory murmur, but no abnormal sounds, except slight crepitation over the middle of both lungs behind. Heart sounds normal. Pulse small and weak. Skin moist and cool. Appetite variable, but never very good.	
Four or five years ago he was laid up with inflammation of the lungs after working in bad air. He had pain in the side, no cough, and was laid up 3 or 4 months. Seven months ago he took cold whilst working at the "dressing floors" in the winter. It was about Christmas, and very wet weather. He had inflammation in the left side and shoulder, but no cough at that time. He was in bed about 6 weeks, and has not been able to work since, though he has tried occasionally for a day or two. He found his breath at that time very bad on climbing, and had a dragging feel in the left side.	Working in bad air, and then exposure to cold.	Has now pain in the right side and a load on the chest. Has a bad cough, and spits up a good deal of dark mucus, sometimes yellow and streaked with blood. He is very weak, and has lost flesh a good deal. Pale sallow complexion, sunken features, pearly conjunctiva, lips pale. Chest less resonant under the right clavicle than the left, and respiration is there somewhat deficient, but not abnormal in character. At the lower part of right chest behind there is a very distinct friction sound, and he has complained of a little pain there during the last day or two. Respiration irregular and catching over the left side, but clear and louder than on the other side. Heart sounds normal. Pulse small, feeble, compressible. Tongue clean at tip; rather furred at the back part.	
About 10 days ago he took cold, and the next day was unable to work from weakness and pain in the head. He has not been able to work since. He has no cough.	Exposure to cold.	Loss of appetite. Sweats a good deal in the night. Pulse slow, full, compressible, soft. Tongue pale, flabby, covered with a white creamy fur. Chest clear.	
Many years ago he was taken ill from working in bad air in Mabley mine. He felt pain in the right side, headache, nausea, and sickness. He used to complain of feeling ill, and one day when in the level he fainted, and was afterwards ill in bed for about 5 weeks. The mine was not hot. About 2 years ago he caught cold whilst working in a draughty level. He had pain in the back and general weakness, and he has been gradually failing in flesh ever since.	Exposure to cold.	He has no cough, no pain in the chest. Has a pain and hardness in the pit of the stomach, and palpitation of the heart, which he noticed whilst at work about 2 or 3 years ago. Body thin, but not emaciated. Chest healthy. Tongue clean. Pulse small and compressible.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
143. Kerrerbridge; Dilated heart; August 1862.	56	67 Dead.	A farmer -	- - -	30	Tutwork -	Before the age of 30 he worked as a farm labourer. First worked at Redmoor, about 18 years, "tramming" in all the levels. Worked in a great deal of bad air. Some, in the 70 level, was so bad that they could not work above one or two strokes at a time. In the 90 level it was so bad that the men could not carry a light along the level. They used to push along "the tram" in the dark, and when they came to where the men were at work they were obliged to put their candles in the air-pipe to keep them alight. He felt no ill effect from that beyond weakness in climbing and shortness of breath, and some sickness at the stomach. He was never laid up for any length of time. He used to work here in the 112 under adit, 142 from grass. It was a "very hard footway," and he used to climb hard sometimes. Then went to Lidcut for a few months, in the 80 level, in very dead air. Then he went to Wheal Ray, for a few months, in the 50 level. Air pretty good. Then went to Mark Valley for 2 months, in the 80 level, in very dead air. Then to Appledore, driving a level under a hill. The air was good there. Then to Wheal Hooper for 4 or 5 years, on tutwork, "tramming" in the 47, 60, and 90 levels. The air is good there. He works there now.
144. Bodminland; Miners' disease; August 1862.	58	- - -	A soldier -	- - -	21 to 22	Tutwork and tribute.	First worked at Bardon mine, near Blue Anchor, for 2 months, in the 40 level. Air good. Then went to Drakewells on tutwork, for 7 months, in 70 level. Then to Wheal Franco on tutwork, for 6 or 8 months, in the 30 level. Air not good there. Candle inclined. Then to Busy Pool for 9 months, in the 124 level. The air was "dead." He used to feel weakness in the legs in climbing, "but nothing to hurt the body." Then he went to adit's foot for 1½ year, sinking from grass, in good air. Then to Beckenwood, for 7 months, in good air. Then to Treburgat for 2 years, on tribute, in the 10 level. Air not bad there. Then to Singinnis for 3 years, in the 20 level, in middling air. Then back to Treburgat for 2½ years, in the 40 and 60 levels, in "dead" air. Then to Wheal Mather for 12 months, in "dead air," in the 50 level. Then to Holmbush for 3 years, in the 90 level. Air sometimes "dead." Then to Wheal Mather for 6 months in the 70 level, in "dead" air after "shooting." Then to North Holmbush for 9 or 10 months on tutwork, sinking a grass shaft. Air was very well there. Then to Simonward for 5 years, on tutwork, in 24 and 35 levels. The air was "dead" there. Then came to Trewether for 4 years, on tutwork, in the 40 and 70 levels. Air very often "dead" there. Then to Wheal Mary Anne for 7 months on tutwork, in the 110 level, in bad air. Then to Lidcut for 6 months, in good air, in the 40 and 60 levels. Then to Redmoor for 6 months, in the 110 level, in dead air. Then to Caradon Slades for 4 months, in a grass-shaft and in the 60 level. In the level the air was "dead," but in the shaft it was good. Then came to South Caradon for 10 months, in the 70 level. Air good, by a machine. He is working there now.
145. Bodminland; Debility; August 1862.	20	52 Alive.	A miner -	- - -	13	Tribute and tutwork.	First worked at West Caradon for 5 years on tribute, in the 17 and 70 levels. The air was very bad in the 17 level; the candle would not burn, except when inclined. Then he went to East Caradon on tutwork, for 6 months, in the 50 level. There was poor air in that level for a month. Then to South Caradon for 15 months on tribute and tutwork, in the 50, 60, and 80 levels. The air was bad in the 50, and he worked in that for 3 months. He is now working in the 80 level, where the air is good. His wages are 45s. to 50s. per month. His father averages 4l., and his brother 45s. to 50s., and there are eight of them in family. He gets about 3 or 4 lbs. of meat a week.
146. Bodminland; Debility; August 1862.	37	54 Dead.	A miner; died in a decline.	- - -	9	Tutwork and tribute.	First worked at Fowey Consols, about 12 years on tutwork in the 70 and 190 levels. He worked in a great deal of bad air in the 90 level for 4 years. Then went to Redmoor mine for 3 months on tutwork, in the 90 level. The air was not very good. It was very wet, and they only worked 4 or 5 hours at a time. Then went to Herod's Foot for 3 years, on tutwork chiefly, in the 60, 70, and 80 levels. He worked in very bad air in the 60 level for 4 months, when he worked on tribute. He lost his appetite and had weakness of stomach. He got his leg hurt here, and was laid up for 2½ years, and then worked the engine for 3 years. Then he went to Spain for 1½ years as an engineman. Then worked at South Finnicks for a year, in the same capacity. He also worked 12 months under ground, at South Finnicks, in the shaft, on tutwork. The air was not very good. There was only one shaft. Then he went to South Caradon, where he has been for 4 years. He worked on tutwork in the 70 level, air rather close. They have an air machine.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
He first noticed that he had palpitation of the heart about 8 or 9 years ago. He has had it when climbing, walking, and even when in bed. It has increased lately, and sometimes he now has an attack 3 or 4 times a day, and sometimes not at all.	- - -	He complains of feeling weak, and has palpitation of the heart. He has it generally after he has been climbing; not more so during that time than at others. It comes on with a feeling of fluttering, faintness, without pain, but with a dread of dying. It comes on suddenly and goes away suddenly, and after it he feels quite well. Heart sounds clear; its action at the present time is regular, and there is no murmur or abnormal sound with it. Impulse feeble, dulness somewhat increased, and displaced downwards more than usual. Healthy complexion and appearance.	
- - - - - -	Working in bad air.	Complains of shortness of breath, weakness, and pain in the pit of the stomach. No cough, except in the winter. Has a sallow complexion, and looks older than his years, but has a not unhealthy look. Nothing abnormal about the chest.	
When working in bad air at West Caradon he used to feel weakness in the legs and shortness of breath. This was about 2 years ago.	Working in bad air.	Does not complain of feeling unwell now, but he has lightness in the head, headache, and general weakness. Does not feel any difficulty in climbing at the present time. Pale complexion.	
When he worked at Fowey Consols in bad air, he used to have cough at night, and could not lie in bed; his head ached very much; and his legs ached in going to and from his work. This is 16 years ago.	Working in bad air.	Feels weakness on the chest, lowness of spirits, and general weakness in the limbs. Appetite good at present. Sallow anæmic complexion, white pearly conjunctiva; face and body thin, but not very. Pulse small, quick, compressible.	

Number; District; Disease; Date.	Age.	Father's Age, and whether alive or dead.	Father's Occupation, and the Cause of his Death.	Other Relatives.	Age at which he commenced working under ground.	Nature of Work.	General History of Occupation, where employed, Quality of Air, &c.
147. Liskeard; Miners' disease; August 1862.	61	71, Dead.	A miner -	- - -	14	Tutwork and tribute.	First worked at Wheal Friendship on wages for 4 years, in good air, in the 30 level. Then to Wheal Clowance for 9 years, on tutwork, in 22 level, in good air. Then to Wheal Fortune, on tribute, for 1¾ years, in good air. Then to West Basset, as a sinker, for 4 months. Then came to Cradock Moor mine, on tutwork, sinking a shaft, in "middling deadish air." Then went to West Caradon, on tribute, for 16 months, in poor air. He then went to Wheal Emma (Devon), for 6 weeks, on tutwork, in the 60 level, in good air. He has not worked for 6 months. Since then he has been a letter carrier.
148. Pengiggen; Miners' disease; August 1862.	32	50, Dead.	A miner -	- - -	14	Tutwork and tribute.	He first worked at Dolcoath for 7 years, in good air. Then went to North Wheal Francis for 4 years, in the 60 level. Air rather slight at times. Then to Gunnislake, to Drakewell's mine, for 4 or 5 years, in the 90 level, in good air. Then to Wheal Nelson for 6 months, in the 30 level, in bad air. Then to Wheal Francis for 5 or 6 years, on tutwork, in the 60 level, for 6 months; before that sinking a shaft from the surface. The air is bad where he is now working in the 60 level.
149. Pengiggen; Old bronchitis and debility; August 1862.	50	80, Dead.	A miner -	- - -	14	Tutwork -	He first worked at Trefina on tutwork, blowing a machine for 2 months, in the 40 level, in good air. Then to Carn Brea for 3 or 4 months on tribute, in the 18 and 34 levels, in good air. Then to Wheal Seaton for 3 or 4 years, "rolling," in the 80, 90, 70, and 60 levels, in good air. Then to Tincroft for 18 months, "rolling" in the 60 level. Then to Wheal Maria for 2 months, in the 80 level. Then to Carn Brea for 4 years, in the 165 level, in good air. Then to South Wheal Harriet for 4 months, in the 74 level, air tolerably good but smoky. Then to Condurra for 4 months, in the 130 level, in good air. Then to Cook's Kitchen for 16 months, on tutwork, in the 234 level, in good air but very warm. He was quite well there. Then went to West Wheal Basset for 2 months, in the 104 level, good air but cold, and too much draught. He was ill there. Then he went to Wheal Seaton for 5 weeks, in the 130 level, in good air.
150. Newton Moor; Debility, anæmia; August 1862.	27	- - -	- - -	- - -	- - -	- - -	Has worked during the last 2 years at South Wheal Francis, in the 154 level, 120 from shaft and 10 from the nearest winze. It is a granite mine. He supposes there is cold damp in the place where he works, but says the air is good enough so far as he knows, for the candle will burn very well. He has had as good health there as in any other mine, and "as good as miners generally." He has been poorly for 2 or 3 days together at times with pain in the head and weakness, but it would go off after being away from work for a day or two. His living has been good, and he has had 3 or 4 lbs. of meat a week.

History and Duration of Illness.	Cause to which he refers his Illness.	Present Condition.	Remarks.
About 2 years ago he worked in bad air, and felt choked in the windpipes, had shortness of breath and headache, could not climb, and spat up stuff as black as ink. At Wheal Emma, about 6 months ago, he had tightness on the chest, shortness of breath, weakness in the legs, and after 6 weeks he was obliged to give up, and has not worked under ground since.	Working in bad air.	Has tightness on the chest and shortness of breath if he goes up hill, but, besides that, he is now pretty well. Chest apparently healthy.	
Has been ailing for 6 months. Has been losing flesh, and his breath is getting very short when he climbs. He takes cold very quickly, and then it goes to his "pipes."	Working in bad air.	Has inward weakness, pain in the stomach and bowels, and lightness in the head in the morning. Bowels habitually too much open. Tongue pale, clean, tremulous. Pulse small, quick, compressible. Heart's action quick, but otherwise healthy. Face thin, sallow complexion. General debility, but no disease detected.	
Three months ago he took cold from working in a draughty mine, and had shivering, followed by pain in the right side. He was at home for 4 days. Six weeks ago he again took cold, and had pain in the right breast, cough, and spitting, but not much. He continued to work until a week ago, when he was obliged to give up, owing to weakness in the limbs. He has not had good living for the last 2 months.	Exposure to cold.	Feels tightness across the chest, and has shortness of breath with a tickling cough. Has weakness in the legs, but that is better than it was. Sweats a good deal at night. Has hoarseness of voice. Chest resonant on percussion, respiration rather coarse on the left side in front. Heart sounds normal. Body and face thin, sallow complexion, eyes sunken.	
During the last 6 months he has felt pain in the left breast, going through to the shoulder blade, but he has felt quite well and able to work until last week, when he was taken poorly with pain and lightness in the head, pain and weakness in the knees. He also felt faint and generally weak.	- - -	He has still pain in the shoulder blade and left breast. The headache and weakness have in great part left him, and he is now feeling pretty well again, and he thinks of going to work to-morrow. Pale anæmic complexion, pearly white conjunctiva. Tongue clean, rather red at the edges. Bowels regular. Pulse soft and compressible. Trembling of the hands when extended. Chest resonant on percussion; respiratory murmur heard all over the chest, but very faintly except at the bases, even on deep inspiration. No prolonged expiration or abnormal sound of any kind, there being merely deficiency of the normal respiratory murmur. Heart sounds feeble, regular, clear; impulse very feeble.	

JAS. BANKART.

III.

STATISTICS and EVIDENCE by Dr. FARR, M.D., F.R.S.,

With Epitome of Tables, and Diagrams, and additional Returns prepared from the Census of 1861.

WILLIAM FARR, Esq., M.D., F.R.S., examined.

19,689. (*Chairman.*) I believe that you are Chief of the Statistical Department in the General Register Office?—I am.

19,690. You have had tables prepared under your direction giving the statistics of miners?—Yes.

19,691. For what purpose were they prepared?—They were prepared to illustrate the mode of determining the influence of occupation on the health of the population. I took the miners because I thought that a well defined occupation.

19,692. Were those tables prepared for the purpose of being laid before any public body?—They were prepared subsequently to the census of 1851, when the occupations of the country were taken out according to the different ages; and it gave us an opportunity for the first time of determining the influence of occupations on sound principles, that is, by a comparison of the living at each age and the deaths at each age. A selection of the tables was laid before the International Statistical Congress, in the hope that the method there employed might be adopted generally in Europe.

19,693. In order to get very correct statistical returns, will you describe in what way you prepared them?—As I have said, the occupations of the miners of Cornwall, for instance, were all returned at the Census of 1851. Each man's name was recorded, his age and his occupation. Those facts were analyzed at the Census Office in 1851, and in that way we got a very complete account of the number of miners living in Cornwall at the several ages. We then took from the Register books the births and deaths of miners in the same districts. We took a certain number of districts in which there was a great number of miners, and in that way we were enabled to determine the rate of mortality at the several ages among miners. I had before that time investigated the mortality in the healthiest districts of the country, and so I had a standard with which I could compare the results obtained from the occupation of the miners; and the comparison showed to what extent the mortality was increased by the occupation.

19,694. Will you state the districts with which you compared them?—I took for the metal miners the Cornish districts. I divided the coal miners into three classes:—the Staffordshire districts, where the coal is worked in a peculiar manner; I formed another group of the Durham and Northumberland districts; and I took, thirdly, a Welsh coal district. The results of that investigation are embodied in the Table which I have the honour to submit to the Commission.

19,695. Can you name the districts which you took in Cornwall especially?—The Cornish districts were Liskeard, St. Austell, Truro, Helston, Redruth, and Penzance. The Staffordshire districts were Wilstanton, Stoke-upon-Trent, Wolverhampton, Walsall, West Bromwich, and Dudley. The Durham and Northumberland districts were Auckland, Durham, Easington, Houghton-le-Spring, Chester-le-Street, and Tynemouth. In Wales the district taken was Merthyr Tydfil.

19,696. (*Dr. Greenhow.*) Did you make a separate calculation for each district, or one calculation for the whole of the Cornish districts taken together?—For the whole taken together. We have the population for each district and the number of deaths. It is absolutely necessary in order to get correct results to have a certain mass of facts, so as to get rid of accidental influences. I therefore, for the purpose of investigating the mortality at the several ages, put all the various results together.

19,697. (*Chairman.*) Then you consider these returns which you have prepared to be very complete?—I do.

19,698. (*Mr. Holland.*) Do you know of any returns more complete than those are?—I do not.

19,699. (*Chairman.*) The returns as to the miners in Cornwall comprise all the males working at the mines, whether underground or at the surface?—I believe that they do, they comprise all who return themselves in such a way as that we can distinguish them as miners.

19,700. They comprise all who returned themselves in the census of 1851 as miners?—Yes.

19,701. Can you show the comparative value of life in the different districts to which your return refers?—I will take the Cornish districts first. Without citing the figures I may state generally that the mortality among the miners from 15 years of age up to the age of 35 appears not to be higher than the mortality of the rest of the population in those districts, or of the rest of the population of other counties of England. I see no sensible effect in the tables up to that age. After the age of 35 the mortality rises among the Cornish miners; for instance, in the rest of the population of the same districts the mortality is at the rate of about 10 in 1,000; among the miners it is 14, that is a very great increase.

19,702. (*Mr. Kendall.*) After 35 to what age?—From 35 to 45; from 45 to 55 the increase is still greater. The mortality among the rest of the population is 15 in the 1,000, and among the miners it is 34; it is an immense increase of mortality. From 55 to 65 it is 24 in the rest of the population, and it is 63 among the miners. After that the number of men working in the mines is not considerable, and I think it is hardly worth while going any further, the facts being so few.

19,703. (*Sir P. Grey Egerton.*) After the age of 35 the ratio of mortality is increased as compared with the agricultural population of the same districts?—Yes, I may state that the residual population of the districts very fairly represents the mortality in other parts of the country. For instance, taking it at the ages which I have mentioned, where the mortality of miners becomes excessive; if we look at Norfolk, which is an agricultural county, from the age of 35 to 45, the mortality of the non-mining population in these Cornish districts being 10, it is in Norfolk also nearly 10. Then from 45 to 55 it is 15 in the non-mining population of Cornwall, and it is 13 in Norfolk, which is not quite so high. From 55 to 65 it is exactly the same in Norfolk, and in these districts of Cornwall—to take the very early ages, under 15, among children, the mortality of the whole population in these parts of Cornwall, including the children of miners as well as the children of the rest of the population, is less than the mortality of the population of Norfolk. For, under the age of five the mortality of the male children in Cornwall is at the rate of 55 per 1,000, and of the male children in Norfolk it is 65 per 1,000, so that it is quite evident that the districts them-

selves are healthy, and that there is nothing in the air of the locality necessarily injurious to health. I show the same facts with reference to the women. The children and the women of these districts enjoy as good health as the children and the women of Norfolk, or of any of the other counties.

19,704. (*Mr. Leveson Gower.*) Have you compared it with the average in the manufacturing districts?—In the manufacturing districts the mortality among the children and women is of course much higher.

19,705. Have you compared the mortality in Cornwall with that in the manufacturing districts?—It would be much less in Cornwall at these early ages. I have not the facts before me, but I can easily supply them.

19,706. (*Mr. St. Aubyn.*) Have you any comparative statement of the mortality of the children of miners in Cornwall, distinguished from the children of the rest of the population?—No; we have not the means in our returns of distinguishing the deaths of miners' children from the deaths of other children.

19,707. Have you any comparative statement with regard to Norfolk and the rest of England. Is Norfolk a fair specimen of an agricultural population?—I have compared it with the adjoining counties to Cornwall, namely Devonshire and Somersetshire, and other counties, and the result is pretty nearly the same.

19,708. There is no material difference?—There is no material difference. The south-western counties are among the healthiest in England, so that it is evident that whatever may be the cause of the mortality among the miners, it is not in the situation, or even in the general sanitary condition of the people.

19,709. At what age do you begin to distinguish between the mining population and the agricultural population?—After the age of 15. The occupations are not so well defined as to enable us to deal with them under the age of 15.

19,710. (*Chairman.*) Can you give us a comparison between the four different districts which you have specified, namely the Cornish district, the Staffordshire district, the Durham and Northumberland district, and the South Wales district?—I can; I will begin at the age of 35.

19,711. Will you state the character of the mining in the different districts?—In Staffordshire the work is in coal and iron. In South Staffordshire it is the ten-yard coal, and many accidents occur. I believe that the work is carried on by small capitalists, and that the arrangements are not so good as they might be for working the mines. The consequence is that the number of violent deaths is excessive in Staffordshire. The same remark might be applied to Merthyr Tydfil, which represents very fairly the South Wales districts. The works are recent, and all the arrangements are less perfect than they are in Durham and Northumberland, where mining is conducted upon scientific principles and generally under great proprietors.

19,712. So that you consider that the large amount of deaths in those two districts which you have last named is attributable in a great degree to accidents, and to the want of sanitary arrangements?— To those two causes, namely, the state of the dwellings of the mining population, and the great number of violent deaths. As many as 8 miners are killed annually by negligence or accident to every 1,000 miners living.

19,713. Out of the four districts, you find that in Durham and Northumberland, notwithstanding that it is a coal district, with large explosions, the number of deaths, whether by natural causes or by accident, according to the proportion of the population, is not so great as in any of the other three districts?—It is not.

19,714. Will you state the comparative amount?—Under the age of 35, where we find that the mortality among the Cornish miners is low, the mortality among the Northumberland and Durham miners is still lower.

19,715. (*Dr. Greenhow.*) Will you mention the rates of mortality per 1,000?—Without going into decimals, there are 9 deaths in 1,000 in Cornwall, and rather less than 9, you may say 8½, in Durham and Northumberland. The difference is not great, but it is in favour of Durham and Northumberland. I will now take Staffordshire. At the same ages the mortality in the Staffordshire districts is 14 and 15 per 1,000; that is to say, 14 in the ages from 15 to 25, and 15 in the ages from 25 to 35; that is an immense increase in the mortality. Then in the South Wales districts, (Merthyr Tydfil is the only one of which I have taken the mortality) it is 20 in 1,000 in the ages from 15 to 35 It is 20·72 in the ages from 15 to 25, and it is 20·42 in the ages from 25 to 35. Passing to the ages from 35 to 45, I will take the Durham and Northumberland districts; there the mortality among the miners is 10 in the 1,000. You will recollect that it was 14 in Cornwall. In the Staffordshire district it is 18.

19,716. (*Mr. Kendall.*) In Durham and Northumberland is there any difference between the miners and the rest of the population?—Yes; the mortality is 12 in the rest of the population. The mining people of Durham and Northumberland experience a lower rate of mortality than the rest of the population.

19,717. (*Chairman.*) What is the amount of mortality in the agricultural population in Staffordshire?—In the agricultural population it is 13, it being 18 in the mining population. You will observe that the mortality among miners in Staffordshire is enormously increased. Then in South Wales the mortality is 24 among miners between the ages of 35 and 45.

19,718. What is the mortality in the agricultural population of South Wales?—It is 19 in the rest of the population.

19,719. (*Dr. Greenhow.*) Is it not the fact with regard to the non-mining population in Durham and Northumberland that you have a large urban element, that is to say, a large proportion of the population living in towns?—That is so to some extent in the districts of Durham and Northumberland which I have taken.

19,720. Therefore it would not be fair to institute a comparison between the rates of mortality among the miners of Durham and Northumberland and the rest of the population, as contrasted with the case of Cornwall and Devon, where there are few large towns?—There are no very large towns in Cornwall; and that is no doubt an element which influences the comparison to a certain extent, but not an element which influences the comparison so much as you may suppose. Tynemouth is, I think, the only large town in the Durham and Northumberland districts which I have taken. As regards Wales, I have only taken the district of Merthyr Tydfil; the rest of the population was in a very deplorable sanitary state at the time when this return was made; cholera and other epidemics were exceedingly fatal among the whole population; it is an undrained district, and all the bad consequences of a neglected sanitary condition existed there. If I took the age from 45 to 55, the result would be similar to what I have mentioned. Taking the miners of Durham and Northumberland, the mortality among them between 45 and 55 was 17, while you will recollect that the mortality among the Cornish miners was 34; among the Staffordshire miners it was 28, and among the Merthyr Tydfil, or South Wales miners, it was 34, being as bad as Cornwall and rather worse. From 55 to 65—I will take Durham and Northumberland—the mortality among the miners was 24, whereas in Cornwall it was 63, in Staffordshire it was 50, in Merthyr Tydfil, it was 57. That completes the table as far as I think it would be safe to go.

19,721. (*Chairman.*) In the returns of the Registrar General, what are the class of diseases which appear chiefly to affect these districts?—In order to show the rate at which the mining population died off, I

constructed four tables, showing out of 100,000 entering at the age of 20, how many remained, and how many died off every year in the same districts, namely, in the Cornish districts, the Staffordshire districts, the Durham and Northumberland districts, and the Merthyr Tydfil district. I will state briefly the result of that. It will put what I have said before in another form, which, perhaps, may be equally striking. To begin with Cornwall. Out of 10,000 men at the age of 15, you have 8,364 surviving and attaining the age of 35; in Durham and Northumberland 8,437; in Staffordshire 7,516 attain that age: in South Wales only 6,627 would live to the age of 35 at the rates of mortality which we have before described. In Cornwall, from 35 to 45, in the next ten years, 1,114 have died out of 8364, leaving 7,250 to attain the age of 45. In Durham and Northumberland 7,623 attain that age, which is rather more. In Staffordshire 6,301 attain the age of 45, and in South Wales only, 5,225. The men are reduced to nearly half the number in the Merthyr Tydfil district. The Cornish miners are reduced to 5,185 at the age of 55. At that age the miners of Durham and Northumberland are reduced only to 6,443, in Staffordshire to 4,779, and in South Wales to 3,709. I will take another age, namely, 65; the Cornish miners are reduced to 2,756 at the age of 65; that is to say, to about one fourth of the original number; in Durham and Northumberland they are only reduced to about 5,046, that is only about half the original number. In Staffordshire they fall to 2,899; that is nearly as low as in Cornwall. In South Wales they fall to 2,088, that is nearly to one-fifth of the original number. You will, therefore, observe that this table shows, as you would expect, that the number of miners decreases in Cornwall up to the age of 35 nearly at the same rate as in the country generally; that after 35 they begin to die off more rapidly; and that from 45 to 55 they die off in immense numbers, leaving few men to attain the age of 65. The state of things, however, is very much worse in the early ages, 15-35, in Staffordshire and South Wales, where the numbers of the deaths at the ages 35 and upwards, are as low in Staffordshire and lower in South Wales than they are in Cornwall. The same table shows the causes from which the men die in each 10 years in these several classes of districts. In the first place, there is small-pox, which produces only a slight effect on the mortality at these ages; then there is cholera and diarrhœa. This was during the years from 1849 to 1853, and, therefore, includes the great epidemic of cholera in 1849. That epidemic was not severe in Cornwall. The mortality from cholera among the Cornish districts was low, and a great number of the miners did not die of this class of disease. In Staffordshire the mortality was very great; in Durham and Northumberland it was excessive from cholera; in South Wales it was also exceedingly fatal. That shows, I think, pretty clearly that the general sanitary condition of the mining population is much better in Cornwall than it is in these other mining districts. It is better I think than in Durham and Northumberland as regards the epidemics of this class,—as regards the water supply. Cornwall has suffered a good deal from typhus fever. The mortality is greater in Cornwall from typhus and typhoid fever than it is in Northumberland and Durham in early life. Typhus is less fatal in Cornwall than it is in Merthyr Tydfil. Then there is nothing remarkable I think in diseases of the brain, as far as I can discover, nor is there anything very striking even under heart disease and dropsy. But when we come to consumption, as it is termed, we have an enormous discrepancy. For instance, in the earlier ages the mortality from that disease is not much raised; but when we get to the ages from 35 to 45 for instance, there are 1,114 deaths; of those 549 are referred to consumption, exclusive of the other lung diseases.

19,722. (*Dr. Greenhow.*) These are not ratios, these are actual numbers?—Actual numbers out of equal numbers living at the age of 15. In the next 10 years 1,206 of these men die; and in the next 10 years 1,394 more of them die from consumption. There is nothing like it in any of the other districts. For instance, I take Durham and Northumberland; between 35 and 45 the number is 111; in the next 10 years it is 118; in the next 10 years it is 119; that takes us up to the ages from 55 to 65, where I will stop. If you will cast your eye back you will see that while you have 118 deaths between 45 and 55 in Durham and Northumberland, you have 1,206 in Cornwall.

19,723. Is that out of the same number of persons?—No.

19,724. Then we cannot compare the one mortality with the other without knowing also the number of the living?—No.

19,725. Is this then a mere statement of figures without any ratio?—I take 10,000 entering at the age of 15; in all cases there is the same basis. Out of 10,000 entering at the age of 15, for instance, in Cornwall, you have 1,206 dying between the ages of 45 and 55 of this particular disease, and 1,394 dying of the same disease in the next 10 years; while in Durham and Northumberland the deaths do not exceed 118 and 119. Out of 7,250 Cornish miners living at the age of 45, the deaths by consumption are 1,206 in the next ten years of age; while 86 die out of 6,301 Stafford coal miners of the same age. The ratios are seen by simple inspection of the Table. Staffordshire shows nearly the same result. In Merthyr Tydfil the mortality is higher; for instance, from 45 to 55 it is 272; from 55 to 65 it is 179: that is of phthisis. If we take the lung diseases, of course we get different results. Dr. Greenhow knows that they are sometimes confounded, but in Cornwall this disease seems to be so well characterised, that all the medical men have apparently agreed in the returns to call it by the name of consumption, and nearly all the deaths from these diseases of the lungs, whatever they may be, are put under that head in Cornwall. [The witness subsequently supplied the annexed Table showing the ratio of mortality from lung diseases in three groups of districts.]

MORTALITY from CONSUMPTION and DISEASES of the LUNGS in the following Groups of MINING DISTRICTS.

Age.	Years of Life.	Numbers Dying from Consumption and Diseases of Lungs in next 10 Years.	Death Rate to 1,000 Living
	CORNISH DISTRICTS.		
35	7807	660	84·5
45	6217	1498	241·0
55	3970	1709	430·5
65	1830	930	508·2
	STAFFORDSHIRE DISTRICTS.		
35	6908	231	33·4
45	5540	440	79·4
55	3839	761	198·2
65	1957	634	324·0
	DURHAM AND NOTHUMBERLAND DISTRICTS.		
35	8030	149	18·6
45	7033	245	34·8
55	5744	277	48·2
65	3837	515	134·2

19,726. Do you not think that it would be better to take the two together, namely, phthisis and diseases of the respiratory organs?—Yes, I think it would. I have given them separately here and in the table which I have put in, so that you can join them together. The next point of importance is to show how the violent deaths go. In Cornwall out of the same 10,000, at the age of 15; 192 died in the next 10 years of violent deaths of various kinds,—that is from the age of 15 to 25, and so on in each successive 10 years, 184, 146, 146, and 57 in the last 10 years of age extending from 55 to 65. Then in Durham and North-

umberland the number of violent deaths is higher. In the first 10 years it is 233, in the next 196, then 268, then 260, and 214. It is not double, but it is certainly more than 50 per cent. higher than the mortality from violence in the Cornish districts. In Staffordshire the difference is enormous. Out of 10,000, 705 died in the first 10 years from violent deaths, 621 in the second, 568 in the third, 485 in the fourth, and 256 in the fifth. I have the particular forms of violence in a subsequent table. Then in South Wales, the mortality is not so high from violence as in Staffordshire, but it is exceedingly high, 636 died in the first 10 years, namely, from 15 to 25, 450 in the next 10 years, 425 in the next 10 years, 359 in the following 10 years; and 206 died between the ages of 55 and 65 out of 3,709. The general result is that in Cornwall the mortality from violence is greater than it is in the rest of the country. If you take all England, the number who die from violence is nearly equal in every 10 years. For instance, out of 10,000 between 15 and 25, 86 men died from violence in the general population of all England; in Cornwall it was 192. In the next 10 years, namely, from 25 to 35, the violent deaths in all England were 86, in the next 10 years 90, in the next 10 years 96, and in the next 10 years 83. It is always higher in Cornwall than it is in the rest of the country, but it is much lower in Cornwall than it is in the other mining districts even in those of Durham and Northumberland.

19,727. (*Chairman.*) You can perhaps state the different kind of accidents?—I have a return of the different forms of violence in the same period, but these are not ratios, they are mere numbers. There were 4,532 violent deaths in the coal districts, and 382 in the copper, tin, lead, and iron districts which I have taken during the five years 1849–53.

19,728. That is to say in the four districts?—In the whole of the districts. I have the figures and I have the proportions; perhaps I had better state the proportions. I will give the average annual number of deaths out of 100,000 miners living. I will do it without distinction of age. Out of 100,000 copper, tin, lead, and iron miners living you had 4 drowned, 35 fell in the pit or shaft, 42 were crushed and injured by the fall of stone, 11 were killed by blasting, and 17 by all other causes. Those are the proportions. The actual numbers returned were 382 as killed in 5 years from all causes; 13 were drowned, 122 fell in the pit or shaft, 149 were crushed and injured by fall of stone, 39 died by blasting, and 59 by other causes. The proportion of deaths by violence was about 1 in 1,000. In the copper, tin, lead, and iron mines which I have taken, there are 109 out of 100,000. Then in the coal mines instead of 109 you have 498, that is nearly five times as many deaths by violence as you have in these metal mines. In the coal mines, out of 100,000 miners living, 4 were drowned, which is the same as in the metal mines, 92 died by falls in the pit or shaft, 236 were crushed and injured by fall of coal, 5 were killed by blasting, 145 were killed by explosions and choke-damp annually. These last are the deaths which make so much noise in the country, and yet there are only 145 in 100,000, while the deaths by crushing and other causes in mines raise that 145 to 498. The number of violent deaths from other causes was only 16. The mortality at all ages above 10 is 5 in 1,000 from violence alone in the whole of the mining districts.

19,729. (*Mr. Kendall.*) In Cornwall what have you under the head of "Typhus?"—123 out of the 10,000 died of typhus in Cornwall. As a complement of that table I may mention that of course the mean duration of life depends upon the mortality, but I have completed the inquiry by determining the average duration of life on the same principle as the insurance offices adopt.

19,730. (*Chairman.*) Do you know the rate charged by insurance offices on Cornish miners?—I happen to know that in one office which does a good deal of business among the miners, the charge is 1*l.* per cent. additional over the ordinary charge; if the ordinary premium at the age say of 26 is 2*l.*, they charge a Cornish miner 3*l.*, and the miners pay it, as they appear to be aware that their lives are of that character.

19,731. (*Dr. Greenhow.*) Is the same increased rate charged throughout life?—It is one uniform rate at all ages. A great number of Cornish miners I know apply to insure their lives also to go abroad, to Chili for instance; a good many emigrate, and they charge that 1*l.*, and in addition there is the sea risk, and so on. The mean duration of life of the Cornish miners is 35 years from the age of 20, that is the number of years they live on the average after 20. If you took a certain number of them, say 10,000, and followed them from the age of 20 till the end of their lives, and added up their ages and divided the sum of years by the number 10,000, you would find that they live on an average one with another 35 years. In the healthy districts of England the mean duration of life is 43 years, (I am always speaking of males), in all England it is 39 years, including the large towns. In the Durham and Northumberland districts it is 42 years; it does not differ much from the healthy districts of the country. In the Staffordshire districts it is 33 years, being rather less than in the Cornish. In the Merthyr Tydfil district it is 31 years. In all there is a very great reduction of the natural duration of life. I have taken the healthy districts generally as a standard. We cannot get the duration of life in the most favourable conditions possible. We have therefore taken these districts as representing that ideal, and we find that life lasts there 43 years, and we consider anything below that as a shortening of life by unnatural means.

19,732. (*Chairman.*) To keep up a certain amount of population how many would it require?—For instance, to keep up a population in Cornwall of 34,862, 1,000 must enter every year. If the miners were made, as they clearly ought to be made, as healthy as they are in the healthy districts of England, the same numbers entering would amount to a body of 43,456 men. You will observe how in that way there is a great waste of the productive means of the country by the premature death of the skilled and experienced workmen.

19,733. (*Mr. Davey.*) How far back do your statistics go?—I conceive that these statistics represent the state of things nearly as it is now, but they are based on the last census.

19,734. You do not go further back than that?—No.

19,735. (*Dr. Greenhow.*) Are these statistics for one year only or for several years?—For 5 years. After the age of 40 of course there is a much greater difference in proportion between the duration of life in Cornwall, and the duration of life in healthy districts of the country. For instance, the Cornish men, after having lived to the age of 40, live on an average 20 years, in Durham and Northumberland 27 years, and in the healthy districts of the country 29 years.

19,736. (*Mr. Kendall.*) If, in Cornwall, we could reduce our deaths from the miner's disease and from typhus, we should then become a healthy county?—Yes.

19,737. And attention ought to be drawn to those two points?—Yes.

19,738. The miners' consumption cannot, I suppose, be like the ordinary consumption?—I do not think that it is the ordinary consumption.

19,739. In ordinary consumption are not children very apt to inherit it from their parents?—Yes, it is considered hereditary.

19,740. But I find that from 15 to 35 they are all healthy?—Yes, it is so well characterised that they themselves call it miners' consumption.

19,741. (*Dr. Greenhow.*) It is a different disease from tubercular consumption?—Yes, it will be very well worthy of investigation.

19,742. (*Mr. Leveson Gower.*) Cannot you give us any comparison between the period to which you have referred and a previous period?—No; the ages of the living miners were not enumerated before so as to enable us to distinguish the numbers living, and again the registers of deaths were only instituted in 1837, and the returns of occupation were very imperfect at that time.

19,743. When was the first time that that information was sufficient to enable you to give these facts?—In the five years of which 1851 is the centre.

19,744. And that is what you have given us now?—It is; I consider that perfectly satisfactory.

19,745. Can you give us any comparison between the statistics of the Cornish miners and those of miners in other districts, other than coal and iron-stone?—I cannot.

19,746. Have you none from North Wales?—None.

19,747. Can you give us a comparison between Cornwall and some manufacturing district; you have compared Cornwall with an agricultural district, can you give a comparison of the rate of mortality among the Cornish miners, and the rate of mortality among the workmen in a manufacturing district?—I can supply such a table if it is the wish of the Commission.

19,748. I will request you to do so.—I will take two or three districts.

19,749. When you talk of miners, I understand you to say that in Cornwall you included those who work on the surface who are connected with the mines?—Those who were returned as miners, so as to enable us to classify them as miners, we dealt with in that way.

19,750. Are those working on the surface included in that term?—I should think that they are, unless they would return themselves under some other name, and then we should not have them.

19,751. Can you ascertain that?—I do not think that I can. We find that a good many of the women are returned, and they of course only work at the mouth of the pit.

19,752. Do you know whether that is the same in the iron districts, that is to say, whether those working in the mills or furnaces are included?—No, they are not included; that would be quite distinct from those working underground.

19,753. (*Mr. Kendall.*) How are those working above ground in the iron mines classed?—They would be classed under "iron manufacture." We have several heads in our tables which would include various groups of persons engaged in the iron manufacture. We have come to the conclusion that it is absolutely necessary to have a sort of industrial census in order to get at all these details minutely. Such a return as the census obtains of numbers and occupations is of course general; you cannot go into detail without losing yourself. In order to get a good mining return of the whole country you must have a special inquiry on the spot by competent persons. In the iron districts they are very close to the coal, but in Cornwall they are not so.

19,754. (*Dr. Greenhow.*) In classifying the miners of Northumberland for these calculations, are lead miners included?—Yes, all who are returned as miners are included; but there are not many lead miners in the districts which I have taken.

19,755. What is the average duration of life after 40 in the miners of South Wales?—20 years.

19,756. In Staffordshire what is it?—22 years.

19,757. And in the healthy districts of England?—29 years.

(*The witness delivered in the following diagrams.*)

The witness withdrew.

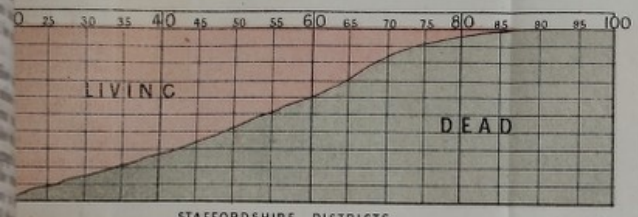
ENGLAND AND WALES.—LIFE TABLE. Showing (Col. 1.) to 10,000 Males at the Age 15 the Numbers surviving and attaining the Age 25, 35, 45, &c.; also the Numbers dying in the Decennial Intervals (Col. 2.); with the Causes of their Death (Cols. 3-15). (Constructed by approximative method.)

AGES.	Numbers living at each Age.	Dying between each Decennial Interval of Age, from All Causes.	Dying by												
			Small-pox.	Cholera and Diarrhœa.	Typhus.	Other Zymotic Diseases.	Diseases of the Brain.	Heart Disease and Dropsy.	Consumption.	Diseases of the Lungs.	Diseases of the Stomach and Liver.	Diseases of the Kidneys.	Diseases of the Joints.	Violent Deaths.	Other Causes.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
15	10,000	782	13	39	95	24	40	32	312	39	31	8	13	86	50
25	9,218	884	9	63	67	22	62	44	354	63	41	15	9	86	49
35	8,334	1016	5	74	60	25	101	75	309	108	70	21	11	90	67
45	7,318	1265	3	87	62	32	135	126	266	191	115	29	13	96	113
55	6,053	1651	1	99	61	41	213	209	186	314	159	48	17	83	220
65	4,402	2126	1	102	56	55	305	279	85	384	153	80	17	59	550
75	2,276	1727	—	68	22	34	192	144	13	208	59	51	7	26	903
85 and upwards	549	549	—	15	3	7	33	19	1	36	8	8	1	6	412

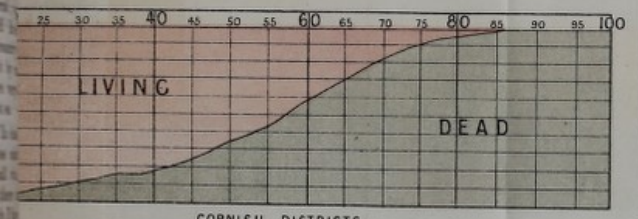
PLATE 1.

DIAGRAMS

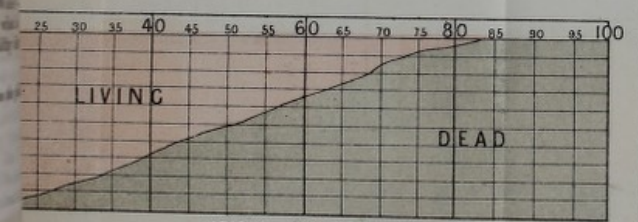
NG OF 100,000 MEN ENTERING AS MINERS AT THE AGE OF 20,
GROUPS OF MINING DISTRICTS, THE NUMBERS LIVING AND DEAD
CH YEAR OF AGE FROM 20 TO 100; ALSO THE RELATIVE NUMBERS
AT EACH AGE, SUSTAINED BY EQUAL NUMBERS ENTERING. GIVEN IN
FARR.



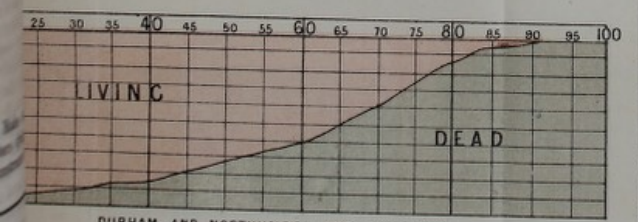
STAFFORDSHIRE DISTRICTS.



CORNISH DISTRICTS.



MERTHYR TYDFIL



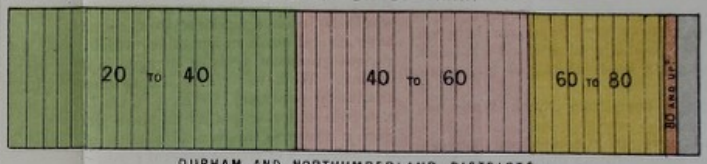
DURHAM AND NORTHUMBERLAND DISTRICTS.

Day & Son, Lith. to the Queen.

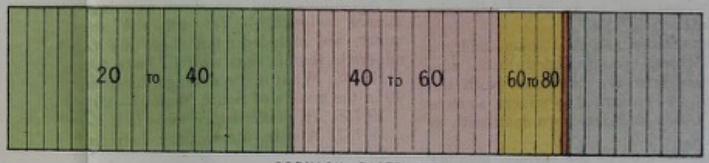
PLATE 2.

DIAGRAMS

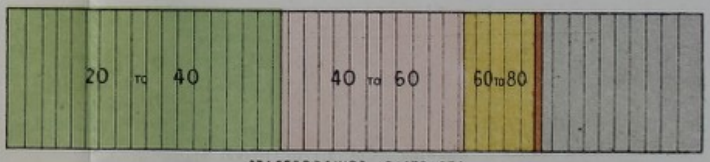
SHOWING OF A RACE OF MINERS BORN IN 4 GROUPS OF MINING DISTRICTS
PROPORTIONAL NUMBERS LIVING IN 4 PERIODS OF AGE.
GIVEN IN BY DR FARR.



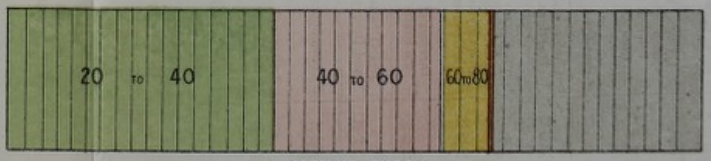
DURHAM AND NORTHUMBERLAND DISTRICTS.



CORNISH DISTRICTS.



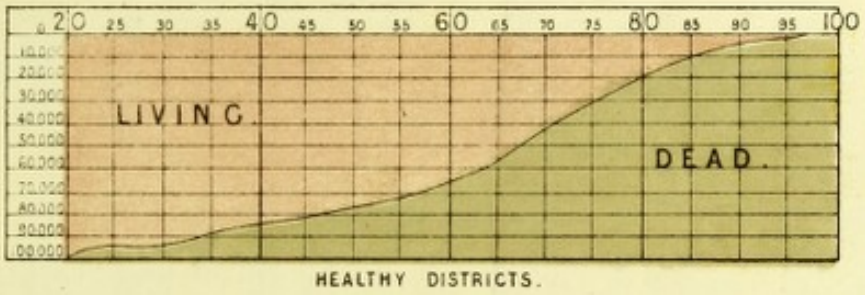
STAFFORDSHIRE DISTRICTS.



MERTHYR TYDFIL.

DIAGRAM

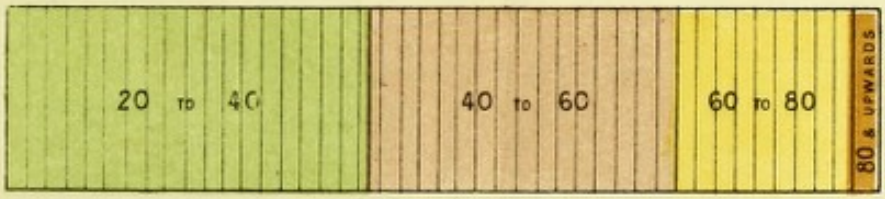
SHOWING OF 100,000 MEN LIVING AT THE AGE OF 20, IN 63 HEALTHY DISTRICTS OF ENGLAND, THE NUMBERS LIVING AND DEAD AT EACH YEAR OF AGE FROM 20 TO 100; ALSO THE RELATIVE NUMBERS LIVING AT EACH AGE, SUSTAINED BY EQUAL NUMBERS ENTERING. — GIVEN IN BY Dr. FARR.



HEALTHY DISTRICTS.

DIAGRAM

SHOWING OF MALES BORN IN 63 HEALTHY DISTRICTS OF ENGLAND, PROPORTIONAL NUMBERS LIVING IN 4 PERIODS OF AGE.



HEALTHY DISTRICTS



MINERS LIFE TABLE.—SHOWING (Col. 1.) to 10,000 MINERS (Males) at the Age 15, the Numbers surviving and attaining the Age 25, 35, 45, &c.; also the Numbers dying in the Decennial Intervals (Col. 2.) with the Causes of their Deaths (Col. 3. to 15.)

AGES.	Numbers living at each Age.	Dying between each Decennial Interval of Age from all Causes.	DYING BY												
			Small-pox.	Cholera and Diarrhœa.	Typhus.	Other Zymotic Diseases.	Diseases of the Brain.	Heart Disease and Dropsy.	Consumption.	Diseases of the Lungs.	Diseases of the Stomach and Liver.	Diseases of the Kidneys.	Diseases of the Joints.	Violent Deaths.	Other Causes.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AGGREGATE OF 19 MINING DISTRICTS.															
15	10,000	1081	34	90	117	19	34	27	254	34	26	4	7	394	41
25	8,919	1023	14	160	84	5	17	34	218	55	34	8	1	363	30
35	7,896	1117	5	158	47	21	32	54	248	95	37	14	5	354	47
45	6,779	1588	3	178	54	24	65	84	457	244	82	12	5	302	78
55	5,191	1906	—	177	58	22	123	141	545	378	86	26	16	177	157
65	3,285	1989	—	170	46	35	167	182	282	435	78	46	17	84	447
75	1,296	1119	—	61	—	6	77	70	38	144	22	10	—	19	672
85 and upwards	177	177	—	2	—	—	7	2	—	15	2	—	2	5	142
CORNISH DISTRICTS.															
15	10,000	852	47	28	123	20	57	22	247	45	24	6	4	192	37
25	9,148	784	15	26	64	3	12	23	331	56	32	12	—	184	26
35	8,364	1114	4	40	32	32	40	47	549	111	36	16	8	146	53
45	7,250	2065	—	37	55	27	41	73	1206	292	69	14	—	146	105
55	5,185	2429	—	57	25	19	145	120	1394	315	69	13	25	57	190
65	2,756	1851	—	35	26	26	139	139	652	278	61	17	17	35	426
75	905	808	—	7	—	—	67	60	60	60	—	—	—	22	532
85 and upwards	97	97	—	—	—	—	—	—	—	—	—	—	—	—	97
STAFFORDSHIRE DISTRICTS.															
15	10,000	1275	24	148	81	12	36	36	141	33	24	—	5	705	30
25	8,725	1209	15	172	56	5	18	30	144	73	40	8	—	621	27
35	7,516	1215	—	131	69	17	31	62	93	138	34	14	10	568	48
45	6,301	1522	5	157	40	46	86	86	86	354	101	10	15	485	51
55	4,779	1880	—	175	88	13	108	182	168	593	108	34	—	256	155
65	2,899	1884	—	205	51	20	154	174	20	614	82	41	20	123	380
75	1,015	880	—	56	—	—	34	34	23	147	11	11	—	11	553
85 and upwards	135	135	—	8	—	—	15	8	—	23	—	—	8	8	65
DURHAM AND NORTHUMBERLAND DISTRICTS.															
15	10,000	815	18	74	80	14	16	26	265	16	24	6	8	233	35
25	9,185	748	8	144	86	5	8	39	162	26	26	5	3	196	40
35	8,437	814	15	187	23	8	31	54	111	38	31	15	—	268	33
45	7,623	1180	5	225	54	15	78	118	118	127	78	20	5	260	77
55	6,443	1397	—	238	16	40	151	158	119	158	95	40	32	214	136
65	5,046	2417	—	251	48	84	215	311	156	359	108	84	24	108	669
75	2,629	2168	—	136	—	34	169	152	17	237	51	34	—	17	1321
85 and upwards	461	461	—	—	—	—	16	—	—	49	16	—	—	16	364
SOUTH WALES DISTRICT; viz. *Merthyr Tydfil.*															
15	10,000	1871	57	166	266	43	19	28	470	47	38	5	19	636	77
25	8,129	1502	23	367	161	9	37	46	266	69	37	5	—	450	32
35	6,627	1402	—	343	70	32	25	51	266	82	51	6	—	425	51
45	5,225	1516	—	403	79	—	53	44	272	166	79	—	—	359	61
55	3,709	1621	—	330	137	14	55	69	179	440	55	14	—	206	122
65	2,088	1569	—	241	69	—	155	69	138	500	52	52	—	69	224
75	519	465	—	65	—	—	26	26	13	129	39	—	—	13	154
85 and upwards	54	54	—	—	—	—	—	—	—	—	—	—	—	—	54

LIFE TABLE.—Showing to 10,000 Males living at the Age 15 the Numbers surviving and attaining the Age 25, 35, 45, &c.; also the Numbers dying in the Decennial Intervals, (1) for all Classes in England and Wales, according to the English Life Table No. 2.; (2) for all Classes in England and Wales, in the Five Years 1849-53; and (3) for the 19 Miners in the Mining Districts, 1849-53.

AGES.	England and Wales, English Life Table No. 2.		England and Wales, in the Five Years 1849-53. (By the approximative method.)		Miners in the 19 Mining Districts, 1849-53. (By the approximative method.)	
	Numbers living at each Age.	Dying between each Decennial Interval of Age.	Numbers living at each Age.	Dying between each Decennial Interval of Age.	Numbers living at each Age.	Dying between each Decennial Interval of Age.
15 - - -	10000	723	10000	782	10000	1081
25 - - -	9277	860	9218	884	8919	1023
35 - - -	8417	997	8334	1016	7896	1117
45 - - -	7420	1217	7318	1265	6779	1588
55 - - -	6203	1696	6053	1651	5191	1906
65 - - -	4507	2223	4402	2126	3285	1989
75 - - -	2284	1761	2276	1727	1296	1119
85 and upwards	523	523	549	549	177	177

LIFE TABLE.—Males 20 Years of Age and upwards.—Healthy Districts and Mining Districts of England in the Five Years 1849–1853.

x	Numbers Dying in each Year of Age.					Numbers Living at each Age.					Sum of the Numbers Living at each Age (Lx) from x to the last Age in the Table.				
		Miners.					Miners.					Miners.			
	Healthy Country Districts.	Cornish Districts.	Staffordshire Districts.	Durham & Northumberland Dis.	Merthyr Tydfil District.	Healthy Country Districts.	Cornish Districts.	Staffordshire Districts.	Durham & Northumberland Dis.	Merthyr Tydfil District.	Healthy Country Districts.	Cornish Districts.	Staffordshire Districts.	Durham & Northumberland Districts.	Merthyr Tydfil District.
	d_x					l_x					L_x				
20	695	887	1369	529	896	100000	100000	100000	100000	100000	4195621	5336167	3380683	4251639	3107454
21	705	904	1365	474	1006	99305	99113	98630	99471	99104	4095621	5236167	3280683	4151639	3007455
22	715	911	1366	509	1263	98600	98209	97273	99157	98098	4196316	5137054	3182053	4051999	2908359
23	724	908	1361	628	1320	97885	97298	96360	98597	96745	4097716	5038845	3084748	3952842	2810542
24	731	900	1356	682	1595	97161	96390	94548	97969	95546	3999831	4941547	2988389	3854245	2713797
25	738	887	1347	721	1589	96430	95490	93192	97287	93841	3902670	4845157	2894231	3756276	2618251
26	744	873	1336	750	1650	95692	94603	91845	96566	92252	3806240	4749667	2801039	3658989	2524410
27	749	859	1326	771	1693	94948	93730	90509	95816	90602	3710548	4655064	2709254	3562423	2432158
28	753	847	1314	784	1720	94199	92871	89183	95045	88909	3615600	4561354	2618745	3466607	2341556
29	756	837	1303	792	1736	93446	92024	87869	94261	87189	3521401	4468483	2529562	3371562	2252647
30	760	833	1292	798	1740	92690	91187	86566	93469	85453	3427955	4376459	2441693	3277301	2165458
31	762	835	1284	799	1738	91930	90354	85274	92671	83713	3335265	4285272	2355127	3183832	2080005
32	765	842	1276	802	1731	91168	89519	83990	91872	81975	3243335	4194898	2269833	3091161	1996292
33	767	848	1271	807	1718	90403	88677	82714	91070	80244	3152167	4105379	2185563	2999289	1914317
34	770	851	1269	816	1704	89636	87829	81443	90267	78526	3061764	4016702	2103149	2908219	1834073
35	772	914	1268	810	1689	88866	86978	80174	89461	76822	2972128	3928883	2021786	2817952	1755547
36	775	956	1271	818	1675	88094	86024	78906	88651	75135	2883262	3841945	1941552	2728491	1678725
37	780	1007	1277	829	1662	87319	85068	77655	87833	73458	2795168	3755921	1862626	2639840	1603502
38	784	1056	1287	842	1652	86539	84061	76358	87004	71796	2707849	3670853	1784991	2552007	1530154
39	790	1136	1300	869	1643	85755	82995	75071	86162	70144	2621310	3586792	1708633	2465003	1458358
40	797	1213	1317	882	1639	84965	81859	73771	85292	68501	2535555	3503797	1633502	2378841	1388194
41	806	1298	1337	898	1638	84168	80646	72454	84420	66862	2450590	3421938	1559701	2293549	1319693
42	817	1391	1361	937	1641	83362	79348	71117	83512	65224	2366422	3341292	1487337	2209119	1252831
43	830	1489	1389	970	1648	82545	77957	69756	82575	63583	2283060	3261944	1416220	2125607	1187607
44	845	1593	1419	1008	1659	81715	76468	68367	81605	61935	2200515	3183987	1346464	2043032	1124024
45	862	1698	1455	1048	1674	80870	74875	66948	80597	60276	2118800	3107539	1278097	1961427	1062089
46	882	1807	1491	1089	1666	80008	73177	65493	79549	58602	2037930	3032644	1211149	1880830	1001813
47	906	1915	1532	1135	1664	79126	71370	64002	78460	56936	1957922	2959467	1145656	1801281	943211
48	931	2021	1574	1180	1661	78220	69455	62470	77325	55272	1878796	2888097	1081654	1722821	886275
49	962	2124	1619	1226	1658	77289	67434	60896	76145	53611	1800576	2818642	1019184	1645496	831003
50	994	2220	1665	1273	1660	76327	65310	59277	74919	51953	1723287	2751208	958288	1569351	777392
51	1007	2365	1742	1276	1661	75333	63090	57612	73646	50293	1646960	2685898	899011	1494432	725439
52	1029	2471	1800	1280	1663	74326	60725	55870	72370	48632	1571627	2622808	841399	1420786	675146
53	1063	2545	1845	1287	1664	73297	58254	54070	71090	46969	1497301	2562083	785529	1348416	626514
54	1106	2592	1881	1298	1666	72234	55709	52225	69803	45305	1424004	2503829	731459	1277326	579545
55	1157	2636	1911	1316	1672	71128	53117	50344	68505	43639	1351770	2448129	679234	1207523	534249
56	1218	2682	1939	1342	1668	69971	50501	48433	67189	41967	1280642	2395003	628890	1139018	490601
57	1286	2733	1966	1379	1750	68753	47879	46494	65847	40298	1210671	2344502	580457	1073829	448634
58	1361	2791	1992	1427	1842	67467	45206	44528	64468	38649	1141918	2296623	533963	1008982	408335
59	1444	2862	2020	1487	1936	66106	42475	42536	63041	36707	1074451	2251417	489495	941514	369686
60	1531	2924	2047	1560	2026	64662	40115	40516	61554	34771	1008345	2208682	446899	878473	333973
61	1625	2481	2075	1645	2105	63131	37583	38469	59994	32745	943683	2068569	406383	816919	299308
62	1723	2432	2099	1743	2169	61506	35108	36394	58349	30640	880552	1930080	367914	756925	265963
63	1823	2381	2122	1851	2211	59783	32676	34295	56606	28471	819046	1793872	331520	698576	234923
64	1926	2324	2137	1970	2220	57960	30295	32173	54755	26260	759263	1663196	297225	641970	206452
65	2030	2264	2145	2098	2220	56034	27971	30036	52785	24033	701303	1532901	265052	587215	180192
66	2133	2200	2143	2226	2185	54004	25707	27891	50689	21811	645269	1404930	235016	534450	156161
67	2233	2130	2139	2350	2122	51871	23507	25748	48463	19626	591265	1279223	207125	483741	134350
68	2328	2056	2101	2486	2034	49638	21377	23618	46104	17504	539394	1155716	181377	435278	114724
69	2418	1975	2039	2608	1924	47310	19321	21517	43618	15470	489756	1034939	157759	389174	97220
70	2498	1887	2000	2716	1798	44892	17346	19458	41010	13546	442446	915018	136242	345556	81759
71	2567	1792	1924	2806	1655	42394	15459	17458	38294	11748	397554	97672	116784	304546	68204
72	2623	1692	1854	2873	1506	39827	13667	15534	35488	10093	355160	82213	99326	266252	56456
73	2662	1582	1729	2913	1351	37204	11975	13709	32615	8587	315333	68546	83792	230764	46363
74	2685	1468	1612	2919	1197	34542	10393	11971	29702	7256	278129	56571	70092	198149	37776
75	2685	1347	1483	2892	1046	31857	8925	10359	26783	6059	243587	46178	58121	168447	30540
76	2666	1224	1351	2827	904	29172	7578	8874	23891	4993	211730	37253	47762	141664	24501
77	2623	1096	1215	2725	771	26506	6354	7523	21064	4089	182558	29675	38888	117773	19508
78	2557	970	1076	2587	650	23883	5258	6310	18339	3318	156052	23321	31365	96709	15419
79	2467	845	941	2419	541	21326	4288	5254	15752	2668	132169	18063	25055	78370	12101
80	2355	725	811	2221	445	18859	3443	4293	13333	2127	110843	13775	19821	62618	9433
81	2223	610	691	2005	363	16504	2718	3482	11112	1682	91984	9332	15528	49285	7306
82	2070	504	579	1775	292	14281	2108	2791	9107	1319	75480	7614	12046	38173	5624
83	1905	409	479	1540	234	12211	1604	2212	7332	1027	61199	5506	9255	29066	4305
84	1727	324	398	1297	184	10306	1195	1733	5792	793	48988	3902	7043	21734	3278
85	1542	250	314	1086	144	8579	871	1343	4495	609	38682	2707	5310	15942	2485
86	1356	190	249	880	112	7037	621	1029	3409	465	30103	1836	3967	11457	1876
87	1171	139	195	697	87	5681	431	780	2519	353	23066	1215	2938	8058	1411
88	994	100	151	537	65	4510	292	585	1822	266	17385	784	2158	5539	1058
89	826	69	114	402	50	3516	192	434	1285	200	12875	492	1573	3717	792
90	674	47	87	293	38	2690	123	320	883	150	9359	300	1139	2432	592
91	538	31	64	207	28	2016	76	233	590	112	6669	177	819	1549	442
92	419	19	48	142	22	1478	45	169	383	84	4653	101	586	959	330
93	318	11	34	95	15	1059	26	121	241	62	3175	56	417	576	246
94	236	7	25	60	12	741	15	87	146	47	2116	30	298	335	184
95	170	4	18	37	9	505	8	62	86	35	1375	15	209	189	137
96	120	2	13	22	7	335	4	44	49	26	870	7	147	103	102
97	80	1	9	13	4	215	2	31	27	19	535	3	103	54	76
98	54	1	7	7	4	135	1	22	14	15	320	1	72	27	57
99	34	.	4	4	2	81	.	15	7	11	185	.	50	15	42
100	20	.	3	1	2	47	.	11	3	9	104	.	35	6	31
101	12	.	2	1	2	27	.	8	2	7	57	.	24	3	22
102	7	.	2	1	1	15	.	6	1	5	30	.	16	1	15
103	4	.	1	.	1	8	.	4	.	4	15	.	10	.	10
104	2	.	1	.	1	4	.	3	.	3	7	.	6	.	6
105	1	.	1	.	1	2	.	2	.	2	3	.	3	.	3
106	1	.	1	.	1	1	.	1	.	1	1	.	1	.	1

AFTER-LIFETIME of MALES of DIFFERENT CLASSES.

AGE.	MALES of all Classes.		MINERS.			
	ENGLAND AND WALES.	63 Healthy Country Districts.	(1) Cornish Districts.	(2) Staffordshire Districts.	(3) Durham and Northumberland Districts.	(4) Merthyr Tydfil District.
	Years.	Years.	Years.	Years.	Years.	Years.
20 - -	39·425	43·456	34·862	33·307	42·016	30·575
25 - -	36·041	39·972	31·390	30·557	38·110	27·401
30 - -	32·681	36·483	27·755	27·706	34·563	24·841
35 - -	29·338	32·945	23·987	24·716	30·999	22·352
40 - -	26·018	29·342	20·314	21·644	27·387	19·765
45 - -	22·741	25·700	16·963	18·591	23·836	17·121
50 - -	19·545	22·078	14·064	15·666	20·447	14·463
55 - -	16·506	18·505	11·702	12·992	17·127	11·742
60 - -	13·614	15·094	9·688	10·530	13·772	9·079
65 - -	10·910	12·016	7·827	8·324	10·625	6·998
70 - -	8·524	9·356	6·131	6·502	7·926	5·535
75 - -	6·547	7·146	4·674	5·111	5·789	4·557
80 - -	4·992	5·378	3·501	4·117	4·196	3·934

TABLE .—LIFETIME ENJOYED and LIFETIME LOST by DIFFERENT CLASSES of ENGLISHMEN.

AGES.	(A) LIFETIME PAST in *Health* or in *Sickness* after the Age of 20 years.						(B) LIFETIME LOST after the Age of 20 years.					
	Healthy Districts.	Miners.				*England and Wales.*	*Healthy Districts.*	Miners.				*England and Wales.*
		Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.			Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.	
AFTER-LIFETIME - - -	43·5	42·0	33·3	30·6	34·9	39·4	36·5	38·0	46·7	49·4	45·1	40·6
20–40 (Athletic Age) - - -	18·5	18·6	17·3	17·0	18·2	18·2	1·5	1·4	2·7	3·0	1·8	1·8
40–60 (Intellectual Age) - -	15·2	14·9	11·7	10·4	12·8	13·8	4·8	5·1	8·3	9·6	7·2	6·2
60–80 (Mature Age) - - -	8·8	7·9	4·1	3·1	3·8	6·8	11·2	12·1	15·9	16·9	16·2	13·2
80 and upwards (Monumental Age) -	1·0	·6	·2	·1	·1	·6	19·0	19·4	19·8	19·9	19·9	19·4

AGES.	(C) Estimated HEALTH-TIME after the Age of 20 years.						(D) Estimated SICK and INFIRM-TIME after the Age of 20 years.					
	Healthy Country Districts.	Miners.				*England and Wales.*	*Healthy Country Districts.*	Miners.				*England and Wales.*
		Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.			Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.	
AFTER-LIFETIME - - -	40·5	39·0	30·3	27·6	31·9	36·4	3·0	3·0	3·0	3·0	3·0	3·0
20–40 (Athletic Age) - - -	18·0	18·2	16·5	16·1	17·7	17·6	·5	·4	·8	·9	·5	·6
40–60 (Intellectual Age) - -	14·6	14·2	10·7	9·4	11·5	13·0	·6	·7	1·0	1·0	1·3	·8
60–80 (Mature Age) - - -	7·4	6·4	3·0	2·1	2·7	5·6	1·4	1·5	1·1	1·0	1·1	1·2
80 and upwards (Monumental Age) -	·5	·2	·1	·0	·0	·2	·5	·4	·1	·1	·1	·4

This Table shows the AFTER-LIFETIME (A) at the age of 20 in the whole male population of 63 of the HEALTHIEST DISTRICTS of England and Wales, among the MINERS of *four great mining fields*, and in the whole male population of England and Wales. The *after lifetime* is the *average number* of *years* that people live *after* any given age; it is sometimes called the *expectation of life*. Thus at the age 20 the *after-lifetime* is 43·5 years in the Healthy Districts; and that is the number of years which, *on an average*, persons there at the age 20 will live; of these years 18·6 will be enjoyed on an average at the age 20–40; 15·2 at the age 40–60; 8·8 at the age 60–80; and 1·0 at the age 80 and upwards. Again, *one* entering annually at the age 20 would maintain a constant population of 43·5; namely, 18·5 of the age 20–40; 15·2, 8·8, and 1·0 of the three subsequent ages.* Contrast this result with that deduced from the law of mortality in the mining field of Staffordshire; there one entering annually would maintain a constant population of only 33·3 miners; namely, 17·3, 11·7, 4·1, and ·2 of the four ages.

This *Lifetime* is divisible into two portions, which may be called *Health-time* (C) and *Sick-time* (D), including all real infirmity. The proportions of these times have not yet been precisely determined; but it has been assumed, hypothetically, that there are 3 constantly sick or infirm persons to every annual death; and this hypothesis represents tolerably well the results of several observations on sickness and infirmity. The numbers in the columns under part (D) are derived from the deaths in the Life Table, and with the numbers in part (C) they make up the *Lifetime* in part (A).

If every person of the age of 20 lived to the age of 100 years they would live through 80 years of *after-life time*; while in the Healthy Districts they only live on an average 43·5: when this is deducted from 80 it leaves 36·5 years of *Lifetime lost* (B), namely, 1·5 years, 4·8 years, 11·2 years, and 19·0 years in the four ages of life. The *lifetime lost* in the mining districts of Staffordshire is 46·7 years; namely 2·7, 8·3, 15·9, and 19·8 years in the four ages.

* These numbers may be read without reference to the decimal points by assuming that *ten* persons instead of *one* enter annually. Thus ten persons entering annually at the age 20 would maintain a constant population of 435; namely, 185, 152, 88 and 10 of the four ages.

TABLE .—ANNUAL DEATH RATE per Cent. of different CLASSES of ENGLISHMEN (1849-53).

AGES.	ANNUAL DEATH RATE PER CENT.					
	Healthy Country Districts.	MINERS.				ENGLAND AND WALES.
		Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.	
Age of 20 and upwards - -	2·30	2·38	3·00	3·27	2·87	2·54
20–40 (Athletic Age) - - -	·81	·79	1·51	1·85	·99	1·02
40–60 (Intellectual Age) -	1·34	1·60	2·84	3·25	3·28	1·97
60–80 (Mature Age) - -	5·24	6·09	8·86	10·62	9·74	6·18
80 and upwards (Monumental Age) -	18·60	23·83	24·29	25·42	28·57	20·03

TABLE .—ESTIMATED ANNUAL RATE per Cent. of the NUMBERS constantly SICK or INFIRM amongst different CLASSES of ENGLISHMEN (1849-53).

AGES.	CONSTANTLY SICK OR INFIRM.					
	Healthy Country Districts.	MINERS.				ENGLAND AND WALES.
		Durham and Northumberland.	Staffordshire.	Merthyr Tydfil.	Cornwall.	
Age of 20 and upwards - -	6·90	7·14	9·00	9·81	8·61	7·62
20–40 (Athletic Age) - - -	2·43	2·37	4·53	5·55	2·97	3·06
40–60 (Intellectual Age) - - -	4·02	4·80	8·52	8·75	9·84	5·91
60–80 (Mature Age) - - -	15·72	18·27	26·58	31·86	29·22	18·54
80 and upwards (Monumental Age) -	55·80	71·49	72·87	76·26	85·71	60·09

NUMBER of MINERS (Males) living in ENGLAND and WALES in 1851.

———	AGES OF MINERS LIVING.									
	Total Living at 10 Years and upwards.	10—	15—	25—	35—	45—	55—	65—	75—	85 and upwards.
TOTAL MINERS living in 1851	252,398	30,668	84,708	59,568	37,442	22,888	11,497	4,386	1,118	123
Coal Miners - - - - -	182,180	23,038	61,604	42,591	26,656	15,955	8,192	3,309	838	97
Copper, Tin, Lead, and Iron Miners	70,218	7,630	23,104	16,977	10,886	6,933	3,305	1,077	280	26

VIOLENT DEATHS at different Ages in the MINES of ENGLAND and WALES during the Five Years 1849-53.

	AGES AT DEATH.										
	Total Deaths at 10 Years and upwards.	10—	15—	25—	35—	45—	55—	65—	75—	85 and upwards.	?
ALL MINERS - -	4,914	715	1,487	1,156	763	470	224	76	9	2	12
COAL MINERS - - - - -	4,532	685	1,368	1,063	702	429	201	68	8	2	6
Drowned - - - - -	39	2	11	13	7	4	2	—	—	—	—
Fall in Pit or Shaft - - -	836	152	240	171	144	72	39	13	3	1	1
Crushed and injured by fall of Coal, &c. - - - - -	2,141	284	597	504	344	244	124	36	4	1	3
Blasting - - - - - -	45	4	17	11	7	4	1	—	—	—	1
Explosions and Choke Damp -	1,321	218	462	337	175	88	25	14	1	—	1
All other Causes - - -	150	25	41	27	25	17	10	5	—	—	—
COPPER, TIN, LEAD, AND IRON MINERS	382	30	119	93	61	41	23	8	1	—	6
Drowned - - - - -	13	2	7	3	—	1	—	—	—	—	—
Fall in Pit or Shaft - - -	122	11	43	28	23	11	6	—	—	—	—
Crushed and injured by fall of Stone, &c. - - - - -	149	6	46	34	23	17	13	5	1	—	4
Blasting - - - - - -	39	—	8	10	10	7	2	—	—	—	2
All other Causes - - -	59	11	15	18	5	5	2	3	—	—	—

ANNUAL MORTALITY by VIOLENT DEATHS in MINES in ENGLAND during the Five Years 1849-53.

	AVERAGE ANNUAL NUMBER OF DEATHS TO 100,000 MINERS LIVING.										
	10 Years of Age and upwards.	YEARS OF AGE.									
		10—	15—	25—	35—	45—	55—	65—	75—	85—	95 and upwards.
ALL MINERS - -	389	466	353	389	409	411	390	347	161	325	—
COAL MINERS - - - - -	498	595	446	500	529	538	491	411	191	412	—
Drowned - - - - -	4	2	4	6	5	5	5	—	—	—	—
Fall in Pit or Shaft - - -	92	132	78	80	108	90	95	79	72	206	—
Crushed and injured by fall of Coal, &c. - - - - -	236	247	195	238	260	307	304	217	95	206	—
Blasting - - - - - -	5	3	6	5	5	5	2	—	—	—	—
Explosion and Choke Damp -	145	189	150	158	132	110	61	85	24	—	—
All other Causes - - -	16	22	13	13	19	21	24	30	—	—	—
COPPER, TIN, LEAD, AND IRON MINERS	109	79	105	112	116	118	139	149	71	—	—
Drowned - - - - -	4	5	6	4	—	3	—	—	—	—	—
Fall in Pit or Shaft - - -	35	29	37	33	42	32	36	—	—	—	—
Crushed and injured by fall of Stone, &c. - - - - -	42	16	42	41	45	49	79	93	71	—	—
Blasting - - - - - -	11	—	7	13	20	20	12	—	—	—	—
All other Causes - - -	17	29	13	21	9	14	12	56	—	—	—

The Deaths of Miners whose Ages were not stated have been distributed proportionally over the several Ages in the Tables.

TABLE 1.—MINING DISTRICTS. Miners living at the Ages 15 and upwards, 1861.

Districts.	Total Living.	Ages of Miners living (Males).								
		15–	25–	35–	45–	55–	65–	75–	85–	95 and upwards.
Total of 19 Mining districts.	100,948	36,931	26,241	18,025	11,235	5,985	2,078	430	23	—
1. Cornish Districts	25,866	11,054	5,471	4,101	2,937	1,640	555	102	6	—
2. Staffordshire Districts	28,108	9,298	8,085	5,473	3,123	1,496	527	101	5	—
3. Durham and Northumberland Districts.	31,766	11,040	8,354	5,741	3,562	2,057	804	198	10	—
4. South Wales Districts	15,208	5,539	4,331	2,710	1,613	792	192	29	2	—

Note.—The following are the 19 Districts comprised in this Table:

1. CORNISH DISTRICTS.—303, Liskeard. 306, St. Austell. 307, Truro. 309, Helston. 310, Redruth. 311, Penzance.
2. STAFFORDSHIRE DISTRICTS.—370, Wolstanton. 371, Stoke-on-Trent. 379, Wolverhampton. 380, Walsall. 381, West Bromwich. 382, Dudley.
3. DURHAM and NORTHUMBERLAND DISTRICTS.—542, Auckland. 545, Durham. 546, Easington 547, Houghton-le-Spring. 548, Chester-le-Street. 553, Tynemouth.
4. SOUTH WALES DISTRICT.—582, Merthyr Tydfil.

The Table may be read thus:—Of the 100,948 Miners in 19 Mining Districts, living, of the ages 15 and upwards, 36,931 were aged 15 and under 25 years; 26,241 were aged 25 and under 35 years; 18,205 were aged 35 and under 45 years, and so on for the other ages given in the Table.

TABLE 2.—MINING DISTRICTS. Deaths from all Causes, of Miners aged 15 and upwards, in the Three Years 1860–2.

Districts.	Total Deaths.	Ages of Miners dying.								
		15–	25–	35–	45–	55–	65–	75–	85–	95 and upwards.
Total of 19 Mining Districts.	5,246	1,124	841	752	734	846	613	275	60	1
1. Cornish Districts	1,504	313	157	186	262	311	184	74	17	—
2. Staffordshire Districts	1,381	232	231	230	197	225	183	70	13	—
3. Durham and Northumberland Districts.	1,524	359	274	204	170	201	188	103	24	1
4. South Wales District	837	220	179	132	105	109	58	28	6	—

TABLE 3.—AGGREGATE NUMBER of Deaths of Miners in 19 Districts during the Three Years 1860–2.

Ages.	Deaths registered from													
	All Causes. 1.	Smallpox. 2.	Cholera and Diarrhœa. 3.	Fever. 4.	Other Zymotic Diseases. 5.	Diseases of the Brain. 6.	Heart Disease and Dropsy. 7.	Consumption. 8.	Diseases of the Lungs. 9.	Diseases of the Stomach and Liver. 10.	Diseases of the Kidneys. 11.	Diseases of the Joints. 12.	Violent Deaths. 13.	Other Causes. 14.
15–	1,124	16	4	109	22	29	23	293	51	41	7	8	476	45
25–	841	13	5	46	17	23	35	216	42	33	11	3	362	35
35–	752	5	5	33	7	29	56	189	70	33	11	6	268	40
45–	734	2	10	30	7	43	62	187	143	44	11	3	151	41
55–	846	1	10	20	14	64	94	190	226	46	7	3	100	71
65–	613	—	5	10	5	70	67	51	159	31	10	2	26	177
75–	275	—	9	1	2	19	10	6	47	9	9	—	3	160
85–	60	—	1	—	—	1	—	—	1	—	—	—	1	56
95 and upwards.	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Total	5,246	37	49	249	74	278	347	1,132	739	237	66	25	1,387	626

TABLE 4.—ANNUAL RATE of MORTALITY per cent., (1) of MINERS; (2) of MALES EXCLUSIVE OF MINERS; (3) of MALES OF ALL CLASSES, in the Aggregate of the 19 Mining Districts, and in each of the Four Groups of Mining Districts, at different periods of Age, in the Three Years 1860–62.

Ages.	Aggregate of Mining Districts.			Cornish Districts.			Staffordshire Districts.			Durham and Northumberland Districts.			South Wales District.			Ages.
	Deaths annually to every 100 Males living at each Age.															
	Miners.	Males exclusive of Miners.	Males of all Classes.	Miners.	Males exclusive of Miners.	Males of all Classes.	Miners.	Males exclusive of Miners.	Males of all Classes.	Miners.	Males exclusive of Miners.	Males of all Classes.	Miners.	Males exclusive of Miners.	Males of all Classes.	
15 and upwards -	1·732	1·566	1·613	1·938	1·785	1·841	1·638	1·504	1·527	1·599	1·490	1·530	1·835	1·700	1·756	15 and upwards.
15–	1·015	·625	·749	·944	·750	·838	·832	·541	·593	1·084	·716	·861	1 324	·676	·986	15–
25–	1·068	·760	·854	·957	·832	·883	·952	·706	·754	1·093	·746	·878	1·378	1·023	1.181	25–
35–	1·391	1·107	1·185	1·512	1·008	1·187	1·401	1·137	1·183	1·184	1·023	1·081	1·624	1·297	1·424	35–
45–	2·178	1·661	1·789	2·974	1·250	1·789	2·103	1·839	1·878	1·591	1·617	1·608	2·170	1·586	1·801	45–
55–	4·712	2·940	3·322	6·321	1·996	3·014	5·013	3·396	3·601	3.257	2·598	2·804	4·588	4·112	4·269	55–
65–	9·833	6·656	7·169	11·051	5·331	6·173	11·575	7·535	7·942	7·794	6·231	6·651	10·069	8·188	8·598	65–
75–	21·318	14·043	14.820	24·183	13·356	14·222	23·102	15·331	15·859	17·340	12·595	13·508	32·184	15·137	17·232	75–
85 and upwards -	88·406	29·302	32·303	94·444	35·821	38·333	86·667	26·793	28·630	83·333	29·123	34·286	100·000	18·605	22·222	85 and upwards.

The Table may be read thus:—To every 100 Miners living in the aggregate of 19 Mining Districts at the age 15 and under 25 there were 1·015 deaths of Miners of the same age. In Cornish Districts ·944 Miners aged 15 and under 25 died annually to every 100 Miners of the same age living in those Districts.

TABLE 5.—ANNUAL RATE of MORTALITY per cent. (1) of MALES OF ALL CLASSES; (2) of MINERS; (3) of MALES EXCLUSIVE OF MINERS, in the aggregate of the 19 Mining Districts, and in each of the Four Groups of Mining Districts, at different periods of Age, in the Five Years 1849–53, and in the Three Years 1860–2.

Ages	Aggregate of Mining Districts.		Cornish Districts.		Staffordshire Districts.		Durham and Northumberland Districts.		South Wales District.		Ages.
	1849–53.	1860–2.	1849–53.	1860–2.	1849–53.	1860–2.	1849–53.	1860–2.	1849–53.	1860–2.	
	Annual Rate of Mortality among Males of all Classes.										
15 and upwards -	1·799	1·613	1·834	1·841	1·740	1·527	1·649	1·530	2·366	1·756	15 and upwards.
15–	·883	·749	·787	·838	·783	·593	·865	·861	1·669	·986	15–
25–	1·016	·854	·889	·883	·985	·754	·900	·878	1·619	1·181	25–
35–	1·343	1·185	1·148	1·187	1·386	1·183	1·129	1·081	2·057	1·424	35–
45–	2·190	1·789	2·025	1·789	2·308	1·878	1·853	1·608	3·016	1·801	45–
55–	3·546	3·322	3·203	3·014	3·897	3·601	2·960	2·804	4·689	4·269	55–
65–	7·243	7·169	6·469	6·173	8·143	7·942	6·468	6·651	8·522	8·598	65–
75–	16·332	14·820	15·066	14·222	18·185	15·859	14·905	13·508	20·213	17·232	75–
85 and upwards -	30·308	32·303	33·289	38·333	29·620	28·630	29·851	34·286	24·348	22·222	85 and upwards.
	Annual Rate of Mortality among Miners.										
15 and upwards -	1·811	1·732	1·797	1·938	2·024	1·638	1·312	1·599	2·618	1·835	15 and upwards.
15–	1·143	1·015	·890	·944	1·363	·832	·850	1·084	2·072	1·324	15–
25–	1·217	1·068	·896	·957	1·492	·952	·849	1·093	2·042	1·378	25–
35–	1·525	1·391	1·430	1·512	1·761	1·401	1·013	1·184	2·378	1·624	35–
45–	2·667	2·178	3·351	2·974	2·765	2·103	1·681	1·591	3·426	2·170	45–
55–	4·575	4·712	6·317	6·321	4·996	5·013	2·443	3·257	5·742	4·588	55–
65–	9·293	9·833	11·123	11·051	10·484	11·575	6·516	7·794	13·893	10·069	65–
75–	20·000	21·318	22·268	24·183	20·526	23·102	17·655	17·340	22·500	32·184	75–
85 and upwards -	40·000	88·406	72·000	94·444	30·000	86·667	35·000	83·333	53·333	100·000	85 and upwards.
	Annual Rate of Mortality among Males exclusive of Miners.										
15 and upwards -	1·795	1·566	1·854	1·785	1·685	1·504	1·855	1·490	2·214	1·700	15 and upwards.
15–	·764	·625	·712	·750	·656	·541	·876	·716	1·375	·676	15–
25–	·932	·760	·884	·832	·874	·706	·933	·746	1·352	1·023	25–
35–	1·277	1·107	·999	1·008	1·314	1·137	1·194	1·023	1·875	1·297	35–
45–	2·038	1·661	1·476	1·250	2·235	1·839	1·945	1·617	2·801	1·586	45–
55–	3·295	2·940	2·412	1·996	3·742	3·396	3·182	2·598	4·295	4·112	55–
65–	6·914	6·656	5·861	5·331	7·925	7·535	6·453	6·231	7·263	8·188	65–
75–	15·914	14·043	14·441	13·356	18·015	15·331	14·370	12·595	19·744	15·137	75–
85 and upwards -	29·534	29·302	31·944	35·821	29·589	26·793	29·153	29·123	22·326	18·605	85 and upwards.

TABLE 6.—ANNUAL RATE of MORTALITY per Cent. of MINERS by different Diseases and at different Ages in the Three Years 1860–62, in the Aggregate of the 19 Mining Districts.

Ages.	Annual Rate of Mortality to 100 living at each Age.														Ages.
	All Causes. 1.	Small-pox. 2.	Cholera and Diarrhœa. 3.	Fever. 4.	Other Zymotic Diseases. 5.	Diseases of the Brain. 6.	Heart Disease and Dropsy. 7.	Consump-tion. 8.	Diseases of the Lungs. 9.	Diseases of the Stomach and Liver. 10.	Diseases of the Kidneys. 11.	Diseases of the Joints. 12.	Violent Deaths. 13.	Other Causes. 14.	
15 and upwards -	1·732	·012	·016	·082	·024	·092	·115	·374	·244	·078	·022	·008	·458	·207	15 and upwards.
15– - -	1·015	·014	·004	·098	·020	·026	·021	·264	·046	·037	·006	·007	·430	·042	15–
25– - -	1·068	·017	·006	·058	·022	·029	·044	·274	·053	·042	·014	·004	·460	·045	25–
35– - -	1·391	·009	·009	·061	.013	·054	·104	·350	·129	·061	·020	·011	·496	·074	35–
45– - -	2·178	·006	·030	·089	·021	·128	·184	·555	·424	·131	·033	·009	·448	·120	45–
55– - -	4·712	·006	·056	·111	·078	·356	·524	1.058	1·259	·256	·039	·017	·557	·395	55–
65– - -	9·833	—	·080	·160	·080	1·123	·075	·818	2·551	·497	.160	·032	·417	2·840	65–
75– - -	21·318	—	·698	·078	·155	1·473	·775	·465	3·643	·698	·698	—	·233	12·402	75–
85 and upwards -	88·406	—	1·449	—	—	1·449	1—	—	1·449	—	—	—	1·449	82·610	85 and upwards.

TABLE 7.—LIFE TABLE showing (Col. 1.) to 10,000 MINERS (Males) at the Age 15, the Numbers surviving and attaining the Ages 25, 35, 45, &c.; also the Numbers dying in the Intervals (Col. 2.), with the Causes of their Death (Cols. 3. to 15.)

Ages.	Numbers living at each Age. 1.	Dying between each Interval of Age from all Causes. 2.	Dying by												
			Small-pox. 3.	Cholera and Diarrhœa. 4.	Fever. 5.	Other Zymotic Diseases. 6.	Diseases of the Brain. 7.	Heart Disease and Dropsy. 8.	Consump-tion. 9.	Diseases of the Lungs. 10.	Diseases of the Stomach and Liver. 11.	Diseases of the Kidneys. 12.	Diseases of the Joints. 13.	Violent Deaths. 14.	Other Causes. 15.
15– - -	10,000	966	14	3	94	19	25	20	252	44	35	6	7	409	38
25– - -	9,034	915	14	5	50	18	25	38	235	46	36	12	3	394	39
35– - -	8,119	1,055	7	7	46	10	41	79	265	98	46	15	8	376	57
45– - -	7,064	1,383	4	19	57	13	81	117	352	269	83	21	6	285	76
55– - -	5,681	2,135	3	25	50	35	162	237	480	570	116	18	8	252	179
65– - -	3,546	2,221	—	18	36	18	254	243	185	576	112	36	7	94	642
75– - -	1,325	1,169	—	38	4	9	81	43	26	200	38	38	—	13	679
85 and upwards.	156	156	—	3	—	—	3	—	—	3	—	—	—	3	144

TABLE 8.—NUMBER of MINERS (Males) living in ENGLAND and WALES in 1861.

	Ages of Miners living.										
	Total living at 10 Years and upwards.	10–	15–	25–	35–	45–	55–	65–	75–	85–	95 and upwards.
Total miners living in 1861	324,060	38,571	106,766	76,259	49,967	29,998	15,428	5,676	1,302	92	1
Coal miners	248,975	31,032	81,940	59,003	37,853	22,287	11,407	4,337	1,038	77	1
Copper, tin, lead, and iron miners	75,085	7,539	24,826	17,256	12,114	7,711	4,021	1,339	264	15	—

NOTE.—At the census of 1861 there were 7,460 males aged 10 years and upwards returned indefinitely as "*Miners*," and it was ascertained that the greater proportion of these were in the Metal Mining Districts. In this Table 3,197 of those indefinitely returned have been added to the coal miners, and 4,263 to the copper, tin, lead, and iron miners, distributed proportionally over the several Ages in the Table.

TABLE 9.—VIOLENT DEATHS at different Ages among the MINERS of ENGLAND and WALES during the Three Years 1860–2.

	Ages at Death.									
	Total Deaths at 10 Years and upwards.	10–	15–	25–	35–	45–	55–	65–	75–	85–	95 and upwards.
All miners	3,746	521	1,047	836	635	398	240	64	5	—	—
Coal miners	3,235	468	906	690	554	346	209	57	5	—	—
Drowned	58	8	13	8	13	9	5	2	—	—	—
Fall in pit or shaft	360	46	105	73	61	44	23	7	1	—	—
Crushed and injured by fall of coal, &c.	1,492	167	423	313	272	178	108	27	4	—	—
Blasting	46	2	14	11	10	3	4	2	—	—	—
Explosions and choke damp	849	96	255	222	142	76	47	11	—	—	—
Rope breaking	8	1	3	2	1	1	—	—	—	—	—
All other causes	422	148	93	61	55	35	22	8	—	—	—
Copper, tin, lead, and iron miners	511	53	141	146	81	52	31	7	—	—	—
Drowned	18	—	2	7	6	2	1	—	—	—	—
Fall in pit or shaft	122	22	40	24	20	6	8	2	—	—	—
Crushed and injured by fall of stones	270	19	73	87	40	30	17	4	—	—	—
Blasting	33	2	9	11	6	3	2	—	—	—	—
Other causes	68	10	17	17	9	11	3	1	—	—	—

TABLE 10.—ANNUAL MORTALITY by VIOLENT DEATHS in MINES in ENGLAND during the Three Years 1860–2.

	Average annual Number of Deaths to 100,000 Miners living at each Age.									
	Years of Age.									
	10 Years of Age and upwards.	10–	15–	25–	35–	45–	55–	65–	75–	85 and upwards.
All miners	385	450	327	365	424	442	519	376	128	—
Coal miners	433	503	369	390	488	517	611	438	160	—
Drowned	8	9	5	5	11	13	15	15	—	—
Fall in pit or shaft	48	49	43	41	54	66	67	54	32	—
Crushed and injured by fall of coal, &c.	198	179	172	177	240	266	316	208	128	—
Blasting	6	2	6	6	9	4	12	15	—	—
Explosions and choke damp	114	103	104	125	125	114	137	85	—	—
Rope breaking	1	1	1	1	1	1	—	—	—	—
All other causes	58	160	38	35	48	53	64	61	—	—
Copper, tin, lead, and iron miners	227	234	190	282	223	225	257	175	—	—
Drowned	8	—	3	14	17	9	8	—	—	—
Fall in pit or shaft	54	97	54	46	55	26	66	50	—	—
Crushed and injured by fall of stones, &c.	120	84	98	168	110	130	141	100	—	—
Blasting	15	9	12	21	17	13	17	—	—	—
All other causes	30	44	23	33	24	47	25	25	—	—

TABLE 11.—TABLE showing the Effects of the high Mortality of CORNISH MINERS on the VALUE OF THEIR LIVES, and on the PREMIUMS which they would have to pay for the Insurance of their Lives, as compared with the corresponding Value and Premiums in the HEALTHY DISTRICTS of England, and in ENGLAND generally (Rate of Interest 3 per cent.)

Age.	SINGLE PREMIUM which will insure £100 over the whole Term of Life.			ANNUAL PREMIUM which will insure £100 over the Whole Term of Life.			Age.
	Πx			πx			
x.	HEALTHY DISTRICTS. (Males.)	ENGLAND. (Males.)	CORNISH MINERS.	HEALTHY DISTRICTS. (Males.)	ENGLAND. (Males.)	CORNISH MINERS.	x.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
20	32 3 5	35 14 11	39 4 0	1 7 7	1 12 5	1 17 6	20
21	32 13 4	36 5 9	39 16 10	1 8 3	1 13 2	1 18 7	21
22	33 3 5	36 16 10	40 9 11	1 8 11	1 14 0	1 19 8	22
23	33 13 7	37 8 2	41 3 3	1 9 7	1 14 10	2 0 9	23
24	34 4 0	37 19 8	41 17 1	1 10 3	1 15 8	2 1 11	24
25	34 14 6	38 11 5	42 11 6	1 11 0	1 16 7	2 3 2	25
26	35 5 4	39 3 5	43 6 6	1 11 9	1 17 6	2 4 6	26
27	35 16 5	39 15 8	44 2 2	1 12 6	1 18 6	2 6 0	27
28	36 7 10	40 8 2	44 18 7	1 13 4	1 19 6	2 7 6	28
29	36 19 6	41 1 0	45 15 8	1 14 2	2 0 7	2 9 2	29
30	37 11 7	41 14 1	46 13 5	1 15 1	2 1 8	2 11 0	30
31	38 4 0	42 7 6	47 11 10	1 16 0	2 2 10	2 12 11	31
32	38 16 10	43 1 3	48 10 11	1 17 0	2 4 1	2 14 11	32
33	39 10 0	43 15 3	49 10 6	1 18 0	2 5 4	2 17 2	33
34	40 3 7	44 9 7	50 10 8	1 19 1	2 6 8	2 19 6	34
35	40 17 7	45 4 3	51 11 3	2 0 3	2 8 1	3 2 0	35
36	41 12 1	45 19 2	52 12 3	2 1 6	2 9 7	3 4 8	36
37	42 6 11	46 14 6	53 13 6	2 2 9	2 11 1	3 7 6	37
38	43 2 3	47 10 0	54 15 0	2 4 2	2 12 8	3 10 6	38
39	43 18 0	48 5 11	55 16 8	2 5 7	2 14 5	3 13 7	39
40	44 14 1	49 2 1	56 18 4	2 7 1	2 16 2	3 16 11	40
41	45 10 9	49 18 6	58 0 0	2 8 8	2 18 1	4 0 5	41
42	46 7 9	50 15 4	59 1 8	2 10 5	3 0 1	4 4 1	42
43	47 5 3	51 12 5	60 3 2	2 12 2	3 2 2	4 7 11	43
44	48 3 1	52 9 9	61 4 5	2 14 1	3 4 4	4 12 0	44
45	49 1 5	53 7 4	62 5 5	2 16 1	3 6 8	4 16 2	45
46	50 0 1	54 5 3	63 6 2	2 18 3	3 9 1	5 0 6	46
47	50 19 2	55 3 6	64 6 6	3 0 6	3 11 8	5 5 0	47
48	51 18 8	56 2 0	65 6 6	3 2 11	3 14 5	5 9 9	48
49	52 18 7	57 0 9	66 6 1	3 5 6	3 17 4	5 14 7	49
50	53 18 10	57 19 9	67 5 3	3 8 3	4 0 5	5 19 8	50
51	54 19 5	58 19 1	68 4 0	3 11 1	4 3 8	6 4 11	51
52	56 0 5	59 18 3	69 1 9	3 14 2	4 7 1	6 10 2	52
53	57 1 10	60 17 7	69 18 9	3 17 6	4 10 8	6 15 6	53
54	58 3 6	61 17 1	70 15 2	4 1 0	4 14 6	7 0 11	54
55	59 5 8	62 16 11	71 11 2	4 4 10	4 18 6	7 6 6	55
56	60 8 1	63 16 10	72 6 10	4 8 10	5 2 10	7 12 4	56
57	61 11 0	64 17 0	73 2 4	4 13 3	5 7 6	7 18 5	57
58	62 14 2	65 17 3	73 17 8	4 18 0	5 12 5	8 4 10	58
59	63 17 10	66 17 8	74 13 0	5 3 1	5 17 8	8 11 6	59
60	65 1 3	67 18 2	75 8 3	5 8 6	6 3 3	8 18 8	60
61	66 4 3	68 18 9	76 3 7	5 14 2	6 9 3	9 6 3	61
62	67 7 0	69 19 3	76 18 10	6 0 2	6 15 8	9 14 4	62
63	68 9 5	70 19 9	77 14 1	6 6 6	7 2 6	10 3 0	63
64	69 11 6	72 0 1	78 9 4	6 13 3	7 9 10	10 12 3	64
65	70 13 5	73 0 3	79 4 7	7 0 4	7 17 7	11 2 2	65
66	71 15 0	74 0 2	79 19 8	7 8 0	8 5 11	11 12 9	66
67	72 16 4	74 19 10	80 14 9	7 16 0	8 14 8	12 4 1	67
68	73 17 4	75 19 2	81 9 7	8 4 8	9 4 1	12 16 3	68
69	74 18 0	76 18 2	82 4 3	8 13 10	9 14 0	13 9 3	69
70	75 18 3	77 16 8	82 18 8	9 3 7	10 4 7	14 3 1	70
71	76 18 1	78 14 9	83 12 10	9 13 11	10 15 9	14 17 11	71
72	77 17 5	79 12 5	84 6 9	10 5 0	11 7 7	15 13 8	72
73	78 16 4	80 9 6	85 0 3	10 16 9	12 0 1	16 10 5	73
74	79 14 9	81 6 1	85 13 5	11 9 3	12 13 4	17 8 3	74
75	80 12 7	82 2 1	86 6 1	12 2 6	13 7 3	18 7 1	75
76	81 9 11	82 17 6	86 18 4	12 16 6	14 1 11	19 7 0	76
77	82 6 7	83 12 4	87 10 2	13 11 5	14 17 4	20 8 2	77
78	83 2 9	84 6 8	88 1 8	14 7 2	15 13 6	21 10 6	78
79	83 18 2	85 0 4	88 12 6	15 3 9	16 10 6	22 13 10	79

TABLE 12.—TABLE showing the Effects of the SHORTENING OF THEIR LIVES on the VALUE of INCOMES or ANNUITIES secured on the Lives of CORNISH MINERS, as compared with the corresponding Value in the HEALTHY DISTRICTS OF ENGLAND, and in ENGLAND generally. (Rate of Interest 3 per cent.)

Age.	PRESENT VALUE of an ANNUITY of £1 a Year for Life (first Payment at Age x).		
	A x.		
x	HEALTHY DISTRICTS (Males).	ENGLAND (Males).	CORNISH MINERS.
	£ s. d.	£ s. d.	£ s. d.
20	23 5 9	22 1 3	20 17 6
25	22 8 2	21 1 10	19 14 4
30	21 8 7	20 0 3	18 6 2
35	20 6 0	18 16 3	16 12 7
40	18 19 8	17 9 6	14 15 10
45	17 9 9	16 0 2	12 19 1
50	15 16 3	14 8 6	11 4 9
55	13 19 7	12 15 2	9 15 4
60	11 19 11	11 0 4	8 8 10
65	10 1 5	9 5 4	7 2 8
70	8 5 5	7 12 2	5 17 2
75	6 13 0	6 2 11	4 14 0
80	5 5 5	4 18 5	3 14 6
85	4 3 2	3 18 9	2 19 2
90	3 6 1	3 3 7	2 6 6

EXAMPLE.—The present value of 1*l.* a year, to be paid during the life of a male aged 40 living in the healthy districts of England is 18*l.* 19*s.* 8*d.*; and the same value taken on an average male life in England generally is 17*l.* 9*s.* 6*d.*; whilst on the life of a Cornish miner aged 40 the present value of 1*l.* per annum is only 14*l.* 15*s.* 10*d.*

In the evidence of Dr. Farr, Chief of the Statistical Department of the General Register Office, is given the results of a very elaborate inquiry on the vital statistics of Miners in four of the chief mining districts of England and Wales, namely, in Cornwall, Durham, Northumberland, and Staffordshire, and Merthyr Tydfil, in South Wales. The number of Miners living between various ages in each group of districts was ascertained by the census of 1851, and the numbers dying between the corresponding ages, and of several diseases, were obtained from the Registrars of Deaths during the five years 1849-53, in nearly the middle of which period the census of 1851 was taken. Corresponding calculations have been made, based upon the census of 1861, and the Death Registers of the three years 1860-1 and 2. From these very extensive data the numbers and proportions of Miners living who survive to different ages have been calculated, and the numbers and proportions also who died at different periods of life and of various diseases are shown; the whole forming a more complete view of the vital statistics of a particular class of men than has ever been before obtained.

In the first place, Dr. Farr in his evidence proves, as is shown in the following table, compiled from those given by him, that there is an excessive death-rate amongst Cornish miners as compared with that amongst men of similar ages inhabiting the same districts, and therefore exposed to the same influences of climate, &c.; and must therefore be caused by peculiarities connected with their occupation.

ANNUAL DEATH-RATE per Cent.,—(1) of MINERS; (2) of MALES EXCLUSIVE OF MINERS; (3) of MALES OF ALL CLASSES, in SEVEN CORNISH DISTRICTS.

Ages.	In the Five Years 1849–53.			In the Three Years 1860–2.		
	Miners.	Males (exclusive of Miners).	Difference in the Death-rate of Miners and Non-Miners.	Miners.	Males (exclusive of Miners.)	Difference in the Death-rate of Miners and Non-Miners.
15 and upwards	1·797	1·854	·057	1·938	1·785	·153
15	·890	·712	·178	·944	·750	·194
25	·896	·884	·012	·957	·832	·125
35	1·430	·999	·431	1·512	1·008	·504
45	3·351	1·476	1·875	2·974	1·250	1·724
55	6·317	2·412	3·905	6·321	1·996	4·325
65 to 75	11·123	5·861	5·262	11·051	5·331	5·720

The table may be read thus:—the mortality among miners above 35 and below 45 years of age was 1·430 per cent. in the five years 1849–53, and 1·512 per cent. in the three years 1860–2.

It will be observed that at neither of these periods was there any marked excess in the death-rate amongst Miners below the age of 35, but that of those between 35 and 45 more than 4 per thousand died per annum of Miners than of other Cornishmen in the former, and 5 per thousand in the latter period. Between the ages of 45 and 55 more than twice as many, and between 55 and 65 three times as many Miners died in proportion to the number living as of other men not Miners residing in the same districts. The table indicates a small improvement in the health of Miners, or a postponement of the diseases which increase the death-rate at that age, and confirms the evidence given that the mines have been improved of late years, but shows that the improvement is not so great or so general as to have produced a marked diminution of the excessive mortality of miners.

The fact of there being a great excess of mortality amongst Miners above 35 years of age, beyond that amongst other men living in the same district, proves that Miners must be more exposed to causes of fatal disease than other Cornishmen, and while the fact that there is no marked excess of mortality among the younger men proves either that those causes do not generally produce fatal diseases quickly, or that the diseases produced are slow in their progress, conclusions which the direct inquiry of Dr. Peacock and Mr. Bankart fully confirm, as does also the evidence of all the medical and other witnesses examined on this point. The following tables quoted from Dr. Farr's evidence show that all Miners are not liable to such excess of fatal disease, for notwithstanding the greater liability of colliers to fatal accidents, the death-rate amongst them from all causes including accidents is considerably less than that of Cornish Miners, who are much less exposed to such dangers.

ANNUAL DEATH PER CENT. of MALES MINERS, and of MALES EXCLUSIVE of MINERS, in each of three Groups of MINING DISTRICTS at different Periods of Age:—

Ages.	1849–53.			1860–62.	
	Miners.	Excluding Miners.	Death-rate of Miners by violence.	Miners.	Excluding Miners.
CORNISH DISTRICTS.					
15 and upwards	1·797	1·854	—	1·943	1·785
15	·890	·712	·200	·944	·750
25	·896	·884	·211	·957	·832
35	1·430	·939	·188	1·512	1·008
45	3·351	1·476	·237	2·974	1·250
55	6·317	2·412	·148	6·321	1·996
65 to 75	11·123	5·861	·209	11·051	5·331
STAFFORDSHIRE DISTRICTS.					
15 and upwards	2·024	1·685	—	1·638	1·504
15	1·363	·656	·754	·832	·541
25	1·492	·874	·768	·952	·706
35	1·761	1·314	·823	1·401	1·137
45	2·765	2·235	·882	2·103	1·839
55	4·996	3·742	·680	5·013	3·396
65 to 75	10·484	7·925	·684	11·575	7·535
DURHAM AND NORTHUMBERLAND DISTRICTS.					
15 and upwards	1·312	1·855	—	1·599	1·490
15	·850	·876	·243	1·084	·716
25	·849	·933	·223	1·093	·746
35	1·013	1·194	·333	1·184	1·023
45	1·681	1·945	·370	1·591	1·617
55	2·443	3·182	·375	3·257	2·598
65 to 75	6·516	6·453	·290	7·794	6·231

Average Death per cent. of Males Miners—*cont.*

Ages.	1849-53.			1860-62.	
	Miners.	Excluding Miners.	Death-rate of Miners by violence	Miners.	Excluding Miners.
SOUTH WALES DISTRICT (Merthyr Tydfil).					
15 and upwards	2·618	2·214	—	1·835	1·700
15	2·072	1·375	·705	1·324	·676
25	2·042	1·352	·612	1·378	1·023
35	2·378	1·875	·721	1·624	1·297
45	3·426	2·801	·812	2·170	1·586
55	5·742	4·295	·730	4·588	4·112
65 to 75	13·893	7·263	·611	10·069	8·188

Examination of the above tables shows no such marked difference in the death-rate of the mining and non-mining population of the colliery districts as is shown in the Cornish tables, and a great part of the difference is due to the excess of fatal accidents, particularly in the Staffordshire and South Wales districts. The following tables show the death-rate among different classes of Miners from violence, and the death-rate excluding deaths by violence. When these latter are excluded it will be seen that amongst colliers there is no such excess of death-rate as amongst Cornish Miners. Amongst the colliers of the Durham and Northumberland districts the death-rate, if deaths from violence be excluded, is at all ages below 75 considerably below the average, thus proving that mining is not necessarily an unhealthy occupation.

DEATH-RATE PER CENT. of MALES aged 15 Years and upwards in 5 Years 1849–53.

DEATH-RATE by VIOLENCE to 100 LIVING.

Ages.	All England.	Miners.			
		Cornish.	Stafford.	Durham.	South Wales.
15	·089	·200	·754	·243	·705
25	·098	·211	·768	·223	·612
35	·115	·188	·823	·333	·721
45	·144	·237	·882	·370	·812
55	·160	·148	·680	·375	·730
65 to 75	·183	·209	·684	·290	·611
DEATH-RATE, excluding DEATHS by VIOLENCE.					
15	·725	·690	·609	·607	1·367
25	·910	·685	724	·626	1·430
35	1·185	1·242	·938	·680	1·657
45	1·753	3·114	1·883	1·311	2·614
55	3·023	6·169	4·316	2·068	5·012
65 to 75	6·412	10·914	9·800	6·226	13·282

The following table shows the class of diseases by which the excessive death-rate of the Cornish Miners is chiefly produced.

Out of 10,000 deaths (from all causes) of males above 15, there were registered as deaths from consumption:—

——	In England.	Of Cornish Miners.	Difference.
15	312	247	65 less.
25	354	331	23 „
35	309	549	240 more.
45	263	1,206	943 „
55	186	1,394	1,208 „
65 to 75	85	652	567 „
Total -	1,509	4,379	2,970 more.

From other Lung Disease.

—	In England.	Of Cornish Miners.	Difference.
15	39	45	6 more.
25	63	56	7 less.
35	108	111	3 more.
45	191	292	101 „
55	314	315	1 „
65 to 75	384	278	106 less.
Total -	1,099	1,097	2 less.

From Consumption and other Lung Diseases.

15	351	292	59 less.
25	417	387	30 „
35	417	660	243 more.
45	454	1,498	1,044 „
55	500	1,709	1,209 „
65 to 75	469	930	461 „
Total -	2,608	5,476	2,868 more.

Out of 10,000 males who attain the age of 15, there were registered as dying of the following diseases:—

—	In England, all Occupations.	Miners in			
		Cornwall.	Stafford.	Durham.	S. Wales.
Diarrhœa and cholera	547	230	1,052	1,255	1,915
Fever - -	426	324	385	307	782
Diseased heart and dropsy - -	928	484	612	928	333
Consumption -	*1,523	4,439	680	948	1,604
Other lung disease -	1,343	1,157	1,975	1,010	1,433
Accident or violence	532	782	2,782	1,312	2,158
All lung disease -	2,866	5,596	2,655	1,958	3,037
Lung disease and accident - -	3,498	6,378	5,437	3,270	5,195

From the above table it appears that nearly three times as many Cornish Miners above 15 as of males above 15 in England are registered as dying of consumption, and a much greater proportion as compared with the coal miners of the Staffordshire and Durham districts, but it is certain that many, and probable that a large proportion, of the deaths registered as from consumption in Cornwall would be registered as from bronchitis, asthma, or other lung disease had the cases occurred in the other districts; it may therefore be expedient to make the comparison also between the deaths from all lung diseases, including consumption registered in the different districts. If this be done, it will be seen that 28⅝ per cent. of all the deaths in England among males above 15 are from lung disease, nearly twice as many in proportion or 56 per cent. are from lung disease amongst Cornish Miners, 26½ per cent. amongst the Miners of Staffordshire, 30½ amongst those at Merthyr, South Wales, but only 19½ per cent. amongst those of Durham. Part of the excessive mortality of the Staffordshire and Merthyr districts may be attributable to a very defective sanitary condition. The Durham and Northumberland Miners are chiefly colliers, and enjoy much greater domestic advantages than those of the other districts, there is a much lower death-rate, and especially a much smaller proportion of the deaths are caused by lung disease, and not much more than a third of the proportion amongst Cornish Miners, a fact which conclusively proves that the lung disease which causes two-thirds of the total number of deaths amongst them is not occasioned wholly or chiefly by working underground; the proportion of deaths from lung disease, including consumption, is little more than two-thirds (19½ to 28⅝ per cent.) of the average of Englishmen of like ages. It may be that the steady temperature of mines, (if they are well ventilated, free from gritty dust and gunpowder smoke, and where the men are not compelled to climb ladders,) may contribute to the comparative exemption of Durham colliers from consumption and other lung disease. The Iron Miners of Ulverston and Cleveland, and the Salt Miners of Cheshire are comparatively free from lung disease for the same reasons. If the Cornish Miners enjoyed a similar exemption from these causes of death, the average duration of their lives would be considerably greater instead of considerably less than that of other Englishmen, as is apparent from the following table:—

* These numbers include the deaths of men above 75.

Annual Death-rate, excluding Deaths from Consumption and other Lung Disease in Miners.

Ages.	Males: England.	Miners			
		Cornish.	Stafford.	Durham.	South Wales.
15	·450	·585	1·177	·556	1·498
25	·533	·454	1·223	·635	1·586
35	·766	·583	1·426	·827	1·786
45	1·216	·920	1·966	1·333	2·436
55	2·217	1·871	2·977	1·957	3·552
65	5·139	5·536	6·951	5·129	8·245

It will be remarked that at all ages between 25 and 65 the proportion of Cornish Miners who die from other causes than consumption and lung disease is small, and if the death-rate from those diseases were the same as it is amongst the Miners of Durham, the death-rate between the ages of 25 and 65 would be considerably below the average, notwithstanding the greater liability of Miners to fatal accidents, which is considerable, though very much less than that to which Coal Miners are exposed.

This is distinctly shown by the following table of the death-rate per thousand, excluding deaths by violence as well as those from consumption and from other lung disease:—

Annual Death-rate in 1,000 Males living above 15 at various Periods of Life, excluding Deaths from Violence, Consumption, and other Lung Disease.

—	In all England.	In Mining Districts.	
		Cornish.	Durham.
15	4	4	3
25	4	2·4	4
35	6	4	5
45	11	7	10
55	21	17	15
65 to 75	50	53	48

It will be noticed that if the excess of deaths above the average from violence and consumption be excluded, the death-rate of the miners in both the Cornish and Durham districts at no age below 65 is greater, and at most ages is much less, than that of the average of Englishmen.

The following tables show the difference in the death-rate from consumption, from other lung disease, and from violence amongst the Miners of the seven Cornish districts, at the two periods examined:

Annual Death-rate per Cent. of Miners in Cornish Districts at different Periods of Time.

Consumption.

Ages.	For 5 Years, 1849-53.	For 3 Years, 1860-62.	Difference.
15	·258	·332	·074 more.
25	·378	·366	·012 less.
35	·705	·650	·055 „
45	1·957	1·339	·618 „
55	3·626	3·008	·618 „
65 to 75	3·916	2·102	1·814 „

From other Diseases of the Lungs.

Ages.	For 5 Years, 1849-53.	For 3 Years, 1860-62.	Difference.
15	·047	·045	·002 less.
25	·064	·049	·015 „
35	·142	·139	·003 „
45	·474	·636	·172 more.
55	·820	1·321	·501 „
65 to 75	1·671	2·402	·731 „

Annual Death-rate per Cent. from Consumption and other Lung Diseases.

15	·305	·377	·065 more.
25	·442	·415	·027 less.
35	·847	·789	·158 „
45	2·431	1·975	·456 „
55	4·446	4·329	·117 „
65 to 75	5·587	4·504	1·083 „

It will be remarked that the death-rate from the diseases registered as consumption has been 6 per 1,000 less during the latter than in the earlier period among Miners between the ages of 45 and 65, and 18 per 1,000 less amongst those between 65 and 75, while the death-rate from other diseases of the lungs has been higher at the later period.

This may be owing to a difference of registration, some cases being now called by another name that might before have been registered as cases of consumption; but it further appears that the total death-rate from both consumption and from other lung diseases has been reduced by between four and five per thousand amongst Miners between 45 and 55 years old, but only rather more than one per thousand among those between 55 and 65. At that age the average death-rate from consumption amongst Englishmen in the years 1860–2, was ·317, and from other lung disease ·691, or together 1·008 per cent. or 10 per 1,000. Among Miners of the Cornish districts it was 4·329 per cent. or above 43 per 1,000, more than three times as great. The death-rate from consumption and other lung diseases in the years 1860–2 among Englishmen of all ages above 15 was ·635 per cent. or 6¼ per 1,000. Among Miners of the Cornish districts it was 1·080 per cent. or nearly 11 per 1,000.

This great destruction of life amongst Miners of middle age of course diminishes their "expectation of life," *i.e.*, the probability of their surviving as long as other men of like ages. The amount of this shortening of life has been calculated by Dr. Farr.

Table 1.

Average Annual Rate of Mortality per Cent. in the Three Years 1860-62 from Pulmonary Diseases amongst the Non-Mining Population of the Cornish Mining Districts.

Ages.	Males (exclusive of Miners) living in 1861.	Deaths from Pulmonary Diseases in the 3 Years 1860–62.	Average Annual Rate of Mortality per Cent.
15 and upwards - -	45,107	657	·486
15— - - - -	13,327	132	·330
25— - - - -	8,009	92	·383
35— - - - -	7,470	95	·424
45— - - - -	6,452	84	·434
55— - - - - -	5,328	83	·519
65— - - - -	3,214	101	1·048
75— - - -	1,173	61	1·733
85 and upwards - -	134	9	2·239

Note.—The districts comprised in this table are the same six districts as were given in the previous tables for Cornish Miners, viz., Liskeard, St. Austell, Truro, Helston, Redruth, and Penzance.

Pulmonary diseases comprise phthisis and diseases of the respiratory organs.

The table is read thus :—To every 100 living of the non-mining population aged 15 and upwards, of the six Cornish districts, ·486 died annually in the three years (or 4·86 in 1,000).

TABLE 1 A.

AVERAGE ANNUAL RATE OF MORTALITY per Cent. in the Three Years 1860–62 from PULMONARY DISEASES among the NON-MINING POPULATION in Six Groups of NORTHERN METAL MINING DISTRICTS.

(For contents of these groups see note to Table 2.)

Ages.	Males (exclusive of Miners) living in 1861.	Deaths from Pulmonary Diseases in the 3 Years 1860–62.	Average Annual Rate of Mortality per Cent.
15 and upwards - -	39,296	688	·583
15— - - - -	11,092	132	·397
25— - - - -	8,163	128	·515
35— - - - -	7,108	74	·352
45— - - - -	5,563	86	·521
55— - - - -	3,880	83	·722
65— - - - -	2,466	131	1·744
75— - - - -	901	49	1·776
85 and upwards - -	123	5	1·626

NOTE.—This table is to be read in a similar manner to Table 1.

Table 2.

Average Annual Rate of Mortality per Cent. in the Three Years 1860—62 from All Causes, and from Pulmonary Diseases amongst the Metalliferous Miners, and amongst the Male Population, exclusive of Metal Miners, in the Lead Mining Districts of Lancashire, Northumberland, Durham, Cumberland, Westmoreland, and Yorkshire and in the Lead and Copper Mining Districts of North Wales.

Ages.	Average Annual Deaths to 100 Living.																Ages.
	Aggregate of 6 groups of districts (excluding North Wales).		Lancashire Districts.		Yorkshire Districts.		Durham. Districts.		Northumberland Districts.		Cumberland Districts.		Westmoreland Districts.		North Wales Districts.		
	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	All Causes.	Pulmonary Diseases.	
Metal Miners.																	
15 and upwards -	2·100	1·102	2·270	·826	2·077	1·009	2·107	1·104	2·342	1·471	1·998	1·138	·803	—	2·524	1·251	15 and upwards.
15— - -	·953	·340	·397	·397	1·097	·425	1·141	·269	·421	·253	·881	·474	—	—	·604	·302	15—
25— - -	1·238	·640	1·626	·813	1·263	·536	1·267	·828	1·320	·770	1·166	·486	—	—	1·572	·419	25—
35— - -	1·764	1·176	3·390	1·130	2·235	1·213	1·401	1·120	1·746	1·429	1·455	·794	—	—	1·805	1·062	35—
45— - -	3·311	2·318	5·051	1·010	2·626	1·826	3·444	2·333	4·464	3·571	3·486	2·179	—	—	2·574	1·471	45—
55— - -	7·834	4·147	1·852	—	5·517	2·529	8·108	4·054	12·727	7·879	8·995	6·878	13·333	—	5·519	3·532	55—
65— - -	12·752	5·369	22·222	11·111	11·728	6·790	11·333	4·000	14·286	4·762	17·949	7·692	—	—	8·696	4·831	65—
75— - -	26·667	6·667	11·111	—	33·333	8·333	19·048	9·524	11·111	5·556	50·000	16·667	—	—	22·222	—	75—
85 and upwards -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	50·000	—	85 and upwards.
Males, exclusive of Metal Miners.																	
15 and upwards -	1·965	·583	2·645	·792	1·908	·508	1·779	·612	1·899	·537	2·005	·756	2·375	·519	1·938	·681	15 and upwards.
15— - -	·757	·397	·737	·527	·784	·385	1·178	·565	·491	·333	·742	·353	·381	·286	·746	·339	15—
25— - -	·919	·515	·976	·751	·902	·475	·856	·494	·826	·469	1·098	·605	·939	·782	1·052	·579	25—
35— - -	1·013	·352	1·720	·491	·873	·274	·853	·310	1·043	·451	1·195	·398	1·314	·493	1·257	·541	35—
45— - -	1·618	·521	2·047	·487	1·451	·380	1·227	·393	1·701	·622	2·001	·794	2·094	·698	1·519	·706	45 —
55— - -	2·938	·722	3·492	1·270	2·440	.526	2·931	1·005	3·051	·455	3·776	1·187	3·881	·685	2·811	1·221	55—
65— - -	6·610	1·744	9·259	2·083	6·278	1·689	6·938	2·112	6·610	1·635	6·522	2·174	6·250	·417	7·578	1·696	65—
75— - -	15·427	1·776	26·667	3·333	13·768	1·087	13·655	2·008	14·545	1·010	18·018	5·706	20·833	—	12·940	2·110	75—
85 and upwards -	28·455	1·626	200·000	—	31·148	1·639	22·917	—	23·333	1·111	18·519	3·704	27·778	—	37·681	1·449	85 and upwards.

Note.—The following are the Districts and Sub-Districts comprised in this table, being those comprised in the printed abstracts of "Deaths of Males aged ten years and upwards":—

1. Lancashire - - Ulverstone (Sub district).
2. Yorkshire - - Skirlaugh, Marske, Kirkleatham Sub-districts; the Districts of Bedale, Leyburn, Askrigg, and Reeth; and the Sub-districts of Kettlewell, Skipton, Grassington, Ramsgill, and Pateley Bridge.
3. Durham - - Sub-district of Middleton; and the District of Weardale.
4. Northumberland - Sub-districts of Bywell, Hexham, and Allendale.
5. Cumberland - - District of Alston, and Sub-districts of Keswick and Whitehaven.
6. Westmoreland - Sub-district of Lowther.
7. North Wales - District of Hollywell.

Pulmonary Diseases comprise Phthisis and Diseases of the Respiratory Organs.

The facts on which the above Rates are calculated are in many instances so few in number that deductions drawn from them should be made with some caution. (*See accompanying Table of Facts.*)

Table 3.

Males Living aged 15 and upwards in the Year 1861 in the undermentioned Groups of Districts.

Groups of Districts.	—	Males of 15 and upwards.	Ages.							
			15—	25—	35—	45—	55—	65—	75—	85 and upwards.
1. Lancashire Districts	Males of all occupations	2,554	717	567	466	375	228	147	53	1
	Metal Miners	323	84	123	59	33	18	3	3	—
	Males, exclusive of Metal Miners	2,231	633	444	407	342	210	144	50	1
2. Yorkshire Districts	Males of all occupations	20,243	5,703	4,383	3,805	2,658	1,921	1,238	472	63
	Metal Miners	2,840	942	871	522	292	145	54	12	2
	Males, exclusive of Metal Miners	17,403	4,761	3,512	3,283	2,366	1,776	1,184	460	61
3. Durham Districts	Males of all occupations	7,285	2,351	1,696	1,336	979	546	271	90	16
	Metal Miners	2,658	993	684	476	300	148	50	7	—
	Males, exclusive of Metal Miners	4,627	1,358	1,012	860	679	398	221	83	16
4. Northumberland Districts	Males of all occupations	8,306	2,500	1,797	1,393	1,131	787	497	171	30
	Metal Miners	1,110	396	303	210	112	55	28	6	—
	Males, exclusive of Metal Miners	7,196	2,104	1,494	1,183	1,019	732	469	165	30
5. Cumberland Districts	Males of all occupations	7,936	2,378	1,831	1,424	1,119	681	381	113	9
	Metal Miners	1,318	492	343	252	153	63	13	2	—
	Males, exclusive of Metal Miners	6,618	1,837	1,488	1,172	966	618	368	111	9
6. Westmoreland Districts	Males of all occupations	1,304	380	232	215	207	151	81	32	6
	Metal Miners	83	30	19	12	16	5	1	—	—
	Males, exclusive of Metal Miners	1,221	350	213	203	191	146	80	32	6
7. North Wales Districts	Males of all occupations	12,626	3,773	2,505	2,224	1,830	1,325	698	246	25
	Metal Miners	1,466	331	318	314	272	151	69	9	2
	Males, exclusive of Metal Miners	11,160	3,442	2,187	1,910	1,558	1,174	629	237	23
Total of 6 Groups of Districts, North, (excluding Wales Districts)	Males of all occupations	47,628	14,029	10,506	8,639	6,469	4,314	2,615	931	125
	Metal Miners	8,332	2,937	2,343	1,531	906	434	149	30	2
	Males, exclusive of Metal Miners	39,296	11,092	8,163	7,108	5,563	3,880	2,466	901	123

Note.—For names of Districts, &c., included in the above Groups see Table 2.

TABLE 4.—DEATHS OF MALES (OF ALL OCCUPATIONS) [illegible] Groups of Districts in the Three Years 1860–62.

Groups of Districts.	Cause of Death.	Males of 15 and upwards.	Ages. 15—	25—	35—	45—	55—	65—	75—	85 and upwards.
1. Lancashire Districts	All causes	199	15	19	27	26	23	42	41	6
	Pulmonary diseases	61	11	13	8	6	8	10	5	—
2. Yorkshire Districts	All causes	1,173	143	128	121	126	154	242	202	57
	Pulmonary diseases	351	67	64	46	43	39	71	18	3
3. Durham Districts	All causes	415	82	52	42	56	71	63	38	11
	Pulmonary diseases	173	31	32	24	29	30	20	7	—
4. Northumberland Districts	All causes	488	36	49	48	67	88	105	74	21
	Pulmonary diseases	165	24	28	25	31	23	27	6	1
5. Cumberland Districts	All causes	477	55	61	53	74	87	79	63	5
	Pulmonary diseases	195	27	32	20	33	35	27	20	1
6. Westmoreland Districts	All causes	89	4	6	8	12	19	15	20	5
	Pulmonary diseases	19	3	5	3	4	3	1	—	—
7. North Wales Districts	All causes	760	83	84	89	92	124	161	98	29
	Pulmonary diseases	283	38	42	41	45	59	42	15	1
Total of six groups, 1–6 (excluding North Wales Districts)	All causes	2,841	335	315	299	361	442	546	438	105
	Pulmonary diseases	964	163	174	126	146	138	156	56	5

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TABLE 5.—DEATHS of MALES (EXCLUSIVE OF METALLIFEROUS MINERS) aged 15 and upwards in the undermentioned Groups of Districts in the Three Years 1860–62.

Groups of Districts	Cause of Death.	Males of 15 and upwards.	Ages. 15—	25—	35—	45—	55—	65—	75—	85 and upwards.
1. Lancashire Districts	All causes	177	14	13	21	21	22	40	40	6
	Pulmonary diseases	53	10	10	6	5	8	9	5	—
2. Yorkshire Districts	All causes	996	112	95	86	103	130	223	190	57
	Pulmonary diseases	265	55	50	27	27	28	60	15	3
3. Durham Districts	All causes	247	48	26	22	25	35	46	34	11
	Pulmonary diseases	85	23	15	8	8	12	14	5	—
4. Northumberland Districts	All causes	410	31	37	37	52	67	93	72	25
	Pulmonary diseases	116	21	21	16	19	10	23	5	1
5. Cumberland Districts	All causes	398	42	49	42	58	70	72	60	5
	Pulmonary diseases	150	20	27	14	23	22	24	19	1
6. Westmoreland Districts	All causes	87	4	6	8	12	17	15	20	5
	Pulmonary diseases	19	3	5	3	4	3	1	—	—
7. North Wales Districts	All causes	649	77	69	72	71	99	143	92	26
	Pulmonary diseases	228	35	38	31	33	43	32	15	1
Total of groups, 1–6 (excluding North Wales Districts)	All causes	2,315	251	226	216	271	341	489	416	105
	Pulmonary diseases	688	132	128	74	86	83	131	49	5

TABLE 6.—DEATHS of METALLIFEROUS MINERS aged 15 and upwards in the undermentioned Groups of Districts in the Three Years 1860–62.

Groups of Districts.	Cause of Death.	Males of 15 and upwards.	Ages.							
			15—	25—	35—	45—	55—	65—	75—	85 and upwards.
1. Lancashire Districts	All causes	22	1	6	6	5	1	2	1	—
	Pulmonary diseases	8	1	3	2	1	—	1	—	—
2. Yorkshire Districts	All causes	177	31	33	35	23	24	19	12	—
	Pulmonary diseases	86	12	14	19	16	11	11	3	—
3. Durham Districts	All causes	168	34	26	20	31	36	17	4	—
	Pulmonary diseases	88	8	17	16	21	18	6	2	—
4. Northumberland Districts	All causes	78	5	12	11	15	21	12	2	—
	Pulmonary diseases	49	3	7	9	12	13	4	1	—
5. Cumberland Districts	All causes	79	13	12	11	16	17	7	3	—
	Pulmonary diseases	45	7	5	6	10	13	3	1	—
6. Westmoreland Districts	All causes	2	—	—	—	—	2	—	—	—
	Pulmonary diseases	—	—	—	—	—	—	—	—	—
7. North Wales Districts	All causes	111	6	15	17	21	25	18	6	3
	Pulmonary diseases	55	3	4	10	12	16	10	—	—
Total of groups, 1-6, excluding North Wales Districts	All causes	526	84	89	83	90	101	57	26	—
	Pulmonary diseases	276	31	46	52	60	55	25	7	—

TABLE 7.—Average Annual Number of Deaths per 1,000 Males at the undermentioned Ages in six groups of Mining Districts during the Three Years 1860-62.

Ages.	Cornish Districts.		Durham and Northumberland Coal Districts.		Staffordshire Districts.		Merthyr Tydfil.		North Wales (Holywell District) lead and tin.		Northern Counties Metal Mining Districts (principally Lead.)	
	Miners.	Males (exclusive of Miners).	Miners.	Males (exclusive of Miners).	Miners.	Males (exclusive of Miners).	Miners.	Males (exclusive of Miners).	Miners.	Males (exclusive of Miners).	Miners	Males (exclusive of Miners).
Between 25 and 35 years	9·57	8·32	10·93	7·46	9·52	7·06	13·78	10·23	15·72	10·52	12·38	9·19
„ 35 and 45 „	15·12	10·08	11·84	10·23	14·01	11·37	16·24	12·97	18·05	12·57	17·64	10·13
„ 45 and 55 „	29·74	12·50	15·91	16·17	21·03	18·39	21·70	15·86	25·74	15·19	33·11	16·18
„ 55 and 65 „	63·21	19·96	32·57	25·98	50·13	33·96	45·88	41·12	55·19	28·11	78·34	29·38

IV.

CORNISH MINES.

Report on Samples of Air and on Materials used by Miners, with Evidence.

By Alfred Swaine Taylor, M.D., F.R.S., of Guy's Hospital.

Gunpowder.

Two samples of powder used in blasting were submitted to examination, in the coarse form in which they were received, as well as in fine powder. They were compared with ordinary gunpowder.

The smaller grained sample burnt more slowly than the larger grained, and left a greater amount of residue of a brownish colour. The products of combustion were similar, namely, *sulphide of potassium*, in a dense white vapour, and the gases usually derived from the combustion of charcoal and nitre at a high temperature, namely, *carbonic acid* and *nitrogen*. Sulphide of potassium is a noxious vapour, and would be likely to prove injurious to health when evolved in a confined space in which there is deficient ventilation. It is this vapour which gives the fœtid odour to recently exploded powder. It soon subsides in a damp atmosphere, and is slowly converted into an innocent salt (sulphate of potash). It is estimated that a cubic inch of gunpowder weighing 251 grains is converted by explosion into 500 cubic inches of gaseous and vaporous matter. This quantity of gaseous matter is from its nature irrespirable, and would render unfit for respiration (unless it was rapidly diffused) a large quantity of air. Carbonic acid is noxious when it forms only ten per cent. of air; but nitrogen may be breathed in an atmosphere containing 80 per cent., provided there are about 20 per cent. of oxygen present. Carbonic acid is a poison; it enters the blood, and poisons that liquid, rendering it unfit to support life, even when oxygen is present. Nitrogen has no directly poisonous action.

The products of combustion in both samples are similar to those of gunpowder of the best quality, the only difference observed being in the production of a larger amount of sulphide of potassium (white offensive smoke) from the two blasting powders. This arises from the fact that it is customary to introduce a larger proportion of sulphur into mining powder. The products are, therefore, more noxious from this cause when the gunpowder is discharged in a confined space.

	Common gunpowder.	Miner's powder.
Saltpetre -	- 75·0	65·
Charcoal -	- 12·5	15·
Sulphur -	- 12·5	20·

The charcoal is also in larger proportion in miner's powder; hence in a complete combustion of the powder, a larger amount of carbonic acid is produced. An excess of sulphur promotes the rapid and uniform combustion of powder; hence it is an advantage for miners' use; but as the sulphur-products act corrosively on metal, the sulphur is kept down to its lowest point for fire-arms.

Fuzes.

Of these there were two sorts: 1st, with gutta-percha; and, 2d, with a pitch-cloth casing. In both, the gunpowder burns with violence and rapidity, giving rise to the products above-mentioned, and apparently in equal quantity for equal lengths. The pitch-casing (2) gives off in burning, acrid acid vapours irritating to the eyes, nose, and lungs. The gutta-percha fuze evolves, while burning, an acid vapour of a more offensive odour, but less irritating to the eyes and nose than the vapour of burning pitch. There is, however, this difference between them, that the gutta-percha fuze has its casing more easily ignited than the pitch fuze, and it gives off a large quantity of smoky carbonaceous matter. In practice, it is probable that both casings are consumed. These fuzes necessarily vitiate the air; of the two, the pitch fuze would be the most open to objection on this account.

Air from the Gallery of a Mine.

The bottle containing the air was well secured and sealed. It was opened under water at a temperature of about 65°. There was neither absorption nor depression of the liquid; the air of the bottle was decanted and tested. The capacity of the bottle at the temperature of 65° was 48 cubic inches.

1. A lighted wax taper burnt in it as in ordinary air, without any apparent diminution in the intensity of the light.

2. Phosphorus and deutoxide of nitrogen proved that there existed in it about the usual amount of oxygen. This was also determined by removing the oxygen from 100 parts of the air, transferred to a graduated tube.

3. A few cubic inches gave a white precipitate with lime water, showing an undue amount of carbonic acid.

4. A salt of lead underwent no change, hence no sulphuretted hydrogen was present.

Of this air, it may be remarked, that it has the characters possessed by air which is collected from underground excavations, in which there is no free communication with the atmosphere. Carbonic acid is the product of numerous causes, constantly in operation. Human respiration, combustion from any cause, as of candles or gunpowder, the action of humidity upon organic matter (woody fibre), and the ordinary process of decay, are all large sources of its production. Were it not owing to the law of diffusion, the air would soon cease to support life; but in spite of its great density, 1·527 (compared with air at 1·000), this gas rises and spreads in all directions, and is thus diluted to an innoxious standard. This law of diffusion is interfered with in the galleries and shafts of mines, in which there is too slight a communication with the atmosphere, or in which there is a want of ventilation. To this may be ascribed the presence of an undue proportion of carbonic acid in this sample of air. As this noxious gas is soluble in water, much of it must be dissolved and removed from the air of the galleries of mines, in which there is much water trickling over the sides and roof. So rapidly is carbonic acid diffused in the air of a crowded city, in which combustion and respiration are going on on a large scale, that the ordinary chemical test does not show the presence of any of this gas in 200 cubic inches of air. In only 3 or 4 cubic inches of the air taken from the Cornish mines, the test indicated at once the presence of the gas.

Air so contaminated is clearly unfit for human respiration. A gas which destroys life instantaneously, when in a pure state, cannot be breathed continuously day by day in a diluted state, without affecting the health of a person. It is calculated that an adult consumes a gallon of air per minute, *i.e.*, that the air becomes so vitiated by his respiration as to be unfitted to support life. *Inspired* air contains only 1-2000th part of carbonic acid; but expired air contains sixty times as much carbonic acid, or 1-33rd part by volume.

Miners' Candles.

Four samples of these were submitted to examination; and the results were compared with those produced by the combustion of candles of common tallow, stearine, and wax. They were tested by combustion in a glass vessel containing about *five gallons* of air. The experiments were chiefly directed to the amount of air consumed or rendered unfit for respiration in a given time, by each candle, and the condition of the air after combustion.

Each candle was extinguished in the glass vessel of air, in the periods under-mentioned:—

	Palmer	Read	Higgs	Webb	Tallow	Stearine	Wax
	Minutes	"	"	"	"	"	"
Exp. 1.	2½	1	3	3	2½	4½	4½
Exp. 2.	2	1½	3½	2¾	2½	5½	5½

In most of these experiments there was scarcely any light evolved during the last minute of combustion.

Carbonic acid and water were the products in all. Read's candle burnt with a thick smoky flame and a suffocating odour; and it left in the vessel an offensive and irritating odour of burnt fat or grease. It gave a greater body of flame, but a duller and redder light than the others.

The candles of Palmer, Higgs, Webb, and that marked "Tallow" left an offensive greasy odour; but this is more or less the case in all candles of inferior quality, which are allowed to burn out *slowly*. An irritating, fatty, acid vapour is produced by the red-hot wick before it is extinguished.

From these results it appears that the mining candles in burning vitiate air with great rapidity, and require for their combustion, in a given time, as much or even more air than is required for the respiration of an adult. This combustion, carried on in an ill-ventilated gallery, must, of course, contribute largely to render the air impure and unfitted to sustain health, if breathed continuously or for many hours together.

Alfred S. Taylor.

15, St. James's Terrace,
Regent's Park,
June 25th, 1862.

ALFRED SWAINE TAYLOR, Esq., M.D., F.R.S., examined.

19,782. (*Chairman.*) You are a Fellow of the Royal Society?—I am, and of the College of Physicians, and Professor of Chemistry in Guy's Hospital.

19,783. I believe that you visited Cornwall last autumn?—I did.

19,784. You also at my request very kindly analysed some bottles of air, which I sent up to you?—I did; I made a general examination of them.

19,785. Will you describe the bottles?—There were a number of samples taken from different depths, 12 samples were forwarded, but one, marked No. 18, was broken. This was the only one not examined. I did not know anything about the mines from which they were taken, but I had merely a reference to the depths in fathoms, and the temperature of the air at the time when they were taken.

19,786. I believe that in the report which you will hand in to the Commissioners, you state the result of your examination?—Yes, it is in this Report. The general result of my examination was that the principal contaminating gas was carbonic acid, and which existed in from 20 to 30 times the proportion in which it ought to exist.

19,787. And would, therefore, be injurious to health?—Yes.

19,788. (*Mr. Holland.*) Do you mean 20 times the least proportion?—20 times the average proportion.

19,789. Was that the least bad air?—No, it was the worst air. Two or three samples were very much alike; but I only made a quantitative analysis in one case. We judge very much in this way:—good air should not render lime-water white or milky. Lime water is a test for this gas in air, and it gives with carbonic acid a white precipitate, which is chalk. A number of these samples instantly affected the test, showing that the carbonic acid was in undue proportion. I took the sample, marked No. 2, which appeared to me to be the worst, and it contained a proportion of nearly $1\frac{1}{2}$ per cent. of carbonic acid, which is a very large proportion, because the proportion is generally only $\frac{1}{10}$th per cent. In the healthy air which we are breathing it is only $\frac{1}{10}$th per cent., that is to say, one part in two thousand, whereas in the case to which I am now referring, it was nearly $1\frac{1}{2}$ per cent.

19,790. (*Chairman.*) I believe that the result of your examination was that you recommended me to make further inquiries?—I did; I recommended your lordship to make an inquiry more minutely than I had done, but I was quite satisfied of the unwholesome character of the air. I had no doubt whatever on that point. With reference to the proportions, of carbonic acid, they may vary, being sometimes more and sometimes less; they are by no means fixed.

19,791. (*Mr. Kendall.*) How many samples did you test in a general way by trying the lime water?—I tested all (eleven samples).

19,792. And they all made it milky?—They were not all equally bad, but they were all worse than the ordinary atmosphere; some were very bad; in fact the air was as bad as it would be in the most crowded and close theatre or room, where there was no ventilation at all. As you are no doubt aware carbonic acid is a poison which when absorbed into the blood, slowly tends to debilitate the person, and to render him susceptible of numerous diseases. It is a blood-poison, and in that proportion, it would, of course be very unwholesome to breathe. A man would not suffer rapidly from the poisoning, but there would be a slow deterioration of the blood, which is even worse, perhaps, than a rapid action, for in the one case he may go on until he is exceedingly weak, but in the other case, he is warned of his danger, and can get away into fresh air: a remedy can be applied. I have myself breathed air mixed with carbonic acid, and therefore know pretty well what it is.

19,793. (*Chairman.*) You also, I think, recommended that I should institute some medical inquiry?—I did.

19,794. And you recommended Mr. Bankart?—Yes, a skilful gentleman in such a matter.

19,795. He is at Guy's Hospital?—Yes, he was a pupil of mine for some years, and is now one of the medical officers at Guy's Hospital.

19,796. (*Dr. Greenhow.*) What office does he hold there?—He is one of the Demonstrators of Anatomy there.

19,797. (*Chairman.*) You therefore consider that he would be quite competent to make the inquiry?—I think that he is a very well-informed professional man.

19,798. (*Dr. Greenhow.*) Did you make any investigation as to the deficiency of oxygen in the samples of air?—I did.

19,799. What deficiency did you find?—There was no very great deficiency in one of the measurements which I made:—it was about $\frac{7}{10}$ths per cent. I will state exactly what it was:—$20\frac{8}{10}$ths we consider to be the natural proportion of oxygen, and I found only 20 and barely $\frac{1}{10}$th. I estimate it at $20\frac{1}{10}$th, so that there was a deficiency. I do not attribute much to this. I should think that the noxiousness of the air arose more from the presence of carbonic acid than from the deficiency of oxygen.

19,800. Then you do not think that an air which contains only 20 per cent. of oxygen instead of $20\frac{8}{10}$ is very deleterious?—No, of itself I should say not. I have made many analyses of air, and sometimes I have found in the borough of Southwark not more than that.

19,801. In the open air?—In the open air; but then I have not found in undue proportion, what I have here described as being superadded, namely the carbonic acid, in the same air.

19,802. Have you any opinion as to what deficiency of oxygen would be dangerous to life?—I think that a deficiency of three or four per cent. would tell upon a person, but I am not prepared with any fact to show that. I say that if the atmosphere contained only 17 per cent. of oxygen, and that the rest was made up of nitrogen, or nitrogen and carbonic acid, I believe that it would be a very unwholesome air for a human being to breathe in.

19,803. But it would require a considerable reduction of the oxygen to affect health directly, exclusive of any other impurity?—Yes.

19,804. If it were reduced to 19 per cent. for instance, would you consider it likely to be injurious?—The respired air which comes out of the lungs is sometimes reduced to about 10 or 11 per cent. of oxygen. In breathing we do not consume all the oxygen, but we could not breathe that air, although there was 11 per cent. of oxygen left in it. I have tried the experiment with my assistant, and as nearly as one could make out, the quantity of oxygen left, assuming 21 per cent. to have existed, was only 11 per cent. after the air had been once perfectly breathed. A large per-centage of the oxygen comes out again as carbonic acid, so that the place of the oxygen is actually supplied by carbonic acid in respiration; but of course that depends upon the capacity of the lungs and a great many other conditions. With regard to your question, we have no instance that I know of by which we could test it, because there is such a providential arrangement of things, that oxygen will not be long deficient: there is so rapid a diffusion of it. I never remember to have found an atmosphere containing below 17 per cent. of oxygen. Generally ill health is caused not so much by the deficiency of oxygen, as by the presence of other noxious gases and vapours, in addition to the nitrogen ordinarily contained in air. A man might be killed by breathing 20 per cent. of oxygen if there was a certain amount of carbonic acid associated with the nitrogen. I have found that a candle will burn in an atmosphere which contains 50 per cent. of carbonic acid and 50 per cent. of oxygen, so that you would not have the slightest idea that that deadly gas was there.

19,805. If the air in a mine had 2 per cent. of carbonic acid gas, and was minus 2 per cent. of oxygen,

that is to say, having only 18 per cent. of oxygen, do you think that a candle would burn in that air?—I should say that it would burn for a short time; but, of course, for a much shorter time than it would burn in the ordinary atmosphere, because carbonic acid itself is to a certain extent antagonistic to combustion unless the oxygen is maintained at a high standard, so that it will fail for two reasons: first, the deficiency of oxygen; and secondly, the presence of a gas which is rather opposed to combustion. I have found from my experiments repeatedly with regard to the candles used in these mines, that they consume an enormous quantity of air.

19,806. (*Chairman.*) I sent you some samples of gunpowder and candles for analysis?—You did.

19,807. Have you fully stated in your Report the results of those experiments?—I have.

19,808. Will you state it shortly to the Commissioners?—With regard to the gunpowder, I found no trace of the products of its combustion, even where it seems the air had been collected only half an hour after the explosion. One of the products of burning gunpowder is sulphide of potassium, and this is rather deliquescent; so that where there is a damp atmosphere, as no doubt there is in these localities, it is speedily removed. I found, therefore, not a trace of the products of combustion in the air which had been collected; but with regard to the candles, I was rather surprised to find that they consumed the air in an enormous proportion. I tried the experiments by taking a 5 gallon jar, and noting accurately the time required for a candle to burn until it was extinguished; and I found that these candles consumed air about twice as fast as ordinary candles; they consumed five gallons of air in about two minutes, that is more than two gallons in a minute.

19,809. (*Mr. Holland.*) Were the ordinary candles burning with the same size of flame?—No; the flame of the candles, which are used in mines, is larger and more smoky. A candle like that which is now in the room would consume about a gallon a minute. One of the smoky thick-wicked candles which the miners use, would consume about twice that quantity, and therefore vitiate the air much faster.

19,810. (*Mr. St. Aubyn.*) Are these calculations mentioned in your report?—Yes.

19,811. (*Chairman.*) I submitted to you candles from different makers?—Yes, and the results are stated in the report, those results being derived not from one experiment but from several averages.

19,812. (*Dr. Greenhow.*) What would be the effect of sulphide of potassium on health?—It is a very deadly poison.

19,813. As given off in the combustion of gunpowder in a mine, what would be its effect?—The white vapour which comes off, and which forms the bloom on a piece when discharged, is the sulphide of potassium; it has a very offensive smell, like putrid eggs. If there is a damp atmosphere, I apprehend that there would scarcely be any effect, as it is so soon removed; but, of course, its presence would be at once announced by the smell, which is very offensive while it remains. A man breathing such air, is breathing a very poisonous vapour, and one much more destructive to health than carbonic acid:—it darkens the blood, it acts upon the brain and nervous system, and tends to enfeeble strength and destroy life. I had some experience of the effect of sulphuretted hydrogen gas during the construction of the Thames Tunnel many years ago. The late Sir Isambard Brunel applied to me respecting the health of the men who were engaged in making the excavation, before it had been carried completely under the river. I examined the air. I found there sulphuretted hydrogen and carbonic acid in large proportion. Several of the men came into Guy's Hospital, and I saw some of the strongest men brought from the western parts of England, fall off in strength during their work, and in about three or four months become emaciated, livid about the eyes, with complete loss of muscular strength and loss of appetite, and attacked by a kind of wasting fever; several of them died. I suggested the use of lime, and pumping out the air and pumping in fresh air; but until the boring was carried completely under the river, there was no cessation of these effects. There was a complete want of ventilation.

19,814. (*Chairman.*) Should you say that that air was at all to be compared with the air which you have tested here?—I have said that I did not find in the air which was brought to me any trace of the products of combustion, but the effects of gunpowder would soon be lost, especially *in transitu* while the air was coming to me from Cornwall. If much gunpowder is used in a locality where the air is not easily renewed, I can easily conceive that a man breathing the vapour of it would suffer very much.

19,815. Much the same as was the case in the Thames Tunnel?—Yes; I have myself perceived it, not in Cornwall, but in the salt mines of Cheshire, where they have used gunpowder to blast the salt, and I have traced it for some time afterwards; but it soon disappears with good ventilation.

19,816. (*Mr. Holland.*) I think that the air was brought (*i.e.* collected) in sand?—Yes, that was what I advised.

19,817. That was the case with the specimens which you examined?—Yes.

19,818. Any traces of salts upon the sides of the bottles would not be perceived by you; they would be taken as sand, would they not?—Yes, they would be deposited.

19,819. Therefore there might have been sulphate of potash, or saline particles of various sorts upon the sides of the bottles without being noticed?—Yes.

19,820. And the sulphides would probably escape notice?—They would all turn to sulphates before I examined them. In order to discover these vapours and their influence on health one must be upon the spot.

19,821. You do not say that such things were not in the air, but only that they were not noticed in your examination?—I did not find any in my examination. The object of the sand was this: carbonic acid is very soluble in water, and therefore if the bottles had been rinsed out with water, the water hanging round the bottle would have removed this gas and I should not have discovered it; that is why I advised dry sand should be used.

19,822. Supposing that there had been sulphuretted hydrogen in the air when gathered, it might have been decomposed before it came to you?—Yes; it is very soon changed, it is very soon oxidized.

19,823. Did you try how fast the tallow of the candles was consumed?—No, I did not do that.

19,824. Did they burn very fast?—Yes, with the thick wicks.

19,825. I presume that the production of carbonic acid was in proportion to the consumption of the candles?—Yes.

19,826. Did the candles, in your opinion, give off any unusual proportion of acroleine?—No, I think not; there was a very disagreeable smell which I could perceive in the 5-gallon jar after the combustion was extinguished.

19,827. Did you try it for acroleine?—Merely by the nose, and there was a slight acid re-action upon test paper. I believe that all fats, without reference to the quality, are very disagreeable in that point of view.

19,828. (*Mr. Kendall.*) Did you ever see a candle burn well in air which on testing you found to contain matters injurious to health?—I have a recollection that it was so in the Thames Tunnel air sent to me by Sir Isambard Brunel; it was taken quite from the end of the Tunnel where the men were working in the shield, and it was of a very bad description, for it not only turned lime water very milky, but it also turned the lead paper brown.

19,829. Did the candles burn well?—No; they burnt dimly.

19,830. Have you ever known an instance where the candles have burnt well, and where the air has been tested and found to be deleterious?—With regard to these experiments I must tell you that I tested each sample of air with a candle, and it burnt very fairly as far as mere burning was concerned. The

amount of oxygen which I have mentioned, $20\frac{1}{10}$th per cent. was quite enough to maintain a fair combustion, and if I had had to form an opinion from the burning of a candle alone I could not have said that there was $1\frac{1}{2}$ per cent. of carbonic acid there.

19,831. The Cornish miners are always content if the candle burns well?—Yes.

19,832. But you are firmly of opinion that that is no test at all, but that the candle will burn where the air is deleterious?—Yes, and where a man might no doubt be killed. I have myself mixed equal amounts of carbonic acid and oxygen; I believe that if a man were to breathe that mixture he would die immediately and yet a candle burnt in this mixture much more brilliantly than in ordinary air. In my work upon medical jurisprudence I have long pointed out, in reference to well-digging, the great fallacy of trusting to the burning of a candle as a criterion of safety. I have found that a candle will actually burn where the proportion, as well as I remember, of carbonic acid mixed with the air amuonts to 12 or 15 per cent., so that the existence of 12 or 15 per cent. of carbonic acid, added to air, will not be revealed by the burning of a candle. The candle will not burn very long in it, but still if a man were to lower it into an atmosphere of this sort, and then hastily to withdraw it and think that he could go in with safety he might be killed.

19,833. (*Mr. Holland.*) Do you mean that when the oxygen is reduced to about 8 per cent. the candle will burn?—You must deduct the 12 per cent. from the 100 for the carbonic acid added: this leaves 88 per cent. of air, $\frac{1}{5}$th of which is oxygen; that would be 17 per cent. of oxygen.

19,834. (*Mr. Kendall.*) You say that you are quite satisfied that a candle may burn very well, and that still the air in which that candle is burning may be very injurious to the miner?—Yes; as a general principle.

19,835. Do you think that that will last for any time?—No.

19,836. Would he find it out within half an hour? Yes.

—19,837. Within a quarter of an hour?—Probably within ten minutes. The combustion will be less perfect, the candle will get dim and pale and the flame blueish coloured, and then go out.

19,838. In the corps of Cornwall the men generally work for eight hours; do you think it possible that a man would go on in such air without finding it out? —Not in the case of very vitiated air without some renewal of it.

19,839. The candle would tell a tale?—Yes; it would burn dimly.

19,840. (*Mr. St. Aubyn.*) Is it possible that air where the candle burns for its usual time, can be injurious to the health of the miner?—Unless there was a provision for the removal of the carbonic acid formed by the consumption of the candle it would be injurious, because that carbonic acid which is constantly produced by the candle, destroys five gallons of air in about every two minutes. Unless there are some means of renewal, it must be an unhealthy atmosphere for him.

19,841. (*Mr. Kendall.*) If there is any air in the same condition as the air which you start with, injurious to health, in the same relative quantities of oxygen and of carbonic acid gas, will the candle still burn on?—It will if the proportion of carbonic acid does not exceed what I have mentioned.

19,842. You may send in a supply of vitiated air, and the candle will still burn?—Yes; and the men might go on suffering.

19,843. (*Mr. Holland.*) Suppose that there is a constant current of vitiated air?—I think that the theory about the burning of a candle indicating what is fit for a man's breathing, is altogether a fallacious one. For instance, I will give you the case of ordinary sewers; there is an atmosphere in sewers which contains two and three per cent. of sulphuretted hydrogen; a candle will burn in that atmosphere readily; but if a man goes into it, he will be dead before very long; therefore there are many cases in which we must not measure the power of the human lungs to resist noxious gases and vapours by the combustion of a candle.

19,844. Is not the common instance of a crowded room a very good illustration?—Yes.

19,845. Are not the people almost choked when a candle will burn well?—Yes. I have noticed in travelling by railway, in passing through a very long tunnel, that the air has been so vitiated at the end of it, that I have seen the flame of the lamp in the centre of the carriage get lower and lower, and nearly extinguished, until we came into the air again at the other end. I have watched it; and it showed that there was a stagnation of impure air in the tunnel.

19,846. (*Chairman.*) Can you explain why the miners are in the habit, when the candle will go out if upright, of placing it in a slanting position? —If I am to give any theory on the point it would be this. The burning of a candle depends upon the melted oil getting into the ignited wick; it is drawn up by capillary attraction. Supposing that the oil is drawn up faster than it can be consumed by the amount of oxygen around it (which we consider to be deficient), then we shall have the wick choked; that is to say, there will be more of the melted oil ready for combustion than the oxygen can take; and if you place the candle on one side, you allow this surplus to flow away, and thus diminish the choking of the wick; it is like overcharging an oil lamp.

The witness withdrew.

Adjourned.

V.
REPORT ON THE AIR OF MINES.

By Dr. R. Angus Smith, F.R.S.

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PART I.
COMPOSITION OF THE ATMOSPHERE,
with special Reference to the Air of Mines.

When I began this investigation I had not given special attention to the air of mines, although I had long interested myself on the subject of air generally. At the same time I had reason to believe that little had been done towards the advancement of the chemical portion of the inquiry, simply because in the accidents of reading on allied subjects so little had been found. Lord Kinnaird who first engaged me to examine the atmosphere breathed by the workmen in the mines, considered that the best beginning of the inquiry would be an inspection of the mines themselves. In this opinion I fully agreed, and laid down no plan for work until I had descended a few shafts and walked along the levels to experience the movements of the air, sitting down with the workmen at the "ends," to compare the sensations of breathing below and above ground.

Lord Kinnaird wished me to examine the air for carbonic acid and for oxygen, and also suggested the propriety of considering whether any other gases ought to be estimated. My belief was that the only detrimental substances to be readily found besides carbonic acid were the organic matter and the powder smoke, and at any rate I did not see the propriety of making extensive inquiries into minute details, until after ascertaining, by numerous experiments, the actual condition of the underground air, with reference to carbonic acid and oxygen, because these bodies are better known than any others which would in all likelihood be found, and because they had been much more carefully studied.

After the examination of about 150 specimens of air the Commission wished that the same determination of oxygen and carbonic acid should be made in a still greater number of cases. Considering the small number of the analyses that had hitherto been made, there was ground for supposing that the conditions might be exceptional, and viewing the still more limited number of the mines from which specimens had been taken, there was a strong temptation to believe, and on the part of the miners an interest in asserting, that the mines from which such defective specimens had been taken were also exceptional.

It was soon found that air having the normal quantity of oxygen and carbonic acid was an exception in the mines. In some cases the deviation from the normal amount was very small and uncertain. This of course suggested the question, what is the normal amount? This question has been answered by many of the greatest chemists, and the answers have been constantly approaching nearer to a definite point. The composition of the air is now universally agreed to be constant within very small limits. When oxygen was discovered, the amount in the air was supposed to be a sure guide to the wholesomeness of a place. This test has been entirely abandoned. I was, to some extent, compelled to revive it, because not only was the above question suggested, but another followed, viz., what is the consequence of a deviation from the normal amount; or what does such a deviation indicate? Before speaking of the composition of the air of mines, it is necessary to deal with this part of the subject.

I begin by giving a short account of the results arrived at by chemists who have taken a prominent part in the inquiry.

Amount of Oxygen in Pure Air.

When Priestly discovered oxygen, he examined the air of various places, and found the amounts of this gas to differ to the extent of 6 per cent. He used as a test nitric oxide, which combines with the oxygen, after which both gases, viz., the combined oxygen and nitric oxide, are absorbed by water. At one time he obtained one-fifth of oxygen, which is nearly the

exact amount; but he did not seize the idea forcibly. Scheele found from 20 to 30 per cent., and others found still greater variations, until Cavendish showed by 500 examinations of atmospheric air that it had a nearly constant composition and arrived at a mean of oxygen equal to * - - - - 20·833 p. c.

Gay-Lussac and Humboldt, after many experiments which gave from 20·9 to 21·2, settled on a mean of - - 21·0

Gay-Lussac himself gave as a mean of the air from mountains and from Paris - - - - 21·49

Th. Saussure examined the air at Chambeisy and found - - - 21·08
20·98
21·03
21·03
21·13
21·15
21·08
21·09
20·98
21·086
21·006
21·1
21·0
21·04

Mean - - - - 21·05

Berthollet found - - - 21·05 p.c.
Thom. Thomson - - - 21·
Davy - - - - - 21·
Vogel found on the Baltic - - 21·59
Hermbstädt do. - - - 21·5
Dalton, at Manchester - - - 20·7
20·8
(in a N.E. wind) - - 21·15
20·9
20·73
20·85
20·95

Doyère found - -		20·5 to	21·5
Regnault gave as mean of 100 specimens in Paris	-	20·913	20·999
9 from Lyons and around	-	20·918	20·966
30 „ Berlin -	-	20·908	20·998
10 „ Madrid -	-	20·916	20·982
23 „ Geneva and Switzerland -	-	20·909	20·993
15 „ Toulon and Mediterranean -	-	20.912	20·982
5 „ Atlantic Ocean	-	20·918	20·965
1 „ Ecuador -	-		20·960
2 „ Pichincha, higher than Mount Blanc -	-	20·949	20·981
Mean of all foregoing	-	20·949	20·988

Mean of the Paris specimens, 20·96.

Bunsen's analyses of air at Heidelberg are as follow:—

Oxygen.	
20·970	20·927
20·963	20·919
20·927	20·880
20·914	20·921
20·950	20·892
20·906	20·840
20·943	20·859
20·927	20·925
20·934	20·940
20·928	20·937
20·911	20·952
20·889	20·953
20·928	20·964
20·927	20·960

Average - - 20·924 - Lowest 20·840

* See Dr. George Wilson's calculations in his Life of Cavendish.

R. F. Marchand finds - 20·9 to 21·03
Mean - - - 20·97
Graham gives - - 20·9
Liebig gives - - 20·9

Regnault has made the greatest number of analyses; no man can doubt his power of analysing well, and he is famous, above all things, for his laborious accuracy. My belief is that his analyses represent most nearly the true composition of the atmosphere. The analyses made by Bunsen deserve equal respect; he is also a man famous for the minute accuracy of his details, and I would not for a moment put him second to Regnault, or to any man; both stand before us as the best specimens of chemical investigators; both living, and in their prime. This is a strong argument for preferring their work to the work of chemists of a past generation. These two have greatly improved the methods of analysis. Still I prefer to take Regnault's results, because they are obtained by a more extensive inquiry. Perhaps the court of the laboratory where Bunsen obtained his specimens may have contained less oxygen than the purest air; at any rate, we cannot doubt Bunsen's accuracy, especially when he gives us these as model analyses.

Judging from all the analyses I am more inclined to look on a very favourable specimen of air as proved to contain,—

Oxygen -	20·96
Nitrogen -	79·00
Carbonic acid -	·04
	100·00

But this is evidently subject to numberless changes. To be moderate, I have assumed 20·9 of oxygen, and Graham and Liebig have done so before me.

Analyses made by various Methods.

The earliest analyses were made with gases soluble in liquids. Nitric oxide united with the oxygen of the air and the resulting compound was absorbed. But, taking all together, they agree with the latest results as well as can be expected. If we examine the results obtained by weighing, we find remarkable differences. It would be difficult to illustrate this difference more clearly than by the analyses of Lewy. When he used the balance he found—

Air of the German Ocean.

——	——	Oxygen.
2d August 1841 - -	Covered - -	20·459
3d do. - -	Fine - -	20·423
3d do. - -	Do. - - -	20·450
4th do. - -	Do. - -	20·432
22d May 1842 - -	Covered - -	20·884
22d do. - -	Fine - - -	20·911
23rd do. - -	Covered - -	20·893
24th do. - -	Do. - -	21·010
24th do. - -	Do. - -	20·839

Air of Guadaloupe.

——	——	——	Oxygen in 100 vol.
Petit Canal -	20 Nov. 1842.	Calm -	20·839
Do. - -	20 do. -	Calm -	20·821
Do. - -	21 do. -	Fine -	20·848
Do. - -	23 do. -	Covered -	20·929
Do. - -	23 do. -	Calm -	20·667
Mangrove on the river Salée -	27 do. -	Calm -	20·839
Do. - -	28 do. -	Fine -	20·504
Do. - -	28 do. -	- -	20·522
Petit Bourg -	29 do. -	Fine -	20·802

When he used explosion by hydrogen his results were as follow:—

LEWY'S ANALYSES of the Air of the Atlantic Ocean. Carbonic acid in 1000 parts. (Annales de Chimie et de Phys., vol. 34, 1852.)

1847.	——	Each a mean of 3 Analyses. Carbonic Acid.	Oxygen.	——
1 Dec.	Cloudy - -	0·4881	21·05170	We left Havre on the 25th November. The weather was wet, and remained so all the time we were in the Channel.
4 Dec.	Clear - -	0·3578	20·96521	
8 Dec.	A little cloudy	0·5497	21·05245	54 leagues from Madeira.
17 Dec.	Clear - -	0·5771	21·00899	30 leagues south of tropics.
18 Dec.	Ditto - -	0·3586	20·96339	Middle between Africa and America.
18 Dec.	A little cloudy	0·5420	21·00099	
19 Dec.	Clear - -	0·3588	20·96074	Sea phosphorescent.
26 Dec.	Ditto - -	0·5288	21·05889	
28 Dec.	Ditto - -	0·5693	21·05686	
30 Dec.	Ditto - -	0·5143	21·05789	
31 Dec.	Ditto - -	0·5767	21·01114	Entering port of Santa Marta.

Air of New Granada.

Locality.	1848.	Weather.	Mean of three Analyses. Carbonic acid per 1,000.	Oxygen per cent.	——
Santa Marta -	25 Jan.	Clear -	0·4616	21·02579	
Mompox -	7 Feb.	Do. -	0·3147	21·04636	
Rio-Magdalena	18 Feb.	Cloudy -	0·3259	21·03222	
Rio-Magdalena	3 Mar.	Covered -	0·4554	20·99826	
Honda - -	29 Mar.	Verycloudy	0·3226	20·99237	
Ambalema -	5 Aug.	Clear -	1·1263	20·54853	Suffocating hot,—wood burning near.
Esperanza -	2 Aug.	Do. -	2·4475	20·35975	Do.
Guaduas -	2 Apr.	Cloudy -	0·3668	20·99691	
Santa-Ana -	2 Aug.	Clear -	1.2333	20·54479	Do.
Bogota - -	5 July	Do. -	0·4994	21·05196	
Monserrate -	8 July	Cloudy -	0·3215	20·98995	Rain beginning.

LEWY'S ANALYSES of the air of Bogota, 2,645 mètres above the Sea.

——	——	Carbonic acid in 1,000 parts.	Oxygen in 1,000 parts.	——
1850.				
7 Mar.	Clear -	0·3864	21·02699	Fine.
12 April	Do. -	0·3564	21·06582	After rain.
8 May	Covered	0·3569	20·99032	Wet.
9 May	Do. -	0·3824	20·99250	Wet.
15 June	Do. -	0·4192	20·95086	Less wet.
24 July	Clear -	0·4249	21·01765	
19 Aug.	Cloudy	0·5013	21·01411	
23 Aug.	Clear -	0·4812	21·01826	Very fine.
1 Sept.	Cloudy	0·6178	21·02434	
2 Sept.	Clear -	0·7049	21·01700	
2 Sept.	Cloudy	1·6291	20·96629	The upper part of Montserrat was covered with clouds, and a white veil descended from the mountain. Many persons became ill.
2 Sept.	Do. -	1·7040	21·03911	
3 Sept.	Clear -	1·5855	21·01976	
3 Sept.	Cloudy	4·8963	21·03176	
3 Sept.	Do. -	4·9043	21·03197	
4 Sept.	Do. -	1·3261	21·02227	Thinks the carbonic acid due to a wind called Las Quemas. After rain it disappeared.
4 Sept.	Covered	0·8048	21·06355	
8 Sept.	Cloudy	1·2829	21·02697	
9 Sept.	Do. -	0·7512	21·03682	
10 Sept.	Clear -	0·4583	21·03193	
12 Sept.	Cloudy	0·4769	21·02689	
3 Oct	Do. -	0·4751	21·07377	

It would appear as if he went in both cases slightly to excess, but it is not well to attempt to judge on this point.

Dumas and Boussingault together and Brunner obtain also less oxygen ; they used weights ; and they also are men standing, like Regnault and Bunsen, in the foremost rank.

——	Oxygen per Cent.	——
Paris - - -	20·810	Dumas & Boussingault.
Brussels - - -	20·856	M. Stas.
Genève - -	20·784	M. Marignac.
Bern - - -	20·757	M. Brunner.
Faulhorn - -	20·773	
Groningen - -	20·793	Verver.
Copenhagen - -	20·811	

Air deviating from the adopted standard.

	Air from heights.	
Dalton	- Helvellyn -	- 20·64
		- 20·63
	From a height of 9,600 feet	- 20·70
	,, 15,000 ,,	- 20·62
Brunner	- Faulhorn -	- 20·91
Boussingault	- 548 metres high	- 20·7
,,	- Sta. Fe 2643 -	- 20.65
Air brought by Green from a height of 11,500 feet	- - -	- 21·
Frankland	- Chamounix -	- 20·894
,,	- Top of Mont Blanc -	- 20·963
,,	- Grand Mulêts -	- 20·802
Berger	- Jura and other mountains -	- 20·3
	to -	- 21·63
Configliachi	- Simplon -	- 21·0
	Mean - - - -	20·818

I leave out some under 20·2, and still we have a rather curious result,—a lower number on the hills than on the plains. I do not profess to be fully satisfied with these results ; we require a few hundred, or, at least, a few dozen analyses ; still these statements are before us, and cannot be removed without much labour. The results of Frankland and Boussingault especially are striking, and require an explanation. Let us again compare results obtained by Dumas and Boussingault (Annales de Chimie, 1841).

Air of Paris.

G. Weight.		Oxygen.
22·93	calculated to volume*	20·729
23·06	,,	20·856
23·03	,,	20·828
23·01	,,	20·810
23·00	,,	20·802
23·00	,,	20·802
23·08	,,	20·826
22·07	,,	20·864
22·89	,,	20·701
Mean 23·07	,,	20·864
	From the Faulhorn.	
22·96	,,	20·766
23·09	,,	20·882
22·97	,,	20·774
22·86	,,	20·674
22·97	,,	20·774
Mean 22·97	,,	20·774

Again we find a smaller amount on elevated places.

Brunner found - - -	20·867
	20·750
	20·790
	20·842
	20·812
	20·837
	20·818

Although, for reasons given, I prefer the actual numbers obtained by Regnault, the comparative numbers in Paris and in the Faulhorn are equally valuable for the purpose of showing differences. These analyses were made by weighing.

* The results are calculated into volumes, taking 1.1057, the number taken by the analysts as the sp. gr. of oxygen.

Dr. W. A. Miller examined air collected during a balloon ascent, in August 1852, at a height of 18,000 feet, and also a sample collected near the surface at the same time, with the following results* :—

	Air 18,000 feet high.	Air near the earth.
Per-centage of oxygen -	20·88	20·92

Dr. Frankland found at—

	Oxygen.	Carbonic acid.
Grands Mulets - -	20·802	0·111
Summit of Mont Blanc	20·963	0·061
Chamounix -	20·894	0·063

He thinks it probable that the carbonic acid is generally, but not invariably, greater in the higher regions of the atmosphere. Messrs. H. and A. Schlagintweit found the carbonic acid to increase up to the height of 11,000 feet.*

If the carbonic acid of the higher regions be really greater than in the best air below and the oxygen less, it will probably be in part owing to the oxidation having been completed more fully. De Saussure considered it to be owing to the action of vegetation decomposing the acid and giving out oxygen at the surface. The organic matter will probably be entirely removed by thorough oxidation in great oceans of air. The process which converts oxygen into ozone would seem very well fitted for removing all organic matter. This, then, might lead to the existence of a smaller amount of oxygen in the air above, and the riddle would be solved. The diminution of the oxygen is probably a disadvantage, although to such a small extent is it so that there is abundant compensation in the purification consequent on the removal of organic substances. We shall have then a distinct variety of air on mountains differing from that of the plains. In the one there would be more carbonic acid and less oxygen, with no organic matter; constituting mountain air: whilst air of the plains would have more oxygen, less carbonic acid, and more or less organic matter.

It is exceedingly probable that the difference of composition is somewhat connected with the existence of water in the atmosphere. Or it may be simply the result of separation caused by the weight of the gases, a result, certainly, which has been much discussed and is well known not to exist in proportion to the weight, and one by no means probable considering the investigations of Graham; but that the physical cause may after all be struggling so as to make itself in some way felt, it is perhaps rather daring for us to deny absolutely. If the oxygen were diminished without the increase of the carbonic acid, it would be safest to advocate the latter reason. The reasons given in the previous paragraph agree best with the state of our knowledge. However, the discussion on this subject would be better postponed until we become absolutely sure of more facts.

Air of impure places.

Reliable analyses on the air of impure places are less numerous than those given, but decided results have been obtained shewing at least a deviation from the numbers found on analysing fresh air.

Observer.		Oxygen.
Configliachi -	air of rice fields - -	20·8
„	- crowded places - -	20·3
Regnault -	Toulon harbour - -	20·85
„	Algiers - - -	20·42
„	- „	20·395
„	- Bengal Bay - - -	20·46
„	- Do. over bad water -	20·387
I found in the middle of Manchester in a place closely surrounded and exposed to smoke - - - - - -		20·868
		20·808
		20·807
		20.613
		20·793
		20·179
	Average	20·652

The following results have been sent me by Dr. Frankland:

Air from laboratory of Owen's College, 1852.

	Oxygen.
November -	20·883
December - -	20·898
Ditto -	20·868
Ditto - -	20·876

M. Leblanc, in his researches into the composition of the air (Ann. de Chimie et de Ph. t. 5, 3d series 1842, p. 248), gives the following analyses of inferior and impure air :—

The amounts are given in weights, but have been calculated into volumes.

——	Oxygen by Weight, per 1,000.	Oxygen by Volume, per Cent.	Carbonic Acid by Weight, per 1,000.
1. Conservatory of Equatorial Plants, Terre de Buffon, 6 o'clock in the evening -	230·1	20·81	?
2. Seven o'clock next morning -	229·6	20·76	0·1
3. Chemical Theatre, Sorbonne before lecture - - -	224·3	20·28	6·5
4. Do. after - - -	219·6	19·86	10·3
5. Bedroom in morning -	229·4	20·74	0·4
6. Hall of hospital three hours after shutting the windows -	229·1	20·72	0·8
7. Same at 8 o'clock morning -	227·2	20·54	2·8
8. Sleeping room at the Salt-petrière, atmosphere sensibly bad - - - -	225·2	20·36	8·0
9. Another in a similar state -	226·0	20·44	5·8
10. Salle d'Asyle, 116 children, smell bad also - -	227·1	20·53	2·7
11. Salle d'Ecole Primaire, 2d arrondissement - -	228·4	20·65	—
12. Same, incompletely ventilated, no smell - - -	—	—	4·7
13. Same, quite closed, a sensation of heat, quickened respiration - - -	—	—	8·7
14. Chamber of Deputies, in the ventilating shaft, no smell -	—	—	2·5
15. Opera Comique, pit before end of play - - -	—	—	2·3
16. Same theatre, centre boxes -	—	—	4·5
17. Close stable, École Militaire	225·5	20·39	1·05
18. Same stable, ventilated by vassias - - -	229·0	20·71	2·2

It was with these results before me that I began the enquiry, and although not expected to speak of the composition of the air generally, it seemed quite necessary to make some experiments, that it might be compared with the air of mines from my own point of view.

In looking over these analyses already presented, some of them means of hundreds and the whole representing many years of labour, we see at once how many give the amount of oxygen to be above 20·9. As a rule those numbers which fall below 20·9 repre-

* Dr. Frankland on the air of Mont Blanc:—Journal of the Chemical Society for 1861

sent air from cities and less pure places or from high mountains, or they have been obtained by weighing the oxygen, a method which seems always to give lower results. Take the conclusion of Cavendish, wonderful at the time, that the average was 20·833, we are surprised at the accuracy of the man who used a method by which no one now seems able to obtain any reliable results. It cannot be supposed to take from the honour of Cavendish, if we add one tenth of a per cent. to his figures after sixty years of scientific activity had made that apparatus the plaything of boys which in his time it required a philosopher to handle. He used acid liquids, and how easy it is to lose a fraction of a per cent. every man who has worked with gas must know and feel most keenly. If however any one shall object to this reasoning we must put up against him Saussure, a man using the same method, and we find his average much higher, viz. 21·05. This also is strengthened by the labours of Gay-Lussac, Berthollet, Thomson, Davy, and Humboldt, all men to whom we must attend. Cavendish could not decide that the London air differed from that of the country (see Dr. Wilson's Life of Cavendish).

Dalton laboured long on gases, and although his thoughts were generally greater than his experiments when a theory could be found, few men could so persistently labour out the facts where no theory existed. On the composition of the air of Manchester he is moderate and, it seems to me, just.

Dumas and Boussingault in conjunction, and also Brunner gave results by weighing the oxygen. The air was conveyed in bottles, and the bottles themselves were filled by sending them free of air and allowing the air for analysis to flow in. There are objections to this method. It is extremely dependent on the accuracy of the apparatus used, and if I am at all right in my judgment, the tendency is to diminish the amount of oxygen, for although the specific gravity of nitrogen does not differ greatly from that of oxygen, it does differ, and is lighter. At any rate I believe the list of analyses given to be a fair representation of the work done. They may be taken as the evidence of the scientific world on the subject.

Regnault's analyses are very beautiful, and the uniformity of his results predisposes us strongly in their favour. Their number comes in to increase their importance.

Another reason why I admire the results of Regnault is one of a kind which affects all men, and which may be excused. They agree with my own, made in an open part of Manchester. His results are 20·913,—20·99 for Paris, and all the numbers he made are above 20·9 until he comes to unwholesome places with putrid waters. A similar reason leads me to believe in the analyses by Bunsen and those of Dalton made in Manchester, as I found like results when air from close places was examined. Those of Dr. Frankland are also corroborative.

Having this great array of analyses, an abstract of the life-labours of many men, we seem to have before us proof sufficient of a decided variation in the composition of the air. The variation is really so great in some places that we must admit some powerful local cause. In filthy places, and in marshy spots at a high temperature the cause cannot be doubted, and how can we doubt the same change to occur in places that are badly ventilated? When carbonic acid increases is it wonderful that oxygen should diminish? In spite of all this there is no firmly founded faith amongst scientific men regarding the subject. The evidence has not been brought fully before them, and probably some links may be wanting. Seeing the question in this state, I was desirous of throwing some light upon it, and indeed I had already come to believe strongly in the variations, because of some which had been observed when making occasional analyses for the trial of new apparatus or for instruction and trial of skill.

Under this impression specimens of air were collected from the front of the laboratory and from behind near an ash-pit, each at the same time, and the analyses, along with some others, are given in the following table.

Afterwards it will be seen that the carbonic acid of the same spot was also estimated, and the result is that not only is there a diminution of oxygen in the less pure spot but the carbonic acid although greater than in the pure air is not sufficient to make up the vacancy left by the deficiency of oxygen, leading us to look for other gases also that tend to increase the impurity. This is an unexpected result, and, to my mind, one which has in it much value. But like all other investigations, after leading us onward one step, it shows us that there is another to take.

If emanations arise from foul places, they must occupy space. They are mixed gases and vapours. When we use caustic soda to absorb the carbonic acid, perhaps we absorb some vapours also, and indeed I always find that in a endiometer we are apt to obtain too much carbonic acid in cases where the quantity is small unless extreme care is used.

STREET and SUBURB AIR, Manchester, compared with CLOSET or MIDDEN AIR.

Time.	Air from Closet or Midden behind Laboratory.	Air from Front Door of Laboratory.
1863.	Oxygen, vols. per cent.	Oxygen, vols. per cent.
Dec. 1	20·80	20·90
„ 10	20·85	20·96
„ 11	20·79	20·98
„ „	20·72	20·90
„ 15	20·87	20·90
„ „	20·76	20·02
„ 17	20·59	20 96
„ „	20·85	20·78
„ „	20·90	20·83
„ 18	20·21	20·91
„ „	20·58	20·92
„ „	20·74	20·87
„ „	20·40	21·02
„ „	20·77	21·00
„ 19	20·99	20·83
„ „	20·70	20·98
„ „	20·82	20·88
„ „	20·46	21·01
„ „	—	20·87
„ 21	20 56	20·92
„ „	20·79	21·02
„ „	20·64	20·88
„ „	20·94	20·91
„ „	20·67	21·01
„ 22	20·53	20·96
„ „	20·71	20·92
Feb. 26	20·66	21·01
„ 24	—	21·05
„ 20	—	20·98
„ „	—	20·99
„ „	—	21·01
„ „	—	20·94
	538·30	670·19
	Average 20·70	20·943

The results are very distinct; there is nothing exaggerated about them. There are no great deviations to astonish us, and there are so many irregularities that if two or three analyses only were made the effect would be bewildering or uncertain; but there are enough here to show a steady diminution of oxygen, on one side, with occasional risings as the wind may blow here or there, and a steady rise of oxygen on the other, with occasional fallings also, as the wind may chance to carry smoke or other gases.

The laboratory stands in an open space, which contains certainly a burial ground in the centre, but is very much freer from the smoke of the town than the streets are; no manufactories exist beyond or between it and the country. The wind from west and south blows over some houses but over no large chimneys.

The results clearly show a difference between the air of more and less pure places and render the oxygen test more valuable than it hitherto has been supposed to be. Unfortunately so many analyses are required that the test cannot be popular; but as one to be resorted to when the occasion warrants the labour it stands very clear. And indeed how can it be otherwise? We see putrid matter laid on the ground, and find it disappearing rapidly, and yet we are told that it is not accompanied by loss of oxygen; it is not credible, and the results given show it to be incorrect.

It may perhaps be said that although some of the specimens contained less than 20·9 oxygen if they came from a clear atmosphere, such air could not be considered very bad. This reasoning cannot hold. Analyses are after all subject to error, and the average is the only number on which we can rely. It may even happen that the small changes are caused by accidents which may give impurity. For example, take gusts of impure air even in the air of a street generally pure.

It is abundantly clear that whenever we leave the region of the uncontaminated or very little contaminated open air we obtain a diminution of oxygen although that diminution is very small; this small loss is therefore a proof of impurity. In crowded rooms, theatres, cow houses, stables, and laboratories it is easily proved, and that diminution is enough in decided cases to bring the figures various stages below 20·9.

Oxygen of the air in wet and in dry foggy weather.

Continuing the subject and going further into detail:

In very wet weather in Manchester, and still before the laboratory, the following results were obtained:—

Oxygen.
20·90
21·01
21·01
21·05
20·96
104·93
Average - 20·98

In dry, foggy, and frosty weather, when the smoke of Manchester had no exit from the town:

The results were	Oxygen.
Near centre of town - -	20·90
	20·88
At laboratory - - -	20·90
	20·96
At laboratory, afternoon - -	20·91
„ forenoon - -	21·01
„ afternoon - -	20·82
	146·38
Average -	20·91

20·82 and 20·89 were found in a dense fog, such as has rarely visited Manchester. The eyes began to smart, and in walking on the pavement carters were met leading their horses into shops in the day-time—we can scarcely say in the day-light.

Thus we have certified by experiment as well as the testimony of the senses, the inferiority of the air at certain times, and these senses seem to estimate on certain occasions an amount as small as 0·07, but so far as we know they do not estimate the loss of oxygen, but the corresponding increase of impurities. In the yard at the back of the laboratory the amount is less than before the laboratory, and is as follows:

Oxygen.
20·80
21·01
20·94
20·84
21·09
Average 20·936

Thus we have the series:—

In very wet weather, in front -	20·98
At all times, an average of 32 experiments - -	20·947
Behind, in medium weather -	20·936
In foggy frost - - -	20·91
Over ash-pits - - -	20·706

These results surprise me as I write. They come from analyses made some months ago, and without the hope of such a fine gradation of qualities. They seem also to show that we are exposed to currents of good air in the worst, and of bad air in the best atmospheres in towns like Manchester. This is suggested also by that number, 21·01 or more, so curiously turning up in the analyses of most persons, although it is absent in the list of Regnault's given.

In dwelling rooms, &c.

If we go to dwelling rooms, &c., we find the same diminution of oxygen where there is insufficient ventilation:—

Before the door of a house in a suburb of Manchester, the air gave of oxygen -	20·96
In the sitting room, not very close -	20·89
In a very small room, with a petroleum lamp burning, a good deal of draught	20·84
After 6 hours - - - - -	20·83
Pit of theatre, February 13th, 1864, 11.30 p.m. - - - -	20·74
Gallery, February 15th, 10.30 p.m. -	20·63

In cow-houses and stables.

If, again, we enter cow houses and stables, the same results are attained. The following six are so uniform, they seem to be as good as thousands, and are obtained from the only specimens collected. I went in the morning after the cows had been milked and fed, and therefore after the air had been allowed to enter. The houses still had a close smell. The stables were badly closed and one was open; the specimens were taken near to the horses, as far from the doors as possible, avoiding the direct breath of the animals. I cannot say they are fair examples of the air breathed by the horses or cattle alone; but they are very fair specimens of the kind of air breathed by those who work in or visit stables. Two of the stables were for cab horses, the doors half open; a third was a gentleman's stable of four stalls, but there was only one horse; the door was shut. The air seemed good for a stable, and still the loss of oxygen is visible in the analysis.

	Oxygen.
Cowhouses	20·70
,,	20·78
,,	20·75
Stables	20·82
,,	20·74
,,	20·74

In such places as have been last described it would not be pleasant to live, and in the atmosphere of the theatre we know how much desire of fresh air is produced. Yet none of these numbers are so low as 20·6, the number assumed as marking the beginning of very bad air. The temperature of the theatre in the pit was 78° F., and this is a common temperature in the mines. By taking Leblanc's analyses a somewhat different number might be arrived at; but even he finds 20·54 only after a hospital window had been shut all night, and 20·53 in a room with 116 children. Five of his analyses give numbers below 20·6. These are bad cases.

Experiment has led me to form the following

TABLE of the COMPOSITION of the AIR of pure and impure places, beginning with that containing most oxygen, although probably not the very richest specimen:—

In a suburb of Manchester in wet weather	20·98
Do.	20·96
In the outer circle of Manchester	20·947
At the back of the house	20·936
In fog and frost in Manchester	20·91
In sitting room which felt close but not excessively so	20·89
In a small room with petroleum lamp, well ventilated	20·84
Do. After six hours	20·83
Pit of theatre, 11.30 p.m.	20·74
Gallery, 10·30 p.m.	20·36
In large cavities in mines	20·77
In currents	20·65
Under shafts	20.424
In sumps	20 14
When candles go out	18·5
The worst specimen yet examined in the mine	18·27
Very difficult to remain in for many minutes	17·2

It seems to me clear that air in places where putrefaction may be supposed to be going on is found generally by all observers to contain less oxygen than pure air. This enquiry puts the subject in a somewhat clearer light, and shows us that those places containing impurities and which are in or near all our houses are also subjected to a diminution of oxygen. The diminution is not entirely made up by carbonic acid, and must be made up by other substances. This diminution is very sensible when it comes to 20·75, or even in some places 20·85, being equal to a removal of 0·2 to 0·1 of oxygen. We do not require to seek deadly places for air with diminished oxygen; the air of every house is subjected to this diminution, which must of necessity be an indication of the amount of impurity existing in the air, although giving no clue to the quality of that impurity which may be more or less innocent or noxious.

It is well known that oxygen over putrid substances is absorbed, whilst carbonic acid and other gases take its place. This reasoning does not touch the question, What is the effect of a loss of oxygen when no impurities take its place?—a condition little known.

CARBONIC ACID OF THE ATMOSPHERE.

Horace de Saussure first paid minute attention to the carbonic acid of the atmosphere, and showed its presence on the mountains of Switzerland as well as on the plains. He used lime water. His results were published in his *Voyages dans les Alpes* in 1796. His son Theodore in 1828 published a resumé of a much fuller inquiry, and in 1830 the complete account. He used a vessel of 34 litres in volume, and washed the air with baryta water, collecting the carbonate of baryta precipitated. This is a laborious process; but, considering the great accuracy of the operator and the long experience which he gained, we may place the greatest confidence in his results. I am disposed to think that there may be a little excess in his experiments, but this will not affect the comparative amounts found at different times, and which form the most interesting part of the inquiry. He says:*

"The quantity of carbonic acid in the open air in the same place is subject to almost continual change equally with the temperature, the winds, the rain, and the atmospheric pressure. The observations which I have made since 1816 until the month of June of this year, in a prairie of Chambeisy, three quarters of a league from Geneva, indicate that the mean quantity of carbonic acid in volume which 10,000 parts of air contain is equal to 5· or more exactly to 4·9. The maximum of this gas is 6·2; the minimum is 3·7.

"The observations published (Bibliothèque Univ., v.1.) show as maximum in the same place a greater proportion of acid, but it is probable that this excess was the result of the imperfection of the experiment.

"The augmentation of the average quantity of carbonic acid in summer, and its diminution in winter, are manifested at different stations,—in the country as in the city, upon the lake of Geneva and upon a hill, in calm and disturbed air. According to an average of thirty observations made at Chambeisy, during seven years, with baryta water, the quantity of carbonic acid in the months of December, January, and February, at mid-day, is to that of June, July, and August as 100 to 77.

* Annales de Ch. & de Ph., vol. 38, 1828.

"This ratio is not constant throughout every year. There are times which form exceptions, and in which the quantity of carbonic acid in summer is inferior to that in winter, or vice versâ. Thus after many years of observation, the mean quantity of carbonic acid of the month of January in 10,000 of air is 4·23; but the quantity of carbonic of the month of January 1828, which was extraordinary for the mildness of its temperature, rises to 5·1. The average quantity of carbonic acid of the month of August, taken in different years, is 5·68; but after an average taken from four observations (the results of which closely approximate) in the month of August 1828, which was singularly cold and wet the quantity of carbonic acid at noon was only 4·45.

"The difference in the quantities of carbonic acid contained in the atmosphere in calm weather, during day and night, is one of the most remarkable results of my late observations. The following is the table of experiments which I have made, in open country at noon, and at eleven o'clock in the evening, of the same day.

The Table of Carbonic Acid in the original is given in 10,000 parts, but for uniformity sake is here altered into per-centage.

Time.	Noon.	Evening. 11 o'clock.
May 22nd, 1827	·0581	·0623
July 7th ,,	·058	·062
Sept. 3rd ,,	·0561	·0601
Nov. 6th ,,	·043	·0486
May 31st, 1828	·0475	·0565
June 13th ,,	·0506	·0583
June 26th ,,	·0539	·0522
August 1st ,,	·0432	·0606
August 12th ,,	·0429	·0582

"It results from these observations, that the air contains in calm weather more carbonic acid during the night than during the day. The only exception to this result was on June 26th, 1828, during extremely violent wind, whilst all the other observations were made in calm weather, or in slightly disturbed air. I have acquired sufficient experience in this kind of work, to affirm that the general difference which is found in this table could not result from errors of observation.

"It remains for me to discover if this difference is maintained in the middle of winter, or when vegetation is inactive.

"The air taken at the middle of the Lake Leman opposite to Chambeisy contains on an average a little less carbonic acid than the air taken a hundred toises from the bank. After eight observations, made at different periods, on the same days at noon, the quantities of carbonic acid at the two stations are as 100 to 98·5; but the air of both places follows the same variations relatively to the seasons.

"The air of Geneva contains more carbonic acid than the air of a prairie of Chambeisy, almost in a ratio of 100 to 92, from six observations made at the same time at both stations. A greater purity in the air of the country could be foreseen. I cite this result only because the other eudiometrical experiments indicate no difference in the air of those two places, and as it shows the utility of the experiment of which this is the subject."

At first Saussure was led to believe that rain increased the carbonic acid, but changed his mind, finding the contrary, and also that this acid increased in dry weather even with a freezing temperature.

For the lake of Geneva and the neighbouring Chambeisy, his numbers are:—*

——	——	Carbonic Acid at Chambeisy.	On the Lake of Geneva.
1826.			
Dec. 29	Mid-day -	·0421	·0385
1827.			
May 22	Ditto -	·0540	·0502
July 2	Ditto -	·0523	·0578
Aug. 9	Ditto -	·0521	·0542
1828.			
Sept. 28	Ditto -	·0495	·0474
Jan. 19	- - -	·0491	·0446
July 7	- - -	·0481	·0441
Aug. 12	- - -	·0408	·0392
Aug. 26	- - -	·0422	·0410
Sept. 26	- - -	·0414	·0320
,,	Night - -	·0493	·0430
1829.			
Feb. 5	Mid-day -	·0445	·0476
March 7	- - -	·0463	·0465
April 18	- - -	·0429	·0422
July 7	Night - -	·0534	·051
July 8	Mid-day -	·0435	·0408
Oct. 13	- - -	·0354	·0342
,,	Night - -	·0416	·0368
	Mean -	·0460	·0439

De Saussure found also more carbonic acid in the town of Geneva than outside at Chambeisy. The numbers are:—

——	——	At Chambeisy.	In Geneva.
1827.			
Feb. 12	Mid-day -	·0358	·0455
May 22	- - -	·0540	·0569
May 26	- - -	·0471	·0528
Aug. 9	- - -	·0453	·0476
1828.			
Jan. 28	- - -	·0426	·0427
Feb. 19	- - -	·0462	·0482
April 10	- - -	·0465	·05
July 25	- - -	·0390	·0445
July 1	Midnight -	·0407	·0385
Sept. 4	11 at night -	·0441	·0439
Sept. 5	- - -	·0382	·0420
Oct. 1	- - -	·0414	·0423
Oct. 2	- - -	·0367	·0405
	Mean -	·0437	·0468

Showing that night increases the carbonic acid in the country more than in a town. This we may imagine, as the influences in a town are towards a diminution at night.

One of the most curious results of De Saussure's inquiry is, that the carbonic acid on the mountains is actually greater than on the plains. It will be interesting to give these figures, as they are often referred to, and seldom seen. It may be remembered here that there was some reason to believe in a diminution of oxygen in mountain air to a minute extent. The increase of carbonic acid is a corroboration.

* Ann. de Ch. et de Ph. Vol. 44.—1830.

Name of Mountain.	Height of Mountain in Metres.	Carbonic Acid in the Air of the Mountain.	Carbonic Acid in the Air of the Plain.
La Dôle - -	1267	·0461	·0474
Grand Salève-sur-Crevin.	877	·0557	·0482
Hermitage (Petit Salève).	331	·0544	·0482
La Dôle - -	1267	·0491	·0446
Vasserode-sous-la-Dôle.	908	·0481	·0446
Grand Salève-sur-Grange-Tournier.	945	·0413	·367 at foot, ·359 at Chambeisy.
Col de la Faucille	963	·0443	·0414
Ditto - -	963	·0454	·0415
Ditto - -	- -	·0369	·0387
Ditto - -	- -	·0360	·2322
Ditto - -	- -	·0422	·0355
Ditto - -	- -	·0395	·0315

He refers the difference to the rain below, and the moisture of the ground, and to vegetation, which diminishes the carbonic acid and increases the oxygen. He finds also that the mountain air does not change at night as the air below does. He finds a minute increase of carbonic acid arising from violent winds, and thinks this may arise from the upper mixing with the lower strata; his evidence on this point may be explained by the fact, that he found a decrease on June 20th during a violent wind, probably from the same cause, namely, mixing.

De Luna has lately examined the air of Madrid with the following results:—

Air of Madrid, outside Walls, during month of March.

(1st series.)

Place.	Oxygen.	Carbonic Acid per cent.
1 - - -	20·71	0·05
2 - - -	20·79	0·03
3 - - -	20·77	0·03
4 - - -	20·77	0·05
5 - - -	20·73	0·06
6 - - -	20·75	0·03
7 - - -	20·70	0·06
8 - - -	20·74	0·05
9 - - -	20·69	0·09
10 - - -	20·81	0·02
11 - - -	20·79	0·03
12 - - -	20·78	0·04

Air of Madrid, inside Walls, during month of April.

(2d series.)

Place.	Oxygen.	Carbonic Acid.
1 - - -	20·70	0·06
2 - - -	20·70	0·06
3 - - -	20·77	0·03
4 - - -	20·75	0·05
5 - - -	20·70	0·06
6 - - -	20·69	0·06
7 - - -	20·78	0·05
8 - - -	20·69	0·08
9 - - -	20·70	0·06
10 - - -	20·78	0·04
11 - - -	20·80	0·03
12 - - -	20·73	0·04

The amounts of oxygen are very small, and the carbonic acid very high. Solutions were used for the oxygen, and permanganate for the organic matter.

Hospitals.

Rooms.	Oxygen.	Carbonic Acid.
(1st series.)		
1 - - -	20·58	·32
2 - - -	20·50	·38
3 - - -	20·49	·43
(2nd series.)		
1 - - -	20·65	·27
2 - - -	20·52	·30
3 - - -	20·60	·29

The experiments of Mr. Lewy on the Atlantic Ocean and in America show a great irregularity. They are given in the previous chapter. We do not see clearly why there should be a rise in the carbonicacid from 0·333 to 0·577 at sea. The great inequalities on the land are interesting, and especially at Bogota, where meteorological influences interfere to render the amount great and diminish health.

Dalton had made experiments on the atmosphere with lime-water, but by no means such as are satisfactory. Mr. Hadfield, who had learned in his school, improved the process very much. He used a bottle of 471—498 cub. in. fitted with a brass cap and stop-cock, and filled it by means of a bellows. He tested the lime-water with sulphuric acid, before and after shaking with the air, or after it had stood for some days. He obtained 0·80 vol. per 1,000. This is high as a constant result, but as he lived on the borders of a putrid canal it may not be too high. His results are found in the Mem. of the Literary and Philosophical Society of Manchester, 2d series, vol. vi., 1842.

Dr. Boswell Reid* made trials with various amounts of carbonate of lime in water, as indications of the carbonic acid absorbed. After passing the air through a solution he compared the result with these trials, keeping the precipitates in bottles. This use of lime he called a carbonometer. The results were comparative, but I do not find that they were quantitative. These precipitates change so much that they cannot be used for comparison after a few hours.

Pettenkofer next took up the subject, using lime, now, I believe, baryta, to remove the carbonic acid from the air, and oxalic acid to test the solution. The bottles in which the experiments were made were dried with great care, and the solution of oxalic acid made very delicate. One cubic centimetre of this solution was made equal to a milligram of lime, but it may also be made equal to a cubic centimetre of carbonic acid. The strength, however, must vary with the air. If the air is very bad, a stronger solution may be used. Indeed this is rather a difficulty in the process, as you cannot use one solution for all conditions, on account of its extreme delicacy. The carbonic acid saturates part of the lime, and the amount remaining is tested with oxalic acid to see how much is still unaltered. The point of neutralization is found by putting a drop of the liquid on a piece of turmeric paper.

The plan is very beautiful and complete. In principle it is exactly that of Hadfield's, but oxalic acid is used, and the experiment made more delicately.

* "Illustrations of the Theory and Practice of Ventilation," by David Boswell Reid, M.D., F.R.S.E. &c.; Longman, 1844.

He gives 0·5 per mille, or ·05 per cent., as the amount in the air generally at Munich. This is above the number of Saussure, and both are above the numbers found here. Munich is 1,690 feet, Geneva 1,154 above the sea. In the Handwörterbuch der Chemie, under "Ventilation," Pettenkofer gives a summary of the amount of carbonic acid in dwelling houses, as follows:

In a dwelling house, during the day, 0·054.

After a while it increased to 0·065, 0·061, 0·064, 0·068, 0·074, and 0·087. Mean 0·068.

In a bed room at night with closed windows, 0·230.

Partly open, 0·082.

He found the following amounts of carbonic acid per cent. on examining public places, hospitals, prisons, &c.:—

	·232	·143	·223
	·226	·307	·247
	·334	·261	·131
	·186	·278	·495
	·362	·429	·536
	·317		
Schools -	·410	·567	·200
	·229	·558.	

Limit of Carbonic Acid in Dwelling Houses.

Dr. Reid's labours are much to be admired; he did much for the subject of ventilation in this and other countries. I am disposed, therefore, to have great respect for his opinion, that air containing between 0·1 and 0·2 per cent. of carbonic acid cannot be proved to be injurious, although certainty has not been arrived at. This, however, we know, that this amount of carbonic acid, at least when given out by human beings and at a temperature not cold, is very offensive, if not on account of the acid, still of its accompaniments.

Pettenkofer, after great attention to the subject, concludes that 1 per 1,000 marks the limit of bad and good air, and that those who can plead for more have lost the refined use of their senses. He then inquires into the cause of this feeling, as there is neither a want of oxygen nor a great amount of carbonic acid, attributing the feeling experienced to the prevention of a proper flow of heat, and in part, very ingeniously to the existence of such bodies as butyric and baldrianic acids, which saturate a large volume, and so prevent further evaporation. In other words, he attributes the depressing feeling to organic matter, as I have also done.

He finds also that a lowering of temperature ventilates a room more rapidly than opening a window.

In order to find the amount of fresh air which must be supplied to any dwelling, he explains that the carbonic acid of the expired air is about 4 per cent. or 40 per mille. The mean in the air is 0·5, and that of a good air for a room is 0·7. This gives a difference of 0·2. Then $\frac{40}{0{\cdot}2} = 200$. If, we must keep up the freshness of the air, we must add 200 times the volume of the air that is expired. If, a man breathes out 300 litres in an hour, there must be added 60,000 litres of fresh air = 2118·96 cubic feet. At the same time it is shown how much more rapid the change of air is when out of doors, where the air is consequently pleasanter, proving that even the apparently excessive amount obtained indoors was not all that was desired.

Pettenkofer mentions that it has been found necessary in some hospitals in Paris to use exactly this amount of 60,000 litres in order to prevent all smell.

If it were desired to keep the air at 0·6 per mille, the calculation would be $\frac{40}{0{\cdot}1} = 400$ times. We cannot do better than adopt the figures for bad and good air given by Dr. Reid, or rather Professor Pettenkofer, as far as they will suit circumstances. Here we must put the amount of carbonic acid in the atmosphere here at 0·4 at the most, instead of 0·5; and it is exceedingly probable that in many parts of England it will be found constantly less, as it certainly is frequently. This would make it possible to have a dwelling room at 0·6 instead of 0·7. But practically we are not always favoured with such ventilation, even in England; and Germany seems to be much worse, judging from the analyses of Pettenkofer, &c. In some cases we may, with Dr. Reid, allow more carbonic acid. Dr. Reid was not exaggerating, although he was frequently blamed, when he insisted on supplying 600 cubic feet per hour for an individual; and we find that, in the Journal of the Chemical Society for 1858, Dr. Roscoe found that 1,200 was nearer the demand in a hospital. Dr. Arnott, a revered authority on ventilation, demands 1,200. I shall return to this question.

Carbonic Acid of the Air in England.

Dr. Roscoe has given what may be called a favourable view of the air of Manchester and London, as he seems not to have found places so bad as those found by me. I may be allowed to quote a calculation of mine in the Chem. Soc. Journal, 1859.

Allowing the air to go at the average rate of twelve miles an hour,* it will sweep over the three or four miles of Manchester three times an hour, or 36 times in 12 hours.

Taking the height of air affected to be 300 feet, as we must assume something, we have carbonic acid

from coals - - -	0·0091 per cent.
expired air - -	0·0002
call the usual amount	·06
	·0692

But call the usual amount 0·03 as it sometimes is, or even below it we have :—

from coals	0·0091
breathing	0·0002
usual air	0·0300
	·0393 or 0·393 per thousand.

We see then that the combustion of coal and the breathing will produce carbonic acid, amounting only to a third of that in the purest air generally found, or one fourth of that in air having 0·04. It is certainly remarkable that the amount which I calculated as that which ought to exist should be found, by experiment, to be correct to the third decimal place, according to Dr. Roscoe. At the same time my own numbers are a little higher, and in extreme cases much higher.

Dr. Roscoe has found the carbonic acid to be as low as 0·027 per cent. outside of Manchester in wet weather, and near the sea 0·043; rather more than in Manchester. This favours the idea of oxygen coming from vegetation, or rather of carbonic acid being absorbed to such an extent as to influence the experiments. Dr. Roscoe has put down for Manchester - - - 0·0392 per cent.

the country - -	0·0402	„
Manchester district	0·0394	„

* Mr. Hartnup, F.R.A.S., finds it 12·62 at Liverpool.

That the amount should be less or even equal in Manchester is scarcely to be explained, especially as even in Geneva, Saussure found more than in the country. Had the country places been mountainous the observations would have been better understood.

At the same time I made some experiments which gave higher numbers, varying from 0·0409 per cent. to ·15 per cent. These, with the exclusion of four which are very high, give an average of 0·0544. The four were taken under circumstances which make me believe they are correct; some places are continually exposed to gusts from chimneys, which must contain a high amount of acid.

Lately I undertook a much larger number of experiments, using Pettenkofer's method of analysis. The bottle I used is of a different shape from Pettenkofer's, and the bellows are different, but the method is essentially the same. The bottle has a very wide mouth, so as to allow the hand to enter, and drying is performed by means of a pure linen cloth which has been washed in acid and distilled water. This saves a great deal of trouble, and repeated analyses have proved that neither from the hand nor the cloth does any hindrance to accuracy arise. The bellows pump is one that I have used for emptying bottles of air for the permanganate test. The bottle and pump are seen at fig. (1). When the bottle is cleaned and dried, the baryta is added, and the elastic cover, as seen in the same figure, is put on.

The following results were obtained after nearly 200 experiments were made in Manchester and London.

Carbonic Acid in the Air just outside of Manchester.

Place.	Per Cent.	Wind.	Date.	Time.	Temp. Cels.	Bar.	Remarks.
Fields in Greenheys -	0·0383	—	Feb. 22	—	—	—	
Higher Broughton - -	0·0350	E.S.E.	„ 24	—	0·6	29·9	
Old Trafford - -	0·0432	—	„ 25	—	3·0	29·98	
Buxton - - - -	0·0431	E.	—	11.0	—	—	Fine day.
„ - - -	0·0459	„	Mar. 19	—	—	—	
„ - - -	0·0467	„	„	—	—	—	
„ - - -	0·0443	„	„	1.0	—	—	
City Road, Hulme - -	0·0367	„	Mar. 8	3.0	4	29·2	Strong wind. Little snow.
Rusholme - - -	0·0295	—	„ 11	—	5	29·2	Very windy. Hail storm.
Queen's Park - -	0·0308	—	„ 14	—	10	—	
Old Trafford - -	0·0340	W.	April 1	—	—	—	
„ over canal -	0·0313	„	„	—	—	—	
Old Trafford - -	0·0293	„	„ 2	—	—	—	
„ - - -	0·0291	„	„ 11	5.50	—	—	
(14)	0·5172						
Mean -	0·0369						

Close Places.

Place.	Per Cent.	Wind.	Date.	Time during Day.	Temp.	Bar.	Remarks.
Theatre Royal, pit -	·2734	—	Feb. 13	—	22	29·3	
„ gallery -	·1358	—	„ 15	10.50	29	29·7	
„ „ -	·1238	—	„	„	„	„	
Queen's Theatre, pit -	·1026	—	„ 16	—	26	29·7	
„ - -	·1019	—	„	—	„	„	
Stables - - -	·0833	—	—	—	8·2	30·	4 horses had been there during the night, and 3 were still there.
„ - - -	·0875	—	—	—	„	„	
Cellar of Laboratory -	·0572	—	„ 17	—	6·2	30·1	
Study, at table - -	·1177	—	„ 25	—	16	29·98	4 persons were in the room, with 3 gas lights and large fire.
„ ceiling - -	·1561	—	—	—	22	„	
Schoolroom - - -	·0970	—	Mar. 15	—	12	—	
„ - - -	·0886	—	„	—	—	—	
Brewery - - - -	·1214	—	„ 16	—	—	—	
„ - - -	·180	—	„	—	—	—	Near fermenting vat.
Mills - - -	·286	—	„ 10	4·0	20	—	Taken in weaving shed which contained 400 people.
„ - - -	·283	—	„	5·30	21	—	
„ - - - -	·293	—	„	5·30	21	—	
„ - - -	·300	—	„	„	„	—	
(18)	2·8883						
Mean -	·1604						

CARBONIC ACID in the AIR of MANCHESTER.

Place.	Per Cent.	Wind.	Date.	Time during Day.	Temp.	Bar.	Remarks.
Churchyard, All Saints -	0·0323	N.E.	Feb. 22	—	1	29·8	
Smithfield Market - -	0·0446	„	„ 20	11·0	1·3	29·95	
„ „ - -	0·0464	„	„ 20	„	1·3	„	
Churchyard, All Saints -	0·0437	„	„ 18	—	5·2	30·18	
„ „ -	0·0521	„	„ 18	—	„	„	
Back yard of laboratory -	0·0539	—	„ 6	—	1·4	30·8	
„ „ -	0·0383	—	„ 6	11·15	„	„	
„ „ -	0·0473	—	„ 6	3·15	„	„	
„ „ -	0·0515	—	„ 6	3·35	„	„	
Philosophical Society -	0·0677	—	„ 9	11·20	1	29·55	Fog, but not very dense.
„ - - -	0·0683	—	„ 9	5·15	„	„	„ „
Bishopsgate - -	0·0734	—	„ 9	4·30	„	„	Fog, very dense.
„ - - -	0·0727	—	„ 9	„	„	„	„ „
Back yard of laboratory -	0·0523	—	„ 10	10·30	8	29·4	Little fog.
„ „ -	0·0541	—	„ 10	11·30	„	„	
Deansgate - - -	0·0578	—	„ 10	2·30	—	—	Fog.
Small court off Berry Street	0·0604	—	„ 11	—	4	29·6	
Midden - - -	0·0724	—	„ 12	5·5	5·4	29·38	
„ - - -	0·0732	—	„ 12	„	„	„	
„ - - -	0·0805	—	„ 13	11·50	7·2	29·3	
„ - - -	0·0837	—	„ 13	12·25	„	„	
Churchyard, All Saints -	0·067	—	„ 19	—	1	30·18	
„ „ -	0·0447	—	„ 19	—	„	„	
„ „ -	0·0518	—	„ 19	—	„	„	
End of Market Street -	0·0374	—	„ 23	—	2·8	29·85	
„ „ -	0·0321	—	„ 23	—	„	„	
Blackfriars Bridge -	0·0495	—	—	—	—	—	Taken immediately over the water. Very bad smell. Fine day.
Near Printing Lane -	0·0351	—	—	—	—	—	
Back yard of laboratory -	0·0327	—	Mar. 4	4·0	5·6	29·5	Rain.
„ „ -	0·0319	—	„ 4	5·30	—	„	
„ „ -	0·0391	S.W.	„ 7	10·15	9·5	29·	Very fine.
„ „ -	0·0358	„	„ 7	11·15	—	„	These experiments, Mar. 7, after 3 days rain.
„ „ -	0·0343	„	„ 7	12·15	10	„	
„ „ -	0.0311	„	„ 7	2·15	7·8	„	After more rain.
„ „ -	0·0311	„	„ 7	2·50	7·4	„	Rain.
„ „ -	0·0335	„	„ 7	3·15	7·2	„	„
„ „ -	0·0367	„	„ 7	4·15	6·4	„	Fine.
„ „ -	0·0333	„	„ 7	5·15	—	—	
All Saints Churchyard -	0·0319	E.	„ 8	4·45	4	—	A little snow; strong wind.
Stockport, back street off Heaton Street.	0·0415	N.E.	„ 9	2·30	4	—	Snowing fast.
„ Chester Gate -	0·0351	„	„ 9	3·30	4	—	„ „
„ near Grammar School.	0·0355	„	„ 9	4·30	„	—	„ „
Back yard of laboratory -	0·0311	—	„ 11	4·50	5	—	Very stormy.
River Medlock, a little above Brook Street.	0·0351	—	„ 17	11·30	—	—	
Back street off Gray Street, Ox. Street.	0·0383	—	„ 17	2·30	—	—	Rather windy.
River Medlock, where the water runs into a basin.	0·0367	—	„ 17	4·15	—	—	
Canal bank, Canal Street -	0·0375	—	„ 18	11·0	—	—	
Old Garratt, river bank -	0·0608	—	„ 22	11·40	—	—	
Granby Row, Crown St. -	0·0520	N.E.	„ 22	4·0	—	—	
„ „ -	0·0544	„	„ 22	„	—	—	
Scholes Street, London Road	0·0408	„	„ 22	4·50	—	—	
Devonshire Street, All Saints.	0·0343	E.	„ 23	—	—	—	
St. Mary's Gate, Exchange	0·044	W.	„ 24	—	—	—	
„ „ -	0·0375	„	Apr. 1	11·0	—	—	
„ „ -	0·0344	„	„ 1	5·0	—	—	
„ -	0·0333	„	„ 2	11·0	—	—	
„ „ -	0·0346	„	„ 2	„	—	—	
„ „	0·0364	S.E.	„ 5	12·10	—	—	
„ „ -	0·0365	„	„ 5	„	—	—	
„ „ -	0·0389	„	„ 5	5·0	—	—	

Place.	Per Cent.	Wind.	Date.	Time during Day.	Temp.	Bar.	Remarks.
St. Mary's Gate, Exchange	0·0398	S.E.	Apr. 5	5·0	—	—	
,, ,,	0·0317	N.W.	,, 11	—	—	—	
,, ,,	0·0329	,,	,, 11	—	—	—	
Back yard of laboratory	0·0399	S.E.	,, 5	2·30	—	—	
,, ,,	0·0352	—	—	—	—	—	
,, ,,	0·0312	—	,, 6	—	—	—	
Ditto, over some mud	0·0358	—	,, 6	3·0	—	—	
,, ,,	0·0415	—	,, 6	,,	—	—	
Ditto, over jar of mud	0·0433	—	,, 7	—	—	—	
,, ,,	0·0404	—	,, 7	—	—	—	
,, ,,	0·0501	—	,, 7	3·0	—	—	
,, ,,	0·0343	—	,, 7	—	—	—	
Yard	0·0353	—	,, 7	5·0	—	—	
,,	0·0387	—	,, 7	,,	—	—	

The following summary may be made of the Manchester results:—

	Average of Carbonic Acid per cent
In Manchester streets in usual weather.	0·0403
During fogs	0·0679
About middens, of which there are thousands	0·0774
Average of all the town specimens	0·0442
Fogs excepted	0·0424
Fogs and middens excepted	0·0403
Where the fields begin	0·0369
In close buildings	0·1604
Minimum of suburbs	0·0291

There may be noticed also a tendency towards increase of carbonic acid as the day advances, as if at times the ventilation could not keep down the increase of acid. This is contrary to the results in a country place. There is less after rain, and less during high winds.

Carbonic Acid on the River Thames April 1864.

Locality.	Wind.	1st Deter.	—
		Carbonic acid per cent.	
London Bridge:—			
City side	S.W.	·0354	
Middle	,,	·0383	
Surrey side	,,	·0383	
Westminster Bridge:—			
City side	,,	·0313	
Middle	,,	·0344	
Surrey side	,,	·0298	
Before the Houses of Parliament.	,,	·0329	
Lambeth Bridge:—			
City side	,,	·0329	
Mean of 10 experiments	- -	·0343	

Carbonic Acid in the Open Places of London.

Locality.	Wind.	1st Deter.	2nd Deter.
Hyde Park	S.W.	·0334	·0334
The same	S.E. from City.	·0306	·0299
Regent's Park	N.E.	·0304	·0304
St. James's Park	,,	·0285	
Duke of York's Column	,,	·0285	·0280
Highbury			
Mean of 5 experiments	- -	·0301	

Carbonic Acid in the Streets of London.

Locality.	Wind	1st Deter.	2nd. Deter.
		Carb. acid present.	
Cheapside, Post Office end.	S.W.	·0352	·0337
Outside the Exchange	,,	·0398	
Newgate Street.	,,	·0413	
Oxford Street, above Regent's Circus	E.	·0344	·0344
Lower Thames Street	,,	·0428	
Small Alley, Smithfield.	,,	·0337	
Small Court, Smithfield.		·0398	
Small Court, Upper Marsh, Lambeth.	,,	·0382	
New Cut, Lower Marsh, Lambeth.		·0413	
Top of the Monument (215 feet high.)	,,	·0398	·0405
Mean of 10 experiments	- -	·0380	
Mean of 25 experiments in London	- -	·0341	

With the aid of Dr. Bernays, of St. Thomas' Hospital, I have also obtained the amount of carbonic acid in close places in London.

CARBONIC ACID in CLOSE PLACES in LONDON.

	Per-centage by Volume.
Chancery Court, closed doors, 7 feet from ground, March 3	0·193
Same, 3 feet from ground	0·203
Strand Theatre, gallery, 10 P.M.	0·101
Chancery Court, door wide open, 4 feet from ground, 11.40 A.M., March 5	0·0507
Same, 12.40 P.M. 5 feet from ground	0·045
Surrey Theatre, boxes, March 7, 10.3 P.M.	0·111
Same, 12 P.M.	0·218
Olympic, 11.30 P.M.	0·0817
Same, 55.11 P.M.	0·1014
Victoria Theatre, boxes, 24 March, 10 P.M.	0·126
Haymarket Theatre, dress circle, 18 March, 11.30 P.M.	0·0757
Queen's ward, St. Thomas's Hospital, 3.25	0·040
Edward's ward, St. Thomas's Hospital, 3.30	0·052
Victoria Theatre, boxes, April 4	0·076
Effingham, 10.30 P.M., April 9, Whitechapel	0·126
Pavilion, 10.11 P.M., April 9 (Whitechapel)	0·152
City of London Theatre, pit, 11.15 P.M. April 16	0·252
Standard Theatre, pit, 11 P.M., April 16 (Strand)	0·320

Pettenkofer informs us that the air of Munich may be taken as containing about 0·05 per cent. of carbonic acid; with us it is certainly below this amount, and if raised to 0·05 by breathing, one would perceive it. May we conclude that such a small amount is imperceptible without organic emanations? Munich is very high; the air must sweep over the whole continent to come to it; it may wash up the carbonic acid, and, perhaps, oxidize the organic matter.

Air with even a smaller loss of oxygen is found deteriorated, if its place is occupied with carbonic acid and exhalations from the person, although we are not able to say how far this is the case when small quantities of pure carbonic acid are substituted for this small amount of oxygen.

On the Thames it is clearly seen that the open river is purer than the streets when the water is not putrid. London is freer from this acid than Manchester, although not equal to the parks in March and April, when the experiments were made. When the new sewers are complete the difference will be interesting.

These analyses indicate that a very minute amount of carbonic acid shows deterioration of air sufficient for the senses to observe. The senses observe a difference between Manchester and the outskirts. The difference is 0·0034 per cent. The senses observe it in London, where the difference between the streets and parks is 0·0040 per cent. They observe it also on the Thames and in wet weather. But they do not observe that in Munich, which has more carbonic acid than even these towns, and more than the New Cut or Lower Thames Street. The conclusion is that carbonic acid in these small amounts is not that which annoys us. In some towns it is no doubt sulphurous acid, in others organic matter and gases from putrefaction.

It does not follow that we must neglect this carbonic acid; on the contrary, it ought to be examined minutely, so that not the smallest increase be allowed if possible; not that we know certainly of any positive evil which it can do of itself in these small quantities, but because it almost always comes in bad company.

In the above analyses the air containing ·0774 is really worse than that containing ·1604, and even 0·3, because over the middens there is a little sulphuretted hydrogen. It is well then in such cases to use a double test. Indeed it is probable enough that other gases besides sulphuretted hydrogen, such as marsh gas and hydrogen products of decomposition, are issuing from cesspools and middens. I should not say probable; it is really certain. These gases, including the carbonic acid, show the reason why less oxygen should be found in such places.

I believe these analyses are of importance in the inquiry into the state of the air of mines, as they teach us the meaning of a deviation from the normal amount of carbonic acid as well as of oxygen in the air. A deviation of 0·2 is painful to us when it is caused by simple want of ventilation. If it is accompanied with gases of putrefaction it is much more hurtful, as some of these are very deadly.

These analyses teach us to be very careful not to allow the air to become deteriorated even to a very minute extent, and that a figure in the third decimal place is not to be despised; but they teach us more, namely, that in some places, such as high mountains, a slight increase of carbonic acid, such as is found in the third or even to the length of 2 in the second place, is rather a proof that the oxygen of the air has done its work well and purified the atmosphere, and that this increase is probably owing to pure carbonic acid. We have no proof of this occurring to a greater amount than 0·02. This number is taken from those observed at Munich and other places. It would be well to have those experiments of Schlagintweit confirmed, where 0·07 and 0·09 are found on high mountains. To conclude, we all avoid an atmosphere containing 0·1 of carbonic acid in crowded rooms, and the universal belief of civilized men is that it is not only odious but unwholesome. When men speak of good ventilation in dwelling houses they mean, without knowing it, air with less than 0·07 of carbonic acid.

ANALYSES OF THE AIR OF MINES.

Gases.

Before giving analyses of the air in mines, it is well to inquire into the work of our predecessors; and this, it must be confessed, is a laborious undertaking, daily becoming more oppressive for scientific men because of the want of any full arrangement of scientific facts. As time presses, and the report must be ready, it may be sufficient to mention the reasons for believing that the analyses quoted are the principal ones made public. Gätzschmann in Freiberg and Combes in France, are men who of all others may be expected to know the subject; and I feel inclined to throw on them the blame if any important collection of the analyses of air from metalliferous mines has ever been made and neglected. On the first especially I have learnt to depend, not merely on account of the greatness of his own knowledge as evinced in his writings, but also from the experience of that knowledge in conversation and by correspondence. I know he was desirous of giving all aid, from the impulses of his own nature, as well as on account of the introduction to him from Baron F. C. von Beust, who is the first officer over the Saxon

mines. To add to these, I might mention many of the most distinguished professors of Germany who would certainly have known inquiries of this kind had they existed. And no one will doubt the extensive knowledge of such men as Bischoff of Bonn.

Without going into details, it may be said that modern writers speak of bad air very much as the mining writers for three centuries have done; but where very late times are arrived at, we have the analyses of Moyle of Cornwall, and of Mr. Hunt, and to these must be added the still more recent inquiries of Dr. Brockmann of Clausthal, which seem less known, although most searching and valuable.

The only separate volume on mining air which has come before me, after advertising and inquiring, is that of Dr. Alois Wehrle, of Schemnitz, published in Vienna, in 1835. But analyses are few. When speaking of the candle, there may be more occasion to quote from him. These are some of his opinions on the air :—

"That air in which the mining candle burns dull and dark, but in which the workman feels no oppression, is called (*matte luft*) dull, flat, or stale air. But when the workman cannot keep his candle burning, it is called bad air (*schlechte lüfte* or *wetter*). A man may live in this bad air, and an Argand lamp may burn in it; but when this also goes out, and the workman feels confined (*beengt*), or when he is suffocated, then it is bad or poisonous air (*bad weather or schwaden*)."

"When the quantity of oxygen falls under 13 per cent., and is too small for the process of respiration, or when the carbonic acid amounts to 7 per cent. with several per cent. of sulphuretted hydrogen and miasmas of a peculiar kind, they communicate to the atmospheric air a property which is often very dangerous."—(Wehrle ueber die Grubenwetter, p. 6.)

Wehrle says, "the first consequence of a disturbed relation of the oxygen is that the mine candle burns darkly, and will only burn by enlarging the wick, until it at last goes out." (By enlarging the wick is meant putting the candle to the side and melting more grease, when more of the wick is laid bare. An actually larger wick does not seem essential.)

"As oxygen has a greater affinity to the ingredients of the burning material according as they are more decomposable, it follows that this phenomenon occurs sooner or later according to the quality of the substances burnt; and it is well known that tallow goes out when oil burns well, and that the common mine lamp goes out when the Argand lamp with the same oil burns clear."

"The venous blood also possesses a greater affinity for the oxygen than the carbon of the combustible substance, and a man can replace the loss of oxygen by frequent breathing, and therefore can live where candles and mine lamps go out."

p. 10. "As neither the combustible material nor the venous blood can remove all the oxygen from the air, but rather diminish it to 18 and at most to 12 per per cent., it follows that atmospheric air, the oxygen of which is to a certain degree diminished, acts towards men and candles like pure nitrogen."

p. 12. "In an atmosphere poor in oxygen, there is felt, not so much as a consequence of the presence of nitrogen, as of the absence of oxygen, contraction of the chest, tickling of the eyes, fatigue, weakness, and anxiety; we breathe more heavily and frequently, and are compelled to make more exertion at work, whilst perspiration and thirst ensue. With continued breathing, Humboldt observed paleness, hardening of the glands, herpetic eruptions, laming of the extremities, and early asthma."

Mr. P. Moyle examined the air of the Cornish mines. His results were published in the report of the Royal Cornwall Polytechnic Society in 1839, and the Annales de Ch. & de Ph. Vol. 3d, 1841. The following is the list of mines from which air was taken, and the analyses of the specimens, taken from the Annales de Chimie, and afterwards supplemented from the original.

		Oxygen.
1.	Wheal Vor.—250 fathoms from the surface, and 15 from the shaft, two men working in the cavity; air taken a few minutes after explosion	18·416
2.	Do.—16 fathoms from the shaft, 10 minutes after explosion	16·69
3.	Do.—24 fathoms from shaft, 30 minutes after firing	18·95
4.	Do.—22 fms., 30 m. after firing	17·282
5.	Do.—21 fms.	16·762
6.	Do.—Four men at dead end	14·76
7.	Do.—After firing	17·01
8.	Great Work Mine.—30 fathoms from a shaft, 15 minutes after firing	15·15
9.	Do.—20 fms., directly after firing	16·45
10.	Do.—23 fms. from shaft, half an hour after firing	17·544
11.	Binner Downs, 18 fms. from shaft, 2 men	16·764
12.	Carn Brea, 25 fms., 2 men	15·693
13	Do.—45 minutes after firing	14·51
14.	Tresavean, after firing, 65 fms. from shaft	16·35
15.	Wheal Ann, 16 fms., 2 men, no gunpowder	16·72
16.	Do. end of a level, powder not employed for some time, 45 fms., 2 men	18·22
17.	Consols Mine	17·78
18.	Do.	18·425

These figures are all the averages of several analyses. The specimens were collected by emptying a bottle of water or mercury at the spot. Water would appear to have been used in all cases, as there is a disproportionately small amount of carbonic acid, from 0·06 to 0·15. Supposing we recalculate, and give to each specimen an amount of carbonic acid equal to the oxygen removed, we should have different numbers. This amount would not be quite correct, but very nearly. Allowing the amount of nitrogen to be 79 pes cent., a number which must be within a small fraction of the truth, we may find the following change in Mr. Moyle's results :—

	Oxygen per cent.
No. 1	18·80
2	17·44
3	19·34
4	17·95
6	15·74
7	17·71
8	16·09
9	17·23
10	17·86
11	17·55
12	16·57
13	15·51
14	17·14
15	17·46
16	18·74
17	18·37
18	18·91
Mean	17·55

Mr. Moyle says that the lights burned with difficulty in No. 6 specimen; I have not found that candles could burn in such air.

These analyses are the only series made in this country, and the largest hitherto made anywhere, on the air of mines. Hausmann found in one of the Harz mines 13 per cent. of oxygen. It is, however, an extremely laborious operation to seek out the literature of any scientific subject, and I doubt if I shall have time to exhaust this branch before the date when this report must be written. It certainly will be no pleasure to me to neglect the labours of any man. I believe we must come to very late years, viz. 1851, to find another inquiry of equal authority with that of Moyle's, although not of equal extent. This was made by Dr. Brockmann, with the aid of a young chemist deceased, named Bodemann. Brockmann, who lives at Clausthal, in the Hanoverian Harz, will be quoted largely elsewhere as well as here, being especially a student of and an authority on the condition of mines and the diseases of miners.

These analyses, by "Bodemann, assayist," were published in the *Bergwerk's Freund* (*Miners' Friend*), vol. 8. No. 11,* and by Dr. Brockmann in his work on the diseases of the Upper Harz.

1st Analysis.

Air from Eleonora Mine. Place, 6th level, 220 fathoms deep, 1 fathom high, and 1 broad; 120 from shaft, 80 from the nearest winze; the rock not a very hard clay slate. Two men had worked from 4 to 9 in the morning, and at 6 o'clock 3 holes were bored; at 9 o'clock, 2.

The air was taken about 3–4 minutes after firing the last of the holes, and at the spot. There were 6 men with 6 candles present at the time. There was a west-north-west wind, a favourable one for the ventilation of the Upper Harz mines. The average of four analyses is—

1·86 less oxygen than normal air.
1·8042 carbonic acid converted into volume, or 2·7496 by weight per cent.

2d Analysis.

Air from pit Queen Charlotte, 80 fathoms from the nearest inside shaft or winze, 500 fathoms from the nearest shaft; 60 fathoms from a draught of air; The place was 200 deep; very moist, and with water on the ground. No ventilators used. Tallow candles were not extinguished, but oil lamps burned badly.

Two men had worked since 4 in the morning, At 7.30 o'clock two holes were fired, then two more; and half an hour after, that is 8.15 o'clock, the air was taken.

1·94 per cent. less than normal oxygen.
1·7781 carbonic acid by vol.
2·6975 by weight.

3d Analysis.

From Queen Charlotte Pit, 135 fathoms deep, 40 from draught; wet ground; may be taken as the representative of an ordinarily well-ventilated place.

0·73 less than normal oxygen.
1·0418 carb. ac. by vol.
1·5874 „ „ weight.

4th Analysis.

Duke William Mine, 289 fathoms down, 100 from draught; wet ground, 3–4 inches water. The ventilator was removed for 4½ days.

Air taken at 10 o'clock after 4 holes had been fired, two men having worked since 4 o'clock. On the previous day two men had worked from 4 to 12, and fired six holes. The day before that two men had worked from 6 to 12, and fired four holes, having 2 ounces of powder.

2·29 per cent. less than normal oxygen.
2·3794 carb. ac. by vol.
3·6262 „ „ weight.

5th Analysis.

Air from Wilhelm's Shaft, 5 fathoms from bottom, or 310 deep; active circulation of air.

0·45 less than normal oxygen; carbonic acid wanting.

6th Analysis.

Air from Caroline Shaft, 157 fathoms deep, before beginning the week's work:

0·29 less than normal oxygen.
0·64748 carb. ac. by vol.
0·9867 „ „ weight.

7th Analysis.

After the week's work:

0·21 less than normal oxygen.
0·7241 carb. ac. by vol.
1·1035 „ „ weight.

8th Analysis.

From the same after a week's work:

0·51 less than normal oxygen, wanting carbonic acid.

From these results Dr. Brockmann says we have—

Carbonic acid, by volume, 1·1964 per cent.
„ 1·8214 „

The mean of oxygen is 19·785, and taking the amount in the atmosphere at 20·815 we have a diminution of 1·030 per cent.; this is where ventilators have been used. Averaging these analyses in the manner adopted with the former we have:—

	Oxygen.	Carbonic acid.
No. 1. -	18·955	1·8042
2. -	18·96	1·7781
3. -	20·085	1·0418
4. -	18·525	2·3794
5. -	20·365	?
6. -	20·525	0·6474
7. -	20·605	0·7241
8. -	20·305	?
Mean -	19·790	1·396

Each line gives the mean of from two to six analyses, making the whole number 29.

Moyle's figures are also means of several trials. It would have been better in both cases to have had the separate items.

These analyses show a very bad condition of the atmosphere in the Harz mines, but a still worse in the mines of Cornwall. I confess myself inclined to think that the figures given by Mr. Moyle for oxygen are rather too low; but the reasons,

* Die Krankheiten des Oberharzes, von Dr. Karl Heinrich Brockmann, p. 30.

founded on the numerous results obtained by myself, must not be taken as conclusive that Mr. Moyle has made any error; it may be that he has been more choice in his spots. One circumstance, however, speaks strongly against his analyses: A candle will not burn in air with less than 18 per cent. of oxygen, when there is 3 per cent. of carbonic acid. Twenty-five years have greatly changed our ideas of the purity of air, and I was informed by Cornish miners that they have worked in spots where it was impossible to remain above ten minutes at a time, and when nearly every man fell down overcome, and the candles went out. Nevertheless, they went to their work and took their turns. This occurred when working upwards to meet a winze which was also being worked downwards. Mr. Moyle has, no doubt, sought such extreme cases, not to be obtained at will, and he had a right to choose such places because the men were at any time liable to be exposed to their influence. Such, at least, would explain a considerable depression of the oxygen. At the same time we must not forget that the habits of men have changed much in many places; and when I saw the holes through which some of the older miners occasionally burrowed in the Harz I was prepared for a worse state of things at a previous period. Looking now at Mr. Moyle's results, from the experience gained in the lead chamber to be afterwards mentioned, there is no difficulty in concluding that they represent very rare conditions of the atmosphere even in mines. A man may live awhile in most of the air, as thus represented, but long I believe he cannot live. I feel strongly inclined to doubt if he can exist in air, such as No. 6, 12, and 13. But with great lungs and great strength perhaps it may be possible. Healthy men and women, of various ages, were found in the lead chamber unable to bear such a loss of oxygen. I read in a lecture by W. Mackworth, Esq., R.E., that Mr. Robert Hunt, F.R.S., found 17·6 of oxygen in the average air of the Consolidated Mines, whilst the average of eighteen samples of air from different Cornish mines yielded 17 per cent. and of six others 19 per cent. of oxygen. I fear I have not seen all the labours of Mr. Hunt on this subject.

Method of Analysis.

It has already been shown why especial importance was attached to the oxygen and carbonic acid of the air, although it was not believed that their presence or absence to the extent of a half per cent. or even one per cent. would have a direct action which could be at once perceived by the senses.

To obtain specimens for analysis tubes of about ¾ of an inch (nearly 2 centimetres) in diameter were used, the length being six inches. They are drawn out at each end, and a fine tube 1½ inch in length is left attached. Near the junction of the fine and the wide tube is a very narrow neck. They are in fact made after Professor Bunsen's model. The air is drawn through the tube until it is filled; and by the use of a candle and blowpipe the neck is melted and the specimen of air hermetically sealed up, so that it may be preserved for ages unaltered, as far as we know. Fig. 2 shows the tube with the pump attached, ready to be filled, and the tube before sealing. Beside it is the tube sealed. Fig. 3 shows another method with an elastic ball pump. The candles in many instances burned very badly and gave little heat

Fig. 2.

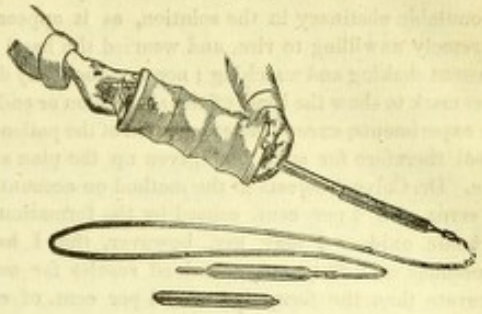
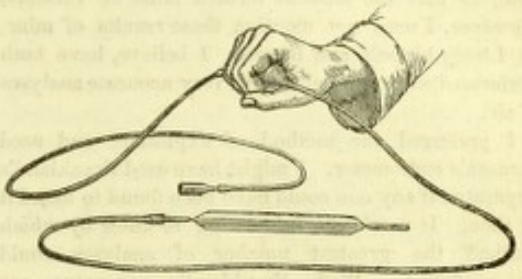


Fig. 3.



so that the act of sealing was difficult, and sometimes a failure. For this reason it will be seen that there are many numbers which have not the analyses attached, as it was found that the tubes leaked. In these cases the air may have been equal to that mentioned by Mr. Moyle, so that the worst are left out of my list. It may even happen that this is the reason for some specimens receiving a better character than they deserve, as the leak may not have been discovered. Most of the specimens were kept a few weeks before examination, some a few months; and minute leaks would be effective in that time in rendering the inside air equal to that outside, although that small leak might not be discovered during the short continuance of an experiment. At first the tubes were examined simply with the eye or a lens to see that the points were melted, afterwards they were dipt into mercury; if any leak existed, it was betrayed by the existence of a drop or more of the mercury entering the tube. If the tube is well handled in sealing, the lens is the best test. The tube was broken at one end under the mercury, and the air transferred to an absorption tube. In this graduated tube the amount of carbonic acid was taken, by absorption with moist balls of caustic potash. When the balls were moist it did not require quite an hour to complete the absorption in wide tubes; an hour and a half, however, was always the least given, whilst one set of tubes stood all night. There was no difference found between those which were done in the middle of the day and those which were begun on leaving the laboratory and kept to stand a night. As the number of analyses was very great, it became important to ascertain the readiest mode of going rapidly over them with accuracy. I had never been called on to prepare an amount of analyses at all approaching to the number now before me, and was a little alarmed. I began with the method of my master, Liebig, and obtained in many cases good results; but I confess to being very much annoyed with the endless washings required in order to remove the caustic solution of pyrogallic acid, a strongly-coloured liquid, from the tubes and from the mercury. Besides these

troubles there was observed occasionally an unaccountable obstinacy in the solution, as it appeared extremely unwilling to rise, and wearied the hand by constant shaking and watching ; nor was there any distinct mark to show the limit of the absorption or end of the experiments, except the exhaustion of the patience. I had therefore for some time given up the plan as a rule. Dr. Calvert objects to the method on account of an error of 0·4 per cent. caused by the formation of carbonic oxide. I may say, however, that I have sometimes and frequently obtained results far more accurate than the formation of 0·4 per cent. of carbonic oxide (See Dr. Calvert's paper, Proceedings of the Lit. and Phil. Soc. of Manchester), would indicate, so that the amount formed must be variable. However, I need not mention these results of mine, as Liebig himself and Bunsen, I believe, have both performed with pyrogallic acid very accurate analyses of air.

I preferred the method of explosion, and used Bunsen's eudiometer. I might have used Frankland's apparatus if any one could have been found to mend it in time. It would be interesting to know by which method the greatest number of analyses could be produced. With Frankland's apparatus one gas only is analysed at a time, but it is done very rapidly. I used five or six eudiometers at once. For obtaining a spark various methods had been frequently tried. At one time for a while I was satisfied with the rosin electrophorus, but from the moisture of the climate it frequently became extremely difficult to carry to another room as much electricity as would cause an explosion, and no spark could be had except before a fire. Bunsen's tube was greedily sought, as a very simple method, and in dry weather acted well, but became at times quite useless, so that whole days were spent in obtaining a spark. A small electric apparatus was got, and then a large one was used, but both required peculiarly warm rooms, and sometimes in wet weather the mere opening of a door would render useless the machine for a considerable time, although one had a plate of about 18 inches diameter. It was then clear to me that to work with any comfort a battery and a Ruhmkorff's coil were necessary. With this apparatus the amount of work was multiplied by five at least, and made into a pleasure instead of a pain. The battery used was made of cast iron and zinc. It was, perhaps, unnecessarily large; there were 12 plates of cast iron, and 24 of amalgamated zinc of 6 inches square. This battery has been some years in my possession ; the plates have never been renewed, and they are as smooth as at the beginning, although now becoming thin. It is lifted up and down into the cells by a pulley, so that the plates are only a few seconds at a time in the acid when a gas is to be exploded. After doing the usual experiments of a laboratory for a few years, it was set down to the induction coil about three years ago, and in that period, without special cleaning, and merely by a change of acid once in six months, it has exploded perhaps two to three thousand gas mixtures, besides being used occasionally for decomposing water. It makes us independent of weather.

My assistant at the time, being little accustomed to the use of this apparatus, preferred pyrogallic acid, and I was willing that he should take his experience, which ended in results similar to my own ; at the same time I am bound to confess that quietness and patience produced better results. Still that quiet and that patience could not be found with 500 analyses waiting before us. It was in fact necessary to work on a scale and by a method where the feelings would be completely excluded, and the mechanism of the operation be responsible for the exactness. This point, I believe, was attained, with gain in time, in comfort and in accuracy ; when I say in accuracy, I do not mean that there is an actual increase of accuracy, but in the number of experiments which were not failures. The analyses that are spoilt by the explosion method are very few, and were in reality at the latter part of the enquiry reduced to almost nothing.

Measure of the Accuracy of the Analyses.

At this stage it is necessary to enquire into the character of the results from which the conclusions are drawn.

I shall cite all the duplicate analyses from one volume of notes, containing the analyses of air from Welsh mines, and a few others, taking them exactly as they come, leaving none out.

Mark.		Oxygen, 1st.		Oxygen, duplicate.
W 53	-	18·60	-	18·74
25	-	20·89	-	20·96
77	-	20·82	-	20·79
64	-	20·52	-	20·61
76	-	20·96	-	20·85
16	-	20·49	-	20·48
60	-	20·73	-	20·67
52	-	19·58	-	19·60
43	-	20·25	-	20·17
37	-	20·64	-	20·76
39	-	19·96	-	19·86
W 55	-	20·47	-	20·52
W 58	-	20·36	-	20·29
121	-	20·79	-	20·90
116	-	19·70	-	19·54
W 16	-	20·44	-	20·34
W 17	-	20·42	-	20·38
D	-	20·73	-	20·56
D 10 top	-	20·09	-	20·50
D 47	-	19·09	-	19·00
D 8	-	20·55	-	20.55
		22) 446·50		22) 446·54
		20·29		20·29

Here we have the average of both columns, absolutely the same to the 2d decimal place, the farthest distance to which it is attempted to go, and farther after all than with absolute certainty we can at all times pretend to go. Of course it is clear that in individual analyses some errors must occur, as in D 10 top ; but these errors equalize themselves, and unless they were small and very regular they would not do so. That the two sets of analyses should be so near as in the columns above, is the utmost that can be desired, especially as it is after all true that we are apt to be more careless about a duplicate, although it is far from wise to be so ; the first may be considered as the real analysis, and the second merely to show that no gross error has been made.

Pursuing further the enquiry into the accuracy of the numbers, we may put the question in this form. How great is the departure from 21 per cent. shown in specimens of good air, and inferior air such as is found at ash-pits? 21 is used here simply as a convenient whole number, without any theory to exalt it.

Departure from the number 21.

Good Air.		Impure Air.	
0·10	0·02+	0·20	0·44
0·04	0·12	0·15	0·21
0·02	0·09	0·21	0·36
0·10	0·08+	0·28	0·06
0·10	0·04	0·13	0·33
0·02+	0·08	0·24	0·47
0·04	01	0·41	0·29
0·22	05	0·15	——
0·17	02	0·10	7·34 Total.
0·09	01	0·79	——
0·08	01	0·42	·293 Average.
0·13	06	0·26	
0·02+	——	0·60	
0·00	2·25 Total	0·27	
0·17	——	0·01	
0·02	·065 Average	0·30	
0·12	Subtracting	0·12	
0·01+	those with	0·54	
0·13	a sign of +		
0·08			

This is the same result as given before, but the numbers in this form, when bared of all their superfluous bulk, show more strikingly the change from pure to impure air. It must, however, be remembered that this is such air as all persons are at times compelled to breathe. The impure air, such as is found about middens, and in waterclosets, actually contains less oxygen than the pure air. The pure air deviates from 21 per cent. by 0·065; the air of these places spoken of, by 0·295. This illustrates further my reason for using the oxygen as an indication of pure air, although not the only one.

In all analyses, and in all work generally, tendency to error is in one particular direction more than in any other; this tendency may depend on peculiarities of the individual or of the conditions of the work. The tendency in these is towards an increase of the oxygen. If the hydrogen which is mixed with the air is not free from oxygen, the air has the benefit of the mistake.

Some of the analyses, about 80, beginning from about No. 60, were made with hydrogen obtained by throwing sodium amalgam into dilute sulphuric acid. This gas was very pure. The amalgam was made so as to be a pretty firm paste, and sulphuric acid with about three times its bulk of water was heated and cooled. The first bubbles were allowed to pass away, after throwing the amalgam into the water lest some air might be taken. 76·22 of this gas exploded with water-gas still gave on calculation 76·22, and with time the manipulation becomes pleasant. The gas stood in a tube ready for use. It was not found practicable to prepare by galvanic methods so much hydrogen as was required. Afterwards, more for the convenience of others than myself, zinc was used, a quantity of unusual purity having accidentally been found some time ago. And whilst I place the fullest confidence in the oxygen as being correct to a small fraction, the same minute accuracy cannot be expected of the carbonic acid, although on taking the average the amount of the gas agrees so well with the amount + the carbonic acid from the powder smoke, that the error must be trifling. The estimations of carbonic acid made elsewhere than in mines are not subject to any error except that of the operator; and this has been reduced to an amount that may be called nothing. The reason that the carbonic acid in these tables is in some cases not so minutely ascertained as the oxygen is this: the amount being extremely small and the total amount of air being extremely small, there was more risk of error. In other cases where the carbonic acid can be estimated at the spot in large bottles, any extent of accuracy may be attained.

The Air of Mines. Analyses.

The numbers indicating the amount of crystalline matter are arbitrary, 10 meaning that the whole tube was dusted with crystals; 0·1 meaning that it was just possible to find a small one with a magnifying power of 60 diameters. When no mark is made the tube was not examined.

Air normal or nearly so, represented by Italic figures, *e. g.*, *20·9*
Air less pure or decidedly impure, „ Clarendon „ **20·6**
Air extremely impure or dangerous, „ Antique „ **20·5**
Italics in the "Carbonic Acid" column mean probable amount, not actual analysis - - - - } *0·6*

Carbonic acid of pure air not above 0·04 per cent.

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
1	Rampgill - -	—	300 ft.	End, 6½ ft. wide, 4½ ft. high -	2 hours after shot	68°	2	**20·4**	*0·6*	0·6	—	Ventilated by fan blast.
2	„ -	—	—	Large cavity, 18 ft. high and 22 ft. wide.	- - -	60	8	**20·60**	0·73	0·4	0	
3	Long Clough -	—	—	Large cavity, 20 ft. high -	- - -	60	5	**20·84**	*0·16*	0·16	—	
4	„ -	—	42 ft.	In vein, 6 ft. wide, 20 ft. high	- - -	61	4	**20·62**	0·27	0·38	1	
5	„ -	—	—	In driving at an end, 16 ft. high.	15 minutes after shot	61	5	**19·94**	0·76	1·06	—	About 4lbs. of powder had been fired that morning.
6	Rodderup Fell -	—	—	Sinking shaft 10 fms. deep from level, 9½ ft. diam., bratticed.	- - -	58	4	*21·04*	0·48	0·04+	0	Here were men working in water; temperature of water 54°.
7	„ -	—	24 ft.	End, 9 ft. high, 6 ft. wide -	15 minutes after shot	57	4	*20·9*	*0·1*	0·1	4	Branching crystals.
7a	„	—	—	- - - -	- - -	—	—	**20·66**	*0·34*	0·34	0	
9	„	—	—	End of level - - -	2 hours after shot -	62	4	**18·80**	2·06	2·20	1	Faggots of little prisms.
10	„ -	—	—	In draught, stope above level -	- - -	64	4	**20·28**	*0·72*	0·72	—	
11	„ -	—	—	Ditto, in level 6 ft. wide -	- - -	59	—	**20·66**	0·19	0·34	—	
12	„ -	—	—	Top of rise, level above not communicated.	- - -	60	6	**20·76**	*0·24*	0·24	0·5	
13	Cashwell - -	—	—	42 ft. from end, level 4½ ft. wide, 5 ft. to 9 ft. high.	- - -	61	4	**20·19**	0·70	0·81	—	Heaps of mineral in level.
14	„ -	—	In current	- - - -	- - -	57	4	**20·34**	*0·66*	0·66	0	
15	„ -	—	78 ft.	- - - -	- - -	61	4	*20·95*	0·05	0·05	?	
16	„ -	—	In current	In current - - -	- - -	55	2	**20·64**	0·25	0·36	—	
17	Garrigill - -	—	In current	End - - - -	- - -	54	4	**20·79**	0·21	0·21	—	

18	Allenhead's Mine, West Henry's Vein.	—	—	120 ft. from rise	- - -	66	6	Broken	—	—	0	
19	„	—	—	30 do.	- - -	66	—	19·01	2·35	1·99	0	
20	„	—	—	In direct current	- - -	63	—	20·20	0·80	0·8	—	Furnace ventilation.
21	„	—	—	In a rise 30 fms. high, bratticed: top 6 ft. above brattice.	- - -	66	2	19·09	*1·91*	1·91	—	Do. do.
22	„	—	72 ft. from winze.	- - - -	- - -	66	—	Broken	—	—	0	
23	„	—	90 ft. from winze.	- - - -	- - -	78	—	20·22	*0·78*	0·78	0	
24	East part Henry's Vein.	—	72 ft. from rise.	End in large cavern, 18 fms. wide and 8 ft. high.	- - -	66	—	20·292	*0·708*	0·708	numerous.	
25	„	—	—	Ditto	- - -	69	—	20·8	*0·2*	0·2	0	No shots for several days.
26	„	—	—	Ditto	- - -	67	—	20·87	0·747	0·13	?	Do. do.
27	„	—	—	Rise 18 ft. high	- - 1 hour after shot	70	2	18·27	*2·73*	2·73	?	
28	„	—	—	In level	- - -	67	—	19·3	*1·7*	1·7	?	
29	Greenlaws	—	—	240 ft. from rise, 6½ ft. high, 4½ ft. wide.	- - -	57	4	*21·*	0·0	0·0	0	Air must have been blowing here.
30	Settlingstone	—	—	End of level, 36 ft. from rise, 6½ ft. high, 4½ wide.	- - -	59	6	20·47	*0·53*	0·53	0	Very dry.
31	„	—	—	End of level, 150 ft. from rise, 6 ft. high, 4 wide.	- - -	58	—	Broken	—	—	0·1	
32	Grinton Moor	—	—	End, 150 ft. from shaft	- - -	51	3	*21·*	0·0	0·0	0·2	
33	„	—	—	Opening at bottom of sump, 3 fms. below level.	- - -	53	7	20·85	*0·15*	0·15	0·1	Two samples from this end.
33a	„	—	—	- - - -	- - -	—	—	20·23	0·75	0·77	—	
34	Surrender	—	—	In a sinking stope below level, 30 ft. long, 18 ft. wide.	- - -	51	—	20·79	0·	0·21	3	
34a	„	—	—	Do. do.	- - -	—	—	20·23	0·64	0·77	—	
35	„	—	—	End, 240 ft. from rise	- - -	57	—	20·17	1·04	0·83	4	Air machine.
36	„	—	—	Just under shaft in adit level	- - -	48	—	*20·89*	0·13	0·11		
36a	„	—	—	End of level, 72 ft. from shaft.	- - -	—	—	20·36	0·6	0·64	—	
*37	Botallack Crowns Lode.	190	—	In direct current	- - -	75	—	20·84	0·53	0·16	0	Smells of tallow.
*37a	„	—	—	Do.	- - -	—	—	20·64	0·22	0·36	—	Two samples taken.
*38	„	190	—	End, 60 ft. from rise	- - -	78	2	20·88	0·11	0·12	0	
*39	„	190	—	End, 84 ft. from rise	- - -	87½	2	19·96	*1·04*	1·04	0·5	Smells of perspiration.

* These samples, 37 to 39, show the difference of the air when a long distance from current.

Analyses of the Air of Mines—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crysals observed in the tubes.	Remarks.
40	Botallack Crowns Lode.	166	—	Stoping in level - -	- - -	77°	2	**20·82**	*0·18*	0·18	1·	
41	Huel Cock - -	125	—	Stoping, back of level, good current.	- - -	65	2	Leaking tube.	—	—	0·1	
42	„ -	142	—	Do. do. - -	- - -	71	6	**20·83**	*0·17*	0·17	0·5	
43	„ -	180	—	In current - - -	- - -	—	—	Broken or lost.	—	—	0·5	
44	„ -	180	—	End 180 ft. from rise. -	- - -	76	2	**20·40**	0·90	0·6	0.1	
45	Huel Hazard - -	85	—	In current. - - -	- - -	62		*21·*		0·0	0	
46	„ -	85	—	120 ft. from rise, dry. -	- - -	67		**20·11**	0·50	0·89	1·5	
47	„ -	85	—	360 ft. from rise, wet.	- - -	—	1	**20·84**	0·31	0·16	0·1	
48	Huel Call -	30	—	End 42 ft. from rise, 6 ft. high by 2½ wide, hard granite, wet.	- - -	62	1	**20·73**	0·42	0·27	0·2	
49	„ -	85	—	End of level, 42 ft. from rise, granite, dry.	- - -	67	2	*20·96*	*0·04*	0 04	0·5	
50	Wheal Owles Buzza Mine - -	50	—	End of adit, 480 ft. from rise, wet .	- - -	63	2	**20·04**	1·24	·96	1·0	Level nearly choked with deads, only 2 ft. clear.
51	,, -	50	—	End of cross cut, 420 ft. from rise, wet.	- - -	63	1	**19·93**	1·43	1·07	0·1	
52	„ -	50	—	End 96 ft. from rise, dry -	- - -	60	2	**20·47**	0·92	0·53	0·0	
53	Levant - -	150	—	End 690 ft. from current, 7 ft. high, 3 ft. wide, hard ground, killas.	1 hour after shot	75	2	**20·75**	0·42	0·25	4·0	
54	„ -	150	—	End 660 ft. from current, 7 by 3 ft.	- - -	73	2	**20·11**	1·25	0·89	—	
55	„ -	150	—	End 1080 ft. from current, 8 by 3½ ft.	- - -	78	2	*21·0*	*0·0*	0·0	—	
56	„ -	170	—	Stopes, 180 feet from winze -	- - -	82	8	**20·53**	1·05	0·47	0·1	
57	„ -	170	—	End 540 ft. from winze, 9 by 5 ft.	- - -	83	2	Broken.	—	—	—	
58	„ -	170	—	Stopes 48 ft. from current -	- - -	73	2	*21.00*	*0·0*	0·0	Large but few	
59	Balleswidden -	130	—	Stopes - - - - -	- - -	72	2	**20·14**	1·59	0·86	4	
60	„ -	140	—	End 7 ft. by 4 ft., smoky -	- - -	73	2	**19·83**	1·03	1·17	—	Smoky.

61	Balleswidden -	—	140	Rise, 6 ft. high - - -	- - -	73	2	*20·93*	0·06	0·7	—	
62	Wire Gill -	—	—	Stopes - - -	- - -	—	—	**20·40**	0·64	0·6	4	
63	„ -	—	—	End - - -	- - -	55	2	*20·96*	0·017	0·04	0·5	
64	„ -	—	—	End of level, 780 ft. from current. In shale - -	20 minutes after shot	60	2	**20·82**	0·59	0·18	0	Ventilated by water blast.
65	Hurst - -	—	—	End 300 ft. beyond a rise, 9 ft. high, 7 ft. wide.	- - -	—	2	—	1·99	—	0	
68	Old Gang -	—	—	End of level - - -	- - -	—	2	**20·58**	0·48	0·42	3	
69	„ -	—	—	End of level - - -	- - -	—	2	—	0·28	—	0	
70	„ -	—	—	Rise 7 ft. high, 132 ft. from current.	- - -	—	2	**20·25**	0,39	0·75	0·1	Air machine. Hand fan, 4 in. pipes.
71	Grassington -	60	—	End of cross cut, 480 ft. from rise.	- - -	—	2	*20·94*	*0·06*	0·06	—	Unusual amount of dust.
72	„ -	—	—	End, 480 ft. from rise - -	- - -	—	2	**19·53**	1·59	1·47	3	
73	„ -	—	—	Rise, 60 ft. high: in shale -	- - -	—	2	**19·52**	1·72	1·48	0·1	
74	„ -	—	—	End, 60 ft. from rise - -	- - -	—	2	**20·47**	1·06	0·53	0·1	
75	„ -	—	—	End, 840 ft. from rise - -	- - -	—	2	**20·08**	0·94	0·92	5	These were chiefly hexagons.
76	Habden Moor -	—	—	End, 150 ft. from rise - -	- - -	—	2	**20·79**	*0·21*	0·21	0·1	
77	Cononley - -	—	—	Pitch in back of level, 7 ft. high, 15 wide.	15 minutes after shot	—	3	**20·84**	0·59	0·16	2·	
78	„ -	—	—	Winze, 15 ft. below level -	40 minutes after shot	—	2	**20·54**	0·37	0·46	1·	
79	„ -	—	—	Pitch in back of level, 18 ft. high, 18 ft. wide.	- - -	—	4	**20·05**	0·66	0·95	3·	
80	„ -	—	—	Rise, 42 ft. high - -	- - -	—	2	**19·27**	1·84	1·73	3·	
99	- - -	—	—	- - - -	- - -	—	—	Not come to hand		—	—	
100	- - -	—	—	- - - -	- - -	—	—			—	--	
101	South Frances -	104	—	End, 90 ft. beyond winze -	- - -	—	2	*20·95*	*0·05*	0·05	1	
102	„ -	—	—	Pitch, 12 ft. high, 3 ft. wide -	- - -	—	2	**20·12**	0·99	0·88	--	
103	„ -	114	—	End, 180 ft. from shaft, 7 ft. by 4 ft.	- - -	—	2	**19·96**	0·75	1·04	2	
104	„ -	124	—	End, 120 ft. from winze, wet -	- - -	—	2	**20·05**	0·95	0·95	--	
105	„ -	50	—	End, 180 ft. from shaft, choked	- - -	—	2	**20·48**	0·42	0·52	3	
106	„ -	60	—	End, 90 ft. beyond rise, 7 ft. by 3½ ft.	- - -	—	2	**20·54**	0·45	0·46	—	

Analyses of the AIR of MINES—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Ozygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
107	South Frances -	70	—	End, 12 ft. from current -	1½ hours after shot	° —	2	**20·37**	0·72	0·63	8	
108	„ -	80	—	End, 120 ft. from winze -	- - -	—	2	*21·06*	*0·0*	0·06+	—	Ventilated by double duck machine.
109	„ -	94	—	End, 42 ft. from air - -	- - -	—	2	**20·36**	0·84	0·64	2	The men had left work.
110	„ -	94	—	End of cross cut, 300 ft. from rise.	1½ hours after shot	—	2	**20·65**	0·46	0·35	5	Double duck machine.
111	Dolcoath - -	314	—	Bottom of shaft - -	- - -	—	—	*20·99*	0·05	0·01	3	
112	Huel Harriet -	130	—	End, 36 ft. from shaft, 7 ft. by 4 ft.	- - -	—	3	**20·75**	0·21	0·25	—	Hard granite.
113	„ -	—	—	End of cross cut 18 ft., beyond winze.	- - -	—	2	**20·00**	0·97	1·0	2	Winze choked.
113a	- -	—	—	- - - - - - -	- - -	—	—	—	—	—	5	
114	-	—	—	Stopes above 100 fm. level -	- - -	—	16	*21·00*	0·10	0·0	—	
115	„ -	—	—	End cross cut 240 ft. in -	- - -	—	2	broken or leaking.	—	—	—	
116	Carn Camborne -	13	—	End, 150 ft. from winze -	- - -	—	2	**19·70**	1·37	1·3	0	
„								**19·54**	1·37	1·46	0	
117	„ -	13	—	End, 36 ft. from rise, 7 by 4 ft.	- - -	—	—	**20·72**	0·29	0·28		
117(2)	- - - -	—	—	- - - - - - -	- - -	—	—	—	—	—	—	
118	- - -	—	—	- - - - - - -	- - -	—	—	broken or leaking.	—	—	—	
119	- - -	—	—	- - - - - - -	- -	—	—	broken or leaking.	—	—	6	

120	Tolcarne	—	—		—	—	—	—	**19·81**	0·91	1·19	1	
121	„	40	—	End, 78 ft. from shaft	—	—	—	2	**20·79**	0·21	0·21	1	
121(2)		—	—		—	—	—	—	*20·99*	*0·1*	0·1		
122	„	40	—	End, 240 ft. from winze	—	—	—	2	**20·49**	0·69	0·51	0·1	
123	„	—	—		—	—	—	—	broken or leaking.	—	—	2	
124	„	—	—		—	—	—	—	broken or leaking.	—	—	0.5	
125		30	—	End, 126 ft. in	—	—	—	2	**20·04**	0·97	0·96	—	
126	„	—	—		—	—	—	—	broken or leaking.	—	—	0	
127	„	20	—	End, 120 ft. from winze	—	—	—	2	**20·88**	0·06	0·12	2	
128	Wheal Friendship	—	—		—	—	—	—	**19·32**	1·15	1·68	—	
128(2)	Tolcarne	20	—	End, 36 ft. in	—	—	—	—	**20·29**	0·51	0·71	—	
129		—	—		—	—	—	—	—	—	—	—	
130		—	—		—	—	—	—	*20·99*	0·03	0·10	—	
D 1		—	—		—	—	—	—	broken or leaking.	—	—	—	
D 2		—	—		—	—	—	—	**20·60**	0·38	0·4	—	Has a smell of mouldiness.
D 3		—	—		—	—	—	—	broken or leaking.	—	—	—	
D 4	Crelake	52	—	End, 144 ft. from rise	—	—	—	2	**19·82**	1·05	1·18	2	
D 5	„	52	—	Rise, in current	—	—	68	—	*20·96*	*0·04*	·04	—	
D 6	„	40	—	End, 576 ft. from shaft	—	—	66	—	broken or leaking.	—	—	—	Ventilated by waterfall.
D 7		—	—		—	—	—	—	no account of it.	—	—	—	
D 8	„	24	—	End, 96 ft. from winze	—	—	—	2	**20·55**	0·23	0·45	—	
D 9	„	12	—	Rise, 24 ft. high, no current	—	—	—	2	**19·98**	0·97	1·02	1	
D 10	„	12	—	End, 24 ft. from shaft	—	—	—	—	**20·09**	0·60	0·91	0	Top.
D 11	Sortridge Consols	30	—	End of level	—	—	—	2	**19·86**	0·92	1·14	some	
D 12	„	40	—	End, 240 ft. from shaft	—	—	—	4	**19·54**	1·26	1·46	—	
D 13	„	40	—	End	—	—	—	—	**20·82**	0·86	0·18	—	

Analyses of the Air of Mines—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
D 14	Sortridge Consols -	40	—	End, 660 ft. from air -	- - -	° —	4	broken or leaking.	—	—	1	
D 15	„ -	50	—	Cross cut - -	- - -	—	4	**20·72**	0·13	0·28	0·5	
D 16	„ -	50	—	End 660 ft. from air -	- - -	—	—	**20·70**	0·10	0·30	?	Top.
Do.	„ -	—	—	- - - -	- - -	—	—	**20·87**	0·14	0·13	—	Bottom.
D 17	„ -	50	—	End 420 ft. from current -	- - -	—	4	**19·43**	1·30	1·57	—	Bottom.
Do.	„ -	—	—	- - - -	- - -	—	—	**20·27**	0·80	·73	—	Top.
D 18	„ -	—	—	- - - -	- - -	—	—	No tube corresponds to this number it is believed.			—	
D 19	„ -	—	—	- - - -	- - -	—	—	Do.	do.		—	
D 20	„ -	—	—	- - - -	- - -	—	—	Do.	do.		—	
D 21	„ -	—	—	- - - -	- - -	—	—	Do.	do.		—	
D 22	Wheal Friendship	—	—	Cross cut, 300 ft. from current	- - -	66	6	**20·67**	0·22	0·33	—	
D 23	„ 100 East	100	—	End, 240 ft. from draught -	- - -	60	6	**19·99**	0·95	1·01	—	Ventilated by door and pipes.
D 24	„ -	70	—	End, 120 ft. from winze -	- - -	61	4	Cannot find it.		—	—	
D 25	„ 80 East	80	—	End, 240 ft. from winze, 180 ft. from trapdoor.	- - -	65	6	**19·40**	1·50	1·60	0·1	
D 26	„ -	80	—	Cross cut, 72 ft. from current	- - -	65	2	**19·55**	1·39	1·45	—	
D 27	„ -	100	—	End, 60 ft. from winze -	- - -	66	6	**18·80**	1·37	2·20	—	
D 28	„ -	100	—	End, 57 ft. from winze -	- - -	66	6	**20·80**	0·27	0·20	3	
D 29	East Gunnislake -	36	—	End, 468 ft. from winze -	- - -	—	—	**19·57**	1·33	1·43	4	Air pump worked by engine rod.
D 30	„ -	12	—	Bottom of shaft - -	- - -	—	—	**20·08**	0·89	0·92	—	
D 31	„ -	12	—	End, 42 ft. from shaft -	- - -	—	—	**20·30**	0·80	0·70	—	
D 32	„ -	—	—	Adit end, 96 ft. from shaft -	- - -	—	—	**20·76**	0·34	0·24	—	
D 33 See at end of D.	Okel Tor -	80	—	End, 300 ft. from winze -	- - -	—	2	**19·22**	1·79	1·78	8	
D 34	„ -	65	—	End, 24ft. from winze -	- - -	—	2	**20·76**	0·74	0.24	—	

D 35	„	-	—	—	- - - -	-	-	-	—	—	20·51	0·31	0·49	—	
D 36	Huel Edward	-	98	—	Bottom of shaft -	-	-	-	—	3	20·73	0·34	0·27	0	
D 37	„	-	91	—	End, 240 ft. from shaft	-	-	-	—	2	20·45	0·42	0·55	—	Smell of mouldiness.
D 38	„	-	81	—	End, 372 ft. from shaft	-	-	-	—	—	20·17	0·72	0·83	—	Waterfall and pipes.
D 38a	„	-	—	—	- - - -	-	-	-	—	—	20·30	0·63	0·70	—	
D 39	„	-	71	—	End - - - -	-	-	-	—	—	20·66	0·29	0·34	—	
D 40	„	-	—	—	- - - -	-	-	-	—	—	20·00	1·31	1·00	0	
D 41		-	45	—	Tribute pitch - -	-	-	-	—	—	19·91	1·01	1·09	—	
D 42	„	-	—	—	End. Side level 180 ft. from main level.	-	-	-	—	—	20·37	0·68	0·63	—	
D 43	Frank Mills	-	60	—	End, 252 ft. from winze	-	-	-	—	—	20·44	0·43	0·56	—	
D 44	„	-	60	—	Stopes, 30 ft. long, 15 ft. wide, 12 ft. high.	-	-	-	—	—	20·55	0·28	0·45	—	
D 45	„	-	70	—	End, 210 ft. beyond winze	-	-	-	-	—	—	20·68	0·31	0·32	—	Trap door and pipes.
D 46	„	-	—	—	Bottom of shaft -	-	-	-	-	—	—	20·82	0·06	0·18	2	
D 47	South Exmouth	-	30	—	End, 150 ft from current	-	-	-	-	—	2	18·87	1·88	2·13	4	
„	„	-	—	—	- - - -	-	-	-	-	—	—	18·80	1·37	2·20	—	
D 48	„	-	—	—	Rise 24 fms. from air	-	-	-	-	—	2	19·46	1·15	1·54	—	Air pipes.
D 49	„	-	45	—	End, 120 ft. from rise	-	-	-	-	—	—	Broken, it is supposed.			—	
D 50	„	-	—	—	Bottom of shaft -	-	-	-	-	—	—	19·34	1·75	1·66	—	
D 51	- - -		—	—	- - - -	-	-	-	-	—	—	Not known if sent.		—	—	
D 52	- - -		—	—	- - - -	-	-	-	-	—	—	Do.	Do.	—	—	
D 53	„	-	45	—	End, 330 ft. from winze	-	-	-	-	—	—	18·67	2·26	2·33	—	
D 57	- - -		—	—	- - - -	-	-	-	-	—	—	No such number sent it is believed.				
D 58	- - -		—	—	- - - -	-	-	-	-	—	—	Do.		Do.		
D 59	- - -		—	—	- - - -	-	-	-	-	—	—	Do.		Do.		
D 60	- - -		—	—	- - - -	-	-	-	-	—	—	18·87	1·97	2·13	—	Peculiar organic smell.
D 61	- - -		—	—	- - -	-	-	-	—	—	No such numbers known to be on the tubes.	—	—	—		
D 62	- - -		—	—	- - - -	-	-	-	—	—		—	—	—		
D 63	- - -		—	—	- - - -	-	-	-	—	—		—	—	—		

Analyses of the AIR of MINES—*continued.*

No. or Mark on Sample	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
D 64	- - -	—	—	- - - -	- - -	° —	—	No such numbers known to be on the tubes.	—	—	—	
D 65	- - -	—	—	- - - -	- - -	—	—		—	—	—	
D 66	- - -	—	—	- - - -	- - -	—	—		—	—	—	
D 67	- - -	—	—	- - - -	- - -	—	—		—	—	—	
D 68	- - -	—	—	- - - -	- - -	—	—		—	—	—	
D 69	- - -	—	—	- - - -	- - -	—	—		—	—	—	
D 70 East.	- - -	—	—	- - - -	- - -	—	—	**19·86**	1·12	1·14	—	
47 D	- - -	—	—	- - - -	- - -	—	—	**19·07**	1·90	1·93	—	Smells of tobacco.
30 S	- - -	—	—	- - - -	- - -	—	—	—	—	—	—	
35 D35	„ - -	50	—	End 360 ft. from winze -	- - -	—	—	**20·10**	0·75	0·90	—	
E 1	Dolcoath - -	314	—	End, 30 ft. from winze - -	- - -	82	12	*20·94*	0·06	0·06	0·5	
E 2	„ -	268	—	Winze, 24 ft. deep - -	- - -	—	2	*20·92*	0·08	0·08	0·5	
E 3	„ -	268	—	Level at mouth of winze -	- - -	—	—	**19·77**	1·17	1·23	1	
E 4	„ -	266	—	End, 150 ft. from sump -	- - -	84	3	**20·41**	0·4	0·59	—	
E 5	„ -	—	—	Stopes between 242 and 256 fm. levels.	- - -	—	—	**20·50**	0·28	0·50	—	
E 6	Huel Ruth - -	130	—	End, 150 ft. from rise, 7ft. by 3 ft.	- - -	72	2	**19·33**	1·70	1·67	—	
E 7	„ -	180	—	End - - - -	- - -	75	2	**20.56**	0·43	0·44	—	Peculiar specks, very numerous, apparently crystalline, or at least transparent.
E 8	„ -	190	—	End, 120 ft. from rise -	- - -	76	2	**20·13**	0·93	0·87	0	
E 9	„ -	190	—	End - - -	- - -	77	3	**19·96**	0·98	1·04	—	
E 10	St. Ives Consols -	160	—	End, 90 ft. from rise - -	- - -	80	2	**20·70**	0·39	0·30	0	
E 11	„ -	177	—	End - - -	- - -	77	2	**20·81**	0·02	0·19	11	
E 12	„ -	147	—	End, 120 ft. from winze -	- - -	75	2	**20·50**	0·39	0·50	0	
E 13	„ -	—	—	Carbons, 70 ft. by 20 ft. to 40 ft.	- - -	72	—	**20·49**	0·63	0·51	1	
E 14	„ -	87	—	End close to winze - -	- - -	65	—	**20·48**	0·36	0·52	—	

E 15	Carn Brea -	155	—	Stopes close to shaft - - - -	64	2	**20·60**	0·43	0·40	—	
E 16	„ -	175	—	End, 36 ft. from winze - - - -	70	2	**20·28**	0·51	0·72	4	
E 17	„ -	197	—	End, 102 ft. from winze - - - -	77	2	**20·20**	0·70	0·80	0	Wet.
E 18	Condurrow -	140	—	End, 108 ft. from shaft - - - -	68	2	**20·71**	0·29	0·29	—	
E 19	„ -	155	—	End, 120 ft. from winze - - - -	71	2	**20·27**	0·72	0·73	—	Dry.
E 20	„ -	166	—	Stopes - - - - - -	66	5	**20·47**	0·43	0·53	0·1	
E 21	„ -	165	—	End, 168 ft. from winze - - - -	—	2	**20·52**	0·43	0·48	—	
E 22	„ -	177	—	End, 132 ft. from shaft - - - -	73	2	**20·29**	0·62	0·71	0	
E 23	„ -	180	—	Bottom of shaft - - - - -	—	3	*20·93*	0·08	0·07	—	
E 24	„ -	188	—	End - - - - - -	70	2	**20·63**	0·27	0·37	3	
E 25	East Pool -	150	—	End, 60 ft. from winze - - - -	75	2	**20·27**	0·79	0·73	2	
E 26	„ -	—	—	Under a rise - - - - -	68	—	**20·41**	0·51	0·59	2	Smell of mouldy substances.
E 27	„ -	140	—	Stopes - - - - - -	66	—	*20·95*	0·08	0·05	—	
E 28	West Cheverton -	—	—	Stope close to shaft - - - - -	64	2	*20·90*	0·03	0·10	—	
E 29	„ -	70	—	End, 120 ft. from air - - - - -	68	2	**19·56**	1·43	1·44	—	
E 30	St. Day United -	154	—	End, killas, 7 ft. by 4 ft. Dry - - -	77	2	**20·45**	0·51	0·55	—	
E 31	„ -	174	—	End, 12 ft. from winze - - - - -	82	2	**19·42**	1·37	1·58	—	Choked.
E 32	„ -	174	—	Bottom of winze, 30 ft. deep - - - -	88	2	**20·72**	0·15	0·28	—	
E 33	„ -	—	—	Stopes - - - - - -	80	—	**19·31**	1·73	1·69	—	
E 34	West Basset -	75	—	Cross cut end, 6.30 ft. in. 7 ft. by 4 ft. Dry. Granite. - - -	—	2	**19·55**	1·46	1·45	—	An aromatic smell, such as we may read of chiefly in German writers as existing in mines.
E 35	„ -	—	—	Mouth of cross cut - - - - -	—	—	**20·70**	0·19	0·30	—	Do.
E 36	„ -	85	—	End, 120 ft. from winze - - - -	—	2	**19·63**	1·4	1·37	—	
E 37	„ -	94	—	End, 90 ft. in, dry - - - - -	—	—	**20·37**	0·48	0·63	—	
	Botallack - -	160	—	¼ a mile from shaft, under sea - - -	—	3	**20·63**	0·68	0·37	some	These four specimens were taken by myself, and the crystals first seen on them. The relative amount therefore not attempted to guess at.
	South Francis -	—	—	Air at surface coming from shaft. - - -	—	—	**20·54**	0·82	0·46	numerous	
	South Francis -	29	—	24 fathoms from a winze, 90 from shaft. - - -	—	—	**18·69**	2·22	2·31	do.	
	Dolcoath Mine -	233	—	80fms. from shaft - - - -	—	—	**20·77**	0·74	0·23	do.	

Analyses of the Air of Mines—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
W 1	Minera - -	60	—	End, 105 ft. from sump, 6½ ft. by 4½ ft.	- - -	—	2	**19·91**	1·16	1·09	—	Hard dry siliceous with shale.
W 2	„ -	—	—	End adit, 210 ft. from sump -	- - -	- -	2	**20·50**	0·29	·50	—	Level choked.
W 3	„ -	—	—	Level in current - - -	- - -	—	—	broken or	leaking	—	—	
W 4	South Minera -	54	—	End 90 ft. from shaft, 7 ft. by 5 ft.	Several hours after shot.	—	2	**19·73**	0·92	1·27	0·1	Ground hard. Wet.
W 5	Park - - -	125	—	Level, 150 ft. beyond winze, 6½ ft. by 5 ft.	- - -	—	2	**19·72**	1·32	1·28	0·1	Ventilated by hand fan.
W 6	„ -	—	—	From air pipe - - -	- - -	—	—	**20·32**	0·82	0·68	longer than usual	
W 7	Maes-y-safn -	125	—	End, 90 ft. from vent - -	- - -	—	—	**19·40**	1·51	1·60	—	Smell of tallow and perspiration.
W 8	„ -	155	—	End, 90 ft. from shaft - - -	- - -	—	6	**19·26**	1·86	1·74	1	Roof of level.
„	„ -	—	—	Do. do. - -	- - -	—	—	**20·47**	0·49	0·53	—	Floor of level.
W 9	„ -	—	—	Bottom of shaft - - -	- - -	—	—	**20·69**	0·27	0·31	2	
W 10	Rhoses Mawr -	—	—	Winze, 15 ft. deep - -	- - -	—	2	**20·00**	0·89	1·00	0.1	
W 11	„ -	60	—	Level between shafts - -	- - -	—	—	**20·67**	0·38	0·33	—	
W 12	„ -	70	—	End, 45 ft. from shaft - -	- - -	—	—	**19·54**	1·26	1·46	0	
W 13	„ -	70	—	End, 75 ft. from shaft - -	- - -	—	2	**20·35**	0·40	0·65	—	
W 14	Talargoch -	90	—	End, 72 ft. from shaft, 6 ft. by 4 ft.	1½ hours after two shots.	—	2	**20·11**	0·81	0·89	0·1	Limestone.
W 15	„ -	—	—	- - - - -	- - -	—	—	broken -	—	—	—	
W 16	„ -	90	—	End of Great Cross Cut, 600 ft. from level.	- - -	—	—	**20·44**	0·57	0·56	—	Ventilated by door and air pipes.
2d	„ -	—	—	- - - - -	- - -	—	—	**20·48**	0·36	0·52	—	
3d	„ -	—	—	- - - - -	- - -	—	—	**20·49**	0·36	0·51	—	
W 17	„ -	—	—	From mouth of pipes	- - -	—	—	**20·44**	0·46	0·56	—	

W 18	„ -	90	In current	evel - - -	.. - -	—	—	20·76	0·24	0·24	0·1	
W 19	„ -	110	In current	Level - - -	.. - -	—	—	20·58	0·39	0·42	—	
W 20	„ -	110	—	End, 90 ft. from rise -	- - -	—	—	—	—	—	—	
W 20a	Coed Mawr Pool -	15	—	End, 72 ft. from air - -	- - -	—	2	20·25	0·46	0·75	—	
W 21	„ -	10	—	End, 102 ft. from shaft -	- - -	—	2	20·27	0·56	0·73	0·5	
W 22	Symmdde Dylluam	40	—	End, 60 ft. ,rom shaft -	20 minutes after 2 shots.	—	2	19·90	1·10	1·10	—	Aromatic smell, formerly alluded to.
W 23	„ -	—	—	Winze, 18 ft. deep - -	- - -	—	2	20·87	0·26	0·13	—	
W 24	„ -	—	—	Rise, 30 ft. high - -	- - -	—	2	20·77	0·09	0·23	—	
W 25	„ -	35	—	End - - -	- - -	—	2	*20·92*	0·04	0·08	0	
W 26	„ -	70	—	End - - -	- - -	—	—	20·47	0·55	0·53	—	
W 27	„ -	—	—	Winze, 12 ft. deep - -	- - -	—	3	20·42	0·49	0·58	—	
W 28	Pary's Mine -	100	—	Stopes from winze - -	- - -	—	—	20·72	0·10	0·28	—	
W 29	„ -	112	—	End, 210 ft. from shaft -	- - -	—	2	19·81	1·18	1·19	—	
W 30	„ -	—	—	Winze, 24 ft. deep, 8 ft. by 4 ft.	- - -	—	—	19·16	1·80	1·84	—	
W 31	„ -	—	—	- - - - -	- - -	—	—	—	—	—	—	
W 32	„ -	90	—	End - - - -	- - -	—	—	20·34	0·49	0·66	—	
W 33	Lisburn - -	—	—	- - - - -	- - -	—	—	—	—		—	Cannot find these.
W 34	„ -	—	—	- - - - -	- - -	—	—	—	—	—	—	
W 35	„ -	—	—	- - - - -	- - -	—	—	—	—	—	—	
W 36	„ -	—	—	- - - - -	- - -	—	—	—	—	—	—	
W 37	„ -	—	—	- - - - -	- - -	—	—	20·76	0·22	0·24	—	
W 38	Loggy Lass -	—	—	- - - - -	- - -	—	—	20·30	0·63	0·7	2	
W 39	„ -	—	—	- - - - -	- - -	—	—	—	—	—	—	
W 40	Cwm Erfin -	30	—	End of cross cut, 300 ft. from shaft.	- - -	—	—	20·35	0·61	0·65	—	
W 41	„ -	32	—	End, 150 ft. from winze, 7 ft. by 5 ft.	- - -	—	2	20·12	0·79	0·88	—	
W 42	„ -	—	—	Rise, 12 ft. high, 102 ft. from winze.	- - -	—	2	20·04	1·74	0·96	—	
W 43	„ -	20	—	End, 312 ft. from winze - -	Soon after shot -	—	2	20·25	0·72	0·75	—	
W 44	„ -	20	—	Stope - - -	- - -	—	4	—	—	—	—	
W 45	East Darren -	104	—	End, 270 ft. from air, 7 ft. by 5 ft.	- - -	—	2	20·12	0·66	0·88	—	

Analyses of the Air of Mines—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
W 46	East Darren	80	—	End, 180 . from winze		° —	—	**19·72**	1·24	1·28	—	
W 47	Bryn Gwiog	75	—	End, 120 ft. from rise, 6½ by 5 ft.		—	2	**19·75**	1·22	1·25	—	All taken before any shots had been fired. A good deal of dust, scarcely crystalline in any part.
W 48	,,	—	—	Pitch 12 ft. up		—	—	**20·11**	0·9	0·89	—	
W 49	,,	—	—	Under a winze. Supply air		—	—	*20·92*	0·02	0·08	—	
W 50	,,	—	—	Bottom of shaft		—	—	**20·76**	0·12	0·24	—	
W 51	- - -	—	—	- - - -		—	—	**20·04**	0·83	0·96	—	
W 52	Mona	60	—	End, cross-cut, 240 ft. from current.		—	2	**19·58**	1.32	1·42	—	Air pipes not much use.
W 53	,,	—	—	Pitch, 150 ft. from current		—	2	**18·60**	2·26	2·40	0·1	
W 54	,,	—	—	End		—	2	**20·20**	0·76	0·80	0	Candles scarcely burn.
W 55	,,	—	—	Do. do. after blower had been worked.		—	—	**20·52**	0·41	0·48	—	
W 56	,,	—	—	Supply air to blower		—	—	*20·90*	0·07	0·10	—	
W 57	,,	—	—	End of cross-cut, 360 ft. deep, 120 ft. from shaft.		—	2	**20·37**	0·87	0·63	—	Aromatic smell, very distinctly that of apples; German miners frequently speak of this.
W 58	Snailbeach	171	—	End, 450 ft. from sump	½ hour after shot	—	2	**20·36**	0·61	0·64	—	
W 59	,,	171	—	Under sump		—	—	**20·07**	0·83	0·93	2	
W 60	,,	186	—	End, 270 ft. from sump		—	2	**20·73**	0·26	0·27	—	
W 61	,,	—	—	In voog		—	—	—	—	—	—	
W 62	,,	201	—	Bottom of shaft		—	2	**20·72**	0·14	0·28	—	
W 63	,,	171	—	End, 132 ft. from sump		—	—	**20·74**	0·12	0·26	—	
W 64	,,	156	—	End, 315 ft. from sump		64	—	**20·56**	0·31	0·44	0	
W 65	,,	126	In current	Level		—	—	**19·44**	1·45	1·56	—	
W 66	,,	126	—	End, 300 ft. from sump		—	2	**20·29**	0·57	0·71	0	Peculiar organic odour.
W 67	,,	—	—	Tribute pitch between two shafts.		—	—	**19·61**	1·33	1·39	0·1	

W 68	Roman Gravels -	6	—	End, 120 ft. from winze - - - -	—	2	**20·81**	0·26	0·19	—	Fatty smell; butyric acid very clearly amongst others.
W 69	„ -	20	—	End, 290 ft. from winze - - - -	—	4	**19·58**	1·42	1·42	—	Air pipes, level choked.
W 70	„ -	—	—	Sump, 36 ft. deep - - - - -	—	3	**19·90**	0·92	1·10	—	
W 71	Dyliffe - -	25	—	Cross cut, 360 ft. from air - - - -	—	—	**19·70**	1·20	1·30	—	Ventilated by duck machine attached to engine rods.
W 72	„ -	75	—	End 480 ft. from winze - - - -	60	2	**19·45**	1·70	1·55	—	Blower idle.
W 73	„ -	—	—	Do. - - - - - -	—	—	**20·07**	0·88	0·93	—	After machine at work.
W 74	„ -	85	—	End, 210 ft. from shaft - - - -	—	2	**18·88**	2·21	2·12	—	
W 75	Foxdale - -	72	—	End, 150 ft. from shaft - - - -	—	—	**20·73**	0·12	0·27	4	
W 76	„ -	—	—	Stopes between 72 and 86 fm. levels. - - -	—	6	*20·99*	0·05	0·10	1	
W 77	„ -	86	—	End of cross cut - - - - -	—	2	**20·80**	0·18	0·20	—	
W 78	„ -	100	—	End, 210 ft. from shaft - - - -	—	2	**19·79**	1·3	1·21	3	
W 79	„ -	86	—	End, 180 ft. from rise - - - -	—	2	—	—	—	2	
W 80	„ -	72	—	End 90 ft. from rise - - - - -	—	2	**19·00**	1·00	2·00	4	
W 81	Laxey - -	—	—	Stopes - - - - - -	—	4	**20·84**	0·05	0·16	—	
W 82	„ -	165	—	End - - - - - - -	—	4	**20·72**	0·16	0·28	—	Air pipes.
W 83	„ -	212	—	End - - - - - - -	—	2	**19·92**	1·16	1·08	3	
W 84	„ -	—	—	Bottom of shaft - - - - -	—	—	—	—	—	2	
W 85	„ -	110	—	End - - - - - - -	—	2	**19·62**	1·53	1·38	2	Air pipes.
W 86	Coniston - -	—	—	End, 900 ft. from draught - - - -	55	2	**20·26**	0·88	0·74	—	Door and pipes.
W 87	„ -	—	—	Sump 84 ft. deep - - - - -	64	3	**19·58**	1·40	1·42	—	
W 87b	Silberthwaite -	—	—	End 3,300 ft. in, - - - - - -	—	2	—	—	—	2	Air pipes.
W 88	Goldscope -	—	—	Stopes in 60 fm. level - - - -	—	2	**20·07**	0·91	0·93	—	
W 89	„ -	90	—	End 36 ft. in, 6½ ft. by 4¼ - - -	—	2	**20·55**	0·3	0·45	0·1	
W 90	„ -	—	—	Bottom of shaft - - - - -	—	3	**20·42**	0·6	0·58	—	Black dust chiefly; not unusually in less quantity.
W 91	„ -	60	—	End 132 ft. from winze - - - -	—	2	**19·77**	1·05	1·23	—	Men just going to fire.
W 92	Castlenook -	28	—	Bottom of shaft - - - - -	—	3	**19·62**	1·13	1·38	0·5	
W 93	„ -	10	—	End, 54 ft. from rise, 6½ ft. by 4 ft. - - -	—	2	**20·46**	0·54	0·54	—	Level choked.
W 94	Greenside -	—	—	Engine sump 23 ft. wide - - - -	—	2	**20·62**	0·47	0·38	0·5	

Analyses of the Air of Mines—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Baro-metrical Readings.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
W 95	Greenside -	—	—	Rise 18 ft. high - -	- - -	° —	2	—	—	—	—	0·5	
W 96	„ -	—	—	End 30 ft. from air - -	- - -	—	2	—	**20·84**	0·08	0·16	1	
W 97	„ -	—	—	Sump - - - - -	- - -	—	4	—	**19·55**	1·39	1·45	—	
W 98	Hutton - -	—	—	- - - - - -	- - -	—	—	—	*20·90*	0·06	0·10	—	
W 99	Upleatham -	—	—	- - - - - -	- - -	—	—	—	**20·22**	0·80	0·78	—	
W 100	„ -	—	—	- - - - - -	- - -	—	—	—	*20·91*	0·1	0·09	—	
	Northumberland:												
K	Derwent -	120	220 ft.	95 fms. level, forehead west -	- - -	66	2	27·98	—	—	—	—	
L	„ -	91	120 ft.	50 „ do. east.	- -	64	2	29·12	—	—	—	—	
	Cumberland:											—	
M	Stow Craig -	7	24 ft.	7 fms. level, forehead north -	- -	48	4 2 per shift.	28·84	*21·00*	*0·0*	0·0	2	
N	„ -	12	180 ft.	12 fms. level end, north -	- - -	56	2	28·84	**20·03**	1·53	0·97	1	
O	Lady Vein -	30	240 ft.	Rise in forehead of adit, east -	- - -	53	2	28·42	—	—	—	2	
P	Guttergill -	12	60 ft.	High level, east driving -	- - -	54	2	28·9	**20·44**	0·72	0·56	1	
Q	Dowpot Syke -	15	66 ft.	South cross-cut end - -	- - -	55	2	28·82	**20·19**	1·02	0·81	2	
R	„ -	10	42 ft.	Top level end - - -	- - -	56	2	28·78	**20·56**	0·29	0·44	1	
S	Brownley Hill -	90	12 ft.	South driving on "jug" vein	- - -	56	2	28·64	**20·77**	0·99	0·23	1·5	
T	„ -	93	72 ft.	Sump below adit - -	- - -	62	2	28·72	**20·69**	0·41	0·31	3·0	
U	„ -	83	50 ft.	Ore workings above adit -	- - -	63	4	28·68	*20·98*	*0·02*	0·02	3	
V	„ -	108	100 ft.	South driving, "4 fms. lime-stone."	- - -	56	4 2 per shift.	28·84	**20·33**	1·49	0·67	0	
W	Nenthead -	About 58	150 ft.	Small cleugh level, end going east.	- - -	62	6 2 per shift.	28·50	—	—	—	—	
X	„ -	About 58	150 ft.	Ditto, end going west -	- - -	66	6 2 per shift.	28·56	—	—	—	—	

Y	„	About 58	In current	Ore workings, roof of level		66	18 6 per shift.	28·58	—	—	—	—		
Z	Nattrass	—	600 ft.	End driving south		62	2	28·84	Cannot find them.	—	—	—		
A A	Honey Bee	7	420 ft.	End driving east		60	2	28·70		—	—	—		
B B	White Bee	25	24 ft.	Ditto		56	2	28·78		—	—	—		
C C	Clargill Burn	40	160 ft.	Bottom of sump in low drift		59	2	28·78		—	—	—		
D D	Fullgrove	10	42 ft.	Adit level end, west		51	2 per shift.	—		—	—	—		
E E	Crossgillhead	25	700 ft.	Adit level end going south		52	2 per shift.	—		—	—	—		
F F	Dosey	25	In current	Slopes in sole of adit		46	2	27·86	**20·62**	0·48	0·38	6		
G G	Calvert	60	120 ft.	Clearing adit, south west		50	2	27·78	**20·79**	0·20	0·21	1		
H H	Dougang	90	720 ft.	Fourbreast of adit level, going west.		60	6	28·24	**20·68**	0·38	0·32	0·2		
I I	„	60	60 ft.	End of driving going east		58	4 2 per shift.	28·24	**19·09**	1·84	1·91	3		
J J	Yorkshire: Stang, Arkendale	20	About 1,000 ft.	South cross cut forehead		55	4 2 per shift.	27·3	**19·63**	1·11	1·37	2		
J J	Cumberland: Birchy Bank	—	80 ft.	End of east drift		52	2	28·22	**20·37**	0·77	0·63	3		
J J 2d		—	—			—	—	—	—	—	—	—	A slight but disagreeable smell. A friend considered it putrescent. I could not decide. Found no sulphuretted hydrogen.	
K K	Yorkshire: Stang Arkendale	15	About 400 ft.	Rise in north driving		58	2 per shift.	27·26	**18·77**	2·38	2·23	2		
L L	Foregill, Arkendale	30	90 ft.	End south; bottom of sump		55	3 per shift.	28·16	**19·04**	2·51	1·96	0·1		
L L 2		—	—			—	—	—	—	—	—	—	Fatty matter and perspiration.	
M M	„ „	30	50 ft.	Drift end going towards sump		55	4 per shift.	28·16	**19·00**	2·40	2·00	4		
M M 2		—	—			—	—	—	—	—	—	3		
N N	„ „	20	500 ft.	"Slack," cross cut end		58	2 per shift.	28·40	**20·13**	0·96	0·87	6	After first explosion n level forehead.	
N N 2		—	—			—	—	—	**19·62**	1·39	1·38	6	After second explosion.	
O O	Fellend „	40	In current	Gutter's level, drift end east		56	3 per shift.	—	—	—	—	—		

E E

Analyses of the AIR of MINES—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Barometrical Readings.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
	Yorkshire :												
P P	Hurst - -	about 30	180 ft.	Pryes level, low drift end -	- - -	58°	2 per shift.	28·40	*20·92*	—	0·08	0·5	
P P 2	- - -	—	—	- - - - -	- - -	—	—	—	**20·37**	0·58	0·63	0·5	
Q Q	Copperthwaite -	45	About 200 ft.	Low drift forehead, east -	- - -	54	2 per shift.	28·10	**20·81**	—	0·19	2	
Q Q 2	- - -	—	—	- - - - -	- - -	—	—	—	**20·56**	0·25	0·44	0·1	
R R	Grinton - -	6	300 ft.	Low level end - - -	- - -	52	2	28·24	**20·52**	0·43	0·48	4	
S S	Old Gang -	90	210 ft.	Bunting, south cross cut end	- - -	63	2 per shift.	28·14	**19·72**	1·28	1·44	1	
T T	„ -	60	300 ft.	Bunting, top drift end, west -	- - -	58	4 2 per shift.	28·	**19·82**	1·17	1.18	2·5	
U U	„ -	about 50	About 300 feet.	Barberry main level, forehead -	- - -	55	4 2 per shift.	28·1	**20·55**	0·22	0·45	0	
V V	„ -	about 50	About 200 feet.	„ cross cut, no. „	Immediately after a shot.	57	4 2 per shift.	28·6	**19·60**	1·11	1·40	2	
W W	Hurst - -	—	In current	Queen's level, drift 12 fms. above it.	- - -	55	6 2 per shift.	—	—	—	—	—	
X X	Arkendale -	70	In current	Faggergill, forehead of adit level.	- - -	56	4 2 per shift.	28·54	**20·78**	—	0·22	0	
X X 2	- - -	—	- -	- - - - -	- - -	—	—	—	20·59	0·40	0·41	0	
Y Y	Keldheads -	65	210 ft.	Main level forehead - -	- - -	51	8 2 per shift.	28·74	**19·77**	1·41	1·23	5	
Y Y 2	- - -	—	- -	- - - - -	- - -	—	—	—	—	—	—	0	A strong smell as of cinders burning, sulphurous evidently.
Z Z	„ -	81	54 ft.	Low „ „ - -	- - -	59	8 2 per shift.	28·76	**19·55**	1·64	1·45	0	

AAA	West Burton	20	180 ft.	Stopes over main level forehead	59	10 5 per shift.	28·58	*20·90*	—	0·10	4	
2d	- - -	—	—	- - - - - - - - -	—	—	—	—	—	—	4	
BBB	„	18	20 ft.	West stopes above level	58	6	28·58	*20·91*	*0·09*	0·09	0·1	
CCC	Keldheads	35	120 ft.	Ash bank, main forehead	58	6 2 per shift.	28·94	**19.24**	2·08	1·76	0·1	
2d	- - -	—	—	- - - - - - - - -	—	—	—	**20.26**	0·76	0·74	—	
DDD	„	31	About 90 ft.	Ditto, rise	58	4 2 per shift.	28·92	**20·29**	1·21	0·71	0·1	
2d	- - -	—	—	- - - - - - - - -	—	—	—	—	—	—	—	Aromatic and also fatty.
EEE	Westmoreland: Dupton Fell	50	Ventilated by fissures in limestone.	"North Dobron's" forehead	53	6 3 per shift.	27·58	**20·13**	0·78	0·87	4	
FFF	„	50	Do.	"South Dobron's" forehead	55	8 4 per shift.	27·58	**20·21**	1·03	0·79	—	
GGG	„	100	Do.	Threalkeld or deep level forehead.	53	4 2 per shift.	28·	**19·84**	1·37	1·16	—	
HHH	Silverband	80	Do.	Stope vein forehead	49	4 2 per shift.	26·94	**20·82**	0·23	0·18	4	
HHH2	- - -	—	—	- - - - - - - - -	—	—	—	**20·47**	0·63	0·53	—	
III a	„	80	Do.	Remington	53	4 2 per shift.	26·90	**20·79**	0·33	0·21	6	
2d	- - -	—	—	- - - - - - - - -	—	—	—	—	—	—	—	A smell somewhat like candles burning—far from pure air.
JJJ	„	—	Do.	Silverband forehead	50	4 2 per shift.	26·98	**20 44**	1·02	0·56	—	
SSS	- - -	—	—	- - - - - - - - -	—	—	—	—	—	—	—	A smell as of burning oils.

Analyses of the AIR of MINES—*continued.*

No. or Mark on Sample.	Name of Mine.	Depth from Surface in fms.	Distance from Current.	Description of Place where taken.	Time when taken.	Therm. Fahr.	No. of Men working in it.	Baro-metrical Readings.	Oxygen per cent.	Carbonic Acid per cent.	Oxygen less than 21 per cent.	Crystals observed in the tubes.	Remarks.
No. 1.	Clifford Mine, the hot mine.	—	—	120 feet from shaft, 2 from winze.	- - -	105°	—	—	**20·87**	*0·13*	0·13	—	A smell as of burning oil; water running at the rate of two gallons per minute, 120° F.
No. 2.	- - -	220	—	From stopes at eastern end of 220.	- - -	95	—	—	**20·30**	0·68	0·70	—	
No. 3.	- - -	220	—	From stopes - - -	- - -	98	—	—	**20·80**	*0·2*	0·20	—	
No. 4.	- - -	—	—	From a cross-cut; men resting themselves.	- - -	—	—	—	**20·62**	0·25	0·38	—	Men resting; 17 men in a high state of perspiration, and seven candles burning.
No. 1.	- - -	40	—	- - - - -	- - -	—	2	—	—	—	—	—	
No. 2.	- - -	—	—	- - - - -	- - -	—	—	—	—	—	—	—	
				*Analyses not included in the average.**									
1	Parr Consols -	80	—	- - - - -	- - -	70	—	—	**20·44**	0·42	—	—	
2	„ -	100	—	Cross-cut - - -	- - -	74	—	—	**19·90**	1·18	—	—	
3	„ -	150	—	Stopes - - - -	- - -	77	—	—	**20·60**	0·27	—	—	
4	„ -	180	—	End - - - -	- - -	84	—	—	**20·75**	0·17	—	—	
5	Fowey Consols -	180	—	N. of union shaft - -	- - -	72	—	—	**19·71**	1·23	—	—	
6	„ -	200	—	Stopes - - - -	- - -	74	—	—	*20·96*	0·04	—	—	
7	„ -	220	—	End - - - -	- - -	84	—	—	**20·22**	0·67	—	—	
8	„ -	270	—	Stopes - - - -	- - -	81	—	—	**19·82**	1·09	—	—	
9	„ -	270	—	Stopes on south lode -	- - -	82	—	—	**20·24**	0·69	—	—	
10	„ -	280	—	End - - - -	- - -	86	—	—	**19·70**	1·19	—	—	

G 1	Der alte Elizabeth, Freiberg.	—	—	End	—	—	—	—	—	—	19·80	1·08	1·20	3	
2	„	—	—	Ditto, another end	—	—	—	—	—	—	20·48	0·39	0·52	2	
3	Mordgrube, near Freiberg.	—	—		—	—	—	—	—	—	18·93	2·03	2·07	0	
4	„	—	—	A stope	—	—	—	—	—	—	18·52	2·42	2·48	1	
5	Samson Mine, Andreasberg.	—	—	End of long level	—	—	—	—	—	—	20·39	0·49	0·61	3	
6	„	—	—	Stope	—	—	—	—	—	—	20·51	0·45	0·49	4	
7	Elizabeth Mine, Clausthal.	—	—	Top of a rise	—	—	—	—	—	—	20·65	0·23	0·35	2	A blowing machine in this mine
8	Samson, Andreasberg.	—	—	End of a long level	—	—	—	—	—	—	*20·90*	0·15	0·10	4	
9	„	—	—	Ditto, farther from shaft	—	—	—	—	—	—	20·25	0·73	0·75	4	
10	„	—	—	Large wide space	—	—	—	—	—	—	20·78	0·10	0·22	4	

COAL MINES.

No. or Mark on Sample.	Name of Coal Mine.	Depth from Surface in yds.	Amount of Air.	Place where taken.	Therm. Fahr.	No. of Men working in it.	Barometrical Readings.	Oxygen per cent.	Carbonic Acid per cent.	Remarks.
1	Cowper Colliery	200	65,000 cubic feet per minute, workings 12 feet by 7.	100 yards from the downcast shaft.	52°	100	30·55	20·85	0·06	Current very strong.
2		—		1000 yards ditto	—	—	—	20·71	0·44	Half way between downcast shaft and end of workings.
3		—	A side working	2000 yards ditto	65	1 and 1 candle.	—	20·87	*0·13*	
4		—	End of workings connected with upcast shaft.		—	—	—	20·57	0·39	
5		—	Air after passing through the whole mine, about 5 miles.		—	—	—	—	—	
6	North Seaton Colliery	248	40,000 to 45,000 cubic feet per minute of air		65	—	30·5	—	—	250 men and 58 horses.
1		—		100 yards from the downcast shaft.	—	—	—	*20·97*	*0·03*	
2		—	Average air of mine to all appearance		—	—	—	20·71	*0·29*	After passing over 40 men.
3		—	Air from workings after passing over 53 horses and 88 men and boys.		—	—	—	20·80	0·16	
4		—	Air after passing over 250 men and 58 horses, and through 2 miles of workings.		—	—	—	20·44	0·42	

*The carbonic acid is given in italics in a few cases. These numbers were got merely by subtracting the oxygen from 21. They are, therefore, only approximative; but, as a rule, they are a trifle too small. Those, for example, with 21 of oxygen are put as having no carbonic acid, whereas they have from 0·03 to 0·04 per cent.

Summary of the Analyses.

Oxygen, average of 339 specimens	20·26
of ends	20·18
of other parts	20·32
in currents	20·65
in large cavities	20·77
just under shafts	20·424
in sumps	20·14
Carbonic acid	0·785

35 or 10·67 per cent., normal or nearly so.
81 or 24·69 per cent., decidedly impure,
212 or 64·63 per cent., exceedingly bad.

Here the division into three classes is made as before explained. Other analyses made after the above 399 give similar proportions.

It is remarkable that the carbonic acid found by the method explained should so nearly approach the amount of oxygen deficient, and also that the difference should be in excess of the oxygen as was anticipated on account of the use of gunpowder, bringing in a disturbing quantity. It turns out as we might expect, that the sumps are the very worst and the ends nearly as bad, and that currents and large cavities have an amount of oxygen equal to that found in a well ventilated coal mine. The value of the oxygen test is perceived here, and the accuracy of the method of taking the carbonic acid is also confirmed.

I need only observe that if 0·1 or 0·2 deficiency of oxygen indicate bad ventilation in houses, the state of these mines must exceed all that we who live above ground can comprehend. We enter gradually, and cannot well judge; if we leapt from the pure air into a close end in an instant, we should recoil with horror.

GENERAL IMPURITIES OF THE AIR OF MINES, AND CALCULATION OF EXTENT.

When a mine opens out into the free air, and when there is sufficient light at the entrance, we are apt to suppose, in many cases, that fires are burning within it, because a constant flow of dusty and smoke-like vapour issues in an endless stream. This is the impure air of the mine, which escapes with whatever solid matter it can support, the powder and candle smoke mixed with the exhalations of the workmen. When you enter that smoke yourself you are not aware of any impurity—at least, after a few minutes are gone; and as the stream is pretty rapid, it leaves even a somewhat cooling and refreshing sensation, if we come from a less pure part of the mine where the air has been warm; this we frequently do when we have gone some distance from the shaft or draught of air.

If we pass from the air of the shafts to the sidings, galleries, or long levels where the air is stagnant, the change is very striking; and when we return to the shaft we are again comparatively refreshed. That this is really a comparative feeling, and to some extent therefore a delusion of the senses, may be proved, because we experience the same feeling of pleasure in breathing as soon as we leave the shaft itself and enter the pure air; and this is found even on escaping from the largest and best ventilated shafts. Our senses adapt themselves with marvellous rapidity to changes. True, when passing rapidly from one atmosphere to another, they give correct notice of the change, but discrimination appears to them much less useful where there is no choice.

In passing through the long levels, between air currents, or removed from close ends, my small experience did not show that anything occurs to render the air oppressive; the impression given is that of want of freshness. As a rule, the long passages appeared so ventilated that although the air is inferior to that above-ground, it is still such as does not strike us with alarm. But it is when we come to the end of the levels that the trial of the air begins, that is, when we leave the direct influence of draughts. It may be, perhaps, looked on as a matter of necessity that most of the borers should work at such ends.

The first mine in which I made experiments was that of Dolcoath. The air which was analysed was taken at 1,320 feet from the surface, at a place half a mile from the main shaft at which we entered, but, contrary to anticipation, only 80 fathoms from another shaft, and one by which the air entered as being the lower; the distance from the nearest winze was 40 fathoms. The height of the level was 7 feet 5 in., the broadest part being below, but narrowing above. The air was taken an hour and a half after an explosion for blasting, in which five ounces of gunpowder were used. A blast such as this was made every 2¼ hours. The men informed me that after a blast they stay away for about half an hour to let the air clear, but they sometimes, in their anxiety to know the result, run in, after five minutes, just for a moment, to see if anything remarkable has happened; especially if they have taken the spot for themselves, when they have hopes of a load of treasure. They generally retire to some nook, somewhere about 20 fathoms from the *blast*. The temperature was 70° Fahrenheit (21·1° cent.) and in cooler corners 65° (18·3 cent.)

In South Francis Mine the depth entered was 1,056 feet, at about 100 fathoms from the direct air shaft, and 24 from a winze; this winze, however, giving only air which had previously passed through other levels, where the height was 6½—7 feet, and the breadth about 3. Five blastings were made in 8 hours, which is a shift, each blast consuming on an average 3¼ ounces of gunpowder. Two men worked together with two candles.

At Bottallack Mine the air was taken at about a quarter of a mile out from the shore and the same distance from the shaft. This mine was remarkably dry, whilst the previously-mentioned were remarkably wet. Mr. Couch considered this mine as very well ventilated, but I was not made aware of its peculiarities.

It was after viewing the condition in which the men in these mines worked that the following calculations were made. After seeing other mines I am still inclined to look on these figures as fair approaches to an average state of things, or, in other words, a statement of the influences at work in the air at an average of these "ends," whilst the analyses show that the calculations represent fairly the state of the worst parts.

The actual condition of the air must of course be obtained from the analyses; there the result is found after all the influences at work have performed their part. The calculations are made for a space represented by 50 feet in length from a close end; if a larger space were assumed the results would correspond to a greater number of cases, but the close

ends are the most important, and for the theoretical part I am not inclined to make a change. We must not forget that explosion, diffusion, and inequalities of temperature and moisture are continually at work to cause variations, and that air which would have had the calculated composition may on account of these influences be found to have fewer impurities. Small as the value of these calculations might be alone, they throw a great light on the condition of the mine, when taken in conjunction with the analyses, to which they are intended specially to act as introductions.

Amount of Carbonic Acid from breathing.

Let us take as the amount of carbon given out in a day by the lungs at 7·55 ounces :—

This will be equal to carbonic acid—

15·6 cubic feet at 70° F.
Or 844·59 grammes
441714·6 cub. c.

Let us consider this given out in a space equal to 50 feet in length, 5 feet in height, and 4 feet in breadth : 50 × 6 × 4 = 1,200 cubic feet, calling this a close end.

It is equal to 35·3166 cub. metres.

Let us double the amount of carbon, as there are always at least two men working, and let us divide it by 3, giving them 8 hours per day :—

15·6 cub. feet × 2 = 31·2 ÷ 3 = 10·4.

This is 0·86 per cent. of the 1,200 cub. feet.

Amount of Carbonic Acid from Candles.

During this time there is burnt about half a lb. of candles. These may differ, and do differ, in quality, some having more and some less rosin. But we may suppose them formed of stearine, and if they are not entirely so we shall at least be near enough for the present purpose by supposing it. It is impossible to work out the numberless suppositions that might be made ; I must be content with one. Let us suppose the candle grease to contain 114 atoms of carbon, 110 of hydrogen, and 12 of oxygen :—

½ lb. of stearine will contain 2689·89 grains carbon.

„	„	432·58	„ hydrogen.
„	„	377·53	„ oxygen
		3500·00	

These 2689·89 grains of carbon will make an amount of carbonic acid equal to 9862·92 grains. Taking the weight of 100 cubic inches at 100 to be 47·339 grains, we have a volume of carbonic acid at 60 F. of 12·044 cubic feet, or at 70 F. of 12·2765 cubic feet.

This, in French measure, is—

Carbon - - 174·18 grammes.
Carbonic acid - 638·69 „
Or 347596 cub.-centimeters.

The amount on the 1,200 cubic feet is 1·023 per cent. of carbonic acid. Add this to the amount by breathing, and we have carbonic acid by breathing :— 0·86 per cent.

From candles - 1·023 „
1·883 carbonic acid introduced into the space of 1,200 cubic feet in eight hours by two men and two candles.

During the same period of time there are used 12 ounces of gunpowder = 340 grammes. The composition of gunpowder varies, but one not unusual contains :

Nitre - - -	74·8	per cent.
Sulphur - -	13·3	„
Charcoal - -	11·9	„
	100	„

Or, in equivalent parts—

Nitre - - -	101
Sulphur - - -	16
Carbon - - -	18
	135

These are converted by explosion into—

Carbonic acid - -	66
Nitrogen - - -	14
Sulphide of kalium - -	55
	135

The weight, therefore, remains the same after explosion, or in other words the smoke weighs exactly the same as the gunpowder. This is not so with smoke generally, which weighs much more than the wood or coal consumed : but powder burns without air ; it supplies its own air in the nitre employed. This powder gives another increase of carbonic acid equal to 2·803 cubic feet, or 0·233 per cent.—

making by breathing -	0·86
candles -	1·023
gunpowder -	0·233
per cent. -	2·116

Besides this amount of carbonic acid there are 2,139 grains of sulphide of kalium or potassium, or an equivalent in sulphate of potash, floating in the atmosphere—a portion of the smoke. This is not constant, but exists in great amounts for a short space of time, and in small amounts for a longer time. It is, however, seldom entirely absent. It exists for a while after the explosion in great excess, so that sight and breathing become nearly impossible for ⅓ or 20 per cent. of the time; that is, above three half hours out of the eight hours. During that time the men are not present above a few minutes, but they breathe the less dense smoke much longer, perhaps some of them constantly.

About one-third of the powder is fired off at a time. There are 713 grains of sulphide of potassium, or its equivalent in sulphate of potash, sent into the air at once, leaving 0·59 grains in a cubic foot, or still more of the oxidized salts and other substances, as will be seen in the last table of this chapter. This amount, small as it seems, is intolerable, and the men can neither work nor live in it. They wait till it diminishes. But it is important to remember this amount to be able to understand the enormous influences which are to be ascribed to substances existing in quantities which by our modes of description appear to be extremely minute.

The decomposition attributed in the above calculation to gunpowder is theoretically correct in this sense, that the arrangement of the elements is fitted to bring about such a result as nearly as we can reckon, but the actual result is very complicated. It is extremely probable that no mixture could be made sufficiently intimate to produce this purely theoretical result. We find that on coming from a mine our mouths and nostrils are extremely black ; this blackness is much greater in those organs than over the face. The reason is that the current of air entering by the mouth or by the nostrils, is strained and purified to a great extent, and charcoal from the powder is one of the substances strained out. The charcoal is not wholly burnt during the explosion of the powder ; the sulphur is not wholly as a sulphide of kalium, and the nitre is not wholly robbed of its

oxygen. The sulphide of potassium is believed to be converted rapidly into sulphate of potash. Professor Bunsen seems to think that the conversion of part is instantaneous; and as he has examined the combustion of gunpowder so carefully it will be needful to consider what would be the composition of the air of the 1,200 cubic feet when we have decomposed the gunpowder according to his formula.

Besides these substances mentioned there are 544·4 grains of nitrogen, or 1,784 cub. in. at 70 F. set free from the saltpetre, being 0·86 per cent. increase on the nitrogen of the atmosphere in the space alluded to.

The changes in the 1,200 cubic feet will now be more fully understood.

The 1,200 cub. feet of air consisted of—

Oxygen -	250·8 cub. feet.
Nitrogen -	949·2 „

This will be increased by 10·32 carb. ac. from breath.
12·276 „ candles.
2·796 „ gunpowder.
1·03 nitrogen from do.

Addition - - 26·422

Supposing the oxygen lost and the carbonic acid found in amount to be the same, which for the man is not exactly true, the volume will be diminished by an amount of oxygen equal to the carbonic acid from breath - - - 10·32
and that from candles 12·276
Oxygen united to the hydrogen of the candle - 4·929

Or - 27·525

We then have the new state of the air in the 1200 feet space—

Oxygen -	250·8	—	27·525	= 223·275
Nitrogen -	949·2+1·03 from gunpowder			950·302
Carbonic acid from breath			10·32	
„ „ candles			12·276	
„ „ gunpowder			2·796	
			25·392	25·392
The 1,200 cubic feet are now -				1198·897

a little of the air from the level will now enter to fill up the space left.

I do not here calculate the amount of oxygen burnt by the hydrogen of fatty matters during respiration. Let us put the above into per-centage and total amounts :—

Original oxygen in 1,200 cubic feet -	250·8	after work	223·48
Nitrogen -	949·2	- -	951·10
Carbonic acid -	-	-	25·42
			1200·000

The same calculated in volumes per cent :—

Oxygen - -	20·9	after work	18·62
Nitrogen - -	79·1	- -	79·26
Carbonic acid -	-	-	2.12
			100·000

The carbonic acid before work is left out as being too small for the purpose of this calculation.

We here see a diminution of 2 per cent. of oxygen, and an increase of rather more than 2 per cent. of carbonic acid ; and this may be said to be the rough result, as far as these two gases are concerned with this calculation and sufficient for all who do not require to go far into details.

If we wish to know with still greater exactness the condition of the air as caused by gunpowder, we must take one of the following analyses. J. Linck gives gunpowder as*—

Saltpetre - -	-	0·7470
Sulphur - -	-	0·1245
Charcoal { Carbon	- -	0·0905
Charcoal { Hydrogen	-	0·0041
Charcoal { Oxygen	- -	0·0279
Water - -	-	0·0060
		1·0000

From these result on explosion—

Solids.	Grammes.	
Sulphate of potash -	0·2891	$KOSO_3$
Carbonate of potash -	0·1537	$KOCO_2$
Bisulphide of potassium	0·0959	KS_2
Hyposulphite of - -	0·0374	KOS_2O_2
Sulphocyanide of - -	0·0116	$KCyS_2$
Nitrate of - - -	0·0120	$KONO_5$
Charcoal left - -	0·0183	
Sulphur - -	0·0031	S.
Sesquicarbonate of ammonium - - -	0·0204	$2NH_4O3CO_2$

Gases.	Grammes.		Cubic C.
Carbonic acid - -	0·2239	CO_2 -	113·86
Nitrogen - -	0·0952	N -	75·72
Sulphuretted hydrogen	0·0238	HS -	16·67
Carbonic oxide - -	0·0118	CO -	9·45
Hydrogen - -	0·0003	H -	3·56
Oxygen - - -	0·0001	O -	0·09
	0·3551		218·35

Messrs. Bunsen and Schischkoff, in the year 1857, Jahrbuch, p. 626, give—

Gunpowder.		
Saltpetre - -	-	78·99
Sulphur - -	-	9·84
Charcoal { Carbon	- -	7·69
Charcoal { Hydrogen	- -	0·41
Charcoal { Oxygen	- -	3·07
		100·00

On explosion there result :

Solids.	
Sulphate of potash - -	62·10
Carbonate of -	18·58
Hyposulphite of - -	4·80
Sulphide of kalium - -	3·13
Sulphocyanide of - -	0·45
Nitrate of - - -	5·47
Carbon - - -	1·07
Sulphur - - -	0·20
3/2 Carbonate of ammonia -	4·20
	100·00

Gases in Volumes.	
Carbonic acid - - -	52·67
Nitrogen - - -	41·12
Carbonic oxide - - -	3·88
Hydrogen - - -	1·21
Sulphuretted hydrogen - -	0·60
Oxygen - - -	0·52
Binoxide of nitrogen - -	0·00
	100·00

* Jahrbuch der Chemie, 1858, p. 649.

Or in actual quantities :—

Solids.

Sulphate of potass.	0·4277
Carbonate of pot.	0·1264
Hyposulphite of pot.	0·0327
Sulphide of pot.	0·0213
Sulphocyanide of pot.	0·0030
Nitrate of pot.	0·0372
Carbon	0·0073
Sulphur	0·0014
Sesquicarbonate of ammonia	0·0287
	0·6856
Add gases	0·3138
	·9994 from 1 gramme of gunpowder.

Gases by weight.

	In grammes.	In C. C.
Carbonic acid	0·2012	101·71
Nitrogen	0·0998	79·40
Carbonic oxide	0·0094	7·49
Hydrogen	0·0002	2·34
Sulphuretted hydrogen	0·0018	1·16
Oxygen	0·0014	1·00
	0·3138	193·10

Although the result here is much more complicated than by the first calculation, and the proportions differ considerably, it also turns out that the resulting gases and solids which make up the smoke are equal to the weight of the original powder used. This simply means, that the amount of nitre has been very carefully calculated. No such accuracy is found in the powder of the miners, or in that which I used for experiments.

The 12 ounces used per day in a close end, or let us say 340 grammes, of gunpowder will give as gases—

	Litres.
Carbonic acid	34·5799
Nitrogen	26·9969
Carbonic oxide	2·5473
Hydrogen	0·7944
Sulph. h.	0·3939
Oxygen	0·3414
	65·6538

As solids.

	Grammes.
Sulphate of potash	144·710
Carbonate of potash	43·311
Hyposulphite of potash	11·189
Sulphide of potassium	7·296
Sulphocyanide of potassium	1·049
Nitrate of do.	12·751
Carbon, charcoal	2·494
Sulphur	0·466
3/2 Carbonate of ammonia	9·790
	233·106

Taking 1,200 cubic feet, or 33,978 litres, we have—

	Litres.
Carbonic acid from breathing	251·0592
„ from half a lb. of candles	324·7711
	575·8303
„ from the gunpowder	34·5799
	610·4102

The nitrogen from the gunpowder must also be added to the total nitrogen ; and when this and other operations are performed we have—

	Litres.
Oxygen	6,326·7036
Nitrogen	26,903·5949
Carbonic acid	610·4102
Carbonic oxide	2·5474
Hydrogen	0·7944
Sulphuretted hydrogen	0.3939
	33,844·4444

By weight in actual amounts—

	Grammes.
Oxygen	9,048·957
Nitrogen	33,726·7
Carbonic acid	1,200·44
Carbonic oxide	3·18800
Hydrogen	0·07186
Sulph. h.	0·59869
	43979·94855

By weight the numbers would be in per cents.—

For pure air.		For the enclosed air.
Oxygen 23·1	Oxygen	20·575
Nitrogen 76·9	Nitrogen	76·686
	Carbonic acid	2·72958
100·0	Carbonic oxide	0·00725
	Hydrogen	0·0001634
	Sulph. hydr.	0·0013613
		99·9993547

This will give a per-centage constitution of the atmosphere in the enclosure as follows :—

	By Volume.
Oxygen	18·6935
Nitrogen	79·4920
Carbonic acid	1·803607
Carbonic oxide	0·007529
Hydrogen	0·002347
Sulph.	0·001164
	100·000147

If we put together all the substances thrown into the air of the 1,200 cubic foot space, we have as air and impurities together—

	Grammes.	Grains.
Oxygen	9048·957	139737·7945
Nitrogen	33726·7	520470·4
Carbonic acid	1200·44	18525·2
Carbonic oxide	3·188	49·2
Hydrogen	0·07186	1·1088
Sulph. hydrogen	0·59869	9·23898
Sulphate of potash	144·760	2233·936
Carbonate of potash	43·311	668·375
Hyposulphite of potassium	11·189	172·668
Sulphide of potassium	7·296	112·592
Sulphocyanide of potass.	1·049	16·186
Nitrate of do.	12·751	196·773
Carbon	2·494	38·482
Sulphur	0·466	7·191
3/2 carbonate of ammonia	9·790	151·079
Organic matter		
Sand		
Sulphurous acid, or Sulphite of ammonia		
Arsenious acid		

All these substances actually are breathed by the miners. All except carbonic oxide, hydrogen, sulphocyanide, and arsenic have been actually found in the air. These four have been proved to enter it, and would be found if sought. We know assuredly that they exist, and search is therefore voluntary.

Every gas, with the exception of the first two, is injurious.

Every Cubic foot contains :—

	Grammes.	Grains.
O	7.540797	114·802599
N	28·105583	433·8182
CO_2	1·036666	16·0086
CO	0·002656	0·041015
H	0·000059	0·000911
HS	0·000498	0·007690
$KOSO_3$	0·120633	1·862865
$KOCO_2$	0·036092	0.557316
KOS_2O_2	0·009325	0·144000
KS	0·006080	0·093897
KCyS	0·000874	0·013476
$KONO_5$	0·010625	0·164075
C	0·002078	0·032089
S	0·000388	0·005989
$2NH_4 3CO_2$	0·008158	0·125779
Solids alone	0·194260	2·999486

It was on my first visit to the mines in Cornwall that it occurred to me that the probable condition of the air would be obtained by these calculations ; and fatiguing as they may be to read, and still more so to make, they approach so nearly the exact truth in the case of those ingredients which can be ascertained by experiment that I believe they may be taken as actually representing the true condition of the air, with reference also to those substances which are not determined by analyses. Here are the impurities of the air ; how far are they removed by the means already in use ? The analyses show how far some of these impurities have been removed ; and if the specimens have been taken from proper places they will show how much purification is due to such influences as position and natural changes or the use of mechanism.

There are some of the ingredients of the air at the end of the table not given in their quantity. The organic matter has been proved to exist, but its actual amount may be variously stated, and will be examined separately.

The sand is meant to include the fine particles of the rocks and the ores which are driven about as dust. The sulphurous acid and the arsenic are both in minute quantities, and both probably have little influence. The arsenic, however, cannot be considered as entirely without effect. The pyrites of Cornwall contain a large amount of arsenic, and when struck with a hammer or pick the smell is very strong. It is not a smell which a chemist only may trace, but one well known and used by the men as a test of the materials. This is a circumstance which may signify good or evil to the miners, most probably evil, but it cannot be entirely avoided, and is counteracted only by draughts of air. To this long list of impurities must now be added the products of distillation of tar and of canvas from the burning fuses. These are in amounts sufficient to affect the senses, and are of themselves extremely complex.

SOLID IMPURITIES IN THE AIR OF MINES.

It has already been said that the air issuing from a mine is not an invisible fluid, but contains solid material enough to make itself distinctly perceived, if not in all cases, still in cases of even well-ventilated mines ; using the expression well ventilated in its ordinary acceptation, namely, compared with other mines. When I first observed this, it seemed to me that the sides of the shaft would be continually receiving accumulations of solid matter from these floating particles, and some of the surface of the wood was taken home for examination. But when it was considered how many solid particles in the form of stones and mud are continually moving up and down the shaft, it appeared on the other hand not at all probable that any conclusion could be drawn regarding those which were only to be caught by the sides out of the moving air. It was needful then to seek another method. In order to obtain floating particles in the air various methods have been used by Pasteur and others. Dr. R. D. Thomson used a screen, and others have used liquids. But an easier method, for a portion of this enquiry at least, presented itself, when Mr. P. H. Holland, on looking at one of the tubes which had been filled with air from an end in South Francis mine, asked why it glittered so much. A careful examination of every tube showed that the floating crystallized bodies of the mine air had deposited themselves on the glass.

The microscope showed that the solid products of the combustion of gunpowder are to be recognized in the specimens of air, and that there is a considerable variety in the form of crystal. In some cases, the crystals of saltpetre may be traced, in most a sulphate of potash. The internal space of the tubes is only from two to three cubic inches, and the substances occurring in smallest amounts will not be readily detected. The per-centage of sulphide of potassium in powder smoke is 3·13, of the solids, and of sulphide of hydrogen 0·6 ; whether from the quantity being so small or from the rapid oxidation of these sulphides, they have not yet been traced with any certainty in the air collected for analysis. In nearly all cases the tubes were examined by the microscope before they were broken open, and a note was made of the amount of crystals which were apparent. The amount is given in figures, which must not be considered as very definite, but as simple approaches such as the eye makes ; in other words, they may be styled estimates. The eye can of course readily distinguish between amounts which differ as much as one and eighteen, and so widely the varieties did in reality differ.

The drawings of the substances speak for themselves ; the power used for magnifying was 85 diameters, a higher power being found unmanageable on account of the thickness of the glass.

Besides the crystalline bodies there are substances transparent but shapeless, some looking like pieces of quartz, some perhaps looking more like glass.

There are also opaque substances, not very dense but shapeless and small, although at times one is found much larger than the others. I suppose these constitute the dust or broken-down portions of the rocks. Sometimes portions are blacker than others; these are the charcoal of the gunpowder.

Again there are occasionally filaments of evident organic origin ; these also are to be counted amongst

the numerous substances that make up that complicated material so vaguely called dust. Portions of our own selves are to be found in it no doubt, and portions probably of everything existing around us.

Having found then that of a certainty numerous soluble and insoluble substances and bodies of various shape and texture are to be found in that air which the miners breathe, we naturally enquire what is the effect on the lungs. As this question belongs properly to a medical man only, I shall not presume to enter fully upon it, but it is certainly my part to prepare the evidence, and in fact to say as much as I have the power of learning.

One complaint I have made against the air, viz., that it is visible, when there is a layer of as little as one foot in thickness. The purest air is probably itself visible in the thickness of many miles. The atmosphere of all our towns is visible in the thickness of about half a mile, but there are portions of it readily seen in the small space of workshops, and even in those where there are employed numerous strong men who have not been found to suffer in an equal degree with the miners. In all these cases it may be said that there is a reservoir of purer air at the door, which may be considered equal to the existence of a shaft within a few feet. If such a convenience existed at every working spot of a mine, this enquiry would have been less necessary.

In those workshops in towns the most apparent impurity is that of smoke and the ashes of coals. It will be well to compare this with the substances found as solids in the air of mines.

Analyses of the Ashes of Coals. *Watts' Dictionary of Chemistry.*

——	Newcastle Coal after deducting Sulphuric Acid.	Average of 5 Welsh Coals.	Average of 5 Scotch Coals.
Silica - -	62·44	42·67	49·63
Alumina -	31·22	—	—
Sesquioxide of iron and alumina -	—	43·56	38·21
Sesquioxide of iron -	2·26	—	—
Lime - -	0·75	6·65	3·18
Magnesia -	0·85	1·08	1·41
Potash - -	2·48	—	—
Soda -	—	—	—
Sulphuric acid	—	4·46	6·26
Phosphoric acid - -	—	0·66	1·03
Per-centage of ash -	1·36	8·15	—

Here the ashes are seen at once to differ very far from gunpowder ash, and the smoke, as is well known, differs far from gunpowder smoke. Let us pursue the differences.

The coal dust consists almost entirely of insoluble salts; the gunpowder entirely of soluble.

The coal dust is shapeless; the crystals of powder smoke and dust from explosions sharp.

The coal is oxidized by a great current of air and sulphides are therefore forbidden. The gunpowder smoke contains sulphides. If a few grains of gunpowder are exploded in a large vessel moistened on the side by acetate of lead, the whole vessel becomes black instantly. There is sulphuretted hydrogen in small quantities, but there is sulphide of potassium in comparatively large quantities, and that salt it is which gives the peculiar odour to powder smoke, in my opinion. I cannot but believe that the action on the lungs of this salt must be equal to that of sulphide of hydrogen, although from acting more slowly, perhaps the effect is more easily overcome. The slow action is a great advantage; the body has time to renew frequently the attack against its enemy; but although there may be power to resist actual death, the effect of slow action may be, and most probably is, to distribute over a long period of time that death which might ensue instantly, so that, if a chemist may be allowed to use the expression, the effect is dissolved in health and becomes disease. Probably the sulphide will deoxidize the blood and act in other ways not yet known. A powerful agent in the lungs it must be.

People who love the smell of gunpowder may be surprised at this, but we need not go to the soldier or the sportsman for examples either on one side or the other. The amount of gunpowder which they inhale is a mere trifle compared with that taken into the lungs of the miners. The soldier may have as much in battles, but these are the rare occasions of his life. So far as air forms the condition of existence a miner lives on a battle field his whole life; he has the smoke, the dust and the heat. Read the description of the air of a battle field and you have already that of a mine. The sportsman with the fine air around him has at the most only a short whiff of the powder smoke.

Let us endeavour to find how much really is inhaled. Let us say there are taken into the lungs in a minute 320 cubic inches of air, an amount considerably below Vierordt's estimate We have, then, in 10 hours, which is longer than the men must be in the mine air, 111 cubic feet. Let us say that 30 of these cubic feet contain the full amount of solid matter estimated, or, in other words, that the 111 feet breathed contain an amount equal to the full dose contained in 30 feet. We have then inhaled in one foot the amount of—

0·19426 grammes × 30 = 5·82780 in 30 feet.

Or in grains

89·914580 in 30 feet.

We cannot expect that a man will inhale so much, but it is at times possible, and to this fully he is at least liable to be exposed during a part of the day. A full dose of gunpowder smoke exists in the air only a portion of the time.

I here give careful drawings of the substances found in air, as they were found attached to the sides of the tubes. An investigation into the small bodies attached to surfaces offers to give much that is new. In this case it is not intended to go into details. The result of the general analysis of dust from the tubes has been given. The crystals on number five must, however, be mentioned separately. They were found even on tubes perfectly fresh from the glass-blowers, and always at the ends. The action of the heat on the glass has produced some changes, diminishing perhaps its soda; and at any rate either causing an efflorescence or a general deterioration. As a rule the greater number of all the crystals was found near the extremities of the tubes; I suppose these places were quieter

and less exposed to currents which would exist even in the small space contained in a tube.

Dust and Crystals collected from the Air of Mines.

No. 1.—Dust collected on the sides of a tube after gunpowder had been exploded in it.

No. 2.—Dust collected from the air of the lead chamber after explosion of gunpowder in it.

No. 3.—Specimen of an unusually large piece of saltpetre found in the air after explosion.

No. 4.—Dust collected on all objects in the chamber after an explosion of gunpowder.

No. 5.—Figures at the end of the glass tubes after much heating.

No. 6.—Figures on the tubes along with crystals from the air of a mine after an explosion of gunpowder. V V Barberry.

No. 7.—From H H H Dufton (Silverlead), Yorkshire.

No. 8.—N N Arkendale, Fregill, No. 2, immediately after an explosion.

No. 9.—V V Barberry, after an explosion.

No. 10.—V V Barberry, after explosion.

No. 11.—28 D 28.

No. 12.—South Francis Mine, 11th September 1862, 1140 feet.

No. 13.—South Francis Mine at surface, 9th September, 1862.

No. 14.—South Francis Mine, 1,140 feet, 10th September 1862.

No. 15.—T T Bunting.

No. 1. gunpowder specimen. This was taken by drawing the air as usual into a tube and sealing it. When examined by the microscope, and even by the naked eye, crystals of saltpetre were distinctly seen. There was clear matter like a crystallized salt, but with no regular form, and in conjunction with black spots. The tube, which before was clear, had a fine dust over it, distinctly showing that even the formless matter observed was brought into the tubes at the time of the explosion.

AMOUNT of CRYSTALS observed, compared with the OXYGEN or its Deficiency.

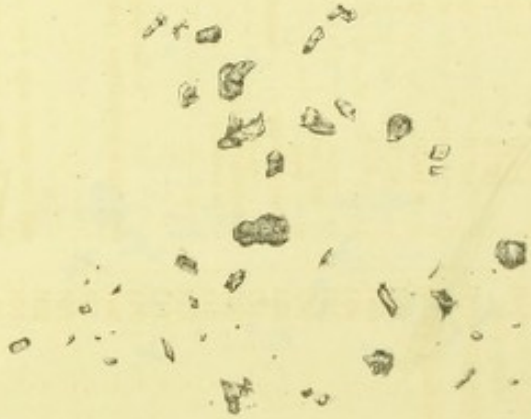
No. of Specimen.	Crystals.	Amount of Oxygen deficient, or the Amount less than 21 per Cent.
2	0	0·4
4	1	0·38
6	0	0·04+
7	4	0·1
8	0	0·36
9	1	2·20
12	0·5	0·24
14	0	0·66
19		1·99
20		0·8
21		1·91
23	0	0·78
24	Abundant	0·708
25	0	0·2
26	?	0·13
27	?	2·73
28	?	1·7
29	0	0·0
32	0·2	0·0
33	0·1	0·15
34	3	0·21
35	4	0·83
36	0	0·11
37	0	0·16
38	0	0·12
39	0·5	1·04
40	1	0·18
42	0·5	0·17
43	0·5	
44	0·1	0·6
45	0	0·0
46	1·5	0·89
47	0·1	0·16
48	0·2	0·27
49	0·5	0·04
50	1·0	0·96
51	0·1	1·07
52	0·0	0·53
53	4·0	0·25
56	0·1	0·47
58	Large, but few.	0·0
59	4	0·86
61	1	0·7
62	4	0·6
63	0·5	0·04
64	0	0·18
68	3	0·42
70	0·1	0·75
71	Dust	0·06
72	3	1·47
73	0·1	1·48
74	0·1	0·53
75	5·0	0·92
76	0·1	0·21
77	2	0·16
78	1	0·46
79	3	0·95
80	3	1·73
101	1	0·05
103	2	1·04
105	3	0·52
107	8	0·63
109	2	0·64
110	5	0·35
111	3	0·01
113	2	1·0
116	0	1·30
120	1	1·19
121	1	0·21
122	0·1	0·51
126	0	
127	2	0·12
128		1·68
129		
130		0·10
South Francis shaft		0·46
„ „ 90 fa.		2·31
Dolcoath mine, 1,400 feet deep.		0·23
D 4	2	1·18
D 8		0·45
D 9	1	1·02
D 10	0	0·91
D 11		1·14
D 14, top	1	
D 15	0·5	0·28
D 16	0	0·30
D 25	0·1	1·60
D 28	0·3	0·20

1



From Gunpowder coarse

2

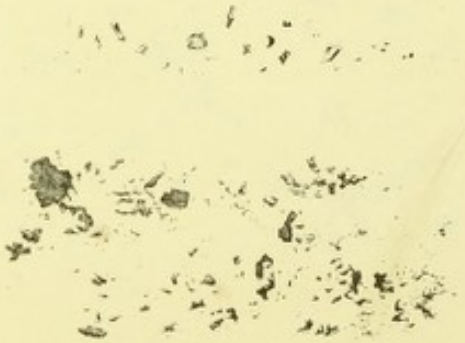


Gunpowder vapour after explosion in Lead chamber.

February 17th 1864



N° 1. Explosion of Gunpowder in the Lead chamber
Floating particles



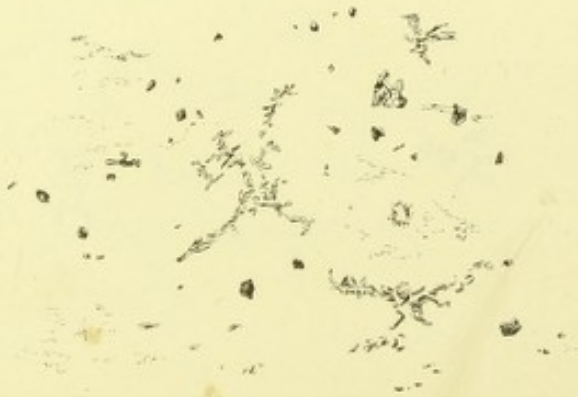
Dust collected in small chamber after an explosion
of Gunpowder



AAA
N° 2

West Burton Yorkshire

Thermometer 59.— Barometer 28.58



VV

Barberry

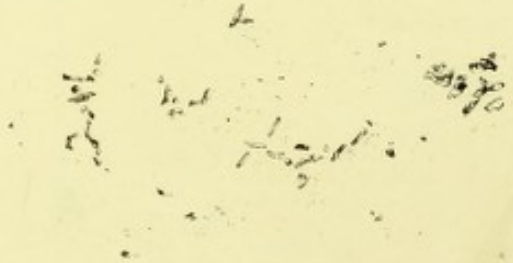
Thermometer 57.— Barometer 28.6

Immediately after an explosion of Gunpowder



HHH Dufton (Silver lead) Yorkshire

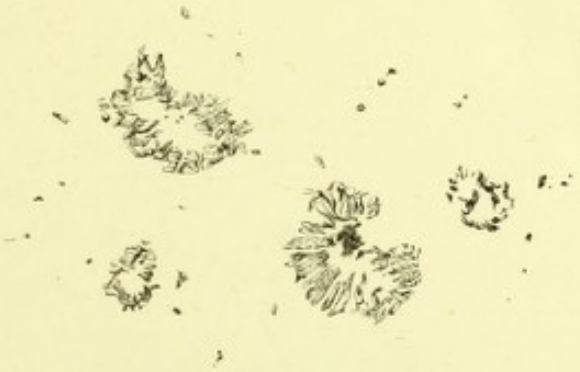
Thermometer 49 — Barometer 24 · 94



NN' Arkendale Foregill
N° 2

Thermometer 56 · · Barometer 27 · ·

Immediately after second explosion in level forehead



VV Barberry

Thermometer 57.... Barometer 28. 6

Immediately after an explosion of Gunpowder

Day & Son, Lith.r to the Queen.

11



12

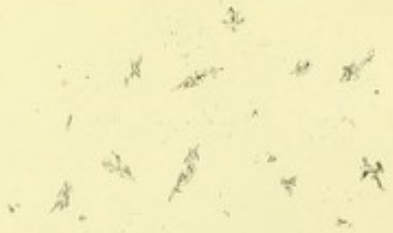


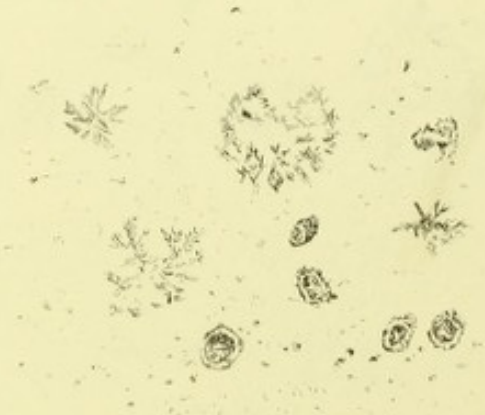
S Francis Mine 190 Fathoms

Sept 11th 1862



South Francis Mine Shaft at Surface
Sept. 9th 1862

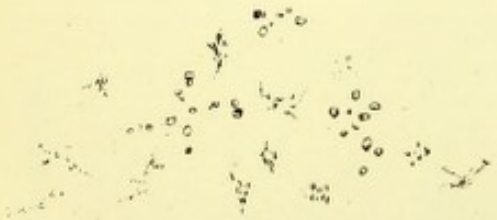




Barberry

Thermometer 57 ... Barometer 28. 6
Immediately after an explosion of Gunpowder

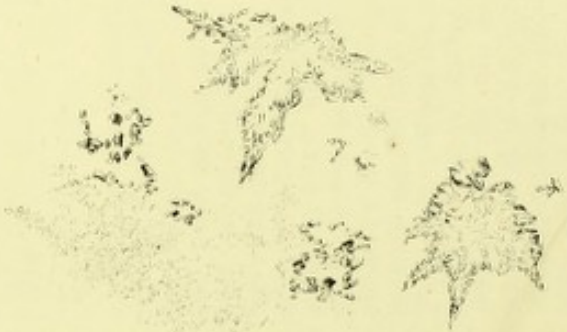
15



TT Buntings

Thermometer 58. — Barometer 28.

14



St Fermins Mine 190 Fathoms

Sept 12th 1862

No. of Specimen.	Crystals.	Amount of Oxygen deficient, or the Amount less than 21 per cent.
D 29	4	1·43
D 32		0·24
D 33	8	
D 35		0·49
D 36	0	0·27
D 40	0	1·00
D 40	0	
D W L 45		
D 41		1·09
D 45		0·32
D 46	2	0·18
D 47, 30 S		1·93
W 1		1·09
W 4	0·1	1·27
W 5	0·1	1·28
W 6	Longer	0·68
W 7	0	1·60
W 8	1	1·74
W 9	2	0·31
W 10	0·1	1·00
W 12	0	1·46
W 14	0·1	0·89
W 16		0·56
W 18	0·1	0·24
W 19		0·42
W 21	0·5	0·73
W 25	0	0·08
W 38	2	0·7
W 50	Dust chiefly	0·24
W 53	0·1	2·40
W 54	0	0·80
W 59	2	0·93
W 64	0	0·44
W 66	0	0·71
W 67	0·1	1·39
W 75	4	0·27
W 76	1	0·10
W 78	3	1·21
W 79	2	
W 80		2·00
W 83	3	
W 84	2	
W 85	2	1·38
W 87b	2	
W 89	0·1	0·45
W 90	Black dust	0.58
W 92	0·5	1·38
W 94	0·5	
W 95	0·5	
W 96	1	
A		0·16
M	2	0·0
N	1	0·97
O	2	
P	1	0·56
Q	2	0·81
R	1	0·44
S	1·5	0·23
T	3	0·31
U	3	0·02
V	0	0·67
F F	6	0·38
G G	1	0·21
H H	0·2	0·32
I I	3	1·91
J J	3	0·63
J Ja	2	1·37
K K	2	2·23
L L	0·1	1·96
M M 1	4	2·00
M M 2	3	
N N 1	6	0·87
N N 2	6	1·38
O O		
P P 1	0·5	0·08
P P 2	0·5	0·63
Q Q 1	2	0·19
Q Q 2	0·1	0·44
R R	4	0·48
S S 1	1	1·44
S S 2	1	
T T	2·5	1·18
U U 1	0	0·45
U U 2		
V V	2	1·40
X X 1	0	0·22
X X 2	0	0.41
Y Y 1	5	1·23
Y Y 2	0	
Z Z 1	0	1·45
A A A 1	4	0·10
B B B 1	0·1	0·09
C C C 1	0·1	1·76
C C C 2	0·1	0·74
D D D 1	0·1	0·71
E E E 1	4	0·87
F F F		0·79
G G G		1·16
H H H 1	4	0·18
H H H 2		0·53
I I Ia	6	0·21
J J J 1		0·56
German Specimens.		
G 1	3	1·20
G 2	2	0·52
G 3	0	2·07
G 4	1	2·48
G 5	3	0·61
G 6	4	0·49
G 7	2	0·35
G 8	4	0·10
G 9	4	0·75
G 10	4	0·22

The result of the comparison clearly is that the existence of solid matter and crystals in the tubes is not coincident with a corresponding deficiency of oxygen. I had, perhaps carelessly, expected the contrary, and hoped to find that one mode of examination would confirm the other. When examined more narrowly (and such results compel us to this fuller examination) we find that the diminution of oxygen in the air of a mine has no exact connexion with the solids contained in the air. Although both must frequently be found together, they are independent defects. For example, it happens that men work long in boring holes for blasts, but making no blast until several are ready. In this case the air deteriorates, but there can be no powder crystals. Next it happens that the powder smoke rolls out upon the purest air of the mine; it does not necessarily carry a diminished amount of oxygen along with it. The solid particles separate from the gaseous. In reality there must be cases where an explosion will purify a portion of the atmosphere, whilst it deteriorates another, and is the most violent agent for evil in the air of mines. For example, it will drive out air from a level at a long distance from the explosion, and other air will enter as the heated gas cools. To

some extent this will be of service, but it is one of those things which serve to complicate the conditions to be considered.

In a recess of small extent, an explosion will drive out all the existing air, substituting powder air. This, being very different from the atmosphere, will rapidly change by its own action, and fresh air will come in. This increased rate of change would go on no further than the point of impurity in the air before the explosion; but the organic matter and the excessive moisture would be removed. If the carbonic acid were washed out there would be a very fair purification, although not a perfect one. When the cavity is long the same result will not take place. The impure air of the end will be driven forward, it is true, but after the explosion most of it will come back mixed. There will be various modifications of the constitution of the air, and there will be a very gradual entrance of purer air. If in this case the carbonic acid and solid matter were washed out there might remain a deficiency of oxygen, an atmosphere not desirable to breathe. It would be interesting to know if this deficiency of oxygen with purity in other respects would be perceptible, allowing that it did not go beyond one per cent. or perhaps two. This is a point elsewhere to be examined. Meantime it may be said that the air will certainly be better without the carbonic acid and solid matter than with it, so that something at least would be gained. This leads to an enquiry as to the advantage of washing the air.

It is not my intention to say much on the effects of breathing so much solid matter. To judge from my own experience, it must be very hurtful. I must leave medical men to describe the effects, but will here remark that twelve hours after breathing powder smoke to an unpleasant amount, phlegm with taste of nitre appeared after a slight cough, entirely different from all previous experience. To assist in forming an opinion I have transcribed the following remarks which seem to me very just.

Effects produced upon the miners by the explosion of gunpowder.—By Dr. Josephson. (Annales d'Hygiène Publique, t. 19, 221.)

"We know that during sieges there passes underground a war of mines and of countermines, in order to hinder the assailants from penetrating near the fortifications by covert ways. The efforts of the besieged are especially directed to destroying and filling up the subterranean trenches of their enemies, by exploding powder in their works. Now, these explosions of powder in narrow spaces, where the air circulates with difficulty, occasion the evolution of gas; whence accidents well known to engineers, the nature of which is found in special works, and of which Dr. Josephson has given an account, when speaking of the demolition of the fortifications of Juliers.

"He has distinguished three particular forms:—

"*First Form.*—This is the mildest; the miners employed in the interior of the gallery experience in the middle of the forehead a piercing pain, so acute that they totter, sink down, and can speak only in a hesitating and imperfect manner. This stupor, the pain in the forehead and the tingling in the ears continue for some time, until exposed to the open air. The temperature and sensibility of the skin have undergone no change; the conjunctivæ are slightly injected; the other functions remain intact, except a little swelling of the stomach; and a slight headache remains for two or three days.

"*Second Form.*—The miner comes from the level apparently in health, then suddenly he falls without uttering a single cry; there is a loss of movement, a retardation of breathing; the eyes are half closed, replies are made in an excited manner; pulse large, full, showing 90 or 96 pulsations; colour and temperature of the skin normal. In about a minute breathing is resumed, the general condition remaining elsewhere the same; there is a want of power to swallow the liquids which are introduced into the mouth; very often hiccough comes on with attempts to vomit, rarely with vomitings which, when they do take place, always bring relief. After ten or fifteen minutes the recollection returns, the sick man complains of a keen feeling of cold and of headache in the forehead; and scarcely has a half hour passed until he can return to his work the headache only remaining and sometimes the oppression.

"*Third Form.*—Here the man falls while at work as if struck by lightning, and is seized with convulsions of an epileptic form; often there are spasmodic movements or actions, during which he stiffens with such violence that it is often very difficult to carry him along the straight galleries where he has been surprised by this attack. Brought to the air, he experiences a kind of tetanic convulsion, the teeth are pressed close, and breathing becomes loud and heavy, then follow foam at the mouth and complete loss of the senses; the eyes open, pupils dilate, the eye rolls in its orbit, conjunctivæ are injected, the pulse is full, moderately quick, unequal, and irregular. After some minutes of this condition there occurs a dilation of the muscular system. The patient is still insensible, presses convulsively his head between his hands, as if he feared that the violence of the pain would cause it to burst; sometimes he grinds his teeth; sometimes he utters hoarse cries; his pulse has become smaller and intermittent, the skin is livid, cold, and harsh. However, intelligence by degrees returns and the patient falls into a deep sleep during which he very often weeps and sobs; from his mouth there escapes a quantity of saliva, the pain in the head continues for a day after he awakes but his recovery is complete the day after."

"It must be admitted that the cause of these accidents is the gas evolved by the explosion of the gunpowder, and particularly the sulphuretted hydrogen; the sickness of the miners ought then to be regarded as a hydrothionic intoxication. Mr. Josephson has placed in the mouth of the sick a piece of paper saturated with a solution of lead, concentrated, and soon observed a grey colour."

Having had an opportunity of observing the instrument as proposed by Sales-Girons for the pulverization of liquids, or mixing them with the air in a condition so fine that they may be inhaled like very fine dust or like mist, it seemed as if the action of some of them would explain the effect of gunpowder smoke on the lungs. But looking at one of the latest papers

by Wedemann,* the only aid on the subject found is this, that the particles of so called powdered liquids are carried direct into the air tubes and that 30 inspirations are about sufficient for a dose, although sometimes very much more is given. The effects are evidently very great. Not to speak too much on a medical part of the subject, I observe that the author remarks the falling of the pulse during the breathing, and attributes this to the long inspirations that are taken. It may not be unwise to place the fact beside it, that as the air became worse in the close chamber during my experiments the pulse became weak and the inhalations long and numerous.

I have taken the liberty of making the allusion, as the instrument does not seem well known to medical men in this country.

ORGANIC MATTER OF THE AIR.

The organic matter has been a subject of great search, and it has escaped the observation generally. Vogel and Boussingault chiefly have laboured on the subject, and proved the existence of dissolved matter in crowded rooms and in unwholesome swamps. Some years ago I published some enquiries which excited great interest. It was desired that the process recommended at the same time should become so easy that every one could use it as easily as a thermometer. I have not been able to reduce it to that simplicity for all cases, but shall here endeavour to show exactly how far the plan is capable of popular use.

Forchammer first used permanganate of potash to test the organic matter in water. I had occasion to use this salt, or mineral chameleon, in the laboratory; and it struck me as very remarkable, that whilst the solution remained unchanged for a long time in a bottle, a thin stratum exposed to the air became brown in a few minutes. I breathed upon it, and it became brown more rapidly. This seemed to give the clue to the cause of the decomposition which the permanganate underwent in the atmosphere. The result was exactly that which occurs when we attempt to filter the salt through paper. The paper decomposes it instantly.

The next attempt was to obtain results from pure and impure air, and these were so decidedly different that a means of measurement seemed to be attained.

The apparatus used was very simple; it was merely a bottle of the capacity of 100 cubic inches. A very weak solution of permanganate was made; but even a very weak solution gives a very strong colour. A small burette holding 100 grains was filled with the solution of permanganate. The air was pumped out of the bottle, leaving the mouth open, so that the air of the place streamed in, and the stopper was put on. This stopper was of caoutchouc, perforated with two holes; one to allow a tube to enter through which the permanganate was poured into the bottle; another to allow, at the same time, a corresponding amount of air to pass out.

The liquid was poured into the bottle, and allowed to roll round the sides. It seemed to me that no improvement was obtained by allowing more than ten minutes for this. A small quantity was used at first, the colour was instantly removed, a small quantity more was added, and so on until the colour remained permanent, showing that the air contained no more of the material fit for decomposing permanganate.

Before making this public, I had made above 300 experiments. Of these, however, few only were published. They were given in a lecture at the Royal Institution. At that time I used oxalic acid to try the strength of the solutions; but oxalic acid is not a very sharp test, and I doubt if all the results are so definite as might be wished; but as a scientific fact, and a mode of showing the existence of organic matter in the air, the plan was sufficiently explained.

In trying the experiments in town and country, however, there was a difference given which could not easily be dealt with. The town air always required more permanganate: and no wonder; this was in reality due, to some extent, to sulphurous acid from the burning of coals. This might be mistaken for organic matter, and could this mode of testing show the difference? It could not readily show it, but when it is carefully observed, it is seen that the sulphurous acid of towns acts instantaneously. The sulphurettted hydrogen of putrid gases acts also instantaneously but the organic matter acts slowly. Still the organic matter does act.

The following table will give a fair specimen of the figures obtained; I need not here record them all. I certainly was not satisfied with the apparatus used, and endeavoured to obtain better results by means of an aspirator, that is by driving the air through a solution through which it might bubble. The experiments made in this way were satisfactory in a scientific point of view as may be seen below, proving the same points; but an aspirator is not generally applicable.

It was for the reasons found here that, in spite of many requests, I have never seen it proper to let it go forward as a popular apparatus. So far as putrefying matter and sewer matter is concerned as well as the sulphurous acid of coal smoke, the action is so rapid that any one may use the plan; but when organic matters purely are concerned, it frequently requires much patience, and some of that peculiar form of discretion which can only come with some knowledge of chemistry.

The following were made with the burette in a bottle of the capacity of 100 cubic inches. The number of grains of the solution of permanganate decolorized by 100 cubic inches of air is given in the last column, and the comparative amount of oxidizable matter is thereby seen. The bellows-pump used to remove the air from the bottle was that which is seen at figure 1.

* Würzburger Medicinische Zeitschrift, 1863. "Inhalation Medicamentöser Flüssigkeiten."

Grains of solution of permanganate of potash, decomposed by equal quantities of air. The last column gives the comparative amount of oxidizable matter in the air.

Place.	Date, 1858.	Temperature.	Grains of Permanganate of Solution used.
London :		Fahr.	
Wellington Street	July 13th	70°	45·
Do. higher up	,,	,,	25·
Waterloo Steps	,,	,,	42·
Blackfriars, in the street	,,	,,	25·
Southwark Bridge (at river)	,,	,,	55·
Street near the same bridge	,,	,,	22·
A little distance from river	,,	,,	22·
Street near Fetter Lane	,,	,,	30·
Fenchurch Street Station	,,	77°	18·
Loughton (in Epping Forest, on the hill)	,,	,,	16·
Loughton, at a goose pond	,,	71°	28·
Forest again	,,	,,	16·
Ditto, in the evening	,,	69°	16·
Inside a house	,,	,,	18·
Camden Square	,,	72°	26·
,, ,,	,,	,,	26·
,, ,, (after a thunderstorm and during rain)	,,	69°	10·
Kentish Town Road (close and warm)	,,	83°	37.
Highgate Road (where the houses form a single row)	,,	,,	27·
Do. at Swainson Lane	,,	,,	25·20
Ditto	,,	,,	24·25
Highgate, middle of village (an open wide road)	,,	,,	23·
Beyond Highgate, on the descent of hill	,,	,,	22·
Ditto	,,	,,	20·
Marylebone Cemetery	,,	,,	21
Finchley	,,	,,	15·
Near Euston Road	,,	,,	33·
Everitt Street	,,	,,	29·
Thames opposite Lambeth	,,	,,	35·
Ditto again	,,	,,	35·
,, Waterloo Bridge	,,	,,	35·
Poets' Corner	,,	,,	24·
Kew :			
Fern House, No. 12	,,	78°	20·
,, No. 10	,,	68°	14·
,, No. 15	,,	79°	18·
,, No. 15	,,	84°	32·
Victoria Regia House	,,	85°	14·
Palmhouse, at bottom	,,	73½°	18·
,, at top, painting going on	,,	,,	22·
Outside Palm House (evening set in)	,,	65°	10·
60 miles from Yarmouth, at sea	Aug. 1st	69·5°	3·5
Hospice St. Bernard in a mist	—	—	2·8
Hill in Lancashire	—	—	2·8
Lake Lucerne in middle-evening	—	—	1·4

Place.	Date, 1858.	Grains of Permanganate of Solution used.
All Saints, Manchester	June 22nd	40·
,, ,,	,,	40·
,, Inside laboratory	,,	48·
,, Outside ,,	,,	40·
,, ,, ,,	,,	37·
Air drawn foom a pigstye	,,	70·
All Saints, Manchester	June 21st, evening.	28·
,, ,,	June 22nd, morning.	36·
,, Inside laboratory	June 23rd, morning.	34·
,, Outside ,,	,,	30·
,, ,, ,,	,,	26·
,, ,, ,,	Evening	15·
Pigstye	,,	63·
All Saints'	June 24th	44.
Greenheys	,,	41·
Greenheys	,,	40·
Extreme of Greenheys fields, testing every ½ mile nearly, and leaving the town	,,	42·
,, ,, ,,	,,	40·
At a bridge (strong smell of putrefaction)	,,	73·
,, ,,	,,	38·
,, ,,	,,	36·
,, ,,	,,	30·
,, ,,	,,	30·
,, ,,	,,	27·
,, ,,	,,	15·
,, ,,	,,	19·
,, ,,	,,	16·
,, ,,	,,	12·

A very much larger vessel than here used would make the test sharper, but there is a great objection to bulky apparatus.

A better mode of conveying the test into the bottle was devised—a tube passing through the stopper was furnished with an elastic ball. The stopper and ball are taken out, the ball is pressed, and the point dipt into the permanganate. The ball is then allowed to expand, and the liquid rises. The taps are then closed, and the stopper put on. When the liquid is to be added to the bottle, the taps are opened and the ball pressed ; by this means any amount may be passed into the bottle without contact of air. If there is a graduated tube connected with the ball the amount may be read off there, and by having the stopcocks, none of the liquid is required to enter the hole.

In this way we may work with very small quantities of liquid and of air.

The method of preparing the liquid and testing it need not be given in detail, as I doubt if any but chemists could manage it.

From the late experiments one cub. centimeter of a solution of permanganate is made equal to 0·00225 grammes of metallic iron. A strong solution is prepared and tested, then diluted to the proper amount. The dilution must take place with very pure water. The best water is got by distilling deep well water, or else by allowing some to stand with a considerable amount of permanganate of potash for a night and then distilling it. The solution must remain clear with some purple in it, and must not become red.



Fig. 1.

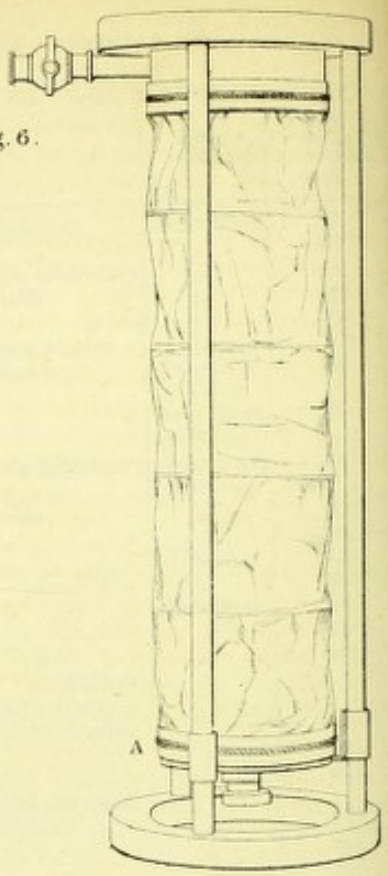


Fig. 6.

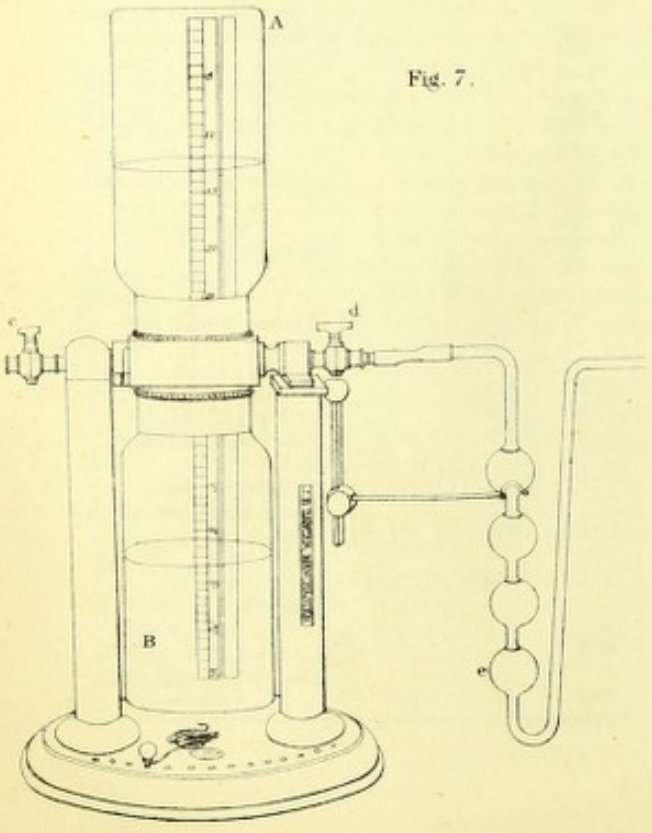


Fig. 7.

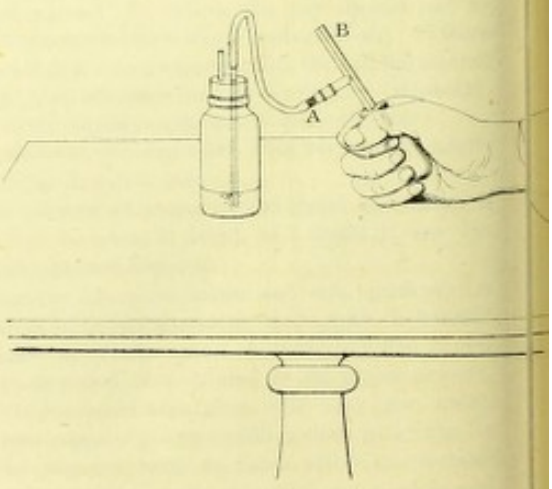


Fig. 8.

Day & Son, Lith.rs

I have made some solution very pure by weighing out a crystal of permanganate and adding water to it, but, on the whole I prefer to begin with manganate, the green salt. By adding water to this, it becomes reddish or purple.

The solution of a crystal was used in the following experiments:—

Organic and other Oxidizable Matter in the Air.

5 cub. cent. (77·20 grains) of the permanganate were used, and air passed through it.

1 cub. cent., tested with protosalt of iron=0·00225 iron, or 0·00032 oxygen.

	Place.	Litres of air passed through.	Cubic feet passed through the Solution.
	Air on the hills near Buxton -	above 90	above 3½
1	At the laboratory -	64·750	2·286
2	,,	61·680	2·178
3	,,	61·680	2·178
4	,,	67·848	2·396
5	,,	66·306	2·341
6	,,	64·750	2·286
7	,,	64·750	2·286
8	,,	66·306	2·341
9	,,	67·848	2·396
10	,,	65·521	2·313
	Mean at Manchester	65·143	2·300
	In the lead chamber after three persons had remained about two hours - -		
1st		46·260	1·633
2nd	,,	49·344	1·742
3rd	,,	43·176	1·524
	Mean - -	46·260	1·633
	Human breath -	44·718	1·579
	,,	47·802	1·688
	Mean - -	46·260	1·633
	Air from a midden	52·428	1·851
	,,	57·054	2·014
	,,	47·402	1·674
	Mean - -	52·294	1·846
	In lead chamber with vapour of gunpowder -	43·176	1·524

The amounts here are not exactly the same as in my former experiments, made six years ago. The earlier were made with an alkaline salt, the latter with a pure permanganate. It seems to me that the former is the most sensitive, and for the following reason :—

When acid, whether carbonic or any other acid, is added to the manganate, it becomes red, and the air which is passed through it, giving up its carbonic acid, causes this redness. When the change once begins it more readily goes forward. The solution is still more easily decomposed when sulphuric acid is added to it, although another cause seems then to act ; that is, the sulphuric acid assists in retaining and decomposing the organic substances.

There may also be some other causes which affect the decomposition of the manganate. Sometimes it is very easily reduced ; sometimes otherwise ; so that I fear we have to deal either with a variable substance, or with very variable conditions. The latter is the more probable, and, at any rate, the causes of a change are very numerous. As a rule, however, the amount of organic or other oxidizable matter in the air ought to be so small that with 5 cub. centimeters (77 grains) of the solution, it will require nearly four cubic feet to remove the colour when the air is caused to bubble through, and if less removes it the air is not the purest. Sometimes, as in the case of putrefactive matter, or of sulphuretted hydrogen, a few score cubic inches will be enough, in very bad air still less. In no case, however, will these experiments be complete, with such a small quantity of air as 100 cubic inches, unless the liquid is shaken in the bottle, or made to roll round its sides. In that case, as it will be seen, much less liquid was used, as well as much less air.

It is fatiguing to roll the bottle about in the hand, and I confess my patience was far too much tried to continue farther, and my assistants became tired also. I propose, therefore, the use of a flexible aspirator,—an instrument since found of the greatest value for many experiments. It stands at figure 6. It is composed of caoutchouc cloth. If standing with A downwards, it will draw air into itself, through a solution placed as at *e* on fig. 7, and with such regularity that even if allowed to go by itself for two hours it will be found not to have varied its pace. With water aspirators, as generally made, a variation is continually taking place. The amount which it has taken in or passed through the solution may be measured by the depth which A has fallen. My earlier experiments were more accurately measured, viz., by passing the air first through a Croll's or Glover's dry gas meter, in which it was easy to measure to a few cubic inches. Those made in a bottle of definite dimensions were not subject to any error of measurement. This flexible aspirator is also an apparatus which might be more employed in laboratories. If inverted, it may be used for pressing air through a solution. This too it performs with great regularity. The air or gas may be collected from any spot, and carried till it is required but extreme purity is not obtained in this way, on account of the sulphur from the vulcanized rubber cloth.

If people have much work to do, even the trouble of filling and emptying such a vessel may be too fatiguing ; and to avoid this evil Mr. J. B. Dancer, of Manchester, has made a very beautiful apparatus, adapted at first for this process only, but capable of being used for numberless purposes in a laboratory. The apparatus stands at figure 7. When the connections have been made as there shown, and the stoppers opened, the flow of water will commence from the upper bottle, drawing the air through the solution at *d*. When this is done, the bottle is reversed by a touch of the hand. It is moved with the greatest ease. The operation commences again. The bottles are measured in parts of a cubic foot, or in cubic centimeters, as required. This is a very elegant apparatus, a great improvement on that of Dr. Reid's, and ornamental either in a house or laboratory.

The 4-bulb glass is intended to allow of very rapid absorption. The first bulb is only half filled, and when the gas passes rapidly, the liquid is thrown up in spray, and thus better exposed.

When any caoutchouc is used it must be black; that is, either the common natural, or vulcanized rubber boiled with caustic soda. If ordinary vulcanized rubber is used in contact with permanganate, the solution is instantly decomposed. If the air from the inside of a bag of this rubber be used, it instantly destroys the permanganate. In fact that which we smell of vulcanized articles decomposes the salt.

It must be remarked that when putrid gases are passed through the solution of chameleon, the amount may be tested sharply, but when the exhalations of the skin or the lungs are passed through, this sharpness is not observed. For example, I have not observed a difference when two persons were in the lead chamber, and when there were three. The cause may be that only a limited quantity is kept in suspension in the air, the rest being deposited. The senses confirm this. If, however, actual putrefaction occurs, the amount is less limited. This leads us to think that the test may be of special advantage in tracing out the existence of putrid gases, either in houses, hospitals, or the human breath itself; but this subject requires labour, and that labour has not been bestowed. The amount of labour necessary to obtain such results as are here given has been more than can be imagined by those who have not been devoted to the search of such hidden and subtle existences and phenomena. I make this remark as I know that many persons seem to think that I have neglected the subject too much of late; but if I have, it has not been from idleness. Another energetic campaign might bring it forward an important step.

Since writing the above I am able to state that an atmosphere containing 0·19 of pure carbonic acid, feels very agreeable and cannot at least in half an hour be distinguished from pure air. To find such a condition Mr. P. W. Holland suggested a manufactory of soda water. This was found at Messrs. Hemsbury and Brown's in Manchester. The windows were wide open, and fresh air was coming in, but the amount of gas escaping was enough to keep the lowest amount of carbonic acid at 0·1 whilst the bottlers breathed at least 0·19 but generally much more. The place was fresh and agreeable. This fact I consider as sufficient to enable us to throw on the organic matter all the first blame of the discomfort in badly ventilated rooms. So pleasant was the air in the manufactory that very much more carbonic acid could have been borne. It was not apparent to the senses; indeed it will be seen that 4 per cent. was not very evident to the senses, although it affected the vitality; whilst we thus throw on the organic matter the sensible discomfort of the time, we are not yet able to say that 0·19 of carbonic acid caused no physiological effect. That point is for the present reserved. The absence of an effect which the sense of smell could detect did not hinder a very remarkable lowering of the pulse when air containing nearly 4 per cent. of carbonic acid was breathed.

Here however a step is distinctly gained. We owe our discomfort to organic matter; although this has been said for some years, it is not anywhere so fully proved as by the several facts now gained.

THE ORGANIC MATTER IN THE MINES.

It is not difficult to prove that organic matter exists in the air of mines. The assurance that human beings live there would of itself be sufficient to convince us of its existence. Organic matter flows into the air as a necessary result of the phenomena of life. If we did not know that human beings existed there, the proof would still be easy; as we find along the sides of the mine in places where the amount of water is neither too great nor small, and where other conditions do not prevent it, that a fine, soft, white covering is given to the rock like the nap of the finest white velvet, but much finer. When the water and light are favourable, it shines like the morning dew on spiders' webs, but I know no appearance above ground giving an idea of so much delicacy. It looks pure as it is white; and it is pure,—it purifies the air. When examined more nearly, it is found to resemble rather the mould which comes on preserves, but blanched thoroughly by its absence from light. It may readily be collected, but so wonderfully light is it that you may gather the crop from many square feet, and almost doubt at last that you have any harvest. It dries up at last into a very tough substance, which Professor Williamson, F.R.S., says is a mass of confervæ. I did not give him any in a fresh state, so that he had no opportunity of making any full examination.

When viewed under the microscope, it presents a mass of transparent fibres matted together and interwoven in a most complete manner. Its analysis is perhaps scarcely to be depended on as far as nitrogen is concerned, as the quantity used for combustion with oxide of copper was small, and the amount in possession insufficient for a second trial. Nearly two per cent. of nitrogen was found.

I sent for more of the substance, but my request was not clearly understood. There is an efflorescence of sulphate of lime, and also of other salts which very much resembles this fungous growth; but I have not found that it was noticed in the mines, whilst it is frequently taken for the inorganic salt. The specimen examined was obtained from the Botallack Mine, but the same kind was seen in other places.

When you enter a beer cellar, the fungous matters that grow around are proof of exhalations arising from the beer; and no cellar can show an analogous phenomenon better than mines. At the same time, these substances are not found in all parts of the mine, because the confervoids seek a suitable soil and climate, and these differ every few yards underground. Even in a cellar there is no fungous covering over the whole wall; it is confined to peculiar spots, which receive it sometimes in great excess. In a country there are little nooks of land, which are so favorably placed as to become natural hospitals; and in a garden there are little corners which have all the effects of hothouses. So one vineyard has the best wine in a country, and one plant in that vineyard is more remarkable than any other. For similar reasons, the confervoid spoken of does not grow on every spot in the mine, but it is common, and must feed only on the organic matter supplied by the miners. That which is found on decayed wood is much more abundant.

Decayed wood is much blamed for giving out bad air. In this country the amount of wood used is often so small that we may leave this source of evil out. When 4,000 fir trees are supplied yearly to a mine, as to the Dorothea Mine at Clausthal, and the Dolcoath Mine in Cornwall, this source of carbonic acid must not be overlooked.

As I had worked a good deal on the subject of or-

ganic matter in the air, it was natural that I should attend to it in the mines, and indeed my first visit was accompanied with an apparatus for testing it with permanganate, as explained when speaking of the organic matter of the air.

A solution of permanganate was used, 20 grains of which were decolorized by 100 cubic inches of air. In the mines 100 cubic inches removed the colour from 28, 30, 39, and 50 grains, and further on in the same level from 70 grains. In another mine 50, 48, 52.

It was clear that deoxidizing agents were abundant in the mine, at certain places. But it must not be supposed that this test fixes on organic matter only. It is affected by sulphides and sulphites instantaneously, and is therefore a test of the amount of these salts besides other substances as already explained.

The air from gunpowder contains sulphuretted hydrogen and sulphide of potassium. If a large jug, or even a basin or tumbler, be moistened on the sides with acetate of lead, whilst a few grains of gunpowder are laid on a dry spot below, and fired off by touching with a hot wire, the sugar of lead or acetate will become black instantly. A deep vessel is better for this purpose, in order to confine the smoke. No such large amount comes from cesspools on ordinary occasions. We see at once that such a gas must act so as to reduce the oxide of iron in the blood, and render much of the air which is taken into the lungs valueless.

For this reason it was found quite useless to apply in the mines the test which has been used for other places. It tells of substances in a group, a sufficient value at times, but not sufficient where a minute enquiry is wanted. I was driven, therefore, to other methods of examining the air for organic matter; numerous results were not sought. It was intended to spend some days on a second visit, in order to make some experiments which, from want of experience on the first visit, had not suggested themselves, but this seems now to be impossible. The following experiments, however, made for the purpose of discovering organic matter, if few, were remarkably satisfactory.

Seventy-six tubes in which gas had been collected were washed out with water. This solution contained chiefly sulphate of potash. I was scarcely sure of any soda without the spectrum test. It also contained a little chlorine, as we might expect, the gunpowder not being free from chlorides; there were also nitrates from undecomposed gunpowder, and partly, perhaps, from the explosions made when analysing.

The ammonia was equal to one grain in 250 cubic feet. This result is given as only approximate, still it looks probable. We do not know to what this ammonia is united; it would probably be to carbonic acid; and it may have come partly from the combustion of gunpowder. If it had come from organic matter only we should still have been in a difficulty, as we do not know how much nitrogen would be found with a given amount of animal exhalations. If the nitrogen came in a compound with the same percentage of nitrogen as fibrin, we should then have one grain of organic matter in 36 cubic feet.

Part of the material from the tubes was burnt, and the unmistakeable odour of nitrogenous substances was perceived; burnt feathers give it in its ideal purity. As a final proof that organic matter was operated on, carbon, black and combustible, remained behind.

True, the total amount obtained was small; and the actual estimation of quantity in such cases has a strong appearance of a guess; but in order to obtain proof of the existence of the organic matter, without regarding the quantity, a far smaller amount might be operated on with confidence. The inorganic salts are found as might be expected—the acids and the bases also.

This experiment is also a proof of the observations by the microscope being correct. The salts observed are proved and tested in a way that is more convincing to a chemist than the mere fact of seeing the undisturbed substances. Still the microscope was a valuable aid and showed the salts clearly to the most inexperienced. Indeed, the drawings were all made by one who knew nothing of chemistry.

Perhaps some persons may think that in washing out seventy-six tubes some impurity may have entered, vitiating the results. The same water was used to each, so as to avoid any accumulation of matter from the water. They were not thoroughly washed out, as this would have caused too much liquid to be used, and the water was not driven on them from a laboratory water bottle, but by pouring. Besides, experience in looking for organic matter has shown me that such noticeable quantities are not easily obtained; the difficulty is to obtain them at all from air.

However, for self-satisfaction, several fresh tubes were opened and treated with permanganate. That in tube marked "Dufton" decolorized 50 grains of the permanganate solution, acting at once; this tube must have contained sulphides, I suppose. It is the best proof of their existence which I obtained, but it is not complete. This is an amount which would not be decolorized by less than 250 cubic inches of common air; and here in the mine we find about 2 cubic inches enough. This specimen is one which had a very large amount of the crystals in it. The air in Z Z 2 acted similarly, to a less extent, and more slowly, which is still a better proof of organic matter, and to me a complete one. Sulphuretted hydrogen acts instantaneously. The slow action of the organic matter is very convincing when one becomes familiar with it. Of course the tubes that had no enclosed mine air were tried, and no such results were obtained from them. This mode of trial promised well, but it was not carried out far enough. For similar indications see table of analyses.

These proofs of organic matter were considered more than sufficient, and it was not deemed wise to destroy many specimens, as I was exceedingly anxious to obtain as much evidence as possible on the two gases, oxygen and carbonic acid. However, a few were broken to make experiments on

The Sense of Smell and Organic Matter.

Some substances are best known by the smell, and in reality only by the smell. Yet the sense of smell is not generally taken by chemists as a guide of the highest class. It is not easy to see why; a part of the reason may be that this sense leads us so accurately to such a great distance that we are apt to presume upon its power, and to judge of substances in amounts really too small even for it. We lead it to extremes more readily than we lead other faculties. In the mines the sense of

smell is not capable of exercising itself well. In order to give it a fair field, the organ must work in pure air, and the substance to be tested must be put to it for a short time only. Pure air must frequently be resorted to. If we act in this way we find that in the mine air there is the smell of tallow, perspiration, and tobacco. These smells were found, not in all specimens, but in some. The tubes containing the air were simply broken and brought near the nostrils. I have some tubes made in a form that will enable us to blow out a small quantity at a time rather than squander it away as hitherto obliged. Still, even by this squandering method, there was enough in two cubic inches of gas to prove it several times to the satisfaction of all the inmates of my laboratory. It required no more proof; it was clear to the observation. There was the close smell,. simply like a school-room or church and the excessively disagreable smell such as I have met in the mine itself, of human perspiration.

But the most curious point is, that on several occasions I found the smell to be aromatic, and one gentleman who smelled it said at once that the smell was that of apples. I recognised apples in it also, but still was conscious of something besides, and simply called it aromatic. I was extremely surprised to find in several German books that the apple smell is an ancient attribute of badly ventilated places. The organic substances decompose, and compounds are formed after a time less disagreeable than at first. One tube had a smell of sulphurous ashes, another of burning oils, another of putrefactive matter,—according to a friend, Mr. Ed. Hunt, B.A., to whose capacity of recognising by smell I had often found advantage in appealing.

A bottle full of the air blown into the nostrils would be a very delicate test, and easily made. When I was shut up in the lead chamber, not imagining that the air was bad, those outside, who breathed from the chamber through a tube, found the atmosphere very unpleasing. Such an experiment is as good as the sense of sight can furnish. It is as good even as the sense of touch; nay, more, you may prove by the sense of sight and touch that a certain atmosphere is hurtful, but you will not prevent men from entering it, except after long and laborious processes of reasoning. But give that atmosphere a bad smell, and the argument is finished at once. This sense must not be despised by the intellect. If the intellect should venture to show such pride, it will be soon obliged to submit and confess itself beaten by the instincts. This unexpected incident, caused by the sense of smell, leads us to a new and very simple mode of testing air. We take it from its place, we stand in pure air, and blow the air to be tested into our nostrils.

TESTS FOR CARBONIC ACID AND OF VENTILATION.

Although the only impurity in air is not carbonic acid, as a rule the best chemical test for ventilation of rooms rendered impure by exhalations from the person is the presence and quantity of this gas. It has been seen in a former chapter that baryta and lime-water were tried for a long time in various ways, and after various stages became accurate in the able hands of H. Saussure; simple, and in theory completely accurate, in the hands of Mr. Hadfield; and at last, by the greatest refinement, were used as scientific instruments by Pettenkofer.

It is not pleasant to speak of the history of discoveries, as we so often find that much that is discovered is so for the second time and not for the first; but it is extremely improbable that Pettenkofer knew of Hadfield; and it is very probable that Hadfield, whom I long knew, could not have carried out the refined experiments of Pettenkofer. Besides, the use made of the instrument by the Munich professor is more important than the instrument itself.

It was one of my duties to examine into the subject of tests, in order to find a simple method of testing the value of the air in a mine. It was clear that my test for oxidizable matter was valueless in such places, and Pettenkofer's could not be used comfortably, or at least would not be used. More simplicity was required. There must be little to carry, little to do, and little to think of. Nothing better than baryta or lime suggested itself. The comparison of precipitates of lime, as Dr. Reid recommended, failed long ago because the precipitates changed in physical appearance; but his mode of keeping the extent of the precipitate in the memory did not exactly fail, and was to be considered correct or otherwise, according to the memory, and according to the frequency of the experiment.

Equal quantities of baryta water were poured into two bottles; air was blown into them from the lungs until a decided precipitate formed, equal in both cases. The amount of precipitate was estimated by testing the amount of baryta still in solution. When this was done several times by two persons, the results were almost absolutely the same. Next day, these same two performed the experiment, relying on the memory of the precipitate of the previous day; and the results were that the oxalic acid required was 23·7 cub. cent., 23·2, and 23·2. The difference in one case is 0·0005 gramme of carbonic acid, as every cub. cent. of the oxalic acid solution was equal to 0·001 gramme of carbonic acid. This was repeated times without number and served as a basis for a

New mode of using the Baryta and Lime Water test.—1st, for definite amounts of Carbonic Acid.

If we shake a bottle containing 644 cub. c. or 23 ounces of common air, we obtain a precipitate such as that described above. Now, if air containing twice as much carbonic acid were to be put into the bottle, the precipitate would be twice as great, but we could not ascertain its value by the eye. We cannot even make a probable approach to it. If, however, we used a bottle just half the size of the first, the air being still twice as bad as the first specimen, we should have a precipitate exactly the same, because in fact the amount of carbonic acid would be exactly the same. If the air were four times as bad, we should then use a bottle four times smaller, and obtain a precipitate also exactly the same as the first; and so on down to the smallest dimensions. I go here in the belief that although we cannot approach at all closely when endeavouring to obtain the comparative value of two precipitates, *we can retain in the memory with great exactness the character of one precipitate of a given density.*

If, then, we wish the air of a place to be kept at any one given state of purity, we should require only to have a bottle corresponding to the amount of carbonic acid, and the trial could be made at once. This plan would not suffice for estimating the amount in any given air; it would estimate only one amount;

but it would show clearly when there was more and when less.

When it was found so easy to remember a certain bulk of precipitate, it became important to know what bulk would be the most easily remembered. Must it be a minute quantity, such as a chemist would call a trace, or must it be a quantity such as we should call milky? Neither suffice. The first is too small for certainty; the second has no translucency, or so little that we cannot judge of the amount that lies behind. The quantity will be expressed most clearly by saying that the liquid is turbid and still translucent; but not so that you could read through it. Any one may obtain it exactly by shaking a clean 23-ounce bottle with half an ounce of baryta water in the air, and this may easily and frequently be done to aid the memory.

The size of bottle for various conditions of air was calculated; bottles of various sizes were made, and experiments were then performed in the close chamber. The time taken to produce a certain amount of carbonic acid when a man or candle, or both, were in the chamber, was known; and at these times the appropriate bottle was taken. It was then found that every precipitate was the same, from the 23 ounces of the open air containing 0·04 per cent. of carbonic acid down to the ounce bottle when the candles were fading, and to the half ounce bottle somewhere about the time of extinction of the light. To be more exact, it is a precipitate obtained by throwing down baryta with 0·2515 cubic cent. of carbonic acid, or 0·00224 grammes carbonate of baryta freshly precipitated, in half an ounce of liquid. In table I, all the information actually necessary is given. Column 2 is for fine measurements in cubic centimetres, indicating the amount of air which will contain the carbonic acid necessary for producing the precipitate of baryta when the proportion is according to any number of the first column. Column 3 is the same number, with the addition of 14·16 c. c. or half an ounce, which is the space occupied by the liquid. This then gives the size of the bottle to be used. The fourth column is the size of the bottle to be used, the numbers being avoirdupois ounces; fractions are not in all cases given, and not required so minutely as they are given.

TABLE I.

Half ounce of Baryta Water containing 0·082 grammes baryta.

Air at 0° C., and 760 m.m. Bar.

Carbonic Acid in the Air.	Volume of Air in Cub. Cent.	Size of Bottle in Cub. Cent.	Size of Bottle in Ounces Avoirdupois.
0·03	838 - 853	30·	
0·04	629 - 644	23·	
0·05	501 - 516	18·	
0·06	419 - 434	16·	
0·07	359 - 374	13·	
0·08	314 - 329	12·	
0·09	279 - 294	10·	
0·10	251 - 266	9·	
0·11	228 - 243	8·55	
0·12	209 - 224	7·88	
0·13	193 - 208	7·32	
0·14	180 - 195	6·86	
0·15	167 - 182	6·40	
0·16	157 - 172	6·05	
0·17	148 - 163	5·74	
0·18	139 - 154	5·42*	
0·19	132 - 147	5·17	
0·20	125 - 140	4·92	
0·21	119 - 134	4·71	
0·22	114 - 129	4·54	
0·23	109 - 124	4·36	
0·24	104 - 119	4·19	
0·25	100 - 115	4·04	
0·26	96 - 111	3·90	
0·27	93 - 108	3·80	
0·28	90 - 105	3·70	
0·29	87 - 102	3·59	
0·30	84 - 99	3·48	
0·40	63 - 78	2·74	
0·50	50 - 65	2·28	
0·60	42 - 57	2·00	
0·70	36 - 51	1·79	
0·80	31 - 46	1·61	
0·90	28 - 43	1·51	
1·00	25 - 40	1·40	
2·00	12 - 27	0·95	

* This size of bottle gives no precipitate in air with 0·04.

TABLE II.

Half-ounce of Lime-water containing 0·0195 grammes lime.

Carbonic Acid in the Air.	Volume of Air Cub. Cent.	Size of Bottles to be used. Cub. Cent.	Size of Bottle in Ounces Avoirdupois.
0·03	2,566 - 2,581	91·	
0·04	1,925 - 1,940	68·	
0·05	1,540 - 1,555	55·	
0·06	1,283 - 1,298	46·	
0·07	1,100 - 1,115	39·	
0·08	963 - 978	34·	
0·09	856 - 871	31·	
0·10	770 - 785	28·	
0·11	700 - 715	25·	
0·12	642 - 657	23·	
6·13	593 - 608	22·	
0·14	550 - 565	20·	
0·15	513 - 528	18·59	
0·16	481 - 496	17·42	
0·17	453 - 468	16·48	
0·18	428 - 443	15·60†	
0·19	405 - 420	14·78	
0·20	385 - 400	14·08	
0·21	367 - 382	13·45	
0·22	350 - 365	12·85	
0·23	335 - 350	12·32	
0·24	321 - 336	11·83	
0·25	308 - 323	11·37	
0·26	296 - 311	10·95	
0·27	285 - 300	10·56	
0·28	275 - 290	10·21	
0·29	266 - 281	9·89	
0·30	257 - 272	9·58	
0·40	193 - 208	7·32	
0·50	154 - 169	5·95	
0·60	128 - 143	5·03	
0·70	110 - 125	4·40	
0·80	96 - 111	3·90	
0·90	85 - 100	3·50	
1·00	77 - 92	3·22	
2·00	38 - 53	1·86	

† This size gives no precipitate in air with 0·04 carbonic acid.

In order to use this table, first in its application to ordinary circumstances in life, we may assume that a bottle holding 5·42 ounces will not give any precipitate in the air around houses if we live in a tolerably fair atmosphere. To try the experiment the bottle must be very wide-mouthed, so that we can put into it a rod covered with clean linen, and rub the sides dry and clean; we must then fill it with the air of the place, either by blowing in air with a bellows, or putting a glass or caoutchouc tube into the bottle, and inhaling the air out of the bottle, so that fresh may enter. No way is more exact than this, if care is taken not to breathe into the bottle. This care is not at all difficult to take, and no amount of apparatus can be more accurate than this method, if done intelligently. If the slightest amount of breath goes into the bottle, the process of rubbing clean and drying must be undertaken anew. Still the safest way is to use to use the caoutchouc pump at fig. 3.

When the bottle is filled with the air of the place to be examined, add the half ounce of baryta water, put on the stopper, and shake. If there is no precipitate, the air is not worse than 0·04 per cent. When it is desired to ascertain if it really contains as much as 0·04, then a 23-ounce bottle must be used.

Having ascertained that the air around contains no more than 0·04, it may be decided that a sitting room shall not be allowed to contain more than 0·06, 0·07, or 1 per thousand. If the first, then a bottle of 16 ounces is taken; if the air contains 0·06 the precipitate will be exactly like that in the 23-ounce bottle. If it is allowed to contain 1 per thousand, and on some evenings many houses will contain this, then a bottle of 9 ounces is enough; but if a very much denser precipitate is given it is easily observed.

For an amount of carbonic acid often found in workshops there is required a bottle of 4·04 ounces; we may neglect the decimal, and say 4 ounces.

In some mines the air contains 20 per thousand of the acid gas, and then less than an ounce bottle, such as one may put in the waistcoat pocket, will be a test more striking than the candle. In the worst case of air analysed, the bottle required for testing would only be 0·678 of an ounce; and in the air of the lead chamber, in one of the experiments 0·48,—less than half an ounce.

This plan does not enable us to make an analysis of air. The person to whom the care of the atmosphere would be committed would have only one bottle of the proper size; he would only have one precipitate to look for. The order would be that the air must never be worse than that size of bottle would indicate. The order might be given for any required purity, and by this test an uneducated man could tell when the amount of carbonic acid was too great.

For a private house the rule would be not to have the air above 0·07 at most. A 13-ounce bottle would be used, and in this bottle a precipitate must not be obtained denser than that obtained outside with a 23-ounce bottle. This is all the labour.

There are, of course, various ways of doing the same thing; some people might prefer that in every case a bottle should be used a few sizes less than the one corresponding to the carbonic acid, and that the proper way would be to find no precipitate at all. This can readily be done, but at present I have preferred the method given. The same tables apply to both.

The baryta water need not be of any particular strength; a weak solution is sufficient. The strength used is given; but the precipitate does not differ when the water is stronger. If, however, the water should be extremely weak, several times weaker than the above, there is a difference. The carbonate of baryta dissolves in the water to a very perceptible extent. The first precipitate made in baryta water by oxalic acid also, although very white at the surface where there is much acid and before mixing, disappears on shaking to a perfectly transparent and brilliant liquid. I speak, however, of very weak solutions; a solution five times weaker than the one given as an example, would be incorrect on account of its weakness.

Hitherto baryta has been spoken of, and it may well be asked why lime should not be preferred. The same precipitate to all appearance may be got with lime water. Table II is suited for lime water, and constructed on exactly the same principles as the former. It will be seen that lime is so soluble or so transparent that it requires three times more space or air from which to collect its equivalent of carbonic acid. This is, of course, an objection. Still, lime is to be had everywhere, and lime water has not the poisonous properties ascribed to baryta water.

It is worth observing that the proportion of lime and baryta are nearly as their atomic weights. Perhaps more minute observation would make it quite the same. It was supposed that lead might give a similar proportion, but the texture of the precipitate was entirely different, the particles much larger. This prevented it being used in a similar way, and obstructed the theory as well as the practice so far.

One of the main advantages of this process is that it requires no weighing and no measuring, and we may almost say no thinking; this idea is, perhaps, more fully carried out with the lime than with the baryta water. Lime water may be prepared of the same constant strength so closely that we may neglect the difference; with baryta we are apt to make the solution unnecessarily strong and so waste it, but the experiment will still be the same. Lime water is common but baryta water could also be prepared cheap if there were a demand for it.

The use of this method would enable us to distinguish air in this manner; we could say, this is 6-ounce air, that is 4-ounce air, that is 2-ounce air; and the miners would understand it, and prove it as easily as the scientific men, whilst vials so often seen in cottages might be converted into scientific instruments for sanitary purposes.

New mode of using the Baryta and Lime Water test.—2nd. For all amounts of carbonic acid.

If it be desired to ascertain the amount of carbonic acid in air which may be of any quality, and which does come under the class mentioned as suited for tables, I propose the following when a more elaborate and more accurate apparatus is wanting.

An elastic india-rubber ball may be made to contain any given amount; let us suppose two ounces. When we press it in the hand we can drive out the whole air, or at least nearly the whole; we let it go, and it fills again. If a tube be fitted to it we can drive the

air which has gone into the ball through a solution of baryta or lime water, and obtain the precipitate above spoken of. If the air be pure it will require so many more balls to be emptied; if impure, a smaller number.

If a ball with a simple tube is used for blowing into a liquid, that liquid is drawn up as soon as the ball expands, and many fillings cannot be made without inconvenience. If, however, a valve be placed between the liquid and the ball, there can be no return. This is the case in the tube A, figure 8; connected with the ball, there is a valve such as is used in air-pumps, preventing all entrance of air, but allowing it to pass out. Then again on tube B there is a valve of the same kind, preventing all egress of air, but allowing it to enter. The little instrument is therefore in reality an air-pump and a condenser. The air passes in at B, and goes out at A.

It is well to use always the same amount of solution, which may be, as in the previous method, half an ounce. If this liquid is put into an open vessel there is an escape of the carbonic acid, which ought to be retained, and also a collection of some from the atmosphere, which ought not to be absorbed. It is better, therefore, to use a bottle as at C, with a small tube of escape. The bottle with the liquid in it holds the same amount of air as the ball. It must be filled with the air of the place; this is done by one or two pressures of the pump. The liquid and cork are put in their places, and the whole shaken up. That counts for one ball. The ball being pressed and let go so as to be filled with the air of the place, is then used as seen in the fig., and pressed again, the air passing through the liquid into the bottle. The former air in the bottle is driven out, and the new air takes its place. This air gives up to the liquid the most of its acid, but as a little remains the bottle is well shaken, so that the liquid may absorb all the acid. This act is performed every time whenever a ball is emptied. The balls are counted, of course, and the following table will show the value of each.

No. of Strokes of the Finger Pump, or No. of Ballfulls of Air.	Per cent. of Carbonic Acid indicated in the Air.	Actual Amount of Carbonic Acid in the Air of the Ball.
		Cub. cent.
1	0·444	0·2515
2	0·222	0·1257
3	0·148	0·0838
4	0·111	0·0629
5	0·088	0·0503
6	0·074	0·0419
7	0·063	0·0359
8	0·055	0·0314
9	0·049	0·0279
10	0·044	0·0251
11	0·040	0·0229
12	0·037	0·0209
13	0·034	0·0193
14	0·032	0·0180
15	0·029	0·0167

We might call the apparatus a finger pump, if no better name is suggested.

In using this ball it is well to observe the method by which the points of the fingers press into the centre. If this is followed the whole of the air may practically be driven out. The ball is thus divided into two parts: one part is pressed between the palm of the hand and the fingers; the other is pressed between the surface of the nails and first joint of the thumb.

3rd. For all amounts of carbonic acid, the bulk of air fixed, the lime water varying.

There are many ways of ascertaining the amount of carbonic acid in the air with great precision. Any man may make any one of them perfect, if he will only continue to use it until familiarity ensues. Lime-water may be used according to table III.

TABLE III.

Neutralization with Lime-water.

12° C., and Bar 780 m. m.

Carbonic Acid in the Air.	Volume of Air in Cubic Centimeters.	Size of Bottles in Cub. Cent.	Size of Bottles in Ounces.
0·03	1,778 -	1,793	63·*
0·04	1,334 -	1,349	48·
0·05	1,067 -	1,082	38·
0·06	889 -	904	32·
0·07	762 -	777	27·
0·08	667 -	682	24·
0·09	593 -	608	21·
0·10	533 -	548	19·
0·11	485 -	500	18·
0·12	444 -	459	16·
0·13	410 -	425	15·
0·14	381 -	396	14·
0·15	356 -	371	13·
0·16	333 -	348	12·25
0·17	313 -	328	11·54
0·18	296 -	311	10·95
0·19	281 -	296	10·42
0·20	266 -	281	9·89
0·21	254 -	269	9·47
0·22	242 -	257	9·06
0·23	232 -	247	8·70
0·24	222 -	237	8·34
0·25	213 -	228	8·02
0·26	205 -	220	7·74
0·27	198 -	213	7·50
0·28	190 -	205	7·21
0·29	184 -	199	7·00
0·30	178 -	193	6·79
0·40	133 -	148	5·21
0·50	106 -	121	4·22
0.60	88 -	103	3·62
0·70	76 -	91	3·20
0·80	66 -	81	2·85
0·90	59 -	74	2·60
1·00	53 -	68	2·39
2·00	26 -	41	1·44

* Lime-water used is the usual lime-water. It generally contains 0·0195 grammes to half an ounce; this is diluted with 9 volumes of pure distilled and fresh boiled water.

Here it is proposed that a bottle, such as that at fig. 1, should have attached to it a flexible ball filled with a known quantity of lime-water. A little is squeezed into the bottle, and shaken about until it becomes neutral; again a little more; and when there is no more carbonic acid to render more lime neutral, the operation ceases. But how are we to know when the liquid is neutral? Of the many substances tried for this, perhaps turmeric was the best;—a little bit of paper floating on the liquid turmeric itself. One of my assistants, Mr. Clement Higgins, tried the turmeric in this way, and became very familiar with its use. The operation, however, was slow, and not satisfactory to me, although it can be made excellent with patience and attention.

The solution used by this method was lime-water ten times diluted. The manufacture of lime-water is a very good method of obtaining a pretty exact strength of a liquid without weighing. The lime-water, which has plenty of lime at the bottom, remains much the same. There is a little change occasionally; it would be well to determine the exact cause, and we might perhaps be able to start from the point of saturation, even for the most exact researches. The following results were obtained. Four bottles of lime-water took of oxalic acid—

	Cub. cent. solution.			
	1st.	2nd.	3rd.	4th.
April 7th, 12° C -	19·5	19·6	19·5	19·6
After two days 6° C	19·4	19·3	19·3	19·4
„ „ 8·4° C	20·0	19·8	20·1	19·9
„ „ 15° C	19·9	20·05	20·1	20·1
„ „ 13° C	19·9	19·9	19·9	19·9
	19·9	19·9	19·9	19·9

This shows that for the precipitate on the plan of tables I. and II., lime-water is more than necessarily constant, and even enough for Table III., and may be used in some cases to save the purchase of a balance.

Some years ago I proposed rosolic acid as an agent for ascertaining neutrality. It shows the neutral point with extreme sharpness when oxalic or any liquid acid is used, and we can tell to a small drop when to cease pouring. If all caustic solutions were coloured with it, it would help to point them out, as well as serve instead of litmus or turmeric. I did not obtain such successful experiments as I could have wished when trying it with carbonic acid lately. The last traces of colour are difficult to remove; I hope to bring it on further some day. It is curious that lime or baryta water take up carbonic acid much less readily when rosolic acid is present. It affects the latter portion of the experiment chiefly when the solutions become weak. It is as if the resinous consistence of the acid repelled the gas; when a liquid is used, such as oxalic acid in solution, the rapidity of action is very great, the same resinous quality causing the rosolic acid to shrink into its shapeless and colourless state with great suddenness.

It may, however, be remarked that weak solutions of baryta and lime take up carbonic acid very slowly of themselves, although rosolic acid renders the absorption still slower.

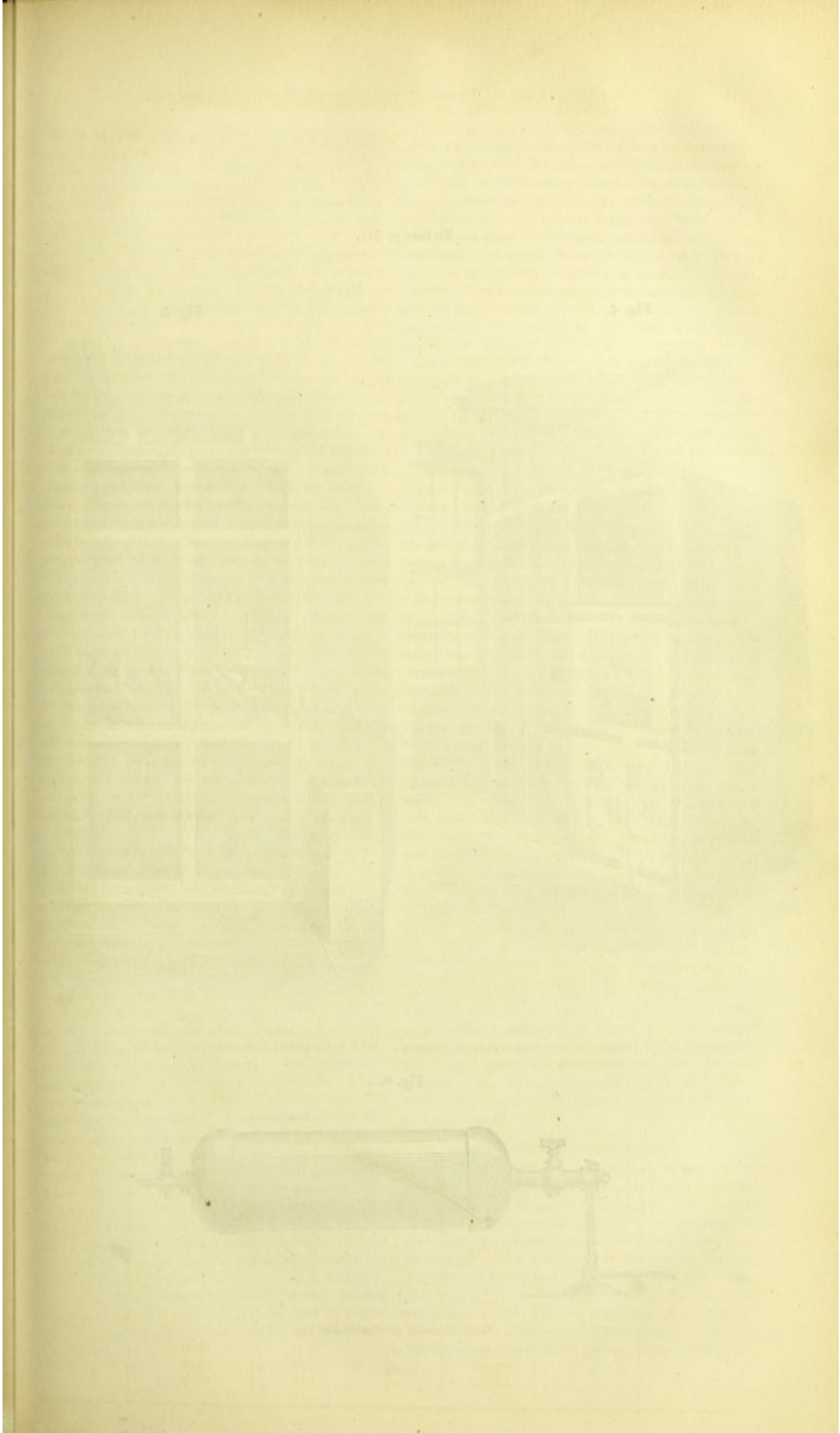
Manganates and Ferrates as tests for Carbonic Acid.

In a former paper I mentioned that the carbonic acid of the air was capable of being estimated by observing its action on manganates. The green manganate was prepared in the usual way, or by adding caustic alkali to the so-called permanganates, which, however, from this action appear rather as bi-manganates. The amount of acid required to convert the green to red may be found readily by a solution of test acid, and the equivalent for carbonic acid calculated. The plan already described, with a ball from which the manganate is pressed, suits the test very well when the ball contains nothing which affects the salt. If the ball is objected to, we may adopt another method. This plan consists simply of a graduated tube like a pipette fitted into the cork of the bottle; a small quantity is allowed to flow down when required, and when the liquid begins to become purple, there being no more carbonic acid to render it red, the experiment is finished; the amount used is read on the graduated tube.

At Mr. Hutchinson's alkali works I obtained from Mr. Powell a salt of ferric acid accidentally formed. It was analysed by Dr. Roscoe. This salt was expected to be still more sensitive to organic matter than chameleon. It was sensitive, certainly, but it decomposed rather rapidly in light. It can, however, be used both for carbonic acid and oxidizable matter, in the same manner as the manganate. The action on light is, however, not quite sufficient to make the salt a good photometer. The objection to it for carburic acid is that it does not keep well. The test requires a little more attention than I have given it; it promises in some cases to be more valuable than the manganates.

The aspirator may be used for drawing the air through any of these solutions, and either the ball apparatus or two small bottles. Even one bottle may be used with great safety, if it is covered from the air, and the speed not very great. To ascertain exactly the difference between the results from one and two bottles, the following experiments were made:—

Duration of Experiment.	Amount of Air.	Solution of Baryta in each Bottle.	Not absorbed in the first of the two Bottles.	10 cub. cent. of the Solution required of Ox. Acid before the Experiment.
	c. c.	c. c.	c. c.	c. c.
1 hour -	11,563	20	0.3	7·8
1 „ -	„	„	0·9	7·8
1 „ -	—	—	0·9	7·8
1 „ -	—	—	0·5	7·4
1¼ „ -	—	—	0·9	7·4
1¾ „ -	—	—	0·4	
			0·3	7·4
2 hours -	12,336	20	0·3	7·7
—	—	—	0·2	—
—	—	—	0·3	—
—	—	—	0·2	10·5
	With Rosolic Acid and Baryta.			
1½ „ -	11,565	20	1·2	3·9
2 „ -	13,107	—	1·5	3·8
2 „ -	13,107	—	0·8	3·8



To face p. 241.

Fig. 4.

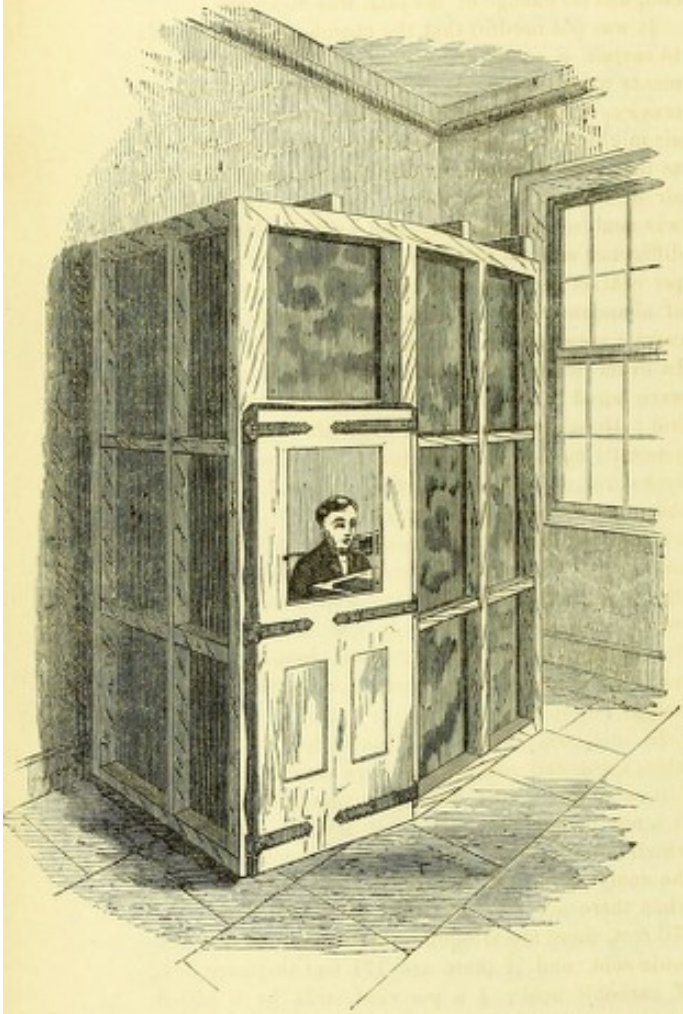


Fig. 5.

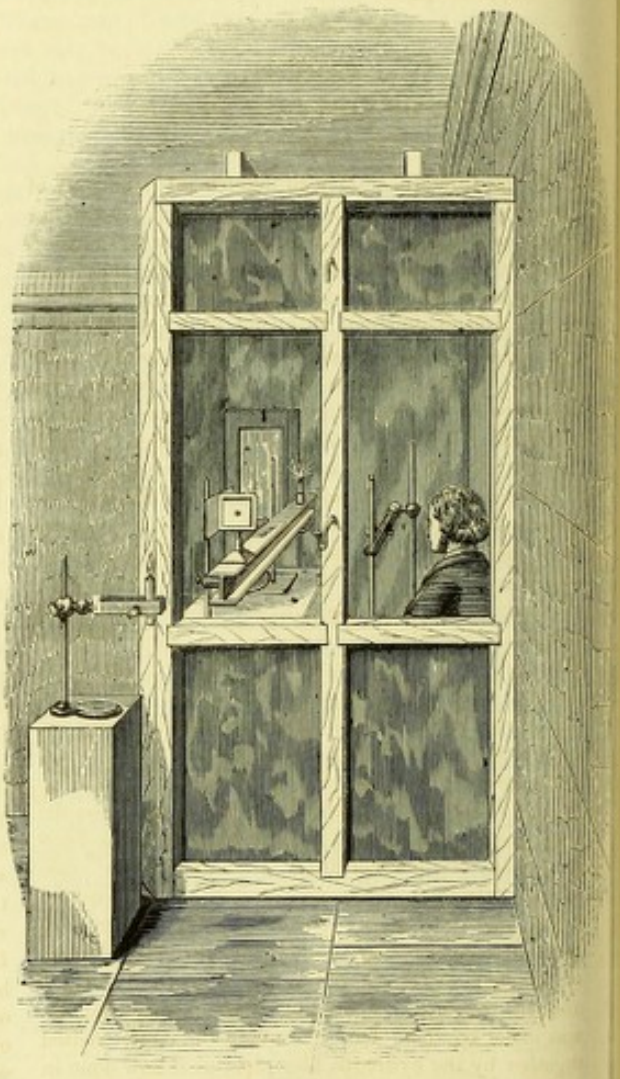
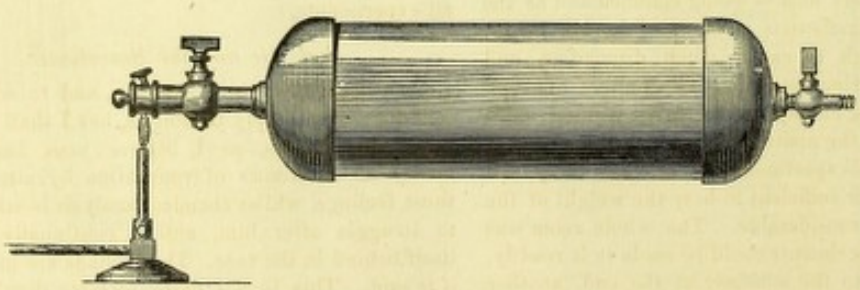


Fig. 9.



It will be seen from this that very exact experiments may be made with the aspirator and one bottle or bulb, and by using Mr. Dancer's apparatus the exact measurement of the air may be attained. This would be like a return to Dr. Reid's carbonometer, made somewhat more convenient and elegant, and made exactly quantitative.

There may be varieties of tastes, but I expect the first and second methods to be very much used; they are very simple. It is quite possible to add many other methods and modifications, but I know of none so simple as these.

PART II.

AIR OF CONFINED PLACES.

The Lead Chamber.

It was found necessary to inquire into the state of the air after it had been rendered impure by candles alone, as well as by breathing alone, and by gunpowder. Besides the bulky impurities, there were the small amounts of organic substances from tallow, from tobacco, from the human skin and from putrefaction; all these mingled in such a manner as to defy separation, but nevertheless were present, causing unmistakeable unpleasantness, and in some instances a positive feeling of disgust, even when a small portion only of a cubic inch of the air was inhaled.

In order to obtain some idea of the effect of the principal agents separately, it was necessary to make the experiments not in the mine but in the laboratory. When examined before the Commission I mentioned my intention of making experiments in a close chamber, of which I expected to have received the use for a short time, but when it was considered that experiments of the kind alluded to can never be performed by a stroke, that they are in reality never really finished, but at best are only made less and less unsatisfactory, according to the frequency of repetition, it seemed essential that a close room should be procured to be at hand for ready use. Accordingly a chamber was made of lead, six feet long, nearly four feet unequally broad, and eight high; the cubic contents were 170 feet—it is unnecessary to describe the irregularities of the shape partly caused by the door, the windows, and the position. The whole lead of this chamber was made into one piece by having the edges melted together by the hydrogen blowpipe, as is now done in making chambers for sulphuric acid. As it was important that no one should be left in the place without having the power of escape, it was determined that there should be sufficiently large windows which in any emergency could be broken through; were it otherwise, the mere idea of being confined and at the mercy of the treacherous memory of human beings would be enough to cause much discomfort and render the experiments void. The half of one end was made of glass, chiefly looking to the window, sufficiently large, of the apartment in which this chamber was placed. This apartment had been a scullery, and had a strong floor sufficient to bear the weight of the lead, which was considerable. The whole room was light, so that experiments could be made in it readily, and in addition to the windows at the end, another large pane of glass was put into the door, so that at each end any one could be seen, and his wants instantly attended to.

The door was of lead except where of glass, and was hung on heavy pivots; strong bars crossed it projecting over the sides. In these projections there were holes through which iron pins on the lintels passed when the door was shut. These pins had screws upon them, and large nuts were used to bolt them down. The door by itself did not fit very closely; it was made so in order to leave room for a tube of vulcanized caoutchouc, which surrounded the lintels; against this the door was pressed by the force of the screws, of which there were three. This arrangement suited exceeding well from beginning to end, and no change of the plan was necessary.

It was not needful that the chamber should be able to sustain a great pressure of air. All the experiments were to be made in a short time, and if minute crevices did exist through which a small amount of air might be pressed, it would not be of consequence, as that process would require much time to affect the air of the whole chamber. When the chamber air was analysed on Saturday, and again on Monday, the difference was not perceived. As there was nearly two per cent. of carbonic acid this will be considered proof of abundant accuracy in the workmanship. In some cases a specimen of air was drawn out for analysis. In order to obtain this from above and below holes were bored in the pillar between the two panes at the end; these holes went through the lead also, and generally contained glass tubes, which were stopped by having caoutchouc tubes fixed on them, which tubes again were closed by glass rods. These holes were the weak points of the chamber with respect to air-tightness; when powder was fired a slight whistling sound was heard which showed that the joinings would not stand pressure. It was not easy to keep the joining of the lead and wood complete, as the tubes on being moved caused a disturbance of the luting.

In this room was a small table and a chair, and when these and one person were present there were 170 cubic feet of air. Of course this cannot be given to a few inches, and even if it were a foot wrong, which is far from the case, the result would not change the analyses to any important extent. For example, when there are two per cent. of carbonic acid with 170 feet, there are altogether 3·4 cubic feet of carbonic acid, and if there are 171 feet there are 3·42 of carbonic acid; ½ a per cent. will be 0·850 in one case and 0·855 in the other. Sometimes there was a person in the chamber, sometimes not; this would make a difference of above two cubic feet; even one cubic foot would require to be accounted for if total quantities were measured, but the experiments as conducted are little liable to be disturbed by this cause. This would not be the case with all experiments.

Bad Air and the Sensations.

Here I am describing feelings, and to some persons they may simply be fancies, but I shall describe them nevertheless, as I believe man has learnt nearly all he knows of ventilation by attention to these feelings, whilst chemical analysis is attempting to struggle after him, and is continually finding itself behind in the race. The feelings are uncertain, it is said. This is not quite correct; they are the most certain facts; but they register so many phenomena at once that they become uncertain guides when one only is sought after. For example, we

may imagine that they tell of increased carbonic acid, whereas they may simply be telling us of diminished digestion and vigour. As to personal qualifications for such experiments, I may merely say that I am not peculiarly sensitive to bad air; many of my friends are more so; but having my mind more directed to the subject I obtain a certain advantage. Perhaps my love of fresh air is beyond the average, as I have an actual pleasure in east wind. If these two conditions are contradictory it certainly is not my fault; but they are not so; experiments in the lead chamber showed that even when nothing unpleasant was perceived, the pleasure of coming out to the air of the laboratory was like that which we have on the sea shore or the mountains, so that the love of pure air is not in exact proportion to our incapacity to endure bad air. Again, I may say that all my fancies lead me to imagine I can bear anything that others can in the way of air, and although this may not be true, it entirely kept away all imaginings of evil during these experiments, and led me to points where actual and long continued discomfort was the result. I think it important to mention this entire freedom from any illness or tendency to illness caused by the imagination.

The first trial of the chamber was made by simply sitting down for an hour and forty minutes. This produces about one per cent. of carbonic acid. The day was clear and the air pleasant; the temperature 45° F. No difference was, to a certainty, perceptible for 25 minutes. Then when the air was drawn from the top by means of an umbrella, it it seemed like a soft wind, and had to some extent a pleasant feeling, but was entirely devoid of a faculty of cheering.

A dull cheerless air is well known. Here we had it produced at once. The air was very moist, and deposited water when drawn out through a tube on taking a specimen.

After an hour the unpleasant smell of organic matter, such as is so well known in a crowded school, was perceptible on stepping rapidly from one end to the other or on moving the air rapidly. Here we learn that when a current of air blows on us, the chemical actions accumulate, and although if continued for one instant only they may be imperceptible, if repeated for many they culminate in a sensation. A sensation, such as smell or taste, is evidently the result of a chemical action. This may be infinitesimally small; in that case the mind does not take cognizance of it; but if many of these small actions occur, either all at once, or so rapidly one after another that they cannot be separated, the mind observes them, and a sensation is the result. How many atoms or molecules must be moved to cause a sensation it is not possible for us to tell, but we can very readily tell that for some persons one, two, or twenty times more must be moved than for others. These chemical actions are constantly going on in the body. They may take ten years to gather impetus to make their movements strong enough to produce sensations, and disease may be generated unknown to the individual, although it may kill him in the eleventh year. But if the chemical action began at the first so violently as to produce decided sensations, he might be able to avoid it at once before it produced any abiding impression. For this reason, a bad climate is more dangerous than the fumes of vitriol, when we are at all able to move out of the way. Concerning the climate, we reason from very distant premises frequently, as no smell is perceived, but the vitriol explains its character at once, and tells its intentions.

Exactly in the same category as the bad climate are all places in which the air is inferior, without containing any peculiarity which the senses can detect. Now although the mine air is all or nearly all such that the senses would perceive it at once, if we were introduced into it at once, we enter so gradually that we are scarcely conscious of the increasing deterioration. As it takes a long time to enter, and a long time to come out, we are incapable of comparing the air of mines by the use of our senses in the same way that we can compare the air of any place above ground, out of which we can come suddenly. This being the case we are obliged to pay more attention to those phenomena that are not perceptible to the senses (except in their results after years), and also to chemical experiment, which two methods after all must turn out our most certain guides.

It was very decidedly perceived after remaining an hour, that the air was soft when made to move in this chamber. This arose from the moisture, and shows us at least that a soft air may be a very impure one. Soft air, air with a good deal of vapour, is very soothing; it calms the mind and the body and the burning of a candle or a fire. In this state it cannot be very cold, as the warmth is essential to the existence of the vapour. This air has a tendency to leave the skin and its action unchanged; it causes little evaporation, and perhaps an influence is due to this that the amount of oxygen introduced into the lungs is diminished, whilst no injurious ingredient is added. I think I hear the question, Will not the air in the lungs decide for itself at once how much vapour there shall be, as there is such an abundant moist surface? The entrance to the lungs, that is, the nostrils and the mouth, feel the moisture with great clearness, and when the air is dry they are dried up. But the lungs seem to feel it also, and it seems a very common thing to know the difference in the respiration. Dry air stimulates the skin, because it removes moisture, and the skin must set to work to renew it. Dry air, therefore, would in this respect be in its first action cheering, and in its last irritating. Moist air would from this point of view be calming in its action, and often at once calming to languor, probably preservative of the vital powers, which are not frittered away by constant irritations. I speak only as a chemist.

After staying in the chamber for 100 minutes, the air had an unpleasant flavour or smell, and I came out; three persons entered at once and pronounced it very bad; I entered after a minute and found it extremely bad. It seemed to me, however, that we are frequently exposed to air equally bad, although I have not found any in daily life so much deprived of its oxygen as this must have been, reduced, that is, to 20 per cent.

I was extremely glad of the escape from this impure air; this gladness not arising from any previous discomfort. I was not uncomfortable. I chose that time of coming out, as it was the moment when the organic matter was most distinctly perceptible; still to perceive it when quiet required attention. The pleasure on coming out was one wholly unexpected; although I now recognise it as exactly that which one has on

coming home on a fine evening after leaving a room which has been crowded—it was the re-assertion of the rights of oxidation ; the blood was evidently in active change desirous to take up a position that was lost ; else why was this feeling of unusual delight in the mere act of breathing, which feeling continued for four hours ? Dinner seems to have first removed it. From the long time required to bring the functions of breathing to their former state, we may of course argue that they had been much disturbed. If to this it is replied, that after all it was merely the memory of the chamber still remaining, it may be said that if the mind is fixed upon the subject, such a memory may exist, without, as far as we know, any equal corresponding prior affection of the body ; but if the condition be unexpected and unthought of, the result seems to indicate distinct chemical or physiological action. In about four hours the lungs recovered their tone. By the tone is meant their unconscious working. Food seemed to be more than usually required, and was followed with unusual rapidity by the feeling of refreshment. Now as there was no unusual bodily exertion, the demand could not arise from an unusual wear of the system, and indeed the peculiar feeling was more that of need of support than that hunger which demands food. We cannot suppose that much wear and tear was going on. We seem left to suppose only that the decompositions which are needful to repair the body had not been made, although material was present, and that it took four hours and dinner to make up lost time. Although oxygen does not directly repair, it takes the initiative in any union of labour for the purpose.

The second stay in the chamber, the day after the above, was continued for 160 minutes. At two hours and twenty minutes, it was observed that very long inspirations became frequent and more agreeable than usual. The air about that time gave a very decided feeling of closeness. Standing on a chair it was found less agreeable than below.

Immediately on opening the door two or three persons entered, and again perceived how uncomfortable it was. The amount of oxygen was found to be 19·61.

After the experiment (tables 3 and 4), we entered with candles and a spirit lamp. The lights were soon extinguished, and it was found impossible to rekindle them with matches : wooden matches were used, they refused to ignite. Still we breathed without difficulty at first, but a gradual feeling of discomfort appeared of a kind which is not easily described; it was restlessness and anxiety without pain, whilst the breathing increased in rapidity.

Afterwards gas was lighted and it burned with brilliancy. On entering after the gas had gone out candles were extinguished as rapidly and completely as if they had been thrust into water; nevertheless we still breathed, and although every one was anxious to go out, no very correct description of the feelings could be given. I stood on a chair and then a feeling of incipient fainting began, but the senses were not annoyed by anything beyond a feeling of closeness, by no means so unpleasant as a school room or close end. This is a very important fact, as it points again to the organic matter, of which there was little here, and of which there is much in the school room. The lungs seemed to refuse expansion, without the senses being able to indicate a reason. The actual amount of oxygen when the gas went out is not given; but a specimen taken from the room after the door had been opened long enough to allow three persons to enter contained 17·45 per cent.

All these experiments tend to diminish our faith in the senses as guides, under certain conditions. The senses are quite unable to measure degrees of closeness and raise as much alarm at a state which may be represented by 0·1 per cent. of carbonic acid, as they sometimes do when there is nearly 4 per cent. with a diminishing pulse and a quickening respiration, or incipient gasping for breath.

After a while the air really becomes by no means proportionately worse to the feelings, but the approach of fainting in the case mentioned showed that the lack of oxygen or presence of carbonic acid was telling on the moving vital act

It is proved that badly ventilated rooms containing less than 20·7 per cent. of oxygen are unwholesome, The present inquiry is believed to establish this point without affirming that the oxygen is much more than the index ; and the late sanitary movements have really been operating on such a condition of things, however unexpressed. I say this because such an amount of oxygen represents what we call a badly ventilated room. Now there is a faintness produced when the oxygen is at 17·4, but is there a corresponding injury when the numbers range between these ? and if a man lives where a candle will not, is it not a proof that he is well ?

It is not possible to obtain exact results with the human being at all these varying stages without going into the region of statistics, and the argument may be considered by some as dependent on that wider range of facts ; but for most persons it will appear clear that if the loss of 0·2 of oxygen and its replacement by 0·2 of carbonic acid, be found to make the air disagreeable and injurious to the extent which is attributed by overwhelming evidence to bad ventilation, double the loss of oxygen and double the carbonic acid will produce still worse consequences. The senses begin the argument, but it takes months or years to show the bad effects of that air which they dislike. At the other extremity the vital powers give way, and between these two we must have a gradation of effect.

We cannot and dare not experiment on human beings beyond near limits ; but one experiment made with two per cent. of carbonic acid without intention shows that the amount which persons can bear differs with the strength. A young lady was anxious to be in the chamber when the candles went out. She was extremely fond of pure air, but when she entered was not much struck by the impurity of that in the chamber, although the candles were threatening to go out, so that there could not be quite 19 per cent. of oxygen or 2·1 of carbonic acid. No one had been breathing in it, so that the organic matter from the person was absent. She stood five minutes perfectly well and making light of the difficulty, but suddenly became white and could not come out without help. She was remarkably healthy, never was ill, and was troubled with no fear of the air in which she stood. Several of the specimens of air from the mines had almost the same amount of oxygen as the air on this occasion and some had less. This is one of the gradations between 21 and 17·4 per cent., the two extremes in which breathing was tried.

On another occasion a still greater amount of carbonic acid was present in the chamber, but it

was not accompanied with a corresponding loss of oxygen, as the gas was driven in upon pure air. The oxygen, therefore, was 20·19 with 3·84 of carbonic acid. On this occasion Dr. Reissig and Mr. Higgins got headaches instantaneously on entering and were unable to stay above seven or eight minutes. I stayed about twenty minutes, still felt very anxious to get out, as all my movements were made with great haste, and both mind and body betrayed symptoms of feverish activity. There was also a rush of blood to the head, the face was flushed, and the lungs acted more rapidly than usual, the inspirations being 26, whilst the average of waking hours is as nearly as possible 20. Similar feelings, but not to quite so great an extent, were observed when the experiment on table 7 was made, carbonic acid being then also poured into the chamber. On that occasion only do I think that the sensations could in any way be heightened by the imagination. At that time I had not the slightest experience of carbonic acid, and it was pouring rapidly into the room, requiring some time to mix it. I had no certainty that the results might not be very bad, and the interest might have been mixed with a little anxiety not to go too far with the experiment. In the case more fully described above there was not that feeling; I knew the circumstances, and was satisfied that the condition of body and mind was caused entirely by physical agents, not by the imagination. There was a burning haste to live, as if life were afraid of being put out.

January 26th, 1864.

EXPERIMENTS IN THE LEAD CHAMBER.

No. 1 TABLE

Experiment to ascertain the General Effects on the Feelings and on a Candle.

Time.		Temp. of Floor. Fahr.	Temp. of Table level. C.	Temp. of Table level. Fahr.	Temp. of Top Fahr.
h.	m.				
12	45	52·5	10·3	50·54	52·5
After	10	53·25	12·2	53·96	54·5
,,	20	53·8	12·4	54·8	55·0
,,	30	54·7	13·2	55·7	55·25
,,	40	54·9	13·4	56·1	55·7
,,	50	55·2	13·78	56·8	55·9
,,	60	55·5	13·9	57·05	55·25
		Carbonic acid - 0·38			
		Oxygen - - 20·54			
,,	70	55·6	14·0	57·2	56·4
,,	80	55·7	14·05	57·29	56·49
,,	90	55·75	14·1	57·47	56·6
,,	100	56·0	14·0	57·2	56·6
,,	110	55·8	14·0	57·2	56·6
,,	130	56·2	14·2	57·56	56·8
,,	140	56·3	14·2	57·56	57·0
		Carbonic acid - 1·130			
		Oxygen - - 19·73			
		It seemed pleasant here to take long breaths.			
,,	150	56·6	14·25	57·65	57·2
		Begins to feel decidedly close.			
,,	155	56·5	14·0	57·2	57·0
		Carbonic acid - 1·26			
		Oxygen - - 19·61			

January 27th, 1864.

No. 2 TABLE.

Four Miners' Candles in the Lead Chamber. No person inside.

Time.		Below. Temp. Cent.	Below. Temp. Fahr.	At Table. Temp. Cent.	At Table. Temp. Fahr.	Above. Temp. Cent.	Above. Temp. Fahr.
h.	m.						
1	50	—	53·5	10·4	—	—	51·7
—		Outside 53·		—	—	—	—
After	10	12·	—	—	59·	—	59·5
,,	20	12·7	—	—	63·5	—	—
,,	30	13·5	—	—	65·25	—	—
		Windows dim with moisture; difficult to read the thermometer.					
,,	40	13·5	—	—	65·	—	—
,,	45	14·3	—	—	65·	—	64·
Outside		—	53°	—	—	—	—
		Carbonic acid 1·78 / Oxygen - - 19·14 — Top.					
		Carbonic acid 1·81 / Oxygen - - 19·02 — Middle.					
		Carbonic acid 1·38 / Oxygen - - 19·31 — Middle.					
		Carbonic acid 2·28 / Oxygen - - 18·80 — When the candles went out, which was at 7 o'clock.					

January 29th, 1864.

No. 3 TABLE.

Eight Candles, one Paraffine Lamp and one Spirit Lamp.

Experiments to ascertain the differences of Candles and Lamps, and also the effect of difference of position of the Lights.

Time.		Bottom, Temp.	Bottom, Fahr.	Middle, Temp.	Middle, Fahr.	Top, Temp.	Top, Fahr.
		Outside 50°		—	—	—	
h.	m.						
12	30	Dry	53°	—	60·25	Dry	76°
		Wet	52°	—	—	Wet	51°
After	10	Dry	56°	—	—	Dry	70°
		Wet	56°	—	66°	Wet	66·5
		Appeared already to burn worse.					
,,	15	Dry	59°	—	68°	Dry	73°
		Wet	57°	—	—	Wet	69°
		Carbonic acid 1·13 / Oxygen - - 19·87 — Windows dim. Three candles, inclined, burnt badly.					
,,	50	The candle nearest the roof went out.					
		Carbonic acid 2·27 / Oxygen - - 18·50					
,,	58	Nearly at same time a candle at the window as high as one on the table; one on the floor near the side; one on the corner of the table, near the chair and window candles; one on the opposite corner went out.					
,,	75	Another on the table	,,				
,,	90	One on the chair	,,				
,,	93	One on the floor	,,				
,,	98	Paraffine lamp	,,				
		Carbonic acid 2·32 / Oxygen - - 18·48					
,,	150	The spirit lamp	,,				
		Carbonic acid 2·45 / Oxygen - - 18·40					

ACTION OF THE PULSE.

Amount of Carbonic Acid given out by a Man and a Candle.

TABLE A.

One Person and one Paraffine Light in the Lead Chamber.

Time in Minutes.	Temperature. Cent.	Carbonic acid.
min.		
After 10	—	0·20
„ 40	—	0·68
„ 60	—	0·95
„ 90	—	1·31
„ 120	—	1·61
„ 150	—	1·76
„ 180	—	1·88
30th March, 1864.		
„ 15	8·0	0·41
„ 60	1·2	0·94
„ 90	9·8	1·32
„ 120	10·2	1·62
„ 150	11·0	1·77
„ 180	11·0	1·89

TABLE B.

One Person in the Close Chamber.

	Carbonic Acid. I.	Carbonic Acid II.
After 20 minutes	0·18%	0·19%
„ 40 „	0·32	0·36
„ 1 hour	0·49	0·49
„ 80 minutes	0·62	0·64
„ 100 „	0·74	0·75
„ 2 hours	0·88	0·89
„ 140 minutes	1·06	1·03
„ 160 „	1·20	1·22
„ 3 hours	1·25	1·34
„ 200 minutes	1·52	1·48
„ 220 „	1·54	1·60
„ 4 hours	—	1·81
„ 260	—	1·98
„ 280	—	2·10
„ 5 hours	—	2·25

I have not had time to attend to the full explanation of each experiment, and some require a continuation of the inquiry, but this last must not be passed over without special notice. The amount breathed every hour is the same—no matter whether there be 0·04 or 2 per cent. of carbonic acid in the air, and no matter, although there be 20·94 or only 18·8 of oxygen. This is strongly corroborative of the views taken by Liebig, but other circumstances tend on the other hand to show that this state of things is kept up at the sacrifice of comfort to other vital functions. In this atmosphere the breathing was changed from 16 inspirations per minute to 22, the pulse fell from 76 to 55, whilst it was so weak that it was difficult to find. My assistant, was in the chamber this time; I requested him to attend to his pulse and breathing, as on another occasion when there was still more carbonic acid in the air, namely, 3·9 per cent., my breathing rose up to 26 inspirations, and my pulse became so weak as to cause alarm. This has happened so regularly that it must be put down as the result of poisoning with carbonic acid. On one occasion there was a comparatively large amount of oxygen in the room, viz., 20·1. The carbonic acid had been driven in upon fresh air, and no oxygen removed. Even here the pulse was weak, although the breathing was not very difficult, and the candles burnt moderately well.

The conclusion is, that in the air containing an increased amount of carbonic acid, this gas alone, even without the other hurtful ingredients, begins to poison, and the men are really gasping for breath without knowing it. All the other hurtful conditions contribute their powerful aid.

As I came on this result at the end of the intended inquiry, it is not easy to do it justice. We learn much from it. We learn that the blood can take its oxygen out of very impure mixtures, but we learn also that some functions are meantime suffering greatly. It is, to my view, a most important thing to show that with an amount of oxygen not less than is found in the air of some mines, and an amount of carbonic acid actually less, such extraordinary changes should result in the functions of a healthy man. We want no other experiment than this to prove great evil arising from the impure air in mines.

In order to obtain similar results in a shorter time, five persons entered the lead chamber, expecting to have in one hour the same results that were obtained by one person in five hours. The figures are here given; it is seen that they are not exactly the same as previously. Time causes us to yield, although we may struggle against the evil influences for an hour or so. The effects are not exactly such as were expected. The pulse begins to be irregular very soon, and certainly when the air contains 0·4 per cent. of carbonic acid; in three cases, 0·2. It rises and falls, but at last begins to fall. In all cases, however, it becomes very weak, as in the first experiment. There are many individual peculiarities; here the youngest had the slowest pulse.

With the younger it rose rapidly at first, and seems to indicate the more rapid struggle for life; it was a steady determination with the more advanced not to be changed by external circumstances, although these gradually caused a change at last.

These figures will probably induce many others to continue the inquiry.

May not the lowness of the pulse show us a mode of lowering it during a fever? And here come questions. The organic matter increases; would that increase the fever? If so, must the experiment be tried with pure carbonic acid? And how much was due to the carbonic acid, and how much to organic matter? All these are interesting enquiries. Meantime one question is so far answered that we see the effects due to the want of ventilation.

TABLE C.

Beats of the Pulse. Five Persons in the Chamber. Observations every 5 minutes.

	A.	B.	C.	D.	E.	Temp.
To begin -	60	78	84	70	73	68° F.
After 5 min.	60	70	90	70	72	
„ 10 „	59	76	90	75	72	
„ 15 „	72	74	91	74	70	
„ 20 „	70	74	89	74	72	
„ 25 „	79	77	91	71	74	
„ 30 „	74	81	89	70	71	
„ 35 „	78	79	87	74	68	72° F.
„ 40 „	73	76	89	76	70	
„ 45 „	70	70	90	73	72	
„ 50 „	74	72	89	72	71	
„ 55 „	70	73	89	72	70	
„ 60 „	66	73	88	73	72	
„ 65 „	66	74	88	72	70	
„ 70 „	69	73	86	71	69	
„ 75 „	70	70	85	71	70	
„ 80 „	73	70	86	70	69	
After coming out 5 min. -	66	68	89	68	68	
After 3 hours	63	74	84	74	73	
„	61	75	85	74	73	

Number of Respirations.

Normal -	20	15½	22	20	20
After 33 min.	24	16½	25	20	25
„ 58 „	23	17	25	22	24½
On coming out after 5 min.	20	16	23	19	21

After 5 minutes.

Organic matter not pleasant.

After 15 minutes.

A. Pulse stronger and quicker.
B. Irregular pulse but strong.
C. Weaker and already difficult to feel.
D. Same to the feeling.
E. Much weaker.

After 25 minutes.

A. Stronger.
B. Irregular.
C. Irregular and weak.
D. Irregular.

After 45 minutes.

Organic matter less sensible than at first to the majority.

D.—Feels air to be bad.

After 50 minutes.

A. Can scarcely feel his pulse; several attempts made to count it. Still feels quite well.
B. Begins to feel head uneasy.
C. Feels his heart beat more than usual.
D. Pulse weak.
E. Pulse very weak.

Here every one was observed to be sighing, although all were cheerful.

After 6 minutes.

B. Flushed.
C. and D. Headache began slightly.

The effect of company was considerable in preventing the lowering of the pulse by keeping the mind cheerful.

But the last experiment, Table F, shows that even when quite alone the pulse did not lower when the air was pure.

This experiment differs from that of Table D. The impure air was formed five times more rapidly, and the results were not so perceptible. It would appear that we can resist for a short time when we cannot resist for a long time.

The irregularity of most of the pulses is apparent.

A. was the youngest, being about 17, and having a naturally low pulse; his was raised.

B. was about 21 years old; his pulse went lower, then higher, then finally lower.

C. about 24; his pulse went higher, then sank to nearly its usual point, but he was the most affected in sensation.

D. 27; his pulse went higher and then lower.

E. 47; his pulse went lower, higher, and lower, but he felt no discomfort; forehead began slightly to warm.

It is remarkable that the breathing increased in all cases, and that it went back to its normal amount very rapidly.

TABLE D.

One person in the Lead Chamber.

Respiration and beats of the pulse taken every 10 minutes.

Time.	Pulse.	Respiration.	Temperature, Celsius.	Carbonic acid in the same periods.
h. m. 10 55	73	15·5	18°·2	0·04
min.				
After 10	73	16	18·2	0·114
„ 20	72	16	18·2	0·187
„ 30	71	17	18·4	0·261
„ 40	71	16	18·4	0·335
„ 50	70	16	18·5	0·408
„ 60	68	16	18·6	0·482
„ 70	67	16·5	18·7	0·556
„ 80	67	17	18·8	0·629
„ 90	66	17	18·9	0·703
„ 100	65	18·	19·0	0·777
„ 110	65	18·5	19·0	0·850
„ 120	64	19	19·0	0·924
„ 130	63	19	19·2	0·997
„ 140	62	19·5	19·1	1·071
„ 150	62	20	19·1	1·145
„ 160	62	20	19·1	1·218
„ 170	61	20	19·1	1·292
„ 180	60	21	19·1	1·366
„ 190	60	22	19·2	1·439
„ 200	59	23	19·2	1·513
„ 210	58	24	19·4	1·587
„ 220	57	24	19·4	1·661
„ 230	57	24	19·4	1·734

TABLE E.

When the door was opened.

Time.	Pulse.	Respiration.
After 10 min.	59	22
„ 20 „	59	19·5
„ 30 „	60	19
„ 40 „	60	18
„ 50 „	60	17

TABLE F.

Sitting quiet for an hour in the Lead Chamber in pure air.

Time.	Pulse.	Respiration.
h. m. 4 50	75	17
After 10 min.	76	17
„ 20 „	76	17
„ 30 „	76	17
„ 40 „	77	17
„ 50 „	76	17
„ 60 „	76	17

The same quiet condition in pure air produced no change.

Experiments B, C, and D, on the beats of the pulse, seem decisive. The air affects the pulse when the ventilation is such that the amount of carbonic acid reaches 0·18. The question of carbonic acid and organic matter, viz., which is the most hurtful, in this case must be decided by other experiments. My belief is that much is due to the carbonic acid, because the progress of the pulse downwards is so regular, and I believe that the organic matter does not increase so regularly. This may not be true at the temperature given, and is another point to be ascertained.

But leaving out all the details, the great broad fact remains that carbonic acid and other emanations from the person diminish the circulation, and hasten the respiration, and that the effect is perceptible when the per-centage of carbonic acid reaches 0·18, or say one-fifth of a per cent. If, however, we do not wish to infer too much from one beat of the pulse, let us for rough practice say ¼ per cent.

COMBUSTION OF CANDLES.

I cannot quote any experiments on the combustion of a candle in the conditions required, excepting those of Wehrle. At p. 11 he says:* "If a candle continues to burn (meaning thereby even with difficulty), the amount of oxygen is 18 per cent.; but if it goes out and a common mining lamp burns, the oxygen is 16–18 per cent.; but if that goes out, and an argand lamp burns, then the amount is under 16; when this goes out also it is 14. The light goes out sooner or later according to the different substances used for burning, and the construction of the lamp." At p. 13 he says: "Candles go out completely when the amount of carbonic acid in the air is only 10 per cent. If it is between 5 and 8 per cent. they burn badly; a small round flame hops round the wick and then goes out."

These accounts do not quite agree, and there is some indefiniteness. Some time ago I made experiments on this subject burning the candle in a tin vessel about two feet high on nine inches square, standing over water, an apparatus belonging to Dr. Holland, with whom the trials were made. The vessel was open below and placed in water. A window in the side showed when the light burnt. The results were:

	Oxygen in the Air when the Light went out.
With a common dip tallow candle	15·2 to 16·2 p. c.
Paraffin oil lamp with diminished draught	15·5
Same lamp, very low, with a ½-inch flame	14·4
Spirit lamp	12·
Petroleum very volatile	10·8

In operating in the lead chamber the candles, as a rule, went out with the oxygen between 18 and 19. These results are still more decidedly in contradiction than those of Dr. Wehrle, but the cause will appear. It was found in the lead house that before the candle went out the tallow around the wick became gradually less liquid and at last solid. If, however, it were again rendered liquid by any means, the light rose up and burnt freely even in air which contained only 18 per cent. of oxygen, and in which a candle would not usually burn. For this reason the miners incline the candles in order that the flame may approach more nearly to the grease and melt it more rapidly. Sometimes this is done to such an extent that there is a constant stream of tallow moving past the lower part of the wick and dropping on the floor. When a small vessel is used for the combustion of the candle, such a box as that above described, it is necessary, in order to observe the varying stages of combustion, to let the candle be in full flame when it is inserted; at that time the tallow is melted around it and a considerable supply is at hand. Before this supply is used up the amount of oxygen is reduced to the number spoken of. Such an experiment, therefore, is not satisfactory; it shows only the combustion of a candle of a given size with a given extra supply of oily matter. If, however, the space is large, as in the lead chamber or the mine, the few additional drops of melted fat will not perceptibly affect an experiment lasting for hours, as, after all, their effect is over in a few seconds, at most 30. In this case the combustion ceases whenever the candle is incapable of giving out heat enough to melt sufficient fat for its consumption. If the experiment last for hours, a gradual diminution of the heat takes place and with it a gradual diminution of light. But if the candle be held on the side, or if additional fat be melted, the flame may be made to rise as high as in the ordinary air; still if left to itself the hardening will take place again. As in this case the flame is artificially made as large as usual, there appears as much heat as usual, and still the tallow is not melted. The tallow is melted by radiant heat, and the hardening seems to prove that there is an obstruction to this radiation. The carbonic acid, the watery vapour, and the fatty matters themselves which exist unburnt in the air, may be these non-conductors. The experiments in tables 4 to 8 will show that this diminution of light, of heat, and of melted matter takes place with vapour of water alone to some extent, and with carbonic acid without any additional vapour added to the air, but that when both the acid and the vapour were present the action was most rapid.

It will be seen from diagram 1, that the diminution of the combustion was not caused by a diminished quantity of oxygen merely, because when the carbonic acid was removed the candle burnt very well in the remaining air, although this air would only have 18·7 per cent. of oxygen in it, whereas

* Ueber die Grubenwetter. Von D. Alois Wehrle, Wien, 1835.

by experiment in table 7, the light was very much diminished by the presence of carbonic acid, although the air contained actually 20·1 of oxygen with little of additional watery vapour to disturb it, and was otherwise in a condition to support very fair combustion.

When Dr. Frankland was on the top of Mont Blanc he found that a candle burnt with an elongated blue flame without consuming less fatty matter than usual. In air rendered bad by carbonic acid and watery vapour, or by any of the substances floating or volatilized in the air of mines, the candle has no tendency to become blue, but preserves its whiteness to the last. On the other hand, the blue edges, especially at the beginning of the combustion, entirely disappear, thus giving what is called a "sickly" or a pale yellow appearance to the light. At the last a pale white flame hovers over the wick, which has become short from a process of self-snuffing. The red wick burns short, and, when the small lambent flame escapes, still glows for some time.

When candles burn in fairly ventilated places the unburnt vapours are not always perceived, but when many candles are burnt in close places these vapours become very perceptible to the senses. Perhaps this is owing partly or wholly to a less thorough combustion than in pure air. Acrolein is probably one of these vapours, and, according to Dr. Tyndall's investigations, we must ascribe to them no small influence in preventing the radiation of heat.

When powder smoke is present, the light of the candle is diminished to a considerable extent. The solid matter, as well as the gases which are evolved, prevent the combustion, and I suppose also the radiation. This is clearly seen from table 8.

By table 4 the light of the candle is observed to to be shorter even after half an hour's delay in the chamber, and with 18·57 of oxygen the candle still retains one fifth of its power. This occurred when the exhalations from a candle and a man rendered the air impure. The exact point of extinction depends on the gases, vapours, and temperature united.

If we compare table 5, showing an experiment in the lead chamber when a small amount of steam was sent into the space where there was one person with a candle, we find the result, after 190 minutes, almost exactly similar to the experiment of table 4; the candle diminishing to the same fraction after the same time, the amount of vapour from the candle and the person saturating the air towards the conclusion.

But if we examine the change in the candle at the beginning of the experiment, we find that, in table 4, without steam, the value of the candle had in half an hour gone down to 0·933, whereas with a small amount of steam, not affecting the air to the sight, the amount had fallen to 0·875 in 25 minutes; and with a large amount of steam to supersaturation, the candle fell in 10 minutes to 0·826, and in 20 minutes was diminished by half. It may here be said that the steam might act as an obstruction to the light if it condensed in the room; but to show that this effect is not that which is observed here, we find that the values of the candle are, after 103 minutes, with steam 0·206, without steam 0·376. The numbers are thus rapidly approaching each other, and at the point of saturation of the air, when no steam was used, would no doubt have met, or nearly so. As the temperature was raised with the steam, the candle would burn a little better, because the tallow would melt more easily. When these experiments are carefully examined, the influence of watery vapour is remarkably shown.

In experiments, tables 4 and 5, the two numbers actually do meet, and at 190 and 195 minutes the values of the candle are 0·0108 and 0·0104. We may draw then this conclusion, that the effect of the vapour of water in preventing combustion is very great. In number 5 the amount of vapour sent in at once more nearly approached that which would arise from natural causes in the mines, and there we see that there is a diminution of light of one tenth of a candle beyond that which is caused when there is the ordinary amount of vapour in the air. This will be the most useful and practical experiment, although the study of experiment, table 6, affords also some valuable information. In No. 5 no steam was ever visible.

At the end of each of these three experiments the air was saturated with vapour, and all were practically very nearly in the same condition.

The experiment in table 7 is given to show the effect of carbonic acid on the combustion of a candle. The only value which I can attribute to this experiment is this, that it proves the effect on the candle to be very great. Here there was one person inside and a candle, and therefore the amount of moisture was considerable after one hour, but the effect is visible in ten minutes, or before the moisture could be formed.

At the end of the experiment the candle was nearly expiring with the same amount of carbonic acid as in experiment, table 4, confirmatory therefore of both, although, from the fact of the carbonic acid having been poured into the chamber, and not formed by the simultaneous removal of the oxygen, some difference might have been expected.

This difference was seen in another experiment when the carbonic acid was thrown in from the outside and no person or candle was present in the chamber; in this case the candles taken in afterwards burnt moderately, when there was 3·9 per cent of carbonic acid in the room. The reason of this I attribute to two causes: first, there was less vapour of water in the room, and secondly there was more oxygen in proportion, as it had not been removed by combustion.

As the combustion of a candle depends very much on the state of the air, it is not a surprising thing that the combustion of a fire should be in the same condition. In cold weather the vapour is removed from the air even if the ground may appear moist, and it is still further removed if the ground is frozen, and this also in proportion to the hardness of the frost. In warm weather the vapour is proportionately increased and the fire burns proportionately dull. The warmth cannot do otherwise than assist the combustion; we learn this on a grand scale by the effects of the hot blast. In cold weather a fire burns brightly even although the cold is an agent of an obstructive kind to the combustion. In warm weather the fire burns less clearly, although the heat is an assistance to the combustion. The reason seems to lie in this fact, that the cold air is deprived in a great measure of its moisture. Its effects on the candle are such as the least observant eye may remark, and the changes on a fire are of the same kind. The value of this action is very great in economising the products of nature which are used for heat, and in economising the labour which must bring these products into active use. If this be so, it is a lesson which may be taught to many who will

N° 1 is air with 2·2 pc carbonic acid

2 the same with the acid washed out

3 common air

DIAGRAM N° 2

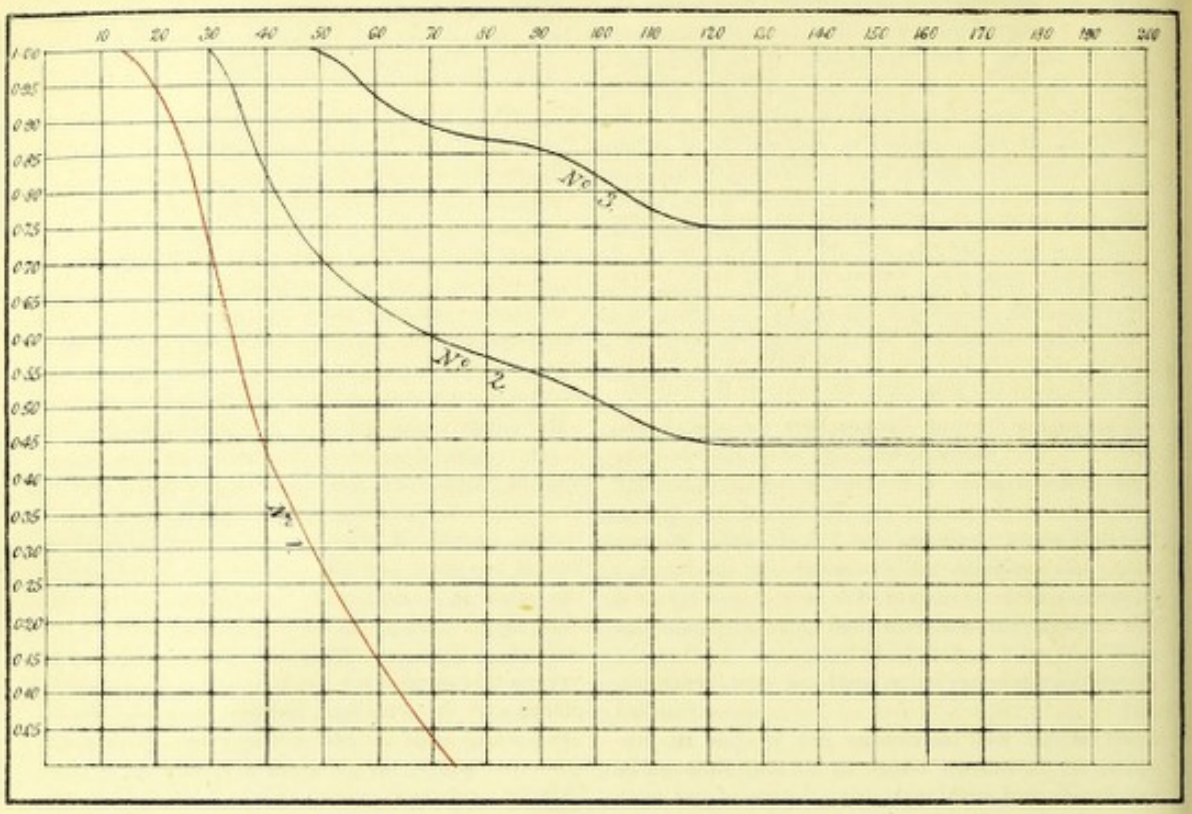
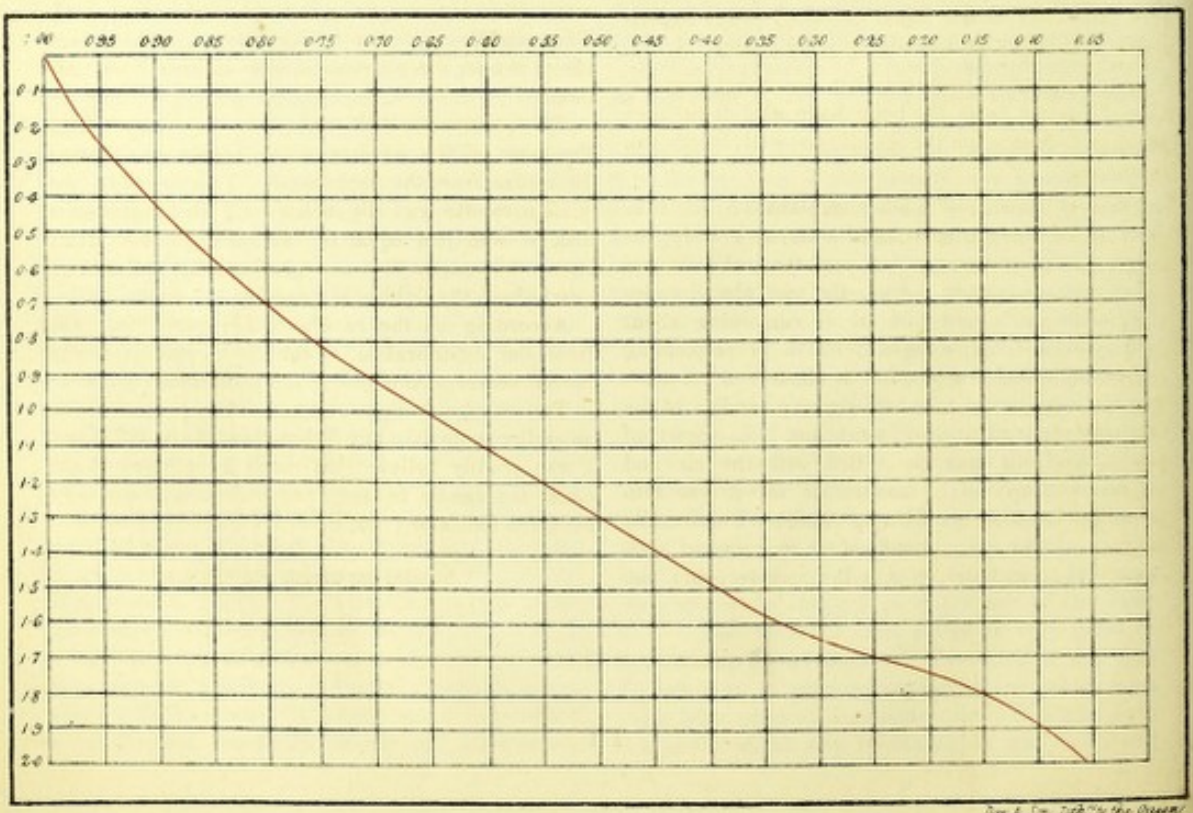


DIAGRAM N° 1

Relation between the carbonic acid in air and the light from a candle



Day & Son, Lith.rs to the Queen

persist in attempting to increase the amount of heat in the fire by pouring in either water or watery vapour.

It may be said that the diminished combustion is due to the imperfect conduction of the heat of the flame to the candle. This appears at first a very remote conception, which will require much reasoning to bring it within the range of daily thought, but in reality it is not so. As the candle stands before you, the grease is seen hardening and the flame expiring simultaneously, you add a little heat by a blowpipe or any other means, and the flame starts up. There is nothing wanted but power to melt the tallow; you raise the flame to a height greater even than the average, and still it soon sinks and goes out. The heat does not pass from the flame to the tallow.

The capacity of the atmosphere to absorb the heated rays of the sun has long been known to be great, and we readily believe that after passing through many miles of air, as these rays do toward the evening, the heat might be diminished till it would be very small, but that it should be absorbed in the space of an inch to such an extent as I now mention would scarcely have been conceived before the investigations of Professor Tyndall. He has shown us that the absorptive power of water, carbonic acid, ammonia, and scents or odours, bodies not unlike those distilled from fat, as well as olefiant gas, one of its products, all powerfully absorb heat; and although he has not worked with such small layers of gas as an inch, the principle seems to apply.

In his inquiry into the absorption of heat by gases and vapours, Professor Tyndall says: "Air sent through the system of drying tubes and through the caustic potash tube produced an absorption of about 1. Air direct from the laboratory containing therefore its carbonic acid and aqueous vapour, produced an absorption of 15." The amount of carbonic acid in the laboratory would in all probability not exceed 0·1 per cent. even allowing for a very bad state of things, whilst the aqueous vapour would in all probability be far from such saturation as was found necessary in my experiments. I trust I do not misapply his theory.

It is extremely probable that the exhalations of animal matter from the body have also their own peculiar influence on the candle as well as on the breathing.

There is, however, another explanation; when 21 per cent. of oxygen surrounds a burning body, the action may be greater by $\frac{1}{21}$st part than when 20 per cent. only surround it. A candle was placed under a receiver and supplied with air containing about 18·5 per cent. of oxygen with a corresponding amount of carbonic acid, that is about 2·5 per cent. This was simply prepared by burning candles in the lead chamber until they went out. A vessel of flexible material was then filled with the air and pressure put upon it, so that the air was driven into a receiver containing a burning candle. The candle went out. The same quality of air was washed with caustic soda and driven into the receiver, and the candle could then be maintained burning, although at an inferior speed, compared with burning in common air. Diagram 2 shows the difference of combustion under the two circumstances.

There are then two influences at work, the active principle of the carbonic acid (a narcotic poison as W. Müller calls it),* and the absence of oxygen. The last would begin to act instantly, and its effects would be visible at the lower part of the flame, the burning being feeble. This may be seen well when a paraffine candle burns; as soon as 1·5 per cent. of carbonic acid is reached the melting is so slow that the flame leaves the lower part and goes above to burn the paraffine that has been drawn up; when this is done it seems inclined to go out. The flame leaves the upper part of the wick, which becomes completely burnt; it then passes down. For this reason the heat is communicated again to the candle, more is melted, and the flame rises; this goes on constantly and we have a candle brightening intermittently, these intervals shortening after a while. That the combustion is rendered less complete at the lower part of the wick is pretty clear; the flame is entirely changed and its clearness is gone, as well as its blueness. Very probably when there is abundant oxygen that gas mixes with the evaporated oil, and explodes with the hydrogen, forming that pale blueish flame which heats the rest of the vapour and produces whiteness above, but with less oxygen there is a dull external combustion producing less heat and so supplying less melted fat. Whilst it is probable that the diminution of heat is one cause, I cannot see that all the circumstances can be explained without introducing the non-conduction of carbonic acid. Perhaps some would suppose an influence such as is exercised by an antiseptic preventing chemical action. There is room here for much experiment and much theory, but the fact is clear.

In photometric experiments a candle was burnt inside the chamber and another outside. I stood inside and the disk of the photometer was within also. Two candles giving the same light were used. These candles, I know by experience, seldom vary above two or three grains in the amount burnt per hour.

The photometer disk was about two inches from the glass of the window. The candle was distant 22 inches from the photometer. That is, when the outside candle was 16½ inches from the photometric disk it was just equal to the inside candle at 22 inches distant, so that the glass destroyed 0·438 or nearly half the light of the candle.

According as the candle within gave less light from the deterioration of the air it was gradually moved nearer to the disk of the photometer.

The change of light was sometimes perceptible at an earlier stage than any figure given in the table, and I can readily believe that much experience might cause the candle in some conditions to be a very sensitive indicator; not in all.

* Annalen der Chemie und Ph., 1858.

TABLE No. 4.

The EFFECT of IMPURE AIR on the Combustion of a CANDLE.—February 6th 1864.

Time.	Outside Candle.	Inside Candle.	Value of the Light in Candles.	Temperature, Fahr., near Roof.
	Inches.	Inches.		
11 h., 20 min. - -	16·5	22·	1·	49·5
After 30 min. - -	,,	21·25	·933	49·
Flame observed to be shorter - -	- - -	- - -	- - -	52·0
Outside 2 inches -	Carbonic Acid 20·38			
Inside 1·6 - -	Oxygen 0·59			
45 min. - -	,,	18·8	·734	54·5
60 ,, - - -	- - -	18·25	·688	55·
75 ,, - -	- -	17·1	·604	55·
90 ,, - - -	- - -	15·5	·496	55·25
105 ,, - -	- - -	13·5	·376	55·25
120 ,, - - -	- - -	12·8	·338	54·5
135 ,, - -	- - -	10·5	·227	54·5
	Carbonic Acid 2·31			
	Oxygen 18·57			
150 min. - -	- - -	9·	·167	57·5
165 ,, - - -	- - -	7·75	·124	54·
		Very small flame.		
180 ,, - -	- - -	6·75	·0941	54·
195 ,, - - -	- - -	2·25	·0104	54·

Before lighting.	At End of Experiment.	
Inside candle 33·82 -	Grammes 14·715.	=5·87 per hour.
Outside	Grammes 2·440.	24·26 diminution when 3 per cent. oxygen were removed from the air.

TABLE No. 5.

EFFECT of STEAM, ONE PERSON and ONE CANDLE in the Chamber.—February, 11th 1864.

Time.	Distance of Candle from Photom. Disk.	Squares.	Candle's value.	Temp. Fahr.	Height of Flame inside Candle and out.
h. min.					
10·52	24·	576·	1·	40	Both 1·5 inch.
After 25 min. -	22·5	506·25	0·879	41	Still the same.
,, 40 ,, -	21·	441·	0·765	46	
*,, 55 ,, -	19·5	380·25	0·660	48	A difference observable in the
,, 70 ,, -	18·	324·	0·562	52	height of the flame.
,, 100 ,, -	14·5	210·25	0·365	54	Flame bad.
†,, 130 ,, -	11·5	132·25	0·229	55	About $\frac{1}{3}$ of its former height.
,, 160 ,, -	7·	49·	0·085	55	Flame changeable, the largest
,, 190 ,, -	2·5	6·25	0·0108	55	given.
**,, 200 ,, -	out			5	Flame out.
		Before burning. Grammes.	After burning. Grammes.		
Outside Candle		33·946	6·547	used	27·398
Inside ,, -		31·01	15·584	,,	15·426
			4·63 per hour		40·26 per cent. diminished.
		2·00 per cent. Co_2			

2 Spermaceti Candles burnt in the Chamber and One Person present, 180 grammes of Steam driven in.

There was no particular inconvenience felt in the chamber during any of the time.

*At this point the steam began to enter the chamber, causing a rapid fall of the light.

Specimen α taken - 1·02 p.c. of carbonic acid.
The steam continued to the end - 20·03 oxygen.

†Here the moisture was strongly remarked in breathing.

Specimen β - 2·10 carb. ac.
18·80 oxygen.

** Specimen γ - 2·66 carb. ac.
18·48 oxygen.

TABLE No. 6.

STEAM in the LEAD CHAMBER sent in from a flask of boiling water. ONE PERSON and ONE CANDLE inside. Experiment compound.—February 16th.

Candle outside 16½ inches from disk.

Time.	Candle inside.	Squares.	Value of Candle.	Temp. Fahr.	——
12 o'clock -	22'	484'	1'00	59'0	Although steam was visible.
After 10 minutes	20'	400'	8'26	63'	
„ 13 „ -	16·5	272'25	0·462	65'	Sudden fall. Steam collected above and fell. Candle visibly declined.
„ 20 „ -	—	—	—		
	Here the steam was interrupted till the air became clear, yet the candle lowered rapidly.				
Ditto -	14'5	210'25	0'434	65'5	Fall rapid. Steam visibly condensed, and thick vapour.
„ 40 „ -	Steam begun ; the heat fallen to - -			62'	
„ 50 „ -	12·5	156·25	0'322	65'5	
„ 60 „ -	*12'5	156'25	0'322	68'5	
„ 70 „ -	12'	144'	0'297	70'	Flame appears very dull.
	Entrance of steam stopt to see if the flame would recover.				
„ 77 „ -	*15'	225'	0'464	69'5	
	*Probably this rise of 15—12 due to the visible steam.				
„ 85 „ -	11'	121'	0'250	65·5	Supply of fat is suddenly stopt.
„ 95 „ -	11'5	132'250	0'273	65'	
„ 98 „ -	12·	144'	0'297	62'5	
„ 103 „ -	10'	100'	0·206	62'	
	At this point the candle began to take its usual course.				
	Specimen of air taken - -		0'85 Carb. ac. 20'01 oxygen.		

TABLE No. 7.

Pure CARBONIC ACID poured into the LEAD CHAMBER. ONE PERSON in the CHAMBER.—February 13th.

Time.	Inside Candle.	Squares.	Candles.	——
11h. 25m. -	22'	484'	1'00	
After 10 minutes	14'5	210·25	3'434	Feeling here an acid or prickly sensation on the face.
„ 15 „ -	12'	144'	0'297	
	Carbonic acid - - -		0'579	
„ 19 „ -	11'	121'	0'250	
„ 25 „ -	10'5	110'25	0'227	
„ 30 „ -	9'5	90'25	0 186	Breathing 25½ ; pulse above average.
„ 45 „ -	5'	25'	0'051	Here came steam, and the candle fell suddenly to 0·227.
	3'5	12'25	0'227	
„ 50 „ -	3'	9'	0'018	Candle became very changeable, as if supplied by an intermittent fountain of oil.
„ 55 „ -	2'5	6'25	0·013	
„ 60 „ -	Nearly out - - - -			Breathing very heavy and frequent.
	Carbonic acid - - -		2·59	Those who entered immediately after found the air very bad.

TABLE No. 8.

GUNPOWDER in the Lead Chamber.—Feb. 17th.

Time.	Squares.		Candles.	Temp. Fahr.
12 h. 56 min.	22 inches	484	1·00	41
After 14 min.	20 „	400	·826	51·5
After 45 grains of gunpowder had been burnt in the chamber, the gunpowder did not cause an immediate fall; but in a few minutes the candle changed suddenly, as the smoke fell down upon it.				
After 24 min.	18 inches	324	·669	51·5
15 grains then burnt—60 in all.				
„ 27 „	18 inches	324	·669	52
„ 29 „	16 „	256	·529	52·5
Very unpleasant breathing, as if every little crystal was felt sharply; caused coughing and discomfort.				
After 39 min.	14·5 inches	210·25	·434	53
Distinct taste of salt as it came from the throat, after collecting there and causing much phlegm. Depressing. Breathing worse than after three and a half hours in the chamber without saltpetre.				
After 47 min.	Fired other 15 grains.			
„ 51 „	13 inches	169	·349	53·5
Decided weakening of the flame, as seen by its indistinct edges; it becomes shorter. The flame at the bottom becomes whitish; it is usually blue.				
30 grains fired.				
After 64 min.	11·5 inches	132·25	·273	54·5

Weight of outside candle on entering, 27·04 grammes; at end of experiment, 12·11 grammes.
„ inside candle „ 21·87 „ „ „ 8·59 „
Outside candle burnt 14·93 grammes.
Inside „ „ 13·37 „ - - - - 6·48 per hour.
13·80 per cent. diminution.

TABLE No. 9.

GENERAL VIEW of the Amount of Light from a Candle under various Conditions, showing Parts of a Candle, a Candle being 1·00.

After Minutes burning.	With Person and Candle Value of Candle.	A little Steam and 1 Person.	With great Excess of Steam and 1 Person.	With Carbonic Acid and Person.	With Gunpowder and Person.
10			·826	·434	
13				·562	
14 (45 gram. of gunp.)					·826
15				·297	
19				·250	
20			·434		
24					·669
25		·879		·227	
27 (6 grammes burnt)					·669
29					·529
30	·993			.186	
39					·434
40		·765			
45	·734			·051	
50			·322	·018	
51					·349
55		·660		·013	
60	·688		·322	nearly out	
64 (100 grms. altogether)					·273
70		·562	·297		
75	·604				
77 (steam stopped)			·464		
90	·496				
100		·365			
105	·376				
120	·338				
130		·229			
135	·227				
150	·167				
160		·085			
165	·124				
180	·0941				
190		·0108			
195	·0104				
200		out			

TABLE No. 10.

BURNING of a PARAFFINE CANDLE in the Lead Chamber.

Time.	Amount of Candle consumed inside.	Amount of Candle consumed outside.	Per-centage burnt less inside than outside.	Carbonic Acid formed by the burning inside.
In one hour - -	7·52 grammes			Per cent.
„ - -	7·456 „			
„ - -	7·14 „	(mean) 7·751	6·2	·312
„ 2½ hours -	19 „	20·47	6·5	·80
„ 3 „ - -	20·828 „	22·574	7·7	·96
„ 3½ „ - -	25·37 „	27·19	6·69	1·12
„ 4¼ „ - -	31·73 „	36·27	12·5	1·52
„ 3¼ „ - -	19·1 „	25·19	24·26	2·21
„ 3h. 20 min. and steam.	15·426 „	25·57	40·26	2·80
„ 2h. 4 min., with gunpowder.	13·37 „	15·96	13·80	

Due to 90 grains of gunpowder exploded - - 8·8 per cent.

* This is 0·07 Co_2 for 1 per cent. of diminution of combustion.

TABLE 10—*continued.*

	Amount burnt in Grammes.	Per Hour.	Less in than outside, Per Cent	By Measure. Inches.
In 4½ hours -	24·700	5·489	29·27	
	26·802	5·956	23·44	
	25·522	5·670	27·09	
In 3 hours -	19·280	6·42	20·19	
	18·803	6·26	22·16	
	20·040	6·64	18·68	

Weight of Candle burnt in Air of various qualities.

By tables 10–13 the amount of sperm and paraffine candles burnt in different atmospheres is seen. The amount burnt is in proportion to the light with remarkable exactness. No. 10 gives the amount burnt in certain times, with the carbonic acid at the end of the experiment. From tables 4, 5, and 6, the amount of light given at various stages is obtained, and by combining these we have table 13 which shows the amount of light presented by given quantities of carbonic acid. Moisture is present in all, but in the lower numbers not to saturation, whilst the saturation will be nearly complete in the higher. Again it seems to me that it makes a difference if the exhalations other than moisture from a human being are present or not, and I cannot therefore call this table accurate as far as carbonic acid is concerned alone. It is given, however, as a very near approach to the condition of things actually found in the mines. It will only be made perfect when each agent is separately examined and the effect of each added to make a total. A mode of making these experiments is already devised, but they may not be ready, if ever made, for the Report of the Commission, and are not strictly demanded by the inquiry.

In order to ascertain the amount of light given by a candle at various stages of impurity of the air, a photometer was used inside and a candle was placed outside. The disk of the photometer was within and the candle was moved towards it as it diminished in light. The distance was generally 22 inches, and the experiment ended by the candle almost touching the disk.

When these experiments were making, it was observed that the outside candle was burnt rapidly down, whilst the candle inside the chamber was still long. It will be seen by experiments in table 10, 11, &c., that this shortening was in exact proportion to the amount of light given. This would not be the case if the candle burnt with a blue flame as in rarefied air. We may conclude from these experiments that the value of the light of a candle may be measured in three ways: 1st, by the photometer; 2nd, by simply weighing it before and after burning; 3rd, by measuring the length of the candle before and after burning. It has been shown that these three modes of measurement may be used for estimating the condition of the atmosphere in a mine, not with great nicety, but to an extent far beyond any method ever yet used in mines. The plans 2d and 3d are actually applicable, and may be said to constitute the best method of applying the candle test, if time is allowed. The amount may be weighed to an accuracy far beyond anything that can be done with the eye only. If therefore the candle is valuable as a test this is one true mode of using it, perhaps the safest; but either a paraffine, spermaceti, or wax candle would be required, and it would require to burn a long time. This length of time is an objection in many cases.

The number of witnesses to the value of the candle as a test is so great that to give them all would seem more to be the transcription of a catalogue of books. In all the writers who in the course of centuries have spoken of the subject, no dissentient voice has been found except perhaps one. Bartels, in his report on ventilation in 1711, says that old air was generally blown back to the places requiring ventilation, and although it was not bad

enough to affect the candles much, it was still hurtful to the workmen.

A belief so long and so well established as that concerning the infallibility of the candle is not to be supposed to be entirely unfounded. It will be seen from the experiments given, that, within bounds, it really is remarkably well founded, and by the aid of fine measures or balances may be carried out to an extent far exceeding that which it has hitherto reached. This great value it certainly has, that it indicates impurity of air of almost every kind usual in mines, little heeding whether that impurity be pure vapours of water or poisonous carbonic acid; and to a great extent the effect of the two substances on the candle very much resembles their effect on human life or at least comfort. A certain amount of moisture, carbonic acid, and powder smoke affect the candle, but this gives no indication whether one or the other is in excess, and although a certain lassitude be produced by the vapour of water in excess we cannot attribute to it the same principal effects which are made apparent by the smoke of powder. There is also a difference if the carbonic acid is brought into the air, and not formed in it by removing the oxygen. As an example the candles will not go out with 4 per cent. of carbonic acid when the acid is poured in, but they are extinguished by 2½ per cent. if the carbonic acid is formed by burning the oxygen. These two extreme cases illustrate some weak points of the candle as a test. They illustrate, also, experiments related to me by Professor Bunsen, in which it seemed clear that the candle burnt longer than the human life.

Reference to similar results is found in Professor Miller's Chemistry. In such cases it is probable that other gases were present. If for example, sulphuretted hydrogen had been present our calculations would be incorrect, as a small amount would be deadly.

The candle will go out when the accumulated effects of the vapours and acids amount to a certain point, but a very large portion of this effect may be due to deadly gases, and none to watery vapours, or the contrary. If the large effect be due to watery vapour a man will have the greater chance of living on. If the chief effect is due to carbonic acid, we cannot doubt that the danger is greater, but this cannot be distinctly proved although it was somewhat illustrated by experiment.

A certain amount of moisture in the air is agreeable, but it diminishes the burning power of the candle; a time then comes when this moisture is prejudicial both to men and candles; but go further again, it is impossible to add moisture enough to the air to do rapid injury to any man, whilst it is very easy to add carbonic acid to that amount. Again, the eye is not quick enough to observe the differences in the early stages, such as when there is a quarter of a per cent. of carbonic acid, and still less able when the amount is below a quarter per cent. Now this is the only state of things in which men should ever be allowed to work; it follows therefore that the candle as used is valuable only when the air is so bad that no one should be allowed to remain in it.

* See *Acta Historico-Chronologico-Mechanica circa Metallurgiam in Hercynia superiori*, by Henning Calvör.

TABLE 11.

The MEASUREMENT of the Length of the Candle as a Test of the Air.

——	In 4½ Hours.	Per Cent. burnt.	Actual Amount in Inches.	Calculated Length from Amount burnt.	Difference.
	Grammes.				
Amount burnt in common air.	34·987		4·036		
1st	24·70	70·73	2·812	2·84	0·028
2nd	26·802	76·56	3·312	3·092	·220
3rd	25·522	72·91	3·	2·94	·060

TABLE 12.

COMBUSTION of Candle in an Atmosphere with Carbonic Acid and Vapour from a Candle and Person.

Time of burning in minutes.	Carbonic acid in the air.	Differences.	Value of the light and candle being 1.
30			0·933
40	0·63	0·43	
45			0·734
60	0·95	0·32	0·688
75			0·604
90	1·31	0·36	0·496
105			0·376
120	1·61	0·30	0·338
135			0·227
150	1·76	0·15	0·166
165			0·124
180	1·88	0·11	0·094
195			0·0014

TABLE 13.

AMOUNT of Light lost by the action of Carbonic Acid in the Air.—Moisture being present.

Carbonic Acid.	Light lost, per cent.
0·63	26·6
0·95	31·2
1·31	50·4
1·61	66·2
1·76	83·4
1·88	90·6

There is here an irregularity, because, as will be seen, the heat rises rapidly the first hour, and slowly the second, whilst it remains stationary afterwards. The amount of light lost may be reckoned for the present, in a rough way, as nearly 10 per cent. for every 0·2 to 0·22 per cent. of carbonic acid, whilst it is somewhat less with some conditions of vapour more nearly approaching 0·25, although both these numbers are disturbed by the temperature. The experiment is not a simple but a very complex one.

Diagrams 1 and 2 illustrate this question. See also under "Carbonic Acid and Ventilation."

Method of ascertaining the State of the Air by the Amount of Candle burnt.

These methods are obtained from 11 and 13.

If a candle burns 120 grains per hour in pure air, and is found in any place to burn only 110, there is

a loss of 9·1 per cent. Let 10 per cent. be equal to 0·25 of carbonic acid, the 9·1 will be equal to 0·22 of carbonic acid. Or let us say, if a candle burns 26·6 p. c. less than its normal amount estimated either by weighing or measuring, the amount of carbonic acid is 0·63, and so on.

I have not applied this to such small quantities, but the principle is found correct in experiments in the lead chamber, and I hope to make use of it a little further.

The mode of measuring is similar, but less exact; a longer time must be allowed for burning, as the edges are unequal, and prevent great accuracy in short lengths.

Effects of Moisture.

It is probable that the amount of moisture in the chamber during the experiment alluded to in table 6 seldom is found in the mines, but the amount in table 5 is, I believe, found. Not having any observations on the hygrometric condition of the mines, a comparison cannot be made. In both the experiments the moisture was at last brought to saturation, in one at an early period. It is true that moisture with a high temperature is oppressive, but when the temperature falls it is a great agent of purification. The organic matter was wonderfully well washed out after the temperature had fallen; it was, in fact, dissolved in the dew. Even when the temperature was high the organic matter was less sensible; this, no doubt, because there was during the whole time a deposit of dew on the substances in the chamber.

The same thing occurs on a summer's evening. The organic matter is removed, but unfortunately it is brought down to be removed, so that in places where it has been abundant and impure the results are disastrous. After the air is cleared of this deposit, it must be much more wholesome. This effect of moisture in purifying the air is remarkably seen in the tables of the carbonic acid of Manchester and elsewhere, also in the amount of oxygen, whilst it was observed several years ago, when examining the air before and after rain, with the permanganate of potash.

This purification of the air by rain is so readily seen to be a matter of course, that it is rather to be wondered at that no one has more fully examined the subject. When we look at the deaths per cent. in different countries of Europe, we are glad to see England stand before the continent; when we go north to Scotland, a moister climate, we find that the number of deaths is still smaller there, whilst the more watery counties of England have in many cases the most healthy spots. Going again to Scotland, the counties in the west that are most deluged with water show a remarkably small amount of deaths. I know there will be many attempts to explain this away by various means, but still I must allow generally the remark to stand, with a belief that it teaches much and unteaches us also much.

The moisture on the clothes and person is a very different matter, and I suppose it cannot be denied that the miners suffer much from it; but even that depends on the amount of animal heat, and the evil is in the great and rapid cooling which takes place when leaving the mine, or going into a cooler place, or resting undried.

Cold and moisture produce according to this view better air,—these are two things dreadfully feared, but the great fact is to be remembered that, in such amounts as they are found in Great Britain, they are capable of producing powerful constitutions. It is heat and moisture that we must still more fear, as far as atmosphere is concerned.

I have sometimes thought it would be well to put persons in the close chamber, to try their power of raising the thermometer, and in this way judge of their heat producing powers, endeavouring also to find if it is in relation to the production of carbonic acid and so ,coming to some knowledge of their capacity of burning hydrogen compounds; in other words, to discover if fat or starch suited best their digestion.

One of the chief evils caused by moisture in the air of mines arises from the temperature being high. There is then a disinclination to exertion which is not idleness, but on one side an actual diminution of oxidation apparently. There may be other causes less purely chemical. The moisture cannot be removed without removing the heat.

CARBONIC ACID AND VENTILATION.

The carbonic acid of the air increases with the activity of life and with artificial warming and lighting, as well as with animal and vegetable decay. It follows us everywhere living and dying, and we can only get rid of it by keeping in the natural currents of the air. We know it in certain conditions by a peculiar smell and taste which it apparently has when in conjunction with other substances, but of itself it has none, or at least very little. We enter into an atmosphere with 2½ per cent. of carbonic acid, and we smell nothing; we enter into one with 4 per cent. and the candles are long ago out, but we perceive nothing. It has been a question if it really does any harm or is only negative. I have always considered it as remarkably innocent in small quantities and been accustomed to look on the organic substances as the real evils, but the experiments in the close chamber have so far changed my mind, that I am inclined to think that carbonic acid has an injurious influence in small amounts. To prove this absolutely is not easy, we cannot readily obtain an atmosphere for a long period with different amounts of carbonic acid without organic matter existing in it at the same time. Such atmospheres do exist in nature, and in all probability there are persons living in them the statistics of whose lives would give us the required information, but this has yet to be collected. We can prove the bad effects of the minutest quantities of the organic matter, but the bad effects of minute quantities of carbonic acid exist as yet only on suspicion.

We can, however, reason in this way:—The carbonic acid increases constantly and regularly in a close place where men breathe. The organic matter does not do so; it deposits with moisture, it covers every surface, and we smell it when all the carbonic acid is washed out by fresh air. The air is not limited in its capacity of holding carbonic acid; it seems to be so with regard to organic matter. In a closed space the capacity of the air to support life diminishes regularly, and the capacity to support a candle diminishes also, in a manner more consistent with the idea of the activity of the acid air than the absence of oxygen. There is much oxygen still left when the candle goes out, and it will be seen by diagram 1 that the air when freed from carbonic acid is at once able to support a candle with much more vigour.

We do not know enough about the absorption of oxygen by the blood independently of oxidation, but allowing it to follow laws such as those that govern

absorption by water, and this to some extent it does, we see that the amount of carbonic acid absorbed increases with great rapidity when the amount of gas present is increased.

For example, let there be 0·1 of carbonic acid
20·9 of oxygen
79· of nitrogen

using Bunsen's tables for calculation.

The amount of these gases absorbed by water at 68 F. or 20° C. will be 0·09914 carbonic acid
0·59142 oxygen
1·10837 nitrogen

but let the carbonic acid be 4 per cent. as was nearly the case in one experiment, the amount absorbed would be 3·6056 carbonic acid
0·4824 oxygen
1·1083 nitrogen

It is to be observed how rapidly the carbonic acid rises, whilst the oxygen diminishes slowly. The numbers will not be exactly the same at blood heat, and blood may act differently independently of its power of retaining oxygen far beyond that amount which water can retain.

It is to be remembered, however, that oxygen is not absorbed by the blood merely according to the laws of absorption regulating the amount taken up by water; that is, the amount absorbed is retained chemically, and the blood is then able to take up another portion. The first act is probably physical, and although the next is chemical, the ordinary law of absorption will in all probability have a very great influence on the rapidity of the act of supply. Liebig does not reason exactly in this method, but his words on this subject are of great weight and value, and explain it more fully and clearly than has elsewhere been done. His chapter in the "Letters on Chemistry" has great beauty and power. I shall here quote a portion of it, remarking only that it does not seem well proved that the increase of oxygen has little influence. Liebig says:

"Moreover, if the quantity of oxygen that can be absorbed depend, according to a certain law, on the amount of the carbonic acid to be expelled, it is clear that the increase of the amount of oxygen in the air must be altogether without influence on the respiratory process. This remarkable fact has been satisfactorily ascertained by Regnault and Reiset in their admirable researches. They found that animals living for 22 to 24 hours in an atmosphere containing twice or thrice as much oxygen as the air, experienced no kind of uneasiness; and that the products of respiration, in their quantity and relative proportion, were exactly the same as when the same animals lived in common air.

"It is further evident, that the amount of carbonic acid in the air is one chief obstacle to the separation of that gas from the blood, and, therefore, an obstacle to the absorption of oxygen. When the amount of carbonic acid increases, the absorption of oxygen is impeded, even when its quantity remains the same. It is only by a corresponding addition of oxygen that this injurious effect of carbonic acid can be counteracted. Such an increase of oxygen never occurs under ordinary circumstances; but Regnault and Reiset have observed, that animals could live in air containing one and a half to twice as much oxygen as common air, even if the amount of carbonic acid were so great as from 17 to 23 per cent., that is, about 400 times greater than in common air; and this, without any injurious effect, after 22 to 26 hours. Such a proportion of carbonic acid in common air is absolutely incompatible with life.

"The fact that men and animals die very rapidly from inhaling pure carbonic acid, while they live comparatively much longer in nitrogen or hydrogen gases, is explained by this—that in an atmosphere of carbonic acid the blood cannot give off any portion of that gas, but on the contrary, absorbs more of it, by which the small proportion of oxygen in venous blood is expelled from the blood, and consequently its vital functions are much impeded, nay arrested.

"The condition most favourable to a rapid and perfect formation of arterial blood, and a more accelerated expulsion of carbonic acid from the venous blood is, consequently, a rapid change of air in the air cells of the lungs.

"When the inspired air has the same composition as that which is exhaled, the object of respiration is no longer attained. The expired air is used air, which cannot a second time perform the same functions in the lungs. The venous blood is no longer changed into arterial; difficulty of breathing, and finally suffocation, soon come on, just as if the mouth and nose had been closed.

"In this case, death is determined by two causes. One is, beyond doubt, the deficiency of oxygen; the other is the presence of carbonic acid, by the presence of which the absorption of oxygen is impeded. In one of the experiments of Regnault and Reiset, a dog, three years old, in an atmosphere,—the amount of oxygen in which had fallen to 4½ per cent., while that of carbonic acid was 9¾ per cent.,—fell into death-like convulsions; but he soon recovered in pure air, and in half an hour was as lively as before. In these experiments the carbonic acid given out from the lungs was for the most part removed, in the confined space in which the animal breathed, by solution of potash, introduced along with the animal.

"If we reckon, in the state of rest, 15 respirations per minute, and for each 31 cubic inches of air (English measure), and in the expired air five per cent. of carbonic acid, and 15 per cent. of oxygen, we easily find that a man in 24 hours produces 540 litres or about 19 cubic feet (English measure) of carbonic acid, consuming in the same time 10,800 litres, or about 380 cubic feet, of air.

"In a closed space, 8 feet high, 9 long, and 8 wide, a man could not breathe 24 hours without uneasiness. At the end of that time the air would have the composition of expired air; and if the patient remained longer in the same air, a morbid state, and finally death, would ensue. Lavoisier and Seguin found that the carbonic acid of expired air when again inspired, may be raised to 10 per cent., but not beyond that quantity, even when respiration was continued, which it could only be for a very short time. This proportion of carbonic acid may be regarded as the limit at which life is endangered in man." (p. 360, et seq.; 4th Ed.)

Here I would remark that the experiment in Table B, showing that the amount of carbonic acid given out was as much when the air had been breathed for five hours as at first, is a companion experiment to that of MM. Regnault and Reiset, when it was found that twice or thrice the usual amount of oxygen did not hurt animals. But I may be allowed to remember that the experiments here recorded were performed on human beings who could register their sensations. All those made with animals take cognizance only of extreme results, such as spasms or approaches to death. I should judge that uneasiness comes on before the air has the composition of expired air, when it reaches that point the discomfort is very

great indeed; and if the air may be raised to the point of having 10 per cent. of carbonic acid, it must surely be by breathing small quantities; at least it seems to me impossible to endure four per cent. for any length of time.

Liebig also says, alluding to the subject, "These "variations in the density of the air from tempera- "ture, evaporation, or pressure, exert no perceptible "influence on the quantity of oxygen taken up by "the blood in every second of time."

M. Em. Fernet,* speaking of the organic substances in blood, says, "The volume of carbonic acid absorbed remains equal to one and a half that which pure water would absorb under the same circumstances. On the contrary, in the absorption of oxygen there is observed a very small diminution of the co-efficient of solubility, and a notable augmentation of the volume absorbed, independent of the pressure. The absorption of oxygen by the serum is on the whole regulated by the law of simple solution." On p. 675, "The volume, chemically combined, is almost five times the volume dissolved under atmospheric pressure."

Meyer and Fernet found that blood took less air up at low temperatures than at high. The contrary is the case with water; but it is clear that if the blood does take up oxygen according to pressure, it retains it by another power, and this is exercised more at a temperature equal to or above animal heat.

Muller† has done interesting work on this subject, and has shown that an animal can reduce the amount of oxygen almost to disappearance before dying. But his experiments were made on animals confined in very small spaces or bottles, the air not being equal to the bulk of the animal itself. The results, although interesting, do not bear on the subject of health. He concludes that the removal of two-thirds of the oxygen does not affect life, and explains thereby the possibility of living in the rare atmosphere of mountains. But that which he called no effect was an observation of ten minutes; and I can bear witness with myself and others that such a short experiment is not sufficient. That which may be borne for many hours, yet depresses deeply, and changes are taking place during the time in the body and mind, which many hours afterwards of fine air are required to obliterate.

That the difference of a small amount in the proportion of oxygen should be perceived in the burning of a candle, whilst the difference of a great amount in absolute quantity is not equally perceived if this difference is caused by rarefaction, points rather to the importance of the proportion of the elements being preserved. The 23rd conclusion of Vierordt seems to be the true one: "The quantity of carbonic acid given out into the lungs increases or diminishes with the amount in the lungs. If the lungs were to be cleared entirely of carbonic acid by the addition of fresh air, the freshest air would clear them most rapidly; but use air with carbonic acid, and near the end of the process the amount of air required would be very great to make any change." This is easily seen by table 16, showing the very great amount required to ventilate. For a similar reason the time required to change the composition of the mixture of gases in the blood, granting it to be changed, would be considerable, and impure air, which would finally kill, might be borne with for a time, although at first scarcely perceived.

When the air has been reduced to 18 per cent. of oxygen, and the carbonic acid removed by caustic soda or lime, leaving then an atmosphere with 18·5 per cent. of oxygen, the difference is great both in the candle and in man, a difference which the change of half a per cent. of oxygen will not give; the breathing becomes pleasant, and the candles burn better. (See diagram.) This difference, if I understand Dr. Frankland's experiments aright, is not produced by diminishing the oxygen to the same extent by rarefaction.

Table 14.

Composition of the Air.			Amount of the Gases absorbed in Water at 20 C. 68° F.		
Carbonic Acid.	Oxygen.	Nitrogen.	Carbonic Acid.	Oxygen.	Nitrogen.
0·025	20·978	79	0·02253	0·59527	1·10837
0·05	20·95	79	0.04507	0·59456	1·10837
0·075	20·915	79	0·06705	0·593851	1·10837
0·1	29·9	79	0·09014	0·593142	1·10837
0·2	20·8	79	0·18028	0·590304	1·10837
0·3	20·7	79	0·27042	0·587466	1·10837
0·4	20·6	79	0·36056	0·584628	1·10837
0·5	20·5	79	0·45070	0·58179	1·10837
1·0	20·0	79	0·9014	0·5676	1·10837
2·0	19·0	79	1·8028	0·53922	1·10837
3·0	18·0	79	2·7042	0·51084	1·10837
4·0	17·0	79	3·6056	0·48246	1·10387
5·0	16·0	79	4·5070	0·45408	1·10387
6·0	15·0	79	5·4084	0·42570	1·10837
7·0	14·0	79	6·3098	0·39732	1·10837
3·84	20.19	75·96	3·461376	0·572992	1·0657188

Table 15.

Composition of Air, Carbonic Acid removed.		Amount of the Gases absorbed by Water at 20° C., 68° F.	
Oxygen	Nitrogen.	Oxygen.	Nitrogen.
20·98	79·01	0·594912	1.108636
20·960	79·041	0·594844	1·108931
20·940	79·059	0·594277	1·109197
20·920	79·079	0·593709	1·109478
20·841	79·158	0·591467	1·110586
20·762	79·237	0·58922	1·11169
20·682	79·311	0·586955	1·112817
20·603	79·396	0·58471	1.11392
20·202	79·796	0·57333	1·11955
19·387	80·612	0·549287	1·130986
18·556	81·443	0·526619	1·142645
17·708	82·291	0·50255	1·15454
16·842	83·157	0·47797	1·16586
15·957	84·042	0·452859	1·179109
15·053	84·946	0·427204	1·191792

* Comptes Rendus, vol. 46, p. 623.

† Annalen der Chemie und Ph. vol. 108.

I do not know that the passage of carbonic acid through moist membranes has been applied to any condition found in the lungs. The table 14 was made, and may be again referred to, in order to explain the action of carbonic acid, supposing it to keep in contact simply with a liquid such as water which will absorb it. We find that with 0·1 per cent. carbonic acid gas, the absorption is 0·09, and of oxygen 0·593, but how rapidly the rise is made in the column for carbonic acid. When we reach 0·2 the amount of carbonic acid is doubled, and that of oxygen scarceiy altered. With 0·1 carbonic acid the absorption is 15 per cent. of the absorption of the oxygen, with 0·2 it is 30 per cent.

Knowing as we do the necessity that blood should give out carbonic acid, it is easy to believe that such a constant exposure to an acid gas would prevent this action.

If we shake a volume of common air containing 0·04 per cent. of carbonic acid with water the amount of oxygen dissolved is much greater than that of the carbonic acid, but let the carbonic acid rise only to 0·6 and the amount dissolved would be greater than the amount of oxygen; when we arrive at 2 per cent. the amount of carbonic acid dissolved is actually more than three times the amount of oxygen; at 4 per cent. it is eight times. This estimation is for water, whilst the oxygen in respiration is absorbed by blood; and this is for 68° Fahr., whilst that of respiration is nearly 30 degrees higher; but although there are experiments on the absorption of oxygen by blood, the knowledge is not in such a state as to admit of decisive replies. It does, however, admit of illustration. R. F. Marchand, and after him Fernet, found that the absorption of oxygen by the blood did not produce instantly carbonic acid,* the oxygen is carried into the blood and gradually acts upon it. Oxygen has been found along with carbonic acid in the blood, and in greater quantity. Meyer's experiments in Watt's Dict. of Chemistry give from two to three times more oxygen than carbonic acid; Bernard found in a dog's arterial blood 19·46 of oxygen.† Much dispute has arisen whether the oxygen was combined or absorbed; without inquiring into the mode by which it is retained, it seems probable that the act of absorption is first physical. The blood has in reality no pure air exposed to it, as Vierordt has shown that in the deepest portions of the organs of respiration there is more carbonic acid. This explains why death does not at once occur, with a moderate increase of carbonic acid, such would immediately be the result if the absorption were exactly as in table 14. Still it is fair to draw this conclusion, that the more carbonic acid there is in the air, the more difficult will it be for the blood to keep its excess of oxygen.

The table B shows that the formation of the normal amount of carbonic acid is no proof that there is a sufficient supply of oxygen or that a place is healthy. There is evidently power lost in supplementing a deficient supply by great exertions. I must not attempt to speak as a physiologist; the chemical fact was well proved.

It would of course be much better if we could reason in a more direct way, and by experiment in a laboratory prove that the smallest amount began the mischief. It would be better, because people have more faith in that which goes on before their eyes rapidly; when the operation is extended through years they begin to lose sight of the cause, and besides this, other influences cause the argument to be more mixed.

In brewhouses the carbonic acid is nearly pure, and I am inclined to think from inquiries made, and from a little more trial of it myself, that even when pure it is not well to have an amount so great as 0·15 per cent., although 0·19 is not perceptible to me. (See under Organic Matter.) This is going farther in that direction than I expected to go, 0·25 will scarcely show on a common photometer, and it is certainly not perceived by the senses in a direct way.

If we look at the diagram showing the effect of bad air on the burning of a candle, we shall see that the beginning is very rapid. The whole bearing of the experiment leads us to think that there is no point at which the effects of the carbonic acid can be called null, but that the effect shades out as finely as the acid itself.

The proportion of the gases in the atmosphere is adjusted so that we can keep combustion freely under control. If we use very little more oxygen the rate of combustion is perceptibly increased; if we take any less than one per cent. (0·8) the rate of combustion is diminished at least a third. If 0·8 per cent. will have such a great effect, is it a strain on our reasoning to attribute a considerable influence to one tenth per cent.? And if the absence of 0·1 of oxygen be felt how much more will this be the case when it is replaced by an equal amount of carbonic acid?

It is extremely probable that the carbonic acid and oxygen are adjusted to the condition of the blood and lungs, or, as some would prefer it, that the blood has adjusted itself to the oxygen and lungs; the slightest excess of oxidation might in a few years destroy the smooth action of the organs; and it is not to be wondered at that some persons are more fitted for working as it were under low pressure, and if put into pure air give way, whilst others again require all the stimulus of the purest air and exercise to set them in harmonious action.

If we were to examine the air of various climates we might arrive at the lowest amount of carbonic acid which affected individuals, but this is only partially done, and we must look rather to analyses such as those here given of the air of mines and close places.

It has been said, and probably with truth, that animals seek inferior air when sleeping, and man also dislikes then a bracing air. It may be well to breathe less oxygen for a short time, such air, for example, as is got by putting the head under the bed clothes. It is probable that it removes the stimulus caused by pure air and calms one down to sleep, but this impure air by degrees becomes more and more unwholesome, and when the sleep has begun it seems more natural that the lungs should themselves adjust the amount of air required, by respiring more slowly rather than moving with rapidity in impure air. But as few persons seem to regulate themselves so well, and as the stimulus required in active life is not required in sleep, it is probable that for many persons, if not all, the air may be with propriety diminished in oxygen to the extent of two or more parts in 10,000; if this is not the case it will be difficult to explain many of the habits of both men and animals.

Viewing the subject from another point it becomes in fact practically necessary to have this diminution;

* Kopp's Jahresb. 1858.
† Kopp's Jahresb. 1858, p. 260.

we cannot during sleep bear so much cold; we breathe less and must be kept warmer, and probably cannot therefore have equal ventilation. In conformity with this it is universally agreed that the temperature shall rule the ventilation in domestic life; a law by no means very bad, and in many circumstances quite sufficient. Could this law be applied in mines, could we use a fine thermometer, so as to indicate the rise? Mr. Holland proposes a differential thermometer, with one bulb in the earth. But the value of this measure would be limited to places in constant occupation. It could give no idea of the value of air, which, although bad, had become cool or produced *cold damp*.

There are certain advantages gained by rising up into a lighter air; to some persons it is essential. There are also advantages gained by a condensed atmosphere, if not permanently, still for a time; speaking here entirely from the evidence of others. To what is the benefit owing in the first, and in the second entirely opposite, condition? On rising up a mountain people speak of the air being lighter; may it not be that, on the pressure being removed, the carbonic acid escapes more readily from the blood and is removed by the lungs, when more oxygen can be absorbed? For this reason a lighter air within certain limits may actually give us more oxygen although it contains less. When advantage is obtained from compressed air, it may be that the oxygen is driven in by the pressure and more oxygen obtained in this way. Both suppositions go on the belief that more oxygen gives pleasure; and this is true, but, as usual, within limits. These are not the only causes. One reason why we are pleased with mountain air, is, to my mind, very clearly the same that makes us seek better ventilation. We seek air freed from all matter capable of oxidizing. Probably we do not require to go very high for this, and it will be very interesting to find how high.

This enquiry would lead us to the conclusion that cold air, moist air, and rather but not very high air where the wind blows, is the purest; it is certainly that which braces. When we lose vigour we are inclined not to seek such air. This is in agreement with much traditional belief; it explains the old instead of introducing new.

But let us put the question clearly: Will the loss of 0·1 of oxygen make any change in the respiration if its place is not supplied by a hurtful substance? According to the quotations already given, the blood would seem to have a reserve of oxygen, and would not require to be supplied with any definite amount. But it is evidently limited in its power of absorbing oxygen, because if you give it more oxygen it can bear more carbonic acid, as Liebig's quotations from Regnault and Reiset prove. Every addiiton, therefore, of oxygen gives a corresponding amount of resistance to the carbonic acid poison. I see no way out of this reasoning myself, considering the position of our knowledge.

Another condition seems to exist in which this small amount will have its effect. In a close place, where the oxygen is becoming less by consumption, every atom will have its value.

In cases which seem to allow of much true reasoning on either side, it generally happens that the subject divides itself into two or more parts. It does certainly appear that the respiration is not affected sensibly by a small or even by a considerable diminution of oxygen, when the place of that gas is not taken up by others of a noxious character. The report is written with this belief. The question, Would the respiration or the health be affected if we lived long in air with a diminished quantity? is not yet answered. It seems rational to believe that an active agent like oxygen cannot fail to show itself. It is against all our knowledge of oxygen to believe that it could remain entirely without character in the presence of organic matter. The only dispute that can be on the subject will turn on the amount of effect, whether it will be perceptible in minutes or years. If the oxygen should be as ozone, I am inclined to believe in the power of very minute quantities perceptible at once; and I think most chemists will agree to believe in some such effect, whatever their theory of the substance called ozone may be. If, however, the oxygen is the common gas, the proof of any rapid effect is wanting, although it is clear that there is no rapid injury. However, the question is not of much practical value, although extremely interesting theoretically.

Washing the Air.

If the oxygen which nature supplies were more than is required, we might wash out the carbonic acid of the mine with lime water or soda, and have again air as good as at first.

This was proposed both by Dr. Bernays and myself, and I find that it has often been proposed. Liebig advocates its use in confined sleeping places. It seemed to me that it would be easy to use that beautiful jet made by Sir Goldsworthy Gurney for washing the air supplied to the Houses of Parliament. The water passes from a narrow tube and strikes a plate of metal, which drives it off on every side in the finest dust, as we have learned to call it, or, as the inventor styles it, Scotch mist. I thought to send caustic soda in the same way; but it was found that practically very pure liquids must be used. These could not be obtained in mines at all times, and after much annoyance it was decided that caustic soda would not do. And why annoyance? The experiments were tried in the lead chamber, and air with 3 per cent. of carbonic acid was attempted to be washed, but the amount of confusion caused by the pumps, added to the causticity of the soda, rendering everything dangerous to touch, made the place less comfortable than the worst washing house, and more disagreeable than a mine, if we consider everything except the atmosphere. Caustic lime could not be used conveniently in such places. Lime water is too weak; it is surprising how much liquid is necessary. The milk of lime would be required.

The lime water or milk would become carbonated at the exit of the tube, and be found destructive. It would whiten the floor and all the rocks, so that the strata could not be seen, and it would increase the water of wet mines, whilst it would render dry mines wet. Finding a jet impossible because so easily stopt up, cloths moistened with milk of lime were used merely as an experiment. By this means the air was rendered pleasant to breathe; a candle burnt better, as the diagram shows; but it did not seem advisable to manufacture such air for men, and I came to the conclusion that if the air were really bad, it was proper simply to replace it by good and to avoid mending. Time is wanting for details of this experiment.

VENTILATION.

The question how much air shall be given to an individual is a very natural one, and has been variously answered. Probably the best answer is that given by Professor Pettenkofer, and mentioned when speaking of carbonic acid. The question of ventilation would best be answered if we could reply to these questions:—What is the smallest amount of carbonic acid which may be called injurious? and what is the smallest amount of organic matter?

The amount of carbonic acid in the air is 0·04 per thousand in many places that are healthy, but less at times, perhaps less in some places at all times. About five times that amount affects a candle sensibly, a photometer being used, and it is extremely probable that less affects it also; are we affected as readily? I rather avoid this question at present, we have not facts enough. But we do not require to speak of the gas except in conjunction with organic matter, and 1 per mille, Pettenkofer's point, seems a very natural point to fix on as the first stage of very bad ventilation when the exhalations from the body are present with it. Let us take the two together and we then find that much depends on the temperature also. If the day is warm we may pass from a room having 0·06 in a hundred of carbonic acid to the air with 0·04 and feel refreshed. If the day is not warm, we do not feel the difference, at least such persons as I have examined do not. *The conclusion is that in the early stages of the want of ventilation the organic exhalations are the most injurious.* Now they increase with the temperature whilst the acid does not. For this reason we ventilate in warm weather for the organic matter far more than for the sake of the acid. As the former cannot be estimated by weight, I have viewed the subject only in relation to the carbonic acid. I think it probable that we shall be able to view it also in relation to other substances. For example, so much temperature will represent so much organic exhalation and the volume of air will differ accordingly. This is not attempted yet.

It is often asked how often must we renew the air of a place in order to keep up the purity at a given point? The first column of this table gives the amount of per-centage of carbonic acid which it is desired to maintain in the air, the other columns the amount of air required per 100 cubic feet of space, in order that the amount of carbonic acid should not be exceeded.

TABLE 16.

Amount of Air required per hour.

Carbonic acid per cent.	For a man.	For a candle.	For a man and candle together.
·4	100	50	150
·3	133	66	200
·25	160	80	240
·2	200	100	300
·1	400	200	600
·09	444	222	666
·08	500	250	750
·07	571	286	857
·06	666	333	1000
·05	800	400	1200
·04	1000	500	1500
·03	1333	666	1999
·02	2000	1000	3000

Here a man is supposed to render 100 cubic feet of of air impure up to 0·4 percent. in an hour, a candle up to 0·2, both together to 0·6. But there is a great variety of candles as well as of men. The number is got thus:—If the carbonic acid must never exceed 0·4, the whole must be renewed every hour, if a man is in the space; if the candle only, every two hours; if a man and candle, add the two.

Here we have a rule to guide us for every amount of carbonic acid. When that gas is removed the organic matter goes with it. But the removal must be entire, the whole air must be moved forward, the draught must not be in one corner only, whilst the rest of the space remains impure, otherwise we have a mere mixture of good and bad; ten times the proper amount of air required may be driven past a place and still do little good. The amount of air as stated in the table will not suffice for those cases where the draught is required for the purposes of cooling by producing evaporation, but I think it will be enough for all temperate places. When the cold is great, a smaller amount is required, because then we do not ventilate for organic matter so much as perhaps carbonic acid, and we can bear more readily carbonic acid in small amounts than organic matter.

I wished to determine how much carbonic acid we can bear pleasantly at very low temperatures, but I have not done so. It is less important to determine how much we can bear at high temperatures as the amount becomes almost too small to consider, the annoyance of the organic matter increases so much. This again varies with individuals more than the acid.

Now that we have the amount of air required in order to produce a certain purity, the next question arises: On what number in these columns shall we fix? For really warm air there is no difficulty; the air around us for comfort and absolute purity must be changed at least three times a minute, so that we may breathe it fresh every time. For houses in a moderate temperature we may take numbers opposite ·07, or if the temperature would bear it ·06, and still better ·05; but as Pettenkofer advises I would not go above ·07 unless cold compels us.

In summer when we keep the windows up as far as possible, we may even arrive at ·04 in the country, and after rain at still less. It is a fair question, How much is the pleasant influence of summer air in a house due to this frequency of change?

The next question that may be asked is, How are we to know that we send into a room 100 or any other number of cubic feet? This I shall not pretend definitely to answer. It is a mechanical riddle not yet solved for private houses. I should prefer answering indirectly, and estimating the amount of carbonic acid by one of the simple methods given under tests for carbonic acid. The per-centage found will determine if the proper amount of air is supplied.

HEAT.

The heat of the mines is often very much increased above that of the ground in which the mine exists. The effects are greater than the theory of internal heat will explain. This has been supposed to arise from the oxidation of pyrites in the ground; and miners generally testify to the greater warmth of such mines as contain sulphur compounds which are readily oxidizable. It is of interest, and perhaps of

use, to know how much of this depends on the men and the candles; and a few experiments were tried in the lead chamber. The results are not in reality of much value in themselves, although they may lead to other ideas and inquiries. This part was very incomplete.

The experiments were made by simply remaining in the chamber and observing the temperature, or by placing a paraffin candle in the chamber and observing, and by both together.

The amount of heat can be better calculated when a paraffine candle is used; and Messrs. Field, of Lambeth, were good enough to make into candles some of the purest paraffin obtained from my friend Mr. Young. It was taken as containing 20 atoms of hydrogen and 20 of carbon. Of this 7·75 grammes burnt in an hour=6·85 carbon and 0·9 hydrogen :—

One of carbon burning into carbonic acid will give 8080 units of heat, or will raise 8080 of water one degree C.

One of hydrogen heats 34,462 of water.

6·85 × 8080 units of heat -	55,348
·9 × 34462 - -	31,015
Grammes of water heated a deg. C. -	86,363
Or the air in the chamber 150* cubic feet, raised - - -	65·8° Cent.
Or - - -	118·4° Fahr

A man burns carbon variously. It will be seen that (10·27 ounces) 302·4 grammes per day was the rate at which the carbon was burnt in some experiments mentioned, or 12·6 grammes per hour (194 grains).

12·6 × 8080 = 101,808

Or the air in the chamber 150 cubic feet heated - - -	77·5° Cent.
Or - - - -	139·6° Fahr.
100 grammes of gunpowder (about 3½ ounces) containing - -	13·3 sulphur, 11·9 carbon,
would give 13·3 × 2221 - -	29,538
11·9 × 8080 - -	96,152
Units of heat - -	125,961
Or the air of the chamber 150 cubic feet, raised - - -	95·8° Cent.
Or - - -	172·4° Fahr.

If we took 100 grains, and had the same percentage of sulphur and carbon, we should have 8,138 units of heat.

The actual rise of temperature in the chamber is shown in the following :—

TABLE 17.

One Person in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, middle.	Temperature inside, bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
	5·4	45·	44·	43·5
After 15	5·4	47·	51·	46·5
30	5·6	48.5	52·	48·0
45	5·6	49·	52·8	48·5
60	5·8	49·5	53·5	49·2
75	6·	49·6	53·8	49·5
90	6·	49·8	54·	49·5
105	6·	50·2	54·8	50·
120	6·2	50·5	54·8	50·2

* This has been calculated for 150 instead of 170.

TABLE 18.

One Person in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, middle.	Temperature inside, bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
	5·9	44·8	49·	44·
After 15	6·	47·4	51·	47·
30	6·2	48·5	52·4	48·4
45	6·3	49·4	53·2	49·2
60	6·4	49·9	53.9	49·8
75	6·4	50·5	54·4	50·2
90	6·6	50·5	54·5	50·4
105	6·5	50·6	54·9	50·5
120	6·6	50·8	55·	50·6

TABLE 19.

One Person in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, middle.	Temperature inside, bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
2 0	5·8	45·5	44·8	44·4
After 15	—	48·1	46·5	47·8
30	—	49·6	48·0	49·4
45	—	50·2	48·9	50·0
60	—	50·6	49·2	50·4
75	—	50·8	49·5	50·5
90	—	50·8	49·8	50·5
105	—	51·0	50·0	50·8
120	—	51·0	50·0	50·8
135	—	51·0	50·0	50·8
150	—	51·2	50·1	51·0
165	—	51·0	50·1	50·8
180	6·3	51·1	50·1	50·8

TAALE 20.

One Person in the Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, bottom.	Temperature inside.
h. m.	cent.	Fahr.	Fahr.	Fahr.
	5·5	44·3	43·4	
After 15	5·7	46·3	46·4	
30	5·8	47·9	48·1	
45	5·8	48·5	48·8	
60	5·8	49·3	49·5	

TABLE 21.

One Person in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, bottom.	
h. m.	cent.	Fahr.	Fahr.	
	4·6	42·3	41·7	
After 15	4·6	44·3	44·4	
30	4·6	45·9	46·2	
45	4·6	46·8	47·1	
60	4·7	47·5	47·8	

TABLE 22.

One Paraffine Light in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside, middle.	Temperature inside, bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
9 10	5·0	43·1	42·7	42·2
After 15	5·0	45·3	44·0	43·4
30	5·0	47·0	45·0	44·4
45	5·0	47·6	45·8	45·0
60	5·1	48·2	46·3	45·3
75	5·1	48·5	46·6	45·7
90	5·2	48·6	46·9	46·0
105	5·3	48·9	47·1	46·2
120	5·4	49·0	47·3	46·4
135	5·4	49·2	47·6	46·5
150	5·5	49·4	47·6	46·7
165	5·6	49·5	47·8	46·8
180	5·6	49·5	48·0	46·9

TABLE 23.

One Paraffine Light in the Lead Chamber.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside middle.	Temperature inside, bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
	5·9	44·5	43·9	43·7
After 15	5·9	47·1	45·4	44·7
30	6·0	48·4	46·4	45·5
45	6·0	49·0	47·0	46·0
60	6·2	49·5	47·3	46·4
75	6·2	49·9	47·8	46·7
90	6·2	50·0	48·0	46·9
105	6·2	50·0	48·1	47·0
120	6·3	50·0	48·2	47·1
135	6·3	50·1	48·2	47·2
150	6·3	50·1	48·3	47·3

TABLE 24.

One Paraffine Light in the Lead Chamber, and one outside.

Time.	Temperature outside.	Temperature inside, top.	Temperature inside. middle.	Temperature inside. bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
10 0	4·2	42·5	42·0	41·5
After 30	4·4	45·6	44·0	43·3
45	4·8	46·5	44·9	43·8
60	4·9	46·9	45·1	44·2
75	5·0	47·3	45·5	44·6
90	5·2	47·5	45·8	44·8
105	5·3	47·7	46·1	45·2
120	5·4	48·0	46·2	45·4
135	5·5	48·1	46·5	45·5
150	5·6	48·3	46·7	45·6
165	5·6	48·4	46·8	45·7
180	5·6	48·5	46·9	45·8
195	5·7	48·6	47·0	46·0
280	5·7	48·9	47·0	46·0

TABLE 25.

One Paraffine Light in the Lead Chamber.

Time.	Temperature inside.	Temperature inside, top.	Temperature inside, middle.	Temperature inside. bottom.
h. m.	cent.	Fahr.	Fahr.	Fahr.
9 0	4·5	42·0	41·3	40·9
After 15	4·4	44·5	43·0	42·0
30	4·4	46·0	44·2	42·9
45	4·4	46·7	45·0	43·6
60	4·6	47·3	45·6	44·3
75	4·6	47·6	46·0	44·5
90	4 8	48·0	46·4	44·9
105	5·0	48·2	46·5	45·2
120	5·2	48·5	46·9	45·4
135	5·3	48·6	47·3	45·6
150	5·4	48·7	47·4	45·8
165	5·4	48·8	47·5	46·0
180	5·5	49·0	47·6	46·2
195	5·5	49·0	47·6	46·2
110	5·5	49·0	47·6	46·2

TABLE 26.

The following Table gives the abridged Results. Increase of Heat caused by a candle in 170 cubic feet of air in Lead Chamber.

	Average Increase of Temperature.		
	In 1st hour.	In 2nd hour.	Total in 2 hours.
1	3·4	1·1	4·5
2	4·3	1·2	5·5
3	3·7	0·7	4·4
4	4·0	1·0	5·0
	4) 15·4	4) 4·0	4) 19·4
	3·85 Mean increase in one hour.	1·0	4·85 Mean increase in two hours.

TABLE 27.

Rise of Temperature caused to the 170 cubic feet of air in the Lead Chamber by one man during one hour.

1st March - -	5·16
3rd „ - - -	6·57
4th „ - -	5·27
8th „ - - -	5·55
9th „ - -	5·65
	5) 28·20
Mean increase in one hour -	5·64

Heat caused by Gunpowder.

1st.			rise.
Temperature to begin - (8 grammes gunpowder burnt.)	roof 43·7 F.	floor 43·5 F	
After 13 minutes -	47·3	47·3	
Total heat - - - - - -			3·7 deg.

We may feel surprise at the enormous amount of heat passing from candles, fires, and animals, as shewn in the calculation, and wonder how it is so rapidly removed as appears by the experiments. The surface of the lead was very large, and we can readily understand the mode by which the heat was conducted. The amount of heat given out by a man is not accounted for by the amount of carbon burnt. The estimation of the carbon was not made at the same time with the observation of the heat. Still, I found the carbonic acid very constant, as it was always made immediately after a meal, and it will be found to stand high, although not at the highest point. The amount of carbon not being able to produce all the heat found, we must have recourse to hydrogen burnt in the body for the production of the remainder; and it may be worth inquiring whether this method of working may not produce results of importance to medical men. Some men will burn less carbon and more hydrogen, as some men eat less starch and more fat; and the capacities for food, and the quality of the decomposition, may in this be observed, not forgetting also the actual power of producing warmth.

I afterwards found in some experiments that the man gave as nearly as possible double the amount of carbonic acid given by a sperm or paraffine candle. A man produced in an hour 0·6 of that gas to 100 feet of air, a candle 0·31. The miners' candles produced more, as is believed, but this was not estimated.

On the effect of heat I have little to observe. We all know how it relaxes the exertions of body and of mind, especially when moisture at the same time saturates the air. Dr. Edward Smith has explained this clearly, by showing that a rise of temperature at once diminishes the amount of carbonic acid formed. The rate of life is arrested, but apparently also the functions of life. When life is allowed to move more rapidly by a lowering of temperature, the rate of living may not be more increased, as the repair seems to depend as directly on the oxidation as the waste depends.

There is at a certain temperature a very decided change in the body. This change is marked on all thermometers at 55° Fahrenheit, 12·7 Cent., as temperate. Above that we require little artificial warmth, and a little exercise supplies sufficient for most persons. On making experiments on putrefaction, the temperature of 54° was observed to be a marked one, or, perhaps, it ought to be 55°, as it was only obtained by many approximate observations, and was not definite. It was supposed that the oxidation was facilitated by the temperature. when colder it is probable that the conducting power is too great for the amount of heat developed, and action is arrested. The same may be the case with man: below 55° the conducting power of his own person is too great to enable him to keep up his warmth, and he must therefore increase his combustion by exercise, or obtain heat from external sources. Above that point the heat is not required, and the oxidation diminishes. In the case of putrefying blood the oxidation increases above 55° in a very marked degree; but it is probable that both depend on the same fundamental fact or facts.

At any rate the point in question is one to be noted, and it is extremely probable that labour will be diminished as the heat rises above that temperature. There is a difficulty in the analogy, as the temperature of man is not lowered to that of the external air.

The use of the lead chamber leads to a new mode of finding the amount of heat given out by man, here it is done in a way that is merely incipient. We are obliged to judge of the amount of heat after the greater amount is actually lost. The chamber might be made with sides less capable of conducting, and a more exact result found.

The production of heat from gunpowder and gun cotton is more rapid, and less is lost. If a thermometer were used capable of rising more rapidly than the mercurial, much more would be gained.

The ventilation requires to be greater in proportion as the temperature rises.

I was led to consider one of the causes of this when working on the gases of putrefaction. It was then perfectly clear that the putrefaction proceeded exactly as the temperature rose, not ceasing at a little above 130°, perhaps approaching nearly 140°,—which marks another point in organic substances of importance, as being that at which albumen coagulates. At any rate, as the temperature rises within any attainable limits natural to this country, the necessity for ventilation is felt. The organic matter becomes especially annoying, even with a small increase of carbonic acid. The heat expands it. The substances that annoy us are very volatile, and we may suppose that they begin to decompose in the air when the temperature rises. Indeed, it is scarcely a supposition; it is a fact that after a time they become entirely changed, whether they be organic or inorganic. Sulphuretted hydrogen becomes oxidized, and the unpleasant odours in the mining galleries become the smell of apples. In a house, the organic odours, if shut up, become mouldy or putrefactive according to circumstances; but if the last, they are more rapidly remedied by abundance of air, which oxidises and washes them away. In a low temperature they will lie unaltered on every substance, and start out again when are they warmed. This action is more distinctly seen when the quantities of oxidizing matter are large; then the eye can perceive the amount daily diminishing until it is all carried away.

If this result be caused by the action of warmth it is not right to demand as much air for ventilation in a cold day as in a warm; it is not right to break the windows of patients in winter, and to tell them that fresh air is better than heat. The chemical action, and with it the feelings, demand warmth first above all things. It is the very first demand, as no function can go on without it. You may live hours, days, or years in badly ventilated places with more or less discomfort and danger; but a draught of cold air may kill like a sword, almost instantly. In railway carriages, therefore, and in houses also, the great instinct of man is first to be warm enough; and he is quite right. Such a universal instinct must not be sneered at; and even if it had no good scientific foundation it must be considered as a power strong enough to stand on account of the number of its supporters.

Whatever it be that causes organic substances to be unpleasant, they are very much connected with the lungs, as the body may bear the heat if the mouth only has the advantage of a good current of air. Certainly this points strongly to want of oxidation and diminished strength on that account. Again, if these minute substances are oxidizing in the air, they will

in the lungs be candidates for the oxygen of the air that the blood is seeking, and act just as sulphuretted hydrogen would act. Moreover they are taken up more rapidly than mere gases would be, as we know from the capacity they have of remaining so as to make a room unpleasant long after the air has been changed; that is, if time has been given them to settle. This is peculiarly to be observed in some churches, and so far is it true that you may know for some time, and at some feet distant by the smell of the clothes, it people have just lately come from such a church. This will not occur when there is warm air, or when the windows have been sufficiently open. Again, near a great number of the working people the same smell is perceived as in their houses. And this great fact is, after all, one of the main causes of cleanliness, as it has produced in us a dislike which demands its removal.

The intense heating power of the gunpowder is to be remarked, and the sudden change which it produces. It is not easy to imagine any greater advantage to the miner than the removal of this evil. Analyses point to a fresh current on the floor, whilst a warm and less pure current is above. Some such thing must take place to keep the mines even in the condition in which they are, and to explain why they do not become filled with poison. Although gunpowder is said to have been used at Rammelsberg, as early as the 12th century,* it was not used with great effect till very modern times. We cannot say, however, that its use has made the mines less fitted for life, as before its time it was usual to heat the rocks by burning wood upon them, after which the place was left for a day or two, till the smoke became tolerable. Some recommend the miners to wait from Saturday to Monday, some from Friday. This practice is not entirely given up, according to accounts received, as it is found useful for very hard rocks.

If gun cotton could be used of a kind which gives out none of the oxides of nitrogen, an advantage of the most pleasing kind would be gained. The solid matter, the crystals and carbon, would cease to trouble the miner, as well as the sulphur compounds that follow every explosion.

The production of heat must be of great advantage to the mine; it makes ventilation possible. A mine without workers becomes filled with stagnant air. It is the problem of miners to compel that heat which is formed so to warm the air as to produce a current. If the air is led towards the shafts this effect will be produced. There are two modes of doing this: one is by drawing out the warm and foul air directly, another is by driving in pure air to the men, and so forcing the foul air towards the shafts.

GUN COTTON.

As gunpowder is evidently one of the most deleterious ingredients affecting the air of mines, the Commission was desirous that the products of combustion of gun cotton should be examined, in order to find if that substance promised to perform the work of blasting with a less injurious influence on the air.

Hecker with Schmidt and Teschemacher with Porret obtained as products of combustion of gun cotton†:—

—	Hecker with Schmidt.	Teschemacher with Porret.
Carbonic acid	20·8	12·92
Carbonic oxide	37·6	20·47
Binoxide of nitrogen	17·2	21·94
Nitrogen	4·0	4·11
Cyanogen	—	7·58
Carburetted hydrogen	4·6	—
Water and loss	15·8	32·98
Parts by weight	100·0	100·00

In a report by a committee of the British Association the gases from gun cotton and gunpowder are given as below, the analyses of the powder being made by Lieut. Karolyi:—

Gases of combustion, volume per cent.	Bunsen.	Karolyi.		
	Sporting powder.	Rifle powder.	Ordnance powder.	Gun cotton.
Nitrogen, N	41·1	35·3	37·6	12·7
Carbonic acid, CO_2	32 7	48·9	42·7	20·8
Carbonic oxide, CO	3·9	5·2	10·2	29·0
Hydrogen, H	1·2	6·9	5·9	3·2
Sulphuretted hydrogen, HS	0·6	0·67	0·86	1·8
Oxygen, O	0·52	—	—	25·37 carbon / water
Light carburetted hydrogen	—	3·02	2·7	7·2

Among these gases there is no nitric acid and no binoxide of nitrogen.

Nitrous fumes must be considered dangerous to breathe. Fatal cases reported in the "Chemical News"* prove that some of the oxides of nitrogen are dangerous to a degree far beyond that which the senses would expect. The sufferer leaves the place well, imagines he has recovered when he feels the influence of purer air, and in a few hours the effects of breathing the nitrous fumes begin, and he is fatally attacked.

Nitric acid and most of the oxides of nitrogen have a powerful oxidizing action on metals, and this characteristic has caused gun cotton to be much feared in connexion with fire-arms.

The improvements made by Baron Lenk in the manufacture of gun cotton has made the analysis by Karolyi of the products of combustion more probable than that by Porret and Teschemacher. The difference between the two is great.

As it was well known that Mr. Abel, F.R.S., of the Woolwich Arsenal, was engaged working on gun cotton, I was very desirous that he should give his experiments to the Commission. He informed me that he had made some advance in the subject, and that the results promised well; he was inclined to believe that when the explosion was under pressure the oxides of nitrogen were decomposed. It is not agreeable to enter on a subject when you may even by accident reap the labours of another, but the Commission was unable to wait, and Mr. Abel was not immediately occupied with the question. I was

* Reitemeier's Geschichte des Bergbaues.
†Jahresber., Liebig and Kopp Vol. 1, 1141.

* Vol. 7, 1863, pp. 132, 156 167.

besides informed by Mr. Scott Russell that although an official inquiry was going forward, the whole question was quite open, being made so by the Austrian Government under which the later improvements were made. It was therefore clear that to make a few experiments on the subject was not an act for which I could be blamed.

Mr. Abel kindly supplied the specimens of cotton, and I suppose therefore that it was of the best quality.

The main results are contained in a few lines, which may be here put at the beginning.

Left loose, and lighted with a hot wire.

Amount of gun cotton exploded.	Per-centage of acid calculated as nitric acid.
0·2 grammes - -	3·48
0·2 „ - -	3·48

Heated by the lamp, as shewn in fig. 9, but loosely rammed.

0·2 grammes - -	5·22
0·2 „ - -	5·22
0·2 „ - -	4·06
0·2 „ - -	4·06
0·1 „ - -	3·48

Rammed hard and beaten in the same way.

0·1 gramme - -	1·16
0·1 „ - -	1·16
0·1 „ - -	1·16
0·1 „ - -	1·16
0·1 „ - -	1·16

In the last five no very perceptible difference could be ascertained.

In the mines.

About 30·0 grammes - Trace.

In all cases, those at the mines excepted, the amount of acid was evident to the senses, but it must be remembered that the gases were confined to a very small space, and not diffused through a great volume of air as in the mines. In order to obtain the gases after explosion a copper cylinder was made 14 in. long, and $4\frac{1}{2}$ in. diameter. A small cannon was attached to one end and pointed into the cylinder. At the other was a tube which was fitted into an air-pump. The cannon was loaded and screwed into the cylinder, which was then attached to the air-pump and freed from air. The touch hole of the cannon was screwed up also, and firing was performed by placing a lamp under the cotton as at fig. (9). By this means all the gases were retained. The only wadding used was soft paper, and when the explosion occurred the only sound which could be heard was a slight tinkling caused by this paper striking against the opposite end of the cylinder. This showed that a good enough vacuum was obtained. Very different was the result even with $1\frac{1}{2}$ grain, which caused a very loud explosion when no vacuum was used. No cyanogen compounds were obtained amongst the products of combustion.

Mr. Prentice informed me that this mode of heating the gun cotton was not a fair one, because heat caused the evolution of acid. This seems to be the case from the results given. Some explosions of the cannon were therefore made by firing gunpowder first, which communicated the fire to the cotton. Still in this was found binoxide of nitrogen. It was not apparently less than in the previous cases, but an absolutely unobjectionable way of doing this experiment quantitatively would require a change of apparatus; it has been done qualitatively several times.

As the oxides of nitrogen, the substances to be feared, are found diminished according to the violence of the explosion, it was important to know if the use of greater quantities of gun cotton, producing more heat during combustion, would give out gases of a more innocent character still. To examine this, Lord Kinnaird had arranged a meeting of captains of mines at Dolcoath, Camborne, with whom I was to act, examining the products of combustion. Accident prevented me going down the mine, but Mr. Richard Pearce of the Royal Institution, Truro, took the apparatus down, passed the air through the solutions, and brought up specimens immediately after the explosions. Several solutions were examined, the amount of air passed through being 1470 cubic inches, but only a trace of oxides of nitrogen could be found in any, and with difficulty.' Considering that nitrates could be found in a few cubic inches of air after the explosion of gunpowder, the result must be considered excellent.

One of the principal objects in view was the observation of the effect of the products of combustion of gun cotton on the senses.

Whilst the experiments were going on underground I selected a hut somewhat about the height and breadth of a "close end," and about 10 feet long, as fitted for making similar trials aboveground. In this was laid a large mass of granite; a hole was bored in it by a miner, and it was fired with gun cotton. When the fuse was lighted all present ran into distant corners, and remained quiet for about a minute or two, their usual time. At the end of that time they became impatient, and some were actually rushing towards the hut to examine into the cause of the delay of the explosion. Some of us who had more caution interfered, and advised a return to the hiding holes. It was well they returned. The explosion was pronounced successful, but although it was believed by the miners present that the gun cotton had done all to the stone that powder could possibly have done, they were surprised that the roof of the hut was not blown away. They held this as a proof that the action of the cotton was different from that of the powder. Probably the vapour of water condensed before reaching the roof.

We all entered the hut instantly. The place was full of a light coloured or nearly white vapour, with a rather pungent smell, having in it nothing at all resembling nitrous gas, or indeed any acid substance whatever. I could think of nothing similar to this containing nitrogen. After all there was not much of it, and it was far from resembling in intensity the smell of gunpowder after explosion in such a place. If the senses could detect any nitrous gases in the vapour, I would not speak in favour of it, but after remaining in the midst of it till it disappeared, I am compelled to defend it against any such charge. The man who bored was much pleased, and all the workmen with whom I spoke preferred very much the vapour of gun cotton to that of gunpowder.

I had tried gun cotton loosely burnt in the lead chamber, which was made to resemble a "dead end," and there the amount of nitrous gases was so great that it was determined that if no improvement did take place the report must be rather against cotton. But in the hut all this fear had disappeared, and Mr. Richard Pearce informed me that underground also there was not the slightest smell of nitrous gas.

There was now a new riddle. Why was there smoke, and what was the smell observed? No one seemed to

know the smell of a fuse; it is never used by itself, and although sometimes it burns without lighting the charge, the men do not enter such places till the smoke is gone. Of this I was informed, although the reckless intention which was leading the miners to the hut before the explosion occurred made that doubtful.

In order to settle the point, the hut was shut up, a burning fuse being inclosed in it; when we entered it after two minutes, there was the same white smoke and the same smell before described; it was now explained to be that of distilled or half-burnt canvas and tar mixed with the gunpowder of the fuse. So strong was it, that I do not hesitate to say that the smell of the gun cotton was not in the slightest degree perceptible; in other words, it had no perceptible influence on the smell in the hut. Such a fuse is not necessary. It is not used everywhere, and in reality seems rather to be a peculiarity of some districts; those manufactured in Camborne for most places being different in composition.

In every trial in which the effect on the senses or the breathing, and as far as we can judge on health, was considered, gun cotton has come with off the highest character. I feel much confidence in speaking thus highly in its favour.

Combustibility of Gun Cotton.

When the trial was in progress in the mine, a circumstance occurred not seen by any one but the sufferer. It was told me by Mr. Richard Pearce. A miner, to whom a piece of gun cotton had been given in the form of a rope, found it too long, and having no knife, struck it with a hatchet; it took fire and burnt him. The burn was unpleasant, but not serious. The act illustrates one of the characteristics of the cotton. In order to obtain definite results regarding its combustibility, a few experiments were made, and are here described.

A thick plate of iron was placed over a gas lamp and heated. On the plate was laid a little gunpowder and gun cotton. It was intended to add a little at short intervals until the plate cooled, in order to obtain some comparative idea to begin with of the different temperatures at which the two exploded. It was found that the plate was so thick that it could not be heated sufficiently to explode the gunpowder. The gun cotton, however, went off readily. The two were placed n contact, and still only the gun cotton exploded.

Then the gunpowder was added in a thick layer, so that gun cotton might be laid over it without touching the iron. When this was done, the powder was heated to such an extent that the cotton fired, but although the flame covered over the powder, it failed to cause ignition. Six times was the gunpowder enveloped in the flame of the gun cotton without combustion being effected. The gunpowder melted, that is, the sulphur became soft and began to distil, and the whole was finally fired by touching with a hot wire, which, however, appeared quite black in daylight.

This experiment may not always be successful when the gunpowder is warmed. In one case also a piece of gun cotton fired powder even when cold. The purity of the cotton will probably influence this, solid matter conveying the fire easily.

This experiment shows an extraordinary difference between these two substances. The want of solid matter in the flame of the cotton, a circumstance to which Mr. Scott Russell in his lecture at the Royal Institute attributed much of the peculiarity of gun cotton, is no doubt one of the causes of the incapacity to fire gunpowder; another cause may be the rapidity of the explosion, although gun cotton will ignite another piece placed at a distance, that is, at the extremity of the flame.

Gun cotton on melted sulphur takes fire at a temperature below that at which sulphur will take fire.

It was found to explode on sulphur when the thermometer in the melted sulphur stood at 437°.

It was found to explode on mercury when the thermometer there was at 415°.

This readiness to take fire is against gun cotton. On the other hand its disinclination to ignite other bodies tells a little in its favour, but not so much as its combustibility tells against it.

When gun cotton is struck on iron by a hammer it explodes. Very curiously it does not communicate its fire to itself very readily, as it frequently burns exactly under the hammer, and no farther, showing partly the effect of suddenness, and partly the effect of the hammer enclosing a space for an instant, in which the explosion takes place, and out of which no flame can issue. For this reason a heavy blow will be less efficacious in causing explosion than one moderate and well measured. With such a blow the whole mass explodes, and that violently. If the cotton is wrapt up in a ball the whole will explode more readily; if it lies loose it may not explode except exactly under the hammer.

Gunpowder struck with a hammer in the same way takes fire readily, and the whole of the amount used is generally quite consumed.

Gun cotton struck between two plates of copper requires a very hard blow; the plates I used were rather flexible.

Gun cotton on stone fires with a very light blow. The friction of the rough stone seems to aid the explosion.

In the Report of the Committee of the British Association a comparison is made of the products of combustion of cotton and powder which scarcely does justice to the first. We must consider that for the same purpose one of the gun cotton will be equal to four at least of the gunpowder. We have no analysis of the gases of mining gunpowder, and it really varies so much that no analysis will be quite correct; but let us take as nearest to it that of ordnance powder, and we shall have, by dividing the gases of gun cotton by four, according to the analyses already adduced:

Gases of combustion.

	Ordnance powder.	Gun cotton.
Nitrogen	37·6	3·1
Carbonic acid	42·7	5·2
Carbonic oxide	10·2	7·2
Hydrogen	5·9	0·8
Sulphuretted hydrogen	0·86	0·0
Light carburetted hydr.	2·7	1·8
Carbon	-	0·4
Water	-	6·2

In all sanitary points the cotton has the superiority, according to the above, except perhaps in the carbon, and the superiority would have been there also if the carbon of the gunpowder had not been forgotten.

When we view the gun cotton with relation to its combustibility, we have not the same favourable view. Six of us stood before the mass of granite in the hut, when a man was preparing the charge by violent blows with a heavy tamping rod of iron.

With a light hammer and slight blows I caused fifty explosions in a few minutes. It seems to me that men should not be exposed to such danger, and even with gunpowder it is not a fair treatment of a man with his dependencies and his responsibilities. I cannot go farther in this matter than saying that it seems to me that care should be taken that no direct blow should ever come against the cotton, or even the powder.

Again, the present mode of manufacturing gun cotton produces it in the form of a rope. The advantages obtained have been fully explained by Baron Lenk; my short experience of it makes me afraid of using any friction whatever, and my belief is that it will not be safe if it is given out otherwise than as a cartridge, not to be divided. If, however, it were made readily divisible, and the purity of the cotton obtained by the rope system still preserved, it may be remembered that the grains of the gunpowder are so convenient that an approach to them would offer many advantages. Suppose, for example, that the rope were cut when moist into pieces of the size of play-marbles.

I do not wish to draw extravagant conclusions from the following, but it speaks well. Calculation in this case is really better than one day's experiment, as we know how much carbonic acid and oxide are produced.

Analysis of Air.

Before blasting in a close end -	20·77 oxygen.
After blasting - -	20·76
"	20·74

PART III.

SUMMARY OF INFORMATION DERIVED FROM GERMANY AND GERMAN SOURCES.

The advantages of pure air and the importance of arrangements for obtaining it have been strongly insisted on in England for many years, but the knowledge has not penetrated the entire community even yet with sufficient vigour, and the most instructed are unable to give directions suitable to all the circumstances of the population. The whole mining population has known the advantage of pure air, whilst the causes of its deterioration, as well as the mode of rendering it wholesome, have been more thoroughly perceived by them than any other class of the working people. They have acted on this knowledge, but the results have never been known to them in all their fulness, and as with a large part of the population in their houses, so with the miners in their mines, the test of the impurity of the air has been an inability to breathe or an inability to see. It is exactly as if we were not to pronounce food unwholesome unless we found that either we could not retain it when swallowed, or if retained we were poisoned by it. Unwholesomeness in food shows it to be a slow poison; it may diminish life by one year or by twenty or more years. Ordinary observation neglects the one, two, three, and even the twenty and thirty per cent. of diminution, and begins to be impressed only when such gross numbers as fifty or sixty are reached. This is abundantly shown in the history of the sanitary inquiry in England, where it has been found that in large communities a death-rate of 36, being 66 per cent. on the average death-rate of the country, has not been clearly observed, and although its existence is proved as well as man can desire, there is even now a lurking belief that after all there is some mistake. This, however, does not represent the still higher death rate of certain portions of the community, entirely unobserved by the passing or inexact spectator. All the chronicles of the world are full of this carelessness or want of observation, and the history of the sufferings of our race is, to a large extent, a history of this very absence of attention.

As no country has paid so much attention to domestic ventilation as England, it might be expected that in other countries there would be very little new information obtained; but I nevertheless thought it right to examine the condition of the subject of the ventilation of mines in Germany, for with them the art may be said to have begun. This was done with a strong faith also that much information would be gained. Germany has many keen and constant observers, who are penetrating continually into new corners, and although I had not met anything on the air of mines in their writings of late, I did not think it probable that the subject would be neglected entirely in such famous mining academies as Freiberg, or the younger institution at Clausthal in the ancient mining district of the Harz. I expected to find some knowledge, not merely because I had been long aware of the wide scope of thought, as well as the great capacity of detail, that characterized the German scientific man, but because of the great care which the Governments of Germany had taken of departments in many respects quite disregarded by us. It is not to be discussed here whether this custom of Government supervision has been politically or socially a failure. I believe, as a rule, it is the latter only because it has been excessive. But with regard to many of the arts and sciences, and to mining especially, the most valuable results have been obtained by the combined labours of the many professors and other officials who have received from the Governments clear and distinct duties, and still more, have had a fair amount of leisure, with active minds, ready to use it for the study of their calling. As I had not found the knowledge desired in journals and books, it seemed better to ask in the academies themselves.

The result of a short journey was to assure myself that although the subject had not been entirely neglected, it stood with them almost exactly as with us. One physician, Dr. Brockmann, in Clausthal, has examined the diseases of the miners there with great completeness, and has given also some analyses of specimens of the air. His results are extremely valuable, and his volume full of fine suggestions. I translate and abridge certain portions. The Government has not given it full attention, and, like new subjects, this has been left to the original research of one or a few. First, individuals make their inquiries; other individuals have their own busy thoughts and it requires much time for them to learn the exertions of the first. So with us when Dr. Moyle made his inquiries in Cornwall some years ago; they were printed, it is true, but entirely neglected for a long time. We certainly cannot complain of the professors of Freiberg or Clausthal on account of idleness; but, as Dr. Reich, whose experience has been great, said, "There has been such a pressing demand for the examination of minerals, that the subject of air has been neglected."

Pure air is certainly not an object of anxiety in Germany, and it is marvellous to find so many good complexions without it. People live in contracted

corners which would produce illness here, and plants grow in luxuriance where no blade of grass would grow with us. The light may be greater, and the heat in summer greater, or some other explanation may be better than this. Here is a subject for physiologists. But the result probably still remains, that the people suffer for their neglect.

On conversing with persons at Freiberg not connected with mines, I found an impression strongly marked that the occupation of mining was a very unwholesome one. Several persons at once said that the miner's life was about 45 years of age. The diseases are described as those of the chest and rheumatism. The first are ascribed to the bad air ; the second to the frequent exposure to wet in the mines. As soon as a miner comes home he must change his clothes and have them dried. This is done in a warm room, a room heated, where fuel is abundant, to a point far surpassing anything I had ever observed in a German house, and extremely oppressive. Brockman says from 90°·5 to 107°·5 F. (26—30 R.) ; Hausmann says that too much wood is used.

In the Harz, where the wood is obtained free, the custom is universal to use excessively warm rooms at home ; it may not be so common in Saxony. Among our navvies it is the rule, I am informed, never to enter a warm room with wet clothes. Some of these workers and ordinary day labourers were employed together at the reservoir of a printwork in Lancashire, where the gas-house was given them as a place of rest and warmth. The regular navvy would not enter, however wet and cold ; the others sought the warmth frequently, and suffered severely, one so much as to be quite disabled for above a year. Although this practice may be well known, it is extremely interesting to hear of it as the experience of a class of men having such opportunities of judging as the navvy.

In speaking with the more educated class of men in Germany, the opinion concerning the bad air did not agree with that of the common people, or of the general popular idea. The belief was that the suffering in connexion with the breathing apparatus was caused by the great length of the ladders. The ladder is universally used, although the man-engine is occasionally brought to assist. So far as I could hear, habitual ascent or descent by the bucket was unknown, although occasionally made against orders. It was believed impossible to take some hundred men up and down daily by such a small apparatus. There, as in England, the two opinions stood confronting us ; but it may be interesting to inquire why one existed among the educated, and the other among the uneducated. The miner's instincts are not to be disregarded ; he seems strongly impressed with the evils of foul air. The physiologist, looking at the lungs, is inclined to think of their excessive strain. Have we no class of men that are exposed to similar fatigue in pure air ? We have the shepherd of Scotland and elsewhere, who thinks little of 6,000 feet ascent or twice the height of the usual hills every day, but in a pure and bracing air. This tells against the air of the mines, and not against the exercise. On the other hand, the ascent is not so steep, and the amount is not performed in the same time as the ladder ascent. We have the bricklayer, too, who ascends 3,700 feet with 90 lbs. on his back ; but none of them do it with the violent haste of the miner, anxious to get home. This haste may be the great secret, but the sequel will show also that the air is injurious even to those who are at rest, and how much more to those who must exert themselves violently in it. The professor may see the men come to the surface panting, but he does not see them below with an enfeebled circulation. He is apt to judge of the little point in the miner's life which he sees.

It was the common opinion that the workmen at the smelting works were a shorter-lived race than the miners, the age of the first being about 40, whilst the latter arrived at 45. This opinion agrees with the numbers found by Dr. Brockmann as to the relative length of life, although the actual numbers are lower than his. This again leads us to the air as the main cause, as the workmen at the metal works have no special strain on the lungs, except so far as I can see, in some cases where very violent exertions are made, and with abundant intervals between the movements. The smelting works themselves are probably less hurtful, but the roasting processes going on around are of a most dangerous class. The metallic compounds of sulphur and arsenic are roasted in large heaps, and send out perpetual fumes which are perceptible to a great distance to the eye and to the taste and smell, as well as by their effect on breathing and on the vegetation, which is in some places completely eradicated from the soil,—at the Ockersthal Works, for example, in the Upper Harz and the Mulden Works at Freiberg. These opinions are universal in the district, and there must be a deep foundation for them. Men who have been disabled by working in the pit seem to be spoken of as known everywhere abundantly by every one. Some of these are only partially disabled, and are fit for one shift of eight hours. These are able sometimes to follow a little out-door work at home, some to keep a little garden, and some a cow. One man in this condition kept birds, by which he made about a pound a year, submitting to his fate as that common to his neighbours. He had, as all the others had, a peculiar look, well-made and apparently strong, and 43 years of age. The sight of such persons is very melancholy.

Going down the Samson mine at Andreasberg, we saw wide cracks as they might be termed at the side of the present levels. These were the workings of old times, when men were accustomed to squeeze themselves through sideways, or crawl like serpents on the ground, forcing a passage with great difficulty, without the free use of their arms, and without the advantage of the fan. Perhaps I do not do them justice ; the sides of the rock may have approached. In those days the passages were high or wide enough where there was ore sufficient to justify the formation of a roomy spot. In those days, *berg krankheit*, the mining sickness, was common, according to Professor Gätzschmann, but it has almost disappeared since wide passages were made. Now wide passages have come in with deep mines, and yet the disease has, according to good authority, diminished. This speaks conclusively as to the cause of the evil being connected with the state of the air, and not the depth of the mine, or in other words, the length of the ladders. According to Brockmann this mining sickness has by no means disappeared, but it has not by any accounts increased.

It would be unfair, however, to older miners to speak of them as ignorant of ventilation ; the accounts of the 16th century prove the contrary. The mines have deepened, and the workings enlarged. The necessity for more care is a natural consequence.

The miner is nourished in this belief of the shortness of his days, and his whole life receives a tinge from it. He sings of it in his hymns, he hears of it in his sermons, and the annuities established by the state continually remind him by taking a portion of his weekly wage as a compulsory insurance against evil days. Notwithstanding, therefore, the existence of some of the enthusiasm from old times, and the undoubted preference still shown among the young population for the mining life, a strict inquiry does not prove that the experience of the people gives to this occupation a favourable character. This spirit I might illustrate from my own experience; but illustrations from printed matter, such as the songs and hymns among the people, will be far more valuable; and my belief is that the evidence proves the miner's life to be hard, badly paid, and unwholesome, even in the very centre of the district which admires it most.

Hausmann on the Harz Miners.

Hausmann* whose work in 1832 on the Harz is almost exhaustive, speaks strongly of the great enthusiasm existing for the work of the mines, and finds it scarcely possible to induce the men to work at anything else; but after all, the actual number in the mines is not great, namely, 5,434 at the silver, lead, and iron mines and works. His successor, Jugler, in giving the statistics of the Harz, puts down the present number at 5,805. In both cases the forest workmen are left out.

Hausmann makes the number of deaths in 1830, 25·4 in a 1,000, but no long details are given. The number of births, male 492 female 485
deaths „ 359 „ 339.
The number of deaths among females is less than among males by 14, or 3·9 per cent.

The actual number of deaths, however, does not seem very high considering the circumstances. To give this any significance, the value of life of those in mines and out of mines must be taken. This number refers to the whole population, which in 1830 was 27,487.—5,434 were on mining works, but little more than half would actually be in the mines. Hausmann looks on the accidents as the dangerous part of the labour in the mine (p. 59). He gives the average in a year at 10–12. He puts the wages at 6–9 shillings, but from his table 7 to 8 would approach more nearly.

Hausmann's work is written in great anxiety for the future of the Harz. He was well acquainted with the miners, and considered it quite impossible for one to keep his family without working over-hours or bye-shifts even when the wife attended to out-door work of any kind that could be got. We learn from him, as we may learn by looking on now, that the girls were sent out in summer to gather berries, in winter to gather dry wood. The boys were more carefully kept at school, but generally were put to work very early. Attempts had been made to introduce other manufactures and work for the women especially, but these had failed; hands could not be got amongst them for wool spinning when they were very much wanted. Still some were occupied in making wafers, starch, vinegar, brandy, soap, candles, lace, paper, sieves, buckets, and other wooden articles, as well as in sawing wood. Since then matches have begun to occupy at least 1,000 persons. It is probable, however, a proof of insufficient labour to find so many employed as I saw in 1863 in the lounging occupation of bird snaring.

Dr. Brockmann's Work on the Harz Miners.

Dr. Brockmann's work on the diseases of miners, especially of the Ober Harz, deserves the attention of medical men, but in the mean time I shall give some of the opinions and facts found in it more immediately relating to our subject.

The greater number of the inhabitants live 1,800 feet above the level of the sea. The inhabitants are of a powerful make.

At Clausthal the pressure of the atmosphere is 314 Paris inches of mercury instead of 336 as on the plains. This will give on the Paris inch 15·0889 pounds instead of 16·1461. Allowing the oxygen absorbed at 336 to be 1·1505 grammes, it would only be 1·0751 grammes at 314 inches. The carbonic acid found in the first case would be 1·353 grammes, in the other 1·2644. The difference would be considerable if not compensated by an instinctive increase of rapidity and power in breathing and other conditions. For example, he thinks that one of the conditions is the low temperature, which is 43¼ F. at Clausthal. (+ 5 R.)

He considers the temperature dry, and the air to be seldom still, removing unwholesome vapours and preventing epidemics.

He mentions the small amount of electricity as caused by the absence of thunder storms, and imagines that, although free from the influences of air so charged, its absence may increase rheumatism.

As foreign bodies in the atmosphere, the balsamic emanations of the fir forests are mentioned, although it is supposed that they may slightly diminish the oxygen.

The Dwellings.—The houses are badly built, kept extremely hot, and are densely crowded; as a slight compensation they are full of draughts, if this can be a good mode of introducing air. He speaks of several families dwelling in one apartment, and of the warmth being from 90 to 107 of Fahrenheit during the whole year, and of the small sleeping rooms with three or four beds in contact. In such case he adds it is well when the roof is not very tight.

Food.—Dr. Brockmann laments especially the want of abundant vegetables, a want which is partly made up by the great abundance of strawberries and bilberries. But he speaks also of the great lack of animal food. The workman has flesh at most only once a week, and is contented with bread and bacon. (This is not a very inferior diet, and is superior to that of the Saxon miner, if it is had in abundance.) The food is very carbonaceous; the water very pure.

The habits of the people are cleanly; no decent workman ever thinks of eating after returning from his work, until he has washed himself from head to foot and changed his clothes.

The Harz miner is a descendant of Bohemian, Saxon, and Frank miners, who came in ancient times and have left proofs of their migrations in the language itself. They form, as Heron de Villefosse says, a strong and patient people, which have taken for a thousand years numerous treasures from the earth, and have still remained poor; a people proud of the dangers of its occupation, and the rigour of its climate; preferring to the rest of the world its own hills and mines in the happy possession of a constant community of feeling and a peculiar natural pride.

* Ueber den gegenwartigen Zustand und die Wichtigkeit des Hannoverischen Harzes, von D. J. Fr. L. Hausmann. Göttingen, 1832.

The pleasure which many writers have in speaking of the strength of the Harz people forbids us looking to any general deterioration of character of body or of mind.

Entering the Mines.—Entry is made by means of ladders which stand at an angle of 60°–90° (or as we should frequently say 0°–30°). The shaft is 6 to 8 feet in diameter, and the ladders have steps about 10 inches long and 2½ thick. (p. 22.)

Exit.—The intense activity required for going up and down is described, and its result in acute or chronic inflammation of the heart. The man-engine, introduced in 1833, is mentioned as hopeful, but its character had not been decided. (p. 24.)

State of the Mines.—The evils encountered in the mine, are described as (p. 26) :—

1. The emanations from rotting wood.—It must be remembered that the amount of wood in the Harz mines is far greater than with us.

2. The combustion of oil.—For an eight hours' shift two workmen receive 7 ounces of oil, of which 6 ounces burn, producing 1·031 lb. of carbonic acid. Oxygen must also be consumed by the hydrogen.

3. The combustion of the gunpowder.—100 parts contain 29·5 oxygen and 21·28 carbon. These burn to 50 of carbonic oxide or 75 of carbonic acid. If then two workmen in eight hours burn ¾ lb. of powder, they will increase the amount of carbonic acid by 0·5625 lbs. Add to this the dust of the gunpowder.

4. The dust from the boring and hammering.

5. The increased humidity of the mines.—This is often very great, as besides the amount of water to be got rid of by adits and pumps, the apparatus for wetting the timbering spreads about so much water, that the men often become wet at once. (This operation is for preventing the decay of the wood, which may be preserved for about 30 years if well moistened. The water is passed through tubes, with small apertures cut along the sides like those for gas jets).

6. The carbonic acid exhaled by the men.—According to Andral and Gavarret, a healthy man between 20 and 40, which age includes the majority of miners, expires 44·746 grammes carbonic acid in an hour. The poverty of the air in oxygen might diminish the amount, but the great exertion of the workmen would increase it. Allowing one to compensate for the other, the two workmen will give 715·93 grammes or 1·53072 lbs. carbonic acid. Besides these causes there are peculiarities of the mine atmosphere, which, although of less importance are not to be forgotten.

7. The want of sunlight.

8. The sudden change of atmospheric pressure, which is obtained by going up and down.

9. The frequent and sudden change of temperature.

10. The action of draughts.

11. The mechanical injuries, caused by falling stones, and the action of numerous machines.

We may characterise the air as (p. 29):

a. Constantly dark; often very wet, heavy, changeable and draughty.

b. As filled with mechanical particles.

c. As poor in oxygen.

d. As rich in carbonic acid.

The excess of carbonic acid is easily determined; two men in an eight hours' shift will produce—

a. By burning the oil	-	1·031 lbs.
b. „ gunpowder	-	0·562 „
c. By breathing	- -	1·530 „
		3·123 lbs. carbonic acid.

Bodemann found neither carbonic oxide, carbohydrogens, sulphuretted hydrogen nor sulphurous acid (p. 33.)

The particles of carbon (p. 34) from the candle, and the fine dust from explosions, if not at once so irritating, are more frequently hurtful than the particles of stone. By means of their great fineness they are taken into the lungs by every inspiration. There they must excite the fine organs to inflammation, and cause great textural changes. If they could pass into the blood they would increase the atrabilious state peculiar to the miner. Still they always assist in forming the black discoloration of the lungs, which is the ordinary characteristic of the old miner.

The diminished amount of oxygen must contribute to an imperfect decarbonisation of the blood.

The persons chiefly exposed (p. 35), according to the same author, are those who bore the rocks. They are obliged to bend a great deal, by which a pressure is caused chiefly affecting the liver. The increased breathing consequent on the labour of boring, must dispose the lungs to take up the impurities of the mine atmosphere in a very high degree.

It is not surprising, therefore, if the borer should not live above 52 years.

Those who blast are exposed to danger in the next degree (p. 36).—Accidents are yearly occurring from this occupation, although the new mode of tamping by means of a clay stopper, has diminished them. The under captain may live to sixty-one years.

The carriage of the ore, no matter how undertaken, is always one of the most difficult and most dreaded, when carriages are used, with 4 or 5 cwt., on a rough road; the lifting and pushing are laborious occupations (p. 37). But if on a smooth railroad of iron the carriage with 18 cwt. is less fatiguing, or the boat which is pushed along by one man, although it contains 100 cwt.

Still, under all circumstances, the removal of the ore and blasted rock demands great muscular exercise, and the consequence is numberless cases of hernia.

If all these movements call forth many disturbances of the health in the open daylight, how much greater must be their result when a portion of the strength is removed by passing down the mine, and some preserved for the way up again.

We think it unnecessary to say much concerning the officers of the mines, as on account of the frequent change of their employment they are very little exposed to danger. At the same time we include the most exposed of all. The captain of the mine (*Grubensteiger*, it is not easy to obtain an exact synonym) who is most exposed of all, and from early life, still arrives at the age of 66.*

The *Einfahrer* and the *Geschworenen*, Inspectors, higher officers still, attain an age of 67.

The master attains an age of 76. This shows that a life of pleasantly-mingled rest and motion is the first condition necessary for the attainment of advanced age.

* He is exposed to danger when going along the mine, and when examining certain spots, but he is not kept long in any one danger, and has change of occupation.

Those officials who are not connected with the actual working of the mines (officers of the pen) need not be taken into consideration.

Hygienic Influence of the Preparation of Ores.

In the mine itself the ore is separated roughly from the unpromising rock; it is afterwards, on the surface, broken into pieces by boys, who also sort these according to quality. This occupation is performed in large rooms, round which the boys sit. The rooms have generally or always large stoves in winter and summer for the warming of food, as well as of the apartment (p. 40).

After this operation the ore is stamped and washed.

Dr. Brockmann continues:—The dressing of the ores is then in a great measure done by machinery, and in any case demands only a moderate application of strength; for which reason this department generally forms the entrance and exit of a miner's life.

At the same time he includes, among the dangers, a violent muscular action as occasional. The chief evils, he adds, connected with preparing the ore are:—

1. Violent muscular exercise.
2. Action of damp.
3. Action of draughts from working in open workshops.
4. Action of dust.
5. Substances set free during the stamping, such as lime.
6. Mechanical lesions from the action of the machinery.

Still the danger of the stamping and washing and the labour on the waste heaps cannot be compared with mining. The evils connected with the preparation of the ore can all be avoided by a little attention.

There are, however, some dangers connected with the work of breaking the ores, of perhaps more importance than those directly connected with health. Dr. Brockmann says:—

The great evil is that boys should be employed, individuals whose growth is unfinished, and whose powers are not ripened. It is a sad experience that whenever men are compelled to gain their living at an early age their powers are readily misused. This is seen in our manufacturing places. If we read the annals of foreign countries* we must see how true this is, and be glad that we cannot in the Harz vie with them in this direction, which is so destructive to every sound organization. Still, we are not free from the disadvantages. The father who is at work seeks as soon as possible to use the strength of his son, and brings him about his tenth year to the sorting room. The choice too is not always according to the father's wish, and healthy sons are found to be living at their ease when the weakest are sinking under the work of the ore breaking.

Sometimes the boy must work twelve hours a day for six days in the week. In the morning he must rise at 4, and go to the mine overpowered with sleep, and sometimes fasting; if late he goes very rapidly. He works without intermission from 5 to 11. He has then an hour to rest, but he must work again till 4. If he has to go to school he leaves earlier, a weary mind in a weary body. Sometimes his rest is broken by night work.

The exercises of youth, fighting, wrestling, leaping, and running, excellent as they are and advantageous to a strong person, are extremely hurtful to relaxed muscles.

Under the head of Asphyxia Metallurgica we include all sudden danger to life produced by the air of the mines. (p. 187).

The common bad Air.

This is characterized by an excess of nitrogen, and by its specific lightness,* as well as by its unfitness to support combustion. Hausmann found in the year 1805 in a mine at Andreasberg air of the following composition—

81·42 nitrogen.
13·75 oxygen.
4·83 carbonic acid.

An analysis of air obtained at Bockwiese, where it could be more accurately examined, gave—

86·52 nitrogen.
12·12 oxygen.
1·36 carbonic acid.

"We must, however, remark that these analyses, as well as those undertaken of mine air give more or less uncertain results, as, in order to make them, air must be used which is better than the original injurious quality." (This relates to a mode of analysis evidently producing uncertainty in the results.)

This kind of air is common in choked or flooded workings.

Combustible gases have been observed in the Harz probably arising from decayed woods, and gases arising from the combustion of wood have also caused great misfortunes.

ABRIDGMENT OF DR. BROCKMNAN'S SUMMARY.

PART I.

General Principles of Metallurgic Prophylaxis.

General Principles for the Board of Management.

(p. 330.)

The care of the physical welfare of the workmen is the first and most sacred duty.

Decisions are not to be left to individuals.

The careful consideration of such important matter as the method of obtaining the highest earthly good for men surrounded with such dangers as miners are exposed to, must be based on the widest views, both as regards technical and sanitary knowlege, and as these are not to be found united in the individual, a metallurgic sanitary committee under the chief board of management is advisable.

This committee might consist of officers from the three departments, the mining, the dressing, and the smelting; and of a physician.

They ought to report quarterly.

They would give constant attention:

1st, to the works.

2nd, to the workers.

They would see that the works were conducted according to the precautions of the sanitary police, and observe any dangers, whether mechanical, chemical, or dynamical. Also they would be expected to introduce requisite precautions.

As duties may be named:—

1st. To decide on the proper time of life for beginning work. This would include an inquiry into the condition of health and constitution best suited for it. Also on the freedom from those diseases which are found by experience to attack the workers.

* I fear England is alluded to here.

* Surely not in Harz mines.

2nd. The individualization of the workman; that is, suiting the work to individuals, or seeking the suitable individual for each kind of work. The son follows the business of the father without consideration of fitness. "All hitherto done in this direction has been proved entirely insufficient."

3rd. The change of occupations (p. 335). The plan of preventing any change of occupation is very hurtful, although certain technical facilities are obtained by keeping men strictly to one class of labour. "How easy is the change; consider the great variety of labour in metallurgic works, and what a difference there is between the miner and the ore dresser." It will repay the trouble of overcoming a few little difficulties by giving up old principles and customs, although a few technical obstructions may occur; although also the expense is apparently increased, a satisfactory equilibrium would soon be established.

4th. The proper time to cease working. Men are anxious to finish the work of the week and obtain their full wages. This they are often not able to do without injury. In the Oberharz no one is allowed to return from sickness to work without a certificate of convalescence. But this is not sufficient; when weakness or age unfits a man for any particular kind of labour he may yet be fitted for work of another kind, and it is extremely important for himself and his family to find this. How trifling is the small gratuity of the union. It is a pity that some department of the dressing or washing does not offer some relief here.

Places such as overlookers might be given to such men and not to the young.

The sanitary committee should keep itself well acquainted with the condition of the workmen, and the influence of every class of work in the widest sense. For this purpose no superficial view will be sufficient, but a careful examination at stated times. The progress of the health of each should be observed, and the Committee should know exactly the hygienic relation of the men, so as to fit it for deciding on the amount and quality of the work which is in the power of each man.

This leads to inspection of the workman's health, as it leads to inspection of the sanitary state of the mine. We know that it will be necessary to remove many an ancient custom and break down much of the deep reverence that exists for old habits amongst the miners of the Harz; but we doubt not that all difficulties might be removed. "And to remove all objections we take as our arms the picture of the metallurgist wasting away. Dumb as that mouth may be, it will rise into command, and put all objections to silence. Therefore to work, and may the sorrowing complaints of the dying metallurgist change into a blessing on those in authority!" *

General Principles for Metallurgic Workmen.

He should see that all his senses are in good condition. By this means he will much more readily avoid all the dangers of his occupation (p. 339).

He must regulate well his life diet. Life diet consists of food diet and work diet.

He must dress himself warm and clean, although he does not require unusually warm clothing; it must, however, be dry.

Every workman should have a double suit with him at his work, that when he becomes wet he may change at once.

He should have a warm, roomy, and well-ventilated house.

He must attend to great personal cleanliness, washing from head to foot every day after work, and every week having a plunge bath.

He must be especially careful to wash out the mouth, nose, and ears.

He must eat good and abundant food, using more animal than vegetable and more lean than fat meat.

He must not allow long fastings.

An important advice is to take warm soup. It is an actual necessity for him twice a day, and his meat must be more frequently warm than cold.

Brandy, if used, must be taken moderately. It may be considered as always out of place, if taken before work, and as taken in excess when it produces complete restoration of the exhausted strength and warming of the body when cold. It should only be used after long work or great exertion, or during work in cold, wet, and draughty places.

A good beer especially is recommended.

He must be moderate in all things.

He should never go fasting to his work. It is well to take a cup of coffee and bread and butter, a warm or cold breakfast with a drink of beer, as a preparation for work.

He must not consider his work done until he has washed himself thoroughly, nor before this must he sit down to eat.

Part II.

Special Rules for Metallurgic Prophylaxis.

The special rules include the duties of the governing body, the physician and the workman (p. 346).

Special Rules for the Spallers and Cobbers.

The elastic power of the young dresser is a fruitful field for prophylaxis. A blessed harvest is the reward of well-directed labour; a broken down miner's life is the curse of its abuse.

Duties of the Board of Management.

1. Not to receive any boys who have not the physician's certificate of fitness.
2. To inquire if the boy is fitted for every kind of work or only for special work.
3. To take care that the boy should not be put to long tasks.
4. To take care that a proper change of labour should take place.
5. To observe him not only at his work but on his way to and from his work.
6. To obtain from the foreman every quarter an account of the behaviour of the boys, and punish or reward accordingly.
7. To obtain from the physician quarterly reports.
8. As this information will come from the doctor and the foreman, it will be necessary, in case of any difference of opinion, to speak to the individuals themselves.

Rules for the Mine Doctor.

1. The capacity of a boy for work depends, first, on the general development of his powers, but particularly of the circulation. Inspection,

* Metallurgist is used for all those who work with the metals, om the miner to him who purifies the metal.

mensuration, percussion, and auscultation must establish the complete healthiness of the heart.

2. The less the heart departs from a normal state and the less the inclination to hypertrophy and dilatation, the more is the boy fit for work. If there be a doubt, he should have light work and a short road to it. The moving of the ores must be avoided by such.
3. When there is insufficient nourishment and an inclination to scrofula, a long road is better, if the lungs are sound, or the skin not in a condition to bear heat and cold. But such constitutions are always to be protected from dust.
4. Those inclined to rheumatism should have dry work and a short road.
5. Those inclined to thyreoid swellings, light work.
6. The son of a father with pneumomelanosis should have a long road and dry work, not at night.
7. Even a slight insufficiency of diet, as well as a slight inclination to any of the miners' diseases, is sufficient reason for avoiding night work.
8. When there is an inclination to *stomacace*, the workman should not have wet or dusty work, and he should have a long road to go.
9. It is always well to take precautions against these diseases early; better too early than too late.

The spaller must himself attend to the following rules:—

1. To go to bed early, so as not to oversleep in the morning.
2. Not to go fasting to his work, but take first a cup of milk or coffee and butter-bread.
3. He should go slowly to his work, to prevent heating.
4. He should not idle, and should not work too hard. By idling at first he may have to work too hard at last.
5. He should rest in the hours given for rest, and not waste his strength by youthful pranks. Rather let him refresh himself with a good quiet breakfast.
6. He should go quietly home and not spend his remaining strength in racing and such play.
7. On his return he should soap and wash from head to foot.
8. He should then have a warm dish.
9. A glass of good beer is good for him; all brandy must be avoided.
10. At home he must take proper rest to restore his exhausted strength.

Prophylactic Rules for the Miner.

As the miner is surrounded with more dangers he requires greater attention than all other metallurgic workmen (p. 350).

The observation of the rules will bring, if not an instant, still a sure remedy, and neglect will assuredly be followed with the severest punishment.

The Board of Management has here a triple duty:

A. includes a full acquaintance with the mechanics, the chemistry, and the organisation of the mine.
B. To take all precautions against dangers.
C. To appoint to each the work for which he is most fitted.

The first relates not merely to the machinery, but to all the mine wherever there is danger, and especially to the timbering. Although much is done in this department the many accidents which occur lead us to venture to ask if more could not be accomplished. *On the chemistry of the mine air much requires to be done. We have already proved how bad and how unwholesome the atmosphere in many places is found. We look on the lulling belief that the ventilation of the Oberharz mines cannot be improved as a very dangerous dream. As we have proved that the most dangerous diseases of the district are produced by this foul atmosphere, we believe ourselves justified in calling for the fullest attention of the Board to this subject.*

It will not be difficult to satisfy the demands satisfactorily. We must have professional opinion on the subject. We look on the want of this as the most dangerous enemy to the health of the miner, and are convinced that without it the question of the sanitary state of the district cannot be answered.

It is not sufficient that the Board should establish excellent ventilation. They must see that it continues in the same condition.

For this purpose it ought, at regular seasons, to be furnished with an exact account of the constitution of the air in the various parts.

Difficult as it may be to obtain this, a trustworthy result may be obtained with ease, by establishing a regular order of procedure towards which we propose the following:—

a. Every captain (or Grubensteiger) to bring to the proper official specimens of the air from the various places under his direction.
b. This officer should give these to the assayist or chemist for chemical examination.
c. The chemist to give the detailed results of his careful analyses to the Board of Management.
d. The Board also to receive a report from the physician, before they consider whether they should take any steps.
e. The reports to be laid before the Board.

A sound organization cannot be obtained at the mines until all the young are under the required inspection, and until all those unfitted in body or mind are removed from the works, either for the time or permanently.

1. As soon as any one observes in any of the mines an unusual condition of the mine air, he must report it to his superior.
2. This officer, after taking proper steps to avoid danger, must report to the physician. In all cases a full account to be given to the Board.
3. The Board must remove all workmen, who can in any way be injured, allowing none to enter without special permission.
4. A sanitary committee must then be appointed to prevent further danger, to save the lives of those who still remain in the pit, and to bring about a normal state of the air.

The committee must sit during periods of danger. It consists of the principal officers (these we cannot easily name, simply because we have no equivalents amongst us), the chief officers of the Board of Mines, certain persons intimate with particular spots, a physician and a chemist. They must hold their meetings daily, and two at least of the committee must be present night and day. For entering the

mine during danger the following rules are given (p. 355):—

a. No expedition to be undertaken by one person only.

b. The persons forming an expedition to be medical as well as technical, and to be chosen from their fitness of body as well as of mind.

c. The expedition should keep closely together, forming a well-connected chain.

d. Each should have a rope round him.

e. No one should go fasting or after drinking much spirits.

f. In the neighbourhood of the pit there ought to be all the means of restoration. Abundance of oxygen, as well as naphtha, spirits of wine, and oil of mustard; also woollen blankets and brushes, with, the most important of all, a magneto-electric apparatus.

When the danger is over this committee may be dissolved. These rules refer to cases which probably do not occur in the metal mines in England. They are more fitted for the exigencies of a coal mine.

The Duties of the Physician.

These duties are given at considerable length, and with them is a more detailed account of the probable diseases, but the principles have already been quoted.

Rules for the Miners.

1. Not to go to work without taking a warm meal, but not to allow spirits to take its place; if taken at all, it should not be before going to work.

2. Always to see that he has taken enough to eat and drink for the time he is at work.

3. He should go quietly to his work, and not waste his strength by running and heating himself.

4. Particularly careful must he be to enter the mine with his light burning clearly, and means of lighting at hand.

5. After his work let him go quietly up the shaft, taking care not to become heated on the way by too much exertion, and if he uses a man-engine let him be careful at every step.

6. Let him remember at his work that he must work neither too much nor too little. In the one case he injures his health by over exertion of his highly taxed powers, in the other he gives way to all the injurious influences of the atmosphere of the mine, especially the wet, the cold, and the dangerous draughts, which then have a doubly injurious effect. For which reason, constant and moderate work, with stated points of rest, is in all circumstances the most wholesome.

7. He must not delay to renew the strength he loses in exhausting work by taking rest at certain times, with proper food and drink. A mouthful of spirits is advisable at such times, but only a mouthful. The least excess increases the susceptibility to the influences of the mine, and leads to incalculable danger.

8. At all times must he be careful to avoid sleeping in the mine.

9. The borer especially requires occasional rest, both on account of the peculiarity of his position and the exertion required.

10. Not less does the waggoner require occasional rest.

11. Those who fill the waggons must also take care not to use too much exertion.

12. Those at the water engines must beware of the influence of moisture.

18. After hard work rest is a necessity for the miner; after that some exercise in the open air, perhaps by garden or field work, still avoiding all excessive exertion. Let him also avoid hot and steaming rooms, which are often worse for him than the air of the mines.

20. He must have at least six hours sound sleep.

21. At every departure from strong health let him consult the doctor.

Dizziness, beating of the heart, and difficulty of breathing, are especially mentioned. If he must give up some of his work, let him remember that his health is more valuable than his wages.

The Silver and Lead Smelter.

Duties of the physicians towards the workmen of the smelting establishment, and rules for the men themselves, are then given, but they do not differ very greatly from those in the case of the miners.

The workman must carefully avoid as much as possible the breathing any lead-smoke, wash himself well, and not eat in the neighbourhood of the fires (p. 373).

9. He must be very careful of his diet.

a. He must avoid all vegetable acids, salad, and all food prepared with vinegar, as poison to him, a little before and a little after the work, and even at other times. Even the common drink in the Harz the Broihan, (a pale ale, called also Breyhan after its first brewer), is suited for him only when well fermented and entirely free from acid.

b. On the other hand he should take a good deal of sweet milk at breakfast and at other times; he should therefore always keep a cow.

c. He ought to eat a large quantity of fat; fat butter is as good for the workmen at the smelting works as it is hurtful to other men; his other food may also be eaten with fat.

d. Generally let him live more on animal than vegetable food, carefully avoiding all acid fruit.

10. He should take a certain number of sulphur baths every summer.

11. If in any difficulty regarding health let him consult the doctor.

12. If he receives advice from the doctor to leave the works let him rather lose a part of his wages than the best part of his health.

For iron, copper, and arsenic works the advice does not greatly differ.

Some Remarks on the German System.

It appears then from abundant testimony, that the atmosphere of the mines in the Harz and in Saxony is very impure; and yet we may expect it in general to be purer than that of our own mines. The reasons for this lie in the whole social and political economy of the districts. In both places the mines are under the strictest government superintendence. In both places the desire is expressed, not that the mines should yield the greatest possible profit, but that the population may be able to live on the produce of the mines for as many years as possible. The fear of poverty has rendered them cautious of using their treasures, and a strangely expressed anxiety for the state of their posterity and their country some cen-

turies after them has led them to leave the treasures in the earth, and with great self-denial, refuse to use them for the wants of the day. The next generation, or perhaps the living one, may think otherwise, and use up in a few years the treasures intended for centuries. The intention of the governments is so good that one is unwilling to see evil in any of the results, but must admire that large and still thrifty spirit that seek slike a kind mother to feed with her own hands all the descendents of her own stock, looking to herself as having the gift of feeding and her children that of consuming, but never thinking that her precious gift may also descend to the children themselves, some of whom may learn to feed more than ever came under the aged mother's eye.

The first view, that we must preserve the world for our children is narrow and presumptuous. It assumes that we have obtained the good things, and that nature has no more to give ; it assumes that if good we can secure them to any one. A wider view informs us that we know but little and have but little, and our children must know more and receive more or they will be discontented. It may be asked, Is it a pleasant thing to prepare a long but gloomy life for a people during several centuries, when all these riches might be taken out in a few years and the money used for wholesome open purposes ? Here there is wealth hid as thoroughly as if sovereigns were shut up in a box. It is capital not bearing interest, if indeed it can be called capital in such a case. If taken out rapidly it might so invigorate the community that a new era of prosperity would at once be achieved.

One rule is evidently making itself felt in the world, and that is that energy gains the day. Energy is strength used with speed, or strength multiplied by speed. You may have coals burning for years under a boiler so slowly that the water will never boil. This boiling can only be attained by burning at a certain speed. So in all manufactures, the work must be done at a given speed, or it is better not to do it at all, as loss will ensue. As the arts progress coal must be burnt faster to melt iron, and bellows must blow it ; again an advance is made and hot air must be used ; another advance and the air is applied to the iron itself, as in the Bessemer process. Steam must be raised to hundreds instead of units of pressure, and spindles must run faster. Training is used so that human beings may do their work without losing time by blundering ; and education, in the same way, is greedily sought because by its means an engine is attained of rapid work. Every high-trained business man is an engine of higher pressure, and every highly-trained literary man is also a mind with less stoppage in its movements. The glow of genius itself seems to be a higher power put on, the energy of two hours compressed into one. As a hand which can lift only 50 lbs. will labour for a life-time in vain if it tries to lift 100 lbs. at a time, so no amount of weak thought will solve a difficult problem ; but double the 50 lbs. and an equivalent to the 100 is obtained, it is two forces acting in one time, and greater energy of mind will solve the hard problem.

Dr. Brockmann speaks despairingly of the Harz, and considering now long the district has been under the careful guardianship of a state really desirous of doing its duty, as we may see by many of its daily acts, the result is not quite satisfactory, and might fairly lead us to inquire into the extent to which state interference may be regarded as valuable. Both the Saxon and the Harz mines are completely under the control of the state, and the number of officials rather surprises one coming from this country. The list would be rather tedious, and would require to be somewhat explanatory, as we have no officers exactly corresponding. The higher officers have all been educated at the academy of Freiberg or of Clausthal, in order to obtain a certain rank ; others again have been educated at the mining school only, which does not grant an education suited for the higher officials. Those actually educated at the academy and retained in office are few. At one large mine, for example, employing 3,000 persons, there was only one who had been at the academy ; he, of course, was at the head of the establishment ; that is, he was at the head of the working establishment. It is not possible to find any one with full power in any mine, as the Government engineers and inspectors, the machine directors, master engineers, mining secretaries, mining councillors, directors, and chief directors, must all be consulted. There are some advantages connected with the plan. When a course of action is pursued it is done after the most careful attention which the whole official community can give ; but it is irritating in a high degree to those who see their way clearly and rapidly ; they propose any plan with little spirit, knowing as they do how wearisome will be the process of conviction. If every official writes his report he becomes responsible for the work, and he is naturally compelled to be careful ; as he has also his share of authority he uses it accordingly. The evil is in the loss of time, strength, and patience. This slowness spreads through the whole works, and seems to penetrate every worker except the boys who hammer and sort the ores. These have the spirit of youth within them, and the impatience which it begets.

This condition of things rises out of the original object of the Government in working the mine, or the principles which govern them. It is by no means the object of the Government to make as much money as possible from the mines. The object is to maintain the population for as many years as possible. It has not been found practicable completely to act in accordance with this wish, even in Hanover,* where it has been found that the ore was supplied more rapidly than can be well used.

The law in Saxony is, that every man has a right to begin a mine ; but immediately following it is said that he must submit to certain conditions, and these form a long volume of obstructions. It thus happens, that those mines which are worked by companies differ little, if at all, from those worked by Government, except in this, that the capital and proceeds have different owners. The great fear in the Harz is that the mines will become exhausted, and the population indigent ; but this fear has been periodical, and perhaps not more so at any time than in 1816 and 1817. The inhabitants increased in the upper district from 27,500 in 1820 to 35,700 in 1852, Many of the mines have decreased in value, or ceased to produce ; but some, again, could be made to produce many times more, with great ease. No advan-

* Die Bergwerksverwaltung des Hannoverschen Oberharzes, seit 1837, und der Ernst-August-Stollen, von Oberbergrathe Jugler. Berlin, 1854.

tage, however, is taken of this, and the richer mines are merely worked so far as to make up the deficiencies of the poorer to such an extent as to give the people wages of a small or moderate amount. On some occasions, however, considerable sums have been paid for emigration, mostly to South Australia.

The amount of ore taken out has a value of 300,000*l.* annually, or about 8*l.* 10*s.* for each of the whole population. If the mines were worked with more vigour, the result would be, in all probability, either the discovery of much more treasure, or its early exhaustion. In the first case, the whole district would become richer for an indefinite time; in the second, the wealth would be obtained in a few years and cease. In the first case, the advantage to the community requires no explanation; in the second, the first generation at least would have wealth enough for the establishment of the second, perhaps on a surer basis. Whether new manufactures would come into the district and occupy still more people than now is one question; and whether some of the people would remove whilst others made more of the agricultural capacities of the place, is another. Even in Hausmann's time it was said that the land suffered from want of water irrigation, all the water being used by the mining operations; and the advance made in agriculture was either small or nothing, as around Clausthal the number of cattle had been actually diminishing. Even now the population spends its strength in carrying on its back the whole manure of the town into the fields,—a laborious and degrading operation performed by the women. When in 1821 the population was 27,500 they had 3,127 houses; in 1852 there were 35,700, in 3,592 houses, whereas if the houses had increased with the people there would have been 4,379. In 1821 there were 8·5 to a house; in 1852 there were 10·5. This is an immense increase in the crowding; and although some of it has been caused by fire, it shows an incapacity to rise with the wants of the people. Or is it an unwillingness? for we are told that much more ore might be taken from the Dorothea mine, if it were wanted. No; it is a want of elasticity in the people, which has shown itself over all Germany for many years; so that, until very lately, building was very rare, and the population crowded into the same houses as their fathers. The buildings made some two to three or even four centuries ago have fitted for the succeeding times over all the country; they would have been a benefit, if no power existed in the country to obtain others. Now there is a great change.

The actual wages for a shift of 8 hours in the Freiberg district is from 7 to 8 groschen, or it may rise to 8½ groschen, or about 10*d.* a day. A strong man can work a shift and a half; so that the first makes 5*s.*, and the second 7*s.* 6*d.* Wood is not given free. In the Harz the wages may be made up to 10*s.* 6*d.*; and besides this, wood is obtained for the mere price of carriage, and even this carriage is charged at a less rate for the workmen than the higher officers. The Government takes entire charge of the forest, and the accounts are so adjusted with the mining and smelting department that the whole shall leave a certain amount to the state. This sum is about 15,000*l.*, or somewhat more lately, but by no means large. The people have by these means abundance of fire, and the mines abundance of wood. The use of fire is too general apparently for comfort, as the warmth of the houses is excessive, but the amount used for one room would keep in a wholesome state the double accommodation which is greatly demanded in the Harz.

The price of grain is never allowed to rise above a certain point to the miner; when it does so in the district, the Government magazines give it out to the miner, at a fixed maximum rate.

In Clausthal, there is the right of pasture for cattle, so that something may thereby by gained, but the ground is not suitable for gardening. By these additions a miner may do pretty well in Clausthal, especially as the wages are much higher among the miners than the field labourers, as Dr. Brockmann informs me.

In spite of all these aids the great evil remains that the miner cannot rise in position; his limit is visible before him, and he must seek contentment in it. It is true that this is the case with all the working classes, more or less, and that few can rise; but the hope that runs through an active community by the fact that some occasionally rise is very great. At any rate, I believe that from such cause, and not from mere constitution, there is a want of exciting aspiration and effort, although no want of good and honest work. The boys go to school two or three hours a day, and receive, no doubt, excellent instruction; but there is not the spirit to keep it up, and the population does not seem to rise in proportion to its school instruction. I am told that many forget both their reading and writing; and at any rate they might as well do so, as the habit of the renewal of their knowledge by books or papers seems not to have spread among them. It is clearly proved that reading and writing are not education, but the beginning only of an education which must be continued by the circumstances of life. The social interlacing of the mining community has destroyed, in a great measure, the circumstances that would give variety of education, and bring out a variety of talent, and is one objection to interference. Yet the Saxon miner is the finest known, even now, according to the opinion of many, although I am informed that the work has not increased in proportion to the population, and his present is not equal to his former condition. He is even wanting in strength, as Mr. P. W. Lawrence, barrister, who has been much among them, and who has made some enquiries on the subject, has informed me. It agrees with my own impression, hastily made, that the Freiberg miner was not equal to the Harz mountaineers in bodily vigour; but above all it agrees with Prof. Gätzschmann's remarks.

The miner is protected from the fear of want by the State. When well he is compelled, by payment of 1–30th of his wages, to contribute to a union (knappschafft). For this he receives medical attendance, and his wages undiminished in illness for about a month; but, if compelled to succumb, he receives about 3*s.* a week, or a sum varying according to a scale of time of service, but not above 3*s.* 6*d.*

He must naturally be afraid to leave this union lest he should lose his life pension, small as it is; but in reality, it is nothing more than out-door pauper relief. This institution is applauded in their songs, and is the great pride of the community. It is right to applaud it; it has done its work well.

In a pamphlet on the condition of the miner of the Hanoverian Oberharz, F. W. Schell says: 'The mining community is a little state within a state. By

the mildness of the rulers of Hanover there have arisen so many institutions, funds for benevolent purposes, and donations in times of want, that it was not without reason said in the French assembly, 'The workman's question has been completely solved in Hanover.' This question, which has so violently threatened the political horizon, has long been settled in Hanover by the humane administrators of its laws."

He adds: The miner begins his work at about 10 years of age, as a spaller. He is not engaged by a single mine only, but may be moved according to requirements. He has no rights giving him power to claim perpetual support; but there are no cases of miners being sent away without work being obtained for them elsewhere, except of course in the case of crimes. Should the works at any time be stopped, the miner works on the roads.

Some mines are worked by companies; but these companies have no power either to hire or remove workmen or fix their wages. The management is under the general board, so that the public and private mines differ nothing in their arrangements. The wages are from 7*s*. 6*d*. to 9*s*. for common workmen; those at the machinery and woodwork, 10*s*. or 10*s*. 6*d*.

As example, the water-engine men work seven shifts of twelve hours in a week. (Every shift 6 groschen). Repairs are done in extra work, and are paid at $5\frac{7}{10}d$. There are 15 of these in a fortnight. He is also paid per week 16 groschen for the time which he stays after these shifts. He receives then:—

		s.	*d.*
2 weeks at 7 × 6 groschen	= 84 =	10	6
15 bye shifts - -	55	6	$10\frac{1}{2}$
2 weeks at 16 gr. -	32	4	0
	171 =	21	$4\frac{1}{2}$
= per week - - -		10	$8\frac{1}{4}$

In sickness the workman has 3*s*. 9*d*. a week (1th. 6gr.) for six weeks; after that time he is invalided at 3*s*. per week, which continues either until he recovers, or for life, supposing he is not to blame. Widows have 6*d*. a week (4 gr.), and children under 14 years of age $4\frac{1}{2}d$. (3 gr.).

Borers are paid 6*d*. a shift. A shift is a certain number of inches bored, from 30 to 40, according to the hardness of the rock. If they begin at six in the morning they are generally done at 10. They may rest till 12; but they use this time for over-work, which amounts to about 12 gr. (1*s*. 6*d*.) a week. This time, from 10 to 12, is used by the under-foreman for blasting the holes bored. The borers then return, and remove the broken materials. This shift is paid $5\frac{7}{10}d$., and is finished at 3 o'clock.

Boring requires considerable strength and certain skill. The Harzman has brought it to such perfection that he frequently, during the time before 10 o'clock and with two bye shifts, has completed 120 inches. This may consist of six holes of 20 inches each; the stone is a greywacke chiefly and also clay slate. So far is certain, that at the morning shift, for which is paid 6*d*., he has bored 30 to 40 inches, at the byeshift for $4\frac{2}{7}d$., he has bored 36 inches. That is so much for each man, whether one or two are together.

The borer receives 2*s*. 3*d*. per week for six weeks on continuity in illness; a widow, $4\frac{1}{2}d$.; children, $4\frac{1}{2}d$.

Nearly all the work is by the piece, so that it is the interest of the men to finish their work as soon as possible.

Schell mentions that the men may rise as high as foreman (Obersteiger), with about 18*s*. a week. The best are made foremen of portions of the mine.

Still the greatest number remain in the lowest class, and may die (as gedinghaüer, whose work is various and requires experience) having about 7*s*. 6*d*. a week.

Medical inquiries have shown that the average age is scarcely 50; they die chiefly of lung disease (bergsucht). The medical and surgical service is not given free to the families of the miners, although in severe cases aid is given.

Wood is given at 2*s*. for 80 cubic feet, and the miner is allowed to cut up the stumps left in the ground and to burn them; some in this way obtain all their wood entirely free. The use of the land for cow feeding is possible to the better classes only.

In Clausthal the schools are free to boys, but girls must pay 9 to 12 pfenning = 1*d*. to $1\frac{1}{2}d$. In Zellerfeld, close to Clausthal, all the children must pay, and so elsewhere. The sons of the officials and miners receive education free when they are taken into the academy.

When rye is above 3*s*. every miner obtains, if married, two *himten* every four weeks at the price of 2*s*. 4*d*. a *himten* (fourth of a bushel). Widows receive every eight weeks one himten. In the case of large families there is power given to increase the quantity, and this institution has unquestionably preserved many from ruin. The miner may also buy for his sons grain at the same price.

There are various burial clubs, to which are paid from 2*s*. to 3*s*. yearly, for a sum of 39*s*. to 72*s*. at death. But as this money accumulates, and interest is allowed, the sums paid rise sometimes to 100 dollars = 15*l*. As there is a little money always on hand, it has been used for giving loans to the men, say of 20 dollars, and also larger amounts sometimes when buying house or fields for cattle.

The pamphlet finishes with admiration of the cheerful spirit of the Harz miners, and the assertion that "the labour question is solved." Nevertheless, Prussia has not adopted the plan, and by the new law mining is free as other occupations.

Comparison of some of the German and English Habits in Mining Districts.

Having visited some of the German mines, as before stated, for the purpose of obtaining information concerning the mode of dealing with as well as the existence of impure air, it was scarcely possible to avoid making some general observations. It is true that the tour with Mr. Twite for a special purpose was short; but, on the other hand, I did not go as a stranger to Germany or its customs, and even in student days had collected ideas and facts about the mines.

Again, I had the privilege of seeing men whose information is of the very highest order, and whose position has given them the fullest opportunities of observing; men also each of whom had obtained his position from the capacity evinced of doing it honour. The impressions collected in a few hours, or even a few minutes, when the speakers converse freely and have given special attention to the point, is in such cases the very essence of their observations, and is

more than can be obtained on any one point by any amount of reading.

I make this introduction to a very few remarks, not to show that I have obtained all the information that the professors there have on their science and art, or indeed any special information whatever, but only to show that I must not be supposed to speak from my observation only. I speak of this here, that I may ward off the remark that some will at once make without listening further,—meaning that, however good their intentions, as Englishmen we cannot follow their plans. It is true we cannot; and I believe the progress of Germany will be towards their demolition. But they are not to be demolished rapidly or unthinkingly. I would rather say that it is to be hoped that the same kind spirit which caused the growth of the present institutions will preside over the change; that it may be shown that freedom and philanthropy go in parallel lines. And when we say that it would be well for our neighbours to have some of our independent action, it is the proper place here to say also that it will be well for us to have some of their solicitude for our workmen. Of course I know the remarks that may be made contradicting this view.

But leave the general character of the people aside, and let us see actually what is attempted in the one department which we view. We have tried neglect of the workman, leaving him to the masters; the acts of the legislature prove this to be a failure. Superintendence has been increased. If the Germans do too much, we have ourselves confessed by our Factory Acts and our mining inspections that we did too little. My belief is that both nations have been wrong; both have failed in their systems. We must approach them; they must approach us. Among us a strong and hopeful working class rise cheerfully, but they help to increase the sufferings of those who do not possess an equal vigour. A mighty struggle takes place with us in which the weakest fall and receive too little care; in Germany a weary sameness, with little hope, attacks a larger class, and still keeps them down.

On the other hand it has brought to the people much contentment, much quiet kindly feeling, and much confidence in each other. It has done more; it has brought to the miner remarkably solid buildings, remarkably comfortable rooms, in many cases, at the mines, and excellent passages under ground, with much care taken for safety; and it has saved the workmen from oppression. It has produced schools and a good education, a respectful demeanour, a religious habit, and sent the workman to his daily work with calmness and with courage, and it has made him proud of his occupation in spite of his poverty. This last is the most wonderful result of all.

It has produced schools of mining serving as models for the world,—learned men that have been its teachers, principles that must guide miners in all countries, and students as well as workmen that have taken their knowledge and their skill with them for the benefit of man.

Every stamper we saw in Germany was in a good building, every washer covered in, every boy breaking up the ore sat in a warm room, and had a warm oven at which to prepare his dinner.

Those who have gone among our mines here must consider this enough to justify favourable observations on the Germans.

I cannot deny, however, much misplaced carefulness. As an example, it is extremely probable that the boys would work better and be stronger in rooms less heated. In our climate heated rooms for violent work would be probably very hurtful; and strong buildings to cover over every washing machine would be an unnecessary expense, but a similar spirit of care, guiding us according to our wants, would have a most benignant influence.

HISTORICAL MINING.

The ventilation of metallic mines for the removal of foul air is nothing new; the necessity is very old, and the means of remedy also old. I thought it important to show how very high was the place which the subject took among the early miners. Without seeking to give the history of the various inventions, let us look at the work of Agricola, De Re Metallica, in 1556, or the magnificent work of Villefosse, and compare him with the latest works on mining, say the Dictionary of Arts, Manufactures, and Mines, or Lehrbuch der Bergbaukunde,—a text book of mining by Wilhelm Leo 1861,—or Dictionnaire des Arts et Manufactures by Laboulaye, &c.; and Traité de l'Exploitation des Mines, Combes. It does seem surprising how little has been the progress of ideas in the adaptation of ventilating machinery. There, have, however, been remarkable improvements in the mode of construction of the fan, and a better theory of its action has been propounded.

The most complete method given by Agricola* is the fan, which is used either in round or square boxes, and is driven either by man, water, or wind power. He also uses bellows, which he has figured, driven by men, and by animals, by wind and by water, and either for driving air into a mine or extracting it. He says:—

"When a mine or shaft is very deep, and has no adit, and no connection with another shaft, or when an adit is long and has no shaft, then the air, as it cannot be rarefied, falls heavy on the workmen: they breathe with difficulty, and are sometimes suffocated, whilst burning lights are extinguished. It is then needful to have machines such as the Greeks call πνευματικας and the Latins spiritales, although they do not use the word. These enable the workmen to breathe freely and to finish their work. There are three kinds of them.

"The first reverses the wind as it comes, and leads it into the pit. Of these there are three kinds. The first of the three is made thus. Three beams are placed on the pit mouth a little overlapping. There is one on each side, and one in the middle. At the ends are holes, into which stakes are wedged and driven into the ground, so as to make them firm. Each of these has three pieces cut out, into which cross beams fit, one being at the right, the other at the left, and the third at the middle. Boards are placed on each, and alternately connected, so that one should be alternately above and below, by which means four angles are made, and as many intermediate

* Georgii Agricolæ De Re Metallica libri XII.: Quibus officia, instrumenta, machinæ ac omnia denique ad metallicam spectantia, non modo luculentissime describuntur, sed et per effigies, suis locis insertas, adjunctis Latinis, Germanicisque appellationibus ita ob oculos ponuntur, ut clarius tradi non possint. Ejusdem de animantibus subterraneis Liber ab auctore recognitus; cum indicibus diversis, quicquid in opere tractatum est, pulchre demonstrantibus.—Froben, Basil, 1557.

hollow spaces, which receive the winds from every quarter. But in order to prevent the escape of the wind when at the top, a covering is made to cause it to be driven back, the vanes or sails being covered above and open below. By a necessity, therefore, the wind passes through these four openings. But it is not necessary to put a cover on this kind of machine in those places where the wind blows down upon it (p. 158). (Agricola A.)

"A, the first planks; B, the pegs or wedges; C, the cross beams; D the vanes or sails; E, the hollows; F, the wind; G, the covering; H, the pit; I, the machine without its covering."

The figure shows two of these ventilators, one covered the other uncovered.

"The second apparatus (Agricola B) leads the wind into the well by a long pipe. It is a square wooden tube, lengthened by fresh planks, as the depth demands; the joints are made up with clay. It may or may not protrude from the mouth of the well; if it does, a kind of funnel wider than the tube projects three or four feet, so as to receive the wind better; if it does not project, boards are placed against it on one side and higher than the mouth, so that the wind may be driven in."

"A, the projecting tube; B, the board placed on one side."

This same wooden pipe plastered with clay is still used in mines, although perhaps not in the same position as that here mentioned.

The third (Agricola C) is made of a barrel and pipes on tubes. A barrel with hoops is placed over an upright pipe four feet high and three broad, having a square opening in the side, always open, and allowing the air to pass into the barrel and thence into the tube D and by one or more passages into the pit.

"The upper part of the tube has fixed on it a circular top, as thick as the bottom of the vessel but not so wide, so that the barrel may turn. The tube stands above the circular top, and penetrates into the middle of the barrel. In the middle there is a fixed axle, which enters into a hole in the lid, and with the fixed axle and the drum above the pipe the vessel moves easily about with a slight wind. This is governed by a vane, which is fixed on the side of the barrel opposite the square hole, and keeps the hole always set to the wind. Every wind that blows enters and is carried by long pipes to the pit. Agricola D.

"A, barrel; B, the hoops; C, the wind mouth; D, the pipe; E, the ring; F, the axle; G, the hole in the bottom of the vessel; H, the vane."

"Another kind of ventilating apparatus consists of fans. The plate (Agricola D) sufficiently shows these fans in square and in round cases, with every separate portion carefully drawn, and the modes by which they are driven. In this plate we have, A, a drum; B, a box; C, the wind hole; D, another wind hole; E, the wooden tubes for conveying the air; F, the shaft on which are the fans; G, the handle; H, weighted ends. These weights are at the extremity of four rods coming from the axle, and serve as a fly wheel to keep the motion regular.

"The box is not so good as the drum, he adds, as the fan touches the drum everywhere, and all the air is impelled into the long tube whilst it escapes into the corners which exist in the square box. But the box can be put on the ground or on boards and driven by the wind like a windmill (Agricola E). It may resemble it by having four sails, these being simply driven into the axle. "This machine requires no attention, and thus no wages are paid for working it; still, when there is no wind, a frequent condition, there is no motion, so that it is less useful than the others."

"A, the box fan placed on the ground; B, the wind hole; C, the sails on the turning shaft; D, the handle; E, the weights; F, the box fan placed on beams; G, the wings on the driving shaft outside."

A water wheel may be used to drive the fan, the motion being communicated by means of toothed wheels, as in plate (Agricola F).

A, the hollow drum; B, the wind or vent hole; C, the driving shaft to which the vanes are fixed; D, its drum with indentations for the teeth of the under wheel; E, the lower axis; F, its toothed wheel; G, the water wheel.

Plate (Agricola G) gives the vanes of the fans. There are three kinds: the first is simply of boards; the second has thin shavings or laths of flexible wood fitted into a firm centre—these are shaped not unlike feathers on the plate; the third has goose feathers fitted into the centre piece. The last is not so much used as the second, and the second is less used than the first.

A, the first kind of fan; B, the second; C, the third; D, the square part of the driving shaft; E, the round part; F, the handle.

The third class of ventilating machines is not less varied and complex than the first, and consists of bellows which may be used, not only for leading air into the pit through long tubes, but also for purifying from foul air by exhaustion. The air is drawn by these bellows through long tubes, being pressed through the nozzle of the bellows, which a man, a horse, or a water wheel may drive. If a man drives it, it may be placed over the pit in this manner: the air is drawn up directly from the long tube, and driven out by the nozzle, the lower board of the bellows is fixed by woodwork, and the pipe from the pit enters it. (See Agricola H.)

"Without this machine it would have been impossible to work without driving two levels into the hill, and after going at most 200 feet to make a shaft from the upper to the lower, so that the air might flow down, and so become wholesome; and this could not be done without great expense."

Horses may drive these machines, and one of these methods is by confining the horse in a frame such as is used when shoeing and causing him to step constantly on a drum or wheel with teeth upon it. (See plate Agricola I.)

Another machine has the vertical axis driven by a horse, and the motion communicated to the horizontal axes by cogged wheels. This machine has the nozzle inserted into long tubes, and blows into the pit or adit.

Plate Agricola H, where the air is blown out by the nozzle. A, the pit (smaller part); B, a square tube; C, the bellows; D, the pit (larger part). Smaller machines are made, such as a man may carry.

Plate Agricola K, shows the air when blown in by the nozzle. A, an adit; B, a tube; C, a bellows with double nozzle.

The more complicated machines are given in plate (Agricola I). A, bellows driven by the weight of a man; B, the man driving it with his feet; C, the

bellows without the nozzle; D, the hole from which the air is driven in larger quantities; E, the long tubes; F, the level; G, the second machine; H, he round drum; I, the steps on it; K, the beams not worked; L, the hole for inserting the bar to stop the machine; M, the bar; N, the third machine; O, the vertical axis; P, its toothed drum; Q, the horizontal axis; R, the drum with cogs.

"The earliest method of ventilation was simply by the diligent shaking of a piece of cloth, as Pliny has observed. The air is heavy, not merely in proportion to the depth of the pit (or well), but in proportion to the length of the level."

Plate Agricola L. A, the level; B, the piece of cloth shaken in the hands of two men.

The passage of Pliny referred to follows immediately his words quoted concerning the amount of foul air met in digging wells. "Fit et sine his vitiis altitudine ipsa gravior aer, quem emendant assiduo linteorum jactatu eventilando." 31, 28 of Pliny's Natural History. "Even when no such evils occur, the air becomes heavier by the mere depth of the well, and this they rectify, diligently ventilating by means of shaking a linen cloth about."

It is not my intention to say much concerning any ancient methods. It is intended only to contrast these old works with one of the newest books, say Leo's, who gives the following:—1st. The air-box with the vane to keep the mouth to the wind. 2d. A box of coals hung in the pit. 3d. A spirit furnace to heat the air rapidly, and to drive it out. 4th. The fire as used in coal mines, (*a*) by regulating the air by means of doors; (*b*) by connecting tubes with the fire, which is confined in a conical brick oven, and through these flues or pipes drawing the air from distant places. 5th. By means of the water drum. 6th. By moving cylinders with water lutes. 7th. The weather wheel or fan (wetterrad), (he describes one of an inferior make). 8th. Bellows of leather or of wood; that is, in fact, cylinders with pistons for driving the air into the mine. 9th. Pumps for pumping the air out.

In the Dictionnaire des Arts et Manufactures, 1855, we have the attention given chiefly to the perfecting of ventilating fans. This we find also in Ure's latest Dictionary. I mention this only to show the relative state of knowledge, not with a desire to enter on the subject. There has been no urgent necessity to improve farther, as it was so easy to purify far enough to enable a candle to burn.

The engines of Agricola's time were capable of extracting air from passages 1,200 feet long.

His description of the air is similar to our present description. Agricola says, "the air remains immoveable in a pit not connected with another, or in a level not connected with a pit. In both cases the air remains without motion, and causes an unpleasant smell, as of a vault or some underground cell which has been shut up for many years; so that the men would not remain, even if the place abounded in gold and silver, and if they did they would have headaches and difficulty of breathing. This is especially the case where there are many people working and many lights used. These lights, too, burn feebly, whilst they give out a worse emanation than men do." (p. 81.)

"Among the miners some are attacked in the joints, some in the lungs, some in the eyes, and others yield their lives. The water is often very cold in the mines, and cold is an enemy to the strength. As a protection the men wear high boots to keep the legs from the cold water. Those who neglect this suffer severely, especially if old. Other mines are very dry, and the constant dust enters the blood and lungs, producing that difficulty of breathing which the Greeks call asthma. When the dust is corrosive it ulcerates the lungs and produces consumption; hence it is that in the Carpathian Mountains there are women who have married seven husbands, all of whom this dreadful disease has brought to an early grave. At Altenberg, in Meissen, there is a black pompholyx which causes ulcers, and eats wounds into the very bones. It destroys iron also, so that all their keys are made of wood. There is also a kind of cadmium which destroys the feet and hands that are wet, and injures the eyes and lungs. The men there use not only high boots, but gloves as high as the elbow, and bind loose coverings (bladders) to their faces. By this means the dust is not carried into the lungs and blood, and does not hurt the eyes. The Roman makers of red lead used the same plan." He speaks also of dangerous emanations, and says that when these are abundant the men fall back from the ladders when climbing and they have the feeling as if their hands were round and globular and also their feet. This feeling is mentioned as occurring when fires have been used for rendering brittle the harder rocks. In this case the wise workmen leave the place from Friday to Monday, so that the smoke may escape. The feeling of the feet having double soles under them is mentioned by Brockmann, speaking of the fire-damp.

There is no need to seek among the German towns of the 17th century for the origin of the candle test. We have it plainly written in works far older. Pliny says, that "in deep wells sulphurous or aluminous (substances) kill the workmen. The extent of the danger is tried by letting down a light to see if it is extinguished."*

This long experience may be received as a fair proof, that where a candle can burn, a man may live; but it applies only to certain qualities of air, and none of it affects the question whether a man may live in vigour. It would not apply to sulphuretted hydrogen or to prussic acid, or nitrous fumes, or even to pure oxygen, as far as we know. It applies, however, in a rough way, in wells and mines, as the usual impurities there affecting the combustion are such as are given out by men and candles.

His Excellency Von Decken, chief of the mines in West Prussia, sent the following;

"Continuous difficulties arising from the accumulation or evolution of carbonic acid gas never occur with us in the metal mines, or at least very rarely. In most cases it is sufficient to make two or more communications with the surface to different depths, such as that of a level and a shaft, or several levels if needful, to strengthen the draught of air, so that it may either remove entirely the carbonic acid in its progress or dilute it so that it may be no longer hurtful.

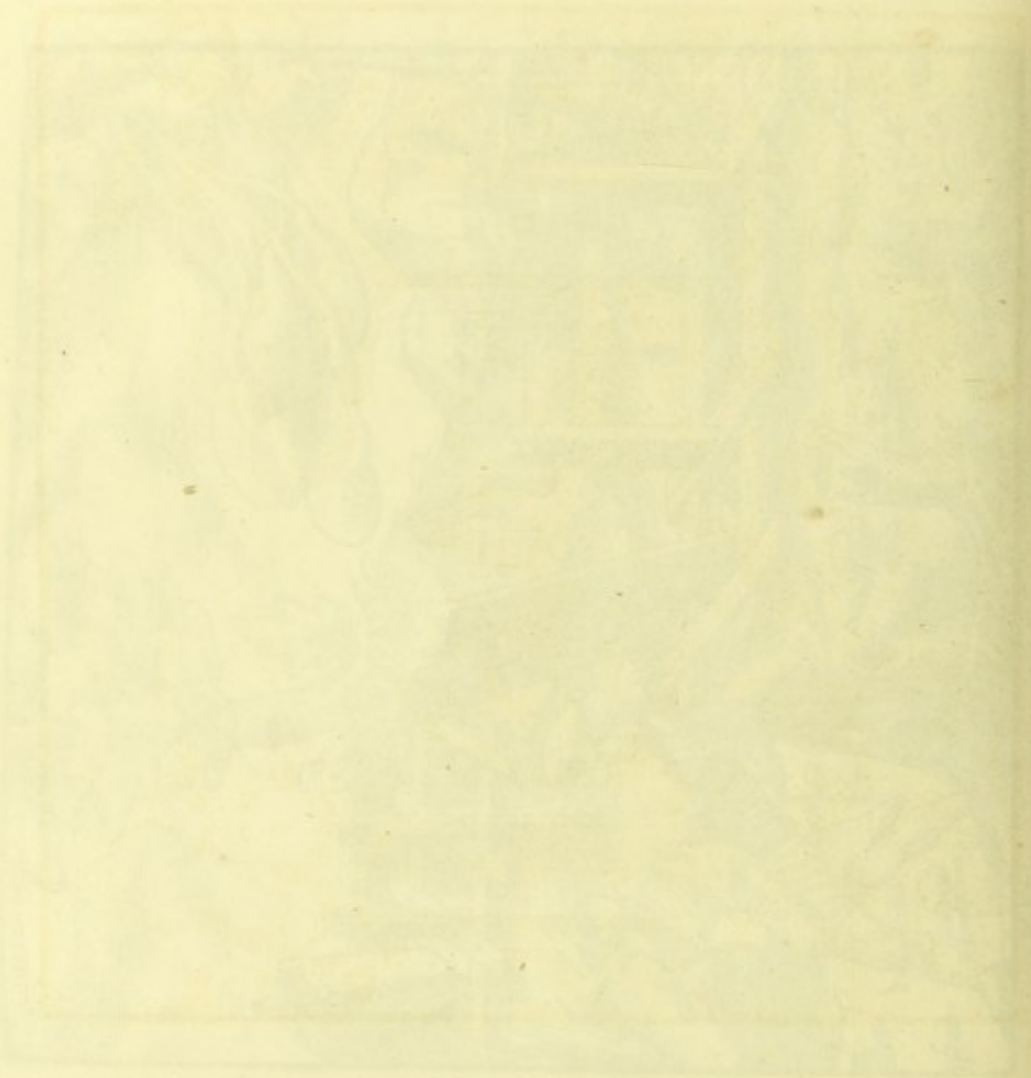
* Depressis puteis sulfurata vel aluminosa occurrentia putearios necant. Experimentum hujus periculi est demissa ardens lucerna, si extinguatur." 31, 28.

AGRICOLA



AGRICOLA A.

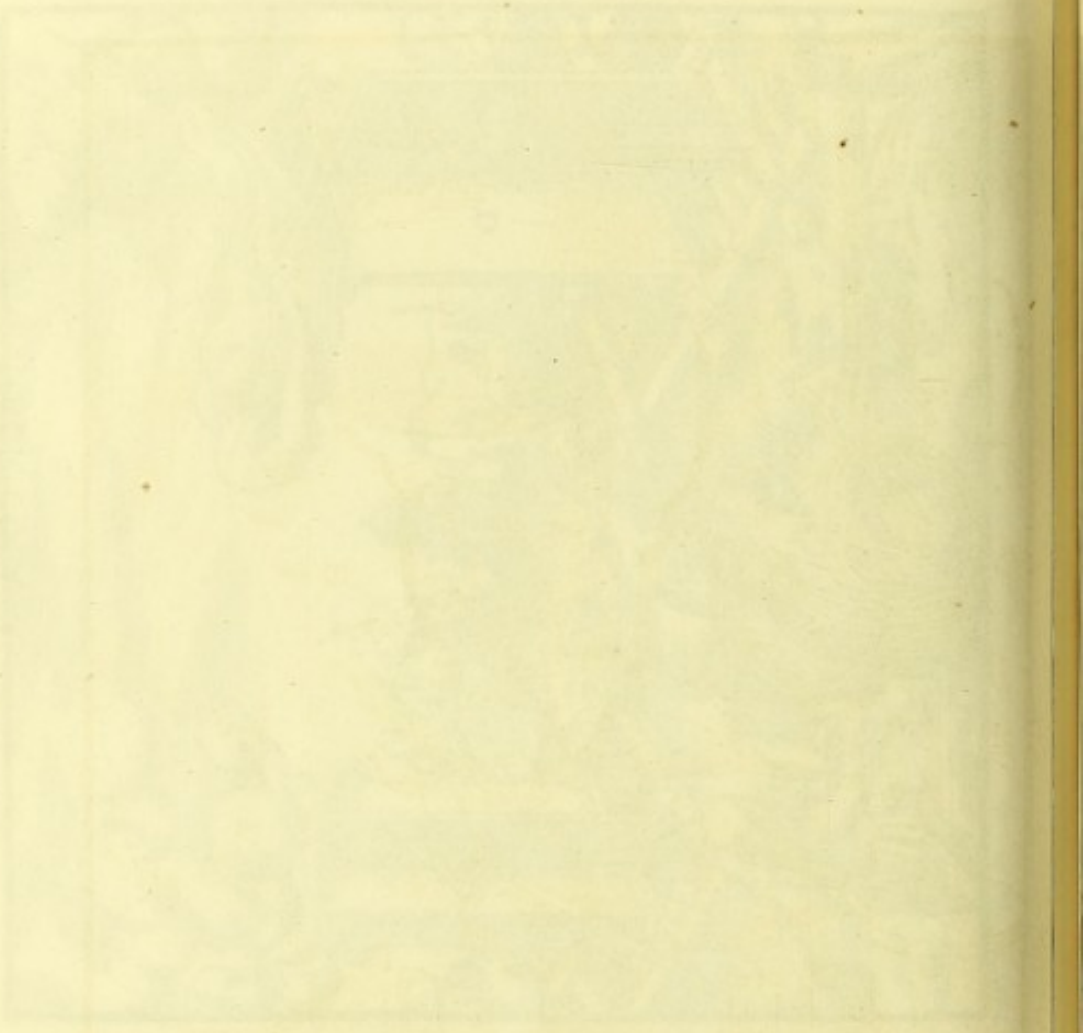




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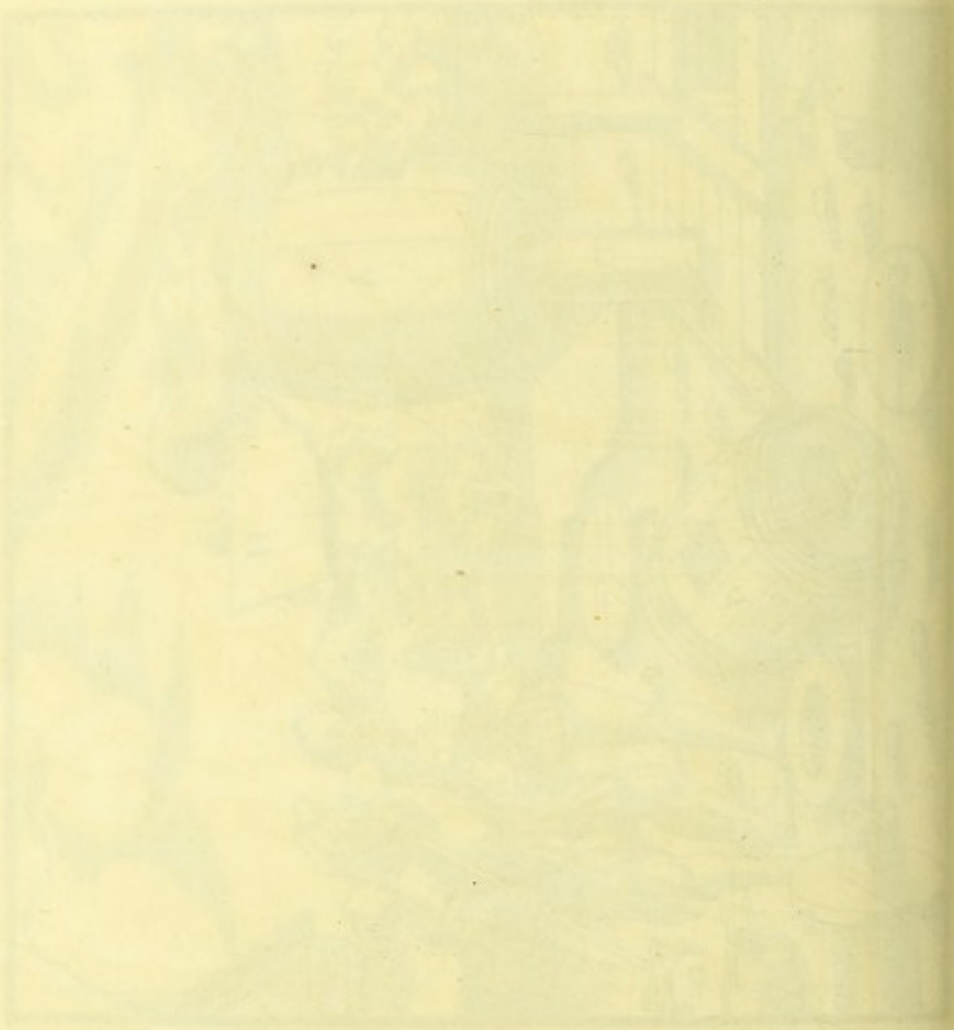


Day & Son, Lith.rs to the Queen.



AGRICOLA C.





AGRICOLA D.



Day & Son, Lith.rs to the Queen

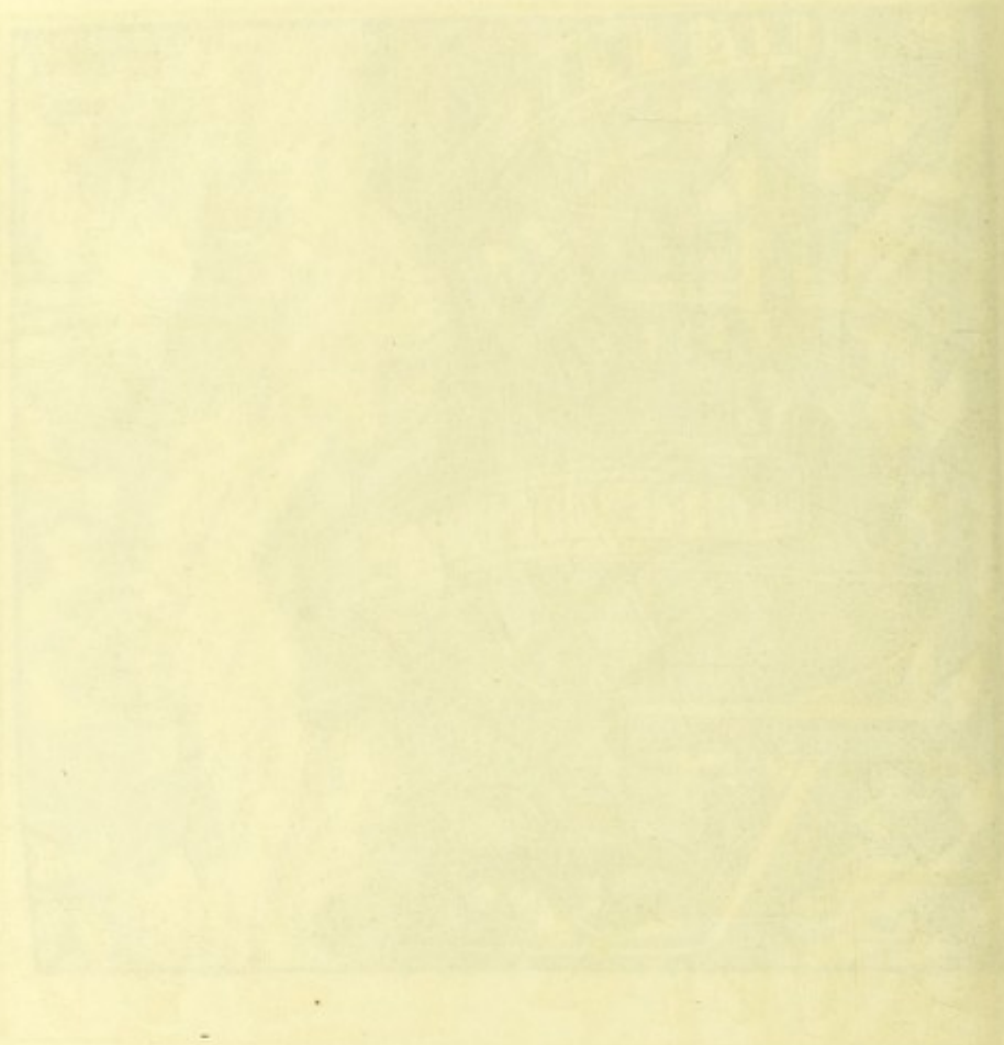
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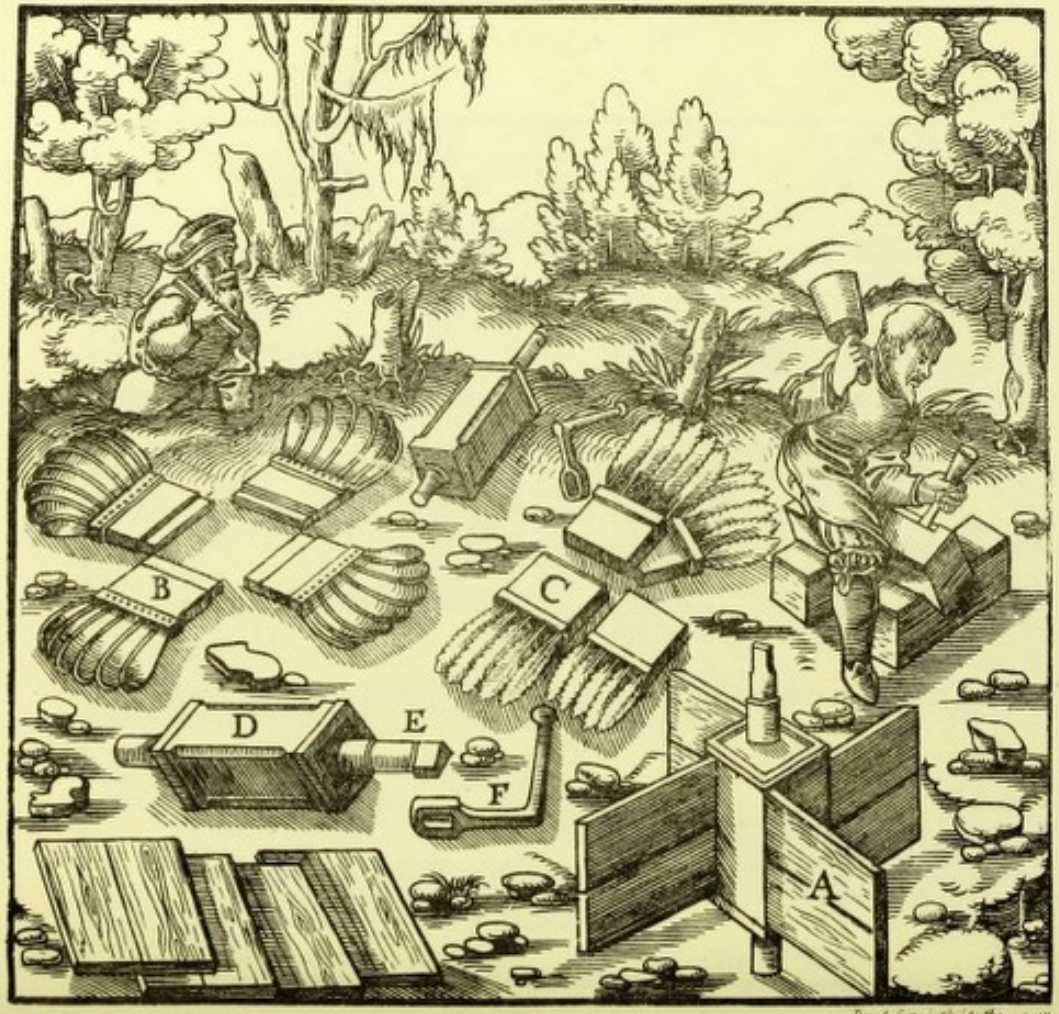


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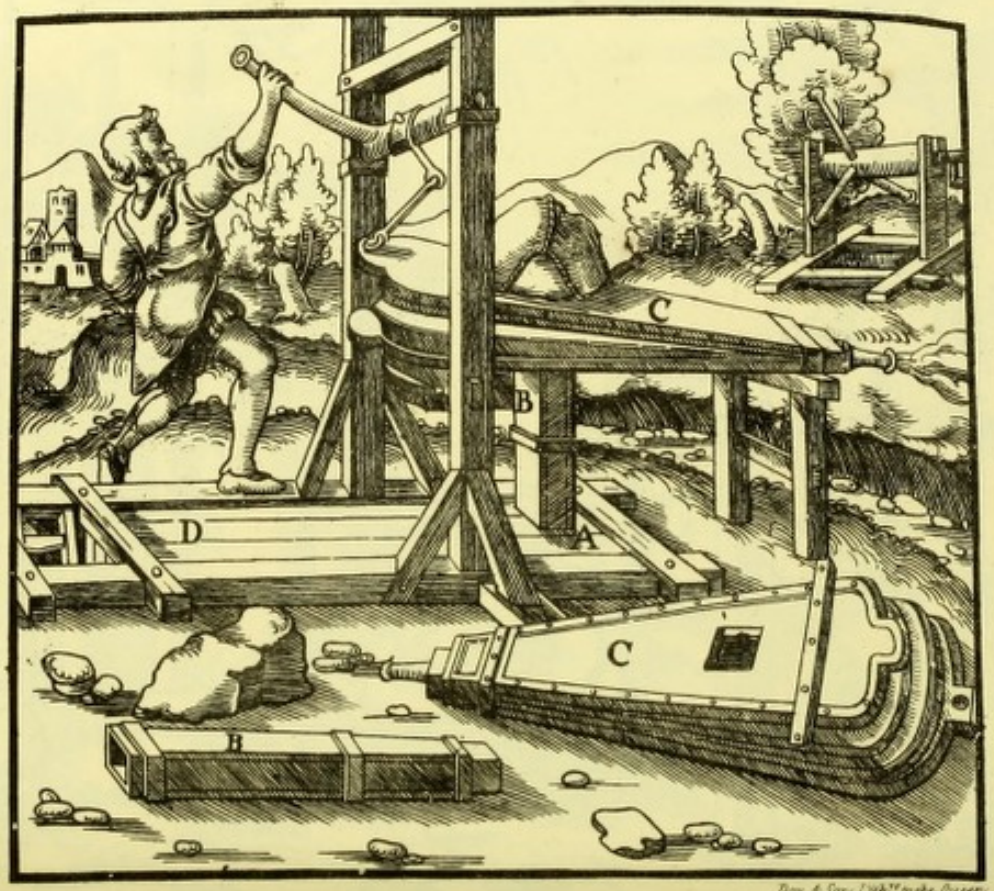


Day & Son, Lith.r to the Queen.

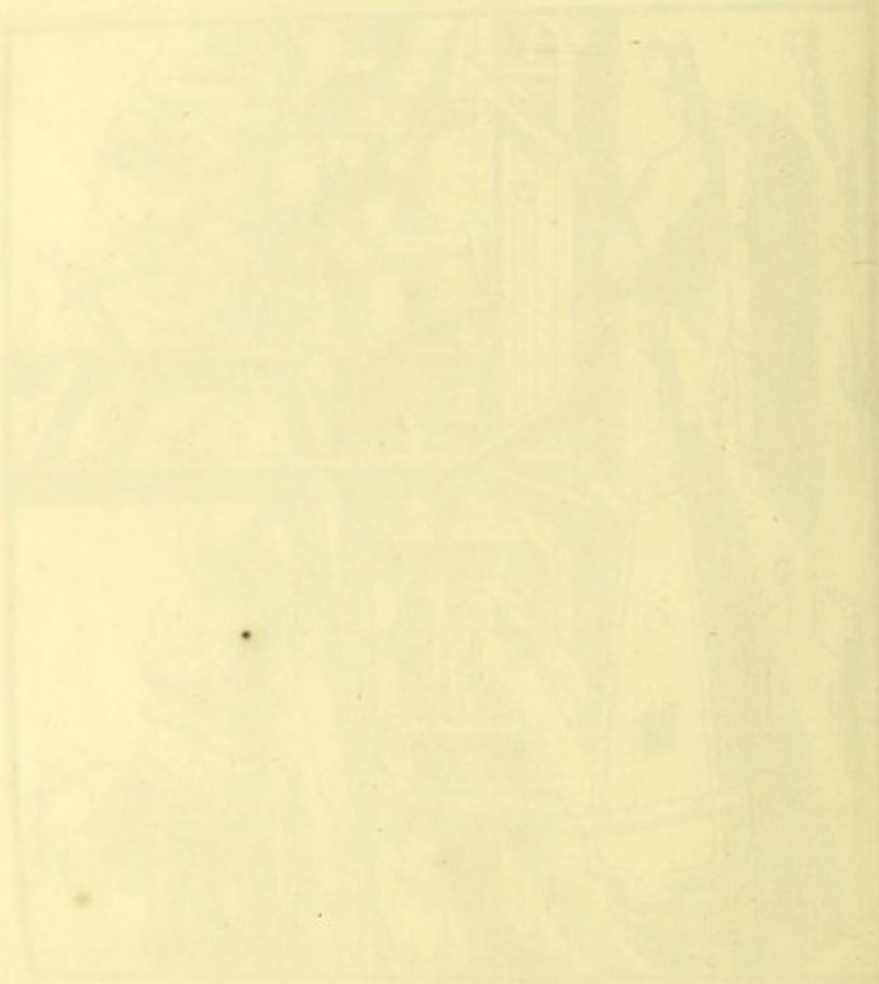



A
B
C
D
E
F

AGRICOLA H.



Day & Son, Lith.rs to the Queen.



AGRICOLA K.



AGRICOLA L.



Day & Son, Lith.r to the Queen.

"In some works fire-baskets or draught fires are used, in others ventilators (fans), and in some cylinder machines, either for forcing the air forwards or for drawing it.

"Levels which are very long, 600-800 fathoms at $6\frac{2}{3}$ feet, have vaulted passages applied with great advantage. These are specially valuable in cases where the ventilating shaft is very deep. The action is increased by having an air shaft 50 or 60 fathoms from the mouth, at the bottom of which it is easy to bring a fire which is carried up to a shaft of 30-60 feet above the ground.

"In some iron mines which are not deep, and where the ironstone is covered with clay, carbonic acid is often found. Two shafts are then sunk at a distance of five fathoms from each other, and sufficient draught is obtained to enable the work to be continued."

"Bonn, 7 Oct. 1863."

Professor Gätzschmann has been kind enough to give me the following replies to questions.

"The workmen who bore are not found to suffer more than other workmen; those suffer most who use sharp instruments, such as saws, and such as are used for striking, as hammers and hatchets. This is on account of the dust, although it is less felt in Saxony than in Spain, where it is besides exceedingly dry.

"The wage of the land-labourer is greater with us than the wage of the miner, not including the colliers, and the wages of masons and carpenters are still higher. On the other hand, the miners have their living regular and secured; they receive a pension when they are sick or wounded, and in times of scarcity they are assisted; they are altogether freer and more independent than the agricultural labourers. On the other side again, it cannot be denied that the children of the miners no longer press forward to the mines as before, but rather go to the land or do nothing, for they are not fond of work; and indeed most of our miners have become less diligent than formerly, and prefer to live without work.

"The duration of life among the miners is certainly on an average less than among other workmen. Partly their work is greater, but more particularly must be mentioned their constant remaining in an atmosphere which if not dangerous is still unwholesome (it is poor in oxygen, has more carbonic acid, decomposing matter, and such things). The long ladders too which must be descended and mounted are only part of the long road between the house and the work. On an average they work in the mines from 50 to 55 years of age, but many live from five to ten years afterwards, seldom more and often less. The life of other workmen is eight or ten years longer.

"The miners do not receive wood (he speaks of Freiberg), but they are firmly convinced that it is no crime to steal it in the forest; besides they and other poor persons are allowed, on certain days, to collect the dry wood (rather sticks) in the forest.

"It is not possible to give the exact numbers of the wounded, because small wounds are often never known, and because in the lists the wounded and sick are given together. I give the figures for a few years at Freiberg, and remark that all the labourers are real miners here spoken of.

——	Actual Miners.	Killed.	Wounded and sick.
1855	8,285	6	1,119
1856	8,355	4	2,092
1857	7,927	10	3,305
1858	7,877	8	3,751
1859	7,854	7	3,241
1860	7,915	12	3,740
1861	7,992	6	3,738

"The *steiger* (mounter) in German mines is the foreman of the hands. In large mines there is an *obersteiger* and *untersteiger* (overmounter and undermounter). These foremen have only a part of the work to examine, as every department has its own foreman, *i.e.*, the *untersteiger* is foreman of the mines proper; the *mauersteiger* is foreman of the builders; the *zimmersteiger* foreman of the carpenters; the *waschsteiger* foreman of the dressing, and so on. The *obersteiger* is over the whole, managing the whole mining process; over him is the *schichtmeister*, who with us is not a mere accountant, but chief technical director of the mine.

"The young enter the mine at the age of 15 at most (not 16), and rise gradually to be miners proper. At first they clean the mine, and then they proceed to the moving of the ore and the rock. The younger boys are employed outside as elsewhere mentioned.

"The allowance to the superannuated will keep a man in a strait, although it is seldom three shillings a week, but he generally earns something by his work; sometimes they are still so strong that the allowance is only a trifle to them.

"There are, properly speaking, almost no royal, that is, state mines and mine buildings. In former times the adits were royal, but were paid for by the gain on the mines; now, however, all are in possession of the revier, the united mines of the district. In all details of management royal and trading mines are alike.

"A workman may become a foreman (*untersteiger*) if he has the requisite knowledge, but to be *obersteiger* it is necessary to have passed the mining school; and this every miner can do who has the proper knowledge (reading, writing, and arithmetic must be learnt by every workman.) Education in the mining school is free, being paid for by the state and the mines."

There are questions arising from the above letter of great importance. The sons of the miners have lost their old enthusiasm for the work of their fathers, and the miners themselves work less cheerfully and powerfully. What is the reason of this? Is it because the work has become less remunerative, or is it because the men are actually deteriorating as a race? The higher wages of the land labourer may be one reason; but this does not explain the change.

The belief that the borer does not suffer more than the others does not agree with the Harz statistics. If dust and solid matter in the lungs were the only cause of disease this would be the result; but as the bad air must be considered one of the most important causes, the borer must have the largest share. Perhaps, however, he is less exposed to dust, in which

case his exposure to evil influence may become equal to that of the others.

Notes from Books.

Calvör* begins his history of mining machinery at once with engines for giving air, and a wonderfully full and rich collection of mining apparatus plates he gives, and in the department of ventilation one or two very interesting. The inventions of Bartels are especially dwelt on. He had a boring machine by which he made air holes for ventilation, but he then went on to pump out the foul air by means of a double pump, made of rectangular boxes simply, and having a large surface. His reasons for pumping are quoted by Calvör, and were given as part of a report to the directors of a mine in 1711. They are to be found quoted by Calvör, p. 10, and are entitled :

"*Some observations and speculations on mines and places in which bad weather, cold, damp, or foul air exists, and whether such can be removed otherwise than by blowing bellows, as hitherto.*"

In mines it is important to remark : 1. How and from what place the air enters and leaves the mine. 2. If such movement is constant. 3. If it changes, does it happen that in winter the air falls into the lower shafts, being drawn out of the higher ones ; on the other hand, if in summer it goes into the higher shafts, being drawn out of the lower, as happens in a gallery which has an air hole, or when two shafts communicate. By what means it happens that the air changes its course in winter and summer ; whether the air is at certain times of the year thicker or thinner, or pressed more to the earth or drawn from it ; or if the wind changes the draught, is not known to the learned.

4. If now the draught in spring and autumn changes, by which generally foul air is caused, we cannot wonder that this should occur, as each draught strives to obtain the upper hand, and neither will yield. As the air is brought by this struggle to a stand-still, and remains balanced, so the air in intermediate levels and cuttings is equally pressed and shut up so that it can move in no direction until one of the draughts has the upper hand, and breaks through, making a proper current ; such standing must cause bad weather.†

5. It is to be observed that the wood in those shafts, adits, and levels, especially when it is old and decayed, causes bad weather, so that in such places fresh air cannot be got.

6. But when a shaft is in the solid rock without much wood, or when the wood stands in wet and does not decay, and still there is bad air, this seems to me to be the only cause, viz. : that the air cannot at the same time go out and go in, as there is only one entrance but no exit.* When the vapours arising obstruct the entrance of the air, then the currents oppose each other, and the bad air must be found in the mine.

7. Nos. 5 and 6 show how this happens in a gallery or adit.

8. If shafts were united to each other by a gallery, so that the air had its proper draught, and if winzes stood under or near the shafts on the levels, and foul air still remained, the cause would be as mentioned in No. 6, because the air rushes through the communications, and cannot without blowing be brought into the lower parts.

9. When in old workings and pits which have lain many years bad air is found, and there is no cutting to stir it up by a draught, such a foul cold or heavy damp is difficult to lift out, even by blowing fresh air into it.

10. When fresh air is blown into such old workings, and the foul air is stirred and driven to the shaft, the bad becomes mixed with good and is then seized hold of by the blowing machines, and sent back down to its former place. And although the bad air might by constant blowing be taken out in this way, it is by no means a sure way. The bad air is moved, it is true, and sent over the whole mine, and although it is not equally oppressive to the candle and the workman, it is still hurtful.

11. That the blowing bellows are not sufficient is seen by the following : Let there be a shaft sunk from the surface ; let it contain bad air, and let fresh be driven in ; that which is at the bottom is certainly brought to the surface, but the fresh air is too weak, and only dilutes the foul air. When the foul air is driven up, it cannot come out, as the air which is trying to enter in a natural way obstructs it, beause it lies some fathoms deep in the pit. A similar opposition comes from the atmosphere above the pit.

12. The same objections are found when it is attempted to drive air into a long gallery.

13. Still less is it possible to succeed by blowing the deepest levels, sumps and close ends, as the air is much duller, and it seems to me like throwing in an ounce of perfume to drive away a hundredweight of stink, so that the weaker will overcome the stronger.

14. In mines that require good air, it is very insufficient to blow it in, as may be seen now at *Stuffenthals Glück*, where it is no easy thing to drive out the bad air from the old workings, and to this date it has not succeeded, being against nature.

15. If it is to be done well nature must be our teacher, and she points out that air hangs on air and follows it, be it good or bad, or of contrary nature, and this attachment is so constant that no man can break it. And even if air is drawn out of a place by the use of a power too great in proportion, the free air around would follow it, and even break the place in pieces to follow the air which was drawn out.

16. Now the foul air in the shafts is so bound up with the air of the firmament that it cannot be torn asunder, but the upper and lower must be torn out

* Acta Historico-Chronologico-Mechanica circa Metallurgiam in Hercynia Superiori. Oder Historisch-Chronologische Nachricht und theoretische und practische Beschreibung des Maschinenwesens, und der Hülfsmittel bey dem Bergbau auf dem Oberharze, darin insbesondere gehandelt wird von denen Maschinen und Hülfsmitteln, wodurch der Bergbau befördert wird, als von dem Markscheiden, Schacht und Grubenbau, von Bohren und Schiessen, von den Maschinen und Vorrichtungen, das gewonnene Erz zu Tage zu bringen, von den Maschinen, wodurch das Erz zu Sand gestossen wird, oder von Puchwerken und der Pucharbeit, von den Maschinen in der Hütte, aus den Erzen Silber, Bley, Glätte und Kupfer zu Schmelzen, und von der gesammten Hütten-Arbeit nach einander, von den Münzmaschinen, das Silber fein zu brennen, und zu Geld zu vermünzen. Ausgefertiget von Henning Calvör. Braunschweig, im Verlag der Fürstl. Waysenhaus-Buchhandlung, 1763.

† The phrase "bad weather" appears to be used in England for bad air, but more generally in Germany.

* That is, there is only one passage to serve both for entrance and exit, I suppose.

together. How and in what way to lead the air to its natural movement is a most important question and speculation.

17. Without stirring the air does not go forward, but hangs together. But if motion comes it moves on hanging together, if there are no obstacles. This may be seen in those mines which have many communications, the air is seen to move, being sometimes clear, sometimes clouded, accordingly as it is mixed with powder smoke.

18. In pits with no communicating levels to the shafts the wind cannot make a movement, and one must be made, not a free one, but a short one, according to No. 10, which shows how the air becomes mixed. This must be done with a machine, in my opinion. When the bad air is once put in motion, whenever it is taken away fresh air must come in its place, as otherwise there would be a vacuum in an open place.

19. But it is not enough to put the bad air in motion, it must be put so far away from the shaft and held in motion until the air begins to come out freely.

20. As long as my fundamental opinion is not contradicted that the air hangs together, I remain in my fixed opinion that the air must be moved by a closed machine and drawn out of the shaft. An appropriate machine has been found, and I have not only announced this to your Excellency and the honourable body with all respect; but if they graciously resolve to pay the cost and try the machine, I am ready to make the preparations. As it never has been made, the expense cannot be known; but a single one ought not to cost above 50 dollars. When it has pumped one spot, it may be kept for further use, as it may be applied wherever there is machinery.

This pump is the mother of many similar. Calvör shows it to be before any of the plans of Friedwald, Sutton and Duhamel.

After this a pump was invented with leather sides, a cylindrical double leather pump, much like that which is shown at figure 1, as being used on a very small scale for emptying bottles of the air they contain so as to refill with the air of the place. Bartels, in the same book quoted, is said to have ventilated a coal pit with a fire and chimney in 1717, carrying out his principle of drawing air from the mines.

In making the deep adit at Clausthal six shafts called light holes were found necessary. "At the sinking of five of these, remarkable circumstances occurred in connexion with the air which are not yet explained. The first showed a want of air even at a little depth; this disappeared after sinking farther, although no communication was made with other parts. The fifth shaft exhibited a want of air at the depth of 27½ fathoms, which diminished by increasing depth in 1780; in 1781, when the deep adit was reached at 53 fathoms it disappeared. In the fourth the want of air appeared at 31½ fathoms and disappeared at 38. The third found a want of air at 19 fathoms' depth, and a duck engine was used, driven by the machinery; at 23 fathoms the want was not felt. The second showed a want of air at the depth of 31 fathoms, so that an air engine was used; but the want disappeared at the depth of 43⅞ fathoms. With the first the want was felt at 40½ fathoms, and a duck engine was used; but in 1781 it was not found necessary although the depth was 46¼ fathoms. In later times, although the galleries are extended far from the shafts, the want of air, properly speaking, has never been felt."*

It cannot, however, be said that the ventilation by machinery was amongst them undertaken to a great extent. The arrangements and expenses were small. In Trebra† we find only 69 dollars among 10,737; but these are for tubes only.

Becker‡ says, speaking of Wallachia, "It cannot be denied that the whole of this mining is kept up by two great powers, chance and necessity. Chance gives or takes the richest spots and leaves hope to be fulfilled or deceived. The rain and the flow of water are matters of accident, on which the district chiefly depends. The impossibility of obtaining other work keeps the men there, and compels them to bring up their children to mining to avoid worse; for I never have seen a poorer class of miners than the Wallachs in the rich gold district of Vôrôspatak. Shut up in a narrow circle, they can do nothing but bore, blast, stamp, and mash, and without the greatest diligence they could not compel nature to support them. I could not help asking if it would not be politically advantageous to do something for the welfare of these poor families, and not entirely remove from them the belief in the possibility of obtaining some little comfort by means of mining." Vol. ii., p. 178.

Becker says that by going forward with the levels, and making winzes between, it is possible to proceed horizontally 500 fathoms, and after that to 1,000 by the use of air machines. The use of many shafts is too expensive; the management of air in this way is best known in Hungary. This was in 1815.—Vol. i. p. 46.

§ "The danger and injury to the miners is various in kind, and terrible, and as health is always more important than gain, all the work should be so done that the workmen may work without danger. In some places the water is much colder and more hurtful to the tendons than in others, and so acts on the legs that in a few years they become stiff and lame.

"To prevent this, the miners ought to wear high water boots to keep their legs from the cold. On the other hand some departments are so dry that they have no water; in these the dust and stones fall upon the lungs, the men have lung disease, breathe with difficulty, and at last take consumption.

"At the Altenberg in Meissen there is found in the mines a black smoke which eats up wounds and ulcers to the bone and destroys the lungs and eyes; it destroys iron also, like the smoke from the smelting works at Zellerfeldt and Wildemann; besides this there is a kind of kobalt, which eats up the hands and feet of the hewers when they are wet.

"In Rammelsberg at Goslar, where the water drops out of clefts on to the clothes of the workmen, it eats them through, so that on account of the sharp water and great heat they must go nearly naked. For the

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* Bergmännische Bemerkungen ueber den merkwürdigsten Theil des Harzes, von Johann Carl Freiesleben. — Leipzig, 1795. (p. 303.)

† Erfahrungen vom Innern der Gebirge, nach Beobachtungen gesammelt und herausgegeben von Friedrich Wilhelm Heinrich von Trebra, folio, 1785.

‡ Journal einer Bergmännischen Reise durch Ungarn und Siebengebürgen, von Wilhelm Gottlob Ernst Becker. Freiberg, 1815.

§ Bericht von Bergwercken, durch G. E. Löhneiss, &c. &c.; folio. Stockholm und Hamburg, 1690 (p. 56).

same reason the hewers must protect themselves with great spectacles and with bladders, so that no dust may go into the lungs and eyes.

"Besides that, the *cold* (dampf) *damp* or bad air which cannot get changed, gives the workmen a heavy breath, so that they must blow air into the levels; besides this there is the heavy damp, Schwaden, which kills the men sometimes. This is found in the Zechen and Fellörter, where the rock is hard, and is fired weekly; in these the air is poisoned. There the veins and clefts have a subtle cold poison, which is drawn by the power of fire out of the veins and metals, like the furnace smoke where ore is smelted, and which is found on the walls and the refinery. When this smoke does not come out it falls on the water in the sumps, swims in them, and makes deadly poison, for where that water is stirred up by a little stone on other things the poison comes again out.

"When people draw this smoke or vapour by breathing they are poisoned, so that they lose all feeling and power of moving, as well as all sense and reason, and die without pain, and those who are overtaken by the bad air in shafts or on ladders fall down, and can neither move hands nor feet, but they think their hands and feet are quite round like balls; and even if they hold their mouth and nose, and flee away from this poison they appear afterwards white like a corpse; therefore no one should enter such pits until they are first plied with fire. Careful people never enter till Monday, for between Saturday and Monday the poisonous air goes away. Some places have this damp, and give it out of themselves. It escapes also from some druses; this may be known by holding a lighted candle to them; the light is put out. It can be no good air when this happens. In some places they put pipes in well closed, by which to draw out the bad air. It often happens that the workmen fall on the ladders and break their arms or legs, or even their necks, or fall into the sumps containing water, and are drowned. In such cases the (steiger) foreman of the pit is to blame, as he should have all the ways in the shaft in good order.

"The door of the mine-house or adit entrance should not open to the north-east, lest in winter the ladders be covered with ice, and the hands become stiff with cold, or slippery, so that they cannot hold. The men should also see that there is no carelessness in their going up and down. Sometimes the walls, the shaft, and the galleries fall in, and the people are smashed so that they become lame for life or die.

"It is said that in Rammelsberg, in one day, there were made 400 widows."

He then mentions various modes of removing foul air, and among others blowing fresh air in with a pair of bellows.

P. 60. On this it is added curiously:—"In the tubes which are made to reach into the foul air, there is found a kind of moss, which forms to such an extent that it chokes them up, and they must be cleaned out with a thick rag."

This volume gives oaths for each class of the mining community, and prayers for all their conditions. The oath defines the duty of each whilst it binds him to perform it.

"Schwaden is bad or poisonous air; on account of it, many mines lie idle.*

"To those who are rendered insensible they give vinegar and oil, and lay the head lower than the body, so as to induce them to eject the poison."* In Lancashire they hold people by the heels when they take them out of the water.

†"Door geheel Sina vind men een ontelbare meenigte van Mynen, die allerlei Metalen in grooten overvloet bezitten. Gout of zilver uit de Mynen, te graven is in Sina uit Kracht der Wetten verboden; dewyl de Sineezen voor vast gelooven dat de menschen, wiens leven veel meer dan het gout en zilver (daarom d'Europers d'ingewanden des Aardryks door snuffelen en outledigen, en devlakte des Aardryks van menschen ontblooten) van Keizeren en Koningen behoorde geacht te worden, doorgans in de mynen door de schadelyke witwaassemende dampen verstikken en om 't leven craken. Evenwel Staat eenen ieder vry gout aan d'oevers der Revieren te zoeken, dat ook aldaar in groote meenigte gevonden word, en daar meê de Sineezen veel meer koophandel dryven, als datze het zelve in betaling voor andere Waaren geven." This old Dutch is not easily read. I give the original.

"In the whole of China there is an innumerable quantity of mines, which possess metals of all kinds in abundance. It is forbidden to dig gold and silver from the mines in China, because the Chinese firmly believe that man's life ought to be taken care of by emperors and kings, as of more importance than gold or silver, for which, the Europeans have emptied the bowels of the earth, at the same time depriving the surface of its inhabitants; and generally in the mines lives are lost by the injurious and stifling vapours that issue."

In Rinman's (Swedish) Dictionary of Mining, 1788 the use of the candle, as a proof of the state of the air, is mentioned. Under the head Grubfvabyggnad (Mining), p. 681, the air is called bad, "dä et brinnande ljus däruti vil slockna," when a burning light will or is inclined to go out.

In the same Dictionary it is advised to draw up air rather than to press it down, and the mode mentioned as that adopted in England, namely, the use of fire-baskets, is recommended. It mentions also ventilators or fans, water-bellows, and pumps for air.

M. Brard, engineer to the Mines d'Alais, says in his "Elémens Pratiques d'Exploitation" that carbonic acid comes from every rock into the mines, but this has failed to receive proof; nor am I aware of anything

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* Herttwig, p. 359.—Neues and vollkommenes Berg-buch, bestehend in sehr vielen und raren Berg-Händeln und Bergwercks-gebräuchen, absonderlich aber ueber 200, vorhin noch nicht edirten und ans Licht gegebenen Berg-urtheln und abschieden, mit grossem Fleiss and Mühe, dergestalt colligiret und abgefasset, dass bey nahe keine einzige Materia in Berg-Schmeltz- und Hammerwercks-Sachen, vorfallen mag, so nicht unter einer Rubric, der Nothdurfft nach, abgehandelt, und mit Allegirung gelehrter und bewährter Männer Schrifften, wie nicht weniger darzu gehörigen Kayserlichen, Königlichen Chur-und Fürstlichen Berg-Ordnungen, sowohl was deren Concordanz als auch Discrepanz betrifft, entschieden, und auf die leichteste Manier zu finden wäre, von Christoph Herttwig, J. W. Doctore, Stadt-Syndico auch des Raths und Berg-Schöppen-Stuhls zu Freiberg Assessore. Zweyte Auflage, Dresden und Leipsig—bey Joh. Christ. Zimmermann's sel. Erben, und J. N. Gerlachen. 1734.

† In the account of the embassy of the Dutch East India Company to China in 1655-57 by Joan Wienhof, "Het Gezandtschap der Neêrlandtsche Oost-Indische Compagnie, aan den grooten Tartarischen Cham, den tegenwoordigen Keizer van China," &c., door Joan Nieuhof toen eerste Hofmeester des Gezandtschaps, &c. Amsterdam. 1693. vol. ii. p. 114.

that can lead us to suppose that it would come from granite.

Mr. Brard says that carbonic acid is known in the mines when mixing with good air by a smell, like that of apples, and by a red flame to the lamps, the wick of which must be drawn up and enlarged. Even with this precaution, however, it often goes out with a slight movement. He says also that the nostrils become blackened in this atmosphere. This may arise from an imperfect combustion of the candle-smoke. "When the light does not go out suddenly, and only on making a movement, one may stay and even work in it; it is bad but not so charged with carbon as to cause asphyxia." (pp. 378 and 379.)

He adds, "When obliged to examine a gallery in which a light would not burn, I used glow worms to light the needle of my compass." In a similar case Mr. Ryan, the engineer, used phosphorus. In these cases it is necessary to have a rope round the waist.

"As the carbonic acid gas is heavier than air it always commences on the floor of the galleries, but it rises up gradually till within a small distance of the upper orifice. It is chiefly in hot and *stormy* days of summer that it rises in the pits, whilst it sinks and disappears completely in winter in cold nights or during great wind. I have observed the movements of the air for several years in a shaft at Lardin, department of Dordogne, where the air constantly became bad in the first few days of May." (pp. 379, 380.)

P. 386. "When the circulation is natural it is different in winter and summer. In summer the external air goes down the shaft and comes out by the horizontal galleries, as a liquid does; in winter the external air enters by the (adit or horizontal) gallery and escapes by the shaft."

M. Brard, who seems to have had great experience of miners of various countries, says, p. 499: "The Saxon miners are the best educated of all who come to France; they can all draw a little, and as they have been brought up in a country where, of all places in the world, mines have been best worked, they have good customs, excellent methods, and an enlightened practice."

M. Brard says that "Large iron nails which miners wear in their shoes destroys the ladders so rapidly that in England they have made the steps of iron; we tried them, but found the cold so great that they became covered with ice in winter, especially if put in an air shaft; oak steps last long enough not to render change too frequent."

Mr. Simmons, of Manchester, mentions another objection to iron ladders, that the foot rests on too small a space; men with very strong boots alone can use them. The same remark must apply to the hands, whilst the inclination to slip is not to be forgotten.

NOTES ON CLIMBING.

I requested Duncan J. Campbell, Esq., who lives near Ben Cruachan, at the top of Loch Awe, to give me his experience of the height which a man may walk daily when in good health, and in such a manner as to maintain his health. He wrote to me as follows:—

"As to the height which a man can climb daily as work, I may mention Ben Cruachan (3,669 feet from the level of the sea, from here perhaps above 3,300). The distance from here to the base will be a mile; from the base to the top not less than five miles. Now an ordinary shepherd will climb to the top of it and back for the summer six months twice in one day, and in the winter once a day, without much difficulty. This will be considered fair work for a man, taking the roughness of the ground into consideration. At the end of the time he will be in as good training as Heenan or King when they met at Tunbridge; that is to say, as regards the muscles of the legs and the expansion of the chest. The arms are not brought into action.

"The shepherd will go up in about two hours, and return in an hour and a half. I think it is the heart which is the cause of the difficulty of breathing, occasionally felt when walking too fast up a hill; it sends more blood to the lungs than they can sufficiently oxygenate. But shepherds are not often troubled with difficulty of breathing, unless they go very violently to work. At least I find it so with myself. But you must not forget to take into consideration the fine pure air we have, compared with miners.

"As to the distance a man will walk in a day up and down hill. When I had the farm in Glencoe, I used to walk across to this place 30 miles in 8 hours, up and down hill. A shepherd travelling the hill daily does not on an average go more than ten miles a day, as he is obliged to stand and look about him; whereas if he had nothing to do but go straight forward, he would walk three times the distance. Shepherds in general are very healthy. Rheumatism is their chief prevailing malady when they get old, caused by being exposed to wet and cold, but often brought upon themselves through carelessness in not changing their clothes, and sitting whole evenings in wet stockings.

"The feeding consists of porridge and milk for breakfast and supper, and broth and animal food for dinner; no grog allowed unless they are very hard at work shearing sheep.

"This is in a district with 144 inches of rainfall last year."

The height here ascended by those who go up Cruachan twice in a day is at least 6,400 feet. This is four times greater than the deepest mines, and the ascent is at a rate not quite double. At the same time the distance to be traversed is great. This is an additional but not demonstrative argument against the opinion that climbing alone is the great cause of the disease of miners. It is true that in this case there is no weight to support,—the shepherd leans on the earth,—and there is no force dragging him from his hold upon the spot on which he rests. To make up for this he walks six miles during the period, and goes at a speed at least a quarter greater than the miner, taking the perpendicular height into consideration. We might argue in this way: that the 3,200 feet are equal to only two miles on the surface, as we find the shepherd walks four miles on level ground. But this cannot be. We might also say that the six miles horizontal walk, and the half greater perpendicular height, were equal to the weight of the body sustained on the ladder. In this mode of argument we come nearer the truth; but another difficulty occurs as we find the one class of men so much stronger than the other. However, we may fairly conclude that there is nothing unwholesome in

climbing daily up steep places in pure air; and this is well known.

Still one does not require to be a physiologist to know that in the purest air of the hills, especially if elevated, climbing is often stopped by alarming beats of the heart.

At the same time all evidence shows that those who climb much in pure air gain by the exercise, and those who climb much in the air of shafts suffer less than those who work in the air of levels and ends, and indeed suffer little.

I requested Mr. Isaac Holden, architect, Manchester, and Mr. Simmons, builder, to give me their observations on the amount of work which could be performed by a bricklayer's labourer. Mr. Holden says, "I have had a man timed (he not being aware of it); the results are:—

"The usual or average work of a man up a ladder 30 feet high, and including a walk, say 10 to 20 yards, is 1,200-1,500 bricks per day; he goes up about 13 times per hour. Three minutes may be taken as the time for going up and down, leaving $1\frac{1}{4}$ minute for rest. With a building 45 feet high, the number of journeys was eight.

"The total height of these journeys, allowing $9\frac{1}{2}$ hours per day, is, for every hour - - -	390 feet.
For the day - - -	3,705 "

"Supposing there was no ascent to be made, the carriage of 94 lbs., besides the loading and unloading, is itself a laborious work.

"45 feet, at 8 times an hour, is equal to 360 = in $9\frac{1}{2}$ hours 3,420 feet."

A miner will do the hour's work of mounting in about 20 minutes, but he will have no weight except himself, which may be taken at 150 lbs. With the hod there is nearly a cwt. more; but the amount of exertion will not be a simple proportionate quantity. The peculiar necessity of balancing the weight on the shoulder calls for a constant exertion of attention; it is an activity of the mind with the body in constant readiness.

Mr. Holden says: "I do not think there is any disease fairly attributable to such men, or indeed to any branch of the building operation, and above all to climbing ladders. From my own persoual experience, and what I can learn from others, the action on the chest generally (in climbing ladders) is highly beneficial. The arms being constantly thrown upward, and the head of necessity thrown back, the chest is pushed forward, and the lungs are more fully inflated than by any other motion of the body. The only diseases which can, in my opinion, be fairly considered as connected with the building operations are such as are brought on by damp clothing and drunkenness, the two being too often brought into operation together. If a sober man becomes wet he prudently goes home and changes his clothing, as soon as his labour ceases. Whilst he works he seldom suffers."

Mr. Simmons, jun., builder in Manchester, has given me the following particulars concerning bricklayers' labourers:—

Hours of labour per day - -	$9\frac{1}{2}$
Smallest amount of bricks carried	1,000
For thick walls sometimes 1,200 to 1,500.	
Average height climbed on the ladder, 30 feet.	
Average number of journeys up the ladder:—	
Of these there are, with bricks -	84
" " with mortar $\frac{1}{2}$ =	42
	126
Weight of hod 10 lbs.	
" 12 bricks at 7 lbs. - - 84 "	
94	94
Weight of mortar - 68 lbs.	
" hod - 10 "	
Weight of mortar loads - 78 "	78
1,000 bricks, at 7 lbs. - -	7,000
42 hods mortar, at 68 lbs. - -	2,856
Add the weight of the hod up and down, 126 journeys - -	2,520
Total weight per day carried -	12,376

That is 84 journeys with bricks,
42 " mortar,
and 126 back journeys with the hod only.

The height, 30 feet, has a step at every 9 inches - - - - 40 steps.

Distance of the building on an average 40 yards.

Here, with an average of 88·2 lbs., men travel up a ladder 3,780 feet or a mile every day, and come down with a load of 10 lbs. They also walk 5,040 yards or 2·32 miles, with a load of 82·2 lbs. on level ground, and 5,040 yards with a load of 10 lbs. Besides this they lift 9,856 lbs. into the hods; sometimes they lift this down, but frequently throw it.

Here is an amount of ladder climbing which is equalled by no class of miners in the world, but it goes on daily before our eyes unnoticed. The deepest of our mines are only half the depth of the hod carrier's ladders, and only a small portion of the miners are at such a great depth as even that. It is extremely probable that the amount of ladder climbing undergone by the hod carriers is somewhere between five and eight times the amount undergone by miners generally, and that too with a load of 88 lbs. upon their shoulders whilst the miners carry nothing.

In comparing the work of the miners and hod-carriers we are met with difficulties, as usual. But we see men whose chief labour is mounting, and that with a load; and if these do not suffer, the case against the ladder is imperfect. Do these men work as much as the miners? Let us take a miner who works at the depth of 900 feet. The hod carrier works the same number of hours, but he goes up four times the amount of ladder. Now all the time he is not climbing the ladder he is working hard. Again, although we say he mounts only four times the amount of ladderway, he actually does more, as there are two labours united to intensify the effort, and the strength required is greater when there is intensity as well as continuation; a man may break his back by lifting in one minute, a weight which might easily be raised in two minutes.

Mr. Simmons says that "The hod carriers' work is so hard that Englishmen will not face it; but if they do, they break down in a few months. The men have very strong boots with iron nails, as the ladders are of iron. (Carpenters, painters, &c. will not and

cannot stand on the iron ladders long, the weight is on too small a portion of the foot.) They smoke a great deal all through the day" (apparently required to keep up the action of the heart). "They take coffee and bread and butter for breakfast, although the butter often runs short by the end of the week. The same for dinner, with a piece of bacon, during half the week; for the other half a small chop, or one or two boiled eggs, sometimes raw onions and bread. We never hear of any dying of lung diseases. They are not men of full flesh, but are thin, muscular, and hard. As they live very roughly, they also die roughly, and in general very suddenly, from some great exposure to wet without any succeeding care."

The steiger in the German mines is an overlooker, not so high in most respects as a captain. He is called steiger, I suppose, from the fact that he is constantly going up and down superintending. Steiger means mounter. He is more in motion than the men, and does more than their share of climbing. Still even the under-steiger is longer lived, according to Brockmann, than the workmen. His exertion on the ladders is actually greater than the workman's; but the exertion in the worse air of the levels and ends is not so great, nor is the time which he spends in the worse parts of the air so great. Labour in bad air must be more injurious than rest. In air with little oxygen we are inclined to rest; it is equal to sleep. It lessens the amount of force. If a man who breathes 20 times a minute in good air falls asleep, or becomes very sleepy, his breathing goes down to 12. If he enters air which gives him so little oxygen as to be equal to a smaller amount of breathing, he becomes proportionably sleepy.

If in this condition he makes an exertion, he draws upon some power which physicians must explain; at least it seems at this stage not yet to be in the power of the chemist.

Prof. Forbes (Phil. Magazine for 1837, p. 261,) says: "From the observation of Borda, who accompanied me in ascending the Peak of Teneriffe, the ascensional effort was 1,225 English feet per hour, continued for 8 hours in a day. This estimate does not differ much from that of the guides at Chamouni. My own experience would give results somewhat greater, and the *constant* must, of course, be determined by each individual for himself. For heights not exceeding 5,000 or 6,000 feet I find 1,500 feet per hour to correspond to the most moderate sustained muscular effect, and which might be long kept up; the only kind of observation of any value, since excessive exertion puts all calculations at defiance.

"For inclinations greater than 25° there is a deficiency of directly comparable results. Coulomb could not persuade a labourer to ascend a stair cut in a rock, through a height of 9,000 feet in a day, at the usual wages. The angle may be supposed to be 30° or 35°."

After speaking of the treadmill, Professor Forbes, now Principal of the University of St. Andrew's says: "In want of decisive observations we shall assume 1,100 feet per hour as the ascensional effect when the ascent is vertical or the horizontal exponent null, being two thirds of the maximum effect." This is explained to be "the amount of labour which may be continued for eight hours a day at least, and for many days together."

Angle of Ascent.	Space described in an hour.	Height ascended in an hour.
0	21800 feet	0 feet
5	10872	984
10	7202	1251
15	5348	1384
20	4198	1436
25	3462	1463
30	2913	1456
50	1706	1307
70	1215	1142
90	1107	1107

From these results it would appear that the actual climbing of the ladder is not a great grievance if performed with moderate speed, but great speed will increase the exhaustion at a very rapid ratio. A horse will take a mail coach at a rapid rate ten miles an hour once a day, but it will drag it 20 miles, not in two hours, but in ten. We may know the amount of force, but we do not know the amount of exhaustion, when a man increases his speed at a given ratio; and who will calculate the effort and anxiety of the miner to get up the ladder and go to his home after his work is done. When we come to this last and most important point of comparison between miners and others who climb we are compelled to confess with Prof. Forbes that "excessive exertion puts all calculation at defiance." These notes are therefore very imperfect, but may be found useful for those who wish to advance farther.

In doing the analytical work of this Report several assistants have been occasionally occupied, but I must especially thank Dr. Reissig, who has now an unusual experience in gas analysis, for the interest he has shewn in carrying out my views during the greater part of the enquiry.

R. A. SMITH.

VI.

REPORT ON THE AIR OF MINES.

By Dr. A. J. Bernays.

At the request of Lord Kinnaird, Chairman of the Mines Commission, I undertook to examine into the condition of the air in certain mines in Cornwall; and I also examined specimens of air which had been collected in other mines in the North. I have in former years had considerable experience of the mines in Derbyshire.

The great cause of impurity here is carbonic acid. The normal amount of carbonic acid in air is 0·035 per cent.; and the generally received opinion among scientific men is, that any atmosphere containing more than three times that proportion, is decidedly injurious to health. I was, therefore, in the early stages of this enquiry, greatly surprised to meet with specimens of air from mines containing 1 and 2 per cent. of carbonic acid which was breathed without fatal results for many hours at a time.

I have further been struck, in the course of my investigations, with the great difference in one's personal sensations of comfort or distress in breathing in different atmospheres containing carbonic acid in the same or scarcely appreciably different proportions. This marked difference, which, so far as I am aware, has not hitherto attracted that notice which it deserves, is due, in my opinion, to the different proportions of organic matter in the air in different places. In other words, the source of the carbonic acid, whether from the exhalations of living beings or from inorganic matters, constitutes the difference. Simple carbonic acid mixed with the air may be breathed with far greater impunity, and therefore in larger proportion, than carbonic acid mixed with organic impurities, as it necessarily is when originating from the respiration or the cutaneous exhalations of living beings. It is not, perhaps, to be wondered at that this effect of the influence of organic matter in aggravating the evil effects of the inspiration of carbonic acid should hitherto have escaped the notice of scientific investigators; for till Dr. Angus Smith introduced his mode of analysis by means of permanganate of potash a few years ago, there was absolutely no method known among chemists of estimating the quantity of organic matter in air. Even now we have much to learn before any investigation into this point can be rendered perfect. We can ascertain the proportion of organic matter, but not its precise nature. We cannot tell what is the difference between the exhalations of different persons; why, for example, a man may continue to breathe without distress a confined space of air so long as it is contaminated solely by his own breath, while he could not, without great disgust, enter an atmosphere rendered foul by the respiration of others, though not more highly loaded with carbonic acid. But however imperfect may be the means of estimating the organic matter, the reality of its influence is unquestionable, and may be easily attested. I found, for example, that in places where water was dripping from the roof, and so constantly percolating the atmosphere of the mine, respiration was far freer than in other parts, the difference depending on the abstraction by the water of the organic matter in the air; and I have repeatedly found that the foul atmosphere was rendered far more endurable by the diffusion of the fumes of chlorine, doubtless owing to the destruction thereby of the organic miasma. Again, I have repeatedly found the air of a crowded assembly room almost unbearable, though containing not more than 0·1 per cent. of CO_2.

I dwell specially on this point, because the conditions of mines in relation to the sources of carbonic acid vary greatly. In coal mines there is a constant source of carbonic acid in the coal itself, and in them an atmosphere can be tolerated more highly charged with carbonic acid than in others, where the sole sources of contamination are combustion and animal exhalation.

The following analyses of air from various mines prove conclusively that in all cases the amount of carbonic acid is far in excess of a normal proportion, and, except in the cases of coal mines, the effects of this excess are aggravated by the proportionately large admixture of organic matter.

With the exception of the airs which I collected myself in different mines, my information as to the exact sources of the different samples of air analysed by me was of the most meagre kind, and did not convey even the remotest idea as to the condition of the mine. Even now, reference must be made to the reports of the mining engineers if the facts which I now record are to be allowed their proper value. All the samples of air which I received in 1862 were forwarded to me by Mr. Rowe. They were contained in large wine bottles of green glass, and carefully sealed. The quantities of carbonic acid require no comment. Whenever it was found in unusual large proportion, a confirmative experiment was always made.

Carbonic acid at barometer 30″, thermometer 60° F.:—

a. Sample of air (A) from the Brentfield lead mine, Sept. 1862; temperature of the mine 60°; contained no less than 2·238 per cent. by volume.

b. Sample of air (E) from Coal Cleugh lead mines. West Allen River, Cumberland; from a rise in west end of low level; temperature of the air where the sample was taken 67°; barometer 28·32″; contained 1·111 per cent. of carbonic acid.

Another sample (F), from another rise further eastward, at a place where the temperature was 70°, contained 1·257 per cent.

A third sample (I), also from a rise above low level, with thermometer at 65°, and barometer at 27·98″, contained 1·078 per cent.

Yet one more sample from the same mine, described as J, driving on the sunflats, with thermometer at 60°, and barometer at 28·1″, contained 1·093 per cent.

All these samples are very bad indeed, and highly injurious. Whether they are fair specimens of the air in a "rise" in these mines, I have no means of deciding; but they indicate an almost absolute want of ventilation. I could discover no sulphur compounds; and if organic matter was present at the time of collecting the samples, it had become decomposed. This decomposition of animal matter would itself account for a certain small proportion of the carbonic acid

found; and for this reason the most reliable experiments are always those made on the spot.

c. Samples of air from Derwent lead mines, Northumberland:—

One (K) from 95 fathom level, west of Jeffries shaft, where the temperature was 66°, and barometer 29·4″, contained 0·596 per cent. of carbonic acid.

The other (L) from 50 fathoms east of Taylor's shaft, where the temperature was 65°, and barometer 29·12″, contained 0·434 per cent.

d. Rodney Fell lead mines. Two specimens.

The one (B) from the bottom of engine shaft. Temperature of the mine 57°; barometer 28·78″. Carbonic acid only 0·084 per cent.

The second sample (C), from low level end west. Thermometer in mine 61°; barometer 28·66″. Carbonic acid 0·597 per cent. (N.B.—From an accident in weighing before the operation was quite complete, I cannot be certain of the figures in this case; they must be regarded as approximative only.)

e. Dowpot Syke lead mine, two miles south-east of Alston. Only one sample (R) from this mine, with thermometer at 56°, and barometer 28·78″. Carbonic acid, 0·405.

f. Nenthead lead mine. Three specimens.—One sample (W 62°, and 28·5″ barometer,) contained 0·352 per cent. of carbonic acid.

A second sample (X, 66°, and 28·56″ barometer,) contained 0·132 per cent. of carbonic acid.

The third sample (Y, 66°, and 28·58″ barometer,) contained 0·147 per cent.

g. Nattrass lead mine. One sample (Z), with thermometer at 62°, and barometer at 28·84″, contained only 0·044 per cent. of carbonic acid.

h. Honey Bee lead mine (A A, barometer 28·7″, thermometer 60°,) contained 0·206 per cent. of carbonic acid.

i. Lady Vein lead mine. (O, barometer 28·42″, thermometer 53°.) Carbonic acid as much as 1·5 per cent.

j. White Lee lead mine, two miles south-east of Alston. (B B, barometer 28·78″; thermometer 56°.) Carbonic acid, 0·344 per cent.

k. Clargill Burn lead mine. (C C, barometer 28·78″; thermometer 59°.) Carbonic acid, 0·401 per cent.

l. Fellgrove mine. (D D, thermometer 51°.) Carbonic acid, 0·165 per cent.

m. Crossgill lead mine. (E E, thermometer 52°.) Carbonic acid, 0·071 per cent.

n. Arkendale lead mines in Yorkshire. Five specimens:—

F F. Danby level. Temperature 55° in the mine. Carbonic acid, 0·223 per cent.

G G. Danby low level. Barometer 27·5″; thermometer 50° in mine. Carbonic acid, 0·213 per cent.

H H. Stang. Barometer 27·3″; thermometer 55° in mine. Carbonic acid, 1·458 per cent.

I I. Stang. Thermometer 55°. Carbonic acid, 1·112 per cent.

O O. Fell End. Thermometer 56°. Carbonic acid, 0·206 per cent.

o. Queen's Level or Hurst. (W W, temperature 55°.) Carbonic acid, 0·209 per cent.

p. Bromley Hill lead mine. Two samples:—

S, barometer 28·64″; thermometer 56°. Carbonic acid only 0·073 per cent.—V, barometer 28·84″; thermometer 60°. Carbonic acid, 0·547 per cent.

q. Stow Craig lead mine. (N, barometer 28·84″; thermometer 56°.) Carbonic acid, 0·503 per cent.

These twenty-seven samples are for the most part bad; some very bad. If they are representative specimens of the mines in the north of England, they show that the ventilation of "rises" and "ends" must in most cases be highly defective and injurious to human life, and calls for amendment. As regards the specimen from Bentfield mine, it must surely have arisen under exceptional circumstances, as men could not work long in such an atmosphere.

The rest of the specimens of air have been collected chiefly by Mr. Twite. As my information * with reference to them is very meagre, I shall give the results with equal brevity.

The samples are all from Cornwall.

a a. Huel Kitty, St. Agnes. Two samples.—A, at 110 fathoms. Temperature of the mine 69°. Carbonic acid, 0·65 per cent.—B, at 100 fathoms, 15 fathoms in an end. Carbonic acid, 0·846 per cent.

b b. North Dolcoath, Camborne. Two samples.—C, 47 fathoms deep. End 18 fathoms from shaft; rise 7 feet high, 3 feet wide. Temperature 67°. Two men. Wet. Carbonic acid, 0·325 per cent.—E, an end worked by two men, and about the same distance from shaft. Temperature 67°. Carbonic acid, 0·584 per cent.

c c. Ding Dong, Penzance. H, 60 fathoms deep. Temperature of the mine, 72°. 20 fathoms from air sollar. Carbonic acid, 0·214 per cent.

d d. Bedford United. Three samples.—1. 115 fathoms deep. Temperature, 70°. End 30 fathoms in. Ventilation by a machine. Carbonic acid, 0·452 per cent.—7. Same level close to the shaft. Carbonic acid, 0·142 per cent.—9. 47 fathoms deep. 170 fathoms from the shaft. Temperature, 71°. Machine ventilated.

e e. Kingston United; Tin mine. Three specimens.—3. 85 fathoms deep. Temperature 64°. End ten fathoms from air. Carbonic acid, 0·447 per cent.—20. 110 fathoms deep. Temperature, 65°. End nine fathoms from air. Carbonic acid, 0·954 per cent.—21. 100 fathoms deep. Temperature 64° in current. Carbonic acid, 0·067 per cent.

f f. Drake Walls; Tin mine. Two specimens.—10. 70 fathoms deep. Temperature 64° in an end. Carbonic acid, 0·477 per cent.—19. 90 fathoms deep. Temperature 64°, stopes. Carbonic acid, 0·285 per cent.

g g. Par Consols. The specimens from these mines were collected by Mr. Pearce, of Truro, in March of the present year. Four specimens.—*α.* 150 fathoms, stopes. 4 men at work. Temperature 77°. Blast two hours previously. Carbonic acid, 0·115 per cent.—*β.* 100 fathoms; cross-cut. 4 men. 50 fathoms from rise. Carbonic acid, 0·088 per cent.—*γ.* 80 fathoms level. Thermometer 70°, one quarter of an hour after blast. Carbonic acid, 0·096 per cent.—*δ.* 180 fathoms, end. Temperature, 84°. Six men. Five hours after blast. Carbonic acid, 0·088 per cent.

* The information was given to me in January of the present year; the analyses were made in the winter of 1862.

h h. Fowey Consols. Four specimens.—Stopes from 270 on south lode. Temperature 82°. Carbonic acid, 0·089 per cent.—Again 270 ; stopes. Temperature, 81°. Carbonic acid, 0·09 per cent.—220 ; stopes. Temperature 74°. Carbonic acid, 0·184 per cent.—280 end ; bottom. Temperature 86°. Carbonic acid, 0·195 per cent.

i i. Clifford amalgamated. The heat of this mine seems to be owing to hot springs ; and the great discomfort experienced is much more owing to heat than to impurity of air. The mine is 275 fathoms deep. The specimens were three in number, and were collected by Mr. Pearce. 220 fathom ; cross-cut to Garland's shaft. Thermometer 85°. Carbonic acid, 0·072 per cent.—Same level. Cross-cut east of Garland's shaft. Stopping place for men. Temperature, 86°. Carbonic acid, 0·068 per cent.—230 fathoms, East. Two fathoms from winze, and 20 fathoms from shaft. Temperature 105°. Carbonic acid, 0·103 per cent.

j j. Phœnix mine. This mine I have to a certain extent examined myself. It is 206 fathoms deep, the last 20 fathoms of which are under water. The mine is entered by the eastern shaft, which is 75 fathoms from the old engine shaft. At the 170 fathom level, the thermometer indicated 64°, and the barometer 29·2″ on Monday, 28th December 1863. I made some experiments in an end about 40 fathoms from a winze on this level. The air, for a mine, was remarkably pure. In two experiments, each with a gallon of air, the quantity of carbonic acid was respectively 0·061 and 0·068 per cent. There was a remarkable freedom from organic matter, as judged by Dr. Angus Smith's air test. Although I perceived in many parts of this mine the most beautiful fungoid growth wherever there was decaying timber, there was no appearance of such in the absence of wood. The fungus seemed identical with that which grows so luxuriantly in the wine-cellars of the London Docks.

In order further to test the air, with reference especially to organic matter, I allowed a quantity of ice to melt at an end where men were at work. The moisture condensed from the air against the vessel containing the ice was collected and carefully examined at the laboratory of St. Thomas's Hospital. It was faintly alkaline, and contained only a very small but appreciable quantity of organic matter.

k k. South Caradon mine. This mine I did not personally examine underground, but obtained samples of air from Messrs. Twite and Pearce. Two specimens were obtained.—α, from the stopes between the 70 and 84 fathom level, at the back of the 80 fathom. Carbonic acid, 0·203 per cent.—β, rise end of 96 fathom level on Caunter lode, 4½ fathoms high. Carbonic acid, 0·411 per cent.

l l. Dolcoath mine. In this mine Messrs. Twite, Pearce, and myself spent the working portion of three days. It is impossible for me to speak too highly of the extraordinary kindness and attention exhibited by the captains of this mine. They afforded me every facility for studying its character, and assisted not only in person, but by the loan of trustworthy men who watched certain experiments by night and by day. With their aid and that of the Messrs. Twite and Pearce, I was enabled to make many observations, some of which I will now record.

The descent into the mine is generally effected by the man-engine, and this mode of conveyance is not at all unpleasant. It is indeed so far less fatiguing than by ladders, that with proper care it must prove a great boon to the men. The air at the 254 fathom level (or more properly 284 fathom) is remarkably good, and shows the efficiency of the ventilation by a down and upcast shaft upon the syphon principle, the greater length of the upcast shaft assisting greatly in good ventilation. The variation of temperature during three days was only half a degree, from 70° to 70½°.

I record five experiments made in the mine, each with a gallon of air :—

Carbonic acid on first day -	0·053 per cent.
Carbonic acid on second day -	0·044 per cent.
Do. do. (2d experiment)	0·049 per cent.
Carbonic acid on third day -	0·056 per cent.
Do. do. (2d experiment after blasting),	0·068 per cent.

Here then we have an average of only 0·054 per cent. of carbonic acid, an amount so little in excess of the normal proportion as to speak highly for the goodness of the arrangements for ventilation. The effect of direct communication between shaft and shaft, even at considerable distances from each other, and at so great a depth, is well shown in this mine.

But this very perfection of the ventilation in the galleries only serves to bring into more striking relief its imperfection in the "levels" and "rises," as the following analyses of samples collected in the Dolcoath mines, and analyzed in London, will demonstrate.

I. At 254-fathom level, west of the cross-cut. Temperature 68°. Carbonic acid 0·101 per cent. —II. At same level. End east, 25 fathoms east of new east shaft. Temperature 79°. The men had left about two hours. Carbonic acid 0·064 per cent. —III. East end of same level, 30 fathoms from shaft. Six men. Carbonic acid 0·254 per cent.—IV. Stopes, eight fathoms below 254 level. Thermometer 69½°. Carbonic acid 0·177 per cent.—V. Bottom of winze in 266-fathom level, one hour after two holes had been fired. Temperature 77°. Carbonic acid 0·22 per cent.—VI. 266-fathom, west end. 50 fathoms in from air. Temperature 82°. 6 men. 20 minutes after blast, the air having completely cleared. Carbonic acid 0·12 per cent.—VII. 266 end, six fathoms from winze, 10 fathoms from shaft. 12 men. Thermometer 80°. Carbonic acid 0·3 per cent.—VIII. 278-fathom level. End east. Temperature 78½°. Carbonic acid 0·208 per cent.—IX. Same place and same level, two hours later. Carbonic acid 0·388 per cent. —X. An end near the lowest working level. Carbonic acid 0·272 per cent.—XI. An end at lowest working level, 284 fathom. Carbonic acid 0·324 per cent. — XII. An end somewhere between 266 and 278-fathom level. Carbonic acid 0·527 per cent.

Although some of these ends are badly ventilated, and notably and exceptionally the last, the general arrangements of the mine are such that very simple mechanical remedies would suffice to free them from impure air. In a large mine like this of Dolcoath, with no fewer than six shafts, change of air in the levels is easily attainable, but there are very few ends and rises which do not require artificial ventilation.

In endeavouring to estimate the impurity of an atmosphere, and the effects of such impurity on the health of those subjected to its continued influence,

it is not enough to point out merely the amount of carbonic acid it contains. I have already in this report insisted strongly on the great part played by organic impurities in aggravating the pernicious effects of an atmosphere charged with carbonic acid. A comparatively small proportion of organic matter will render the air far less endurable than a much larger proportion of carbonic acid not so tainted, Thus in coal mines, as I before mentioned, where carbonic acid is disengaged from the coal, an atmosphere containing above 1 per cent. is far more tolerable than one containing $\frac{1}{4}$ per cent. derived from respiration. And the fact that where several men are aggregated they must breathe each other's exhalations, aggravates still more, in my opinion, the effects of deficient ventilation.

Being fully satisfied of the importance of this point, I of course directed considerable attention, in all cases where it was practicable, to the amount of organic matter in the air of the mines. For this purpose I adopted two modes of analyses. I analyzed the air by Dr. Angus Smith's method, and I also condensed (by means of iced vessels) the moisture from the air, and examined the liquid so collected. Several of these experiments required 24 hours for their completion.

These experiments fully coincided with the results I had previously arrived at from an estimate of the carbonic acid. Thus, in a gallery in the Dolcoath mine, at 254 fathoms depth, I could detect scarcely any organic matter. It was even less than that ordinarily to be found in the air of an inhabited room; and less than I have found in the air of the Surrey Gardens on a foggy day, after making due allowance for the presence of sulphurous acid in the latter.

The largest quantity of organic matter and carbonic acid I found at an "end" in 284 fathoms level. But the character of this was greatly changed by keeping. The organic matter was diminished by oxidation, with, of course, increase of the carbonic acid.

It is certain that the worst effects of carbonic acid and accumululated organic impurity are found in "ends" and "stopes," and in these ventilation by air machines should never be neglected. As it is, the principal current of air in these places results from the blasting operations, which, in so far, are undoubtedly highly beneficial. Blasting, doubtless, adds certain impurities of its own to the air; for, besides an excess of carbonic acid, sulphuretted hydrogen, sulphide of potassium, and nitrite of potash are generated and volatilized by it, and may be detected in the water condensed from the atmosphere. Some arsenical compound, recognizable by the odour of garlic, is also produced in many mines. A certain time is requisite for the dispersion of these impurities. But if this interval were allowed before the return of the workmen to the spot, the effects of blasting in causing movements of the air would be highly beneficial.

The above arsenical compounds may sometimes be detected in the air where no blasting has been carried on, the arsenic in the ore being ignited by sparks from the workmen's picks.

Besides the amount of organic impurities there are three other circumstances which modify the effects of an accumulation of carbonic acid in the air. They are temperature, moisture, and barometric pressure. It is unnecessary to enter at length into the consideration of all their possible variations. It will be sufficient to observe that the most injurious, as it is undoubtedly the most unpleasant condition of atmosphere, is one frequently encountered in mines, where a high temperature is accompanied with excessive barometric pressure and great humidity. The great condensation of the air enabling a larger inhalation of oxygen with each breath, is supposed to give a compensating advantage; but probably this is more than counterbalanced by the general distress induced by greatly increased barometric pressure, amounting as it does in Dolcoath mine to $1\frac{1}{2}$".

I have but one more observation to make on the chemical character of the air. Increase of carbonic acid implies diminution of oxygen, and to this diminution has sometimes been ascribed much of the deleterious effects of the polluted air. But that this is an error is apparent from this (besides other reasons), that, whatever the source of the carbonic acid, the air is rendered far more endurable by the presence of water, even where the normal amount of oxygen is diminished, manifestly because the water removes both carbonic acid and organic matter.

Having thus considered at length the chemical condition of the air as evidence of the defective ventilation of mines, I will endeavour briefly to point out the effects upon the health of the miners of this and other deleterious influences to which they are habitually exposed.

1. The effects of bad ventilation are two-fold. *a*. It affects the health and the duration of life. *b*. It also directly diminishes the working power of the individual.

There is no greater proof of its effects upon the duration of life than the distressing fact which thrusts itself upon the notice of the observer in all mining districts, that almost all of the male sex are cut off in comparatively early life. The ordinary limit of life among them is from 40 to 45; it is rare to see a man of the age of 50. I may refer to the Registrar's reports for evidence of the extreme frequency among them of diseases of the lungs, contenting myself with one observation which has been brought specially under my own notice. It is well known that miners are subject to a peculiar disease, in which the lung becomes charged with a black deposit. The nature of this deposit has given rise to considerable discussion, but I have proved it beyond doubt to consist of finely divided particles of carbon. Now, in my experiments I found the air abounding most in such floating particles in the immediate neighbourhood of burning candles, and my attention was accordingly directed to the wretchedly bad candles employed. I believe that the miners suffer far more from the finely divided carbon from these candles with their flaring wicks than from the blasts of gunpowder.

b. That bad air incapacitates from work will be admitted by all physiologists. Nothing is more certain than that under its influence both the nervous energy and the power of the muscles themselves are greatly diminished.

2. Next to the bad ventilation, the most serious trial of the miner is an insufficiency of animal food, the supply of which in the majority of instances does not amount to more than 3 or 4 oz. a day; and even this miserable allowance cannot be turned to the best account, for want, in most cases, of proper appliances for cooking. It is scarcely necessary to observe that

such an insufficiency of diet renders the men more amenable to the deleterious influences of the air they breathe. Perhaps, too, the excessive water-drinking to which they give way during work has a debilitating effect, which might be to a certain extent obviated by the substitution of cold weak tea.

3. A third very trying circumstance to which miners are exposed is the rapid change of temperature and pressure in passing from the surface to the depths of the mine, or, still worse, from the depths to the surface. The effects of this sudden change would be reduced to a minimum, were the changing houses close to the mouths of the shafts, and abundantly supplied with the necessary appliances for washing. As it is, these houses are frequently at so great a distance from the shafts, and so deficient in proper arrangements for cleansing, that many of the men find it more convenient to walk home to their own houses, exposing themselves in their unchanged clothes to the chilling influence of the outer air ; the evil effects of which exposure are by no means imaginary.

4. The mode of descent, viz. by ladders, into many mines, especially those of Cornwall and Devonshire, is needlessly laborious. Much fatigue might be avoided, and consequent saving of health effected, by the more extensive introduction of the man-engine.

5. The above are conditions affecting the health of the miner while at work ; all of which may be met by special arrangements. There remains one important question, of a totally different character, viz., at what age such work should be commenced. There can be no doubt that throughout the mining districts it is the custom to set boys to this very severe labour at far too early an age ; before the chest is properly developed, and before the limbs are knit ; thus laying the foundation specially for disease of the lungs.

It is easy now to see in what direction, specially, improvements are loudly called for :—

1st. All "ends" and "stopes" which cannot share in the general ventilation of the mine should be ventilated by special apparatus ; not by pressing fresh air into them, but by exhausting the foul, special care being taken that the current of fresh air so drawn in be derived from a pure source.

2nd. The character of the men's diet must be improved, and opportunities for cooking should be supplied, as at South Caradon mine.

3rd. Changing houses should be provided at the mouths of the shafts, furnished with every reasonable accommodation, and with some organised assistance by attendants.

4th. Some limits of age should be fixed before which employment as a miner should be prohibited.

Finally, I cannot altogether omit to notice the innumerable accidents to which miners are constantly liable. What with imperfections in ladders, and other means of descent and ascent, pitfalls on all sides left unprotected, through a miserable economy, when a trifling expense would provide the means of defence, and the want of any adequate supervision, the miner's life may be truly said to be constantly trembling in the balance. He is compelled from morning to night to exercise an amount of vigilance with which it is unfair to tax him, but a momentary failure of which may cost him his life. In such matters, a far greater responsibility ought be laid upon the owners of mines than is the case at present.

A. J. BERNAYS.

VII.

GENERAL REPORT

By C. TWITE, Esq., M.E.

ON MINES VISITED BY THE COMMISSIONERS.

Camborne,
1st January 1864.

My Lord,

I beg to submit this my general report upon the mines of England and Wales, visited by me under the direction of your lordship during the years 1862–63.

I append reports upon mines visited, and from which samples of air were taken, since the time of my last report dated 3rd August 1863.

By the various reports I have furnished it will be seen that I have visited and examined the workings of the principal metallic mines in Cornwall, Devonshire, North of England, Wales, Isle of Man, and, in company with Dr. Smith, several of the largest and most important mines of Saxony. If we take the money value of the produce of the metallic mines for the year 1862 to represent the extent of mining in this country, then the value of the mines visited will show the relation of proportion they bear to the whole.

Mr. Hunt's statistics give this value for the whole to be £13,443,550, and from the same source we find the value of those visited and examined to be £8,682,028.

Again, if we take the number of men employed as the test, we find that out of 81,223, the total number of miners, there were visited the number of 48,702, and this is independent of those mines visited and reported upon by Captain Rowe.

The metallic mines of this country divide themselves into two great classes, which may for convenience be named the deep mines and the shallow mines. Under the first class may be comprised the mines of Cornwall, Devonshire, South Wales, and the Isle of Man. They are all found in kindred rocks of Granite or Devonian, are worked to great depths, reaching in some cases to above 300 fathoms. The form of the deposits of ore is similar in character, and the modes of working assimilate themselves very much, differing only according as the enterprise and skill of the manager has led him to open out and work the property entrusted to him with greater judgment and attended with greater success. The other mining districts of North Wales and the North of England, comprising the mines of Alston Moor, Allenheads, Yorkshire, &c., forming the second class, differ from the preceding division, inasmuch as that as a rule they are comparatively shallow, in few cases being more than 50 fathoms deep, are found in beds belonging to the Carboniferous period, and from generally being found in rising ground are mostly worked by a system of adit levels, or galleries driven in the sides of hills, thus rendering unnecessary the expensive sinkings and essential machinery requisite for working the deeper mines of the first class.

The points to which your lordship directed my attention were, 1st, the ventilation of mines, 2ndly, the means of access to and egress from the mines, and, 3rdly, the surface arrangements for the comfort and convenience of the miners, when they come up from their labour, in the form of changing houses, and lodging houses in those cases where the men residing a long distance from the mine in uninhabited districts, involve the necessity of their spending several nights of each week in the mine; and, lastly, the arrangements for the protection of the persons employed on the surface in the operations of dressing the ores.

I shall proceed, first, to consider the ventilation. This is really the most important of the subjects to be inquired into, and at the same time the most difficult about which to arrive at a correct conclusion.

When we consider the large number of men employed daily in the bowels of the earth, dependent upon the systems of ventilation adopted for the due supply of that air necessary to their existence, and when we further consider the fatal consequences which are sure to follow if this supply be at all limited in quantity or poor in quality, we shall be duly impressed with the importance of the subject, and if we call to remembrance the necessary various differences in the detail of workings in metallic mines, the difficulties attending all attempts to get any practical tests to bear upon the question, and the necessity of visiting so large a number of the underground workings under every variety of circumstance, relating either to district of deposit, place of working in the mine, time of working, and detail of working, an idea of the complicate and difficult nature of the inquiry will at once be arrived at.

But these difficulties, while they presented themselves very forcibly when the inquiry was first entrusted to my hands, have to a great extent been dispelled by the fact, that the question of the quality of the air has been referred to the eminent chemists, Drs. Taylor, Angus Smith, and Bernays, leaving to me only the inquiry into the methods of ventilation employed, and the furnishing of these gentlemen with such samples of air as should enable them to arrive at a fair conclusion as to the quality and condition of the air to be met with, and to be breathed in the underground workings of the mines.

With this object in view, I have visited the various mines referred to in the several reports I have had the honour of submitting to your lordship on several previous occasions, and have taken from them specimens of air, from about 350 working places in the mines, all of which have been forwarded to the gentlemen referred to above.

Your lordship will at once readily see that it was impossible to visit every mine, or to take samples of air from every working place in those mines which were visited, the considerations of time and expense rendering this impossible. Neither was it necessary. The plan adopted has been to make a judicious selection of such as may be considered as typical mines, and then again to select such places in these mines in which to take the samples as should give air which should also in itself be typical of a great class.

These samples were taken in various ways:—

1st, in bottles filled with fine dry sand before taken into the mine, and, being emptied of the sand, became filled with the air, were then corked with carefully selected corks, and securely sealed.

2d, in bottles carefully cleaned and dried, and filled by the method of exhaustion by an air pump contrived by Dr. Smith for that purpose, and corked and sealed in the place.

3rd, in bottles so made that they might be hermetically sealed in the place where the sample was taken. These were also contrived by Dr. Smith, and were the ones most generally used. In all cases care was taken that the circumstances, as far as regarded the number of men breathing, and the number of candles burning, should remain the same while the bottles were being filled as they existed in the course of working.

These bottles were sent to the chemists employed in most cases without any descriptions of the places in which they were taken, while full descriptions of these were forwarded to your lordship from time to time.

These samples will therefore:—

1st. Embrace air from every kind and place of working to be found in metallic mines.

2d. Give the true characters of the nature and quality of the air inhaled by the men in the place of working in which it was taken.

3rd. Those taken from any one mine would together give a fair average of the general state of the air in the workings of that particular mine, and

4th. The whole of the samples taken together will give a fair, truly impartial, and in every way a correct view of the condition of the air existing in the metal mines of England and Wales.

Your lordship will be better able to judge of this from the fact of your having accompanied me in so many cases underground and seen both the manner in which the selection was made, as well as the manner in which the samples were taken.

In addition to this, both Dr. Smith and Dr. Bernays have visited Cornwall, and accompanied me through the workings of several of the most important mines of that district. I have thus had the benefit of their skilled judgment to assist me in my selection of places.

THE SYSTEM OF VENTILATION adopted in the metallic mines is that known as natural ventilation. This in its simplest form, consists of two shafts with a communication between them, when it will be found that a current of air passes down one shaft, through the level, and up the other. It is by no means certain which of these two shafts shall be the upcast or which the downcast; they are found to vary according to the direction of the wind and other accidental circumstances; neither can the velocity with which the air shall pass through, and consequently the quantity, be relied upon, this varying with the relative heights of the shafts and with the state of the external atmosphere. The same results take place when there is one shaft and an adit or day level, and are attended with the same uncertainties.

When the workings extend beyond this primary state, a series of levels are driven one under the other between these shafts, and smaller shafts, known as winzes or sumps, are

sunk from one to the other. It is in driving these levels, and in the sinking of these sumps, and in putting up rises, as these smaller shafts are called when commenced from below, that the great difficulties of ventilation are met with. Again, when the workings are extended beyond these shafts, the same means are adopted to ventilate, and the same difficulties met with. This will be rendered more clear from the various sections of mines accompanying this report.

Again, when several lodes are known or believed to be running parallel to the one being worked upon, or in cases where a perpendicular shaft is sunk, and in consequence of the underlie the lode at certain depths is some distance from it, levels are driven to cut these lodes, and are called crop cuts. These again present difficulties in ventilation.

The length these levels can be driven beyond a shaft or winze before having recourse to assistance in ventilation varies very much, and depends mainly on the nature of the ground, whether it be hard or soft, dry or wet, and the size of the level.

Besides these drivings, sinkings, or risings, which are simply for the purpose of opening out the ground, there are the various methods of working away the mineral, in the stopes or pitches. These are all fully described in other places.

Thus it will be seen that the system of natural ventilation ensures, under favourable circumstances, a circulation of air between the shafts and even beyond the shafts, if openings are made between the various levels communicating with the shaft.

Having now described the method of natural ventilation, I will proceed to explain the various methods adopted for assisting ventilation in such cases where the natural ventilation has failed. The first method is that of,

Furnace Ventilation.—To be seen at the Allenheads and Burtree Pasture mines, and in the Cleveland district.

The first, of which I append drawings, is to be seen at Plantation shaft on Henry's vein. The workings on this vein are very extensive, and at certain seasons the ventilation had been so feeble that the men were obliged to leave their work for days at a time. To prevent this a furnace was erected, which ensures at all times the circulation of a good current of air through the mine, which can be distributed to all the working places. The furnace is erected at the top of the shaft, for convenience of attending to it. The shaft is 25 feet higher than the other shafts, and communicates with the workings of all the mines in the district.

The fire grate is 4 feet 3 inches by 3 feet.

The chimney is 40 feet high from the foundation, or 35 feet above the fire. This height was necessary from its being built close to the road.

A drift is carried from the shaft about 8 feet from the top to the furnace, having a section of 5 feet by 3 feet 6 inches. The top of the shaft is closed by airtight doors.

The expense for one year of this furnace was 170*l*. This includes 10 per cent. on the cost of building, 25*s*. per week for attendance. The price of coal on the mine is 13*s*. 6*d*. per ton, and the quantity burned about 140 tons per annum.

The second furnace is upon the workings at Burtree Pasture shaft. I also append drawings of it. This furnace is placed at the top of a surface shaft, about 500 feet above the highest and upwards of 1,400 feet above the lowest workings in the Burtree pasture vein. This shaft is situated 350 fathoms west of the present easternmost forehead in the vein, and 1,100 fathoms east of the principal winding shaft. It may, therefore, be considered to, at any rate, ventilate a mile in length of vein workings, allowing that a portion of the total length is ventilated by the engine, or winding, and other shafts, but I have no doubt its influence is felt over the entire workings. It is placed at the N.W. corner of the workings.

In the heart of the walls on each side of the furnace there is put in a course of ashes, which being compressible, allow of the expansion of the inner course of bricks, without bulging the external face of the walls. The fire bars rest on metal plates built into the walls, with a little projection.

I am indebted to Mr. Sopwith for these drawings, which make further description unnecessary.

(*See Drawings, App. A. pp.* 15–16.)

The third case in which a furnace is used is in the ironstone mines in the neighbourhood of Redcar. These are placed at the bottom of the shafts, as in coal mines.

Water Jets.—The next method of assisting ventilation is that of water jets or blasts. These are most commonly met with in the North of England, where long cross cuts are driven without any communication with the surface above. They are simple in construction and present little variety in form. Those to be found at Rampgill, Long Cleough, and Fletcheras mines may be fairly taken as affording a good description of this kind of appliance.

I have reported fully on these machines. In each of these cases the pressure from a column of water is the motive power. In the first two, the power thus obtained is applied to a fan while in the other case the velocity of the jet of water is applied to increase the velocity of the air in the small air course, that is, the air pipe, and so to increase very largely the quantity of air entering the end or working place per minute.

The quantity of air supplied in the first case was about 30 cubic feet per minute, in the second 20, while in the third case it amounted to 38, while the distances the air was carried in the first and second was 90 fathoms, in the third it was 190.

The quality of the air supplied is good in these respects. It is cooled from the contact of the water, and to a great measure purified, if the air be supplied from the mine itself.

The jet as used by Captain Williams at Charleston United mine, near St. Austle, may complete my description of these. Captain Williams estimates it as being capable of sending a quantity of air equal to 2,639 cubic feet per minute into the place; he has applied it with a fall of 80 fathoms, and drives it a distance of 65 fathoms.

(*See Drawings, App. A. p.* 17.)

The next plan adopted is that of pumping machines, generally known as duck machines. These are either single or double in construction, and worked either by hand or by being attached to the pumping rods.

Fans are next to be described. They consist of a number of vanes, varying from 6 to 8 or 10, forming the radii of a wheel which revolves rapidly in a circular box provided with two holes, through one of which the air is drawn in, and driven out through the other. These fans, like the duck machines, are worked by hand labour, though sometimes small water wheels are used for the purpose.

Besides the appliances now described, in many cases where a strong current passes through a level, a door is put up, and pipes arranged to carry the air into such adjacent parts as seem to require it. Various plans and descriptions of these will be found in other parts of my reports.

In some mines the precaution is adopted of laying down a flooring of planks raised some 6 to 12 inches above the bottom of the level on which the broken ground rests, thus ensuring a passage for the water, and to some extent for the air.

Having described the means adopted for ventilating the mines, the next thing to which I would direct your lordship's attention is the efficiency of these methods in securing good air in the working places of the mine. This will of course show itself in the results of the analyses now being made; but at the same time I should not consider my report complete if it did not contain my views on this point. How far they may coincide with these results I am of course unable to say. This opinion is formed, not from any practical tests by which, having established a standard, any difference therefrom may be seen, measured, and reported, but rather from an intuitive feeling, a sensation of oppression, or otherwise, the result of much practice in the mines, which enables one to judge when the air becomes very bad.

The common test amongst the miners of trusting to the effect upon the burning of a candle as showing the condition or the air is a most fallacious and dangerous one, as shown from the fact that many cases where the burning of the candle is not sensibly affected, the air has proved itself to be quite unfitted for human respiration.

In some cases, as where explosions have recently taken place, the presence of the results of combustion are detected by their odour.

When a mine is generally badly ventilated the effect shows itself upon the system, affecting to a greater or less extent the health. This, as experienced by me on several occasions, has been a feeling of exhaustion quite incompatible with the amount of muscular exertion undergone and the state of fatigue naturally to be supposed to be experienced therefrom, followed by great languor and general debility, attended with a much greater disposition of catching cold on exposure than at ordinary times.

The places where the feeling of bad air was most experienced were those in which the following tubes were filled, viz.:

Nos. 5, 9, 13, 19, 21, 23, 27, 39, 50, 51, 54, 56, 60, 65, 72, 73, 80, 103, 113, 116, 125.

E. 3, 5, 6, 8, 9, 19, 25, 31, 33, 34, 36.
W. 1, 4, 5, 6, 7, 8, 12, 22, 29, 30, 42, 43, 46, 47, 52, 67, 67, 69, 70, 71, 72, 73, 74, 78, 83, 85, 87, 91, 92, 97.

Full descriptions of these places appear in the reports, so that your lordship can examine the circumstances affecting each, and from the analyses learn the chemical causes.

It will be seen that the principal causes of this defective ventilation are,—

1. The distance which the ends are driven beyond a winze. No general statement can be made as to how far it is safe to carry these ends, so much depending upon the nature of the rock, in its composition and hardness, the size the level is driven, the amount of water met with, and the number of men working per 24 hours in it. The most favourable circumstances of course being a moderately hard rock, requiring on the one hand small charges of powder for blasting it, and no timber to support it, while from its composition no deleterious gas should be evolved. Even with these things favourable, it has been too often found that excessive distances occur between the last winze and the end, while in other cases without these favourable features the distance is not lessened.

2. These remarks apply with even greater force in the case of rises and sumps. It will be found to be generally the case that these are only commenced when the air in the ends is getting or has got bad. It is therefore easily to be seen that the ventilation of these, especially when some distance above or below the level, will be as a rule bad also.

3. A great cause of evil is to be found in the heaps of broken ground allowed to remain in the levels, which narrows the air passage very materially, and checks to a very considerable degree the circulation of air.

4. The next vitiating cause is the amount of gunpowder used in blasting, the smoke of which at the periods of blasting fills and remains for hours circulating through the mine; and this leads to the consideration of:

5. The uncertainty both with regard to the amount and direction of the air entering the mine by the system of natural ventilation. This I have referred to at length in another place.

6. The general want of attention to the condition of the pipes in those cases where the various kinds of machines are used to assist the ventilation. In many cases the joints were found to be defective, the pipes themselves battered, leaky, and in some instances quite choked; while in others no regular person was employed to work the machine, the men preferring either to work in bad air, or occasionally to send one of the party to blow, rather than suffer what they imagine would be a diminution of their wages if they paid a regular blower.

To sum up therefore shortly, I would say that the system of ventilation as found practised in the metallic mines provides only for those workings between the shafts, and is uncertain in quantity; while it fails in providing good air for the workings beyond those openings, and in workings situated above or below the main levels of circulation.

I now proceed to the second subject, that of the mode of access to and egress from the mines.

The first and most general method is that of climbing by ladders, a most unsatisfactory one, as it entails great loss of valuable time, and inflicts upon the men, when in a condition the least able to bear it, after an exhaustive period of labour, an enormous amount of muscular exertion, and reduces them by the time they arrive at surface to such an exhausted and overheated state as to render them more than ordinarily subject to the influence of sudden exposure to cold, and is a great existing cause of the general prevalence of bronchial and kindred diseases among the miners.

The ladders are generally of wooden sides with staves of wood or iron. The latter are becoming more general.

During the last few years great attention has been paid to this subject by the mining community, and with considerable benefit. The result is, that the number of mines where decidedly bad ladders are to be found is reduced very considerably, so that they may be considered upon the whole to be well made, firmly secured, and so far safe.

From the various reports submitted from time to time to your lordship upon this subject, you will be able to see the particular condition of the ladder road in every mine visited. I may therefore very shortly summarize.

1. *Places in which the ladders are fixed.*—These are generally in the shafts. There is always a set of ladders in the pumping shaft, near to the pump rods, and quite open, placed there primarily for the use of the men whose special duty it is to look after this portion of the machinery. This roadway is generally the most direct one to the bottom of the mine; but owing to the pump rods working so near the ladders, in some cases actually grazing the men upon them, and where a break occurs in them, it being often necessary to dodge the pumps to avoid being caught by them, it is not a very safe one for general purposes, yet it will be seen that it is in very many cases the one appropriated and used.

Ladders are also in many cases placed in the shafts in which the mineral is raised, sometimes separated entirely by a casing or partition of wood, in other cases only partially, while in some instances it is quite open.

In the places where the mineral is raised by means of iron chains and kibbles swinging loosely in the shaft, the placing of ladders alongside, even with a partition between, is attended with considerable danger, from the liability of the chains to break, and the great havoc committed by a falling kibble, acknowledged in most cases by the existing rule that the men stand in a level until the kibble has passed them.

Where there is no complete casing, in addition to this danger, there men are also exposed to the danger of pieces of ore falling upon them, and also to the dangers of an open shaft.

In places where the winding is done by skips running in guides, the danger to the men climbing in the same shaft is considerably lessened, in case the chain breaks the skip being confined to its course, and going down to the bottom.

In some few cases, special shafts originally used for pumping or winding purposes are appropriated for footways. Where this is the case, the shaft is generally divided into lengths of from three to five fathoms in length, by platforms of wood called sollars, which fill the whole area of the shaft with the exception of a small space large enough for a man to pass through, which is called the man hole. The ladders rest upon these sollars.

These footways are very comfortable and safe. The ladders are of easy lengths, generally inclined at an easy angle for climbing; the shaft being large affords plenty of air to the men, and is much cooler, while the sollars lessen very considerably the danger to be apprehended should a man fall away. It is much to be regretted that such provision is not more general in the large mines.

The more general arrangement is using the ladders in the engine shaft to reach the adit, and then to the bottom by means of ladders placed in winzes, as near the ends of the mine as is practicable. This is a very safe way, as the winzes being upon an average only 20 fathoms deep, this is the greatest depth a man can fall, while generally this distance is divided into two or sometime three stages.

Where the lode is narrow (upon which the winze is sunk), and not inclining much, these winzes are narrow and the ladders steep, occasioning much greater fatigue to the men.

2. *Inclination of the ladders.*—Upon the inclination of a ladder, depends in a great measure the ease with which it can be climbed. Formerly, very little attention was paid to this, and the ladders were very often to be found quite perpendicular, and even now some remains of these are stil to be found.

In shafts and winzes sunk upon the course of the lode, and therefore always with some degree of underlay, the ladders being placed upon the foot wall have at least that angle of inclination; where this is not enough, if there be sufficient room, it can be increased by giving the ladder a base of a few feet.

In those cases where the angle is large the ladders are too flat for easy climbing, and are nearly as objectionable as when they are too steep.

The point to be obtained in fixing a ladder should be, that a line drawn from the centre of gravity in the man upon it should fall upon the round of the ladder between his feet. When this occurs, the effort of climbing is equally divided between the arms and legs; but, if a deviation of only a few degrees takes place, greater strain is thrown upon one or the other of these members, much to its distress and discomfort. This is illustrated by the accompanying sketch.

The angle most generally applicable has been found to be from 15° to 18° from the perpendicular, giving an underlay of 1·8 feet per fathom.

The distances between the staves vary from 10 to 11 or 12 inches. At an angle of 18° 10 inch staves are very comfortable, but as the angle increases, the distance may also increase.

In many cases where the angle is very great a handrail by the side of the ladder would be a great convenience enabling the men to retain an upright or nearly upright position while climbing instead of a nearly horizontal one.

In the lead mines of the North, the men are not subjected to the fatigue of ladder climbing, their work being

reached from the adit or day level. This is oftentime of great length, even 2 miles long, and is generally wet.

In Alston Moor and Allenhead, some of the larger mines provide small waggons on which the men and tools of each core side, one of the number pushing it along from behind, and riding occasionally, when the momentum acquired renders more force unnecessary to ensure locomotion.

But while ladders are the most general means of gaining access to the mines, there are several instances in which machinery has been applied to this purpose, which I will now consider.

Man-Engine.

There are eight mines, all of them deep ones, in which the men are lowered and raised by the man-engine. Its origin in Cornwall is owing to an effort made by Mr. C. Fox, in connection with the Royal Polytechnic Society in 1834, by whose exertions a large pecuniary reward was offered to the engineer who devised and to the mine which should erect it, and which were gained by Mr. Loam and Tresavean mine in 1842.

The machine erected here was of the same kind as the German *Fahrkunst*, and consisted of two wooden rods, with alternative reciprocal motion, on which wooden platforms were fixed 12 feet apart, on which the miner stood, passing from rod to rod alternately. This machine is not in use now, but one on the same principle is working at the United Mines, Gwennap.

The plan adopted in the other mines where the man-engine is to be found, is that of the single rod: where there is only one rod in the shaft, provided with platforms 12 feet apart, while a series of platforms or sollars are placed a similar distance apart in the shaft on each side of the rod, in such a position as to correspond with the levels of the platform at the end of each stroke. The miner on leaving the platform at the end of the up or down stroke, waits upon this sollar until the next up or down platform comes to him. The men ascending keeping to the sollars on one side of the shaft, while the descending stream keeps to the other.

The mines with this form of man-engine are Levant, Dolcoath, Carn Brea, Par Consols, Fowey Consols, Huel Reeth, and Cook's Kitchen.

The following table shows the depth to which each engine extends, particulars of motive power working it, the relative number of strokes made by the motive-engine for one of the man-engine rods, the rate at which the rods moves the duration of the journey, and the velocity of the miner.

Mines	Depth of Engines.	Particulars of Motive Engine.			Relative No. of Strokes.	Rate of Man-Engine.		
		Size of Piston.	Length of Stroke.	No. of Strokes.		No. of Strokes.	Journey.	Velocity.
	fs.	′	′ ″	Per. Min.		Per Min.	Min.	Per Min.
1. United Mines, double rods	210	32	6 0	18	6	3	17½	72
2. Levant single	200	20	3 8	40	10	4	25	48
3. Dolcoath „	220	20½	5 0	42	12	3½	30	42
4. Carn Brea „	132	26	6 0	16	4	4	16	48
5. Par Consols „	220	24	6 0	25-30	5	5-6	20	68
6. Huel Reeth „	188	30	9 0	5-6	1	5-6	16½	68
7. Fowey Consols „	280	Water-wheel, 30 × 6.				5-6	25	68
8. Cook's Kitchen „	190	„ 52 × 3.				3½	27	42

At Fowey Consols and the United Mine, the shafts are perpendicular the whole way. At Levant, the shaft underlays 15 inches per fathom in an easterly direction, till it reaches 130 when it changes to a westerly direction. At Dolcoath, it underlies from 18″ to 2′ per fathom after the first 50 fathoms which are perpendicular. At Carn Brea, it underlies below the 80, about one foot in a fathom, changing in direction. Cook's Kitchen underlays two feet per fathom.

Rods.—These are of the same construction as the pump rods, of Norway pine, of an average length of 36 feet, and varying in size from 8 inches square to 6½ inches. They are strapped together by wrought iron strapping plates, about 1 inch thick, 5 inches wide, and from 10 to 12 feet long: these are screwed two and two together, with 1¼ inch bolts, 18 inches apart, so that each rod is held by 8 bolts.

Platforms of deal, 1½″ thick, always horizontal, and of varying size, from 18 inches wide by 15 deep, at the United Mines, to 16 inches square at Dolcoath, and 12 inches square at Fowey. They are fixed to the rods either by bar iron or angle iron. Handles about two feet long are placed on the rod, about four feet above the platform.

To keep the rods working truly in their places, guides are placed in the shaft in which the rods work, and cast iron sheaves are used in the inclined part of the shaft. The accompanying sketch will illustrate the man-engine.

Catch pieces are also used to prevent in case of breakage a greater fall than 12 feet. They are placed at intervals of about 40 fathoms, and are composed of six pieces of timber, each 8″ square, forming a support four feet deep. Behind the catch pieces another longitudinal retaining piece, 18 feet long and 8 inches square, is securely strapped and bolted by iron strapping plates at the top and bottom to the man-engine rod, leaving an intervening space of 12 feet long by 11 inches wide.

The weight of the rods with iron work complete is about 12½ tons per 100 fathoms. This is as nearly balanced as possible by means of balance bobs.

The rods are put into motion by single rotary engines or water wheels, the men stepping on and off during the time the rod is at rest, during the dead points of the engine; the number of strokes per minute varies from 3 to 6, and the velocity from 40 to 70 feet per minute.

The only danger attending the use of the man-engine, will be the chances of a man slipping when stepping on or off the platforms, or from his head or shoulders coming into contact with the sollars above.

These dangers are lessened by using small platforms on the rod, compelling the men to stand close to the rod, and upright, and by placing sloping boards, called shoulder boards, under the sollars.

It is satisfactory to know that the number of accidents in connexion with the man-engines has been very small indeed, only one death having been caused during the period of this inquiry.

The other machinery used is that known as skips.

The mines where they are employed are Botallack, South Francis, and Dyliffe, for the men generally; and East Pool, Balleswidden, and Condurrow, for the agents and men occasionally.

The arrangements at Botallack having been fully reported upon in my report to Mr. Wylie, dated 22nd April 1863, need not to be again described, only remarking that since that deplorable accident wire rope has been substituted for iron chain.

The skips employed at the other mines are of one construction, being long rectangular boxes of iron from 18 inches to 2 feet square, and from 4½ to 6 feet deep. It has a bow, oval or rectangular in form, to which is a short length of iron chain, serving as connector between the wire rope and the skip.

The shaft at East Pool is perpendicular the whole way. At South Francis it is perpendicular to the 54 fathoms level, then underlies for 6 fathoms, is then perpendicular to the 84 fathoms, and then again underlies to the bottom, 116 fathoms deep. At Balleswidden there is a regular underlie of 18 inches per fathom, while the section upon the shaft, given in the report upon Condurrow, will show at once the character of the shaft at that mine.

At the places where changes occur in the line of direction of the shaft, or of the rate of underlie, cast iron sheaves are placed to prevent the rope rubbing against the rock.

The skips are provided with cast iron wheels, which run upon wooden rails, four to six inches square, placed in the shafts, and are prevented from having the rails either by cast iron bars projecting behind the rails, called rubbers, or by placing two sets of guides, so that the wheels run *between* them, instead of *upon* one set, or two sets of wheels working on each side of the rail. In each case, a safety catch is fixed to the skip, so that in case of the breakage of rope the skip is stopped in its downward progress, and held firmly in the guides.

The arrangement at Dyliffe is fully described in the report of that mine. I consider the whole of the winding machinery in use there to be the most perfect to be found in the metallic mines visited.

These are the modes at present in use for preventing the men from climbing so much in the mines.

Considerable discussion has arisen amongst the miners as to which means is the best under all circumstances, the man-engine or skip. On the one hand, it is contended that the man-engine is safer; that after it is once fixed in its place it will send down or take up a larger number of men in less time than can be accomplished by any other means; and the great facility it affords the men of getting upon the machine, at any level in the mine, without the interference of any other person, is considered a great advantage. On the other hand, it is urged by the advocates of skips that the great expense attending the erection of a man-engine, and the extra space so often required, renders it generally inapplicable; and that the system of sending men down in skips used for drawing the ore in by wire ropes can be made *reasonably* safe, and if generally applied might be very much improved from what it is now, to the great advantage of the men and to the mines.

It is also generally contended that the men themselves object to riding in skips. Many do, but from personal observation, I found that in all cases where the men were allowed to do so they eagerly rode up, and expressed themselves as very much pleased and very much relieved by the favour.

In riding in the skips the dangers to be apprehended are those arising from the breakage of the rope, drawing by iron chain being of course inadmissible. This will always present itself, but is I think, greatly exaggerated by the objectors to this system. The sudden breakage of a wire rope in the case of those mines using them is very rare indeed, so that good supervision reduces this danger almost to a minimum, while the use of *self-acting* safety catches prevents any serious results even in case such an accident should occur. Another danger is likely to arise from the timbering of the shafts, pieces may become loose, project out, and the men or skips strike against them. Supervision ought to be a sufficient protection from this. The third danger is from overwinding, a case of which occurred at East Pool, 8th April 1863. This can be prevented by giving greater height to the poppet heads, and by affixing disconnecting hooks to the ropes.

So that a method of raising the men in *all mines* by the machinery which should be found on the mine presents itself, and is recommended from its great *economy* and from its safety.

The *underground* travelling ways are, as a rule, not so well looked after as they should be. These comprise many of the levels along which the men have to walk, the ladders leading to the places of working, and various substitutes for them in places where they are not applicable.

The levels are frequently allowed to be, to a more or less extent, flooded, causing the men to get their feet wet going to their work. The matter of wet feet is looked upon with very little concern by the miners themselves; indeed it is no uncommon occurrence for them to soak their shoes in water before putting them on to make them soft. In other places large excavations are made in the bottom of the levels, over which planks are placed for the men to pass upon. These are often very narrow, and without any side protection. A slip of the foot, or a slight deviation from the path, may cause the miner to be precipitated, 40, 60, or even a greater number of feet, while the danger is not at all lessened by the fact that many of these holes are are filled with water.

The ladders are generally conveniently placed, but the substitutes for these are not always so. The most general one in use is a chain if for climbing above the level. By taking a firm hold of it with both hands, digging the toes into any roughnesses of the rock which may present themselves on one side, and keeping the back firmly fixed against the other, the miner contrives to raise himself oftentimes very considerable heights. This method is often necessary for short distances, but from inattention is often persisted in long after the necessity has gone. For descending sumps, chain ladders, or a rope and windlass is used. By the latter, the man places one foot in a loop at the end of the rope, or places one leg into it, holds fast by both hands, and uses the free leg to keep himself from rubbing against the rock.

The shafts passing through the various levels are in many cases quite open, and are a great source of danger. They might be very easily secured by a light gate, or even a chain draw across them.

The subject of changing Houses comes next.

Cornwall is the only district where these are provided.

In Wales and the North of England, except in such places as where the men sleep on the mine, the men go to and from their work in the clothes worn underground.

Dyliffe mines present the only exception met with. While it is admitted by all the miners in Cornwall that changing houses should exist, in many cases those provided are very defective. Very many of them are too small very dark, dirty, and badly ventilated, the floors thick with dirt, and an atmosphere always charged with dust and effluvia arising from a number of men's clothes saturated with perspiration drying over the fire tubes.

The flannels and clothes worn by the men when underground are very rarely washed, making it the more necessary that they should be dried in a well ventilated room, that they might be a little sweetened as well as dried.

These houses are also deficient in washing accommodation for the men.

In too many cases the men are allowed to change over the boilers, from want of proper accommodation being provided. The danger of this needs no remarking upon.

There are several mines where changing houses of a very superior description are provided, presenting very favourable contrasts to those before alluded to; and it is very satisfactory to know that the men avail themselves to the greatest exent possible of all conveniences provided for their comfort. Where water is supplied they furnish themselves, and make good use of soap and towels.

These houses are in most cases a considerable distance from the climbing shaft, necessitating on the part of the men, the walking of this distance in all states of the weather, and while in a very heated condition. It would be a very great boon if an underground communication could be made with the changing house, and so do away with the necessity of the men exposing themselves until after they have washed and changed. This was formerly the case at Dolcoath, and might easily be adopted in a very great many instances.

Lodging Houses provided in many places in the North of England. They are great conveniences to the men saving them walking many miles when tired with work. They were in many cases wanting in ventilation.

I now come to the last part of the subject, the arrangement of the floors. It will be seen that the workers are mostly females, and the cases where they are entirely enclosed is very few, while the cases where they are quite exposed is very few also. They work generally under sheds, so they are protected from above while exposed at the sides.

In many mines in Cornwall, dining houses are provided to which the male and female dressers retire at certain times of the day for refreshment. They are provided with ovens to warm the pasty, the universal dinner, and hot water for the making of tea and coffee. Where such houses are not provided, the carpenters' or smiths' shops are used, and in some cases even the changing houses.

The dressing floors in the North of England are very much scattered about the mine, and are rarely covered in. The dressing is done by boys and men.

These remarks, with the various reports of mines appended, will afford your lordships and the Commissions, all the information I have gathered on the subjects referred to me.

Respectfully submitting the same to your Lordship,

I am, my Lord,

Your Lordship's obedient Servant,

C. Twite.

Mining Engineer.

Lecturer to the Miners' Association of Cornwall and Devon.

The Right Hon.
Lord Kinnaird, K.T.,
Chairman of Royal Mines Commission, 1864.

Report on Mines in Cornwall. By C. Twite, Esq.

Camborne, Cornwall.
31 Dec. 1863.

My Lord,

I beg to submit the enclosed reports upon mines visited in Cornwall according to your lordship's directions.

I am, &c.

Right Hon. Lord Kinnaird, K.T. C. Twite.
Chairman Royal Mines
Commission.

Dolcoath Mine.

This is the largest tin mine in Cornwall, and is very well provided with suitable accommodation for the comforts of the people.

Changing house is about 25 fathoms from the man engine shaft. It is 80 feet long by 22 feet wide, and 20 feet (13 wall, 17 roof) high. It has 11 windows, glazed and capable of being opened. There is also a large ventilator in the roof formed by raising a portion 17 feet in length about 6 or 8 inches. This is always open. A gallery runs round three sides. It has a wooden floor. It is warmed by a fire and tube 41 feet long. Around the ground floor are the men's lockers, each being 2 feet 2 inches long 1 foot 10 inches wide, and 1 foot 6 inches deep. Before the man-engine was employed the footway shaft opened into this changing house. The number of men changing here is about 350. These are divided into several corps, some commencing work at 6 o'clock, others at 7, others again at 2, and the night corps at 10 p.m., so that the number changing at any one time will be rarely more than 70 or 80.

Sump houses, for men engaged in the shafts.

No. 1 is 12 feet 6 by 12 feet 5, for 9 sump men. One window; fire and tube.

No. 2 is 14 feet by 13 feet, for 11 men and 3 boys, and 2 assistant pitmen; fire and tube.

Timberman's house is 11 feet by 25 feet; fire and tube. Pitman's house same as the last.

It is to be noticed that the sump houses and timberman's house are not kept in that nice and clean state which the other changing and drying houses are. This is the more surprising, as each house is used by a small number of men, and these men have often to spend several hours in them.

Dressing floors: these are very large, giving employment to 570 persons. Of this number 260 are girls. The operations are mostly carried on in large yards enclosed and roofed in.

There are 4 houses set apart for these dressers to dine in. For each house a woman is hired, whose duty it is to keep it clean, have the kettles boiling, and everything ready for the employed when they leave work at 10 and 12 o'clock for refreshments.

No. 1., 53 feet long by 16 feet 4 inches wide, is provided with a fire place of the kind known as a "slab," which is a stove with boiler for hot water on one side of the fire and an oven on the other. Two other ovens are above the fire, and provided with shelves. The general dinner is a potato and meat pasty which is cooked at home, but warmed in these ovens. Tea, coffee, or cocoa is provided by each one. The smoke and heated air is carried away by means of a tube which runs through the greater length of the house. There is a good supply of forms and tables. There are 3 windows in this house each 4 feet by 3 feet 9 inches, opening at top and bottom.

No. 2; this house is a comfortable building, 44 feet 6 inches long by 12 feet 6 inches wide, and 10 feet high. The heating arrangement is similar to that described in No. 1. There are two windows, each 3 feet × 2 feet 8 inches, open top and bottom. It is provided with forms and tables.

No. 3 is 48 feet long by 13 feet wide, and 11 feet high. This house has a wooden roof. Tables, forms, and heating apparatus as in Nos. 1 and 2.

No. 4 is 64 feet long by 17 feet 6 inches wide. This is for the largest number of people. It has 3 glass skylights and no windows. Forms and tables and heating apparatus as in the other houses, the ovens being a little larger.

Samples of air taken as follows:—

No. 1. 1, taken from the bottom of the new shaft in the 278 fathom level, 314 fathoms from surface.

There were 8 men and 4 boys working in 4 shifts set to drive a X cut from this shaft to cut the north lode. The driving 8 feet high; temperature 84°.

E. 1, taken some weeks after the above when the lode had been cut, and a winze brought down from the level above. The end was now 5 fathoms beyond winze and 13 fathoms from shaft; temperature 82°.

E. 2, from a winze in the 268 fathom level, 4 fathoms deep; 2 men in 2 shifts of 12 hours, 20 fathoms east of sump shaft.

E. 3, From the level at mouth of the above winze.

E. 4, from the 266 fathom level eastern end; 25 fathoms from sump shaft; and 10 fathoms east of stopes, temperature 84°, 6 men in 2 shifts of 12 hours.

E. 5, From the stopes between the 242 and 254 fathom levels, between the old and new sump shafts. The stopes full of smoke.

Huel Reeth Mine.

A large tin mine at St. Ives, under the management of Captain Stevens. It is 220 fathoms deep, in granite. There are two shafts from surface about 100 fathoms apart, one going to the 190 fathom level, the other to the bottom. The workings are extended west of Frederick's shaft, 130 fathoms at the 180 fathom level, and east of Stevens' shaft 170 fathoms.

Took samples of air as follows:—

E. 6, from the eastern end of the 130 fathom level on the south lode, 25 fathoms beyond a rise; 1 man and boy working in the end. There were 3 pitches between rise and end. The rise was open to the 110 level. There was a pile of stuff in the end. The ground wet. Temperature 72°. Size of level 7′×3′.

E. 7, from the eastern end of the 190 fathom level, driving by 3 men and 3 boys in 3 shifts. This end is about 90 fathoms beyond the 170 end, and 20 fathoms beyond 190 end. A pair of men are sinking towards the 190, which will, when that level is brought forward; communicate in some months time. The candles burned badly 2 other pairs of men were working in the back of this level. Temperature 75°. Size of level 7′×3′.

E. 8, from the eastern end of the 190 fathom level in dry ground. This level was wider, being intended for a tram-road, driving by 3 men and 3 boys in 3 cores, about 20 fathoms from rise, a communication will in time be opened from this end to the 180. Temperature 76°.

E. 9, from a level driving west from winze below the 190 to meet the 200 fathom level driving east, 9 men in 3 parties. Ground dry, 77° F.

The levels in this mine are narrow, about 3 feet wide; a very great advantage would be gained if they were driven wider.

The ladders in the engine shaft were good, and, as far as the 120 fathom level, divided off from the pumping rods. The winding is done by skips drawn by chains. There is a man-engine in this mine, by which the men can ride to the 150 fathom level. It is a single-rod engine.

I notice here as is to be noticed in nearly every mine the absence of anything approaching protection at the ends of shafts in the different levels. They are left quite open with nothing to prevent a man from walking directly into them. In many cases the men have to walk directly in front of the shaft or on a single plank over it, which cannot but be attended with danger.

Boilers.—Main engine boiler, provided with feed gauge cocks. Steam whin boiler provided with feed gauge cocks. There were 40 men changing over the boiler. Pumping engine boilers. There were 2 boilers connected. The safety valve leaking; 30 men changing over these boilers.

Steam stamps boiler.—Safety valve leaking.

Changing house, 40 feet long by 10 feet; and 10 feet high. A fire and tube in the house. It was very dirty and devoid of ventilation. The tutwork men only change here. The tributers changing over the boilers as referred to above.

The floors were mostly shedded.

St. Ives Consols.

Samples of air were taken as follows:

E. 10. From the 167 fathom level eastern end on the counter lode, driving by 2 men. 200 fathoms from the nearest shaft, 15 fathoms from a rise, and 45 fathoms from a winze. The air passing from the winze up to the rise. Ground dry. About 1½ hours after shot when ¼lb. of powder had been fired. Level driven 7 feet high by four feet wide. Not much stuff in the end. Temperature 80°.

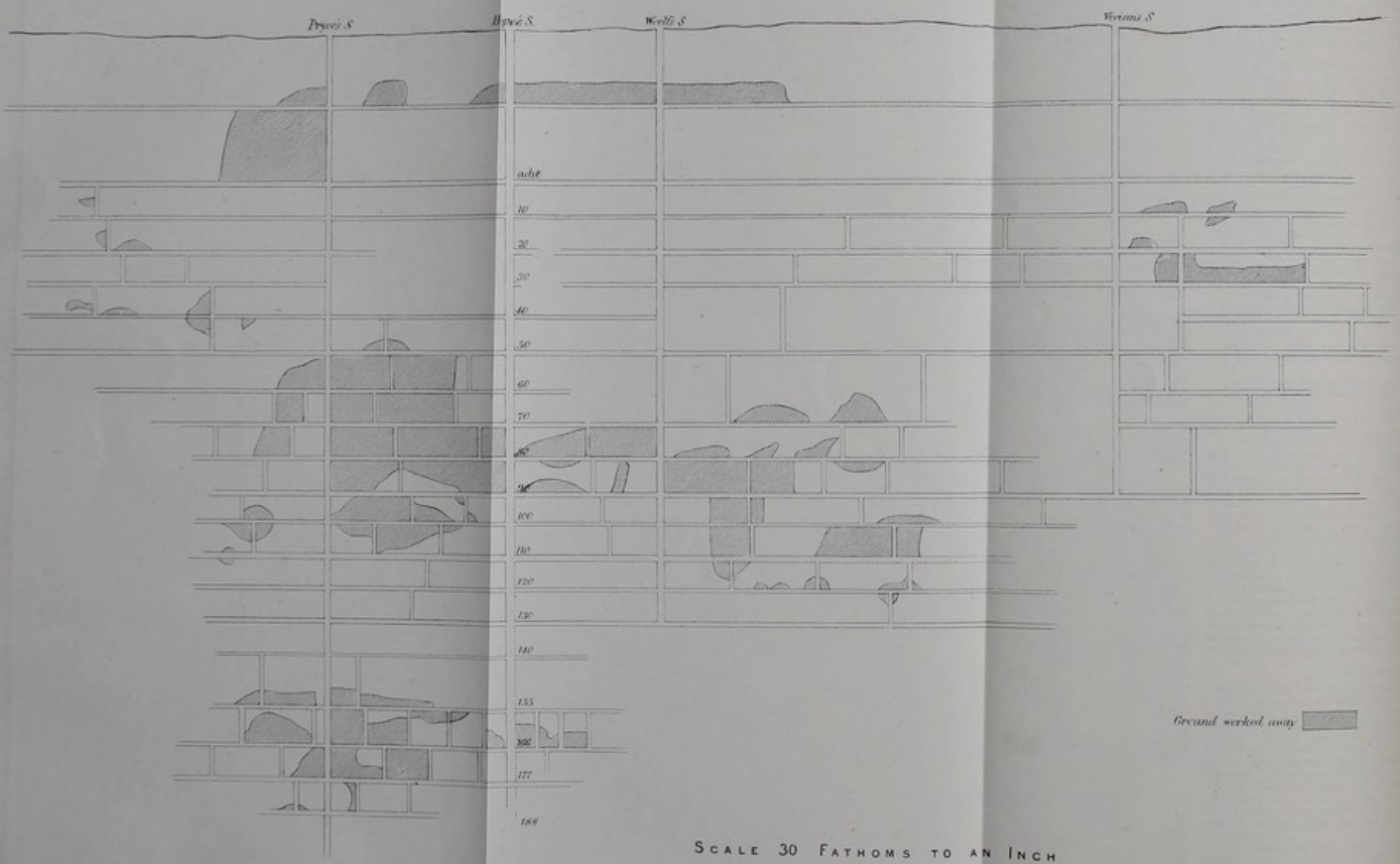
E. 11. From the eastern end of the 177 fathoms level. Two shafts from surface on this level, besides common scaling with workings on Daniel's lode, on which also shafts open to surface, This cross cut 60 fathoms from end. Temperature 77°.

E. 12. From the 147 fathom level eastern end on Daniel's lode; 4 men in 2 shafts. Hard dry ground. 30 fathoms further from rise, and 20 fathoms from winze. Temperature 75°.

E. 13. From Carbona on the Daniel's lode in 117 fathoms level. This is a large opening 70 feet long and from 20 to 40 feet wide and open from the 90 to 130 fathom levels. Temperature 72°.

SECTION SHEWING WORKINGS ON THE MAIN LODE

CONDURROW MINE CAMBORNE 1863

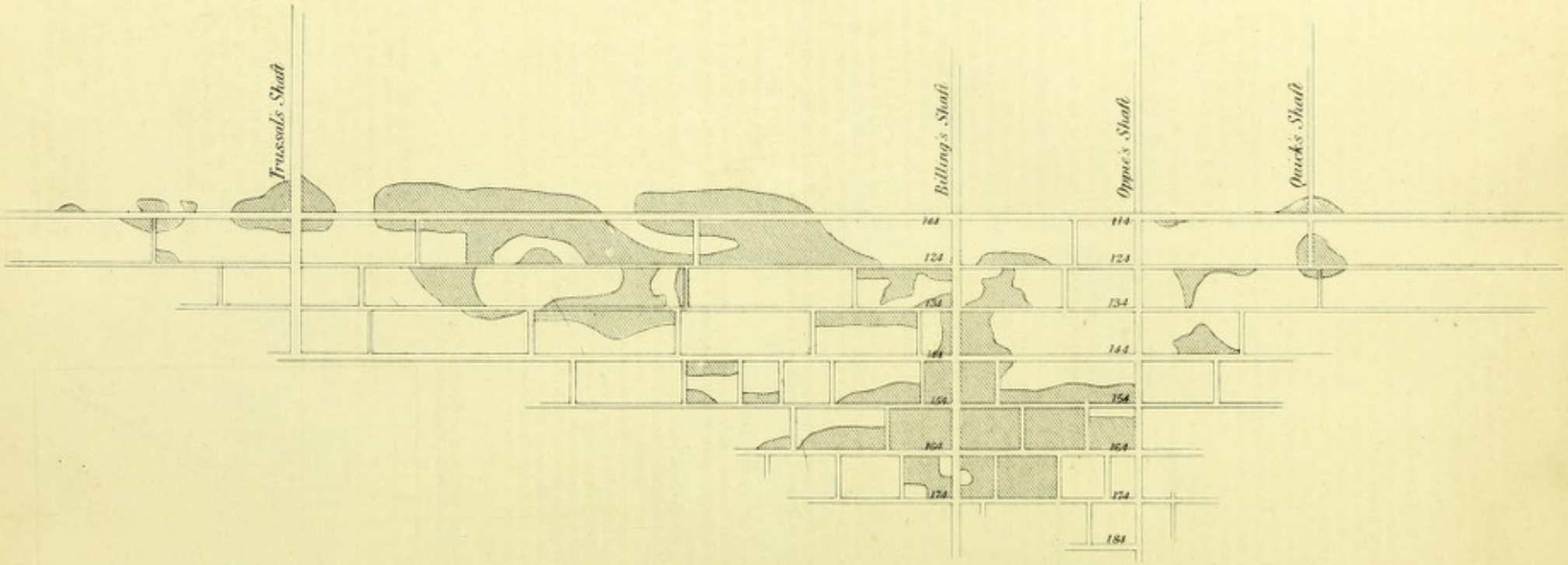


SCALE 30 FATHOMS TO AN INCH

SECTION SHEWING WORKINGS ON THE TIN LODE

St. DAY UNITED MINE SCORRIER

below the 114 (149) Fm.s Level



SCALE 30 FMS TO AN INCH

E. 14. From the western end of the 87 fathom level on the North lode. 130 fathoms from shaft.; but just over a winze up which the air was coming. The air was taken on the eastern side of winze as showing the air coming into this level from the lower workings. Temperature 65°.

Carn Brea.

This is a very large mine, there being 582 underground, and 153 boys and 237 girls on the floors. It is worked in two parts, Carn Brea and Burncoose each having its own changing house. The house for Carn Brea is an old one, and is low and narrow, while at Burncoose being a new one, is of good height, well lighted and ventilated.

The accomodation for the surface hands is very good. All the dressers work under cover.

1. *Copper Floor.*—About 51 persons engaged. There are two houses for dining &c. in each, being about 15 feet square, and furnished with an oven and fire.

2. *Burning House Floors.*—About 80 persons here. Dining house 43 feet long and 11 wide, with fire, ovens, and pipe, well supplied with boiling water. A woman to attend to this house.

3. The third floors, with 300 persons at work. Dining house 66 feet long and 20 wide, has 8 windows, fire, and ovens; and a woman to attend.

There is a man-engine employed at this mine. Comfortable houses are also provided for the working engineers, (6.) and for the carpenters.

Samples of air were taken as follows:

E. 15 was taken from the 155 fathom level on Highbarrow lode, close to to Highbarrow western shaft; some were stoping close by and other places in close proximity. Temperature 64°.

E. 16. From the eastern end of the 175 fathom level on Highbarrow lode driving east of Highbarrow, western shaft 6 fathoms from winze communicating with large stopes. 6 men, in 3 shifts. Wet, hard ground. Temperature 70°.

E. 17. From the 197 fathom level, on Teague's lode driving east of old engine shaft, 50 fathoms from shaft, 17 from rise, and 20 from winze. Ground hard and wet. A great deal of stuff in the level. Temperature 77°.

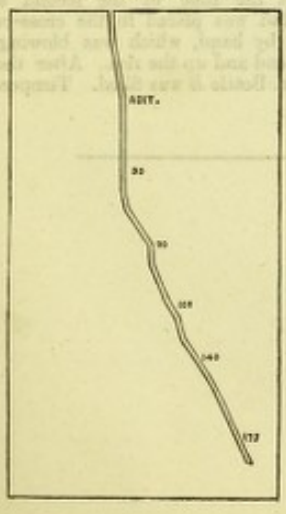
A winze coming down from level above 4 fathoms from this end. At present rate of sinking this will be through in 5 months.

Condurrow Mine.

This is one one of the few mines where a skip, provided with safety catches, for the men to ride in up and down, has been introduced.

Engine Shaft is 168 fathoms below the adit, which is 50 fathoms deep. It is perpendicular for 30 fathoms surface, and is then sunk upon the course of the lode, its underlay varying both in direction and in its amount. It is still being sunk. It is 14 feet by 6 large, used as engine and winding shaft. The winding done by a single skip which is 4½ feet deep by 2 feet square; and drawn by a wire rope 1¼" size. The skipp is provided with Bennett's Safety Catches, which consist of a series of levers acted upon by a spring in such a manner that directly the rope breaks the levers press against and are driven into the wooden guides and so hold the skip.

Transverse Section, shewing Engine Shaft on Main Lode, Condurrow Mine, Camborne.



The men frequently ride up in this. It is contrary to the laws of the mine, on account of the quantities of ore to be raised; and the mine not being well provided with drawing machinery. Three men ride at a time.

Hope's Shaft.—Is 150 fathoms below the adit which is 50 fathoms deep. It is perpendicular for about 20 fathoms, and then underlays at a varying rate. It is 10 feet long and 3 to 5 feet wide. This shaft is entirely devoted to winding; has a double skip way. Each skip 5 ft. long, and 2 feet by 1 ft 9 inches large, is provided with safety catches, and is drawn by 1½-inch wire rope. The men will be allowed to ride in these.

Woolf's Shaft is another winding shaft, 130 fathoms below the adit (50). Kibbles and chains are employed here. This shaft is not often used.

Smith's Shaft is also provided with a winding shaft, 90 fathoms below adit; provided with chains and kibbles.

Footway Shaft is a special shaft only 7 or 8 fathoms deep. Then the ladders are placed in winzes which underlay with the lode about 2 feet per fathom. The staves are 10 inches apart.

Changing House is a very clean comfortable house, 75 feet long, 18 wide and (10+8) 18 feet high. It has a good-sized ventilator in the roof, and 3 glass windows. A large fire tube runs half way through which is heated from the sump house. It contains a large trough, filled with warm water from the engine, and which is continually flowing through it, for the men to wash in.

There are 120 men working underground. The number changing at one time would be about 50.

A good sump house; 8 sump men.

There are some dressing sheds; but more are required. The girls are allowed to dine in the assaying house.

The levels were remarkably clear of stuff, owing to every pair of men tramming for themselves; the levels all driven 7½ feet high by 4½ feet wide.

In consequence of the pumping engine being stopped, a good stream of water was coming down the engine shaft, and bringing with it an increased volume of air.

Took samples of air as follows:

E. 18. From the eastern end of the 140 fathom, level, 18 fathoms from shaft, driving by 2 men, working 8 hours. Taken 1½ hour after shot. Temperature 68°.

E. 19. From the eastern end of the 155 fathom level driving by 4 men, in two cores. 20 fathoms from winze. No shot had been fired. Temperature 71°. End dry.

E. 20. From the stopes in the back of 166 fathoms level, east of Hope's Shaft in which 10 men were working in 2 cores. Stopes 10 fathoms long and 10 feet wide in widest part. A winze passes through these stopes. Temperature 66°.

E. 21. From the eastern end of the 165 fathoms level, driving by 4 men in 2 cores. 28 fathoms from winze.

E. 22. From the eastern end of the 177 fathom level driving by 4 men in 2 cores. 22 fathoms from shaft. Temperature 73°. End choked with stuff.

E. 23. From bottom of Hope's Shaft, sinking by 9 men in 3 cores about 3 fathoms below the 177 fathom level.

E. 24. From the eastern end of the 188 fathom level, driving by 8 men in 4 cores. Temperature 70°.

The accompanying sectionwill show the present operations of the mine, and the way in which it is ventilated.

(*See lithograph.*)

East Pool.

The workings are upon two parallel lodes, on each of which one shaft has been sunk. The workings at each level are, however, connected by cross-cuts.

Visited the workings on the north lode, sketch of which is added, and took samples of air, as follows:—

E. 25. From the western end of the 150 fathom level, driving by 6 men in 3 cores, 10 fathoms beyond a rise; stuff in end. Driven 7 feet high by 5 feet wide. Taken half an hour after firing. Temperature 75°.

E. 26. From under the rise just at the end before visited. Lode here large, and being stoped away by 4 men. Place 15 feet high and 12 feet wide. Temperature 68° F.

E. 27. From the stopes in the back of the 140 fathom level; the men had left work. Temperature 66° F.

(*See lithograph.*)

West Chiverton.

A lead mine near Truro, 80 fathoms deep, with about 130 men working underground. In the upper levels there is only one lode, but in the deeper one there are three. These are being worked upon by levels, connected to each other by cross-cuts.

There are two shafts open, and a third one now being sunk. The ground is killas, and of a very soft nature, requiring very heavy timbering.

The air in the ends gets close, when but small distances from winzes, and the same is the case when sinking or rising.

Samples taken:—

E. 28. From stope a little west of winding shaft, 8 feet high by 5 feet wide; 2 hours after shot, with 4 men working in two cores. Temperature 64° F

E. 29. From the western end of the 70 fathom Williams lode, 20 fathoms from air; 4 men. Temperature 68°. No shot.

A rise, only 6 fathoms high, in fair ground, not requiring powder, with 2 men working, and open at each end; had a temperature 75° F. Air circulating below.

A winze, about 8 fathoms deep, with water at the bottom, had an atmosphere in which a candle would not burn.

There are two shafts open to the bottom levels, and two others open to the 134. The ground is killas, and, as will be seen, the temperature rises high.

St. Day United Mines.

Tin mines near St. Day. All the operations now going forward in these mines are in the bottom levels, and are shown in the accompanying section.

(*See lithograph.*)

Samples of air were taken as follows:—

E. 30. From the 154 fathom level, driving west on lode, by 6 men, in dry killas ground; 7 feet high and 5 to 7 feet wide. Taken ½ hour after shot. Temperature 77° F.

E. 31. From the western end of the 174 fathom level, driving by 3 cores of 2 men, 2 fathoms from winze, but the level choked with stuff. Temperature 82° F.

E. 32. From the bottom of winze in the eastern part of the 174 fathoms level, 5 fathoms deep; 6 men in 3 cores. Temperature 88° F.

E. 33. From the stopes in the back of the 174. Temperature 86° F.

The ladder road is remarkably good, being in a large shaft, specially kept for that purpose, and having ladders with a good inclination and moderate length. The sollars extend over the whole width of the shaft.

West Basset Mine.

Copper mine near Redruth, under the management of Captain Roberts.

There are four shafts upon a length of 1,530 fathoms of workings. There are—

1. *Thomas Shaft*, 110 fathoms from the eastern end down to the 154 fathoms level, at which place levels are commenced to be driven. It is an engine and drawing shaft, 13 feet long, 27 feet wide. It is perpendicular to the 60; then underlays 18 inches per fathom to the 104, and is then perpendicular to the bottom. Engine and drawing. Double skip, drawn by flat hemp rope.

2. *New Shaft*, 750 fathoms west, perpendicular on the cross-course to the 114 fathom level. It is 8 feet long by 5 feet wide. Drawing by double skip and flat hemp rope.

3. *Percy's Shaft*, 120 fathoms west, now sinking below the 114 fathom level, 8 feet by 5. Perpendicular to the 65, and then underlays 16 inches per fathom to the bottom. Drawing by double skip and chain.

4. *Grenville, East Shaft*, now down to the 134 fathom level, where a cross-cut is being driven to cut the lode. Perpendicular to the 94 fathom level, then underlays 16 inches per fathom to the bottom. Engine and drawing shaft. Double skip and chain. Size of chain $\frac{11}{16}$ths on case, with $\frac{12}{16}$ths and $\frac{9}{16}$ths in shaft.

Visited and took samples of air, as follows:—

E. 34. From the end of the cross-cut in the 75 fathom level, driving by two men in dry granite, 7 feet high by 4 feet wide, 105 fathoms from level. A very strong current passing through this level to shaft close by.

E. 35. Taken from the mouth of the cross-cut near the shaft.

E. 36. From the 85 fathom level east of Grenville shaft, 20 fathoms from winze; 4 men in one core.

E. 37. From the western end of the 94 fathom level, west from Grenville's; by 4 men. 15 fathoms from rise. Dry.

This mine possesses one of the best changing houses in Cornwall. Is large, light, well ventilated, and kept scrupulously clean. A constant supply of warm water is circulating through a large trough in the floor, which is taken the greatest advantage of by the men when changing their clothes, after their underground labours are over.

North Dalcoath.

Two examples of air were taken from the 47 fathom level. There is one shaft to this level, but two others sunk to the shallower workings.

Bottle C. was from the eastern end, which was being driven by 2 men; 7 feet high by 3 feet wide. Temperature 67°. Very wet, 18 fathoms from shaft.

Bottle E., from western end, about the same distance from the shaft, same size, only blocked with heaps of broken ground. Temperature 68°.

Huel Kitty, St. Agnes.

Visited this mine in company with Lord Kinnaird to take samples of air from the 54 fathom level. There are three shafts.

1. *Engine Shaft.*—110 fathoms below adit (45). It is perpendicular to the 50, and then underlays at the rate of 1 oft to the fathom. It is 11 feet by 6. The footway in the perpendicular part is in 3 to 4 fathoms lengths, with 3 to 4 feet base. In the inclined portion no ladders required; the men walk down. Winding single skip and chain employed.

2. *Holgate's Shaft.*—100 fathoms below the adit, and still in process of sinking. It is perpendicular to the 24, and then underlays the same as Engine shaft. This is the general footway. The ladders are in 3 fathom lengths, with 3 feet base, and the staves 11 inches apart. No ladders in the inclined portion. There is no division between the part where the men walk down and the part used for drawing.

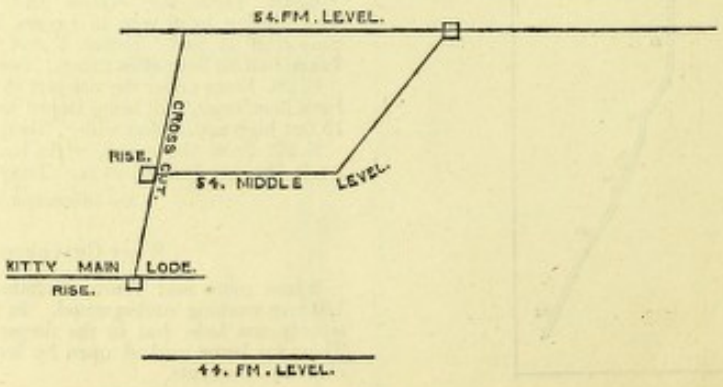
This shaft is 50 fathoms from the changing house.

3. *Sunny Corner.*—Perpendicular to 10 above the adit. It then takes the same lode as the other shafts, and is carried down on the same underlay. Winding by single skip.

The dressing operations are mostly under sheds. The men change in the boiler house; but a dry is being built.

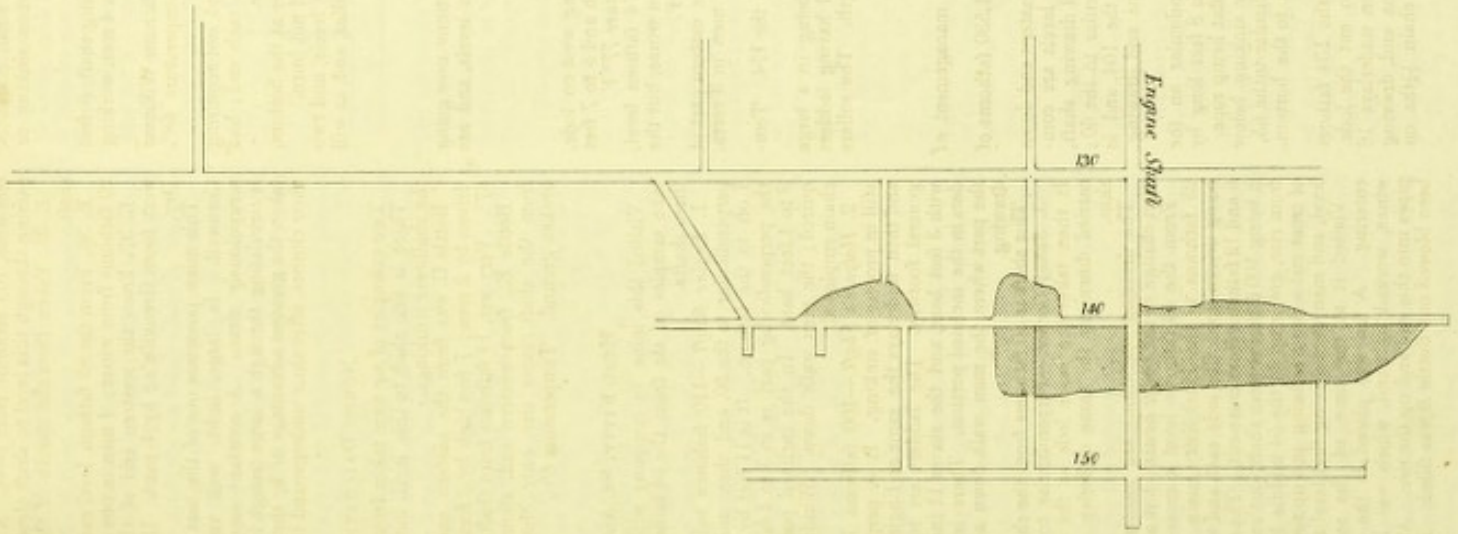
From the 54 fathoms level a cross-cut is driven south 25 fathoms to the Huel Kitty main lode, and a level is being driven upon this lode east and west, the ends being 6 and 12 fathoms from cross-cut. The eastern end was close, it being 100 fathoms from shaft, but only about 15 fathoms from rise, going up to the 54 middle level. At the mouth of cross cut a rise was being put up towards the 44 fathom level, and men were driving that level towards it.

Visited it at the time of the second shift of men entering. A fan was placed in the cross-cut under the winze, worked by hand, which was blowing air through pipes into this end and up the rise. After the smoke had been blowed out Bottle *B* was filled. Temperature 70°.



SECTION OF WORKINGS AT EAST POOL MINE ON MAIN LODE

BELOW THE 130 FATHOM LEVEL



SCALE 30 FMS TO AN INCH

Bottle *A* was filled in the middle level as the air was coming from the middle level through the cross-cut, the 54 fathom level. Temperature 67°.

Bedford United Mine.

In the Gunnislake district, under the management of Captain Phillips.

This mine is worked by three shafts.

1. *Inclined Shaft*, 148 fathoms deep, with an inclination of 4 feet per fathom. It is 14 feet long by 5 feet wide. It is used as a winding shaft, the ore being raised in waggons running upon rails, two in number, and drawn by chains.

2. *Marquis' Engine Shaft*, 115 fathoms deep and perpendicular. It is 9 feet long by 6 feet wide. Ore is also raised in this shaft by two kibbles. There is a ladder-way in the shaft for the use of the shaft men, securely cased off from the kibble-way.

3. *New Western Shaft*, 130 fathoms deep, also perpendicular. Used for winding only; two kibbles used. The shaft is 10 feet long by 7 feet wide.

The general footway for the men is through the inclined shaft to the 24 fathom level, after that through the winzes. Ladders generally in 5 fathom lengths, and incline from 18 to 20 inches per fathom.

Air was taken in bottles as follows:—

No. 7. From the 115 fathom level at the New Western shaft.

No. 1. From the end of the 115 fathom level, driving west 30 fathoms from draught. No shot had been fired. The level was 6 feet high by 5 feet wide. The end was ventilated by a duck machine, fixed and worked by the pump rods, which exhausted the air in the pipes. They were within 20 fathoms of the end. Size of pipe 5 inches square. Velocity of air in mouth of pipe 260 feet per minute. Number of strokes 5 per minute. Temperature 70°. End very wet.

No. 9. From 47 fathom level, driving from cross-cut, going south from inclined shaft. The cross-cut is 115 fathoms long, and the level 55 fathoms long. There are no levels above or below. Ventilated by duck machine as in the 115 end. Temperature 71°. End very wet.

It is proposed that a shaft be sunk upon this lode from surface.

Fowey Consols.

Formerly one of the most extensive mines in the county at one time returning 140 tons of copper per month, but now reduced to about 30; consequently the number of men employed is very much smaller than formerly. It is very deep, but the men in the eastern part are raised and lowered by the man-engine. In the western part the men use the adder.

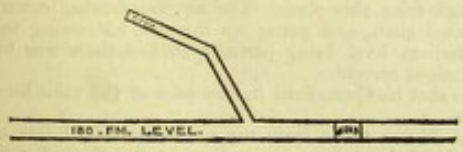
Examined 14 July 1862, taking bottles of air from different levels, noticing the temperature.

Bottle 14, 50 fathom level, north of Pedlar's Shaft driving east,—the end is driven 2 fathoms beyond a rise from the 60, and averages 6 feet by 4. It had been stopped for a month. Temperature 74° F.

Bottle 16, 90 fathoms level, north of Pedlar's Shaft, driving east,—this level has not been worked at all during the last 10 years. Bottle filled about 20 fathoms from shaft in main draught. Temperature 69° F.

Bottle 11, 140 fathom level, west of Ray's Shaft on Footwall lode;—this level is driven 30 fathoms beyond a rise without any winze at present down to the 150, although one is now being sank. It averages 7 feet by 4. An air-pipe 8 inches square is carried in. Two holes had been fired about half an hour previous to visiting, using about 1 lb. of powder. Temperature 79° F.

Bottle 13, 180 fathom level, west of Pound's Shaft,—this end is being driven, branching from the main level at a distance of 200 fathoms from the shaft, and is in about 7 or 8 fathoms from the level. A winze is down about 10 fathoms from the mouth of the end. The level is carried 7½ feet by 4. Temperature 84° F.

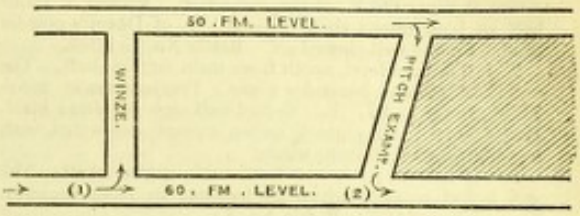


Bottle 2, 240 fathom level, south-east of Pedlar's Shaft;—this is the hottest level of the mine, and is 50 fathoms long. No men working. Air-pipes 8 inches square connected with a hand fan for ventilating when worked. Air taken 25 fathoms from shaft. Temperature 96° F.

6. 260 fathom level, east of Bottrall's Shaft on Bottrall's Lode,—is driven 250 fathoms from the shaft, and is 20 fathoms from a winze. Temperature 88° F.

7. 270 fathom level;—this the bottom level. The end is 26 fathoms from draught, and is being driven. A winze is being sunk from the 260, which will cut the 270 about 2 fathoms east of present end. This will ventilate the end. Temperatnre 94° F.

8. 60 fathom level, examined 16 July, surface temperature 64° F.,—cross-cut between western and Pedlar's Shaft supplies air. Examined particularly a pitch in the back.



The air comes from the shaft and ascends the winze at a velocity of 272 feet per minute; it then passes along the 50 fathom level, and down through the pitch, entering the level again at a rate of 96 feet per minute. Filled bottle No. 12. Temperature 72° F.

Changing and drying houses. In the eastern part ther is one changing house, a dry, and two runs of barracks. The change is a stone building 42 feet long, 16 feet wide, and 7 feet high, with a spring roof of 6 feet, making a clear height in the centre of 13 feet. The roof is a good slate one, plastered inside. There are two openings on each about 2½ feet square, furnished with shutters; and also a doorway 5½ × 3 feet, but no door. There is no roof ventilation. The floor, I imagine, is a stone or earthen one, but there are several inches of dirt and accumulated rubbish upon it so that it cannot be seen. The roof and all parts of the woodwork covered thickly with accumulated dirt. There is no provision made for the men to wash themselves, any more than a stream of water running along outside. About 30 men use this house. The men stand upon their hutches while changing.

The dry is about 30 feet long by 12 wide. It is warmed by means of a fire, the smoke and heat of which pass through a series of three pipes before entering the stack. The men's clothes are dried on these pipes. The shutters of the windows are studiously kept closed to prevent loss of heat, there is no roof ventilation, therefore the house is most offensively close, and the clothes instead of being sweetened to some extent by a circulation of warm, dry resh air, are simply dried, and retain all the offensive matter given off by the men while at work. This is a point of some considerable importance, as I am told that the men rarely, if ever, wash their flannels. A man is kept to look after the dry.

The sump men and pitmen have each a changing and drying house to themselves.

The floor is covered to some thickness with dirt so that there is a continual stirring up of dust every time a number of men enter the house, which of course falls upon and is retained by the wet clothes of the miners.

The changing house in the tutwork part of the mines is of very good size, being 55 feet long, 24 feet wide, and 17 feet high. It is provided with six windows and a large doorway. The floor, as in other cases, is dirty in the extreme, and the walls and ledges covered with dirt. The men change standing on their hutches. There is no fire, nor a supply of water.

The dry is 54 feet long by 15 wide. This is much better than the eastern dry, having a better floor and a small ventilator in the roof. It is warmed by a fire and pipes. It has also a large oven in which the men can warm their dinners, &c.

The men generally change here in the winter.

The barracks are merely long runs of low sheds, of stone and slate roofs, built for changes when the mine employed larger numbers of men. They are devoted now to the men for store houses.

The greater number of the females employed on the surface work in the open air. There are some sheds, but as they are only provided with roofs, without any sides, there is such a strong draught of air through, that the girls prefer being out of them. In case of wet weather, inasmuch as the mine is not working very extensively, the females stop work, they being able to dress all the ore in fine weather. There is a good house in the eastern part, of same size as the changing house, which is used for dressing purposes in wet weather.

During the summer the females eat their dinners, &c. sitting about where they can, there being no place appropriated for them; in the winter a house is provided for them.

Par Consols.

Examined 15 July. Bottles of air from different levels, noticing the temperature.

1. The 100 fathom level, eastern end from underlay shaft is driven 45 fathoms beyond a winze; it is driven 7 feet by 4. There is no level above or below this end. Temperature at winze 66° F., at the end 68° F. Visited it about half an hour after a shot. About ½ lb. of Davey's powder used. Smoke well cleared off. Bottle No. 15 filled.

2. 120 fathom level, north from main engine shaft. The end is 32 fathoms beyond a winze. Temperature at winze 71° F., in the end 77° F. Visited half an hour after a blast. Bottle No. 8. Air pipes 6 inches square, connected with hand-fan carried in from winze.

3. 165 fathom level, west from main engine shaft. The end 5 feet square, driven 26 fathoms in from draught. Temperature 84° F. Bottle No. 4.

4. 200 fathom level, east of underlay shaft. One bottle of air taken (No. 18) at the winze supplying air to the end, and another (No. 17) taken from the end, 35 fathoms in, one hour after a shot. The end is driven 6 feet × 5½. Temperature of end 87° F.

5. 180 fathom level.—End 52 fathoms in. Temperature 86° F. Bottle No. 6. This end is ventilated by 6-inch air pipes connected with a water jet having a fall of 15 fathoms.

Changing Houses.

There are three parts of this mine, each having a change and dry.

1. *For the man-engine.* The change and dry all in one building—a stone house 48 feet long by 14 wide. A rough flooring of planks placed upon transverse beams about 6 feet from the ground forms the division, below being the dry, and warmed by a cylinder connected with the boilers, together with a fire. The floor of this part very dirty. There are two windows, the shutters of which are kept closed; no convenience for washing; no roof ventilator. This house is about 100 fathoms from man-engine.

Three corps, of from 50 to 60 men each, dry and change here, besides a number of tutworkers.

2. *Western part.* The change and dry all in one as before. About 60 feet long and 15 wide. A length of 12 feet is partitioned off for the sump men and provided with a fire. The change is above the dry, a rough flooring separating it, warmed by a fire and pipe. There appeared to be only one window in the house and that closed, with no roof ventilation. The men go out to the engine pool very near and wash.

The houses about 20 fathoms from footway.

3. A run of *barracks*, about 15 fathoms from another footway. These are about 120 feet long and 12 feet wide, with a height in the centre of 9 feet (7 feet wall × 2 feet spring of roof). The dry is about 50 feet long and warmed by a fire and pipe. Old men are allowed to change here.

The change is the remainder of the building; very dirty and dark. The men stand upon their hutches to change.

Besides these some few men (principally trammers) change in the boiler house.

Drake Walls.

A large tin mine in Gunnislake, under the management of Captain Gregory.

The tin occurring in a number of small strings running side by side renders it necessary to remove a large quantity of ground, having large openings underground which are spoken of as "gunnisses" in this district.

The mode of working is similar to that in other mines sinking shafts or driving levels, with this difference, that all the mineral is worked from below the workmen, this, under the peculiar circumstances, being the safest mode of working.

There are seven shafts sunk below the "*adit*," which, at the western extremity, is 25 fathoms below the surface, and from which point this adit is extended eastward 272 fathoms before emptying itself at the "*adit's mouth*."

1. Sunk to adit level which is only extended four fathoms west of shaft.

2. *Brunton's Shaft*, which is nine fathoms apart, in an east direction, and is sunk 100 fathoms below surface.

3. *Machine Shaft* next, in same direction, sunk 80 fathoms below adit, which last, at this point, is 20 fathoms from surface.

4. *Foot-way Shaft*, in same direction, 80 fathoms apart from last, or "*Machine Shaft*." Depth of adit at "*Foot-way Shaft*" 15 fathoms, and depth of shaft below adit 92 fathoms.

5. *Webb's Shaft*, in same direction, distant from last 18 fathoms. Depth of adit here 18 fathoms, and of shaft 40 fathoms below adit.

6. *Matthews's Shaft*, in same direction, apart from last 23 fathoms. Depth of adit 12 fathoms, and of shaft beneath 92 fathoms.

7. *Stamps' Shaft*, 17 fathoms apart from last. Adit here seven fathoms deep, and sunk beneath nine fathoms.

In the 30 fathom level the gunnis was 12 feet wide, and temperature 61°.

In the 50 fathom level two men were driving west of Brunton's shaft. Level seven feet wide, six feet high. Between shaft and end gunnis seven fathoms deep. Bottle No. 10 filled in the end. Temperature 64°.

In the 70 fathom level five pairs of men were stoping the ground from the shaft eastward. The height of opening near the shaft was nine fathoms. Length of stopes 11 fathoms. Bottle No. 19. Temperature 64°.

Hingston Downs.

Under the management of Captain T. Richards. Has three shafts, but no adit.

1. *Morriss' Engine Shaft*, 130 fathoms deep. It is perpendicular for 35 fathoms depth, and then underlays two feet in a fathom. It is 12 feet long and six feet wide. Used for pumping and drawing. One kibble drawn by chain used.

2. *Hitchen's Engine Shaft*, 75 fathoms deep, sunk on the south lode. 12 × 6 feet. Used for pumping and drawing. One kibble.

3. *Bailey's Shaft*, a new one sinking. It is 35 fathoms deep. Used for winding, and, when completed, for pumping the water below the 110 fathom level.

The general footway is through Hitchen's shaft, and through the winzes. Ladders five fathoms long. Staves one yard apart. In the shaft they are cased off from kibble-way.

Bottles of air were taken as follows:—

No. 3, from the western end of the 85 fathom level, 10 fathoms beyond a winze. End seven feet high, five wide. Two men. Temperature 64°. Between the winze and shaft there was a very brisk current 600 feet per minute, ground hard.

No. 21, from the 100 fathom level, where air was passing at the rate of 660 feet per minute.

No. 20, from the eastern end of the 110 fathom level, nine fathoms from draught. There was a brisk current in the level, but a heap of stuff in the end rendered it a little close. Temperature 65°.

Changing houses.—There are three houses for this purpose. The first is 50 feet long, 10 feet wide, and wall six feet high. Neither window nor ventilator. Warmed by tube from fire in a smaller house adjoining, which is appropriated to men working in very wet places. The third house is by the side of the whinn boiler.

Dressing floors are closed in, and provided with fires. A fire in sampling house. The dressers dine either there or at their working places.

The engines provided with steam gauges.

Botallack Mine.

Samples of air were taken as follows:—

1. *Crown Lode.*

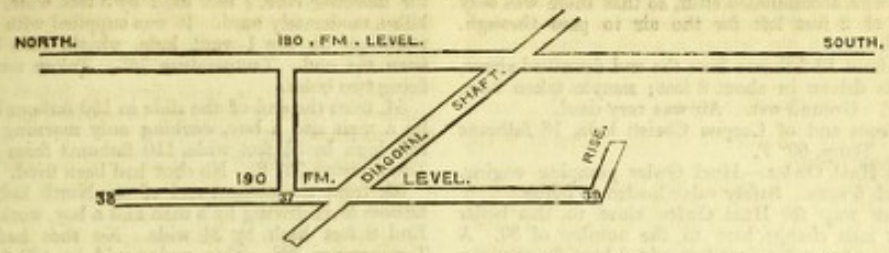
No. 37, temperature 75° F., at surface 53°. From the 190 fathom level immediately under the rise communicating with the 180 fathom level. There were no men working here except a filler, but three pairs of men were deriving their air from this place. The air was coming down the diagonal shaft, and going up this rise, but, owing to the 180 fathom level being partially choked, there was but a very slight current.

No shot had been fired in this part of the mine for four hours.

No. 38 was taken from the northern end of this level, about 10 fathoms from rise, by three men. Seven feet high. Country a mixture of granite, greenstone, and killas. Temperature 78°.

No. 39 was taken from the south end, driven 14 fathoms from the rise. A rise is being driven here to meet a winze coming down from the level above. Temperature 80°.

The accompanying sketch section will show where these samples were taken.



In each of these places there are three cores of men.

No. 40, from stopes in the 160 fathom level. Three men taking away the lode. Place 80 fathoms from shaft, but between it and a winze to the 180. This winze was stopped up with dead (temporarily), so the current was dead. Temperature at shaft 71° F., at stope 77° F.

II. *Huel Cock*. Surface temperature 56° F.

No. 41, in the 95 fathom level. Stopes immediately over a rise, 120 fathoms east of engine shaft. Stope nine feet high by four feet wide. Temperature 69° F.

No. 42, stopes in the 112 fathom level. In direct current six men. Temperature 70° F. The smoke from the lower levels passed through here.

No. 44, end of 150 fathom level, 30 fathoms beyond rise, and 80 fathoms from shaft. This is the closest place in this mine. Temperature 76° F. Two men.

No. 43 was taken immediately under the rise, so that these two samples will show the difference in the quality of the air.

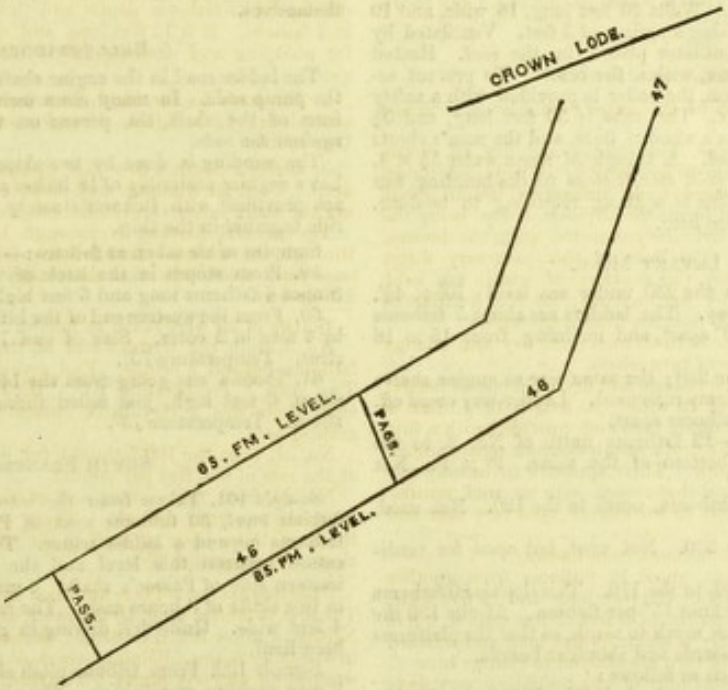
III. *Huel Hazard*. Surface temperature.

No. 45, from the 85 fathom level. Only one shaft to this level, but several rises to levels above. This sample taken in direct current, between a shaft and a rise. Temperature 62° F.

No. 46, about 20 fathoms beyond rise towards the end. Temperature 67° F.

No. 47 from the end driving towards Crown's Guide lode, and 60 fathoms beyond rise. This end is being driven by one man. Temp. 65° F., thus cooler than No. 46, arising from the end being wet. The level is driven 6 feet high and 2½ feet wide.

The accompanying sketch plan will explain these samples.



The same circumstances occur in the 65 fathom level.

When these levels cut the Crown lode, a winze will be cut between them, and thus restore the ventilation.

Huel Call.

Samples of air taken as follows:

No. 48, from the south end of the 30 fathom level, 7 fathoms beyond a rise; driven by one man in hard granite; 6 feet high by 2½ wide.

No. 49, from the north end of the 85 fathom level, driven under the sea; 7 fathoms beyond stopes, opening to levels above; in hard granite; very dry; two men; 6 feet by 2½ feet.

Huel Owles Mines, St. Just.

Under these adventurers there are working five distinct mines:

1. Buzza and Parknoweth.
2. Hl Owles and Cargatha.
3. Hl Boys and Grouse.
4. Hl Drea.
5. Hl Gendall.

Visited the Buzza Mine, which is worked by two shafts.

1. Skip shaft; 130 fathoms below adit, which is 50 fathoms deep; it is 10 feet long by 4 wide; perpendicular for 18 fathoms, then underlies on the lode 18″ to 20″ per fathom.

Double skip.

Ladderway eased off to the 80, after then ladders through winzes; ladders in 5 fathom lengths.

Buzza skip shaft is worked by Parknoweth steam whim-engine, 26½″ cylinder, 2¾″ piston rod, with 4 feet stroke equal beam; fly wheel 15 feet, making 2½ revolutions to 1 of the cage; number of strokes from 10 to 60 per minute.

Calculation of cost of winding.

Drawing from the 90=140. In 7½ hours drew 432 sacks = 48 tons 12 cwt. 14½ skips per hour.

Cost:—	s.	d.
Coal, 4½ cwt. at 10*d*.	3	9
Oil and tallow	0	9
Wear and tear of chain and shaft	3	0
Landers, fillers, driver	7	9
	15	3

or 3¾*d*. per ton.

Higher Buzza Shaft. To adit (50) 2 kibbles and ladder way. Shaft 9′ × 4′. Ladder way 4½′ × 4′. Ladders incline about 1 foot per fathom.

A cross-cut comes in at the 80 from Parknoweth mine.

Samples of air taken from the upper workings in Buzza Mine:—

No. 50. From the south end of the adit level driving in the granite, in very wet ground, 80 fathoms from winze.

The level just behind where the men were working was nearly filled with accumulated stuff, so that there was only an opening of 2 feet left for the air to pass through. Temp. 63° F.

No. 51. About 10 fathoms from the end described above, a cross-cut is driven in about 8 feet; sample taken here. Temp. 63° F. Ground wet. Air was very dead.

No. 52. From end of Corpus Christi lode, 16 fathoms from winze. Temp. 60° F.

Boilers at Huel Owles.—Huel Owles pumpine engine. 2 boilers, each 6 tons. Safety valve loaded to 50lbs.

The ladder way for Huel Owles close to this boiler house. The men change here to the number of 30. A pool of warm water under a roof provided here for the men to wash in.

Huel Owles Whim.—1 boiler, 7 tons. Engine driver 16 years of age. Been driving it 3 years.

Parknoweth.—Pumping engine, two boilers. Two drivers one 51 years old, the other 24. Each of these work continuously for 24 hours, and rest 24 hours. This is the case for pumping engines, but in whim engines they work eight hour cores.

Whim boiler, 4½ tons. Surface men change over this boiler.

None of the boilers are provided with water or feed gauges, or steam gauges, they being only furnished with the ordinary water cocks. In every case the feed was very good.

Sweeping floors.—About 260 working on the floors, all of whom with but slight exceptions are in good sheds.

Changing house for Parknoweth.—A new house, stone walls and slate roof. Walls 40 feet long, 16 wide, and 10 high, with a roof having a spring of 3 feet. Ventilated by six windows, and ventilator placed in the roof. Heated by a tube of hot water, with a fire below. To prevent accidents from explosion, the boiler is provided with a safety valve and feed cocks. The tube is 30 feet long, and 3½ feet diameter. It has a wooden floor, and the men's chests are arranged all round. A trough of warm water 5½ × 4, fed from the engine pool stands close to the building, but is not covered in. This is a thing requiring to be done. About 120 men change here.

Levant Mine.

1. *Engine Shaft* to the 230 under sea level; 10′ × 4½′. Pumps and ladder way. The ladders are about 5 fathoms long, with stones 10″ apart, and inclining from 15 to 18 inches per fathom.

2. *Skip shaft* to the 230; the same size as engine shaft; double skip road. Hemp rope used. Ladder-way cased off. These two shafts 5 fathoms apart.

3. *Batten's Shaft.*—12 fathoms north of No. 2, to the 242, which is the bottom of the mine. 9′ × 4′. Not used, but kept open.

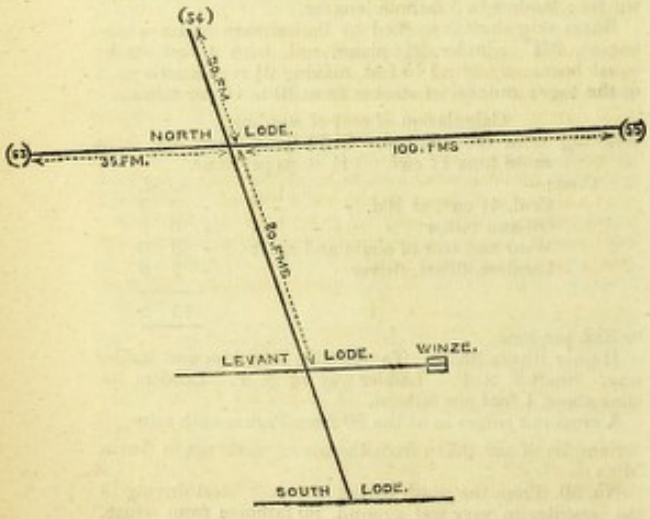
4. *Augwin's.*—16 fathoms, north to the 130. Not used, but kept open.

5. *Phillip's*, to the 230. Not used, but open for ventilation. 12′ × 4½′.

6. *Man-engine shaft*, to the 170. This shaft is 80 fathoms east of No. 1. It inclines 15° per fathom. At the 130 the underlay changes from north to south, so that the platforms are reversed. Backboards and shoulder boards.

Samples of air taken as follows:

53, from the western end of the North lode in the 150 fathom level. Sketch of the 150 fathom level workings.



This end was being driven by two men, working only in the morning core, 7 feet high by 3 feet wide, through dry killas, moderately hard. It was supplied with air from the workings on the Levant lode, which were 115 fathoms from the end. Temperature 75°. Taken one hour after firing two holes.

54, from the end of the slide in 150 fathom level, driving by a man and a boy, working only morning core, and 8 feet high by 3½ feet wide, 110 fathoms from Levant lode. Temperature 73° F. No shot had been fired.

55, from the eastern end of the North lode of the 150 fathom level driving by a man and a boy, working one core. End 8 feet high by 3½ wide. No shot had been fired. Temperature 78°. This end would be 180 fathoms from the Levant lode.

56, from the stopes in the bank of the 170 fathom level on the North lode in which eight men were working. Winze 30 fathoms from end of stope. Temperature 82°.

57, from the eastern end of 170 fathom level on the North lode, driving by four men in two cores, 9 feet high by 5 wide, 90 fathoms from winze to 190. Taken two hours after two holes had been fired. Temperature 83°.

58, from the stopes in the middle lode in the 170 fathom level, two men 8 fathoms from ventilation. Temperature 73°.

Drying and changing houses.—A large stone building devoted to this purpose, the lower portion being for drying purposes, the upper for the men to change in. The house is 70 feet long and 14 feet wide. It is well lighted, ventilated, and kept very clean. A continuous stream of warm water passes through the house, in which the men wash themselves.

Balleswidden.

The ladder road in the engine shaft is not protected from the pump rods. In many cases owing to to the irregular form of the shaft, the person on the ladder quite rubs against the rods.

The winding is done by two skips in one shaft, which has a regular under-lay of 18 inches per fathom. The skips are provided with Bennett's safety catches. Three men ride together in the skip.

Samples of air taken as follows:—

59. From stopes in the back of the 130 fathom level. Stopes 6 fathoms long and 6 feet high. Temperature 72°.

60. From the western end of the 140 fathom level, driving by 4 men in 2 cores. Size of end 7′ × 4′. The end not clear. Temperature 73°.

61. From a rise going from the 140 to 130 fathom level, about 6 feet high, just holed through to party sinking above. Temperature 73°.

South Francis.

Sample 101. Taken from the western end of the 104 fathom level, 50 fathoms west of Pascoe's shaft, and 15 fathoms beyond a ladder winze. There is no communication between this level and the one below it, on the western side of Pascoe's shaft. 4 men were working here in two shifts of 8 hours each. The end was 7 feet high and 4 feet wide. Quite dry, driving in granite. No hole had been fired.

Sample 102. From tribute pitch about 2 fathoms high; 2 men working granite rock. The place was between 2 and 3 feet wide.

Sample 103. Taken from the western end of the 114 fathom level, 30 fathoms from the shaft. There is no communication other than the shaft with the level above or the level below. The end was driving by four men working in two shifts of 8 hours. Rock granite, and dry. The size of the end, seven feet by four.

Sample 104. Taken from the western end of the 124 fathom level, driving on the south lode, which is in 20 fathoms from a winze, going to the 134, but having no communication with the 114 beyond Marriott's shaft, which is 120 fathoms east. Four men working in two shifts. Granite. Wet here.

Visited the 134 fathom level west, which is carried upon the same lode as the east. The end is 35 fathoms from ladder winze, but within five fathoms of a rise going to the 124. No men working here.

Visited the 144 fathom level, west, which is driven 24 fathoms beyond a ladder winze, and three fathom beyond a rise.

This rise had been just holed through; the driving of the end had been suspended.

Sample 145. Taken from the north part of the mine in the 50 fathom level east of Pascoe's shaft. The end was driven 30 fathoms from the shaft. Two men had commenced sink-

ing a winze close to the end, and another pair of men was rising. The rise up 2½ fathoms.

Only one shift of men work here.

The level was choked with stuff.

Sample 106. Taken from the 60 fathom level, west of Pascoe's shaft. The end is 60 fathoms from the shaft, 15 fathoms beyond a rise. A winze is now sinking about nine fathoms east of the rise, which is down five fathoms. The end is set to be driven 7 feet high by 3½ feet wide. No shot had been fired.

Sample 107. Taken from the 70 fathom level, from a level driven on a branch about two fathoms in from main level.

Working by two men. Two holes had been fired about 1½ hours before visiting.

Sample 108. Taken from the 80 fathom level, 20 fathoms beyond a winze. Four men in two shifts. Two hours after a shot.

Sample 109. Taken from the 94 fathom, west, from a driving on Bassett's lode, seven fathoms in, from a cross cut from main level.

Men not at work.

Sample 110. Taken from the end of the 94 cross-cut, which is being driven by six men, working in three shifts of eight hours. This end is ventilated by a double duck machine placed under a rise, 50 fathoms from the end.

The supply pipe is seven inches square.

Two holes had been fired about 1½ hours before visiting.

Huel Harriet.

Engine shaft is 127 fathoms below the adit, which is 40 fathoms deep. It is sank perpendicular to the 80, then underlays for 15 fathoms at the rate of 1½ feet, and afterwards at the rate of 3 feet. It is used as an engine and a drawing shaft. A length of 4 feet is cased off for drawing; chains and two kibbles employed. The ladder-way for the men is through this shaft to the 30; the ladders in 20 feet lengths, with 6 inches per fathom under-lay, and 10-inch staves. From the 20 the men go through winzes which have an average under-lay of 1 foot per fathom. Is is above 100 fathoms from the changing house.

Eastern Shaft Winding down to the 10 below adit, but not worked below adit. It is 6 feet by 4. Underlays 1½ foot per fathom. One kibble, driven by steam.

Alexander's Shaft. A new shaft now being sunk, it is down to the adit, and is 8 feet long by 4 wide, on the under-lay of the lode, which is 2 feet 10 inches per fathom. A foot-way put in. Ladders 20 feet long, with 10 inches under-lay and 10 inch staves.

Samples of air were taken as follows:—

No. 112, from the 130 fathom level, driving east of the engine shaft. The end is 6 fathoms from shaft, and is being driven by six men working in two shifts of 12 hours each. Hard granite, 7 × 5 feet.

No. 113, from end of cross-cut, 65 fathoms long. A winze within 3 fathoms, but it was full of stuff. Sample taken soon after a shot.

No. 114, from stopes in the tin ground above the 100 fathom level, 5 feet wide, 16 men at work. Air was taken from the middle part. A winze at one end of the stope, but full of stuff.

No. 116, taken from end of cross-cut in the eastern part of the mine from Alexander's shaft, driven about 40 fathoms. Ventilated by a fan, driven by a boy who is paid by the miners, six men in three cores, but no boy for night core.

Changing house. The men do not dry their clothes in this house, a separate place being provided. This is a very good arrangement, the changing house being kept free from dust and that close smell always to be experienced where a number of men's clothes are drying.

The house is 36 feet long by 18 wide, and 12 high, and has a good large ventilator in the roof, made by raising a portion of the roof 6 inches higher than the other part. It has a wooden floor, glass windows, and a washing trough, through which a constant stream of warm water is flowing.

Drying house was formerly the changing house. It is a long, narrow, and dark house, warmed by tubes passing through it from the *Sump house*, which has a good fire and oven. There are nine sump men, working in three corps.

There are not many dressers, most of them under cover. They all live in the adjoining village of Beacon, and go home to dinner.

Carn Camborne.

Samples of air were taken as follows:—

No. 116, from the eastern end of the 13 fathom level, 35 fathoms beyond shaft and 25 fathoms beyond a winze. 4 men in 2 shifts. Granite. No shot had been fired. A place where the smoke hangs a long time.

No. 117, from the western end of the same level, 6 fathoms from a rise, driven by 4 men, 7 feet high and 4 wide.

No. 118, south end of the adit level, 5 fathoms from winze. 2 men. Dry granite. Level, 7 feet by 5.

No. 119, from a tribute pitch 3 fathoms above back of the adit level, 2 men. Granite. There was a fan in level below, with pipes to this place, but no regular boy to work it. The men, after firing a shot, would work the machine to clear the place of smoke.

Tolcarne.

Samples of air taken as follows:—

No. 121, from the west part of the 40 fathom level, from the end driving north on cross course, 13 fathoms from shaft; 3 men and 3 boys working in 3 shifts of 8 hours each.

No. 122, from the eastern part of the 40 fathom level; the lode is very loose. The end is about 40 fathoms from engine, and is ventilated by 4-inch air pipes connected with waterfall from the 30 fathom level. Level driven 7 × 4 feet by 2 men and 2 boys.

No. 123, from the 30 fathom level, 10 fathoms from a winze; 2 men and 2 boys.

No. 124, from eastern end of 30 fathom level, 10 fathoms from a winze which was just holed through; 33 fathoms from shaft.

No. 125, from 30 fathom level from cross-cut driving from Field's lode to the New North lode; 21 fathoms in. Dry granite.

No. 126, from the 30 fathom level eastern north lode, 13 fathoms in. Granite, dry; 1 man and a boy. Level choked.

No. 127, from the 20 fathom level, west, on the N. lode, 20 fathoms beyond winze; 1 man and a boy. Dry.

No. 128, from the east part of 20 fathom level, 6 fathoms beyond winze.

No. 129, from the 20 fathom level on Field's lode; 10 fathoms from winze; 2 men.

No. 130, from the eastern part of the 10 fathom level, 24 fathoms from winze; 1 man. Ventilated by handfan.

No. 131, from a crosscut gang, south from adit level. A distance of 40 fathoms. There was a very brisk current in the adit level, and a fan was placed at mouth of cross-cut to drive the air into the end; 2 men.

MINES VISITED BUT NO SAMPLES OF AIR TAKEN.

West Caradon Mine (Copper).

A very old and extensive mine.

Operations are carried on from four shafts. Two of these are old ones, the other two quite modern.

Shafts.

1. *Fox's Shaft.*—An old engine shaft. It is called a downright or perpendicular to the 80 fathom level below the adit, which being 26 fathoms from surface, makes a depth of 106 fathoms, but there are several alterations in its course. From the 80 to 140 it is carried down on the course of the lode, and underlies from 2 to 2½ feet per fathom.

Winding is carried on by means of a kibble and chain.

The shaft is very old and much word.

2. *Elliot's Shaft.*—Perpendicular to the 150 (below adit). From the top to the 50 it is 4½ feet by 5 feet inside the timbering; below it is 6 inches longer each way. Two kibbles are used in this shaft if winding below the 50, so that they always meet below there; if above the 50, only one employed. Flat hempen rope, 6 inches by 1½, used.

3. *Hallet's Shaft.*—This is a new shaft, now in course of sinking. After a depth of 3 fathoms it is carried on a regular underlay of 2½ feet per fathom. It is down to the 27 fathom below the adit, which is 20 fathoms deep, and is still being sunk.

A double skip way will be laid in.

4. *Pryor's Shaft.*—Another new one down to the 30 fathom with a regular underlay of 2½ feet. Still sinking. All these shafts are on different lodes, but have communication one with the other.

Drying and Changing Houses.—There are two buildings provided for the men to dry and change in. The first a stone building 60 fet long, 18 wide, and 18 high, provided with two windows on each side, and a ventilator in the roof; but these were all closed up. The floor is covered for several feet with a fine dust; many of the men's boxes being ¾ buried in it. There were about 300 men's clothes drying here. This house is warmed by a large fire and a tube running through it.

The other changing house adjoins and is about 50 feet long; without any fire. Very few men change here.

It is to be noticed that the men object very much against having the windows opened, on accouut of the draught.

The mine appears to be well provided with roofed sheds for the females to work under, but there is not a house set part for them to use during their dinner hour.

South Caradon Mine (Copper).

A very old extensive and rich mine. The management for a number of years has been in the hands of one man.

There are two principal winding shafts now in use, and two new ones in course of sinking in the eastern part where the principal operations are now being and will continue to be carried on. These are,—

1. *Jopes Shaft.*—Perpendicular to the 80 below adit (18 fathoms); then underlies at the rate of 2½ feet to the 140. Winding carried on by two kibbles and chains.

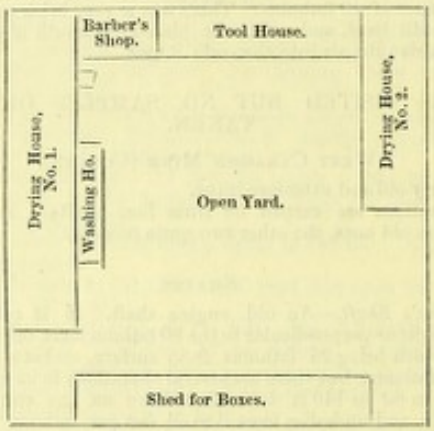
2. *Kitto's Shafts.*—It is ¾ of a mile from Jopes, but communicates by levels. It is down to the 180, underlying at the rate of 4 feet per fathom.

3. *New Shaft* adjoining Kitto's. To be used as an engine and a drawing shaft. It is perpendicular to the 80 (adit about 20 fathoms). At the 30 another shaft cut away, underlaying north, at the rate of 2½ feet per fathom to the 120. This shaft is 12 feet by 7 and will be used as an engine and drawing shaft. A roadway is laid down for the use of skips, but at present kibbles drawn by chains are employed.

4. *Rule's Shaft.*—This is the other new shaft, and will be used as an engine, and drawing shaft. It is sunk from surface to the 84 with a regular underlay of 2½ feet per fathom. It is 12 by 5 feet inside timbering. Skips with wheels will be employed to be drawn by chains.

Drying and Changing Houses.

These are most admirably adapted to meet the comforts and requirements of the men. They form the two sides of a rectangular yard, the upper and lower ends being appropriated for tool houses, and sheds for men's boxes.



Drying and Changing House No. 1 is 100 feet long, 22 feet wide, and 20 feet high. It is well lighted by means of glass skylights in the slate roof, and well ventilated by means of roof ventilators.

The floor is good. Benches are placed around the sides of the house, with boards below for the use of men when changing. The house is warmed by a fire and tube: provision is made for warming the men's dinners. The whole is kept remarkably clean, two men being kept to look after the drys, and it is a special part of their duty to thoroughly clean them out at least twice a week.

Adjoining this dry is a washing house, in which is a long rectangular washing trough, filled with warm water, a small stream constantly running through it. Here all the men wash before leaving the mine, many providing themselves with soap and towels.

Drying House No. 2, is similarly arranged to No. 1, only being smaller. It is 60 feet long, by 18 wide. About 200 men change here, but there is room for 500.

A comfortable house is provided for the barbers' shop, where the men get shaved &c., with a good supply of warm water.

The footways are respectively 30 and 50 fathoms from the changing houses. There is a good roadway from each. The site of the changing houses was the only spot available at the time.

There is a good supply of roofed sheds for the dressers to work under; but no adequate provision made for them during resting time. The manager is alive to this, and at an early period such accommodation will be furnished.

This mine was visited at a later period of the enquiry, and samples of air taken by Dr. Bernays, who reports upon them.

East Phœnix Mine (Copper).

This is comparatively a new mine, the operations being confined to exploration.

There is only one shaft. It is perpendicular for 72 fathoms, it then passes through the lode which is underlaying 42° south, and is then carried on under the lode at that rate of inclination.

It is 14 feet by 7 in size, and used as an engine drawing and footway shaft.

A kibble with chain used for winding.

The ladders in the perpendicular part are in 22 feet lengths, with an inclination of 1 in 12.

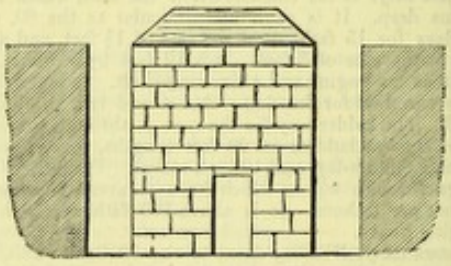
In the inclined part the ladder way continuous.

The ladder bars are 10 inches apart.

The men change and dry in the boiler house. There is a fine space of ground left for building a dry upon; and as the carpenters' and smiths' shops are good, high, and well ventilated buildings, it is to be hoped a correspondingly good dry will soon be added.

Powder Magazine.—This is a stone building quite away from all the other mine buildings. It is built in an excavated space, so that all the powder shall be under the evel of the adjoining ground.

No tin canisters are used, they are all of copper.



North Phœnix Mine (Copper).

This is quite a new mine. It has only one shaft.

The shaft is perpendicular to the 70. It is then carried down upon the course of the lode at an angle of inclination of 43° to the 140. The operations are confined to sinking, and driving at the 100 and 120.

This shaft acts as engine, drawing, and footway shaft.

The ladder way in the perpendicular part is in 12 feet lengths. In the inclined part they are continuous.

A very easy ladder way.

There are 15 men employed underground. There is a small changing house 15 by 10 feet provided, with a good fire.

West Sharp Tor (Copper).

Shaft perpendicular to the 60, then to the 162 underlying 5 feet in a fathom. The ladder way appeared an easy one.

The men change in boiler house.

The operations confined to exploring.

South Phœnix (Copper).

A new mine. Exploring operations.

There is only one shaft sunk any depth. It is an inclined shaft from surface. To the 50 it is inclined at an angle of 45°, from there to the 100 at an angle of 35°, then to the 126 at an angle of 20°, and then to the bottom 166 at an angle of 45°.

It is used as an engine, drawing, and footway shaft.

The drawing is performed by a tram waggon.

The ladder way is continuous from the 20. From the 100 to the 126 the men walk down the incline.

There are 24 men working underground, all of whom change in the boiler house.

An air shaft is sunk down 15 fathoms, in which are placed two 20-inch plunger air machines, which exhaust at the rate of 400 cubic feet per minute.

Huel Mary Ann Mine (Lead).

This is one of the old established mines of the district.

There are principal shafts, each of which is used as an engine and drawing shaft.

1. *Pollard's Shaft.*—This is a perpendicular shaft, and is down 205 fathoms from surface. It is 10 feet by 14. The engine part being 10×8, the whin part 10×6.

2. *Clymo's Shaft.*—Also a perpendicular one, about 72 fathoms from Pollard's. It is 11 feet by 15. Engine part 11×8. Whin 11×7. It is down 205 fathoms from surface, and has communication with Pollard's.

In both shafts skips are employed and flat hemp ropes.

The ladder way in each shaft, for shaft and pitmen is put in 3 fathom lengths with a base of 4 feet.

Footway for Men.—A special shaft for this purpose to the adit. A small house over it to keep rain out. It is perpendicular for 6 fathoms, with the ladder dipping 2½ feet per fathom, from there to adit upon course of the lode inclining 4 feet per fathom. From the adit to the 90, an old shaft (Barrett's), is kept clear as a ladder way, sunk on the course of the lode, and dipping at the rate of 4 feet per fathom. From the 90 the men go through special winzes.

Drying and Changing House.—A good sized house, 52 feet long, 18 feet wide, and 20 feet high. It has two windows and a ventilator in the roof. It is warmed by a fire and tube. From 70 to 80 men change here, and it is about 60 fathoms from the footway.

About 30 men change in the boiler house which is very roomy, and well provided with windows. The fillers, landers, and trammers change in the whim boiler house.

There is a change for pitmen, and two houses for shaftmen.

All the dressing operations are carried on under sheds, most of which are provided with moveable hanging sides to protect the dressers against wind and rain.

One shed is completely boarded in, and provided with a fire and seats. This is for the women and girls to dine, &c. in. During the summer the kettles are boiled in the smith's shop.

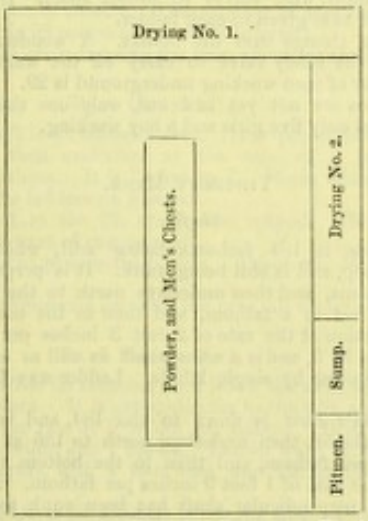
Huel Trelawney Mine (Lead).

This is another old established lead mine, working in two principal parts.

There is one large shaft used as an engine and drawing shaft, and two other drawing shafts.

Trelawney's Shaft.—Engine and drawing, perpendicular, and 170 fathoms deep. Two kibbles used, with chains.

The other drawing shafts are respectively 160 and 180 fathoms deep, underlaying 1 foot per fathom. These have one kibble in each, worked by the same engine.



There are two ladder ways for the men. The ladders are in 4 to 5 fathom lengths, underlaying 20 inches per fathom

The drying and changing houses form the end and side of a rectangular yard. In the centre is a shed with lockers built in a wall for holding the powder, and containing the men's chests.

No. 1 is 50 feet long, 15 wide, and 14 feet high. It has one fixed glass window, one open one, and a ventilator in the roof. It is warmed by means of a fire and tube. An aperture is formed round the fire for warming dinners. There are raised planks for the men to stand upon while changing. About 100 men and boys change here.

In winter the females eat their dinners here.

No. 2 is 30 feet long, 12 wide, and 12 high. No roof ventilator. It is warmed by a tube passing from the fire to the sump house.

The sump house is for the shaftmen; good fire.

Pitmen and timbermen's house very comfortable. It has a wooden floor and good fire.

The dressing mostly carried on under roofed sheds.

In the north part of the mine the dressing also under sheds, but no provision for girls to warm their dinners, &c., other than engine house.

Huel Treweatha (Lead).

The old mine abandoned, and a newer part being worked.

A perpendicular shaft is sunk to the 30, and the operations confined now to driving upon that. There are about 30 underground men. In the old mine skips were employed, and the new shaft is sunk with that object in view.

A separate ladder way is carried down on the course of the lode underlaying 1½ feet per fathom.

There is a small drying and changing house, though most of the men change in the boiler house.

About seven persons employed dressing the ores. All under cover.

West Fowey.

Changing and drying house is 30 feet long by 12 feet wide. There is one window, but no roof ventilation. The house is built at the end of the boiler house, and is warmed by a flue passing from the boilers.

Sump men and pitmen have changing houses to themselves.

Some of the underground men, the fillers, and the landers change over the boilers.

1. *Deeble's Shaft.*—124 fathoms below the adit (11) is an engine and drawing shaft, and is perpendicular to the bottom. It is 12 feet by 7. Two kibbles are used drawn by chains. Footway for shaftmen. Ladders in 3 fathoms lengths, with from 3 to 4 feet base, the staves 12 inches apart.

2. *Protection Shaft.*—100 fathoms below the adit (24). From the 35 it underlays at the rate of 3½ feet per fathom. It is 10 feet by 5 feet. The ordinary ladder-way for the men. It is cased off, and is 4 by 5 feet. Down to the 35 the ladders are in 4 fathom lengths, with from 2½ to 3 feet base, and staves 12 inches apart. I went down to the adit, ladder way very good. Below the 35 the ladders continuous on the course of the underlay.

This shaft 60 fathoms from changing house.

The mine very well supplied with sheds.

East Crinnis.

This mine has been a very extensive one. It is now very nearly abandoned. The operations confined to clearing up.

Changing House is 40 feet long by 18 wide, and 20 high. Provided with a fire and tube. A sump house by the side. It has 7 windows. There is a very good roof but no ventilators. There were 73 men using it.

1. *Thomas's Shaft.*—Formerly a whim shaft, but now especially kept for footway shaft. It is 4 feet by 2. It is perpendicular to the 40, the ladders in 4 fathom lengths, with 3 feet base and 10 inch staves. The shaft below the 40 underlays at the rate of 2½ feet per fathom. The ladders here continuous from level to level, a distance of 10 fathoms, 140 fathoms from change.

2. *Daney's Shaft.*—Also a footway to the 30, underlaying 3 feet in a fathom. From the 30 the men go through winzes. This shaft not used by many men. It is about ¼ mile from change.

The dressing operations are very much scattered about, with but few under sheds.

No house for females to dine in.

West Par.

Engine Shaft.—An inclined shaft from surface, 65 fathoms in length. From surface down to the 45 it is 8 feet by 6. Below that depth it is 9 × 6. The underlay is 6 feet in a fathom. A footway for shaftmen. Ladders continuous. A tramway laid down for waggons. The waggon employed is 5 feet long, 5½ feet high, and 2 feet 10 inches wide, running on four wheels 20 inches high, and made of ¼ inch plate. Single waggon way. Chains employed.

Winding Shaft down to the 65. The same underlay as engine shaft. It is 6 feet by 5 down to the 20. Below that 7 × 5. Tram waggon and tramway as at engine shaft. Drawn by 1¼ inch wire rope.

Footway Shaft.—Special one for the purpose. The same underlay as the other shafts. Ladders continuous. It is 60 fathoms from changing house.

Charleston United.

This is a very extensive mine, employing a large number of hands.

1. *Barker's Engine Shaft* is 140 fathoms below the adit (22 fathoms), and is perpendicular. It is 8½ feet by 8 one end and 7 the other. Ladder way for shaftmen.

2. *Barker's Whim Shaft*, close by, and to the same depth as No. 1. Kibble and chain employed.

3. *Middlemore's Whim Shaft*, 100 fathoms below the adit (22) is 7 by 4 feet, and worked with chain and kibble.

4. *Annie's Whim Shaft*, 80 fathoms deep, is 7 by 4 feet. Worked with single skip running with a chain guides, and drawn by hemp ropes.

A footway for 46 fathoms. Ladders in 4 fathom lengths with 6 feet base. From the 46 the men go through winzes. This shaft is 90 fathoms from changing house.

5. *Worthey's Whim Shaft.*—Perpendicular for 85 fathoms, then underlays for 30 more at the rate of 5 feet per fathom. Kibble and hemp rope. It is 7×4 feet.

6. *Buckler's Footway Shaft.*—Perpendicular to the adit (22). Then the men go through winzes underlaying 5 feet per fathom. A good size wooden shed, with closed sides erected over this shaft.

Changing House.—This, with a run of barracks, form the side of an enclosed rectangular yard. The changing house is 60 feet long, 18 wide, and 15 high. There are 7 glass windows. No roof ventilation. It is warmed by a fire and tube. There are seats all round the house. About 200 men changing here.

A house is now being built adjoining the change which will be supplied with warm water for washing purposes.

A large number of the men changing in the barracks.

The mine well provided with sheds. 150 out of 170 hands under cover.

A very comfortable house provided for the girls to dine in. Wooden floor. Glass windows.

There is a good arrangement of water ventilation employed.

It consists of a 1½ inch pipe running from the 40 to the 124 fathom levels, which is turned sharply round, enters another pipe 14 inches diameter and tapering off to 8 inches on a length of 3 feet. The small pipe terminates with a rose, and is supplied with a stop cock to regulate the supply of water. The water in issuing from the rose causes a current of air to enter the large pipe with a velocity of from 2 to 300 feet per minute. The air carried any length by means of pipes fitting on.

Boscundle Mine.

This mine has been extensively worked. It is worked now to a much less extent.

1. *Anna Maria's Shaft.*—A perpendicular shaft and 102 fathoms deep. It is 11 feet long, 6 feet wide one end and 5 the other Engine and whim shaft. A double skip way with wooden guides. The skips have no wheels, only running plates. The skips are 2 feet by 1′ 10″ on the top, and 4½ feet deep. Ladder way for shaftmen. Ladders in 4 fathom lengths underlaying 1 foot per fathom.

2. *Matthew's Whim Shaft*, 75 fathoms below adit (15) is 7 by 3½ feet, and with kibble and chain guides.

3. *Engine Shaft.*—Perpendicular to the 20 below adit. It then underlays to the 75 at the rate of 20 inches per fathom. It is 10 by 7 feet.

4. *Footway Shaft* to the adit. Perpendicular, with ladders in 4 fathom lengths, underlaying a foot per fathom. Only 7 or 8 fathoms from changing house. From the adit, the ladder way is through special winzes.

Changing House is 42 feet long, 16 wide, and 12 high. Provided with fire and tube. There are 9 windows. No roof ventilation. No night corps in the mine.

The dressers very well protected with sheds. The burning house, not often used, is appropriated for the girls to dine in, &c. Comfortably provided with seats, a table, fire, and kettle.

Cuddra Mine.

Tickle's Shaft is 100 fathoms deep. After a perpendicular course to the 90 it underlays at the rate of 4 feet in fathom. It is 10 feet by 6; and is engine, drawing, and footway. The drawing done by a horse whim and double kibbles.

Walker's Shaft is 75 fathoms deep. Perpendicular to the 65, and then takes the same underlay as Tickle's. A steam whim and a single kibble. It is also an engine shaft from the 75 to the 60.

The general footway is in this shaft; and is cased off. The ladders are in 4 fathom lengths, with from 3 to 4 feet base, and staves 12 inches apart.

The men change in a loft over the smith's shop.

The dressing frames are all under cover. There are only three boys and three girls exposed. Sheds for these are being built.

North Roskear.

Changing Houses.—No. 1 is in the smith's shop. This shop is 71½ feet long by 26½ wide, and 24 feet 3 inches high. A portion of this, 44 feet 9 inches long, and 10 feet 3 inches broad, is taken from the smith's shop, with a stone wall partition, for a changing house. This has a wooden floor, with a rough sunk in it running the whole length, through which a stream of warm water is constantly flowing. It has two glass windows. A gallery runs round two sides of this, and opens into a gallery running round three sides of the smith's shop.

There are five forges in this shop, three working a very large ventilator in the roof. This house is 40 fathoms from the footway.

No. 2. Is in the smith's shop, and in its arrangement is similar to No. 1. The shop is 42½ feet long, 25 feet wide and 26 feet high. A portion partitioned off, 25 feet long and 10½ wide. This has wooden floor and a stream of warm water. In addition to the forges, a fire and tube provided in smith's shops for drying the clothes. This house is 25 fathoms from the footway shaft.

Dressing Floors.—All the dressers on the tin floors, and nearly all on the copper floors, are under cover. There are 200 persons engaged in dressing operations, 160 of whom are girls.

There is good provision made for the comfort of the people. There are six dining houses on the floors. This prevents a large number congregating together.

These houses have, in each of them, an open fire, and also an oven with shelves in it for warming the dinners.

Half an hour before the bell rings for the hands to leave work, one of the girls for each house goes in, prepares the fire, boils the kettle, makes the tea, puts the pasties in the oven, &c., so that when the bell rings and the dressers go in, they can sit down to a warm meal at once.

Many of the girls are being taught to write by the clerk of the mine, under the auspices of the manager, who gives prizes monthly for the best copy book, and best reading.

West Condurrow.

Engine Shaft is 37 fathoms below the adit, which is 23 fathoms deep. It is perpendicular to the adit, and then underlays at a rate varying from 2½ to 3 feet per fathom. It is 6 by 12 feet.

Purser's Shaft is 23 fathoms below the adit, which is 27 fathoms deep. It is perpendicular for 20 fathoms and then underlays about 3 feet per fathom.

The footway is through the engine shaft to the adit and then through purser's shaft. The ladders are in 3 to 5 fathoms length, with staves 10 inches apart. In engine shaft 3 feet base given to each ladder.

The men change over the boilers. A wooden pipe is fixed over the safety valve to carry off the waste steam. The number of men working underground is 29.

The floors are not yet laid out, only one shed being erected, and only five girls and a boy working.

Tincroft Mine.

Shafts.

1. *Engine* is 184 fathoms below adit, which is 25 fathoms deep, and is still being sunk. It is perpendicular for 70 fathoms, and then underlays north to the 130 at a rate of 2 feet in a fathom, and then to the bottom in a south direction at the rate of 2 feet 3 inches per fathom. It is 10 feet by 5, and is a whim shaft as well as an engine shaft. Winding by single kibble. Ladder way for shaftmen.

2. *Martin's East* is down to the 184, and is perpendicular to the 58, then underlays north to 135 at the rate of 2 feet per fathom, and then to the bottom underlays south at the rate of 1 foot 9 inches per fathom. From the 58 a new perpendicular shaft has been sunk to the 142, which is 6 by 4 feet for winding purposes. Winding in the old shaft by kibble. The new one not used yet.

3. *Martin's West* is down to the 160. It is perpendicular to the 100 and then underlays south at the rate of 2 feet per fathom. It is 7 feet by 4 and used for winding 2 kibbles.

4. *Tyries Shaft* is down to the 154. It is perpendicular to the 48 and then underlays north to the bottom, at the rate of 2 feet 3 inches per fathom. Whim shaft. A footway cased off. Ladders in 3 fathom lengths underlaying a foot in a fathom in perpendicular part. About 100 fathoms from changing house.

5. *Blight's Shaft*, is a special footway to the 58. The ladders are in 3½ fathom lengths with bases of 3 feet, and staves 10 inches apart. From the 58 the men go through winzes on the underlay of the lode. This shaft is 50 fathoms from changing house.

This shaft is now down to the 100. Levels are being driven towards and under it, at each level below, to the 140. These will be communicated, and then a man-engine will be placed in this shaft.

Changing House is 70 feet long by 20 wide, and 16 high (wall). It has 10 windows and good roof ventilation. It is

warmed by a fire and tube. It is supplied with warm water The men's lockers are around; they stand upon them to change.

Underground men:—
22 men and 11 boys on tribute.
36 ,, 26 ,, tutwork.

Dressing Floors.—All well covered in. The number employed is 43 girls, 61 boys, and 27 men on the tin floors' and 22 girls, 1 boy, and 2 men on the copper floors.

A good dining house 36 feet long by 12 wide, furnished with fire and ovens. This is for the tin dressers. Another smaller house with an open fire for copper dressers.

North Dolcoath.

Engine Shaft is 47 fathoms below adit, which is 10 fathoms deep. It is perpendicular to the 20, then underlays 2½ feet per fathom. It is 12 feet 3 inches by 6 feet. Horsewhim and 2 kibbles. Ladder way. Ladders in 5 fathoms lengths on footwall. Staves 10 inches apart. There are 14 men working underground; they charge over the boilers.

Whim Shaft to adit 6 by 3 feet. Horse whim and 2 kibbles. Footway shaft, perpendicular to the adit. 6 by 3 feet.

Dressing floors. Only 7 persons employed. A very comortable house in which they can dine.

Huel Nelson.

Engine Shaft is 74 fathoms deep.

Changing house is 40 feet long, 20 wide, and 12 feet wall; fire and tube. 16 men change here.

No dressing operations.

Huel Grenville.

Engine Shaft is 114 fathoms from surface, there being no adit. It is perpendicular for 18 fathoms, and then underlays at the rate of from 16 to 18 inches per fathom. It is 13 by 6 feet. Winding by single skip and chain. A footway in the shaft, the ladders in 5 fathom lengths, on the footwall, with staves 10 inches apart.

There is a footway through winzes all through the mine.

The men change on the boilers. It is intended that a dry shall be built shortly. The number of men working underground is 58 tutworkers and 28 tributers.

There are 14 girls dressing the ores, all under sheds.

East Grenville.

Engine Shaft is 53 fathoms deep. It is perpendicular to he 25, and then underlays at the rate of 1 foot 10 nches per fathom. It is 13 feet by 7. Horse whim, and footway. The ladders on footwall.

An air shaft to the 25, and winzes opened. This shaft s 70 fathoms west of engine shaft.

The men change over the boilers. There are 36 underground men.

There are 18 persons dressing the ores, all under cover.

East Rosewarne.

Engine Shaft is 55 fathoms deep below the adit, which is lown 13 fathoms. It is perpendicular to the adit, and then nderlays at the rate of 9 inches per fathom. It is 12 feet y 6. Horse whim and 1 kibble. Ladder way; ladders in fathom lengths, with 4 feet base, and stattes 10 inches part.

Hallett's Shaft is 55 fathoms below the adit. It is perendicular to the adit, and then to the 22 fathom level nderlays (S) at the rate of 18 inches per fathom. It is hen perpendicular for 11 fathoms, and then to the 43 nderlays (N) at the rate of 9 inches per fathom. Horse whim and kibbles. A footway for sump men.

There are several other shafts down to the adit, and ome more down to various depths.

Changing House is 31 feet long by 13 wide, and 10 feet valls. It has two large sliding skylights, and 2 windows for ighting and ventilating. It is heated by a fire and tube. he floor is an earthen one. The men stand upon their oxes to change.

The number of men is 56.

There are about 20 persons on the floors, about one half f whom are under cover.

Rosewarne United.

No agent on the mine.

Changing House is 48 feet long, 15 wide, and 12 feet walls. t is well lighted by means of skylights. It is heated by eans of a fire and long tubular boiler. On either side of the oiler the floor is raised about 4 feet, and boarded. Lockers all round. About 50 suits of clothes hanging around. The house is ventilated by having the skylights about 6 inches higher than the roof.

There were about 20 persons dressing the ores. All were under cover. The spalling house has closed sides and a fire place.

The shaft is down to the 90 below adit, which is 16 fathoms deep. From the plan there appeared to be about 10 shafts sunk to various depths.

Rosewarne Consols.

Engine Shaft is 55 fathoms deep from surface. It is perpendicular to the 20, and then underlays at the rate of 2½ feet per fathom. It is 10 feet by 6. The general footway for the men. Ladders in 5 fathom lengths, with 4 feet base in the perpendicular part.

Flat Rod Shaft is 30 fathoms below the adit, which is 14 fathoms deep. It is perpendicular to the adit, and then underlays at the rate of 18 inches per fathom. It is 8 feet by 3. Ladder way perpendicular to adit then on footwall.

Western Whim Shaft is 30 fathoms deep.

Ellen's Shaft is 45 fathoms deep. It is perpendicular to the 20, and then underlays at the rate of 2½ feet per fathom It is 6 by 3 feet. Horse whim.

The men change on the boilers.

There are 10 people dressing. All under cover.

Huel Unity (Gwinear).

No agent to be seen, he being underground.

Only eight girls dressing ore. All under cover. The girls dine in bucking house.

About 30 men work underground. They change in boiler house.

There are two shafts. The deepest level is 29 fathoms deep.

Ladders in about 5 fathom lengths, with about 3 feet base.

Basset and Grylls.

There are two portions in this mine at present not communicating, but levels are being driven, which, when completed, will effect this.

In each part there are two or more shafts.

The Old Part.

Robartes' Shaft is 50 fathoms deep. It is perpendicular for 32 fathoms, and then underlays with a regular underlay of 2½ feet per fathom. It is an engine and winding shaft 11 feet by 7 in size. One kibble drawn by chain used.

A ladder way in this shaft which is used by about 150 men. The ladders are in 3 to 3½ fathom lengths, with bases of about 3 feet, and the staves 10 inches apart. It is about 40 fathoms from changing house.

Middle Work Shaft is 22 fathoms deep, 5 feet by 3 in size, and used for winding. A horse whim and kibble.

Huel Fat Shaft is now being sunk below the 30 fathom level. It is perpendicular the whole way, and 9 feet by 5½ large. Engine and whim shaft. Horse whin. One kibble and chain.

Footway, with ladders same as in No. 1. This shaft close to the changing house.

Harris' Shaft.—Whim shaft down to the 22.

Footway Shaft.—Adjoining Huel Fat Shaft down to the 16. The ladders are not so easy as in engine shaft, having only 1 foot base to 3 fathom ladders; hence the men mostly come up the engine shaft.

Changing House.—A house 40 feet long, 20 feet wide, and 15 feet high in centre, with a wooden roof. It has only one window and no ventilator in the roof. It is warmed by a tube leading from the sump house, which is a portion of the changing house partitioned off, but included in the measurements before given. There are 2 windows in the sump house.

Dressing Floors.—The number of hands employed on the floors in this part of the mine is 10 men and 4 girls. They are not under cover. They take their dinner in the sump house.

A number (about 15) of men change over the boiler. This is against the law of the mine, and with the knowledge that in case of any accident arising therefrom, they shall have no claim upon the club.

This engine boiler house is about 40 fathoms from the change, but there is a shaft close by the changing house, through which these men might all travel, and so avoid the boiler house altogether.

New Part of the Mine.

Tyack's Shaft is 34 fathoms deep, and 11 by 7½ feet in size in the upper part, while downward it is 13 feet in length. It is a perpendicular shaft used for engine and winding shaft. House whim and 2 kibbles. Only 12 men working in three cores at work here.

Wilkins Shaft is down to the 32. It is 8 by 5½ feet. 27 men working in 3 cores.

The men from these shafts change over the boilers.

Dressing Floors.—The main floors are in this part of the mine. About 150 persons employed, of whom only 15 are working in the open air. The girls mostly eat their dinners under the sheds where they are working. There is one house for the purpose, 12 feet long by 10 wide, with a fire, and several go into the burning house, where an open fire is kept. This house has a good ventilator, and there is no arsenic in the tin.

Wendron United.

Engine Shaft is 50 fathoms deep, and 11 feet by 5½ large. It is perpendicular down to the 20, and then underlays about 1 foot in a fathom. Engine and whim shaft. Ladder way all down. Ladders 4 fathom lengths with 4 feet base, and staves 11 inches apart.

This is the principal shaft and general footway. About 50 men and boys travel here.

Men's Shaft.—40 fathoms deep. 6 by 4½ feet. Horse whim. 2 kibbles.

South Shaft.—Horse whim. 2 kibbles 9 by 4½.

New Shaft.—30 fathoms deep. Whim shaft and ladder road.

Dressing Floors.—Only 15 to 20 boys and girls dressing. All under cover. They dine in the burning house, which has an open fire in it. No arsenic fumes.

The men change over the boilers, close to the engine shaft. The house has no ventilation.

The sump men, six in number, have a portion of the mith's shop partitioned off for them. No ventilation.

Calvadnack.

Engine Shaft is 92 fathoms deep, underlaying from surface at the rate of 6 inches per fathom. It is 14 feet by 6. Engine and whim shaft. A single kibble drawn by chain.

Ladder way.—Ladders in 3½ to 4 fathom lengths, with a base of 6 feet; and staves 10 inches apart.

Paynter's Shaft is 70 fathoms deep, with the same underlay as engine shaft. It is 8 feet by 6 in size. There is a whim shaft and ladder way. The skip is used here, and is 5 feet deep by 2 feet square. Ladder way is cased off, and is 3 by 6 feet. The ladders average 5½ fathom lengths, with a base of 3 feet. This, with the underlay, makes a base of 5½ feet from the perpendicular.

Granju Shaft. — 40 fathoms deep, underlaying from surface 18 inches per fathom. It is 8 by 5 feet in size. The ladders are in 3½ fathom lengths, with 18 inches base. 30 men travel through this shaft. Skip used for drawing stuff.

Changing House is 40 feet long, 15 feet wide, and 15 high. It is warmed by a tube leading from the sump house. It has two open windows, but no roof ventilation. There are about 100 men changing here, about 40 at a time.

Sump House adjoining changing house, 6 men and 3 boys. Not kept very clean.

Dressing Floors.—Out of 100 dressers, only about 30 are under cover. Sheds are being erected, and it is intended that all shall be covered in before the approach of winter. There is a house provided for the dressers to dine in, 15 feet long 12 wide and 10 high, warmed by a fire and tube.

Polhigey Moor.

South Shaft is 15 fathoms deep and a perpendicular one. It is 8 by 6 feet at the top, increasing to 10 by 7 at bottom, Engine and whim shaft. Horse whim, kibble, and chain. A footway of 3 ladders in this shaft, each having a base of 2 to 3 feet, and staves 10 inches apart. 15 men.

East Shaft is perpendicular and 13 fathoms deep, is 6½ by 4 feet in size, and is for whim shaft only.

Treffry's Shaft is perpendicular and 15 fathoms deep, is 11 by 7 feet in size. Engine and whim shaft. Ladder way same as in South Shaft.

There is no regularly built changing house, it not being known which shaft will be devoted to a footway shaft. At the present time some of the men change over the boilers, while others change in a shed 20 feet long close to Treffry's shaft.

There are no dressing operations carried on, except two little boys attending to a round buddle.

Garlidna.

Engine Shaft is 52 fathoms deep, and perpendicular. It is 7 by 10 feet. Engine and whim shaft. Winding by means of horse whim, kibble, and chain.

Ladder way in engine shaft, with ladders in 5 fathom lengths; the ladders are perpendicular. Not used by the men.

Flat Rod Shaft is the principal shaft. It is 60 fathoms deep and 12 by 5 feet in size. It is an engine shaft below the 50. Winding by a single kibble. Footway in this shaft. Ladders in 4 fathom lengths, with 6 to 7 inches underlay per fathom. Staves 10 inches apart.

Footway Shaft is down to the 20. Then the men go through winzes. The ladders here underlay 1 foot in fathom. Staves 10 inches apart.

The men change over the boilers, which are 30 yards from footway shaft. About 65 underground men and boys. It is intended that a drying and changing house shall be built at some future time.

The whole of the dressing is carried on under cover. There is no special house for the girls to dine in; but they go to the tin house where a fire is kept for their convenience. The foundation for a dining house is dug out, so that one will be erected shortly.

The amount of covering provided on this mine is 12,000 feet. There are 50 persons employed on the floors.

Wendron Consols.

Sump Shaft is 45 fathoms deep. It is perpendicular for 25 fathoms, then underlays at the rate of 2 feet 9 inches per fathom. It is 11 feet by 6. Engine and winding shaft. Winding by means of a single skip and chain. The general footway is through this shaft. The ladders are in from 3½ to 4 fathom lengths, with 2 feet base in the perpendicular part, but no base given in the underlay part. The staves are 10 inches apart. It is 30 fathoms from the changing house.

Sleeman's Shaft is 35 fathoms deep, and still being sunk. It is 5 feet by 7 at the top, but widens downward. This is a whim shaft, a double kibble, horse whim and chains employed. The shaft is perpendicular to the 25, then underlays at the rate of 2 to 9 inches per fathom. A ladder way in this shaft. It is 80 fathoms from the changing house.

3. *Baldhee's Shaft* is a perpendicular shaft of 45 fathoms deep. At top it is 7 by 5½ feet, increasing downward to 10 by 6. Engine and whim shaft. Drawing by 2 kibbles, horse whim and chain. A ladder way in this shaft, with 6 inches underlay per fathom. This shaft is 120 fathoms from changing house.

4. *Hill's Shaft* is 80 fathoms deep, and still being sunk. In the upper part it is 6 by 9 feet, while lower it is 10 by 5 ft. Engine and winding shaft. Winding by means of singleskip. The shaft is perpendicular for 20 fathoms, and then underlays at the rate of 1 foot 7 inches per fathom. A ladder way. This shaft is 130 fathoms from the changing house.

5. *Huel Flat Shaft* is a horse whim shaft 25 fathoms deep. 5 feet by 2½ in size.

6. *Bishop's Shaft* is 62 fathoms deep, perpendicular for 12 fathoms, and then underlays at the rate of 2 feet 9 inches per fathom. Engine and whim shaft. Winding by single skip. Ladder way 90 fathoms from changing house.

Changing House is a very good building 36 feet long, 12 feet wide, and 14 feet walls. A gallery runs around it at a height of 8 feet from the floor. The house is warmed by means of a tube. The house is well lighted, and ventilated from the roof. There are 152 underground men.

A few men, perhaps 20, were changing over the boilers.

All the dressing appeared to be carried on under sheds; but a portion of the ores is dressed by contract by another party. This part appeared badly off for shelter. The number of dressers engaged were 54 men, 87 boys, and 59 girls.

Crane.

This is a mine lately set to work. There is no house as yet provided for the men specially to change in. Until such accommodation be provided the men change in the smith's shop, and the sump men in a room over the carpenter's shop. There are 20 men working underground, and 12 sump men. The men dry their clothes over the boilers.

Engine Shaft is 60 fathoms below the adit, which is 20 fathoms deep. It is perpendicular to the adit, and then underlays at the rate of 1 foot in a fathom. It is 9 feet by 6 to the adit, and then increases to 12 feet by 7. Engine and whin shaft. Winding by single skip. The skip is 6 feet deep by 2 feet, by 1 foot 9 inches at the top. A

ladder way in this shaft. The ladders from 5 to 10 fathoms long, with a base of 5 to 7 feet.

Whim Shaft is down 30 fathoms below adit. It is perpendicular down to the adit, and then underlays from 10 to 12 inches per fathom. It is intended to sink on the lode from the adit, and to put in a double skip way. The shaft to be 8 feet by 5.

Footway Shaft.—A special footway to the 30. Then the men go through winzes. The shaft is 6 feet by 4. Ladders in 5 fathom lengths, with 4 feet base and staves 10 inches apart.

There are only 4 or 5 hands engaged in dressing, and these are under cover.

South Seton.

Marriott's Shaft is 40 fathoms below the adit, which is 11 fathoms deep. It is perpendicular to adit, and then underlays at the rate of 5½ feet per fathom. It is 14 feet by 6. Engine and drawing shaft. A double skip road is laid down, winding by horse whim. Ladder way in this shaft. In the perpendicular part there are 3 ladders, each with a base of 3 feet. In the underlay part no base required. The staves are 10 inches apart. This will be the principal ladder way to the 26, and then through winzes.

Tippett's Shaft is a perpendicular shaft, and 42 fathoms deep. It is 13 feet by 6.

There are no dressing operations on the mine.

Changing House is 20 feet long and 10 feet wide, It is 15 feet high one side, and 8 the other. There is no window nor ventilator. It is warmed by fire and tube; 30 men and boys at work underground, there would therefore be about 10 or 12 changing at a time.

West Seton.

Engine Shaft is 130 fathoms below the adit which is 22 fathoms deep. It is perpendicular to the 18, then underlays at a varying rate, averaging 3½ feet per fathom. It is 14 feet by 5½, whim and engine shaft. Winding by double skips and chains. Ladder way for shaftmen.

New or *Western Shaft* is down to the 56. It is perpendicular to the 18, and then underlays regularly at a rate of 4½ feet per fathom. Winding by double skips. The shaft is 10 by 6 feet.

Old Sump Shaft down to 50 is a perpendicular shaft.

South Shaft is down to the 110. It is perpendicular to the 18 and then underlays at the rate of 3½ feet per fathom. It is 12 by 6. This is the general footway, the ladders in 2 to 3 fathom lengths with 3 to 4 feet base, and staves 10 inches apart. In the inclined portion the ladders require no base.

There is a special footway to the 18; then through the previous way.

Changing House is a good stone building, 50 feet long 20 feet wide, and 24 feet high.

It has a gallery running around the whole building. This part is lighted by 5 windows each 3½ by 4½ feet.

The lower part is divided, one part 22 feet long, for the men, the other part for sumpmen and pitmen. This part has also windows; and there is a large ventilator in the roof.

There is a large trough with warm water for the men to wash in.

There are about 250 men working underground. About 80 would be changing at a time. There were about 150 suits hanging.

Dressing Floors.—(1). The main dressing floor is well covered in. The side which is usually left open can be closed by means of moveable frames, formed of wooden supporters and thatch.

A dining house for the dressers on this floor, 54 feet long, 14 feet wide, and 13 feet high, provided with fireplace and ovens, as at Dolcoath. It has 5 windows. A woman to keep it clean, and attend to the dinners. There are 140 hands on this floor.

(2). *Tin Floors.*—36 hands on this floor, 6 of whom are not covered. A small house 16 feet by 13 with open fire provided for them to dine in.

(3.) *Halvan's Floors.*—30 people working, 13 of whom are under cover. A house 17 by 13 with a fire and oven provided.

New Huel Seton.

A new mine.

Engine Shaft is being sank under the 52. Adit 16 fathom. It is perpendicular to the 14, then underlays 4½ feet per fathom. It is 13 by 6 feet. Horse whim.

Whim Shaft to the 28. It is 10 by 6. Horse whim.

The men change over the boilers. There are 24 men and 4 boys.

No dressing operations.

Huel Seton.

Tilley's Shaft is 140 fathoms below the adit, which is 26 fathoms deep. It is perpendicular to the 20. It is 6 by 12 feet. Engine and winding shaft, two kibbles and chains. Ladder way. Ladders in from 3 to 5 fathom lengths with 4 feet bases; staves 12 inches apart.

Bull's Shaft is down to the 130; is 12 by 6 feet. Winding shaft; two kibbles and chains. No ladder way.

Footway Shaft to the 12; then through winzes. This shaft is 25 fathoms from the changing house.

Changing House is 40 feet long by 15 wide and 27 high. A gallery all round. There are 4 windows and a large ventilator in the roof to light and ventilate the upper part, and 3 windows under the gallery. There were also 3 other windows but they were fastened up. The house is warmed by means of a fire and tube. There are 160 men working underground.

There are 130 engaged on the dressing floors, nearly all of whom are under sheds. The girls dine in the sampling house, which is 40 feet long by 15 wide, and 14 high, and provided with an open fire.

North Crofty.

Engine Shaft is 170 fathoms below the adit, which is 20 fathoms deep. It has a regular underlay from the 20, of 3 feet per fathom. The shaft is 13 feet by 6. Engine and whim shaft, winding with chain and single kibble Ladder way for shaftmen. Ladders in 4 fathom lengths, no base required; staves 11 and 12 inches apart.

2. *Praed's Shaft* is 150 fathoms below the adit. It underlays from the adit at the rate of 2 feet. It is 8 by 4 feet. Winding by double skips and chains. No ladder road.

3. *Rule's Shaft* is 140 fathoms below adit, underlaying at the rate of 2 feet in a fathom. It is 10 by 5 feet; 1 kibble drawn by chain used here. Ladder way cased off from the whim shaft; ladders as in engine shaft. This is about 90 fathoms from the changing house.

There is a special footway down to the adit.

Changing Houses.—There is no large changing house on the mine, but there are three rows of buildings called barracks, which consist of 10 or 12 little houses, each about 8 feet long, 7 wide, and 8 high, appropriated for the use of a pair of men. These houses are not heated at all, and have no window. A stream of water flows through them for the men to wash in. The men dry their clothes over the boilers. If a party is working in a very wet place, they are allowed to use either a small house adjoining the sumphouse, or another house, each of which is furnished with fire.

Sumphouse is 20 feet long by 10 wide. Fire and tube; 8 men and boys.

The dressing floors are well provided with sheds. There are from 80 to 100 dressers, of whom, only 20 work in the open floors.

East Pool.

North Shaft is a perpendicular shaft, 150 fathoms below the adit, which is 20 fathoms deep. It is an engine and whim shaft. Winding with two kibbles and chains. Ladder way in 4 fathom ladders with 6 feet bases.

South Shaft is 112 fathoms below the adit. It underlays from the 38. It is 9 by 5 feet. Winding by two skips and chains. Footway. Ladders in 3½ fathom lengths in the underlay, no base required.

There is also a footway close to the changing house, through which all the men can travel.

Changing House.—A good building 72 feet long, 18 feet wide, and 27 feet high. There are 9 windows, the upper part of each is glazed, and the lower part is fitted with a sliding ventilator. There is also a large ventilator in the roof. The house is warmed by a fire and tube. A row of lockers run around the buildings 6 feet wide, on which the men stand to change. The floor is an earthen one, which gives up a great deal of dust. A washing trough 15 feet long by 12 inches wide, and 1½ deep, with a running stream of warm water for the men to wash in. About 150 men and boys.

Dressing Floors.—There are two floors, the northern and southern. The former is fairly supplied with sheds. The cobbing is done in a large shed, which has a fire in it. The southern floor is entirely enclosed. It is about a quarter of an acre in extent, completely walled in and roofed. It has a capital house for the dressers to dine in 30 feet long, 10 feet wide, and 8 feet high, and provided with a "slab" and ovens, similar to those described at Dolcoath.

Huel Tremayne.

Agents underground.

Engine Shaft.—The general footway for the men. It underlays 6 inches per fathom. The ladders appear to be very steep, having only one foot base on 5 fathom ladders. It is 130 fathoms deep.

There are two other shafts.

Changing House is 50 feet long, 20 wide, and walls 12 feet high. It is well ventilated from the roof, has 3 windows, fire and tube, and earth floor, 120 to 130 undergroundmen.

The trammers change on the upper floor of the whim engine house.

Dressing Floors are very well provided with sheds. The girls eat their dinners in the tool house, which is four bare walls with a thatched roof. About 60 dressers.

West Providence.

Just being abandoned. Captain not on the mine.

Changing House 36 feet long, 12 wide, and 8 feet wall. Heated by fire and tubular boiler. No roof ventilation.

Huel Anna.

Western Shaft is 90 fathoms below the adit, which is 20 fathoms deep. It is perpendicular to the 20, and then underlays at the rate of 1½ feet per fathom. It is 12 feet by 9 feet wide one end, and 7 feet wide the other. Engine and whim shaft. Winding by single skip. Footway for shaftmen.

Special footway for the men through a shaft to the adit, 6 feet by 3, with ladders of 3½ fathom lengths, and 4 feet or more base, and staves 10 inches apart. From the adit, ladders through winzes underlaying 1 foot 9 inches per fathom. Over each ladder a "pentice" or sloping board is placed to prevent anything from falling upon the men while climbing.

James	Shaft,	70	fathoms	deep.
Richards	,,	60	,,	,,
Bucket	,,	50	,,	,,
Ellerys	,,	70	,,	,,
Lobbys	,,	72	,,	,,

All on one lode.

Changing House is 80 feet long, 16 wide, and 16 feet walls. It has 10 windows in front wall, each 3½ feet square, and two good ventilators in the roof. A gallery runs all round it, about 8 feet high. The lower part for drying the clothes, with a tube heated by fire in sumphouse adjoining, and the upper part for the men to change in. About 100 underground men. The day core about 50.

The sumphouse is 16 feet square, and has 3 windows.

Dressing Floors are very well provided with sheds. There are between 60 and 70 dressers employed.

There are several small houses with fires in different parts of the floors for the dressers to dine in, as well as a large space in the calciner house.

Huel Gurlyn.

Bawden's Shaft, or engine shaft, is 70 fathoms below the adit, which is 10 fathoms deep. The mine is not being worked below the 40. It is 10 feet by 6. Footway. Ladders in 5 fathom lengths, with bases of 4½ feet.

From the adit, there are ladders through winzes to the 40, underlaying 2½ per fathom.

Whim Shaft.—Perpendicular to adit, then underlays at the rate of 2½ feet per fathom. Horse whim and kibble.

Whim Shaft on Rich's Lode is perpendicular to the adit, and then underlays as before to the 30. It is 6 feet by 4½.

Shaft on Fox's Lode is a perpendicular shaft 30 fathoms below adit.

A ladder way to adit on this shaft, and then through winzes.

There are 64 tributers, and 25 tutworkers, all of whom change over the boilers.

Dressing Floors.—On the tin floors, 13 dressers at work, and none under sheds. On Guskin's floors 24 employed, 8 of whom are under cover. There is no special house appropriated for dining, &c., but the females use the smith's shop.

West Stray Park.

Until a short time ago, the men changed over the boilers, but as the mine became deeper, and the engine required to be worked with a higher pressure steam, it was determined that a dry and changing house should be built. This is done by the side of and communicating with the boiler house. The house is 32 feet long by 14 wide; has a wooden floor, and a trough of warm water for the men to wash in. There were about 40 suits of clothes hanging in his house. The men dry their clothes over the boilers.

Shafts.—Only one shaft, which is 130 fathoms deep, underlaying 3 feet in a fathom. The ventilation is produced by adit and winzes.

Floors very well furnished with sheds. About 50 dressers at work.

Huel Agar.

Engine Shaft is 100 fathoms below adit, which is 23 fathoms deep. It underlays from adit at the rate of 3 feet per fathom. It is 12 feet by 6. Winding by 2 skips. Footway. Ladders in perpendicular position in 4 fathom lengths with 4 feet base, in underlaying part 20 fathom lengths.

There is a special footway perpendicular to the adit, then through winzes to the 13, and then through the engine shaft.

In the western part of the mine there are 3 shafts open to the 90.

Changing House is 38 feet long by 18 wide and 10 feet wall. It has only one window and no roof ventilation. A part of this length partitioned off for pitman's, and sumpmen's house. The whole is heated by a fire and tube.

There are 60 persons employed underground.

Dressing Floors are well roofed in. About 20 dressers. They dine in the sampling house.

Great South Tolgus.

Engine Shaft is 140 fathoms deep, is perpendicular to the 60, and then underlays at the rate of 2½ feet per fathom. Winding by single skip. The shaft is 14 feet by 6. Footway to the 25. The ladders in 4 fathom lengths, with 4 feet base. Then through winzes.

Changing House is 50 feet long, 20 wide, and walls 16 feet high. There is a gallery around. The ground floor is of earth. There are 3 windows, with a sliding panel in each. It is warmed by a fire and pipe. It is supplied with warm water. About 100 men change here.

Dressing Floors.—Well provided with roofs. The dressers dine in the sampling house, which is 26 feet long by 12 wide; fire and 2 windows. There are 40 girls and boys at work.

Providence Mines.

Changing House.—A good stone building with slate roof, well lighted and ventilated, and kept thoroughly clean. It is 90 feet long by 20 feet broad. It has a wooden floor, and the men's lockers are neatly arranged around the room. The day clothes are hung over each man's locker.

It is warmed by a fire under a large tube of water, which runs the whole length of the house.

It is lighted by 6 windows made to open, and by 6 skylights placed in the roof. Besides these windows which open, 3 large ventilators are placed in the roof, and kept constantly open.

A long trough is laid in the floor, through which a stream of warm water is constantly flowing. This is one of the best changing houses in the county.

Boilers.—Stamps boilers. Manhole leaking very badly. Gauge cocks.

Whim boiler. Gauge cocks.

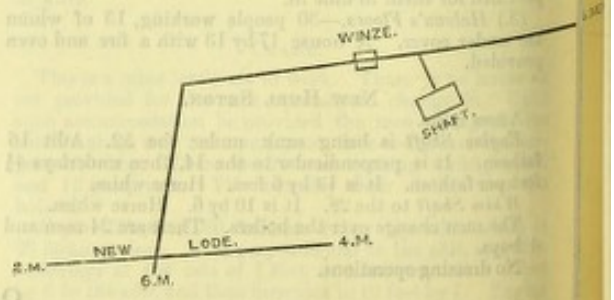
Stamps boiler. Safely weighted with bricks. Gauge cocks.

East Providence.

Boorman's Shaft, 12 feet long by 5 feet wide, is 70 fathoms deep. Used as pumping and winding shaft, underlays 3 feet per fathom.

70 fathom level now driving by 6 men, about 10 fathoms from Boorman's shaft.

60 fathom level, driven 18 fathom to new lode, which it has gone through, and is still driving by 6 men. The new lode is being driven east by 4 men and is 15 feet in, the western end is 6 feet in and being driven by 2 men. The winze by 6 men nearly through to the 70.



40 fathoms level driving towards Wilson's shaft which is being sunk from surface by 6 men, and is 45 fathoms from Boorman's shaft.

30 fathoms level is driven from Boorman's to under Wilson's. A bore hole has just been made through.

The men change over the boiler in boiler house. The boiler has guage feed cocks, and is working at low pressure.

Polbreen Mine.

1. *Engine Shaft* is 32 fathoms below the adit (30). It is 9 by 6 feet. Perpendicular. Winding by kibbles and hemp rope. Ladder way. Ladders in 5 fathom lengths with 1 to 2½ feet base. Some are perpendicular.

2. *Dorcas Shaft*, 91 fathoms east of engine shaft. Perpendicular to the adit, and then underlays on the course f the lode to the 52, at the rate of 9 inches per fathom. Ladder way continuous from level to level. The shaft is 9 by 6 feet. Horse whim, kibble and rope.

All the dressing operations are under cover. A comfortable house provided for females to dine in.

No dry at present. The men change in boiler house. There is one being built adjoining the boiler house, 30 feet long, 12 wide, and 15 high, and which will be supplied with a cistern of warm water.

Penhall's Mine.

1. *Engine Shaft.*—It is down 40 fathoms below the adit (46). It is perpendicular for 50 fathoms below the surface, thence underlays at the rate of 2 feet per fathom. It is 12 by 5 feet. Horse whim and kibble employed for winding.

Footway.—Ladders in 4 fathoms lengths, underlaying in perpendicular part, 9 to 10 inches per fathom. The staves 10 inches apart. It is 60 fathoms from the changing house.

2. *Western Shaft.*—70 fathoms deep from surface. It is 6 by 4 feet. Horse whim and kibble.

The men change in boiler house, but a new dry is being built.

Report on Devonshire Mines. By C. Twite, Esq.

Bedford Hotel, Tavistock,
25th May 1863.

My Lord,

In obedience with your instructions we have visited the mines in the neighbourhood of Tavistock and Ashburton, and beg herewith to submit our report upon the same.

We are, my Lord,
Your Lordships obedient servants,
Chs. Twite.
W. H. Rowe.

The Rt. Hon. Lord Kinnaird, K.T.
Chairman, Royal Mines Commission, 1862.

THE DEVONSHIRE GREAT CONSOLIDATED MINES.

These mines, the largest and richest copper mines of England, are situated about four miles west of Tavistock. They consist of five largely developed mines, giving a series of workings on one large main lode of nearly two miles in length, and all communicating one with the other, and a tract of new ground nearly a mile in length, which is now being opened out.

The Company is formed upon the old joint stock system. The Chairman of the Company is Mr. W. A. Thomas, of Threadneedle Street, London; Mr. Thomas Morris, of Tavistock, is the resident director; and Captain James Richards the managing agent, with Captain Isaac Richards, principal dressing agent.

The mines taken in order from the west are :—

1. Huel Maria	- -	120 fathoms long.
2. Huel Fanny	- -	285 ,,
3. Huel Anna Maria	- -	197 ,,
4. Huel Josiah	- -	367 ,,
5. Huel Emma	- - -	417 ,,

The number of persons employed during month of April were as follows :—

Underground :—	Agents - - -	10	
	Pit and timber men -	11	
	Tutwork men - -	334	
	Tributers - -	13	
	Trammers, fillers, and landers - - -	79	
	Laborers - -	7	
	Boys - - -	19	
			473
Surface :—	Agents and engineer -	9	
	Smiths - - -	20	
	Carpenters and sawyers -	18	
	Masons - - -	13	
	Engine men - -	15	
	Laborers - -	128	
	Foundry - - -	15	
	Railway - - -	22	
			240
Dressing Pans :—	Men - - -	117	
	Boys - - -	181	
	Girls - - -	199	
			497
	Total - -	1210	

Going through the workings of these mines from west to east, the principal points to be observed are as follows:—

I. Huel Maria Mine, the most westerly, has three shafts :—

1. *Castles Shaft*, 23 fathoms deep, is quite at the western extremity of the workings, and is kept open as a ventilating shaft. It is 9 × 5 feet.

2. *Gards Shaft* is 60 fathoms east of Castles shaft, and 100 fathoms deep ; is 10 × 6 feet, and used for pumping and drawing.

3. *Morris' Shaft* is 60 fathoms east of Gards shaft, is down to the 100 fathom level, and is 10 × 6 feet in size.

These are all perpendicular shafts.

The only end driving in this mine is a cross-cut from the 23 fathom level, which is driven 20 fathoms from Morris Shaft. All the other workings are upon tutwork, this being the only part where tributers are employed.

II. Huel Fanny Mine is next going east. The workings here are 80 fathoms south of those in Huel Maria, the lode having been heaved that distance by the Great Cross Course, and extends for a length of 285 fathoms.

Huel Fanny is worked from 3 shafts.

1. *The Western Engine Shaft*, 90 fathoms east of Morris' shaft, is 12 × 8 feet in size, 135 fathoms deep, and used for pumping and drawing. It is perpendicular to the 18, and then underlays 2 feet in a fathom. The drawing is done in kibbles.

2. *The Eastern Engine Shaft*, 65 fathoms east. The last one is down to the 80—15 perpendicular ; the rest on the course of the lode. It is 10 × 6 feet in size, and used for drawing.

3. *The Ventilating Shaft*, 65 fathoms east of the eastern shaft, is 65 fathoms deep, and 8 × 4 feet.

There are only two ends being driven in this mine :—

1. A cross cut from the 25 fathom level driven fathoms in from the main level. A good current of air would be circulating through the level, and air pipes are placed to carry the air in to the end.

2. A cross cut driven from the 55 to intersect a lode 10 fathoms south.

III.—Huel Anna Maria Mine extends 197 fathoms east of Huel Fanny to Agnes Shaft. It has two shafts.

1. *Engine Shaft*, 102 fathoms east of the boundary, is down 137 fathoms, 30 fathoms perpendicular, and 107 on the course of the lode. It is 12 × 7 feet in size, and used for pumping and drawing. The drawing is done by two skips, drawn by a 7-inch flat hemp rope.

2. *Field's Shaft*, 95 fathoms east of Engine Shaft, is down 154 fathoms, is 10 × 6 feet in size, drawing by a single skip.

The drivings in this mine are :—

1. *Jeffries' cross cut*, gone out from the 70, 50 fathoms west of Engine Shaft, driven 60 fathoms south by two men. Ventilated by air pipes.

2. *The 95 fathom level*, driven 90 fathoms west of Engine Shaft, and 20 fathoms from a winze. The back of this level has been taken away, so that the level is open.

3. *The 40 fathom level*, driven 100 fathoms west of Engine Shaft, and 15 fathoms beyond a winze. No backs opened. Southcomb's rise is going up about 3 fathoms east of this end.

4. *The* 80 *fathom level*, driven 47 fathoms west of Engine shaft, 18 fathoms from winze.

IV.—Huel Josiah Mine extends from Field's Shaft to Agnes Shaft, a distance of 367 fathoms. This part is worked deeper than any of the others. It is worked by 3 shafts.

1. *Richards' Shaft*, 100 fathoms east of Field's Shaft, is now sinking below the 212, by 9 men. It is perpendicular to the 40, then on the course of the lode. Engine and drawing shaft. Kibbles are used here, drawn by 6-inch flat ropes.

2. *Hitchen's Shaft*, 67 fathoms east of Richards', is 170 fathoms deep. Is 12 × 6 feet in size. Used for pumping and drawing. Kibble, and 6-inch flat rope.

3. *Agnes' Shaft*, 200 fathoms east of Hitchen's.

(*a.*) *Old Shaft* to be 103, open for ventilation and ladder way.

(*b.*) *New Shaft* to be 184, perpendicular to the 115, and then underlays 2 feet per fathom. Engine and drawing shafts, 12 × 7 feet in size, 2 kibbles, and 4-inch flat ropes.

The drivings are more numerous in this part.

1. *Drivings from Field's Shaft* :—

(1.) *The* 130 fathom level is driving on the south lode, and is 40 fathoms east of the shaft, and 15 fathoms beyond a rise. Driving by 4 men.

(2.) *The* 115 *fathom level* is driving 70 fathoms east of the shaft, and is 5 fathoms beyond a rise. Driving by 4 men.

(3.) *The* 103 *fathom level* is driving 90 fathoms east of the shaft, and is 25 fathoms beyond a rise. A winze is coming down from the 90 just upon this end.

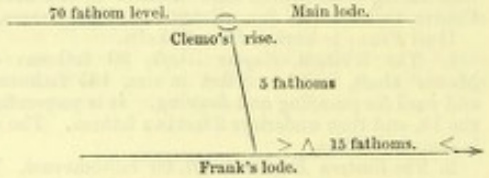
(4.) *The* 90 *fathom level* is driving 100 fathoms east of shaft, and is 20 fathoms beyond a rise. A winze is going down to the 103, about 8 fathoms behind this end, sinking by 4 men, and 4 men are now put to rise against it.

(5.) *The* 80 *fathom level* is driving 150 fathoms east of shaft, and is 10 fathoms beyond a rise.

(6.) *The* 70 *fathom level* is 45 fathoms east of shaft, and 35 fathoms beyond a rise.

(7.) *The* 60 *fathom level* is driving 45 fathoms east of shaft, and 12 fathoms beyond a rise.

8.) In the 70 fathom level, 60 fathoms east of shaft, a cross cut 5 fathoms long is driven south to Frank's lode, and a level driven east 15 fathoms on this lode. Clemo's rise from the 80 is just at the mouth of the cross cut.



2. *Drivings from Richards' Shaft* :—

(1.) 212 *fathoms level*, driven east 20 fathoms. It is now stopped in consequence of the high temperature (90° F.) of the end, until a winze is brought down.

(2.) 158 *fathoms level*. A rise going up from the back of the level, 4 fathoms west of the shaft, to meet a winze coming down from the 144.

(3.) 144 *fathoms level*, driven 50 fathoms west. It only requires driving 1 or 2 fathoms to communicate with the 114 east of Field's Shaft.

(4.) 90 *fathoms level*. James' cross cut gone out 5 fathoms west of Richards' Shaft a length of 25 fathoms to the south lode. When the cross cut is through the south lode, a rise will be put up.

If the 212 level turns out well, it is proposed to sink a perpendicular shaft to that depth, and to put in a man-engine.

A very powerful double piston air-machine is now being made, which will be placed in Richards' Shaft under the 144, and be worked by the pumping rods, to ventilate these deep workings.

3. *Drivings from Hitchen's Shaft upon South Lode* :—

(1.) 70 *fathom level*. Wilkin's cross cut gone out 3 fathoms east of the shaft, a length of 35 fathoms to the south lode, upon which a level is driving east 35 fathoms. Daniel's rise is 35 fathoms west of the mouth of cross cut.

(2.) 60 *fathom level*. The cross course cross cut is gone out rom the level 35 fathoms east of the shaft, a length of 30 fathoms to the south lode, upon which a level is driving, 20 fathoms east and 70 fathoms west, on the course of the lode. The latter end is 8 fathoms from a rise, and there is a winze sinking close to the end.

The cross cut is continued south, 95 fathoms.

(3.) 50 *fathom level*. Trevenas cross cut is gone out from the level at a distance of 35 fathoms east of the shaft, for a length of 25 fathoms to the south lode. A level is driving from it on the course of the lode, 25 fathoms east and 75 fathoms west. The western end is 10 fathoms beyond a rise.

Trevanas cross cut is continued north of the main lode, under the name of Hawk's cross cut, a distance of 25 fathoms, where it cuts a north part of the main lode. A level is driving east upon it, and is about 10 fathoms in.

(4.) 40 *fathom level*. Bennett's cross cut is gone out 37 fathoms east of the shaft, and cuts the south lode at a distance of 22 fathoms. A level is driving upon the lode 18 fathoms east and 55 fathoms west. Western end is just communicated with the 50 by means of Broad's rise.

(5.) 30 *fathom level*, is worked by Burrow's rise from the 40, which is 5 fathoms west of Bennet's cross cut. Driving west from rise 25 fathoms.

(6.) 80 *fathom level*. Steven's cross cut is gone out 65 fathoms east of the shaft, a length of 30 fathoms to the south lode, on which a level is driving 8 fathoms west.

4. *Drivings from Agnes' Shaft* on main lode :—

(1.) 157 *fathom level*, driving east, 70 fathoms from shaft. A rise open close to the end.

(2.) 144 *fathoms level*, driving east, 80 fathoms from shaft. End a few fathoms beyond a rise.

(3.) 130 *fathom level*, driving east, 125 fathoms from shaft. End 35 fathoms beyond a rise. The ground here is very soft in its character, not requiring any powder. A rise is going up from this end, which will communicate with the 124 in Huel Emma, the next mine east.

V.—Huel Emma Mine extends from Agnes' Shaft in an easterly direction to the road, which was formerly the boundary of the sett, a distance of 417 fathoms on the course of the lode.

In this mine there are two principal shafts,—the Incline Shaft, and Thomas's Shaft.

1. *Incline Shaft* is on the course of the lode, and is down 8 fathoms below the 162, inclining 2 feet in a fathom from surface. It is situated 200 fathoms east of Agnes' Shaft, and the ground rises 20 fathoms above the level of Agnes' Shaft. It is 14 × 7 feet in size. C is used as a pumping and drawing shaft. The drawing is done over a double skip road, the skips being drawn by wire rope over timber guides.

2. *Thomas's Shaft* is 102 fathoms east of the incline shaft, and 20 fathoms above its level. It is perpendicular to the 50, and then on the curve of the lode to the 145. It is 12 × 7 feet large, and used as a pumping and engine shaft, drawing by kibbles and chains.

Drivings from Incline Shaft:—

(1.) 162 *fathom level*, driving 25 fathoms east.

(2.) 150 *fathom level*, 40 fathoms east and 40 fathoms west, without any winzes or rises.

(3.) 137 *fathom level*, is driven 80 fathoms east, but is now stopped, and driving west 75 fathoms from shaft, and 43 fathoms from Chenoweth's rise.

(4.) 124 *fathom level*, is driving west 70 fathoms from shaft. Is now on the point of communicating with 130 east from Agnes' Shaft.

(5.) 50 *fathom level*, driving 5 fathoms west from shaft.

(6.) 47 *fathom level*. Parsons' cross cut gone out from plat 25 fathoms south.

(7.) 50 *fathom level*. Barkel's cross cut gone out 55 fathoms west from shaft, and 50 fathoms south.

Drivings from Thomas's Shaft:—

(1.) *Sinking the shaft* below the 145 by 6 men.

(2.) 130 *fathom level*, driving east 85 fathoms, with a rise close to the end.

(3.) 60 *fathom level*, is driven 110 fathoms east of the shaft to the boundary, and then continued 167 fathoms to Stephen's rise, which communicates with a shallow adit level, and then is driven 10 fathoms further east.

(4.) 30 *fathom level*. A cross cut is gone out from the shaft 10 fathoms long, from which a level is driving 50 fathoms west and 115 fathoms east. The cross cut is also driving south 25 fathoms by two men.

(5.) 20 *fathom level*, is driving from Water's rise, which comes up from the 60, and is 25 fathoms west of it, driving by two men.

VI.—Eastern Ground. This ground has recently been included in the company's set, and extends from the old boundary for a length of 900 fathoms east on the course of the lode.

At a distance of 660 fathoms east of the old boundary a cross cut was commenced from the adjoining valley, which cut the lode 25 fathoms south. Driving was continued on the course of the lode for 110 fathoms, when a cross course was met with; through which a cross cut was driven 25 fathoms long, and the lode again met with, and followed upon. This level is 100 fathoms in serving as an adit, and is still driving. Several air shafts have been opened from the surface to ventilate these workings, and there is one now open within 20 fathoms of the end.

The men pay monthly the sum of 9*d.* to the mine doctor, and 6*d.* towards the club fund. For this the man and family are provided with medical attendance (midwifery excepted), and the man when ill receives 4*s.* a week. In case of accident an additional allowance of 5*s.* a week is paid from the mine.

During illness a regular system of visiting the men by the agents prevails, and the agents have power to give donations of money where it is needed.

In cases of accidents, in addition to the 9*s.* allowed weekly, the injured man is provided with coals, candles, and a nurse if one is needed.

When a death occurs, all the funeral expenses are paid by the mine.

A school is held on the mines for all the children of the men on the mine under 10 years of age. The charge per child is one penny per week.

Surface Arrangements.

Huel Josiah.

Drying and Changing House.—A stone building, 81 fee long and 15 wide. Lighted and ventilated from the roof The floor is of stone, but there are wooden platforms around for the men to stand upon when changing. Wooden pegs are placed around these walls for the men's clothes. The house is warmed by a fire, communicating with a tube, which runs lengthways through the middle of the house. Two men are employed to attend to this house, keeping it clean, and drying the clothes.

The men are not allowed to keep their hutches in this house, another being provided for the purpose, into which no lighted candle is admitted, it being lighted by a lamp outside the window to avoid the risk of explosion.

Other houses provided for the lamp-men and watchmen.

Huel Anna Maria.

Another large drying and changing house for the men on this part, 42 feet long and 24 feet wide, lighted and ventilated from the roof.

Instead of placing the pegs for the men's clothes around the walls, as is generally the case, they are here placed in lines across the house.

In none of the changing houses is there any provision made for the men washing themselves.

Dressing Floors. Are well provided with sheds, nearly all the hands employed being under cover.

A large house is specially devoted for the dressers to dine in. This is furnished with tables and seats, a large oven for warming dinners, and a boiler for water for making tea or coffee.

CRELAKE MINE.

Situated in the town of Tavistock, near the railway station, under the management of Captain Wm. Skewis.

There are two sets of workings, one upon the copper lodes, the other upon the lead lode, and these do not communicate. Examined the workings upon the lead lode.

Bedford Shaft. Is perpendicular, and 52 fathoms deep. It is 12 feet long and 7 wide, and used for pumping and drawing. The footway is also in this shaft. The stuff is drawn up in kibbles by chains ¾" diameter. Besides this shaft, which is the main working shaft in this part of the mine, there is another opened to the 26 fathom level for the purpose of ventilation, and called the Ventilation Shaft. It is about 100 fathoms south of Bedford Shaft. A rise is being prosecuted from the 40 fathom level to the 24, which will communicate with this shaft, and so continue it to this depth. The size of this shaft is 6 feet long by 3½ feet wide.

Visited the following places:—

1. The 52 fathom level, the north end. Two men driving 24 fathoms beyond a rise. Sample No. 4.

2. About 15 fathoms north of shaft at the 52 fathom level is a rise, now nearly holed to the 40 fathom level. This rise is in communication with another, 5 fathoms south, which serves as a pass, and for ventilation, the current coming up the first, which is the roadway, 2·6 long. 2 feet wide, and supported with timber. Temperature of air 68°. Tube, 5 of air.

3. 40 end; driving south; 4 men; 96 fathoms from shaft. Ventilated by a fall of water in the shaft, the top of which is a few fathoms below the 24. Zinc pipes, 2½ in. diameter towards the end, and 4 ins. outside. Level, 7 by 4 feet. Temperature of air, 66. Blast at end of pipes very weak. Tube, 6.

4. 24 south on No. 5 lode, 80 fathoms south of shaft; 4 men in a rise; 13 fathoms above level; ladder way up one end; ground insecure, falling stuff having broken the ladder stones considerably; no platforms, and the stairs wood.

5. Sample No. 8, was taken from the end of the 24 fathom level on No. 5 lode, worked by 2 men, and now 16 to 20 fathoms beyond a winze.

6. Samples No. 9, taken respectively from the top of a rise in the back of the 12 fathom level, going south on No. 1 lead lode. The rise was 4 fathoms high, without any current of air passing through it. Two men.

7. Samples No. 10, from the end of the 12 fathom level, going south from Ventilation Shaft about 4 fathoms beyond this shaft.

The footway used by the men is in the Engine Shaft. The ladders are about 5 fathom lengths, with a base of about 3 feet.

There is a complete casing between the engine and their shafts; and at each sollar on which the ladders rest, a guard about 5 feet high is placed to prevent the men falling off.

The levels were generally well timbered. The nature of the ground is such that it requires a great deal of timbering, and in some places it is giving way.

There is a very commodious changing house on the mine, which only requires a roof ventilation, wooden floor and a stream of water for washing purposes, to make it all that is desirable for such a purpose.

The stoves are well provided with sheds.

DEVON HUEL UNION MINE.

This mine is situated about two miles N.E. of Tavistock, and is under the management of Capt. T. Williams, of Huel Friendship. It is divided into 12,000 shares with limited liability.

The workings are confined to exploring the north lode.

The Engine Shaft is down to the 50 fathom level, underlaying north from about 3 feet to 3 ft. 6" per fathom. It is 14 ft. long and 7 ft. wide. It is divided by wooden casing, and serves as an engine and drawing shaft, the engine part being 11 × 7 ft. with 19-inch and 12-inch pit work side by side, and a ladder way. The drawing is done by kibbles. The pumping and drawing is effected by a water wheel 40 ft. high and 10 ft. breast.

Ventilation Shaft is another shaft sunk to the 15 fathom level, about 37 fathoms east of the Engine Shaft, used, as its name implies, for the purpose of ventilation. It is 10 ft. long and 6 ft. wide. The 10 fathom level and the 15 fathom level are driven from shaft to shaft.

There are 3 pairs of men working—

1. A pair of 2 men driving the 28 fathom level east. The end is 30 fathoms from shaft.

2. A pair of 4 men driving the 40 fathom east. The end is 20 fathoms from shaft.

3. A pair of 8 men sinking the Engine Shaft.

The South Lode has been opened upon by Quick's Shaft, which lies about 80 fms. S.E. of the engine shaft, but the workings here are now suspended.

There is a house 20 ft. long, 12 ft. wide, and 10 ft. high, provided with a fire which heads a boiler for the men to change in, but it is dirty and badly ventilated. The men pay 8*d.* per lb. for candles, and 7*d.* per lb. for powder. The sum of 1*s.* 6*d.* per man is deducted monthly for doctor and club. For this the man and family is attended by the doctor, and the man receives sick pay as well as hurt pay.

HUEL FRIENDSHIP.

Is a very large copper mine about 4 miles N.E. of Tavistock, worked under the management of Messrs. Taylor and Sons. The resident agents are Capt. L. Williams, Capts. Bennetts, Pearce, and Kent. It has been under the present management more than 60 years; and as the workings have been actively prosecuted on 16 different lodes besides numerous branches during this period, and as these workings are all communicated by means of shafts, levels, and cross cuts, all of which are kept open for ventilation and for carrying on the necessary operations of the mine, the quantity of ground opened out, and the length of levels kept open, is very great.

The number of persons employed during the month of April were as follows :—

Resident agents	6
Engineer	1
Assistant Engineers	3
Carpenters	2
Sawyers	2
Smiths	7
Superannuated smiths	1
Pitman and binder	2
Machine men	2
Dry men	4
Cart men	2
Fillers and landers	4
Trammers	9
Tributers	14
Do. boys	19
Halvanners man	1
Do. boys	5
Do. girls	1
Tutwork men	66
Do. boys	31
On dressing floors, men	15
Do. boys	34
Do. girls	58
Total	289

The mine is worked from the following shafts :—

1. *Taylor's Shaft*, on the main lode to the 2,400 is perpendicular to the 90, and then underlays 5 feet in a fathom.

2. *Curtis Shaft*, on the main lode 90 fathoms south-east of Taylor's Shaft; is perpendicular to the 40, and then on the course of the lode to the 170.

3. *Pearce's Shaft*, on the main lode 30 fathoms south-east of Curtis' Shaft; is perpendicular to the 40, and then on the course of the lode to the 150.

4. *Old Sump Shaft* is sunk upon the main lode 45 fathoms east of Pearce's Shaft; is perpendicular to the 26, it is then carried on the main lode to the 190; it cuts Sprague's lode at the 200, and is continued on this lode to the 220.

5. *Buller's Engine Shaft* is also on the main lode 70 fathoms north-east of the Old Sump Shaft. It is perpendicular to the 90, is then carried on the course of the lode to the 190, and is then perpendicular to the 220.

Connected with the main lode there are also two inclined shafts, both of which are open, but only one used.

New Inclined Shaft is sunk from the surface about 40 fathoms south-east of Taylor's Shaft, at an angle of 45°, and cuts the 200 fathom level a little to the west of Taylor's. Its length is 267 fathoms. This inclined shaft is 7½ feet long and 5 feet wide. A single waggon road of the ordinary bridge rails. The waggon is 6 feet long, 2 feet deep, and 2 feet 3 inches wide, and holds about a ton of stuff. It runs on 4 wheels, 2 of which are 1½ feet diameter, and the others are 2 feet. It is drawn by iron chain and water wheel. An iron bar one end, which is hinged to the under back part of the waggon, with the other end trailing on the road, forms a very good break to prevent the waggon running down the shaft in case the chain should break.

The men are not allowed to ride in this waggon.

6. *Brenton's Shaft* is 127 fathoms east of Buller's; is perpendicular to the adit, which is 35 fathoms deep in this part, and then is sunk on the course of the lode to the 150.

7. *Brenton's Incline*, 30 fathoms south-east of Brenton's Shaft, is sunk to the 100 at an angle of 40°.

8. *Kent's Shaft*, on Kent's Lode, 180 fathoms south-east of Brenton's, is 112 fathoms deep.

There are several shafts down to the shallow levels, and there is a new one now sinking 117 fathoms south of Kent's.

The operations now going on are various drivings, as follows, taken from setting book for April:—

1. A pair of 6 men and 2 boys, working in 4 shifts of 6 hours each, driving the 230 fathom level east. The end is 23 fathoms beyond a rise.

2. A pair of 6 men sinking a winze under the 220. They are in 35 fathoms from a rise.

3. A pair of 6 men driving the 150 fathom level east. This end is carried 160 fathoms, and is ventilated by an air pipe communicating with a water-fall. The water falls from the 100 fathom level into a funnel-shaped pipe leading into a cistern, where it strikes upon a board, scattering itself in spray. The air brought down by the water and thus liberated is conveyed by the pipes to the men.

4. A pair of 3 men and 3 boys driving a cross cut north of the 128. The level is in 48 fathoms from a rise, and the cros scut is driven 10 fathoms north. This place is ventilated by a similar water-fall to the last.

5. Driving the 100 fathom level by 3 men and 3 boys east of Brenton's Incline.

6. A pair of 3 men and 3 boys, driving the 100 fathoms level west of Dunn's winze, and in 6 fathoms from winze.

7. 3 men and 3 boys driving each of Dunn's winze, and 6 fathoms in from it.

8. A pair of 6 men sinking a winze under the 80, and 25 fathoms beyond a rise.

9. 4 men and 2 boys driving the 80 fathom level east, about 7 fathoms beyond a rise.

10. 2 men driving a cross cut south from the 80 fathom level, 10 fathoms in from the level, and 13 from a rise.

11. 4 men driving the 70 fathom level east of Crew's cross cut, 12 fathoms in.

12. 3 men and 3 boys driving 100 fathoms level east on the New Lode, 37 fathoms from rise.

13. 4 men sinking new shaft, 2 fathoms deep.

14. 2 men driving adit, west on New Lode. This is 117 fathoms from shaft. It is supplied with air by means of pipes carried along the level, near to the shaft; the level is then closed by a trap door, and the area of the airway being thus contracted, a greater rapidity is given to the current, and the air in the end is put into motion. An air fan is also in communication with these pipes, to be used when required.

15. A man and a boy driving adit east on New Lode; 130 fathoms from ventilation.

All the other men are engaged in taking away ground previously opened, mostly upon tribute.

There is a very large drying and changing house upon the mine. It is 52 feet long, 30 wide. It has a wooden floor, which is kept clean. It is deficient in ventilation and light, and would be much improved by being lime-washed.

There is a fire and boiler for warming and drying the house and clothes. There is also a trough of water for the men to wash in, but as it is stagnant it soon becomes very dirty.

The dressing floors are well provided with shedding.

The mine has a code of general laws, a copy of which is appended. These laws are suspended before the office every settling day.

The men pay 9*d*. a month per man to the doctor, and 9*d*. a month to the club. This club is a sick club only, the men receiving 15*s*. a month while sick. In case of accidents the mine allows those injured 1*l*. per month.

The sick fund is in arrears, but the debit account is charged monthly to the adventurers. The loss for the three last months being for February, 3*l*. 3*s*. 10*d*; January, 3*l*. 2*s*. 6*d*.; and for December, 2*l*. 11*s*. 8*d*.; total loss, 8*l*. 18*s*.

Besides this charge on the mine there are several blind men receiving pensions from the adventurers.

The men are paid monthly, but there is also a regular intermediate advance pay, when every man working on the mine receives a portion of his month's earnings.

WHEAL FRIENDSHIP.

150 east of "Brenton's plane;" driving east of cross-cut on New South Lode; 4-inch air pipes, length 170 fathoms; water fall 14 fathoms high; no perceptible draught at end of pipes, which are 6 fathoms from end. 6 men (2 every 8 hours) work here, but have been employed otherwise for a week. Temperature, 60; of water, 53. Level, 7 feet by 4 feet.

128 east of Brenton's; cross-cut driving north by 3 men and 3 boys (1 man and 1 boy every 8 hours). 100 fathoms air pipes, from a water fall. Temperature, 66. Barometer, 29.88. Tube, "21." About 50 fathoms from this end is a winze to the 150, where the draught is strong.

Cross-cut; driving south, by 3 men and 3 boys, at 100 fathoms level, 100 fathoms east of Brenton's shaft, and 50 fathoms from "Plane" and draught. Temperature, 66. Tube, 22.

100 east on New South Lode; driving by 3 men and 3 boys, 40 fathoms from a trap door, from which are air boxes to about 10 fathoms from the end; current at end of pipes pretty good. Temperature, 60. Ground wet. Temperature of water, 53. Tube, "23."

70 end east, 100 fathoms from Brenton's plane; 4 men (2 shifts); 20 fathoms from draught winze to 80. Temperature, 61. Tube, 24.

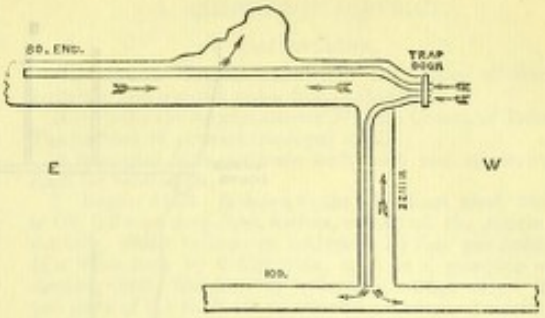
80 end east; driving by 3 men and 3 boys, three 8 hour

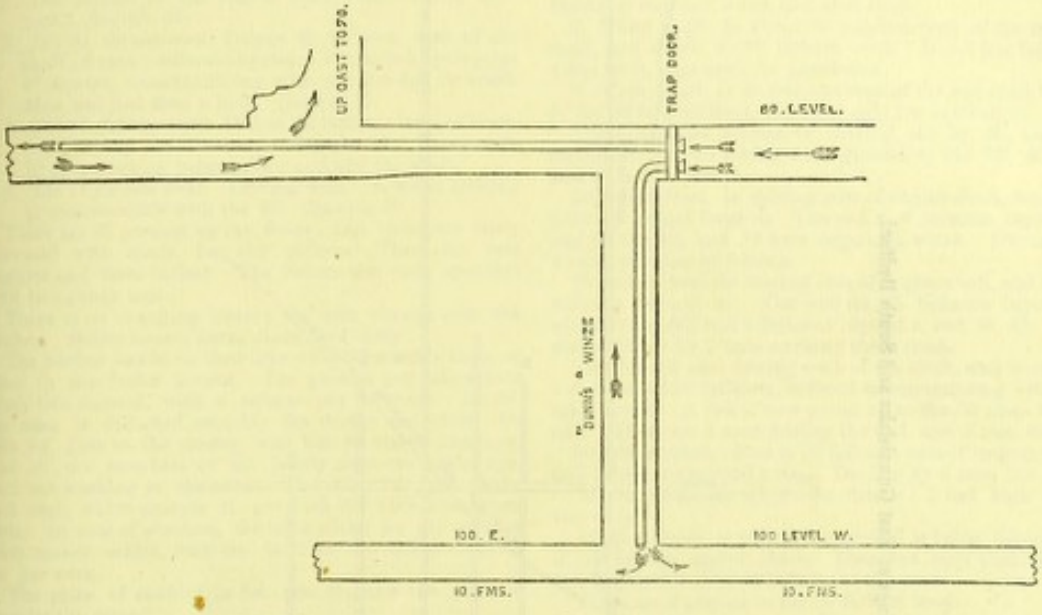
shifts. 40 fathoms from a winze from 70, and 30 fathoms from a trap door. Temperature, 65. Tube, "25."

80 cross-cut east, 12 fathoms from current. 2 men. Temperature, 65. Tube, 26.

100 west of and 10 fathoms from Dunn's winze, per sketch. Driving by 3 men and 3 boys. Temperature, 66. Tube, "27."

100 east. Driving by 3 men and 3 boys. Temperature, 66. 9½ fathoms from winze. Tube, "28." The ladder way to this part of the mine is through the "engine pump" on the dip of the lode, and alongside the pumps; sollars about every 10 fathoms; iron staves; and the footways generally are easy and safe.





SORTRIDGE CONSOLS.

About 4 miles south-west of Tavistock; is a copper mine, under the management of Captain James Richards.

It is 110 fathoms deep, but at the present time there are no men working at a greater depth than 50 fathoms.

The workings are upon a copper lode and two tin lodes, and extend a length of about 230 fathoms. In this length there are 4 shafts opened to the 50.

Visited :—

1. 30 fathom level on the tin lode. 2 men driving. Sample No. 11.

2. 40 fathom level. End going west on tin lode. 4 men. This end is 40 fathoms from eastern shaft, with air pipes communicating with an air fan, which was not at work. Sample No. 12.

3. From the western end of the 40 on tin lode. 4 men. No. 13.

4. From the western end of No. 2 tin lode, which is 60 fathoms south of No. 1 tin lode, here at the 40, and reached by a cross cut of this length. The lode has been worked upon a distance of 50 fathoms, and 4 men now driving. Sample No. 14.

A rise is up to this level from the 50, but the level requires to be driven about 8 fathoms to cut it.

5. Sample No. 15, from the cross cut, going north from eastern shaft at the 50 fathom level. 4 men.

6. Sample No. 16, taken from western end of the 50 fathom level on No. 2 tin lode. The length of cross cut from the eastern shaft to this lode is 60 fathoms, and the lode has been worked a length of 55 fathoms. The end is 16 fathoms beyond a rise, which is gone up to cut the 40 fathom level, but which requires driving in order to cut it.

7. Samples 17, from the 50 fathom level, west of ventilating shaft on copper lode; the end is 70 fathoms beyond the shaft without any rise or wings. Doors are placed a little east of the shaft to prevent the air going away to the eastern part of the mine.

The ladder ways are in the engine shaft, about 5 fathoms long, with 3 feet base. Stories, 4 inches apart.

EAST GUNNISLAKE AND SOUTH BEDFORD.

This mine is situated south of the Bedford United Mine, and is worked under the management of W. G. Gard, Esq., the resident agent being Capt. J. Phillips.

From the accompanying section it will be seen that there are four shafts.

Commencing at the western point there is,—

1. *Gullett's Shaft*, down to 55 fathom level, now only a ventilation shaft.

2. *Red Whim Shaft*, 50 fathoms east of Gullett's Shaft, down below the 75. Is 10 feet long by 6 feet wide.

3. *Engine Shaft*, 70 fathoms east of Red Whim Shaft, is down below the 62. Is the same size as the last. Used as engine and drawing shaft.

4. *Gard's Shaft*, 160 fathoms east of engine shaft, is now sinking below the 12, by 8 men. Is 11 feet long by 6½ broad. Used as engine and horse whim shaft.

East of Gard's Shaft the deep adit is driving east by 4 men, and is in 16 fathoms from the shaft. The 12 fathom level is also driving east by 4 men, and is in 7 fathoms from shaft.

The 36 fathom level is being driven from the engine shaft towards and now nearly under Gard's Shaft. Air is supplied to this end by a piston and cylinder worked by the main rod in the engine shaft; diameter of cylinder 18 inches, stroke 8 feet. The machine is double-acting, and forces a steady current of air through 4-inch zinc pipes to the 36 end, a distance of 156 fathoms. About half way from the shaft to the end is a rise to a 24 fathom level, driven east of engine shaft, a strong current of air passing up from this winze from engine shaft.

Places visited. Barometer at surface, 30·18.

"36" *end*; barometer, 30·40; temperature, 68; (tube 29)

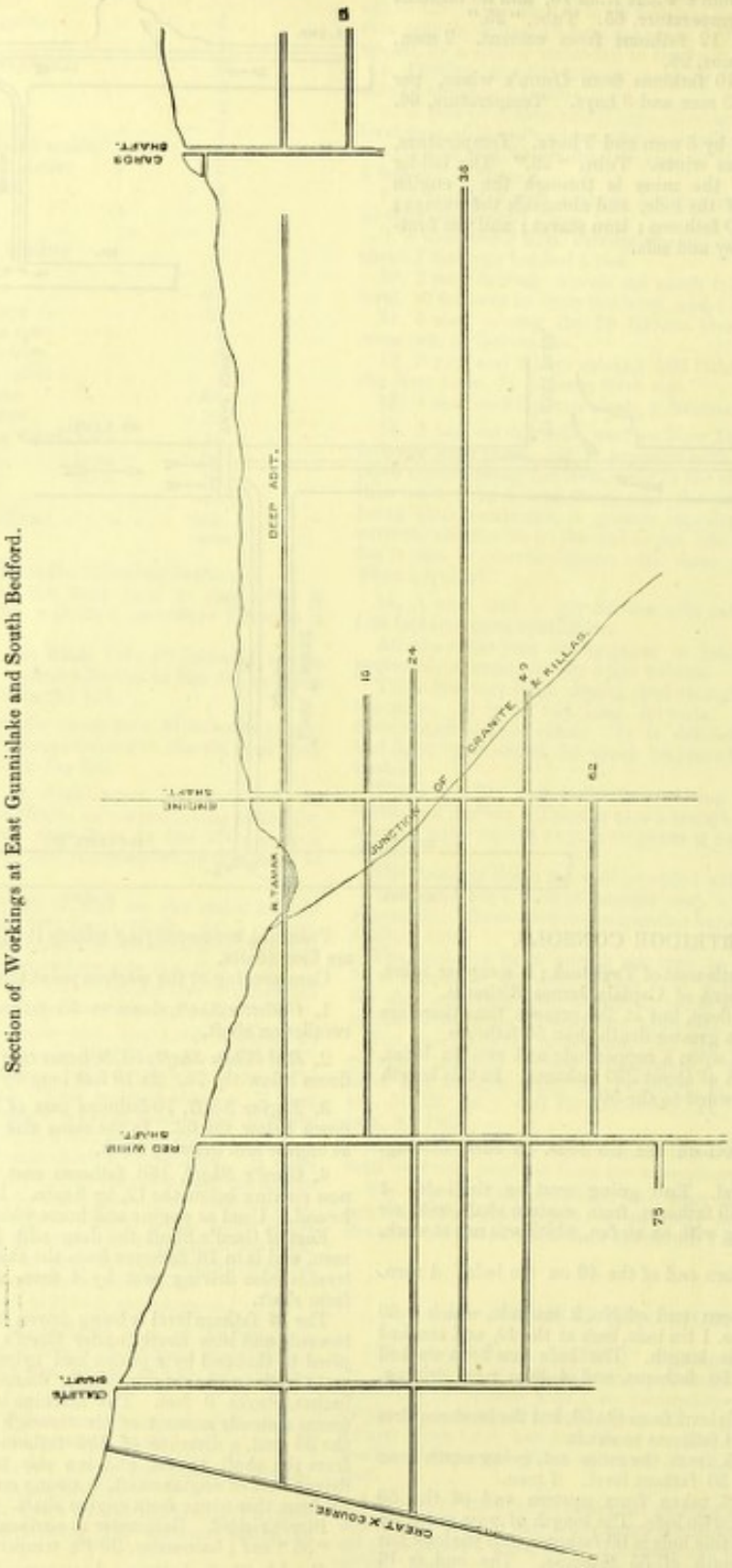
Garde's Shaft, bottom; barometer, 30·28; temperature, 64; of water from lode, 60; (tube 30).

Twelve fathom level, end; barometer, 30·34; temperature, 63; (tube 31).

Adit level end, north of Garde's; barometer, 30·20; temperature, 61; (tube 32).

The footway or ladder road in Garde's Shaft is only partly separated from the rest of the shaft. There are *rests*, but no proper sollors; and in order to get to the adit and 12 fathom level, it is necessary to crawl across the shaft on one's hands and knees over a couple of boards.

(*See woodcut next page.*)



HUEL EDWARD MINE.

This is a copper mine, having Mr. E. King as secretary, and Captain G. Rowe, as resident agent. The workings at this mine have been upon two parallel lodes about 50 fathoms apart, both underlaying north about 2½ feet per fathom. At the present time the workings upon the north lode are abandoned. Upon the south lode there are two shafts.

1. *Engine Shaft.* Is 98 fathoms deep from surface. Is 14 × 8 feet. Used as engine and drawing shaft. Is perpendicular to the 50 and then on course of lode. The footway is in the engine shaft.

2. *Air Shaft.* Is 38 fathoms south-east of engine shaft, and is down 30 fathoms from surface. Its size is 12 feet long and 6 feet wide.

It is to be noticed that the adit, which is 50 fathoms deep, communicates with the workings on the north lode, upon which there is an engine shaft; and also with Huel Arthur and adjoining mine.

The tutwork operations are:—

(1.) 92 *fathom level.* Driving west, and in 40 fathoms from engine shaft, without any rise. It is driving by 6 men, working in three shifts of 8 hours. Size of end, 7 × 4 feet.

(2.) 81 *fathom level.* Driving west; 70 fathoms from shaft. A rise to the 70 about 25 fathoms behind the end. 4 men.

(3.) 61 *fathom level.* Driving west 100 fathoms from shaft; 40 fathoms beyond a winze to the 70, and a rise to the 50.

(4.) 50 *fathom level* east. A cross-cut gone out 70 fathoms from the shaft, which after a course of 50 fathoms south cuts the New South or Phœnix lode. A pair of 6 men are driving east on this lode, and are in about 6 feet. Another pair of 6 men are rising in the back. At the mouth of the cross cut a rise comes up from the 60.

There are two pitches in the north part.

Visited the following places:—

1. The bottom of the engine shaft, now sinking by 9 men. Sample 36.
2. *The* 91 *fathom level.* Driven 40 fathoms west of the shaft; 6 men; without any rise. Ventilated by air pipes 5" square, communicating with a water-fall in shaft. Men had just fired a hole. Sample 37.
3. *The* 81 *fathom level.* Driven 62 fathoms west of shaft, without any rise or winze. Sample 38. There were 10 men working between this end and the shaft.
4. *The* 71 *fathom level.* Driving west. A winze sinking to communicate with the 80. Sample 39.

There are 26 persons on the floors; and these are fairly provided with sheds, for the pickers. There are two engines and three boilers. The boilers are each provided with two gauge tops.

There is no changing house; the men change over the boilers. Boiler houses dark, close, and dirty.

The surface hands eat their dinners in the smith's shop, or even in the boiler houses. The general pay takes place every two months, with a subsist pay between. 1*s.* 6*d.* per man is deducted monthly for doctor and club. Of this 9*d.* goes to the doctor, who has to attend the man, and all the members of his family who are under age, and not working at the mine. The other 9*d.* goes to the sick club, which provide 4*s.* per week for each man when sick. In case of accident, the mine allows 5*s.* per week as hurt money, which, with the 4*s.* from the sick club, gives 9*s.* per week.

The price of candles is 8*d.* per. lb., and the price of powder the same.

HUEL ARTHUR MINE.

Adjoins Huel Edward, and has Mr. Dunford for Secretary, and Capt. Carpenter for resident agent.

Engine Shaft is 110 fathoms deep from surface, perpendicular to the 90, and then on the course of the lode underlaying north 4 feet in a fathom. It is 12 × 6 feet large, and used as an engine and drawing shaft. The drawing is by 2 kibbles, worked by a water wheel with chains.

The operations on the main lode are—

(1.) Driving east and west from the bottom of shaft. This is just starting.

(2.) 60 *fathom level.* Driving west on the lode, 110 fathoms in from shaft, 70 fathoms beyond a rise, but with a winze just coming down from the 50 over the end. There are 6 men driving the end, and 6 men sinking the winze.

(3.) 50 *fathom level.* A pair of 6 men stoping.

(4.) 50 *fathom level.* 100 fathoms west of shaft a rise communicates to the 40, and 15 fathoms west in the 40 a rise communicates to the 30, which is driving south, 18 fathoms, by 4 men, to cut the Great South Lode.

Besides the operations on the main lode some workings are being prosecuted on Edward's lode 32 fathoms north of main lode. These are reached from the adit, 110 fathoms west of the shaft, and which is 60 fathoms deep here, from which a cross cut is driven 43 fathoms north cutting Edward's lode, and a pair of men are now driving 10 fathoms east on the lode.

The 50 is also driving on this lode 32 fathoms east.

A pair of 6 men, rising from the 60 on this lode near the cross cut.

Between these two lodes another lode is being worked upon at the 50.

The surface hands consist of 10. The pickers under cover. Dine in smiths' shop or boiler house.

There are two boilers, each provided with gauge cocks. Men change over boilers. There is a capital large dry adjoining the boiler house, which, if cleared up, would make a very satisfactory changing house.

The men pay 9*d.* per month to doctor, and 9*d.* per month to the hurt club, from which in time of accident they receive 40*s.* per month. There is no sick club. The price of candles is 8*d.* and of powder 8*d.* per lb.

2. ASHBURTON DISTRICT.

Buckfastleigh.

Huel Emma. Copper mine near the village of Buckfastleigh, and about 5 miles from Ashburton.

It is under the management of Mr. Hy. Crease, of Totnes. The number of persons employed is 127.

It is worked from our main shaft, with two others kept open for ventilation.

1. *Engine Shaft.* Is down to the 80 fathom level, which is 100 fathoms deep from surface, carried on the course of the lode, which inclines or underlays 3½ feet per fathom. It is 9 feet long by 6 feet wide, used as a pumping and drawing shaft; the drawing is done by a single skip. The two parts of the shaft are separated by casing. Footway in the engine shaft. The ladders in 10 fathom lengths. Staves of iron and wood 10 inches apart.

2. *Whim Shaft.* Is about 80 fathoms west of the engine shaft, and down to 10 fathom level. It is 6 feet long by 4 feet wide, kept open for ventilation.

3. *Whim Shaft.* Is 40 fathoms west of the east shaft down to the 30 fathom level, and used only for ventilation.

The operations consist of driving the 58, 70, and 82 fathom levels, and taking away ground at the 30, 46, 58 and 70 fathom levels.

58 fathom level. Is driving east of engine shaft, being 90 fathoms distant from it. The end is 4 fathoms beyond a rise to the 40, and 15 tons beyond a winze. Driving by 4 men, working in 2 cores.

70 fathom level. Is driving east of engine shaft, and is 100 fathoms beyond it. The end is 25 fathoms beyond a winze to the 80, and 4 fathoms beyond a rise to 58. The end is driven by 2 men working these cores.

This level is also driving west of the shaft, and is carried a distance of 50 fathoms, without communicating with the other levels. A rise is now going up to the 58 close to the end. There are 4 men driving the end, and 2 men rising.

80 fathom level. End is 70 fathoms east of engine shaft, and 5 fathoms beyond a rise. Driving by 6 men in 3 cores.

All the ends are set to be driven; 7 feet high and 4 feet wide.

All the places at which the ground is being taken away is east of the engine shaft. Therefore men working will not be benefitted by the shafts to the west.

There are 2 pitches in the 30 fathom level.

„	3	„	„	46	„
„	4	„	„	58	„
„	3	„	„	70	„

with 2 men working on tribute in each.

The 46 and 58 fathom levels are driven into the adjoining mine. There is no steam engines on the mine, all the work being done by water power. There is no changing place specially provided; the men use the smith's shop.

The men pay 9*d.* per month to doctor, and 9*d.* per month to hurt club.

The price for candles 8*d.* per pound, and for powder 9*d.*

Brookwood Mine.

Is east of Huel Emma, being on the same lode, and is under the same management

It is worked by one shaft; but the two bottom levels run into Huel Emma. The shaft is down 9 fathoms below the 42.

The workings consist of driving the 30 and 42 levels east, and in working 3 pitches in the back of the 30. The men change in smith's shop. The same charges for materials and doctor and club as in the last mine.

No steam engine.

There are two small mines just opening up in this district,—Brookwood Consols and East Brookwood; but nothing of any importance has been done at either as yet.

Smith's Wood.—A small mine, just being opened. There is a shaft being sunk by 9 men, which is down 27 fathoms. It is 11 × 7 feet. A level has been driven about 10 fathoms west from the shaft.

Bag Tor.—Another small mine now opening. They are sinking a shaft, which is down 10 fathoms from surface; there are 9 men sinking it. A level has been driven from surface for 40 fathoms, but is now abandoned.

There are 7 people on the floors, all underground.

Hay Tor.—Another little mine, with 2 men working.

These mines are under the management of Captain Hoskings, of Ashburton.

Atlas Mines.

These are tin mines, but on a small scale. There are two shafts, one 20 fathoms deep, the other 35.

The work consists of sinking a winze in the 25 fathoms level, 16 fathoms east of the shaft, by 9 men working in 3 cores; it is 6 fathoms down. Of driving the 35 fathoms

level east by 6 men, and west by 6 men; each of these ends 2 fathoms in. There are also 4 men stoping in the back of the 35.

These men all change over the boilers.

The surface pair consists of 12, all under cover.

The secretary is Mr. G. F. Goodman, 7, George Yard, Lombard Street, London; and the manager is Capt. Warren, on the mine.

Yarner Mine.

This mine is a copper mine, under the management of Capt. R. Barkle, of Bovey Tracey.

1. *Engine shaft*, on the S. lode, is a perpendicular shaft, 46 fathoms deep, 11½ ft. long, and 6 wide. Engine; and drawing by kibble. Footway in engine shaft, and cased off from drawing. The ladders are in 4 fathom lengths, with a base of 4 ft.

2. *Air Shaft*. About 20 fathoms east down to the 20. Is 6 ft. long by 4 wide.

The operations consist of driving the 40 fathom level east by 4 men, who are about 11 fathoms from the shaft; and of driving the same level west by 4 men, who are 34 fathoms from shaft, and 7 fathoms beyond a rise to the 30. Besides these there are 25 men working on tutwork, taking down ground already opened out.

The men change in smith's shop.

The men pay 9*d*. per month to a sick club, receiving 3*s*. 6*d*. per week when invalided, and 9*d*. per month to doctor. There is no hurt club. The price paid by the men for candles and powder is 8*d*. per lb.

South Exmouth.

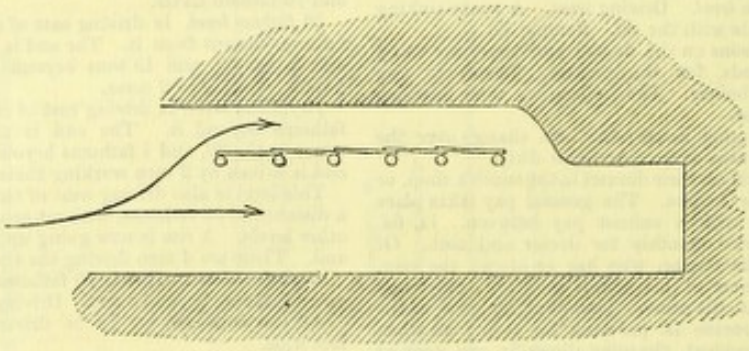
Is a lead mine, under the management of Capt. J. P. Nicholls.

The workings are upon two lodes, which are worked from cross cuts from a perpendicular engine shaft.

Westcomb's Engine Shaft. 60 fathoms deep, 11½ feet long, by 6½ wide. Pumping and drawing. 2 skips and flat hemp ropes. Footway in engine shaft. Ladders, lengths of 4 fathoms, with base of 4 ft. Staves, 11 inches apart.

45 *fathom level*. Driving S. on east lode by 4 men. About 27 fathoms from shaft. No rise or winze.

30 *fathom level south*, on west lode. Driving by 4 men. Ventilated by James's Shaft, which is 30 fathoms behind. A winze is sinking to cut the level below, about 20 fathoms behind this end.



45 *fathom level south*, on west lode. Driving by 6 men to cut the winze coming down from the level about . The end is 65 fathoms from air shaft, and 24 fathoms beyond a winze.

30 *fathom level south*, on east lode. Driving by 4 men. 15 fathoms beyond a communication. The back of this level has been worked out, and the air is carried through them, there being a casing between.

45 *fathom level south*, on east lode. Driving by 4 men. 45 fathoms in. Ventilated as the last place. Two other men driving a cross-cut.

South Exmouth Lead Mine on two parallel north and south lodes. The engine shaft is sunk to a depth of 60 fathoms. "James's" Shaft is a whim and footway shaft 60 fathoms north of the E. shaft, and sunk to and communicated with the 30 fathom level. Cross cuts are driven from the engine shaft westward to the lode at the 30 and 45 fathom levels. About where these cross cuts intersect the W. lode is an air shaft on the lode from the surface to the 45. The 30 is driven south of shaft about 70 fathoms, northward of James's Shaft 35 fathoms, where they are cross-cutting east. The 45 fathom level is driven southward 45 fathoms, and northward 60 fathoms, where a rise is now making to a sump sinking from the 30. Lastly, the 45 on east lode is driven northward to about 5 fathoms, from being under James's Shaft.

The engine shaft is a large well secured shaft; ladders about 5 fathoms in length; good sollars, dividing or uniting at the foot of each ladder. Skips drawn by a flat rope are used in this shaft. The ladder road at "James's" is not so good;—narrow, and the casing between it and the whim shaft broken, and for 10 or 12 fathoms at the bottom altogether gone.

Strong timber is necessary in this mine, the ground being soft.

Places visited:—

The bottom of the mine, the 60. 6 men cutting plat. Barometer 29° (at surface 28·65); temperature about 60°; (tube 50.)

45 north on east lode. 4 men driving 55 fathoms from cross cut and current. Temperature 68; (tube 51.)

45 north on west lode. 6 men rising (3 shifts, 8 hours'. 24 fathoms back from the end is a rise to the 30, from which air-boxes are taken to the end, the bottom of rise being closed. Draught from end of pipe tolerably strong. Temperature at rise top 71; (tube 48).

45 south. 4 men driving 20 fathoms from rise to 30; temperature 66; (tube 49).

30 north. 4 men driving cross cut east, 44 fathoms from current. Temperature, 64.

30 south. 4 men driving end, about 25 fathoms from a current. Temperature 68; (tube 47).

Besides these there are 14 men working in stopes in the 40, and 6 men working in stopes in the 30.

There are 9 men opening a plat at the bottom of engine shaft.

The men change over the boilers.

The number of persons on the floors is 40. They are well provided with sheds.

The men pay 9*d*. per month to doctor, and 9*d*. per month to a hurt club, receiving from the latter 30*s*. per month in case of accident.

Frank Mill Mine.

A lead mine, under the management of Captain Nicholls. The workings are about 500 fathoms in extent.

The engine shaft is similar to engine shaft of the last mine described, and is 100 fathoms deep.

There are 60 men underground.

60 *fathom level*. 4 men driving 25 fathoms beyond a winze.

72 *fathom level*. 6 men driving. Not quite as far in as the 60.

A cross-cut is driving from the 60 to a new lode. These workings are under the lawn of Lord Exmouth's house; so no shaft can be sunk at this part of the mine.

Frank Mills Lead Mine, north of South Exmouth, on the same lodes, and of the same composition, with the exception that the "gossan" (quartz and oxide of iron), is still more abundant and runs deeper than at South Exmouth. Carbonates of lead, lime, and iron are also contained in these lodes. A perpendicular engine and drawing shaft, 12 feet by 7, divided cased ladderway, and otherwise properly timbered, is sunk 100 fathoms at this point. 6 men are cross-cutting west about 6 fathoms from shaft. Temperature here, 63. Tube, 46.

The other tutwork operations consist of driving the 70 *end north* (nothing is being done at the 80), by 4 men 335 fathoms from shaft. About half this distance is an air-shaft continued to the 80 fathom level; and 35 fathoms back from the end is a winze from the 60. Temperature of air, 65; of water, 60. The draught going towards the winze named, by means of a trap door and air pipes, is conveyed to the end, or nearly so, but is very weak. Tube, 45.

60 *end north* is only 7½ fathoms further than the 70 and about 42 from the winze. 4 men are cross-cutting, west. Temperature, 62. Tube, 43.

4 men are "stoping" the roof a few fathoms back, in a working about 5 fathoms in length, 15 feet wide, and 12 feet high. Temperature here, 64. Tube, 44.

We also visited a branch or side level, about 120 fathoms north of the shaft, about 30 fathoms from the main level. Temperature about 60. Tube, 42.

A range of tribute pitches are being worked above the 45, north of shaft. "Passes" about 10 fathoms apart form the limits of these pitches, and serve partially to ventilate them, being holed from one to another moreover. In one the temperature was 63; tube, 41. About 4 fathoms above the roof of the level.

In the 60, and some other parts, the timbering was giving way; but on the whole, considering the heavy nature of the ground, the mine is fairly secured in this respect.

There is a capital stone building for drying and changing house. The men dry their clothes below, and change above. It only requires cleaning up.

There are about 50 people on floors, well provided with sheds.

3. PLYMPTON DISTRICT.

There are two mines of some importance in this district, situated on adjoining hills, about 3 miles from Plympton railway station. These are—

1. Bottle Hill, producing tin, with a little copper. It is under the management of Capt. Eddy.

This mine has been working for about 60 or 70 years, so that a great deal of ground has been opened and taken away. The workings at present are principally in stopes above the deep adit, which is 60 fathoms deep.

On the main lode the levels are carried for a length of about ¾ of a mile. In this length there are 6 large shafts opening to the deep adit, besides several smaller ones to various depths. The longest distance from a shaft to an end is 80 fathoms, but there are several winzes communicating to the level.

On the north lode, which is about 50 fathoms from the main lode, there are two other shafts; and another shaft is sunk upon the south lode, which is 40 fathoms from the main lode. The workings upon these different lodes also communicate with each other by means of cross cuts.

There are 34 men working in stopes on the main lode; 8 men working in the same way on the north lode; and on the south lode there is a pair of 4 men employed in driving up a cross cut or adit from surface to cut the lode. The end of this level is 44 fathoms from the mouth without any assisted ventilation.

The men change, some in the smith's shop, others in small houses in different parts of the mines.

The dressing pair numbers 20. They are fairly provided with shelter.

The men are charged 8*d*. per lb. for candles, and 8*d*. for powder; 9*d*. per man monthly for doctor. There is no club.

Huel Sidney, Captain Edwards, is the adjoining mine, employing 40 men underground, and 20 on surface.

Of the underground men 4 are employed in driving the 60 fathom level, the lowest, east from the shaft, and are 17 fathoms from it; while six are driving the same level west, and are 20 fathoms in. All the others are employed stoping.

Furze Hill Wood Consols.

A small mine, 21 persons employed underground:
9 men sinking the shaft;
6 men driving the 20 fathom level;
6 men sinking a winze in the 20;
7 persons on the floors.

From conversation with several mine agents in the Tavistock district it appears the custom for the men, individually to select a doctor from the whole number practising in the district to attend each one in case of illness or accident.

At Huel Crebor, although the men pay 9*d*. monthly to a hurt club, there is no regular scale of payment allowed in case of accident, the amount paid being fixed by the doctor according to the necessities of the case.

Okel Tor Mine, Calstock, Cornwall.

Now working for copper and mundic on an east and west lode in clay slate; lode averaging 4 fathoms wide, and underlying south about 2 feet per fathom. There is a perpendicular engine shaft, 12 feet long, 7 feet wide, sunk to a depth of 80 fathoms; divided and caved for drawing; 2 kibbles and chain.

The mine extends eastward of the engine shaft about 170 fathoms, and consists of the adit, 20, 35, 50, 65, and 80 fathom levels. There is no other regular shaft other than the engine shaft. The ladder road or footway is a succession of winzes from one level to another, sunk on the lode, and situated from 20 to 30 fathoms east of the shaft. The most advanced and most important levels are the 80, 65, and 50 fathom levels now being driven eastward and form the only "tutwork" operations in the mine. 32 men work on tribute above and between these levels.

Places visited:—

80 *end* east driving by 6 men (3 shifts of 8 hours). A winze from the 65 is holed to this level about 50 fathoms back from the end. Barometer in end 30·80 (at surface 30·26). Temperature 67 (tube "33").

65 *end* driving east by 4 men, 2 shifts, 4 fathoms from a winze from the 50. Barometer 30·70. Temperature 65 (tube "34").

50 *end* east driving by 4 men, 2 shifts, 60 fathoms from a winze to the 65. Barometer 30·60. Temperature 67; of water 61.

The changing house is 30 feet long by 12 feet wide and 9 feet high. No fire or fireplace.

Report on Mines in Swaledale District. By C. Twite, Esq.

Camborne, Cornwall,
January 19th 1863.

My Lord,

In obedience to your Lordship's request I have visited the mining district of Richmond, Yorkshire, and beg herewith to submit my report upon the same.

It comprises in the first place a general report upon the whole district, and secondly a detailed report upon the operations of each mine visited, and descriptions of the places in which samples of air were taken.

The description of the rocks is taken from a book just published by a local gentleman, Mr. Lonsdale Bradley, which is a very trustworthy one, as also the map and general section.

I have the honour to be, My Lord,
Your Lordship's obedient Servant
(Signed) Ch. Twite.

To the Right Honorable
Lord Kinnaird, K.T.,
Chairman of the Royal Mines Commission, 1862.

The mining district of Swaledale is best visited from the village of Reeth, about 10 miles from Richmond in Yorkshire.

It comprises the following mines:—

Mines.	Name of Company.	Lessee.
Arkendale	Arkendale Co.	Jacques Roper and Co.
Blakethwaite	Blakethwaite Co.	Bradley and Co.
Beldi Hill	Beldi Hill Co.	Milner, Knowles, & Co.
Ellerton Moor	-	M. Wyvill.
Grinton, Surrender, Summer Lodge	-	Robinson and Co.
Hurst	Hurst Co.	Bradley and Co.
West Swaledale	-	Do. do.

Of these Blakethwaite and West Swaledale are now idle, owing to expiration of the old lease, all the others being in operation.

Character of the Rocks.

The valley or dale is formed by the river Swale, which, in its course eastward, has excavated a way through the whole of the Upper Limestone series to the lower series. On the north, west, and south are the highlands formed of millstone grit.

The principal rocks of these series are limestone, chert, grit, and plate or shale.

The mineral characters of these are as follows:

1. *Limestone*, a calcareous rock, consisting principally of carbonate of lime, with from 10 to 17 per cent. of silicious matter. It is generally fine grained, hard, and compact.

2. *Chert* is a silicious, and to some extent a calcareous deposit, dark in colour and extremely hard. It contains about 37 per cent. of carbonate of lime, and 57 of silicious matter.

3. *Grit* is a highly silicious and occasionally micaceous deposit, and is more commonly known as "Sandstone" or "freestone," consisting of more than three fourths of silica or sand.

4. *Plate* or *Shale* is an argillaceous deposit of a more or less slaty or laminated structure, containing much vegetable and carbonised matter. They contain about 80 per cent. of silicious matter.

From this description it will be observed that the rocks being formed with a high per-centage of silicious matter, chiefly sand, and as the workings in these rocks are very dry, the quantity of dust flying about and inhaled by the men must be very great.

The size of the mining setts.

The next point to which I would direct attention is the large tracts of country leased to the various companies to work.

Taking the list of mines in this district as given above, the Arkendale sett covers an area of 28 square miles, Blakethwaite 13 square miles, Beldi Hill one and a half square miles, Ellerton Moor two square miles, Grinton, Surrender, and Summer Lodge 21 square miles, Hurst 9 square miles, and West Swaledale 30 square miles. A result of this is that the workings are very much scattered about, and the ore found in each place is dressed as near the spot as possible, thus rendering a number of floors necessary, which being only used a few days at a time are left quite exposed to the weather, the companies urging the great expense which would have to be incurred if they were all provided with shedding. Another result is the long distances which many of the men have to travel in going to and returning from their work, it being in all cases from two to 5 miles, and as no changing houses are provided upon any of the mines, the men work in the clothes in which they walk to and fro. This must affect them very much in wet weather.

System of working.

In all the mines of this district now working the productive beds that have been explored are to be found above the level of the bottom of the dale. Hence all the workings are above the "adit" or "day level," which serves at once to drain the mine, and also to form the traffic way for men and mineral. Sometimes several of these levels are driven at different heights or randoms, communication being made by rises or winzes. These levels are carried for great lengths from 1 to 2 or 3 miles.

The ventilation is natural through these levels, and up and down the rises. In some cases air shafts are specially opened to the surface, while in others no provision at all is made, trusting entirely to the "swallows" or crevices in the rock. In some close places fans are used.

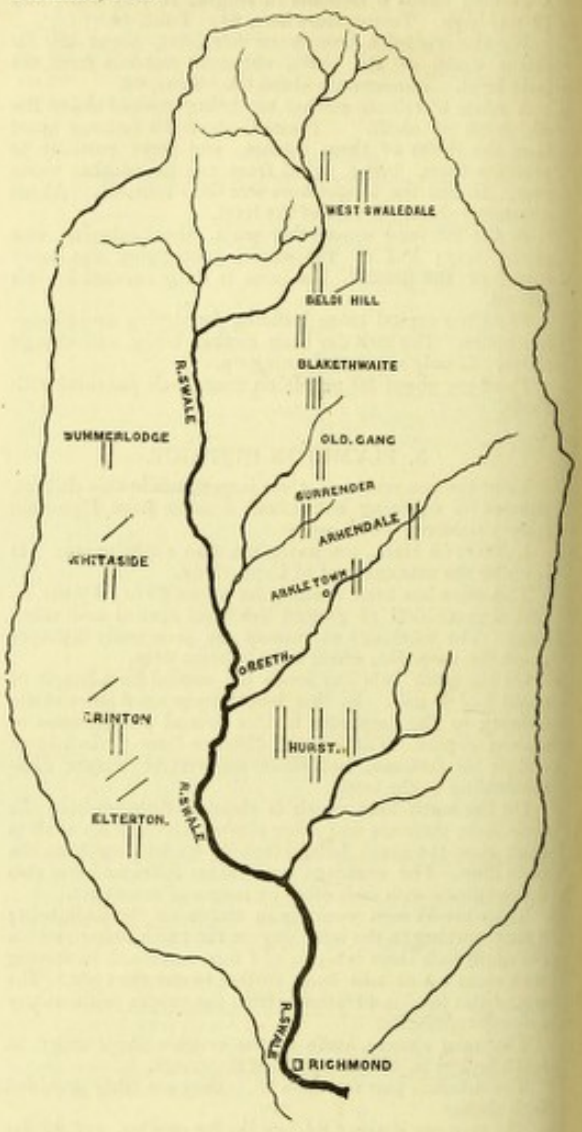
The men work in shifts of 8 hours, and work the 6 days of the week. They work by "bing tale" and "fathom tale," which corresponds to the Cornish "tribute" and "tut work." In all cases the material is provided by the mine, and charged against their accounts. They have monthly settlements. No club or doctor provided. The average wages of the men are variously stated, Mr. Bradley fixing from 6*s*. to 8*s*. per week, Mr. Robinson 11*s*. to 14*s*., and Mr. Coates 16*s*. to 18*s*.

Most of the men have small holdings of land, which enables them to keep a cow and pig, and which provides them with milk, a cheese for home use, and butter and bacon for market. Boys are allowed to enter the mine at 10 years of age.

There are very good schools at Reeth founded and endowed by some members of the "Society of Friends," who previously worked some of the mines. There are also night schools, and Mr. Robinson has a very good "brass band" of boys, and choral class for boys and girls formed of persons working in his mines.

Appended is a sketch map showing the position of the mines, and a general section of the strata.

Sketch of the Lead Mines in the Swaledale District, Yorkshire, 1863.



GRINTON MOOR MINE.

Surface temperature 55°.

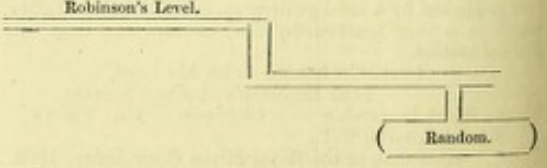
The first place visited was the end of main level driving east on Wellington's Vein, in the shale on the main limestone.

The end is driven by 1 man and 2 boys. 6 feet high and 5 feet wide. It was carried 200 fathoms from the mouth.

The ventilation was natural, there being an old shaft open to surface about 25 fathoms back from end, and a partnership of men were rising to a level within a fathom from this place.

Sample No. 32. Temperature 51° F.

The other place visited was the workings in the second Flot Random. This was reached by Robinson's level as far as Pearson's Sump, which is 7 fathoms deep, and the Random is 60 fathoms north of this, and 3 fathoms below it.



The working was aired by current of air passing above the sump. There were 7 men working in this place.

Sample No. 33. Temperature 53° F.

SURRENDER MINE.

Surface temperature 55° F.

The first place visited was a sinking upon the new vein in the middle turn level.

General Section of the Strata, Swaledale District, Yorkshire.

Millstone Grit.
Coal.
Plate.
Flinty Chert.
Plate.
Crow Chert.
Crow Lime.
10 fathoms Grit.
Plate.
Iron Beds.
Plate.
Redbeds (Lime).
Plate.
Blackbeds.
Lime.
Main Chert.
12 fathom Lime.
Grit.
Plate.
Middle Grit.
Plate.
Underset Chert.
Underset Lime.
27 fathom Grit.
Coal.
Grit.
Plate.
3rd Lime.
Grit.
4th Lime.
Grit.
5th Lime.
Grit.

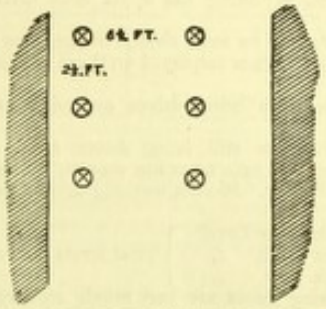
It was about 2 miles up the horse level. There is no direct communication by shaft to the surface, but 10 or 12 rises to workings above, and a branch level opening to the day.

The working was about 3 fathoms below the level, and embraced a space of about 20 fathoms in length and 4 in width. It is in the beds known as the Chert or Brangill rider. There were 3 openings to the level above.

Sample No. 34, temperature 51°.

The second place visited was the end of a cross cut, which was being driven from a rise 7 fathoms above the main level and about 150 fathoms from the end.

The rise was 9 feet long and 2 wide. There were no ladders, but stemples were fixed for climbing. These stemples are pieces of wood 2 or 3 inches diameter, placed across the rise, and firmly fixed in about 3 feet 6 inches apart in width, and 2 feet 6 inches apart in height.



In this case the rock was firm, so that no casing was required. The part by the side of the stemples is used as a pass for the ore.

The cross cut was driven a length of 110 fathoms 5 feet wide, and 4 feet high, by a partnership of 3 men It was supplied with air from the level below, by means of a hand fan placed immediately over the rise, and worked by an old man 76 years of age, the air being conveyed through a zinc pipe, 4 inches diameter, and delivered at a velocity of 2½ feet per second.

No shot had been fired for the day

Sample No. 35. Temperature 57°.

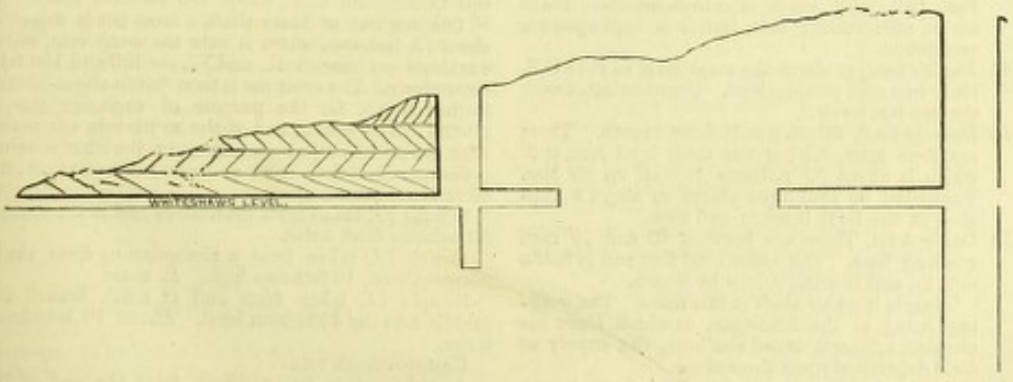
The third place visited was a working in Whiteshaws level, which is a level exploring the higher beds.

(See plan below).

The end of this level is 90 fathoms from mouth of the level, and about 12 fathoms beyond the shaft, which in 5 fathoms deep. The rock on one side is shale, and on the other chert. The level is being driven in to meet a level which is coming towards it from another shaft, and about 70 fathoms beyond it.

Sample No. 36. Temperature 48°.

The second shaft above spoken of is sunk to a depth of 60 fathoms to the lower workings, and is used as a travelling way for many of the men. It is 9 feet long and 4 feet wide, without ladders, but stemples as before described. At the distance of 4 fathoms apart, a bunting is put across one part of the shaft on which the men can stand and rest



In these two mines the men use iron tamping rods. The dressing of the ores is carried on entirely by men and boys, and is almost exclusively done in the open air.

The men are paid monthly.

Hurst Mine.

This mine is worked under the management of Mr. Bradley, of Richmond, Mr. Daykin being the local manager.

The workings consist in driving several trial levels, driving level on veins already proved, and in taking away the contents of the veins in the ground opened out.

Hurst head.

1. Lowest or Prye's Level.—This level is a main horse way, and is driven a length of 240 fathoms from the mouth. It is still being driven by a partnership of 8 men working in four shifts of six hours each, so that

there are 2 men working continuously the whole week hrough. It is carried 9 ft. high and 7 ft. wide, in the rock known as Millstone Grit.

The end is carried 50 fathoms beyond an air rise.

Sample No. 65.

The next place visited was a working in a drift 8 fathoms below this level. The place contained a great deal of water. It is in the rock known as Plate. The air was very bad; so bad that the candles had to be held nearly upside down. It was impossible to seal the tubes. The man working said he burned five candles in six hours, and the air affected his breathing and caused head-ache.

The other levels on this vein are:

1. Queen's level about a mile west of Prye's, which is about a mile long, and still being driven.

There are no air shafts, but a double air gate is carried for ventilation.

2. A level called *Hurst level*, about 50 fathoms above Queen's level, exploring the upper oeds driven nearly a mile.

3. *Nuugate level* on some strings of the same vein.

The number of men employed on these workings amount to 100.

Other levels are being driven on veins to the south of Hurst.

1. *Copperthwaite* still being driven at a distance of three quarters of a mile from the mouth. The vein is also being stoped away. 30 men working here. Ventilated by air shafts.

2. Marrick Moor Level
3. Marrick High ,,
4. Marrick Low ,,

} Trial levels four men each.

The dressing floors are very much scattered over the sett, and are nearly all exposed. About half a dozen persons were under cover. Women are employed to dress the ores.

The miners live, some near the mine in the village of Hurst, others scattered two or three miles away. Some very nice houses have lately been built on the mine, containing two good sleeping rooms, a living room with kitchen and dairy, but having no yard or back premises of any kind.

The men are settled with monthly.

Arkendale Mines.

These mines are about two miles from Reeth. They comprise an area of about 28 square miles, and have been worked from many points.

The following are the principal places at which operations are being prosecuted:

1. *Fell end. Gutter's level.*—Driven about 700 fathoms from the mouth, and 100 fathoms beyond an air shaft. It is being driven by three shifts of two men each. It is ventilated by an air drift carried about 8 fathoms above them, which is communicated with at about 15 fathoms interval. The present end is about 10 fathoms from the last hopper.

2. *Arkendale proper*—South side.
   (1.) *Fore Gill*, worked by 60 men and boys; 6 men are driving the horse level back towards a cross cut.
   (2.) *Turfmoor level*, about 14 fathoms higher than Fore Gill, with which it communicates. There are no men working here, but it is kept open for ventilation.
   (3.) *Moulds level*, at about the same level as Fore Gill. Only two men picking here. Communicates with the two last levels.
   (4.) *Daurigg level*, driven a mile from mouth. There are four men driving the main level fore end, which is about 30 fathoms beyond an air rise. Ventilated by zinc pipes placed in above a stopping in the level between two rises.
   (5.) *Dauby level*. There are between 60 and 70 men working here. The main level fore end is half a mile in, and is being driven by 6 men.

   There is is no air shaft in this mine. The workings being in the limestone, in which there are numerous fissures called swallows, the supply of air is dependent upon these alone.
   (6.) *Kouth level*, driven a mile in. There are 4 men rising here; they are 30 fathoms above a level, and have no other opening, trusting to the air finding its way through the swallows.

2. *North side.*
   (1.) *Fagger Gill level*, 1¼ mile in the limestone; 4 men driving it. No air shafts or drifts, trusting to swallows.
   (2.) *Stang*, ¾ mile in. 34 men. No air shafts or drifts.

3. *Old Gang.*
   (1.) *Hard level*, driven 1¼ miles, and still driving. It is also being worked away in stopes, employing about 100 men and boys.
   (2.) *Bunting level*, 60 men and boys following up old men's workings.
   (3.) *Barkary*, 30 men and boys working over the old men's places.
   (4.) *Kinning level*, with 6 men.

The dressing floors are scattered about these mines They are mostly exposed to the weather.

Old Gang Mine.

Visited the fore end of Hard level. This had been worked before by old men. It was quite dry.

Sample 68.

Sample 69 was taken from a similar fore end near to last one. Each of these worked by 3 shifts of 2 men each, the men working 8 hours.

The next place was a rise 7 feet high at the end, a cross-cut 22 fathoms from main level. It was in the black beds, 2 men working. The place was ventilated by a hand machine placed in the middle of the cross cut, worked by a a boy, which drew the air from the main level and forced it into the rise, through zinc pipes 4 inches diameter.

The machine was working while the sample was being taken.

Sample 70.

Access to this working by stemples 2 feet apart.

The Grassington Mines.

These are lead mines about 12 miles from Skipton, belonging to, and worked by his Grace the Duke of Devonshire, under the management of Mr. Jas. Kay Eddy, who has also the management of the Snailbeach Mines, Shropshire, and several slate quarries.

The sett is a very extensive one, covering some 13 or 14 square miles, and the number of men employed being 80.

The late Mr. Eddy, father of the present manager, having been a Cornishman, introduced the Cornish methods of mining. The mine is worked by several shafts; a changing house is provided for the men, but not one will use it; a doctor and sick club is established, and all the payments are made monthly.

The men live in the adjoining villages of Grassington and Halsden, about 2½ and 3 miles from the mines.

The accompanying tracing from the plans at Grassington, kindly furnished by Mr. Eddy, will very clearly illustrate the system of ventilation, and the places which I thought it advisable to examine.

The ladders in Moss shaft were very good in about 3 to 4 fathom lengths, and with an inclination of from 2 to 2½ feet per fathom.

Grassington Mine.

Visited the end of the cross cut, driving south from the 60 fathom level. From the accompanying plan it will be seen that in the north part there is a vein called the middle vein, in which there are two shafts, marked Moss shaft and Cottingham shaft, about 190 fathoms apart. About 50 fathoms east of Moss shaft, a cross cut is driven south about 75 fathoms, where it cuts the south vein, on which workings are carried E. and W. for 150 and 100 fathoms respectively. The cross cut is then driven about 95 fathoms further south, for the purpose of exploring the south ground. The eastern end of the south vein communicates with the middle vein by workings on the Slanter vein.

Sample 71, taken from end of south cross cut, 2 men, 90 fathoms from a rise.

Sample 72, taken from the western end of the south vein, 80 fathoms from a rise.

Sample 73, taken from a rise going up from the 60 on Slantern vein, 10 fathoms high. In shale.

Sample 74, taken from end of north branch of the middle vein the 40 fathom level. About 10 fathoms from a rise.

Coalgrovebeck vein.

A cross cut is being driven from the end of the 58 fathom level on this vein. This end is 140 fathoms from the shaft. As there is no other level above or below this one, there is no back current. The end is driven by 2 shifts of 2 men each working 8 hours.

Sample No. 75.

Preparations are making for supplying this end with air from the shaft by a water pressure blast.

The ladders in 3 or 4 fathoms length, with an inclination

of 1 foot in a fathom, except the last 14 fathoms, which are perpendicular, and in one length.

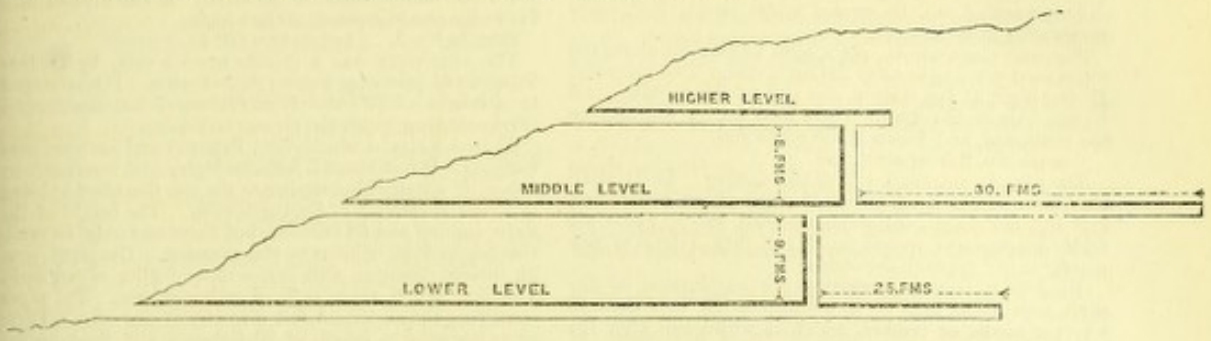
Some of the dressing is carried on under sheds, and houses are provided with fires for the men to eat their dinners in.

It is to be noticed that the men in this and other Grassington mines are working in the grit and limestone beds. The mines being dry, a great deal of dust is inhaled. As this dust is composed mostly of silicious matter, it must injure to a considerable degree the lungs of the men.

I append the rules of the sick club.

Habben Moor Mine

Adjoins the Grassington mine, and is worked by a Leeds Company, of which Mr. T. Kirkby is chairman, under the management of Mr. Job, the property being divided into 20,000 shares.



It is worked by three levels driven into the hill side, with communication between them.

The end of the lower level on the star vein is driven 500 fathoms from the mouth, and 25 fathoms from the air rise. It is drawn by 2 shifts of 2 men, working 8 hours. The end is dry, and in the grit rock. Sample 76.

The middle level not working, owing to the accumulation of black damp forcing the men out.

There are 46 men working underground, and 17 dressing the ore. There are no sheds on the mine.

No doctor or club.

Cononley Mines.

Near the village of Cononley about 3 or 4 miles from Skipton, worked by the Duke of Devonshire, under the management of Mr. Eddy.

The workings are all above the adit level, which is 34 fathoms deep at the engine shaft.

There are about 14 men and 14 pitches.

Sample 77, from Dakin's pitch in the back of Bigg's level. This pitch was about 15 feet wide and 7 feet high, worked by 3 men. Visited it 15 minutes after 2 holes had been fired.

Sample 78, from James Stoddart's sinking, 2½ fathoms below Bigg's level; 2 men working. There was a small air drain from a rise from air below; 40 minutes after blast.

Sample 79, from John Cherry's pitch in the back of the top adit, 3 fathoms high. It was 3 fathoms wide. One shift of 4 men working 8 hours. The same men working here for 6 years.

Sample 80, from the rise in the engine shaft middle level cross cut; 7 fathoms high. One shift.

Note.—Candles sold on the mine at 6*s.* per dozen.

Camborne, Cornwall,
6th February, 1863.

My Lord,

I beg herewith to send your Lordship, my report upon the mines visited by me in the Alston Moor district in September of last year.

I have the honour to be, My Lord,
Your Lordship's obedient servant,
Chas. Twite.

To the Rt. Hon. Lord Kinnaird, K.T.,
Chairman of the Royal Mines Commission, 1862.

Report on Alston Mines.

The district of Alston Moor is one of the largest mineral districts in the north of England. It lies around the town of Alston which is reached by a branch line from Haltwhistle on the Newcastle and Carlisle railway.

The mines are mostly in the high lands or fells around at an elevation of from 1,200 to 2,000 feet above the sea level. They are mostly the property of the Greenwich Hospital Commissioners, and are leased to the various companies now working them.

Some of these companies, as the London Lead Company, are the lessees of very large extent of mineral ground, and employ large number of men, while others consist of only two or three speculative working miners who, receiving a "take note" or permission to work from the lord's agent, go into any part which is not being worked, and search for mineral.

The character of the *rocks* is of the same description as those described in my report upon Swaledale.

The system of working is also the same excepting that the men work only 5 days in the week.

The period which the men's accounts are allowed to run vary in this district. With the London Lead Company the accounts are settled *annually*, the men drawing a regular amount of *advance* money monthly. At Roddcrup Fell the accounts are made up quarterly.

A new feature to be observed in this district is the providing of sleeping rooms on the mine for those men who live at a distance of several miles, who go home only on the Friday night, and remain there until Monday morning.

This district, and especially the London Lead Company's mines afford good opportunities for seeing the working of ventilating machinery. I have reported fully on three of these machines, working respectively at Rampgill, Long, Cleough, and Fletcheras mines. In each of these cases the pressure from a column of water is the motive power. In the first two, the power thus obtained is applied to a fan while in the other case the velocity of the jet of water is applied to increase the velocity of the air in the small air course, that is, the air pipe, and so to increase very largely the quantity of air entering the end or working place per minute.

The quantity of air supplied in the first case was about 30 cubic feet per minute, in the second 20, while in the third case it amounted to 38, while the distances the air was carried in the first and second was 90 fathoms, in the third it was 190.

The quality of the air supplied is good in these respects. It is cooled from the contact of the water, and to a great measure purified, if the air be supplied from the mine itself.

There are good schools provided by the London Lead Company at Nenthead. All the children of the men employed upon their mines are compelled to send their children to school, the boys until they are 12 years of age, the girls until 14. The boys enter the works at 12, but have to attend a night school until 18.

A good reading room and library is also provided.

The Ramp-gill Vein.—This vein is worked by the London Lead Company. It is situate at Nenthead, about 4 miles from Alstone. The deposit of lead occurs in the great limestone, having the beds of plate above, and the Hazle beds, known as the tuft or water sill, below.

Visited the end of the water level, which was driven about a mile from mouth, and was still being prosecuted by two men. The contract for driving was to the effect that it should be driven 6½ feet wide and 4½ feet clear height above the rails. The end was about 50 fathoms from an air rise, and was 4½ feet high in all. The men were working in a sitting posture, one beating and the other turning the borer.

Two holes had been fired, consuming ¾ pint of powder, about 2 hours previous to visiting.

The temperature was 68° F. Sample No. 1.

Air was being forced into this end by means of a blast consisting of a fan driven by a band, attached to a water wheel, fixed under an air rise 90 fathoms from the end, and communicating by a 6 inch pipe of cast iron. The

velocity of the air at the end of the pipe was 150 feet per minute.

This not being considered quite sufficient a new one was being constructed with a different motive power. Instead of driving the fan by a water wheel, a column of 3½ inch pipes, 20 fathoms high is to be erected, which will always be kept full of water, and a jet issuing from near the bottom will strike against the vanes of the air fan, causing them to revolve with much greater rapidity.

This machine will be erected under an air shaft, communicating with the surface.

The next place visited was a level 16 fathoms above the water level working in a flat on Carr's vein. This place was 16 feet high, 21 feet wide at one end of the working, and 18 feet wide on the other. There were 4 men working on the south end, and 4 men in the north end.

Sample No. 2 from south end.

The men do not employ fuse in blasting. In its stead they make squibs from pieces of paper about a foot or a foot and half long, and about an inch wide. These are folded length ways several times, and then a train of fine powder is laid through the inside.

The hole is tamped previous to the introduction of this squit, room being kept for it, by introducing into the hole a copper needle or pricker, which is withdrawn after the hole is tamped.



The tamping bar is furnished with an end capped with copper.

The squib is fired by a match, made of well-greased twisted paper, placed obliquely across the hole.

The ladders throughout the mines are good, being of wood, about 12 feet long, with flat staves about 10 inches apart, and inclining about 2 feet in 12.

Owing to the abundance of suitable stone, the levels and passes are mostly lined with pack walls, and the roof, where it is required, secured by arching.

The men all go to their respective places of work from the water level. As the rock is, comparatively speaking, hard here, the quantity of tools to be carried by the men is large, and therefore would be a tax upon their strength. To ease them in this respect each partnership is provided with a small light tool waggon sufficiently large to carry the tools and men; this is pushed along by one of the partnership.

Surface Operations.—In all the mines worked by the London Lead Company, the dressing of the ores is carried on by men and boys, no females being employed in any of the operations. As this company have such extensive fields of operations, and as they have been working for many years, they have afforded employment to a great many families for successive generations; it being a rare thing for any of their employed going to any other mines for work. They thus take them from school at 12 years of age, place them at work on the floors, where they remain until they attain the age of 18, when they are sent to work in the mines.

The greater part of the dressing operations are carried on in the open air. In consequence of this, during a portion of the year, three or four months, these operations are suspended owing to the inclemency of the weather. During this time the young men are sent into the mines to act as labourers in repairing the road, &c. By the time operations can be resumed, there is a great accumulation of ores to be dressed, when the younger men among the miners are brought out and put to this work.

There are several dining houses furnished with seats and fires for the workmen to dine in.

As many of the men live at great distances, 4, 5, or even more miles from the mine, sleeping-rooms have been provided, so as to obviate the necessity of the men going this distance more than once a week; these sleeping rooms are called "mine shops."

Visited Small Clough mine shop.

This was a stone building divided into two rooms, one for day use, the other for night.

The day room was 15 feet long 14 feet wide and 7 feet high. It had a wooden floor, and was ceiled. It was lighted and ventilated by one window 3½ by 2 feet, opening at the top. A good fire and oven provided. The sleeping room was 19 feet long; it had no ceiling, and was furnished with two windows 3 by 2½ feet; also an open fire grate. There were six bedsteads giving accommodation for 12 men.

The company provide bedsteads, the men their beds and blankets.

The men clean the house. They generally bring their provisions with them on the Monday ready for use in sufficient quantity to last them until Friday when they leave work.

Long Clough Mine.—Also at Nenthead and belonging to and worked by the London Lead Company.

The first place visited was that worked by William Foster and partners, consisting of five men, father, son, and three half-brothers of the latter. It was a place in a flat in the great limestone 20 feet high.

Sample No. 3. Temperature 60° F.

The next place was a driving upon a vein, by Thomas Vickers and partners, 4 men; 6 feet wide. It was stoped to a height of 20 feet. It was about 7 fathoms from a cross cut along which the air was travelling.

Visited a rise in which Alex. Paterson and partners were working. It was about 5 fathoms high; and ventilated by means of a water blast similar to the one described as being in course of erection at Rampgill vein. The height of the water column was 68 fathoms, but there was only an available height of 20 fathoms on this occasion. The pipes were 3½ inches diameter, with an orifice of ⅝ths of an inch. The fan had 6 vanes each, 6 inches square. The pipes conveying the air were 5 feet diameter of cast-iron. These pipes traversed a length of 90 fathoms, and then up the rise, and air was being forced into the working with a velocity of 1,200 feet per minute.

Visited Robert Barnes' partnership's bargain. This consisted of 5 men who were driving to meet those driving in the first place visited. The place was 16 feet high. Ten holes had been fired that morning, consuming about 4 lbs. of powder; one had been fired within 15 minutes. Sample No. 5; temperature 61.

The men in these mines carry their powder in gutta percha bottles called "cuddies," costing from 3*s.* 6*d.* to 5*s.* each.

The London Lead Company settle accounts with their workpeople only once in the year. To enable them to go on a regular system of advancing money prevails. For the first three months each man draws 35*s.* per month. From that time until he is 21 years old 40*s.* is the sum allowed, and after that period each man draws 44*s.* per month.

Rodderup Fell Mine.

This mine is about three miles from the town of Alstone, and is worked by a private company under the management of Mr. Crawhall.

In this mine workings are being carried on both above and below the water or Blackburn's level.

The workings below are only of recent date, and consist of sinking two shafts about 12 or 14 fathoms apart, between which on reaching the productive beds communication will be made, and levels driven.

These shafts are circular in form, and 9½ feet diameter inside cribs; the ground not being firm they are timbered the whole way down. This timbering consists of cribs of English oak 5 inches square, placed around the shaft at distances varying from 3 to 6 feet apart. To these are fastened a complete lining of 1½-inch timbering, the joints all being made tight.

Only one of these shafts was being sunk; it was 60 feet deep, and was divided into two portions by wooden brattice. It was used as a winding, pumping, and ladder way shaft. Four men were working in the bottom, which was very wet and cold; the pumps raising 2,100 gallons of water per hour.

Sample No. 6; temperature 58°; water 54°.

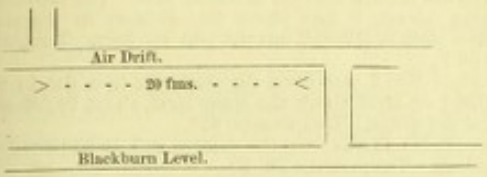
Sample No. 7 was taken from a working on the sun or south head of the Rodderup Clough vein, 3 or 4 fathoms from the main level or air-way. It was 9 feet high and 6 feet wide, worked by 4 men. Two holes had been fired about 15 minutes previous to visiting this place. Temperature 57° F.

Sample No. 8 was taken from a partnership of 4 men's working on the same vein as previously mentioned, who were driving to meet the last partnership. A small communication 4 feet wide by 1 foot 9 inches high had been opened between them, so that the air passed from the main level to the place last visited, then through this small opening to these men, and then to main level again. All the ground had been worked away above, but the space was filled in with attle. Temperature 58°.

Sample No. 9 was from a heading in the principal vein driving by 4 men. A hole had been fired about two hours previously. Temperature 62°.

The next sample No. 10 was from a working in a drift above the lower water level. This drift or level was 5½ feet wide, and 5 feet high. Four men were stoping. There was a circulating current passing through the place. Temperature 64° F.

Sample No. 11 was from Jonathan Spark's partnership working in the air drift above Blackburn level, which communicates with an air shaft to surface.



Two leads meet in this drift, making a vein 15 feet wide which these men were working away. The rise was 6 feet wide and divided off into two parts, one forming the travelling road for the men, the other serving as a pass for the material. There were no ladders for the men, they having to climb by the stemples, which were 2½ feet apart.

From the air drift last referred to a rise, 13 fathoms high, communicates to the middle level. This rise is used as a travelling way, it being furnished with stemples, which were 3 feet apart and several missing.

At the top of this rise a level has been driven 7 fathoms eastward and 9 fathoms westward, and 6 men were working in it. Sample No. 12 was taken just over the rise. A shot had been fired about half an hour previously.

Surface Arrangements.—There is only a changing house provided for those men who are working in the shaft, and even these men, although working in such a wet place, do not keep a change of clothes, but simply dry themselves before the fire.

There were 86 men and boys employed in dressing the lead ores. With the exception of 3 or 4 employed with the Brunton frames all these were working exposed to the weather.

There were several sleeping houses in the mine; one was a house of 2 storeys, 18 feet long and 16 feet wide. The ground floor room serving for a day room was 7 feet high. Each man here had a lock-up cupboard to himself. The first floor room, 7 feet high, was a sleeping room accommodating 8 men. There were 2 windows, 4×3 feet, but no fire-place. The upper room having beds for 4 men had 2 windows. In all these shops it is the rule for two men to sleep together.

There were three other shops on the mine similar to this one built for the convenience near the mouths of the different levels.

Besides these shops the company has built several houses for their workmen; they are let at moderate rents, a five roomed house with a right of pasturage for two cows on the common being let for 8*l.* per year.

Another large house is a lodging house for single men working upon the mine. A man and his wife has charge of it living rent free and receiving from each lodger sixpence per week as remuneration. This is the only payment they have to make.

Cashwell Mine.—This mine is about 5 miles from Alstone, at an altitude of 2,000 feet above the sea level. The operations are carried on mostly below the water level. There are 80 men underground.

Sample No. 13 was taken from the bottom level, 7 fathoms from the eastern end, where 4 men were employed taking down the sides. The height of the level varied from 5 to 9 feet, and was generally 4½ feet wide. There were several heaps of mineral in the level 2 to 3 feet high. Temperature 61° F.

Sample No. 14 was taken from the same level, about 8 fathoms west of the last one. There were 4 men taking down the side. Temperature 57° F.

Sample No. 15 was from a working in the main bot om level, 13 fathoms from the shaft. Four men were working. Temperature 61° F.

Sample No. 16, taken in the same level, in direct current where two men were working. Temperature 55° F.

Sample No. 17 was taken from the western end of the Copper Hazle Level, 10 minutes after a shot. Temperature 57° F.

There are no sheds of any kind upon the mine for the dressers.

There is a comfortable sleeping shop.

In the passes from the water level to the deep workings, which serve as travelling ways for the men, wooden ladders are fixed, having flat wooden staves 12 inches apart.

Appended to this report is a section of the workings at Cashmell Mine, which will illustrate this district.

Garrigill Mine.—Visited this mine, belonging to the London Lead Company, to see another kind of water blast. It differs from the one before described in this respect only, the absence of the revolving fan, the jet of water being the acting cause.

It was erected under an air shaft, 194 fathoms west of the eastern forehead in the scar limestone in Fletcheras level.

The pressure pipe was 8 fathoms high and 3 inches diameter, while the supply pipe was 6 inches diameter, of cast iron. Air was being supplied to the end at a velocity of 170 feet per minute. Temperature of the end was 61° F.

This was not the whole effective power of the blast, as a part of the supply went by a branch pipe to ventilate a rise in another part of the mine.

Allenheads Mines.—These mines are worked by W. Beaumont, Esquire, M.P., under the management of Thomas Sopwith, Esquire, F.R.S., and form part of the W.B. Lead Mines.

Visited first the ventilating furnace erected at Plantation shaft on Henry's vein. The workings on this vein are very extensive, and at certain seasons the ventilation had been so feeble that the men were obliged to leave their work for days at a time. To prevent this a furnace was erected, of which I append a plan and sections, which insures at all times the circulation of a good current of air through the mine, which can be distributed to all the working places. The furnace is erected at the top of the shaft, for convenience of attending to it. The shaft is 25 feet higher than the other shafts, and communicates with the workings of all the mines in the district.

The fire grate is 4 feet 3 inches by 3 feet.

The chimney is 40 feet high from the foundation, or 35 feet above the fire. This height was necessary from its being built close by the road.

A drift is carried from the shaft about 8 feet from the top to the furnace, having a section of 5 feet by 3 feet 6 inches. The top of the shaft is closed by air tight doors.

The expense for one year of this furnace was 170*l.* This includes 10 per cent. on the cost of building, 25*s.* per week for attendance. The price of coal on the mine is 13*s.* 6*d.* per ton.

There was another ventilating furnace in course of erection at the Burtree pasture shaft, which is now completed and in working. This furnace is placed at the top of a surface shaft, about 500 feet above the highest and upwards of 1400 feet above the lowest workings in the Burtree pasture vein. This shaft is situated 350 fathoms west of the present easternmost forehead in the vein, and 1100 fathoms east of the principal winding shaft. It may therefore, be considered to ,at any rate, ventilate a mile in length of vein workings, allowing that a portion of the total length is ventilated by the engine, or winding, and other shafts, but I have no doubt its influence is felt over the entire workings. It is placed at the N.W. corner of the workings.

In the heart of the walls on each side of the furnace there is put in a course of ashes, which being compressible, allow of the expansion of the inner course of bricks, without bulging the external face of the walls. The fire bars rest on metal plates, built into the walls with a little projection.

Visited the workings on the western part of Henry's vein. Descended Gin Hill shaft, which is a perpendicular one, 77½ fathoms deep. It is five feet square, used for winding, having two cages each, 5 feet by 2 feet 4 inches. The guides are the common bridge rails, weighing 16 lbs. per yard, and fit into a groove in the cage. The cages have neither bonnets nor safety catches. Three men ride at a time in each cage. They are lifted by wire ropes 2¼ inches circumference, which are wound over 6 feet pulleys unto 4½ feet drums, by hydraulic engines. The engine is worked by a man at the shaft top. The time occupied in putting the waggon into the cage and drawing it to surface is one minute. The shaft is enclosed by a wooden house, for the protection of the engine man and landers.

Went down Gin Hill shaft for 40 fathoms, to the horse level, which I may here state, is carried by an incline to the surface, and which forms the ordinary travelling way for the men and horses, which we travelled for a length of ¾ of a mile, until we reached Kearston's cross-cut, which after a length of ¾ of a mile, cut the Henry's vein, the western forehead of which we visited, at a distance of one mile from the mouth of the cross-cut. This end was about 20 fathoms from a rise, was 5½ feet high by 5 feet wide. Six men were employed taking down the sides. Temperature 66° F. Sample of air No. 18.

Visited the level above horse level to test the velocity of the air current. The air was being drawn up through the rise about 20 fathoms east of the last place; visited along

this level towards the furnace drift. The level was 3 feet 3 inches wide by 3 feet 4 inches high, and the velocity of the air in the centre was 150 feet per minute.

We visited the workings in the 2nd level above the horse level. The workings are driving westward, which end is 5 fathoms from the rise, and taking down the sides of the level on the eastern side, which leads to the furnace drift.

Took sample No. 19 from the western end, where the air was standing and temperature 66°; and sample No. 20, from the eastern end, where the velocity of the current was 100 feet per minute, and the temperature 63° F.

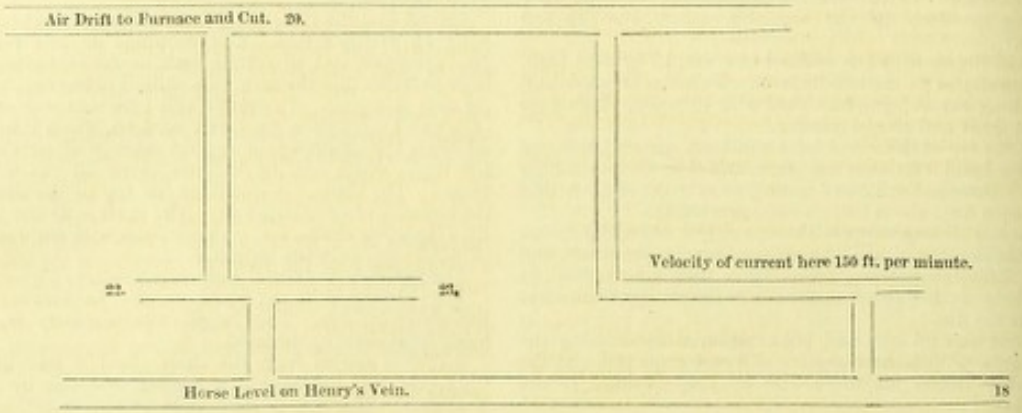
The next sample, No. 21, was taken from the rise at the end of Plantation cross cut in Henry's vein. This rise, 80 fathoms high, is a double one, or has the centr part filled in with attle or deads, forming an air-tight division, and ensuring an up and down current of air. The circulation in this place is ensured by placing a stopping in the level underneath the middle of the rise, and by cutting an air drift to the furnace drift on the other side. The men were working about 6 feet above the division in the rise. Brattice cloth is allowed, but not put up here. Temperature 66 F.

Sample No. 2 was from the workings in a flat in the middling or level above the horse level, about 12 fathoms east of the winza. Temperature 65°.

Sample No.23 was from the western end, 15 fathoms from the winze. Temperature 78° F.

These flats are very dry and dusty; so much so that occasionally they are watered by means of small water carts.

Hand Sketch of Workings visited.



The Workings on the Eastern part of Henry's Vein.—Entered by Famside Level driven in the shale on the top of the fire stone, which, at a distance of a mile from the mouth joins the high underground shaft, down which we went to the level in the 4 fathom limestone, a depth of 77 fathoms, from which level we visited John Oatman's place in the deep workings in the 6 fathom hazle.

The men ride up and down the shaft in the cages which are the same as before described. In the rises ladders are placed throughout these mines.

Sample No. 24 was taken from this place.

Samples No. 25 and 26 were taken from the flat workings in the lower part of thick limestone. These places of workings were about 18 fathoms wide, and 8 feet high. The temperature was high, it being respectively 69° F, and 67° F. No shots had been fired for several days.

Sample No. 27 were from Thomas Iceton's Rise on Henry's Vein. The rise was 3 fathoms high, 2 men working. A shot had been fired about an hour before visiting it. Temperature 70°.

Sample 28 was from Isaac Reed's working in string from Victoria Vein. Very smoky half an hour after a shot. Temperature 67°.

The Allenheads Benefit Society.—There is no benefit club immediately in connection with the W. B. lead mines; but from a very early period benefit clubs had been in existence in the district, supported almost entirely and managed by Mr. Beaumont's workmen. These worked until about the year 1847, when it was found that the principles of management not having been laid down by qualified persons, the affairs of these societies, like many others of the same class, were in such a condition that nothing else could be expected but disappointment and eventual distress, which was seen fast approaching. Steps were taken, through the active interference of Mr. Sopwith, and the liberality of Mr. Beaumont, to enable the existing societies to meet their engagements for three years, so as to allow time to consider the proper basis of a new society to be formed from the several old ones upon *correct calculations*, and which, by *improved management*, should ensure permanent benefit to the old members as well as to new ones. For this purpose a joint committee was nomi nated, the services of eminent actuaries secured, and the result was the formation of the Allenhead's Benefit Society on the 25th February, 1850, which is now in a very flourishing condition.

The benefits to be secured by the members are of three degrees:

1st. An assurance for an allowance of from four to ten shillings a week in sickness, to commence one year after enrolmen t,and to extend over the lifetime of the assured.

2nd. An assurance for an *annuity* of from two shillings and sixpence to ten shillings weekly for life, commencing when the assured has attained his seventieth year.

3rd. An assurance for the payment by the society to the heir or heirs of the assured, any sum from five to twenty pounds on the death of the assured.

In no case can any member assure for more than three-fourths of his average weekly earnings, including any benefits from any other Friendly Societies.

The contributions from members are regulated by the age of the member at the time of admission, and are set forth in Tables, approved by Mr. F. G. P. Neison, the Consulting Actuary.

Besides these contributions by the members, honorary members subscribe to the funds; and Mr. Beaumont gives a sum annually, equal to 5 per cent. on the sum subscribed by the ordinary members.

The management is vested in the hands of a president, four vice-presidents, four trustees, and a board of 9 directors elected by the members.

The surplus funds are invested with the Commissioners for Reduction of National Debt, but the rules provide for this to be distributed among the members every 5 years. Besides the annual contribution from Mr. Beaumont referred to above, this gentleman subscribes also a sum equal to 2 per cent. annually on the surplus money or capital of the society.

From the twelfth annual statement of the society, being for the year ending May 16th 1862, it appears that the income in the year was 553*l.* 5*s.* 5*d.*, while the expenditure was 272*l.* 11*s.*, leaving an excess of 280*l.* 14*s.* 5*d.*, which added to previous credit balance, makes the capital for the year 1863, 2,400*l.* 15*s.* 3*d.*

From the same statement we learn that the number of members admitted since its establishment, is 493 ordinary, and 44 honorary, making a total of 537, that the number who have died has been 54 ordinary and 10 honorary, and that the number withdrawn has been ordinary 29, honorary 8, leaving the nnmber at the time of statement 410 ordinary and 26 honorary; total=436.

The number of members receiving sick pay from May 18 1861 to May 16 1862=49, and the amount so paid 232*l.* 18*s.* 6*d.* The amount paid by the society on sums assured on death of member for the year was 20*l.*

There are good schools provided by Mr. Beaumont for the children of his workpeople. The instruction is given by a master and mistress, and appeared to be sound and suited to the condition which the children are likely to fill in after life. I was very much struck with the cleanliness and order of the children as well as their general intelligence.

Report on Mines in North Wales. By C. Twite, Esq.

Camborne, Cornwall,
3rd August 1863.

My Lord,

In obedience with your lordship's instruction I have visited some of the mines of North Wales, and examined the underground workings of the same, for the purpose of reporting to your lordship the condition of the mines in regard to ventilation, the safety of the footways, and arrangements for the general welfare of the working miners. With this object in view, I have visited the mines in the districts of Wrexham, Mold, Holywell, Llandudno, Llanrwst, Carnarvon, Pary's Mount, Dolgelly, Aberystwith, and Shrewsbury.

As the time at my disposal is limited, the plan adopted has been,—first, to visit each district, in order to acquire a general knowledge of it, inspecting the principal mines, taking samples of air in different parts, and reporting upon the same; then if time will permit, and your lordship should think it necessary, to return and visit such other mines as require it, and so, in a supplementary report, complete the whole district.

The following summary will show the mines in each district :—

Summary of Mines in North Wales.

District.	Principal Mines.	Secondary.
Wrexham -	Minera - -	South Minera, Park, Central Minera, Pool Park.
Mold -	Macsysafn - -	Westminster, Panty Buarth, Hendre Ucha, Bryngwyn, Mt. Pleasant, Cefn Cilcen.
Holywell - (Halkin side.)	Rhosesmawr, Bryngwiog, Long Rake.	Halkin Level, Milwr, Grosvernor.
Holywell - (St. Asaph side.)	Talargoch - -	Holywell Level, Orsedd, Merllyn, Michell, Trelogan, Pennant.
Llandudno -	Old and New Llandudno.	
Llanrwst -	—	Coed Mawr Pool.
Carnarvon	—	Smydde Dyliuan, Drwys-y-Coed-Cwmdyle.
Parys Mountain	Pary, Mona.	
Dolgelly	Clogau, Vigra, Cambrian.	
Aberystwith	Lisburne Cwm Erfen E. Darren	Aberyffwd, Abermant, Rheidol United—Gelli rheiron.
Shrewsbury -	Snailbeach Roman Gravels.	
Machynlleth -	Dyliffe.	

These are all lead mines, with the exception of those around Llandudno and Carnarvon, which are copper.

These mines, visited and reported upon in detail, give a general idea of the various works in operation. For convenience, the mines may be divided into two classes. First, those in North Wales, around Wrexham, Mold, and Holywell, and, secondly, those in Anglesea, and those around Aberystwith and Shrewsbury. In the first division the Minera, Maes-y-safn, Rhosesmawr, and Talargoch mines present large works upon metallic veins traversing the country, and opened upon to great depth, and affording employment to large numbers of people; while those of Park, Hendre-Ucha, Mount Pleasant, are cases where the ore is found lying between the beds of the rock, with all the working upon one plane, an inclined one. And, lastly, several of the others are explorations, conducted in many cases by numbers of poor men, working miners, and known as poor men's ventures. These are mostly to be found in the neighbourhood of Holywell and Llanrwst. These men join together in taking a "take note" of a piece of mineral ground, and work it themselves in their spare time, after working their usual 6 hours shifts in some mine. As they are in all cases totally deficient in capital, the opening out of the property is most imperfectly done. Holes are dug, they cannot be called shafts, and levels are driven small and cramped.

The result is the travelling ways are bad and the ventilation bad also. The men ,weakened by excess of bodily fatigue, are more affected by these evils, and so these ventures are known as bad places to work in.

In addition to this, the loss to the mineral proprietor is great. Instead of having his property well explored and opened out, he has it burrowed in, the richest portion of the ore taken away, while middling and inferior ore, which would return a fair profit if the whole were fairly worked, is left behind, requiring at any future time a large expenditure of capital to work the property, necessitating a reduction of dues on the part of the lord, to induce capitalists to come forward.

Of course there are cases where a large mine has been the result, as in Rhosesmawr, where a few poor men have in a short time found themselves proprietors of great riches, but for one success of this kind there are many where little has been found to reward the explorers for their trouble.

The rocks in which these mines are situated are of the same description as those in which the lead is found in Cumberland, known as mountain limestone and millstone grit, and described in my report upon the lead mines of Alston Moor, and, as in those mines, the deposits are in the upper measures, and form elevated ridges, but the system of day levels does not prevail in Wales to the extent that it does in the North, rendering pumping machinery necessary, and causing all the descending and ascending of the men to be done by means of ladders. A notice of the footways will be found in the report of each mine visited and reported upon. From some of these is will be seen that in the earlier workings of them, the levels driven were low, particularly narrow, the shaft, small and irregular, so that when they come to be reworked, either great expense has to be incurred in widening the levels and enlarging the shafts and passes, or the footways allowed to remain small and inconvenient. But as these passages serve also as airways as well as footways the inconvenience not only applies to the latter but also to the former, and as anything which affects the ventilation of a mine affects also the economic working of the same, the outlay required to remedy these defects would neither have been wasted nor unprofitably employed. In some cases the present management appear to be impressed with this view, and are sinking new shafts and driving larger levels, while in others nothing is being done, things being left exactly as they were found.

In the second division the mines are in the clay, slate, and gritstone beds, and the veins are found traversing these deposits, and going down to considerable depth. In this district the workings assimilate themselves to those seen in Cornwall.

Through the whole of the districts visited, with the exception of the Dyliffe mine, there is a great want of suitable places for the men to change their clothes in before descending to their work, and again upon ascending. In many places there is no provision whatever, in others they change upon the boilers, and in those mines where houses are provided, with only a few exceptions, they are far from being uncomfortable as they might be made by the outlay of a very small sum of money. In no mine that I have visited was there any place provided for the men to wash themselves in, and when we consider the importance of cleanliness upon the general health of these men, working as they do in an atmosphere charged at times with a large proportion of deleterious matter, and considering also the fact that the flannels worn undergound by the men are rarely if ever washed except when taken home to be repaired, it becomes a question worthy of consideration, if a suitable place was provided and the men became accustomed to a good wash upon coming up out of the mine, whether they would not, in the first place, more frequently wash their flannels as well as themselves, and then, secondly, whether the clean flannels and clean skin would not improve the general health, and so prevent their being affected so much when working in badly ventilated places. Again, if the changing houses were loftier and better ventilated, and in this all, even the very best, are defective, the underground clothes of the men would have the benefit of a current of resh air, and so be benefited by being a little sweetened. As it is the clothes of the men are hung up to dry in close house, and with the exception of being dried are very little improved.

The dressing of the ores in the mines visited is done by men and boys, girls being only employed in Anglesea. The dressing floors are not, as a rule, well shedded.

Doctors and Club.—There is no general system prevailing in respect to doctor or club. In some cases the mine appoints a doctor to whom the men pay the sum of sixpence monthly; in others where no doctor is appointed the men generally belong to some friendly society or club, by which means they get medical attendance at the same rate, or in other cases medical men contract to attend any body of men at the same charge. Whenever clubs exist they are described in the report of the mine.

The price of material varies from 6*d.* to 9*d.* per pound for powder and candles, with the exception of the Mona mine, where the price is 1*s.* 4*d.* and 1*s.* 2*d.* per pound.

General habits of men.—The mines are very much scattered, and are in most cases away from towns. The men therefore have the advantages of a country life.

The length of the shifts is generally six hours in the north and eight in the south.

Most of the men with families have allotments of ground as a garden or small farm, so that the miners have the advantages of short hours, country air, and agricultural pursuits for leisure time. In addition to these they have a better diet than their fellows in towns, having a good supply of vegetables, milk, and bacon, but little fresh meat.

These, my Lord, have been the different points to which I have directed my attention, and beg now to submit my report upon the same.

The Right Honorable Lord Kinnaird, K.T., Chairman of Mines Commission.

I am, &c.,
C. Twite.

Minera Mine.

This mine, situated about 4 miles N.E. of Wrexham, is worked for lead, under the management of the Messrs. Taylor and Sons, London, and having Mr. John Darlington for the resident agent. It is one of the most important lead mines of this country, and has stood high since the year 1710, both for the large quantities of mineral returned, and for the large profits yelded. The present company commenced operations in 1849, working having been suspended for some years in consequence of the great quantity of water met with, which frequently resulted in flooding the mine, and the stopping of the regular workings. The present management attacked this difficulty by driving a deep adit through the mine, which collects and carries off all the water which is found in a depth of 120 yards. The water below this is raised by an 80-inch and a 40-inch steam engine.

The rocks found in the sett are the millstone grit, mountain limestone, and silurian rocks.

The workings are upon two veins, and extend about 1¼ miles in length, giving rise to many varieties both as to the form of deposition, and also as to quantity, in some places presenting a vein of solid galena 8 to 10 or 12 feet wide, and giving a produce of 80 per cent. of lead. In other places nothing but the finest thread, scarcely perceptible to the most experienced eye, is to be seen; while again in other places huge excavations lend proof to what would otherwise appear to be fabulous tales of large deposits met with and removed in times past, to the advantage of the district and the profit of the shareholders.

The two veins now being worked upon are parallel, and about 80 yards apart. They are worked from a large number of shafts, there being 15 used for winding, pumping, and footways; besides which several more are open for the purposes of ventilation. Levels are driven upon both veins at distances of 20 yards apart, and these communicate with each other, and with the shafts, which are all, with one exception, perpendicular, by means of cross cuts.

Ventilation.—The general ventilation of the mine is good. By this I mean, that, taking the whole range of workings between the two extreme shafts, in consequence of the large number of openings to the surface, and the frequent communication between the respective levels by means of sumps, together with the hardness of the ground, reducing the use of timber almost to a minimum, everything is favourable to a state of good natural ventilation. But while this is the case between the shafts in the direct line of current, the air in the ends of levels now being driven was dead, even when at no great distance from sump. Two samples of air were taken from ends.

W. 1. From the end of the north vein, 120 yard level, 35 yards from a sump, with two men working in it. Size of level 6½ feet high by 4½ wide. Character of rock, hard, dry, and silicious, with bands of shale.

W. 2. From end of the deep day or adit level. Driving towards the western boundary. This end is 70 yards in from a sump, with a sump hob sinking from the level above, directly upon this end. Two men. An accumulation of stuff in this level.

W. 3. Was taken from a level immediately between two shafts.

Travelling Ways.—Ladders are placed in several of the drawing shafts, which are divided in two parts by wooden casing. The ladders are about 8 yards long, and incline about 1 in 3. They rest upon wooden platforms in the shaft which extend the whole width, and leave only the manhole open. In the mine the roadways are generally good. In some cases, especially where the roads are carried over stopes and pitches in the bottom of the level, they require attention; the plank between the rails being narrow and weak, and in some instances altogether wanting. In one or two places the men have to walk up to their knees through water.

Changing Houses.—The mine is not so well provided in this respect as one would expect to find it. The principal house was formerly a boiler house. It is about 50 feet long by 21 wide. It is lighted and ventilated from the roof. The floor is of loose earth. It is warmed by means of a fire and tube, and also by the steam pipe from an adjoining boiler house passing through to an engine house adjoining. The number of men changing here is 200. The house is dark and dirty. Besides this house there are several other smaller ones, for about 20 men each, in various parts of the mine, but none of them more comfortable than the larger one.

Dressing Floors.—These are several in number. Only men and boys are employed. The principal floors are roofed in. The other floors, which are used by equally as many persons, are not roofed in. There is no place provided for the men to dine in.

There is no sick club. The men pay one penny per month each to an accident club, and the company pay an equal sum to the same. In case of a man receiving an injury, the managing committee award him a gratuity varying in amount at their discretion.

A doctor at Wrexham contracts with the men to attend them and families at the rate of 6*d.* per month per man.

The price of candles and powder is 6*d.* per lb. each.

Boilers.—Saw eight boilers in use. They were all Cornish tubular boilers. They were all provided with a safety valve, several of them having two, one with a weight, the other attached to a spring indicator. They were each provided with a steam gauge, water gauge, glass tube or cocks, and a swimmer connected with a weight, showing height of water in boiler, or with a steam whistle, which is brought into operation when the feed is low, and continues pouring forth its shrill sound until the engine man has remedied the evil.

In connexion with this mine, I called upon Edward Davis, Esq., surgeon, of Wrexham. This gentleman has a most extensive practice amongst the labouring community of the district, being the doctor to the Minera and other mines, Westminster colliery, several quarries, eight clubs, parish doctor, and one of the surgeons of the infirmary. He stated that the general condition of the lead miners of the district, so far as he had an opportunity of knowing, was good; that they lived well, having good proportion of animal food, were well lodged, though inclined to think a little over-crowded; and were not subjected to any peculiar disease, any more than the general population. He has promised to consider the cases now under his care, and will be very willing to give the Commission any assistance in their inquiry.

The number of accidents appear to be very small, he having had only six in that number of years.

South Minera Mine.

Another lead mine adjoining the Minera, but only working on a very small scale. It is under the management of — Williams, Esq., 4, King Street, Wrexham, and gives employment to 23 underground men and 12 surface men. There are no dressing floors.

The operations consist in sinking the shaft, driving a day level from the hill side, and driving the 108 yard level.

The shaft is an oval one, now 130 yards deep, perpendicular the whole depth. It is divided into two parts by an air-tight wooden bratticing, the one part used for winding, the other for a footway. The sides of the shaft are walled with brick laid upon wooden curbs. The winding is by kibble drawn with wire rope. A skipway will be put in when the shaft is completed, and the men will be raised by means of it. The ladderway is in good condition.

The 108 yards level, driving south by 6 men in 3 shifts, is about 30 yards from shaft. It is driven 7 feet high by 5 wide; the ground moderately hard, with fair quantity of water. Sample W. 4 taken here, several hours after a shot. A changing house is provided for the men. It is a good stone building with a fire. The floor of loose earth.

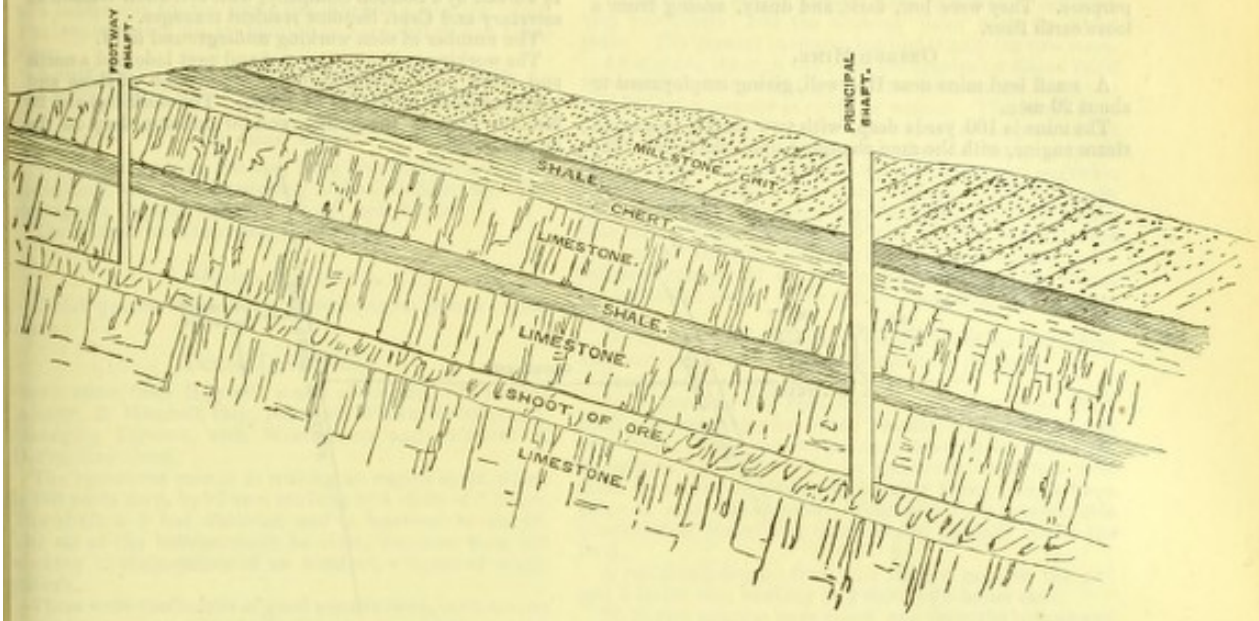
There is one steam boiler on the mine, recently new. It has two safety valves, and a glass tube to show the height of the water in the boiler. There is no steam gauge; but the arm of the lever, on which the weight of the safety valve slides, is graduated in pounds weight, showing at once the pressure of steam on the boiler. In this case it was 25 lbs.; but the two valves being under the control of the engine man, the actual weight on each valve was 50 lbs. He explained that his object was to prevent the steam blowing off.

Park Mine.

Another lead mine adjoining the Minera, and under the same management as the South Minera. It has been very extensively worked upon a very valuable shoot of ore in the lower limestone rock, which has been followed as deep as the dip of the beds would allow the water to be drained by the Minera mine. The operations are now nearly at a standstill, waiting until a day level has been brought up

to drain the lower parts. This shoot of ore appears to be in connexion with a long line of caverns, in which runs for a considerable distane a subterranean river, emptying itself into the adjoining mine.

Sketch Section, showing the Strata and Deposit of Ore at the Park Mine, Wrexham.



All the workings have been upon this deposit, which in the western part of the mine comes to within 30 yards of the surface, while at the main shaft it is 140 yards. Between these two shafts the workings form a rough kind of incline plane, no ladders being required, steps being cut in the rock. The main shaft is 190 yards deep, and a level has been driven 150 yards beyond it, and about 50 yards beyond a rise. It is ventilated by a fan worked by a boy sending in air through a 40-inch zinc pipe. The fan is fixed about 100 yards from the end. Sample W. 5. was taken from the end of level, and Sample W. 6. from the pipe furnishing the air. Size of level 6½′ × 5′ worked by two men.

Travelling ways. — There is a good ladderway in the principal shaft, but it is not used by the men, they preferring to use the footway shaft in the western part of the mine, which gives them only 30 yards of climbing, and walking through the old workings. This 30 yards of laddering is in a very bad state; the ladders perpendicular, very old, and, in many cases, several staves wanting. The levels through the old workings are small, showing a marked difference to those now being driven.

Ventilation.—The rock being hard, with very little timbering ground, and the frequency of swallows, are so many aids to good ventilation. The number of men working is also small, and consequently the quantity of powder used is trifling.

Dressing Floors.—The ore is found in a state of pure galena, scarcely at all mixed up with matrix or other mineral, and the amount of dressing therefore required is consequently small. The number of dressers is but six. There is a house for these.

Changing House.—A fair stone building in the mine without fire.

Rhoses Mawr Mine

Is a large lead mine in the Halkin mountain range, about 500 feet high.

It is worked by two perpendicular shafts, which are about 200 yards apart, and both intended for engine and drawing shafts. This mine, like most others visited, is overburdened with water, which interferes with the working of the bottom parts of the mine. Descended the new engine shaft, which is 120 yards deep, 12 feet long, and 9 feet wide. This shaft communicates with the vein at the 120, by means of a cross cut 8 yards long. A level is driven eastward on the vein to the other shaft. At a distance of 70 yards from the shaft another cross cut is driven south 7 yards long, at the end of which a sump or winze is sunk a depth of 5 yards. Four men were at work here in two shifts of 6 hours each. Sample of air, W. 10, taken here.

Sample, W. 11, taken from workings in the 120 yard level between the shafts. Men engaged in taking down the sides of the level.

Sample, W. 12, taken from the end, a cross cut from the 140 yard level, which was about 15 yards from a shaft.

Sample, W. 13. End of 140 yard level on the course of the vein; 25 yards from shaft; 4 men.

These were the only places accessible; all other workings being stopped by the water.

The ore found in this mine is of a very rich quality; and the character of the deposit is very interesting, more especially as showing some very sudden changes in the underlay of the rocks and vein.

Changing House.—A large stone building, without any fire. Loose earth floor.

Talargoch Mine.

Very extensive lead mines in the neighbourhood of Rhyl, giving employment to from 200 to 300 men. Here also, the water is the great difficulty to be contended with. All the sumps from the lower level being full, a pumping engine with 100-inch cylinder has lately been erected at Clive's shaft, and a level is being driven from this shaft through the whole length of workings. When this is effected the whole mine will be drained, and exploration resumed.

Visited with Lord Kinnaird, and took samples of air from the following places:—

1. End of 180 yard level, driving west from Clive's shaft to communicate with the workings in the western part of the mine. This end is being driven by 8 men, working in four shifts of 6 hours each, 6 feet high, and 4 feet wide. It is in limestone rock, 24 yards from shaft; and sample, W. 14, was taken 1½ hours after two holes had been fired.

2. 180 yard level, driving east to communicate with the place last visited. At a distance of 40 yards from the end men were engaged in taking down ore upon tribute. The air here was coming down a sump from the 150 yard level. Sample, W. 15, taken.

3. End of great cross cut from the 180 yard level. This is driven about 200 yards from the level in limestone, by 8 men working in 4 shifts of 6 hours each, 6 feet high by 4 wide. Air is supplied by putting a door in the level to stop the air passing, and fixing the mouth of a pipe 8 inches square in the upper part, which carries the air to the end. On visiting the end, the quantity of air coming through the pipe was nil. Sample, W. 16, taken in the end, and W. 17, from the mouth of pipe in the level.

4. While walking through the 180 yard level, and especially while over sumps, a peculiar smell was experienced, very like that of sulphuretted hydrogen, and the eyes became affected, becoming very sore and watery. Sample, W. 18, taken where these sensations were most strongly experienced.

5. The western end of the 220 yard level, 80 yards west of the shaft, and 30 yards from a rise; 8 men in 4 shifts. W. 20.

6. In the eastern part of the 220 yard level, between 2 shafts, main current of air. W. 19.

There were several sumps down from 220 yard level various depths. These were all more or less filled with water, and men were employed in pumping them dry. When in work, I am of opinion the air would be close.

It would be very interesting and beneficial to this inquiry if Dr. Smith visited this mine, and examined the air more

minutely, especially as to the nature of the gases found in the 180 yard level.

Footways.—Throughout the whole of the mine the state of the ladders and passages were remarkably good.

Changing Houses.—A long stone building used for this purpose. They were low, dark, and dusty, arising from a loose earth floor.

Orsedd Mine.

A small lead mine near Holywell, giving employment to about 20 men.

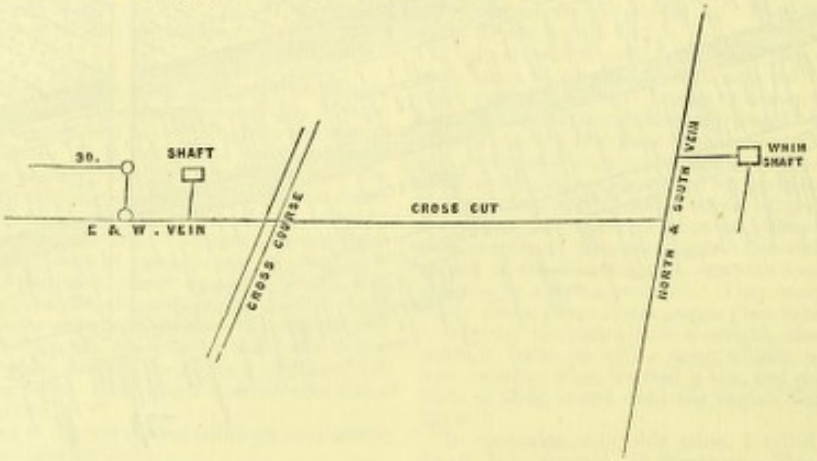
The mine is 100 yards deep, with two shafts; one small steam engine, with the men changing upon the boiler. The ladders in the whim shaft are used by the men to a depth of 30 fathoms. They are all in one length without any resting place.

Merllyn Mine

Is worked by a London Company, with Mr. John Watson as secretary and Capt. Sandow resident manager.

The number of men working underground is 14.

The workings are upon an east and west lode and a north and south one. A shaft is sunk upon each of these and communicated by means of levels. The workings are 20 fathoms deep in the former, and 30 fathoms deep on the on the latter.



The workings are :—

1. Sinking whim shaft below the 30, by 6 men in 3 shifts of 6 hours each. This shaft is 7 feet long by 3 wide, used for winding,—a kibble and horse whim employed,—and as footway. The ladders are securely cased off from the kibble.

2. Driving level south from the 30, by 2 men working 6 hours. They are 15 fathoms from shaft, and 5 fathoms from a winze from the 20.

3. 6 men stoping the winze from the 20.

4. 2 men driving west on the east and west vein. The men change in the boiler-house, but the engine is not worked.

Went through all the workings of this mine. None of them are any great distance from the shaft or winze, and the air throughout was good. The ladders are in the whim shaft, and are cased off from the kibble way. There is scarcely sufficient room allowed for the ladders, only three by two feet, which cause them to be very steep until they reach the 20 fathom level, when they are on the footwall, and incline 20°.

Michell Mine.

Adjoins the last mine, and is under the same management, and is only just being opened; 8 men being employed in sinking a shaft, working in 4 shifts of 8 hours each.

Garreg Mine.

Also under the same management. This is an old mine, but the workings are now being carried on in new ground.

The workings are—

1. Two men driving east in the 20 fathom level, about 40 fathoms from shaft. Air pipes carried to the end from the shaft.

2. About 15 fathoms behind this end, 4 men are rising towards the surface. They are 8 fathoms high. This rise is divided into two parts for air to ascend, go through the top and down the other side.

3. Two men sinking a winze in this end; now 3 fathoms deep.

4. Four men driving north from an old shaft in another vein.

5. Two men driving south of another shaft 7 fathom deep.

The time at my disposal would not allow of my visiting the underground workings of this mine.

Trelogan Mine.

A large sett recently taken by a limited liability company, having Mr. Martin, of Mold, as secretary. Very extensive workings have been opened out by the former workers, but the shafts are small and the level low and narrow. The operations now in progress are—

1. Driving a level from the Pen-y-frith shaft. The shaft is 25 yards deep, and from it a level has been driven 45 yards. There is no bratticing in the shaft, nor level above or below working. The air in the end was very bad; the men had left work, and it was with the greatest difficulty that the candle could be kept burning.

2. Driving a cross cut from the level on the course of the vein at Afon-goel shaft. The shaft is 21 fathoms deep; the level is driven 40 fathoms from shaft, and the cross cut is 10 fathoms from level. The level would not average 3 feet in width nor 4½ feet wide, and as might be expected the air was very bad. In each of these places the ground is hard and dry.

3. Clearing up an old shaft, only 20 fathoms deep. The footways are very steep, and in the first shaft there are no proper sollars, and in the second shaft it is only one ladder.

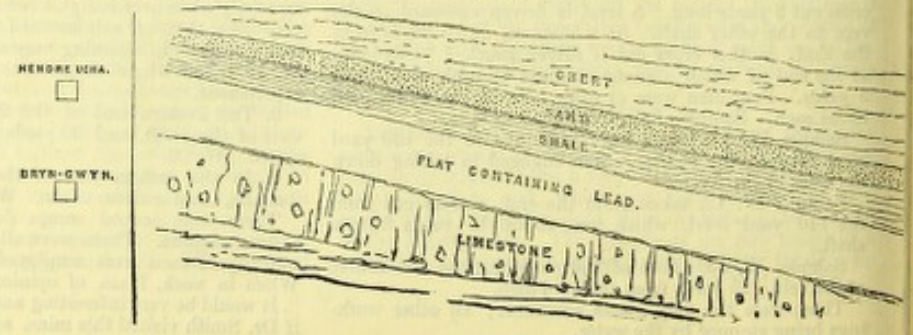
The men go home in their underground clothes.

Bryn-gwyn Mine.

A lead mine in the Mold district. F. Field, Crown Court, secretary, and Captain Nottingham, on the mine, manager. This and the two adjoining mines, Hendre Ucha and Mount Pleasant, are working upon a deposit of lead ore, which is found in a large flat, traversing the three sets. The ground dips very fast eastward, and all the water naturally drains off.

The mines are worked from one shaft each, but the workings, which may be considered as being all upon one plane, an inclined one, communicate with each other, and so assist the ventilation in each.

Sketch Plan and Section, showing Relative Position, and Strata of these Mines.



The ore is found in lumps of solid galena, which only requires washing to get rid of the clay about it to render it fit for the market.

The shaft in Bryn-gwyn is 84 yards deep, 6 feet long, and 4 wide, divided by tight casing into two parts, one used as a ladder way for the men, the other as a winding shaft. The ore is drawn up in kibbles by horse whim and hemp rope.

A very good room provided for the men to change in.

The number of men working underground is 19.

Hendre Ucha.

Worked exactly as the last from one shaft, which is 84 yards deep, and used for winding and as a ladder way. The manager is Captain Ivelgilga, Waen, near Mold.

The number of men underground is 12.

Mount Pleasant.

Could get no information, there being no person on the mine.

Axton Lead Mine.

Seven miles from Holywell, a new adventure, with limited liability, E. Marshall, Esq., Britannia Works, Birmingham, Managing Director, with Woodehouse and Jeffcock, of Derby, Engineers.

The operations consist in sinking an engine shaft, which is 108 yards deep, by 12 men working in 4 shifts of 6 hours. The shaft is 9 feet diameter, and is bratticed to the 60. The air at the bottom must be close, the men were not working in consequence of an accident, a report of which follows.

There were two boilers of good construction, each having two safety valves, and a steam water gauge whistle.

The men change upon the boilers.

Axton Mine.—Fatal Accident.

On the 24th July a fatal accident occurred at this mine, resulting in the death of Ellis Pritchard, a miner 50 years of age, engaged in sinking the engine shaft. This shaft is perpendicular, sunk through beds of limestone, for the purpose of cutting the vein in depth. It is now 108 yards deep and 9 feet diameter, divided by wooden bratticing for a distance of 60 yards, and furnished with ladders to this depth. Below this the shaft is open and without ladders of any kind, the men being lowered and raised in a kibble drawn by a flat hemp rope by a horizontal steam engine. The number of men engaged in the shaft is 12 working in 4 shifts of 6 hours duration.

At a depth of 50 yards from surface a flat or lodge is cut and the men come up to this lodge every time a hole is fired, and there wait till they can descend to their work again.

It appeared from the statements of Capt. S. Evans and of Evan Evans, who was the comrade of the deceased, that they in company with a third man went down to their work at six o'clock in the morning, and shortly before twelve, their holes being ready to fire, they went up to the lodge at the 50 yard, and that after hearing the report of the explosion the three men prepared to descend in the usual manner, standing upon the rim of the kibble and holding by the rope. The act of stepping on the kibble would naturally give it a swinging motion, there being no guides of any kind to steady it; and on this occasion, immediately after starting, and before they had descended half a dozen yards, it struck against the side of the shaft and jerked the unfortunate man from his standing-place, causing him to be precipitated to the bottom of the shaft, and instantly killed.

It also appeared that about a year ago this same man was at work in this shaft, and an auger or borer fell upon him and cut his right hand very severely between the fore finger and thumb, causing him to be disabled for 6 weeks, and that since then he has complained of a weakness in his arm and hand.

During the morning of the accident, while holding the borer, he observed to the man Evans, who was beating it, "That something had taken his hand like rheumatics;" and it was found upon recovering the body that his fingers were black.

The poor fellow leaves a wife and 9 children, 6 of whom are as yet totally unprovided for.

I examined the whole of the machinery, and found everything well arranged.

The system of men stepping from a level into a swinging kibble, as well as the habit of riding in the manner described, cannot but be considered, as it has proved to be, highly dangerous, and one which it is to be hoped will be checked for the future.

Maes-y-safn Mine.

This is the largest lead mine in the district, and is under the management of the Messrs. Taylor and Sons, Captain Ninnis being the resident agent.

This mine is opened upon a large vein, which has been very productive; and the working dates back for many years. The present company has had it only for two years.

After going through the mine the conclusion forced itself upon me, that the workings had not been opened out in so satisfactory a manner as could be wished. The levels were in all cases, where driven through unproductive parts of the vein, low and narrow, ignoring the principle that good levels are necessary for good ventilation, and consequent economic working of a mine. For many fathoms, both in length and depth, the travelling can be called nothing better than scrambling: for though the present management has put all through the mine good sound ladders, with sollars as convenient as possible, yet the contracted size of the levels and passes quite prevents anything like a good footway.

For the general working and ventilation of the mine there are four shafts down, besides two inclined planes.

Samples of air were taken as follows:—

W. 7, from the 250 yard level driving west from No. 4 shaft. It was 30 yards beyond ventilation, and the air was very dead. Two samples taken. A sump or winze was being sunk upon this end. In connection with this level there is a swallow, from which, after heavy rain, a large efflux of water takes place, bringing with it considerable quantities of gravel and sand, which partially closes the level.

A rise also going up from this end; 4 men in the end and 4 in the rise, working in 2 shifts of 8 hours each.

W. 8, two samples were taken, one from the bottom and the other from the back of the end of the 310 yard level going east from No. 4 shaft. It was about 30 yards from shaft; 6 men working here.

Another end was driving from an incline shaft towards the end visited. A distance of 60 yards has to be driven through when there will be communication between.

W. 9, was taken from the bottom of No. 4 shaft as the air was coming down the shaft, to enter the workings and ventilate them.

Travelling Ways.—From what I have said upon the general state of the mine it will be seen that these are not so good as they should be in a first-class mine. The ladders are all safe, but in many cases there is not rope enough.

Changing Houses.—About 100 men change upon the boilers attached to No. 4 engine-house; the rest change in a house which is set apart for the purpose. A new house is repuired which shall accommodate all the men.

Boilers.—There are two classes of these to be seen,—the old ones left by the former proprietors, and which are being gradually replaced by new ones. The latter are of the most approved kinds, having two safety valves to each, gauge to show the pressure of steam in the engine-house, and swimmers to show the height of water in the boilers, and connected with a steam whistle which calls attention when the feed is low.

Westminster Mine.

Under the management of Captain Floyd.

The principal work now is in the part known as the Bog Mine. There the shaft is 120 yards deep, and is used as a pumping, winding, and footway shaft, and is still being sunk. Winding by kibbles and chain. Two pairs, of 6 men each, have just commenced driving at the 110. All the other men, 50 in number, are picking over all the old workings.

Boilers.—Two boilers to the engine, each with feed cocks, and a swimmer in one.

Changing-house.—A stone building, no fire, loose earth floor.

Cefn Cilcin Mine.

This is a series of single shafts sunk in various parts of the set, with men driving upon different veins, none of which communicate with each other. The number working underground is 30.

These shafts are from 80 to 115 yards deep.

I am inclined to think that the ventilation in these mines is generally poor, and especially so at such times as when the external air is damp and heavy with little or no wind; and upon inquiry it appears that the men have been on several occasions totally unable to work here.

There is no steam engine on the mine, nor changing-house for the men.

The manager is Mr. Hector.

Bryn-Gwiog and Long Rake Mines.

These mines are lead mines, in the Halkin Mountain Range, and are worked by London companies, having Mr. Dunsford for secretary, and Capt. F. Evans as manager.

They are both in similar strata, limestone and accompanying rocks, have been worked by previous companies, and have a great deal of ground opened in the upper levels.

Bryn Gwiog employs about 80 underground men. Of these 12 men are sinking the shaft, which is now 90 fathoms deep; 28 are exploring the bottom level westward, and the others are employed in raising ore from the old working.

Visited and took samples of air as follows:—

W. 47. From the western end of the 75 fathom level, 50 fathoms west of engine shaft, and 20 fathoms from a rise. The end is driving by 8 men working in 4 shifts of 6 hours each, and carried 6½ feet high by 5 wide.

Between this end and the rise spoken of there were two pairs of men of 4 and 8 each working in pitches in the back, and one pair of 8 men sinking a winze.

W. 48 was taken from one of the pitches in the back, in which 4 men were working about 2 fathoms above the level, and which was 3 to 4 feet wide.

W. 49 was taken under the winze where the air would be purest, and which would give the air as it came down to supply all the men in this level.

W. 50 was taken from the bottom of the shaft.

All these samples were taken just before the time of midday relief, and before the shots had been fired.

Travelling ways.—In no place could the ladderway be pronounced good. In going through that part of the mine worked by the previous proprietors, the passes were small and levels low, while in the new part the ladders were only temporary ones. The passes require to be enlarged, and more inclination given to the ladders. A little attention is also required in the footway over some of the sumps.

Changing houses are provided for the men, but with the exception of the shaft men, the miners use them very little, wearing their underground clothes from home, and changing there after finishing their labor.

Dressing Floors.—The spalling under cover, all other operations exposed.

Long Rake.

In consequence of a stoppage of the pumping engine, the water was in the bottom of the mine, and the work stopped.

Pary's Mine.

In the island of Anglesea, near the town of Alnwick, is a copper mine under the management of the Messrs. Taylor and sons, with Captain Vivian as resident manager. The workings have been carried on by different bodies of proprietors for above a century; the earlier operations having taken the form of an open cast upon a large mass of low produce ore, leaving an excavation 200 fathoms long, 40 to 65 fathoms deep, and from 30 to 65 fathoms wide. The later workings have followed the deposit in depth where it contracted in width, but increased in thickness; and the present party commenced operations at the 100 fathom level and have proceeded to sink Gwen's shaft, to put in new pitwork and skip way, drive the 112 fathom level on the course of the vein, and sink winzes below the 100 and 112. From this it will be seen that the main body of the men are working in these two levels.

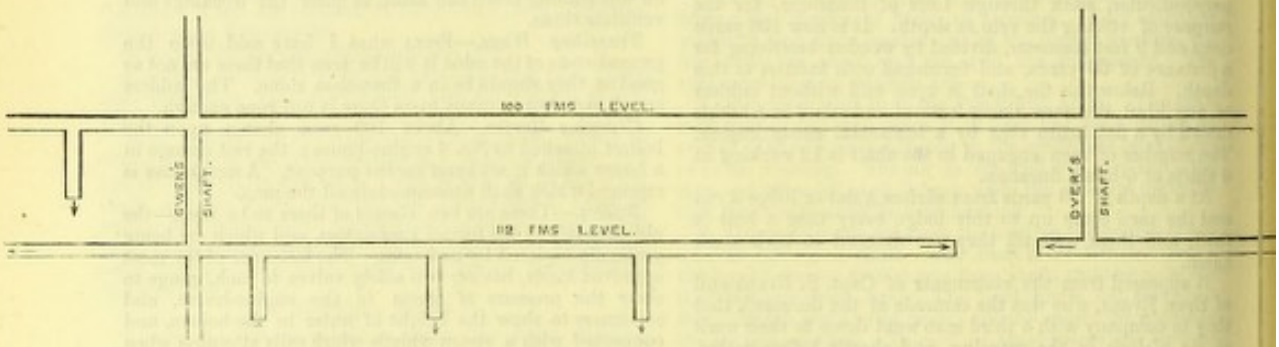
Visited with Lord Kinnaird most of the workings, and took samples of air as follows:—

W. 28. From a pair of stopes going east and west from a winze between the 100 and 112 fathom levels. Length, 12 fathoms; 7 to 8 feet wide. 6 men in 3 shifts working in each end. Two holes in each end had been fired within a quarter of an hour.

W. 29. From the western end of the 112 fathom level 35 fathoms beyond Gwen's shaft. A winze is sinking from the 100 to come down on this end; 6 men in 3 shifts in the end and in the winze.

W. 30. Winze sinking below the 112, about 10 fathoms east of Gwen's shaft down about 4 fathoms, 8 feet long by 4 wide. Six men.

Sketch section showing the workings in and below 112 fathom level.



W. 31. From main level in 112. Air between 2 shafts; they supply air to all the workings.

W. 32. From the 90 fathom level, where 4 men were working on a south branch of the lode, 35 fathoms west of Gwen's shaft.

These samples would give the fair average state of the air in the various workings through this mine. This season of the year is against natural ventilation, and at that time there was no communication between the two shafts in 112 east. This has now (second visit) been effected, though even since this the air has been so dead as to drive the men from the 112 workings; but ventilation has been restored by pouring large quantities of water down the shaft.

The ladders and travelling ways were in very good condition.

The dressing is performed by 58 men and 70 girls. They were mostly in open air, but there is a good supply of shedding for their use in wet weather. The girls are allowed to use the sampling house, and a small house for retiring to for dinner.

The men change at home.

Mona Mine

adjoins Pary's mine, and is worked for copper by a very old company.

The deposit of ore must have been an enormous one, judging from the extensive and large underground excavations and the huge burrows on surface.

The present works consist of 3 exploring parties numbering 30 men, and 125 men working on tribute in various parts of the old mine, who are scattered very much about.

Visited and took samples of air as follows:—

W. 52. A cross cut driven south from the new shaft at a depth of 60 fathoms; the level then driven for a length of 30 fathoms to the lodes, and 10 fathoms on the course of it. End driving by 6 men in 3 shifts. Air dead.

This is the only working from this shaft. No cross cut above or below. There are air pipes from the adit level to bottom of shaft, 8 inches square, but are not of much, if any, use in improving the ventilation.

W. 53. From a level driving from Cairn's Shaft at the 44 fathom level, about 25 fathoms in. Two pairs of men working here, one of 4 men driving the end, and 4 men working in a tribute pitch. No communication with level above or below. The object of driving is to communicate with old workings and so to open out the intermediate ground. These workings are ventilated by air pipes brought from the 30 fathom level down the shaft. The end of the pipe in the level is placed by the side of a trap door, which is between two shafts. The door was not tight, and consequently no air was going down the pipe. This sample taken in tribute pitch.

W. 54. Taken from the end. Air very dead indeed. Candle scarcely burn. Men working.

W. 55. Taken some time after when a boy had been working a blower in the level above connected with the pipe and forcing air in.

W. 56. Was taken at the place where the machine was working. This machine consisted of a piston with two valves opening inwards, working horizontally in an air pipe by a boy. A fan would be more efficient.

W. 57. Cross cut at the 60 fathom level from Charlotte's shaft. The end was about 20 fathoms from shaft. Six men.

The men work in 6 hour shifts single-handed, and blast with straws.

The price of candles is 1*s.* 2*d.* per lb., and of powder 1*s.* 4*d.*

No changing house.

The men pay 6*d.* per month to the doctor and club, receiving attendance and 5*s.* weekly in case of accident. There are 22 persons receiving pensions varying from 16*s.* to 20*s.* per month. The agents report this as coming from the mine, but as accidents are very rare, and the men get no benefit in case of sickness, either the club fund must be in a very prosperous condition, or these pensions come from it. As no account is rendered of this fund, a very common feeling exists that this should no longer be the case. This has arisen from the fact that the adjoining mine has recently changed hands, and previous to the retiring of the former proprietors no account was given of any balance that might be in hand.

There are 60 girls at work on the floors, earning from 7*d.* to 10*d.* per day, and 25 boys, getting 10*d.* to 1*s.* 4*d.* per day.

The ladder-ways in the shafts were steep and small. In the old workings the men principally walk over rough inclines, as the lode lays very flat.

General Condition of Miners in Anglesea.—The men earn from 35*s.* to 50*s.* per month. According to Dr. Hughes, surgeon to the Pary's Mine, the men and families are most healthy, are well lodged and fed. Consumption, asthma, and rheumatic affections almost unknown. But Dr. Parry, who has practised in Amlwch 15 years, and was for some time the Union doctor, described them as in a very wretched state. Badly fed and wretchedly lodged, the men and their families are constantly suffering from disease. Consumption, fever, or some other disease in nearly every house.

Went with him to about 100 cottages scattered about the Pary's mine, and inhabited by miners. I should scarcely think it possible to conceive anything more wretched or miserable.

In nearly all cases the dimensions of the whole house was 20 feet long by 12 wide, generally of one room, with a door, and two or three windows from 12 to 18 inches square, but not made to be opened.

The roof was thatched, without any ceiling, and the floors of earth. No outlet or convenience of any kind to be seen or heard of. A cesspool in front of every house, and a heap of rubbish to keep it company.

In these miserable hovels families from 3 to 9 members were living and sleeping. Mother, father, grown up sons and daughters, all mixed together, and observing none of the decencies of common life. No wonder that disease and death should prevail; and of all the houses visited more than one half had some member ill of some illness or the other.

A change for the better is happily to be seen in some newly built cottages, where the roofs are of slate, the floors of flags or boards, and the building containing two or three rooms.

Symmdde Dylluam.

A copper mine about 10 miles from Carnarvon. Captain Julian resident manager.

Visited with Lord Kinnaird and took samples of air as follows:—

W. 22. From the 40 fathom level 10 fathoms from Whim Shaft, about 20 minutes after 2 holes had been fired; men working in two 8 hour cores.

W. 23. From a sump or winze 3 fathoms below the 40 level, and 6 fathoms from shaft. Six men; 3 cores.

W. 24. From a rise about 5 fathoms above the 40 fathom level. Four men in 2 cores.

W. 25. From the 35 fathom level. Four men.

W. 26. From the 70 fathom level in the western part of the mine. fathoms from shaft.

W. 27. From a winze 2 fathoms below the 56 fathom level. Three men in one shift.

The men work single handed.

Ladders pretty good, but in some places very inconvenient.

The wages in this mine are high owing to the demand for labour in the slate quarries adjoining. Some of the men live at Carnarvon, and these sleep in a house adjoining the office, which is much too small, very dirty, and badly ventilated.

Coed Mawr Pool Mine.

A lead mine about 4 miles from Llanrwst. The workings were very limited in consequence of the great quantity of water which overpowered the machinery.

Visited with Lord Kinnaird and took samples of air as follows:—

W 20 b. From the 15 fathom level from the Footway Shaft. A cross cut was driven 10 fathoms south from the shaft, and the level was driven from this cross cut 2 fathoms west. Four men in two 8 hour shifts. Air poor.

W. 21. From end of the 10 fathom level driving west of Mallett's Shaft, and now 17 fathoms from it.

The levels are smaller than generally found. Ladders safe.

There were some sheds for the use of the dressers.

Lisburn Mines.

A group of lead mines near Aberystwith, under the management of Messrs. Taylor and Sons. Mr. Henry Thomas, of Aberystwith, general manager.

Visited Glayvawr Mine, accompanied by Lord Kinnaird.

Is 103 fathoms deep, with 54 men underground. The workings are upon one lode, and are ventilated by three shafts to the 56 fathom level. Below that there is only one shaft.

1. Western shaft, 31 fathoms deep.

2. Skinner's shaft, 120 fathoms east of Western shaft to the 103. The surface rises going eastward, so that the mouth of this shaft is 30 fathoms higher than that of the Western shaft.

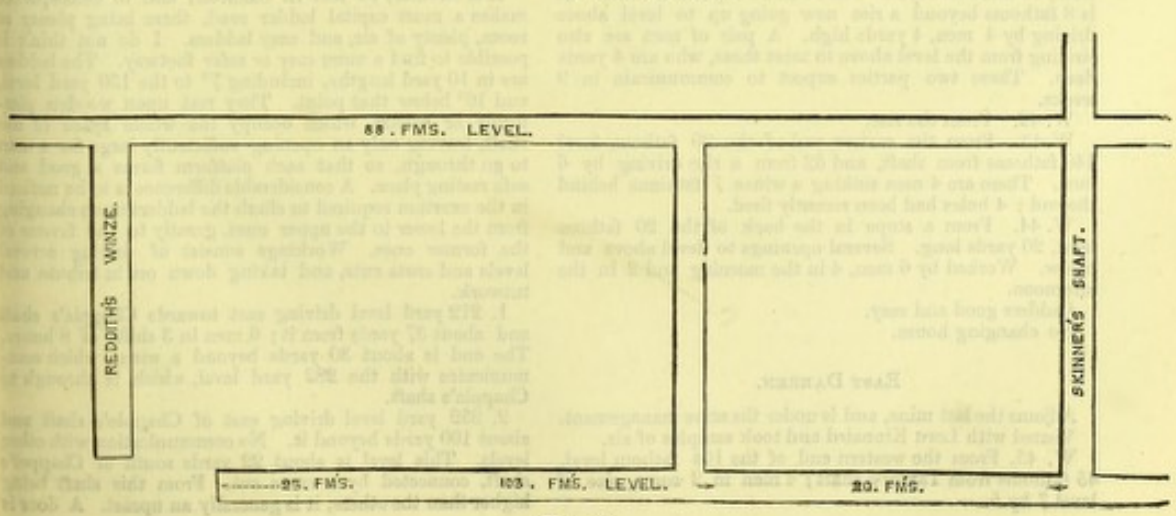
3. Lug shaft 40 fathoms east of Skinner's shaft. 26 fathoms deep.

Visited and took samples of air as follows:—

W. 33. From a stope going east in the 88 fathom level worked by 4 men on tribute, about 3 fathoms above the back of the level 20 fathoms east of shaft. A communication with the level each end, but one just closed to prevent the stuff falling down into the level below on blasting. It had been closed some few minutes.

W. 34. From the western end of the 103 fathom level driving by 6 men working in 3 shifts of 8 hours.

The end is 45 fathoms west from Skinner's shaft, and 25 fathoms from a rise driving towards Reddith's winze, which is coming down from the 88, and is now about 5 fathoms short of it.



W. 35. From the bottom of Reddith's winze sinking by 6 men in 2 shifts. The accompanying sectional diagram shows these two places.

W. 36. From the western end of the 73 fathom, 140 fathoms from Skinner's shaft and 40 from a winze, driving by 4 men, 7½ feet high by 4½ wide. No holes had been fired for some hours. Air pipes were in the level, but very little air passing through them.

W. 37. From the western end of the 58 fathom level fathoms from Skinner's shaft. Air pipes were also in this level, but as they were carried 20 fathoms in an easterly direction in the level above, and then down a winze 15 fathoms long and then west for 20 fathoms, and as there was no fan or motive power of any kind, the amount of air brought in or carried out was quite a minimum quantity.

Ladders very good both with regard to safety and ease.

No changing house.

Dressing floors only partly covered in.

In addition to these works on the lode, a party of men were engaged driving a level on adit, from the hill side to intersect the lode at a greater depth than the present adit, which would serve the purpose of exploring the ground and afterwards as a channel for the water to flow through. Visited the end and took sample W. 38. Driven 30 fathoms north, 5 fathoms east, and then 6 fathoms north, in all 41 fathoms from mouth, 6 men, 7½ feet high by 5½ wide. No shots for some hours.

A new shaft was being sunk in another part of the set, and was about 9 fathoms deep. Men complained of the air. Air pipes appeared at the top but only went down a few feet. An old barrel was placed upon the pipe to catch the air, but was of very little service being nearly to pieces. Holes had been just fired. Went to the bottom, but was unable to remain there, in consequence of the smoke laying.

W. 39. At the Loggy Lass Mine there was a long level known as Level Vawr being driven in from the hill side to serve as an adit and also to explore the district. It has been driven 365 fathoms to the first vein and then 86 fathoms to the next vein and then fathoms to the present end. Workings have been carried on upon the veins with shafts to surface.

The end is ventilated by a fan worked by a water wheel, the pipes being within 15 feet from the end. Sample W. 39 taken in the end.

The broken stuff was in a heap higher than the mouth of the pipe, interfering with the delivery. End 7½ feet high by 5 wide.

It must be noticed that this period of the year (July) is very unfavourable to good ventilation. The exterior temperature is very high, on this day, being 90° F., and very little or no breeze.

The air in the mines was generally dull.

Cwm-Erfin Mine.

A lead mine under the management of Messrs. Taylor and sons.

Visited with Lord Kinnaird and took samples of air as follows:—

W. 40. From a crop cut in the 32 fathom level, 50 fathoms from a shaft with no other communication with other levels.

W. 41. From the eastern end of the 32 fathom level driving by 4 men in 2 shifts of 1 hours each, 7 feet high by 5 wide, 35 fathoms beyond a rise and 25 beyond a winze. It is 8 fathoms beyond a rise now going up to level above driving by 4 men, 4 yards high. A pair of men are also sinking from the level above to meet these, who are 4 yards deep. These two parties expect to communicate in 9 weeks.

W. 42. From the rise.

W. 43. From the eastern end of the 20 fathom level 140 fathoms from shaft, and 52 from a rise driving by 6 men. There are 4 men sinking a winze 7 fathoms behind the end; 4 holes had been recently fired.

W. 44. From a stope in the back of the 20 fathom level, 20 yards long. Several openings to level above and below. Worked by 6 men, 4 in the morning and 2 in the afternoon.

Ladders good and easy.

No changing house.

East Darren.

Adjoins the last mine, and is under the same management.

Visited with Lord Kinnaird and took samples of air.

W. 45. From the western end of the 104 fathom level, 45 fathoms from Taylor's shaft; 4 men in 2 cores, size of level 7 by 5.

W. 46. From the eastern end of the 80 fathom level 30 fathoms beyond a winze. A rise going up 26 fathoms behind the end which is up 10 feet. The end is being driven by 6 men, working in 3 shifts of 8 hours.

Ladders good and easy.

No changing house.

The following mines in the neighbourhood of Aberystwith were also visited:—

Aberaant.—No person on the mine.

Aberyffwd.—Suspended.

Rheidol United.—Capt. Ridge; 32 underground men.

The following drivings were being prosecuted; 6 men driving Gwaithcoch level; end is 130 fathoms from shaft. Ventilated by waterfall in shaft, having a fall of 30 feet, 6 men driving. Nantglass level 40 fathoms beyond old workings. Price of powder and candles 6*d.* per lb. The men pay 6*d.* per month to the doctor. The manager being away, I could not go underground.

Gelli-rheiron.—Capt. Northey. 18 men underground; 6 men sinking engine shaft, which was then 30 fathoms deep.

Two men driving Burn's level eastward, 70 fathoms beyond the stopes.

Ten men stoping.

Fourteen people dressing.

Snailbeach Mine.

Visited in company with Lord Kinnaird, Sir Philip Egerton, N. Kendall, Esq., and J. F. Campbell, Esq.

Large lead mines about 11 miles from Shrewsbury, under the management of Mr. James Ray Eddy, of Carlton Grange, Skipton, and Capt. Henwood, underground agent.

The workings are upon one large main vein, and one or two branches of the same, and extend in length about 90 yards east of Chapple shaft, and about 400 yards west of the engine shaft.

There are three shafts open as follows:—

1. *Chapple shaft* is about half a mile west of the eastern boundary. This is a new shaft sunk in ground recently added to the sett, and the workings only extend 80 yards east of it. It is 340 yards deep from surface, and perpendicular, cutting the vein at the 280 yards level. The mouth of this shaft is 60 yards higher than that of the engine shaft, owing to its being situated in higher ground. It is 9 feet long by 7 wide, and used as a pumping and drawing shaft. The drawing is done by skips drawn by 1¼ inch wire ropes.

2. *Engine shaft*, 720 yards west of Chapple shaft. Is perpendicular to the 282 yards level, where it cuts the vein, and is continued from there to the 402 yard level, following its course and underlaying south 2 feet in a fathom.

This shaft is circular and 10 feet in diameter while perpendicular, and the diagonal part is 12 feet long by 6 wide; engine and drawing shaft. Winding by two kibbles, drawn by flat wire ropes 3½ inches by ⅞ths, which pass each other in the perpendicular part of the shaft when in operation.

3. *Old engine shaft* is 120 yards north of the last one, and is down to the 252 yards level. It is perpendicular. The new shaft was sunk to save the cutting of cross cuts in the deeper levels. This shaft is now used as a footway shaft, and occasionally for sending down tools and timber as far as the 150 yard level, it being divided off to that depth, but below the whole shaft is used as a footway.

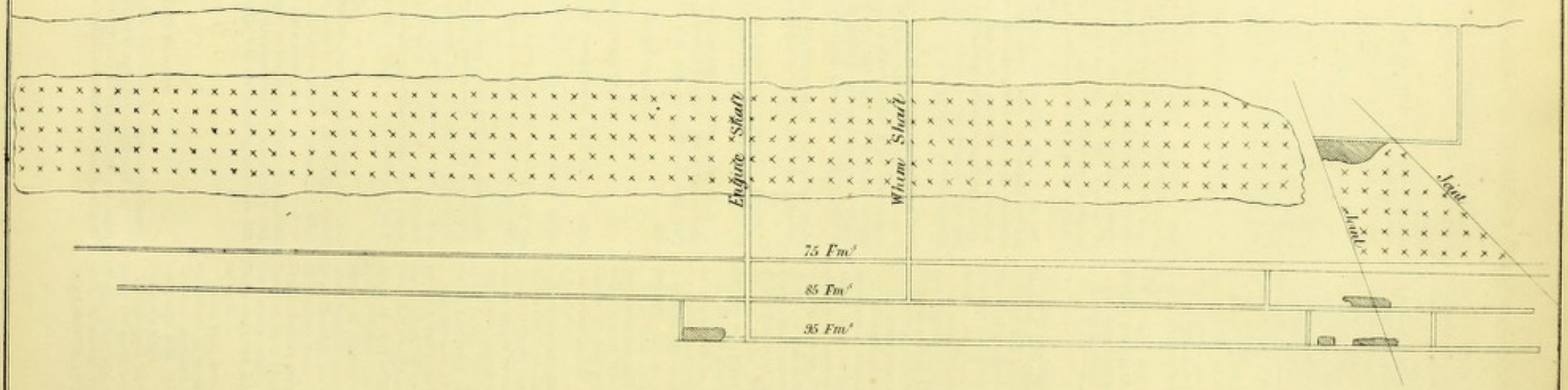
It is circular, 10 feet in diameter, and in consequence makes a most capital ladder road, there being plenty of room, plenty of air, and easy ladders. I do not think it possible to find a more easy or safer footway. The ladders are in 10 yard lengths, including 7° to the 150 yard level, and 10° below that point. They rest upon wooden platforms or sollars, which occupy the whole space of the shaft, leaving only an opening sufficiently large for a man to go through, so that each platform forms a good and safe resting place. A considerable difference is to be noticed in the exertion required to climb the ladders upon changing from the lower to the upper ones, greatly to the favour of the former ones. Workings consist of driving several levels and cross cuts, and taking down ore in tribute and tutwork.

1. 212 yard level driving east towards Chapple's shaft and about 37 yards from it; 6 men in 3 shifts of 8 hours. The end is about 30 yards beyond a winze, which communicates with the 282 yard level, which is through to Chapple's shaft.

2. 252 yard level driving east of Chapple's shaft and about 100 yards beyond it. No communication with other levels. This level is about 22 yards south of Chappel's shaft, connected by a cross cut. From this shaft being higher than the others, it is generally an upcast. A door is

DYLIFFE MINES.

SECTION ON LLECHWEDDU LODE.



Old Workings

Present Workings

SCALE 40 FATHOMS TO AN INCH

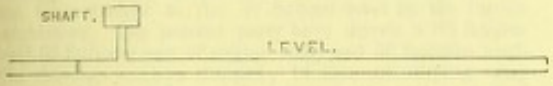
C. Lloyds

placed in the level west of the cross cut, and the air so drawn from the end, a supply being furnished by means of a pipe through the door carried in the roof of the level close up to the end.

The air in the end, however, was very dead, owing to there being a partial stoppage of the shaft in the form of a platform to protect the men sinking in the bottom of it.

Sample W. 65 was taken from the western side of the door, and W. 66 from the end, 2 hours after a hole had been blasted and while 2 men were at work.

Plan.



Section.



Sample W. 67, was taken from Thomas Lee's tribute pitch in this level between two shafts about 3 hours after a hole had been fired.

3. 282 yard level; 30 feet east of Chapple's shaft. 6 men.

4. 312 yard level; Chapple's shaft is not down to this level, but preparations are now being made to sink it. The eastern end is 105 yards beyond a sump from the 282. Six men.

Sample W. 64 taken in this end an hour and a half after firing, and while 2 men were working. Temperature 64° F. The level was choked with accumulations of ore.

5. 342 yard level. Eastern end 480 yards from engine shaft and 44 yards beyond a sump. 6 men.

This level was partially choked with ore and deads, there being only a clear height of 4 feet. Air at end dead. Sample W. 63 taken there.

6. 342 yard level. Western end 360 yards from shaft, and 150 yards from sump. 6 men. Air close and flat. Sample W. 58 taken here half an hour after shot. 2 men in end. Sample W. 59 was taken from under the sump, air coming down.

7. 372 yard level. 135 yards east of engine shaft, and 90 yards east of sump. 6 men. Sample W. 60 taken here. Temperature 65° F. There was a small boog in the end, in which the candle would not burn. W. 61 was taken from this boog.

8. 402 yard level, driving east and west of engine shaft, about 2 feet each way. No men working when visited, but took sample W. 62.

9. 112 yard level. A cross cut from Chapple's shaft, south towards Eddy's vein, 76 yards long. 6 men. 7½ feet high by 7 wide.

All the levels in this mine are driven a good size; they being 7 feet high by 6 feet wide in all cases. The result upon general ventilation of the mine is most beneficial, and consequently upon the economical working.

Raising ore in stopes.

1. Above 242 yard level; 10 men between the last sump and the end.

2. Above 312 yard level; nine men between sump and shaft.

3. Above 282 yard level; 9 men.

4. Above 230 yard level; 6 men.

The rest of the men are working on tribute ground in various parts of the mine. The total number underground is 206.

Changing houses.—A row of sheds about 70 feet long by 10 wide, divided into 6 houses. The roofs are very low; no ventilation; floors of loose earth and houses dusty. An iron pipe runs through them all, with a fire in one end. There is no provision for the men's washing themselves.

Dressing Floors.—There are several floors. All dressing done by men and boys. Some portions are covered in. There is a small house for the men to dine in in wet weather, but it is small and uncomfortable.

There is a benefit club in connection with the mine known as the Snailbeach Miners' BenefitSociety, which is managed by a committee elected annually from among the men, which conducts all the business of the club, and renders an account of all moneys received and expended each year.

The sums paid are 9*d.* per month for each man earning 1*s.* per day, and 6*d.* per month for those earning less than that amount. But this is reduced to 6*d.* and 4*d.* a month, when the balance in hand amounts to 150*l.* For this each man receives 7*s.* per week in case of sickness or injury, for a period of six months; 5*s.* 6*d.* for the next twelve months; and after that period until the termination of his illness 4*s.* 6*d.* per week.

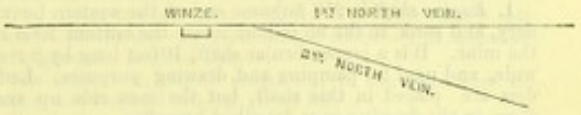
In case of the death of any member, each adult pays the sum of 6*d.* and each junior 4*d.* to the funds, from which the widow or nearest relation receives 4*l.* The same levy and payment is also made when the wife of a member dies.

Roman Gravels.

A lead mine, 14 miles from Shrewsbury, under the management of Capt. Vivian. Visited it in company with Lord Kinnaird.

This mine is worked from the engine shaft, situated at the northern extremity of the workings, and is 60 fathoms deep. It is perpendicular, 8½ feet long by 5½ feet wide. The shaft is divided, one part used as engine and footway shaft, the other for winding. The ladders are in lengths of 4 fathoms, quite perpendicular, and are very difficult to climb. The winding is done by kibbles drawn by wire ropes.

Workings.—1. 6 men on the second north vein in the 6 fathom level, 72 fathoms from shaft, and 20 fathoms from a winze; size of level 7 × 4 feet. This level runs along side of another level driven on the first north vein.



It is 20 fathoms from a winze, while the other is 30 fathoms. At the time visited the end was very close and smoky; the smoke coming from a hole which had been fired from the end of the first north vein about one hour and a half previously. The air was coming down the winze and keeping the smoke in the two ends. Sample W. 68, taken in the second end where men were working.

2. 4 men on the first north vein in the 20 fathom level, 6 fathoms from shaft and 8 fathoms from winze.

3. 4 men in the 20 fathom level on Gravel Vein, 40 fathoms from winze. This end was close. It was supposed to be ventilated by air pipes communicating with a waterfall running from the 6 fathom level; but the pipes were a long way from the end and in a very poor state, and the level was choked with stuff. Sample W. 69 taken here.

4. 9 men sinking a sump in the first north vein going down to the 40, now 6 fathoms deep. Sample W. 70 taken here.

5. 4 men in 40 fathom level on Gravel vein, 48 fathoms from shaft, 20 fathoms from winze.

6. 4 men in 40 fathom level on first north vein, 40 fathoms from winze.

7. 4 men driving a crosscut from Roman gravel, 6 fathom level, to Sawpit vein.

50 men on tribute in various parts.

There are 30 boys and girls on the floors.

The jigging machines and buddles are not covered in.

The men change upon the boilers.

There is a club to which the men pay 6*d.* per month, receiving 5*s.* per week when sick; they pay also 8*d.* per month to the doctor, receiving medical care only for themselves and not for their families.

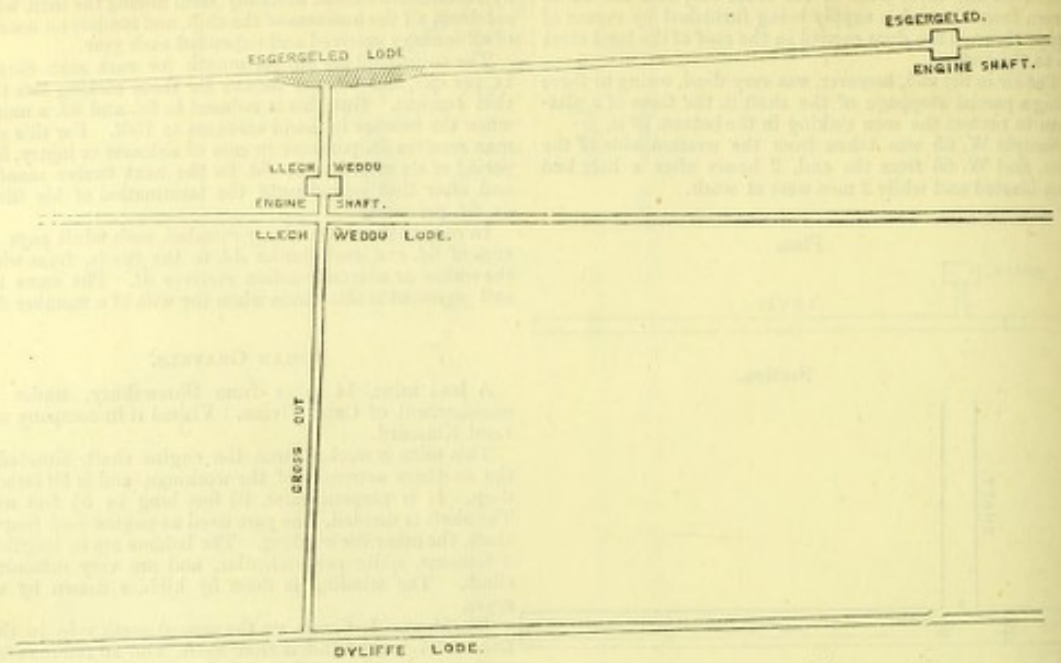
(*See lithographic section on Llechweddu Lode.*)

Diliffe Mines.

Large lead mines about 10 miles from Machynlleth. John Bright, Esq., M.P., chairman of the Company, and Messrs. Taylors, managers. 250 men underground when in full operation.

The workings are upon three nearly parallel lodes, converging as they run westward, each one worked upon from independent shafts, and forming a distinct mine.

Sketch map showing position of lodes, and the workings on Esgergaled lode from Llechwed-du engine shaft.



I. *Llechwedd-du-Lode.*—This is the middle lode. From the accompanying section it will be seen that the mine is worked and ventilated by three shafts.

1. *Engine shaft* is 250 fathoms east of the western boundary, and sunk to the 95 fathom level, the bottom level of the mine. It is a perpendicular shaft, 10 feet long by 8 feet wide, and used for pumping and drawing purposes. Ladders are placed in this shaft, but the men ride up and down in the drawing cage described hereafter.

2. *Whim shaft*, 50 fathoms east of the engine shaft, sunk on the course of the lode to the 85 fathom level, and underlaying north 1½ feet per fathom. It is 7 feet long by 5 wide, not used for any purpose, but kept open for ventilation.

3. *Eastern shaft*, 170 fathoms east of the Whim shaft, is an air shaft sunk to the 35 fathoms level, cutting into the old stopes which reach from this level to near the 75 fathom level.

Workings.—The upper part of the mine has been worked out by former proprietors.

The present party are driving as follows :—

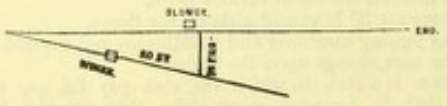
1. 95 *fathom level east*. 6 men. 10 fathoms beyond a rise to the 85. Size of end, 7 feet high, 5 feet wide. 3 shifts of 8 hours.

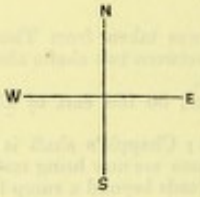
2. 90 *fathom level west*. 6 men. 30 fathoms beyond a rise to the 85. Suspended owing to the water being in.

3. 85 *fathom level east*. 6 men. 10 fathoms beyond winze to 95. This end just over the 95 end.

4. 75 *fathom level east*. 6 men. 80 fathoms beyond a winze to the 85 level. 3 shifts of 8 hours. The air in this end is bad. To assist the men a blowing machine is placed in the level, 50 fathoms from the end, which is worked by a boy, two boys being attached to this party for the purpose; so that the machine is working 16 in every 24 hours.

The air is taken by the machine from a winze on a side lode.





Sample W. 72, was taken in the end, while the blower was not at work, and after it had been idle for some time, but as the men were working. Temperature, 60° F.; and sample W. 73, after the machine had been worked for some time. Temperature, 57° F.

Pairs of men to the number of 32 belong to stopes in the bottom of the 95 level; but these men all stopped owing to the water being in. A pair of 12 men stoping in the bottom of the 35 level, 45 fathoms west from air shaft.

II. *Dyliffe lode* is the south lode, being 350 fathoms south of the Llechwedd-du-lode. The surface of the country rises towards the south, and a crosscut has been driven from Llechwedd-du to the Dyliffe, cutting the latter at the 60 fathom level. The men walk, and the ores are carried through this tunnel. There are 38 men working underground in this part.

There are two shafts.

1. *Waller's or Boundary shaft*, close to the western boundary. It is perpendicular. 72 fathoms deep and 8 feet in diameter. Used as a pumping and drawing shaft.

2. *Engine shaft*, 212 fathoms east of boundary shaft, and 120 fathoms from eastern boundary, is also perpendicular, 85 fathoms deep, and varies from 7 to 10 feet in diameter.

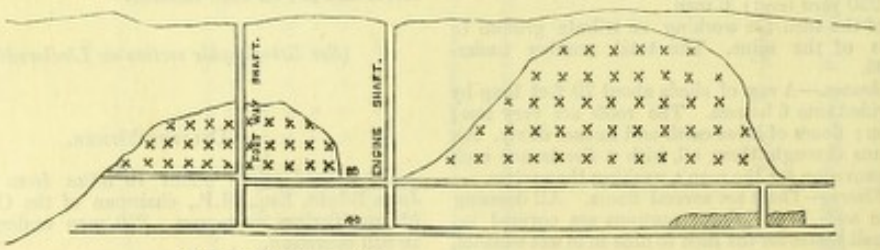
The workings are

1. *Two crosscuts* from boundary shaft south to cut the lode. One at the 62 is 3 fathoms in, driving by 6 men, the other at the 72 is 5 fathoms in, also driving by 6 men.

2. 85 *fathom level west*. 6 men. 35 fathoms from engine shaft. No rise. Sample W. 74 taken here.

3. 75 *fathom level west*. 6 men. 96 fathoms from engine shaft. A communication just opened with the 65 over the end. Before this the end was very close.

Section on Esgergaled Lode.



Old workings.

Present workings.

Scale 40 fathoms to an inch.

III. *Esgergaled lode* is 40 fathoms north from Llechwedd-du lode. There are 14 men working underground.

It is worked in two parts.

1. *Western part*, worked by a crosscut from Llechwedd-du engine shaft at the 25 fathom level. The crosscut is 40 fathoms long, and the lode is worked away east for 20 fathoms and west 2 fathoms. The workings are ventilated by a duck machine worked by the pump rods in the shaft. Sample W. 71, taken from the western end half an hour after a hole had been fired.

2. *Eastern part*, worked from the Esgergaled engine shaft, which is 100 fathoms east of the crosscut. The lode has been worked to the 30 fathom level by the former proprietors. The present party have driven a 40 fathom level 80 fathoms east of engine shaft and 60 fathoms west. The drivings are now stopped; 14 men are stoping away the ground east and west of a winze in the eastern end of the bottom level. The engine shaft is perpendicular, 9 feet long by 6 wide. A footway shaft also goes to the 40 fathom level, 30 fathoms west of engine shaft; it is perpendicular, 6 feet long and 4 feet wide. The ladders are in 5 yard lengths, inclining about 2 feet.

State of the levels.—The levels in all cases were driven 7 feet high, and averaging 5 feet wide. Places visited clear of stuff. This produced a good effect upon the ventilation of the mine. The ladders were all in a very good condition, and the timbering also firm.

Machinery.—Very good winding machinery in use. In all the levels tramroads are laid down. The waggons are filled at the places the mineral is being worked; and these waggons are raised to the surface in an iron cage, similar to the cages in use at the best collieries. These cages are all fitted with Aytoun's patent catches, which are self-acting when the rope breaks. The load is drawn by steel wire ropes 1" diameter, having a breaking strain of 27 tons, and costing 65*s.* per cwt. One rope has been in use for two years. A very ingenious contrivance is in use to prevent accidents from over winding. The rope after passing over the pulley on the poppet heads, passes through a strong iron ring, and has at its end a short piece of iron chain, which is attached to the chain by means of a spring hook, so arranged that when the hook is drawn through the ring, the lower part being larger than the hook is compressed in passing through it, causing the upper part to open when the pin which holds the chain gives way, and the cage becoming detached falls down until caught by the safety catch.

Drawings of cage and hook are appended.

Dressing Floors.—Very well laid out for ensuring greatest convenience to the workpeople. They are very well provided with good dressing houses, a very small number indeed being exposed to the weather.

Changing House.—A very commodious house is provided for the men to change in. Well lighted and ventilated.

The cottages of South Wales are very little, if any, better than those found in North Wales.

In the neighbourhood of Dyliffe, in consequence of the scarcity of cottages, those in existence are very much crowded. In many cases lodgers are taken, where there is not really room for the members of the family, giving rise to much overcrowding.

I also found cases where two sets of men, working in different coirs, slept in the same bed.

As might be expected, fever was raging to a great extent in the district.

Camborne, Cornwall,
My Lord, 1st Nov. 1863.

I have visited the mines in the Isle of Man, and some of the mines of the Cumberland and Cleveland districts, for the purpose of taking samples of air, according to directions received from your lordship, and beg now to submit my report upon the same, together with sections of the workings at Laxey and Greenside mines.

I am, &c.,
The Right Hon. Lord Kinnaird, K.T. C. Twite.
Chairman of Royal
Mines Commission.

Foxdale Mine.

Lead mine, giving employment to about 200 men.

The workings are upon one lode, which is very wide, and of a very soft character.

The mine is ventilated by two shafts.

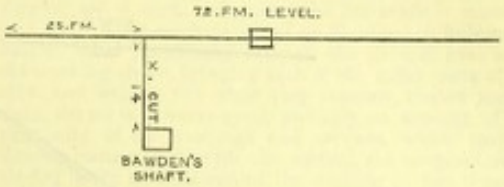
1. Engine shaft, 10 feet long by 8 feet wide, divided into two parts, one of which is used as a pumping shaft, and the other as a drawing shaft.

2. Bawden's shaft, sinking to the 86 fathom level, 11 feet long by 8 feet wide, to be used as a pumping and drawing shaft. Both shafts are perpendicular.

These shafts are perpendicular, and are about 100 fathoms apart.

Air was taken as follows:—

W. 75 from the western end of the 72 fathom level driving on the south part of the vein. The end is 25 fathoms beyond Bawden's shaft, and 40 fathoms beyond a communication with the levels above and below.



W. 76 from the stopes between the 72 and 86 fathom levels. 6 men in the stopes. Ground opened through.

W. 77 from and of cross cut driving south to Bawden's shaft in the 86 fathom level. The mouth of cross cut is 95 fathom west of engine shaft, and there are communications open both with level above and level below. 4 men in 2 cores of 8 hours.

W. 78 from the western end of the 100 fathom level, 35 fathoms from the engine shaft driving by 6 men in 3 cores.

W. 79 from the eastern end of the 86 fathom level, 90 fathoms from engine shaft, 30 fathoms from rise, and 60 from winze, end driving by 2 men.

W. 80 from the eastern end of the 72 fathom level, 15 fathoms beyond a rise, driving by 2 men. The men had just left their work.

The levels are all driven high. The lode being soft necessitates the use of a great deal of timber: this appeared to be generally in good state.

The ladders in engine shaft, and in the rises were all sound, and inclined at an angle of 18°.

The boilers are provided with water gauges and steam gauges.

The men change at home.

Laxey Mines.

Very large lead and copper mines under the management of Captain Rowe. The workings are all upon one vein, and reach a depth of 212 fathoms.

The vein is wide, and the levels all driven good height, averaging 7 feet. The ground being hard very little timbering is required.

A large proportion of the men were working in the stopes, raising ore, and consequently a large amount of blasting was going on, and a great deal of smoke found in the mine.

The ventilation was effected by two shafts, one the engine shaft, also used as a drawing shaft, going to the 212 fathom level; the other only used for winding, going also to the same level. The ladder way in the latter shaft is not cased off securely.

Samples of air taken as follows:—

W. 81, from the stopes in the roof in the southern part of the 100 fathom level, 2 parties of 4 men were working here. The working was 7 feet above the level, the men standing and working upon the stuff which had been broken from above.

W. 82 from the southern end of the 165 fathom level, 2 parties of men working here. Sample taken 15 minutes after a shot had been fired. Air was brought into the end from a distance by means of air pipes, but the current was very feeble.

W. 83, from the north end of the 212 fathom level. The men had left work some time, but another party was about to commence, if not prevented by surface duties.

W. 84, from the bottom of engine shaft, in the 212 fathom level.

W. 85, from the northern end of the 110 fathom level, air pipes were also laid in this level, but very little air indeed came through them.

The surface arrangements were very well marked. All the ore is dressed by men and boys, and is mostly done under cover.

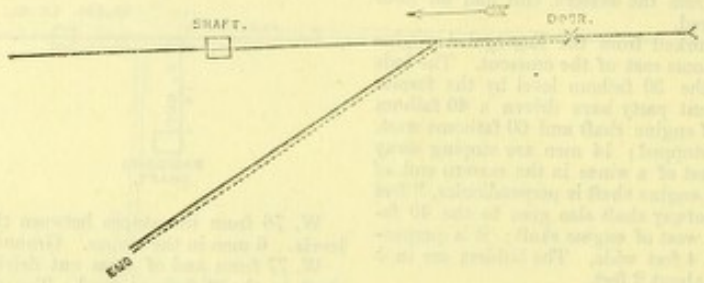
Coniston Mine.

About a mile from Coniston village, under the management of Mr. Barret. The workings are upon four parallel lodes, the workings upon each connected with the workings upon the other by means of cross cuts driven from the adit level. Upon the first vein or old mine the workings

are carried to a depth of 150 fathoms. The principal operations are in the 110, the 130, and 150 fathom levels.

In the 150, only a few fathoms of ground have been driven from the engine shaft. In the 130, a series of sumps are in course of sinking, varying from 9 to 14 fathoms in depth, which will be intercepted by the 150 fathom level at some future time. Two shafts down to this level. Sample W. 87 was taken from the deepest of those sumps, 30 fathoms from new engine shaft. The sump was 12 feet long by 4 feet wide, and there were 3 men engaged in sinking it, working 8 hours per day. Temperature 64°.

W. 86 was taken from end of a side cross cut, called Grey Craig Cross Cut, driven from the Grey Craig level between its mouth and a shaft communicating with the surface, the distance between being 110 fathoms.



A door is placed in the main level, 80 fathoms from its mouth, and pipes carried from there to the end, a distance of 150 fathoms, two men working here 8 hours per day.

Temperature 55°.

The men blast by straws.

Ladder roads.—In the shafts good, inclining 18°. They are in the engine shaft, which is divided from the kibble shaft by a 5-inch wooden casing.

Several of the ladders in the winzes in an insecure state. The deep sumps in course of sinking were without ladders, and the pieces of timber put in to assist the men in climbing were much too far apart, and very insecure. In several levels old sumps left quite open in the roadway, and as the smoke laid very heavy in the mine, these were sources of danger.

The men change at home.

The dressing floors only partly enclosed.

Tilberthwaite Mine.

Also under Mr. Barrett's management, about two miles from Coniston.

The operations consist in driving a long adit, the end of which is 550 fathoms from the mouth; and being driven by six men working in three shifts of eight hours each.

Ventilation is assisted by pipes five inches square, connected with a water jet at surface, having a fall of 30 feet.

No timber required.

Sample W. 87b taken one hour after blasting.

Goldscope Mine.

About three miles from Keswick, and about one mile from Derwentwater; under the management of Mr. B. Plammer.

The Goldscope vein is a very large one, making in some places, 18 to 20 feet wide.

The mine is worked by one shaft, 90 fathoms deep, communicating with the surface. There is also an adit level opening to the hill side, and also communicating with some old workings in other veins.

The ground is very difficult to keep open after the lode is worked away, requiring heavy timber; and as the dry rot affects it very much here, the timber requires renewing very often.

The shaft is small, so that only a small kibble can be worked. The ladders between the pumps and kibble are not cased off, and this is the general footway below the 60. The winzes small. In the places where the men put in their own ladders or semples they were badly placed.

Samples of air taken as follows:—

W. 88. In the stopes below the 60 fathom level, 2 men. No shot had been fired here, but the place smoky from men below. The whole width of level taken away, only a plank to walk upon.

W. 89, from the south end of the 90 fathom level; here from the shaft two side levels driven, leaving bar of ground between. End 6½ feet high by 4 feet wide, 6 fathoms from shaft. 2 men.

W. 90, from the bottom of the shaft. 3 men.

W. 91, from the south end of the 60 fathom level, 2 men just going to fire; this end is 22 fathoms from winze, and beyond the stopes where W. 88 was taken. In consequence of there being no road over these stopes the end was full of deads.

Lodging houses are provided on the mine, and largely used by the men. The accommodation consists of a sitting room and two bedrooms; in the first of these, which is 15 feet long, 9 feet wide, and 9 feet high in centre, there are three beds, in each of which two men sleep; it is lighted and ventilated by a small window 2 feet high by 1½ feet wide. In the other room, 20 feet square and 12 feet high in the centre, there were nine beds, in each of which two men slept.

This room had a larger window, and there was also a hole in the wall, about eight inches diameter. Neither of the windows would open.

The house was of stone, the walls unplastered, but whitewashed. The roof was not ceiled.

The rooms were dark, dirty, and close, the bedsteads of wood, and the bedding consisted of coarse linen bags filled with straw or chaff, a blanket or two, and the men's overcoats.

In the sitting room, a good fire provided. There was no place provided where the men could wash themselves, neither did the men appear to change their clothes on coming up from the mine.

Castlenook.

Adjoining Goldscope, and under the same management.

Samples, W. 92 from the bottom of the shaft, 28 fathoms deep, sinking by six men in two shifts.

W. 93, south end of the 10 fathom level, driving by four men in two shifts, nine fathoms from rise. End 6½ feet high by 4 wide. Stuff at least 4 feet high, for a length of 12 to 14 feet from end.

The men use the lodging house at Goldscope.

Greenside Mine.

Near Ullswater, a large lead mine, worked by a series of adits driven in from the hill side.

The workings are upon one large vein, which varies in width from 2 feet to 20 feet, and in some places reaches a width of 40, and even 70 feet. The ore is found in ribs in the vein, and is worked out, leaving the poorer parts standing.

The ground is hard, requiring little timber, is very dry, and the workings dusty.

Samples of air taken:—

W. 94, from the south end of engine pump, between the Low Horse and the 36 fathom level, 12 fathoms below the horse level. The working was 23 feet wide; two men working.

W. 95, from a rise three fathoms above level, worked by two men.

W. 96, from the headings north of engine sump, 20 fathoms below the horse level, five fathoms from current of air.

W. 97, from sump below 36 fathom level, north of engine sump; four men working, one hour after shot.

Visited also the end of the Glenroy level, which is carried 200 fathoms beyond ventilation. Only one shift work here; The men had just left, and the end was full of smoke. It is undoubtedly a very close place.

There were very few men at work in the mines, owing to its being Monday, and a very rough, stormy morning. The men live long distances, 8, 10, or 12 miles from the mine, owing to the want of houses near; they go home Friday and return on the Monday. There are lodging houses provided for them to sleep in during the week. Visited one which was 12 × 14 × 10 feet, and contains 16 men; it was deficient in ventilation.

VIII.

REPORT ON MINES IN THE ALSTON MOOR DISTRICT. By Captain W. H. Rowe.

Mines Newtownards Co. Down,
Ireland, 10th February 1863.

My Lord,

At your request I have lately visited and reported upon the lead mines of Alston Moor, the rocks of which it is scarcely necessary to say are geologically termed the Carboniferous Limestone and Millstone Grit. Throughout this well-known district the hills are literally "riddled" by the adit or day level system of mining, either crossing or on the course of the veins. These levels, smaller drifts, and workings are in some cases of great extent, and so connected that it is possible to find one's way from one side of and through a ridge of hills, to the other side, a distance probably of more than 3 miles, attaining a "cover" or depth from surface of from 20 to 100 fathoms.

Levels or working, some distance from the main current, are either ventilated by the double drift plan, communicating, if above, by rises about every 20 fathoms, or, which is the same in principle, bringing the draught through air-tight boxes or pipes as the workings advance. This last is generally the method adopted to ventilate the forehead or forebreast, and, together with other contrivances for forcing air to the workings, have been referred to in my reports.

It may not be out of place to remark in conclusion, that anyone accustomed to mines, where the health and safety of the workman are not overlooked, cannot but be struck with the rude and neglected state of the travelling ways in most of the mines of Alston Moor.

I remain my Lord,
Your very obedient and faithful servant,
(Signed) W. H. Rowe.

Right Hon. Lord Kinnaird.

Nentsbury Green Lead Mine employs 8 men below ground and 6 at surface, and is an adit or day level, the mouth of which is close to and at the level of the High Road from Alston to Nenthead, near and not many yards above and to the east of the Nent river. The level is driven in a north-easterly direction (on what is called the Hagsfoot vein) for a distance of 400 fathoms, height 6 feet, width 4 feet, arched and timbered where necessary also rails for waggons. Three cross veins are intersected by this level "Old Carrs," "Middle," and "Wellgill cross vein," the latter is at the extremity of the distance named, and is that on which the main level is continued both north and south 400 fathoms in each direction, these communicate in the first instance with the "High rise" day level, and southward into the Broomsberry day level. On this last driving about 200 fathoms south, and in and about the Wellgill vein are 3 partnerships of men (2 in each), raising ore: in every case not far from the main level, where there is a current or draught passing in one way or other (north or southward) according to the direction of the wind or state of the atmosphere outside. I should here state that at about 30 fathoms west of the extremity of the N.E. driving is a shaft to the surface (about 50 fathoms to the top), so far, therefore, as the main level is concerned, this is an addition in the matter of ventilation. The point of most interest in this mine is that of the fourth or last partnership of men (2 only). These are driving a level eastward from the Wellgill vein, about 8 fathoms above the main day level, and driven about 50 fathoms, with the intention of intersecting a vein named the Brownhill cross vein, supposed to be about 5 fathoms further east; the arrangement for giving air to this forehead is a "trap door" directing the draught into iron pipes (5 inches diameter) fixed at the main level, and continued to within a few yards of the forehead; the air coming from the end of the pipe was scarcely perceptible, temperature of air at the forehead 59°, that of the rock dry 57°; the men work 8 hours, blasting immediately before leaving, the place remaining idle for the rest of the day; size of the working 5 feet 6 inches high, and 4 feet wide; climbing way from the main level is up a rise about 13 fathoms, (6 by 5 feet) old wooden staved ladders insecurely fixed on platforms at about every 15 feet, partly rotten and broken; the way is then along a small drift to the top of the *pass*, 5 fathoms below which is the east driving described, the lower part of which is used to convey the broken stuff to the main level. Poles or sticks are fixed across the upper part of this pass at every 3 or 4 feet, so as to reach from one to the other instead of ladders. There is no shed or covering at the washing floors, and the hands are only occasionally at work.

Grassfield Lead Mine is an old adit level mine about half a mile south of the former, and employing the same number of men at surface and below-ground; the main level is driven about 400 fathoms in a southerly direction into the hill, several surface shafts communicating with it and its branches. Between the mouth of the level and the southernmost shaft, little more than half-way from the former, are 4 men, rising into the limestone in search of lead ore. A zig-zag hole (3 feet by 2), about 4 fathoms in height, water percolating through the ground from some old working above, bringing with it the softer parts of the rock, and making the place very insecure, timber insufficient, the air is however good, probably on account of the proximity of old workings and crevices, which may indirectly communicate with the surface, the temperature of air 58½ in the extreme end of the working (4 feet 6 inches by 2 feet 6 inches wide), about 6 or 7 fathoms from the main current or draught. Another party of 4 men at the western extremity of this right, and adjoining the "Galligill Syke" mine, are working 5 fathoms below an adit level, close to the forehead, which is distant from the mouth of the level in a south-west direction 120 fathoms; there is no communication affording natural means of ventilation here. An air machine worked by a boy is stationed about 30 fathoms from the mouth, it is simply an iron fly-wheel (5 feet diameter), encircled by a belt working a circular fan, sheave of which is 3½ inches, pipes (5 inches dia.) are conducting the air from the machine to the top of the sump, but not continued down, and the blast is weak; no ladders in this sinking, which is 5 feet by 4 feet, 3 inch rope and windlass in fair condition. Temperature of rock at bottom of sinking 56·30, air 58, the roof of the level is for the most part secure. There are no "shops" connected with these mines, and the dressing department at Grassfield is only preparatory, the stuff to be finished is taken to the Nentsbury Green washing floors.

Galligill Syke Lead Mine, 3 miles east of Alston, and ¼ of a mile south of the Nent river, 25 men working below ground and 1 man and 9 boys on the "washing floors," consists of 2 veins running east and west, about 17 fathoms apart, worked by means of adit levels extended west into the hill about 360 fathoms. The main level through which the mine is entered is commenced on the northernmost of the veins, and at a distance of 110 fathoms turns south (a cross cut across) to the southernmost, the first level, however, continues on, and by means of another cross cut at a higher level 200 fathoms from the first cross cut, a communication is effected with the extreme west workings on the south vein; thus far is the track of the draught or current, which now turns back again to the east on the south vein drivings, &c. till within 25 fathoms of the first cross cut where there is a sump to a level 15½ fathoms deeper, another sump is sunk to this level further east a short distance which serves as the ladder road to this low level, the current goes down the first sump and along the low level eastward 110 fathoms to and through a shaft to the surface (shaft 20 fathoms deep), which is termed the air shaft. This describes the general ventilation of the mine. The majority of the men are working within a short distance of the first named sump on the south vein above the higher level. An average specimen of these workings is a party of 3 men, about 10 fathoms above level and draught; temperature of air here was 59°, the drift in which they are working 5½ feet high and 2½ feet wide; the average depth from surface to this part of the mine is about 40 fathoms. In the deeper level 4 men are driving a forehead west of sump 35 fathoms, level 5½ feet high and 3 feet wide, temperature of air in forehead 56°, no air machine. The ladder way to this level (before referred to), is 5 feet diameter; the ladders are made of 2 inch by ⅝ iron ⅝ round iron staves, 1 foot wide and 1 foot apart, 6 in number, 14 feet long, each bolted together, light wooden stays at each joint, but no platforms or "sollar" for the whole length of 13½ fathoms; both sump and ladders perpendicular. The timber supporting the roof over the sump is in fair condition, and this may be said of the timberwork through the levels generally, which are high good levels. A wooden house on the washing floors serves as a shelter for the boys, but is not a sufficient protection from bad weather.

Hudgill Burn Lead Mine, mouth of the adit level about ¾ of a mile N.W. of Galligill Syke Mine. This level is driven in a south and south-easterly direction intersecting several veins, on which are old drivings and workings of great extent; on the east this level is holed (or said to be), to the Galligill Syke mine; there is a perceptible draught going in that direction, and from the great extent of old workings and number of branch drifts the present workings are well ventilated. A line drawn

from the mouth of the level in a south-west direction 300 fathoms would represent the adit cross-cut to the veins, from this another in a south-east direction 360 fathoms, running obliquely through the several veins (four in number), would reach the innermost workings now in operation. This is a sump about 5 fathoms in depth, not far from the regular draught at the bottom of which is a 5ross cut north 4 fathoms, then a drift east and west 8 fathoms in each direction; here the temperature of air was 35½, that of the rock 52°; 4 men are driving and stoping the sole of the drift; there are no ladders in the sump, the men go down and up by means of a windlass; going back again north-west, and scattered over a distance of 175 fathoms in the old workings on the different veins are 4 more companies of men, making the total number working above, below, and in this level 16 men, the depth from surface about 30 fathoms. An average of these places was a drift 5½ feet by 3 feet, about 8 fathoms from draught; temperature of air 53° and 52°. The main level will average about 6 feet high by 4 feet wide, ground firm, or where necessary, supported. West of the mouth of this level about 220 fathoms is a shaft sunk from surface about 38 fathoms deep, at the bottom of which 9 men are engaged boring towards the forehead of a deep level, which has been driven south from a Whimsey shaft, on the line of what is called the "Teesdale cross vein," a distance of 190 fathoms; this level is drained by and is a continuation of what is known as the "deep level from Lovelady shield shaft." The object of "boring" I believe is to drain the shaft as well as endeavour to discover its position in regard to a *rise* made from the forehead of the "deep" level. No men were working during my visit to the mine in this level, in the expectation that the boring would soon inform them the relative position, when a communication could afterwards be more readily effected. About 40 fathoms north of the Whimsey shaft is a ladder-road through a *rise* 5 feet diameter; the ladders and stages are at short distances. The washing department is of no importance, a man and 2 boys dressing ore in the summer season. There are no "shops" connected with either of these mines.

These mines were examined by me on 23rd September 1862.

Alston, 26th September, 1862.

Bentfield Lead Mine.—This mine may be described as now comprising an adit or day level about 550 fathoms in length, on an average about 7 feet high and 4½ feet wide, arched for a good distance at the entrance, and in those places where ore ground has been wrought, and also a 25 fathom level, which has been reached by means of a hydraulic engine, drawing or pumping the water from a shaft, through which the stuff is also drawn in small skips working in guide rods. This the engine shaft is situated about the centre of the above distance, or about 280 fathoms from the mouth of the day level in a westerly direction; continuing in the same direction till within 50 fathoms of the extreme end, is a shaft communicating with the surface, from the mouth of the day level to and up through this shaft is the direction the draught or current of air takes under ordinary conditions of weather. In very fine and settled weather it comes down this shaft and goes out at the mouth; near the engine shaft is a "rise" or hole to the surface, but from being the way the pipes are conveyed to the engine, and other causes, does not affect in any way the draught between the points stated.

The present workings are all below the adit level, principally above the 25 fathom level, which has been driven about 25 fathoms east and 15 fathoms west of the shaft; in the roof of the latter are three partnerships of men, numbering 14 men altogether, and above the former are two men only; where these men work is a "rise" communicating with the day level about 20 fathoms east of the engine shaft. The direction of the draught, which I found weak in these workings, was through the engine shaft till it arrived to the roof or ceiling of the west workings, along which it is attracted by "deads" filling up the middle of the excavated ground, down through a small passage left open between the deads and unwrought ground along the 25 fathom level and up the last rise; the width of the workings, which is the size of the vein at that point, is 10 feet wide; west of shaft about 6 fathoms, and about midway between the two levels, I took sample of air marked "a," the temperature of the air 60°. The travelling or rather climbing way is through the engine shaft alongside the pumps; wooden ladders and staves, about 14 feet long, at an angle of about 80, "sollars" or platforms broken, no "casing" between the ladder way and the pumps, &c., staves of ladders 10 inches apart. Eight men are engaged sinking in two places further east than these workings, drawing the stuff by an ordinary windlass, but these do not require remarking upon.

The whole of the men employed below-ground in Bentfield Mine is 24, and 2 boys, earning wages from 12*s.* to 15*s.* per week, and 6*s.* to 9*s.* boys. There are also 12 hands on the dressing floors, but no covering or protection from the weather. A "shop" or sleeping room is over the smithy, 16 feet square, 8 feet high, in which 6 men and 1 boy sleep in 4 beds. A small window in front, 2 feet 10 inches square, roof unsound in many places. The rest of the men live in the vicinity of the mine.

Coal Cleugh Lead Mines.—West Allen River, Northiumberland, employs 250 miners The main low adit level is first a cross-cut southward upwards of a mile in length, then continued on the principal veins to a similar extent westward, the length from the level mouth to the inner-most vein, and west on this vein to the end and boundary, is about 2¼ miles, an excellent tram road, and levels well secured by arches, &c., throughout the main level and its branches; the great bulk of the men go and come from their work in waggons (called "vessels") for that purpose (as in most of the mines of the district), through this main level. By following the general direction and track of the draught we shall give a fair idea of the position of the levels as well. Entering at the level mouth, it goes along the cross-cut 620 fathoms to the flank level, to the first principal vein, viz., "Coal Cleugh" level and vein; here the current is divided, one part continuing through the cross-cut 330 fathoms further to the level and workings on "Barney Craig" vein, the other going west 500 or 600 fathoms on the Coal Cleugh vein level, and up through a whimsey shaft west of Coal Cleugh village. On the Barney Craig vein communication is made with Swinhope Mine on the east, and westwards by means of a whimsey shaft with Coal Cleuga top level; in case the current draws towards Swinhope, the draught enters at the latter level, the adit at Coal Cleugh village, then down the sump, and to east workings; by means of other surface shafts, shallower drifts, rises, and old workings of great extent, the draught is spht into a number of channels or divisions not easy to describe, nor are the details of which, I presume, necessary at present. The levels are of the ordinary size, waggon roads about 7 by 4 feet, others 5·6 by 3 feet, rises to workings and between levels 6 by 5 feet wide. I subjoin a sketch of an air machine generally used in this mine, (and worked by a boy), in order to give air to a rise or drift, before a communication has been made to cause a regular or steady current. When, however, there is a draught at the foot of a rise, for instance, the following plan is relied on to give air instead of a machine: the rise s divided or portioned into three divisions, the middle one is the climbing way, the passes on each side for the broken stuff to come through at the bottom of the rise, supposing the draught going in any direction, a trap door if placed between the climbing way and one of the passes, which when properly made, together with the casing on each side of the climbing way, on the principle of *bratticing*, does very well under certain conditions.

At the west end on "Barney Craig" vein I visited a rise applied by a machine 25 fathoms distant, (where there is a draught), rise was only 7 feet above roof of level, and is 9 feet long by 4 feet wide; 4 men work here, (in two shifts of 8 hours per day; barometer here 28·32, temperature of air 67°, (thermometer touching the rock 63°); samples of air in bottle and tube E. Another rise further eastward also supplied with air by a machine, about 10 fathoms or 12 distant, height of rise 30 feet, no ladders, pieces of timber fixed across one end about every 4 feet, rise open and 9 feet long by 4 feet wide; barometer near roof of rise 28·26, temperature of air 70°, (thermometer leaning against rock 66°; samples of air in tube and bottle, both marked F. Tube of air G, was taken from an average of the "Engine Strings" workings in draught; barometer 28·32, temperature of air 63, thermometer on rock 60°. On the Barney Craig vein eastward, 20 fathoms above level, in draught, and 4 feet from roof of stopes, working 4 feet wide, the temperature of air and rock the same as last; the tube H was taken, barometer 28·08.

At the roof of a rise on the vein first named, 45 fathoms above level, barometer 27·98, temperature of air 63°, thermometer on rock 60°, the bottle I was taken here; ladders almost perpendicular, wooden staves 9 inches apart, no platforms for 18 fathoms; 4 men here. The bottle of air J, was taken from a driving going east on "Sun String," near Coal Cleugh vein, level 5 feet high and 6 feet wide, 8 fathoms from draught, temperature of air 60°, thermometer on rock 57°, barometer 28·1; 4 men working here.

There are no "shops" on this mine; miners coming from a distance lodge in the houses in the neighbourhood of the mine from Monday till Friday. One of these lodging houses I examined; it was clean, rooms airy and large. On

the washing floors there are good sheds for the hands to take their meals in, and also parts of the floors, grates for instance are covered.

The depth from surface to the inner workings of the Coal Clough low level is about 100 and 120 fathoms.

Derwent Lead Mines, Northumberland. The limited time afforded to me in my visit to these mines only enabled me to examine some underground workings of the principal section named "Taylors and Jeffries" shafts (on 3 parallel east and west veins,) and about 370 fathoms apart; the former shaft is sunk from surface to the depth of 136 fathoms, the latter about 125 fathoms these shafts are communicated with each other at the depth (at Taylors) of 75, and also at 100 fathoms deep, viz., by the "30 fathom level" below adit, and "50 fathom level." The mine is usually entered by an adit cross cut south opposite Jeffries shaft to a ladder road on the northernmost vein, which following the course and dip of some old workings, leads to the "50 fathom level," the angle of the ladders and way will probably average about 70°, platform at various distances, seldom over 15 or 20 feet apart, wooden staves and some well worn; below the 50 fathom level at Jeffrie's the ladder-road is through the engine shaft to the 80 fathom level, sollars or platform from 20 to 30 feet apart, shaft perpendicular, ladders at an angle of about 80°; at the 80 fathom level is a separate sump or winze for a footway to the bottom or 95 fathom level (ladders are however continued through the engine shaft as well). The ground over the winze top not having been sufficiently supported, a heavy fall of rock has made the footway for the present exceedingly unsafe. The 95 fathom level is driven west of Jeffrie's shaft, and this winze nearly 60 fathoms, level about 6 feet high, 4 feet wide, no machine or means of giving air to this forehead of any kind, 2 men are driving the forehead. Barometer here 29.4, temperature of air 66. Thermometer leaning against rock (which is dry) 64°. Specimen of air contained in bottle marked K. At the 80 fathom level a party of men are commencing to rise from the end of a cross cut north, ground heavy and wet. Returning again to the 50 fathom level, I then visited the 60 and 50 fathom levels east of Taylor's shaft; two forcheads are being driven at the latter level eastward on separate veins, one is 13 fathoms from draught, the other 20 fathoms, at this latter (the north level) driving by 2 men, temperature of air was 65°, barometer 29.12, thermometer leaning on rock 64°, sample of air in bottle marked L, levels 7 feet high, 5 feet wide.

The number of hands employed at the Derwent mines is 264, 120 of which are on surface.

This mine visited October 3rd 1862.

Brownley Hill Lead Mine, 4 miles west of Alston, and west side of Nent River, 42 miners, 5 waggoners; 5 men and 5 boys on dressing floors. An adit level going first eastward 200 fathoms, then northward (to Brownley Hill Vein) 175 fathoms, eastward (on the vein) 335 fathoms, to a north and south vein (called "Brownley Hill High Cross Vein") then southward on this vein 350 fathoms to an air shaft from surface 50 fathoms deep; in this last distance above and below level are the principal workings; the forehead is 50 fathoms farther south, ventilated by bringing an air course along the level from the bottom of the rise and continued to within a few feet of the forehead, by this means the general "suck" or draught of the mine has to come to the mouth of this air course, and back through it to air shaft; at the forehead barometer was 28.64; temperature of air 56°, rock dry, samples of air in bottles and tube S; 2 men work here. In a driving from the foot of a sump 4 fathoms deep, 8 fathoms northward (2 men). Barometer 28.72, Thermometer 62°, tube of air T, rock dry. Ore workings 8 fathoms above main level, 20 fathoms or more in length, several fathoms in height and about 30 feet wide, temperature 63°; barometer 28.68, tube of air O. Sump 20 fathoms deep (to "4 fathoms limestone") a level is being driven south of this sump 17 fathoms to forehead, supplied with air by a hand air machine, barometer here 28.84, thermometer 60°, thermometer in water 56°, (4 men). 4 men are also driving this level north of sump, a rise is however holed to the main level at forehead causing a current where they are working. Levels average 6 feet high, 4 feet wide. The main level is a little larger and is a good safe level, the greatest depth from surface to this "Brownley Hill" main adit level, is 90 fathoms.

On the dressing floors are sheds for the hands to take their meals in.

Mine visited 19th November, 1862.

Dougang Lead Mine, Nenthead, 20 pickmen and 10 hands on washing floors. The main adit level on the "Brigalburn" and "Dougang" veins is driven westward about 550 fathoms; depth from surface at the forehead 90 fathoms. A whimsey shaft back 120 fathoms from the forehead is 60 fathoms deep (from surface to level): though on the whole a tolerably good level it is in many places, where arched, small and crushed at the roof and sides, the nature of the ground being similar in this respect to the porphyries of this, the Newtownards lead mines; after a while contact with the air making it to swell or expand, and necessitating the arching to be renewed, or the level would be closed. The most important point in this mine is the main level forehead or rather forebreast, being 18 feet high and 20 feet wide, now driving by 6 men. The "deads" from this forebreast go to fill up behind, leaving an arched way for the main level about 6 by 4 feet, and a drift about 12 feet above, 4 feet high, 2 feet wide, for the air way. I examined this air drift for some distance and could find no observable draught or current going in any direction; the cause is probably either a stoppage in the air drift or shaft, the distance from a proper current, or the many other interruptions such a plan of ventilation is liable to. Temperature of air 60°; barometer 28·24, rock dry; specimens of air in 2 tubes "H H." Near the main level, and east of the "whimsey shaft" is a rise about 2½ fathoms high to a drift or working on a branch of the vein running about E.S.E.; forehead of drift about 10 fathoms from main level, and is about 2 feet wide; roof taking down back from forehead for a height of 15 feet; another drift at the top of this working leads again to the workings on main vein over main level; the draught enters by the first rise and through the higher drift returns to main level. Thermometer in forehead 58°; barometer 28·24; samples of air in two tubes marked H. 4 men work here. The rest of the men are working nearer the mouth of level, and also clearing a shaft and drift 3 fathoms deep at the mouth of another adit level, 400 fathoms to the east in good air.

Dowpot Syke Lead Mine, 2 miles S.E. of Alston; 4 men and 1 boy below ground. An adit level driven eastward 300 fathoms in length; at about half this distance is a rise to surface, the bottom of this rise is closed with the exception of air-boxes coming through and continued to a side drift running alongside the main level to within 50 fathoms of the forehead. At this point is an ordinary fan blast worked by a boy, and supplying the working with air. These are up a rise at the forehead, the first about 5 fathoms, 2 men driving a forehead about 11 fathoms from rise; size of drift not more than 5 ft. 3 in. by 2 ft. 6 in. Barometer 28.82; temperature of air 55°; tube of air Q. Two other men are driving a forehead, eastward from top of rise (10 fathoms above main level); air-boxes are continued to rise top. Barometer in forehead, 7 fathoms from rise, 28·78; thermometer 56°; tube and bottle each marked R: drift about 6 feet high and 4 wide; rise 6 feet by 4 feet; no ladders; pieces of timber in the sides and ends of rise afford the only means of climbing up and down; depth from surface about 20 fathoms.

Guttergill Lead Mine, a short distance south of Dowpot Syke. 8 miners work here, 6 sinking a sump below an adit level, draught passing by sump top to a rise communicating with old workings and surface, sump 5 fathoms deep, about 7 feet by 5 feet. Barometer at bottom of sump 28·96; temperature of air 54°, of water 48°. The other 2 men are driving a drift from the old workings, and rise about 12 fathoms above main level, and about same depth from surface, 10 fathoms from rise, which from the surface is also a ladder road. Barometer in forehead of drift 28·24; thermometer 54°; tube P. Ladder road about 4½ feet square, short and old ladders and sollars, wooden staves; timber-work generally old.

Guttergill and Dowpot Syke visited 18th November 1862; Dougang, 20th November.

Small Clough Adit Level.—Nenthead Lead Mine, about ¾ of a mile S.E. of the village of Nenthead; 130 miners. Workings first visited about ½ a mile in a southerly direction from the level mouth, at the junction of the "Carrs" and "Long Clough" veins; depth from surface at the water blast shaft 62½ fathoms. Driving a forebreast 20 feet high, and 15 feet wide on the Long Clough cross vein southward are 5 men, 6 fathoms from current; space behind is filled with deads as they proceed, leaving the size of an ordinary level or drift on one side, through which the stuff is wheeled, &c. Temperature at forebreast 58½. The next working is 7 fathoms from draught, 4 men taking down roof of a drift on a small E. and W. vein, about 5 feet above roof, and about the same width; drift arched to within a yard or two of forehead; temperature of air 59°; near this is a large open working, in which four men are making a rise towards another flat, height of rise about 12 feet, size about 8×5 feet; temperature of air 59½. Further south are 6 men driving a forebreast northward towards the first-mentioned

place, 19 feet wide and 16 feet high, open behind forebreast for a distance of 10 fathoms. This is ventilated by a branch pipe from the air boxes at the main level about 10 fathoms distant, and 90 fathoms from the blast alluded to; temperature at forebreast 59½. The water-jet fan is supplied by a column of 4-inch pipes 62 fathoms high, the hole through which the jet acts on the blades of a circular fan is ⅜ of an inch in diameter; diameter of fan 1 foot 6 inches, 6 wings 6 inches square, pipes leading from machine 5½ inches diameter. When the water is abundant this blast is powerful, but was weak during our visit, there being not more than about 10 fathoms column of water. The workings not being many fathoms above the main level, the ladder ways need no more notice other than they are wooden staved ladders firmly secured.

In the same level, about 130 fathoms east of the workings before named, is the first cross cut south to the new discovery of ore lately made, being on the course of what is called the "Long Clough Second Sun Vein." A plain hand fan blast fixed in the main level, where there is a regular or steady current, from this, 5-inch pipes lead along the cross cut south 16 fathoms, then in the level east 10 fathoms more, 6 men are employed driving this forehead towards another forehead and level coming west from another cross cut 90 fathoms further east; at the end of the first-named driving the bottle of air marked W was taken. Barometer at 28·50; thermometer 62°. At the mouth of the second cross cut going south is an air rise to a higher level, and to the surface; in this rise is a column of 5-inch pipes, 20 fathoms high; the jet of water at the bottom enters a bell-mouthed pipe, there being no fan as in the other blast. The air pipes are laid along the cross cut south 50 fathoms to the level on the same vein as the last driving, then on to west forehead 40 fathoms further. Here are 6 men driving a level similar to the last about 6 feet by 4 feet. Temperature of air 66; barometer 28·56; bottle of air marked X. Back, east from the end 26 fathoms, 18 men are engaged breaking ore from the roof of the level about 2 fathoms high and same wide, and about 7 or 8 fathoms long. Temperature was also 66 here; barometer 28·58; a sample of the air contained in bottle Y. At this point there is an intermediate branch level or cross cut communicating with the main level, making this working somewhat independant of the blast, which is exclusively intended for the forehead.

The average gettings of the miners in these mines, which may be taken as a specimen of the district generally, are 16*s.* per week full pay, once every three months, but advanced 11*s.* per week monthly. No boys under 14 years of age work below. Size of jumpers used in boring ½ of an inch, copper prickers; instead of safety or straws, "swibs" made of paper are used, which are greased in wet ground. Accidents from blasting are rare. The miners' club fund here is sustained by each member contributing 30*s.* per year, who in the event of accident or sickness receives 7*s.* per week while unable to work. After 65 years of age a member is entitled to 1*l.* per month as a pension.

Above mine visited 19th September and 20th November 1862.

Stow Craig Lead Mine, 6 miles S.E. of Alston, and 2 miles Garrigill village, an adit cross-cut west of the Tyne river, going first west 100 fathoms to a vein running N. W. and S.E., and continued on it in the former direction 300 fathoms. 2 men are driving a drift or level from the top of a rise 17 fathoms high; at the rise top is good air from communications with old upper workings, the drift is driven northward 20 fathoms, and is not above 5 feet high and 2 feet wide. Barometer at forehead 28·84, temperature of air 56°, samples of the air contained in bottle and tube N. Depth from surface at this point about 12 fathoms. The main level requires timbering in many places where the roof is broken down and unsafe. 2 other men are working about 3 fathoms below level close to a rise from a level below, and in good air. A few yards from the foot of a surface shaft 7 fathoms deep north of the adit level are 4 men searching for and raising ore close to some old workings, a rise from a deeper level near where they are working is both an *air-rise* and *pass* for the broken stuff; when full, the air comes through a wooden pipe. Barometer in forehead 4 fathoms from shaft 28·84. Thermometer 48°, tube of air M.

1 man and a boy wash the ore, making 8 men working below and 1 man and 1 boy at surface, the number employed.

Mine visited 17th November 1862.

Dosey Lead Mine, 1¾ miles south of "Stow Craig," on the east side of the Tyne, and about one third of a mile from its source. An adit level on the Dosey vein, 300 fathoms in an E.S.E. direction. Only two men are here working in the sole of a drift on the "Tyne Boggs" vein 60 fathoms from its intersection with the Dosey vein (S.W.) between this point and the forehead; 30 fathoms further a rise and upper drift communicates with the surface, 25 fathoms above good air and ground wet. Barometer 27·86, temperature of air 46°, of water 45°, tube F.F.

Calvert Lead Mine on the west side of the Tyne, about 4 miles from Garrigill village, an adit level going west 150 fathoms to the "Calvert Vein," then in a south-westerly direction 200 fathoms more; the level is continued a greater distance than this but is crushed together at this point; the present works of this mine are only the re-opening this level and putting it in repair, and also commencing a new level higher up the hill which is 12 fathoms only driven as yet in clay &c. Barometer in the first level (where 2 men are working) 27·78. Thermometer 50°, tube of air GG. Height to surface here 60 fathoms. 20 fathoms from where they are clearing level is a rise to old workings, but there being no draught whatever is not likely (as said) to be communicated with surface. 4 men are working in new level. These 6 men and another man and a boy live in a "shop" near the level mouth, room 18 feet by 12 feet, and 8 feet side walls, two double beds, one small window, roof old and unsound, one bed in gable end next the hill near a heap of coals. This part of the house farthest from fire-place very damp.

Lady Vein Lead Mine, an adit level about a quarter of a mile from the source of the Tyne southward, driven east about 350 fathoms; where it is about 30 fathoms from surface a rise is being made from the forehead to an upper drift, and is about 40 fathoms from another rise which communicates with that drift; this upper level leads to a shaft open from surface. By means of air boxes in the lower level continued from the holed rise to the forehead (risefoot being otherwise closed) the draught is conveyed to foot of rise now making, which is about 3 fathoms above roof of level. Barometer here 28·42, thermometer 53°, temperature of water 50°, bottle of air O. 2 men work here, sometimes a few hours only at a time when the air is very "dead." 2 other men are raising ore from the sole of a small drift 6 fathoms from the foot of a shaft 4 fathoms deep in good air. Barometer 28·24, thermometer 48°.

"Shop" 14 feet long by 11 wide, two stories, sleeping room 7 feet high, no window, roof requiring repairs, two men in two beds.

Foregoing mines visited 24th November 1862.

White Lee Lead Mine.—About 2 miles north of Alston, an adit level driven eastward about 18 fathoms, 4 fathoms back from forehead, is an air shaft to surface 25 fathoms; 2 men are driving the forehead 6 feet high, 4 feet wide. Temperature 56°, barometer 28·78, bottle of air BB. Two other men are driving a cross-cut north from the forehead of another adit level going west about 90 fathoms in length, air finding its way through old workings to surface, depth from which being about 15 fathoms. Temperature in cross-cut forehead about same as last.

Clargill Burn Lead Mine, about 100 fathoms S.E. of While Lee, an adit level driven S.E. about 190 fathoms where there is a sump or winze to a drift 8 fathoms below. In this drift, 15 fathoms east, is another sump, 5 fathoms deep; at the foot of this sump, a few yards north, are 2 men working on ore. Temperature here 59°, barometer 28·78, bottle of air CC., draught passing over first sump top, which is about 4 feet square, wooden staved ladders, stapled to side of sump; no platforms; 2 other men are working nearer mouth of main level in good air.

Fell Grove and Crossgill Head Mine, adit levels about 2½ miles S.West of Garrigill village; 4 miners in each. The first level is driven about 90 fathoms west, and about 7 fathoms back from forehead is a sump to a deeper level, 9 fathoms, which is also an adit level 135 fathoms in length. In forehead of first level where men are working temperature was 51°, bottle of air DD. At Crossgill Head the forehead of an adit level is being driven southward, level 160 fathoms in length, 40 fathoms from mouth is a water blast through a small shaft about 6 or 7 fathoms deep; pipes are laid from this to forehead (120 fathoms). Temperature in forehead 52°, bottle of air EE. Blast weak.

Nattrass Lead Mine, adit level 1½ miles S.E. of Alston.—2 men are driving a cross drift southward 2 fathoms above level. Near the commencement of this drift is a rise to a higher level communicating with surface. The drift forehead is nearly 100 fathoms from this rise. It is supposed the fissures in the ground ("Great Limestone") assist to ventilate the drift forehead. Size 4½ high, 3 feet wide. Temperature 62°, Barometer 28·84, sample of air in bottle marked Z. Draught in main level generally goes through level and up rise.

Honey Bee Lead Mine, adit level half a mile S.W. of Nattrass, 2 men driving the forehead. Level 60 fathoms in length driven eastward. Depth from surface at forehead only about 7 fathoms. No rise or air machine. Temperature in end 60°, barometer 28·70, bottle of air marked A A.

The foregoing mines were visited on 24th, 25th, and 26th November 1862.

Rodderup Fell Lead Mine, examined on Friday 26th September 1862, consists of 3 adit levels, the lowest and principal one is on the right bank, and at the level of the Blackburn river, and is first a cross-cut, southward to the main "Rodderup Fell" vein, running about N.E. and S.W.; the level is extended in the first direction 200 fathoms from the cross-cut (which is 700 fathoms in length), and workings of great extent above it, and communicating with an upper level 30 fathoms above, which is driven about 130 fathoms eastward. This the eastern part of the mine is at present abandoned. Taking the end of the great cross-cut as a starting point, there is first the engine shaft, sinking below the level by 16 men, drained by a hydraulic engine, 7 inch pipes are brought from surface 60 fathoms above through a rise close by, the shaft below level is 9 feet diameter, cased and divided in the usual way for ladder road and pumps (9 inches dia.), ladders and good stages at short distances; the reading of barometer at the bottom of engine shaft was 28.78, temperature of air 57°, specimen of air contained in bottle B, good air current at top of shaft. 493 fathoms west of the cross-cut brings us to the forehead of the low level west; the bulk of the men are working above this level within the last 150 fathoms of that distance, and generally not over 10 fathoms above level, or more than 10 fathoms from current; about 4 fathoms above the main level is the air drift at present in advance of the former about 10 fathoms. A rise to the "middle level" (30 fathoms above), and a shaft from surface to the middle level cause a free circulation of air to within 10 fathoms of the low forehead west, this shaft and rise is the westernmost of several communications with the middle level and surface between the forehead and cross-cut, these airways are about 5 by 6 feet, the one just named serves as well for a climbing way to the upper workings, ladders about 9 feet in length, stages at each ladder. The shafts from the surface to the middle level are round and 4 feet diameter. The draught was downward and out through main level. In the forehead of the low level west the temperature of air was 61; barometer 28·66. Bottle marked C and tube C contain samples of the air; another specimen of air in tube D was taken from a working 6 fathoms above level near the air drift. Barometer 28.64, temperature 62, working about 10 feet wide; most of the men go to and from their work in waggons through the main level, which is arched almost for the whole distance from the cross-cut, size of level 6 feet high, 4 feet wide. One end of the passes conveying the broken stuff to the level, about 2½ feet square, is portioned off, and serves in some instances as the climbing road to the ore workings, the dividings, &c. projecting as a footing. The forehead of the middle level going west is not now being driven, and is extended 150 fathoms beyond the end of the low level; 54 men are working on the run of ground nearest the low level forehead, and 42 outside nearer the cross-cut, including the engine shaft; very little is being done at the shallower workings of this mine.

Birchy Bank Lead Mine, 1 mile west of Rodderup Fell. In the great low level cross-cut of the latter mine, about 500 fathoms from mouth, a vein is intersected, but not now worked upon, called the "Victoria Vein," running N.E. and S.W.. This is the vein running into, and being worked by a few men at "Birchy Bank." The adit level is being driven on the vein north-east about 250 fathoms, at the forehead of which is a (crooked) rise 9 fathoms high (a drift communicating with other rises at the top of this one, causes a free circulation of air here) from the end of a cross-cut south 8 fathoms from top of rise, a small drift has been driven east 5 fathoms. 2 men work in this end. Barometer 28.22, thermometer 52; 2 tubes of air taken here and marked J J; ground dry. Other two men are searching for ore about the old workings further west in good air. The main level is not arched, parts of it are supported by light and old timber, not of sufficient strength to keep the ground safe. The 4 men and 1 boy live in a "shop" near the lever mouth, room 17 feet by 11 feet, side walls 7 feet, 2 double beds, house dry.

Arkendale Lead Mines, Yorkshire, in the millstone grit and mountain limestone rocks, examined by me on the 19th, 20th, 21st, and 27th of January, 1863. The first visited was Danby, on the south-west side of Arkengarth Dale. The present principal workings are on a vein running N.W. and S.E., intersected by an adit level, about 250 fathoms southward from the level mouth; the depth from surface at this point is probably about 35 fathoms. The ventilation of this mine is mainly dependent on the fissures or cracks in the limestone and other beds, most of them nearly vertical and not many inches in width, crossing generally the line of the vein; these open joints oftener draw the air from than convey it to the workings, causing a current from the level mouth; and during my visit there was a steady draught from the lower to the upper workings, leading one to imagine there must be other openings, besides natural ones, communicating with the surface. What would favour this opinion is, that coming through the rise leading to an upper drift is a quantity of surface water, at that time perhaps increased by the melting of snow. In the main drift forehead north-west on the vein, 50 fathoms from the rise up which the draught goes, thermometer was 50°, barometer at 27·50, sample of air in bottle G, G, 8 men in this driving (4 per shift of 6 hours), size of drift 5 feet high, 2 feet wide. In the upper drift forehead, about 13 fathoms above adit, going in an opposite direction, 2 men; thermometer was 55°, bottle of air F F. The bulk of the men within a length of 100 fathoms, and a little above this drift, the only climbing road to which is the rise before mentioned. No ladder, and for a perpendicular height of 9 fathoms, it is impossible to carry a lighted candle. Through this water and mud the men have to scramble twice a shift. In ventilation Danby may be considered good.

Stang, about 2 miles N.E. of Arkengarth Dale, is an adit level driven in an easterly direction 350 fathoms. At this point a cross-drift is now driving southward from the top of rise, about 4 fathoms above main level; the forehead is 40 fathoms from rise; no means of ventilation whatever. Barometer 27·30, thermometer 55°; 2 tubes of air marked I I, and bottle H H; drift 5 feet high 2 feet wide. Candles burn dimly; temperature of rock 52°; depth from surface 25 fathoms, or thereabouts. Six men in this drift (4 in one shift and 2 in another). In the ore workings further west, about 3 fathoms above main level, are 12 men working, making 18 men altogether in Stang. In a rise 3 fathoms high (worked by 4 men), 6 feet long and 4 feet wide, thermometer was 58°, barometer at 27·26; tube of air K K. At the top of another rise 9 fathoms high, thermometer was 55°, sample of air in bottle I I. This is the worst ventilated of the Arkendale mines.

Foregill is communicated with another adit level to the north, a draught always going in one direction or another. The present main workings are about 500 fathoms N.E. from the level mouth, the extent of which is about 100 fathoms, going back parallel with the main level southward. The mode of ventilating this part is by a trap-door in the main level, turning the draught into a sump or winze to an under drift 8 fathoms below, which follows, and is communicated with the upper one by sumps, the last of which is 10 fathoms from, but another is now being sunk *at* the forehead of main level. At the bottom of sump 5 fathoms deep, barometer at 28·16; thermometer was 55°. Two tubes of air L L (6 men, 3 a shift). In drift forehead driving towards sump, 8 men and lads (4 a shift). Barometer and thermometer same as last. Two tubes M M. Nearer the level mouth is a forehead driving west, 84 fathoms from the main level, where there is a plain hand fan blast to supply the forehead with air; level is 7 feet high by 5 feet wide. Barometer 27·20; thermometer 58°. Two tubes N N., taken immediately after firing; 6 men, 2 each shift of 6 hours. Altogether about 50 men at Foregill.

Faggergill Adit Level, 528 fathoms, S.E., and 308 fathoms north easterly (nearly one mile in length); 4 men (2 a shift), driving forehead of main level: chasms in limestone affording ample ventilation, a strong draught through one, close to forehead. Barometer 28·54; thermometer 56°. Two tubes of air X X. Depth from surface about 70 fathoms.

Fellend, an adit level driven eastward about 350 fathoms. Six men are driving the forehead of a drift 14 fathoms above main level, which is ventilated by the draught to an air rise, being made to pass the forehead by means of a trap door and air pipes. Current through pipes, strong. Thermometer 56°. Bottle of air O O. Depth from surface about 40 fathoms.

Bunting Level (Old Gang, Swaledale) is communicated with "hard level" on the other, and *east* side of the hill. About 450 fathoms along this level is a cross-cut southward 300 fathoms, where are some workings, with the level continued about 250 fathoms south east on a vein running in that direction. Near the forehead of this level a cross-cut is now driving southward by 4 men (2 a shift). A draught or current passes through a rise 35 fathoms from

this forehead in this way:—Near the end of the first-named cross-cut is a rise to surface 90 fathoms high; thirty fathoms up this rise is an air drift continued along to the other rise, which is about 20 fathoms from the mouth of the cross-cut now driving. Barometer in cross-cut forehead 28·14; thermometer 63°. Two tubes of air S S. No air pipes or means of conveying air to this forehead. The air drift just mentioned is being driven north-west of air shaft about 50 fathoms. About three quarters of this distance a boy works a small fan blast, which is intended to draw fresh air from the rise and force it to the forehead of drift. The air here was very dull, candles burning badly, the shale giving strong indications of carbonic acid gas. Barometer 28; thermometer 58°. Two tubes of air T T. Drift 5 feet high, 2 feet wide; 4 men work here (2 a shift). Altogether, 40 men and lads work in Bunting level, and the places described are the only foreheads of importance now working.

Barberry is an adit level, a short distance south of and parallel with Bunting level. The forehead is about 400 fathoms in a south-east direction from the level mouth. Twenty fathoms from this forehead a hand fan draws air from a rise (to another adit level 30 fathoms above Barberry level), and forces it to forehead. Thermometer here 55°; barometer 28°. Two tubes of air U U; level 6 feet high, 4 feet wide. Air pipes (here and at the other levels) of zinc, 3½ inches diameter. Between this forehead and rise is a cross-cut, being driven by 4 men (2 a shift) northward 20 fathoms from main level. No air pipes. Barometer 28·60, thermometer 57°. One tube V V. Nineteen men and one boy work in Barberry level.

Hurst Mines Lead, near Reeth, Yorkshire, examined 23d Janpary 1863. Prye's Adit Level, on vein running about north-east and south-west. Main level extended in the latter direction from mouth about 220 fathoms. About 90 fathoms back from forehead is an air shaft from surface, depth 23 fathoms. A short distance west of air shaft is a sump 8½ fathoms deep to the low drift, which is driven on towards main forehead about 30 fathoms; 6 fathoms back from this low forehead is another sump from main level. There was no current of air in this sump or drift during my visit, owing to some water being dammed up in the drift, between the two sumps. Four men (2 in a shift) work in this forehead. Barometer 28·40; thermometer 58°. Two tubes of air P P. The main level forehead is nearly 50 fathoms from the western sump. Temperature 54°; barometer 28·36. Very little blasting required, and old workings apparently close at hand (Mr. Twite took samples of air from here). Fourteen men in all work in Prye's level.

Copperthwaite Adit Level, 450 fathoms westerly from level mouth to forehead. At this point is a sump to a low level or drift 15½ fathoms below main level, and driven back east 20 fathoms, 4 men in this forehead (2 a shift). Barometer 28·10; thermometer 54; 2 tubes Q Q. Open ground, air pretty good, drift 5 feet high, 3 feet wide; sumps 4 feet by 3 feet; no ladders. Men generally climb by means of the timber in sides of sump; 2 men work in roof of drift near sump, making altogether 6 men in this low level. Other 6 men in old workings, nearer level mouth. Depth from surface at forehead, 31 fathoms.

Queen's Level, an adit level 660 fathoms from level north-west. 6 men (2 a shift) are driving the forehead of a drift, 12 fathoms above main level, ventilated by the draught going through the rise to a higher level, communicating with surface, having been conveyed by means of air pipes to the forehead; air good. Thermometer 55°, bottle marked W W. No ladders in rise. 12 men work in old workings in Queen's level, making 18 in all.

Keldheads Lead Mines, near Leyburn, Yorkshire. The main forehead of the upper ("Keldheads") adit level, is about 1¼ miles north-west from the level mouth. About 300 fathoms back from the forehead is an air shaft, communicating with the surface, also a water blast or jet, and pipes conveying air to the forehead. Between these, the air shaft and forehead are the principal workings, from 5 to 15 fathoms above the level. An air drift about 8 fathoms above level is continued on, and communicated with the main level, about 35 fathoms from the forehead; 8 men work in the latter (2 every shift of 6 hours). Barometer here 28·74; thermometer 58°, temperature of water issuing from vein 51°; 2 tubes of air Y Y. Zinc air pipes 3¼ inches round, a steady blast at the end of these pipes. About 200 fathoms south of air shaft is a sump to the bottom drift, which is driven towards the shaft and main forehead 180 fathoms, and ventilated by an air way a few yarns below, brought from an engine shaft at the mouth of the adit level (end of air drift, 9 fathoms from forehead) draught coming from air drift, very weak. Temperature of air at low drift forehead 59°; barometer 28·76; 2 tubes of air Z Z; 8 men (2 each shift of 6 hours); 8 other men work in this low level. The sump named is used to draw the stuff to the main level by a windlass. The men go to and come from their work by raising each other by the windlass, a perpendicular height of 17½ fathoms. About 38 men work in the vicinity of the air drift *first* mentioned, making in all, 54 men in this part of Keldheads Mines.

Ashbank Level, Keldheads. An adit going northward from the level mouth, 290 fathoms to an air shaft, communicating with an upper level. The main forehead is 42 fathoms north of this air shaft. An air way 4 fathoms above main level, communicates the shaft with a rise 20 fathoms back from forehead. Temperature of air in main level forehead 38°; barometer 28·94; 2 tubes C C C; 6 men, 2 a shift of 6 hours.

Sample of air marked D D D, was taken from a rise top 4 fathoms above level; 4 men. Thermometer 58°, barometer, 28·92. Depth from surface to forehead of this level 35 fathoms, and the depth from surface to "Keldheads" main level forehead 65 fathoms. The vein runs west of north and east of south. Principal ore working in what are termed the "Fossil" and "Bottom" lime beds of the Mountain Limestone Series.

The rise and other workings were very wet in this level.

West Burton Lead Mine, Yorkshire.—The adit level is driven in an E.S.E. direction about 200 fathoms, depth from surface about 18 fathoms at air shaft, which is about 30 fathoms back from forehead. From this shaft a double drift is carried to about 8 fathoms of forehead. 10 men (in two shifts), are working in the roof about 3 fathoms above level and about over the forehead, working 4 fathoms high and 6 feet wide. Temperature of air here 59°, barometer 28·58, 2 tubes of air A A A. Another party of 6 men are working close to the air rise, 4 fathoms in length 9 feet wide. Thermometer 58°, barometer 28·58, 2 tubes B B B; draught rather strong and going up the air shaft.

The level is not arched, and some of the timber-work requires to be renewed.

Dufton Lead Mines, Westmoreland. Visited 2d and 3rd February, 1863.—Dufton Fell. The adit level in the "Jew limestone" is driven eastward on two east and west veins, about 220 fathoms; the two forebreasts driving parallel with each other and about 6 fathoms apart, the depth from surface about 50 fathoms; these forebreasts are 23 feet wide, 12 feet high, and in the north one, the deads are thrown behind, an arched way 6½ feet high, and 4 feet wide, left for the level, 6 men work here (3 in a shift). Temperature of the air 53½°, barometer at 27·58, 2 tubes of air E E E. In the other forebreast are 8 men (4 a shift.) Temperature 55°, barometer same as other, 1 tube, F F F. In a deep level coming under these workings, driven for a distance of 470 fathoms eastward are 4 men driving a forehead (2 a shift). Thermometer 53½°, barometer at 28, 1 tube of air G G G.

Silverband Low Level, driven eastward about 630 fathoms, principal workings on three parallel east and west veins in "great limestone;" here, as well as in the levels before-named of the Dufton mines, ventilation is dependant on the open joints of the surrounding rock; the largest, or rather the one attracting the greatest current of air, I noticed in the main level at the northernmost workings of this mine, causing a draught almost equal to an open air rise to the surface. In the forehead on the "Slope" vein driving east by 4 men; theremometer 49°, barometer 26·94, 2 tubes of air H H H. At "Remington vein," forehead going east, 4 men, thermometer 53°, barometer 26·90, the two tubes I I I were taken. In forehead going west on "Silverband" vein 4 men. Thermometer 50°, barometer 26·98, 2 tubes of air J J J. I found the air good throughout the Dufton mines, and levels in safe condition. The number of men working in Silverband is 24; at Dufton Fell, 33. The shop at Silverband is a two storey house, about 18 feet long and 14 feet wide; 6 men and 1 boy sleep in 3 beds, side walls of room 8 feet high, one window. The shop at Dufton Fell is also a two storey house; two sleeping rooms; one 20 feet long, 15 feet wide, 8½ feet side-walls, 2 windows, 8 beds (generally, 2 men occupy each bed), the other 12 feet by 15 feet, same height as the last; 4 beds, 1 small window.

Grinton Lead Mine.—A tube of air marked R R. Barometer 28·24, thermometer 52°, was taken from the new level forehead, driving south in clay, 50 fathoms, depth of forehead from surface 6 fathoms.

W. H. Rowe.

18th February 1863.

IX.

RETURNS BY THE REGISTRAR GENERAL.

DEATHS OF MALES aged Ten Years and upwards in each of the Years 1859–61.

COUNTY OF CORNWALL.

Camelford	1. Boscastle		348
	2. Camelford		348
Launceston	1. Altarnon		349
	2. North Petherwin		349
	3. St. Stephen		349
	4. Launceston		350
	5. Northhill		351
St. Germans	1. Antony		351
	2. St. Germans		353
	3. Saltash.		354
Liskeard	1. Callington		355
	2. Liskeard		356
	3. Looe		358
	4. Lerrin		359
Bodmin	1. Lanlivery		359
	2. St. Mabyn		360
	3. Bodmin		360
	4. Egloshayle		362
St. Columb	1. Padstow		362
	2. St. Columb		363
	3. Newlyn		364
St. Austell	1. Fowey		365
	2. St. Austell		366
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COUNTY OF CORNWALL.

Superintendent Registrar's District.

CAMELFORD.

Registrar's Sub-District.

1. Boscastle.
2. Camelford.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Boscastle.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 27	82	Maltster -	Bronchitis, 4 weeks. Certified.
„ 27	84	Agricultural labourer.	General debility. Not certified.
Feb. 13	25	Son of farmer	Influenza. Not certified.
April 4	72	Agric. labourer	Apoplexy, 4 days. Certified.
„ 22	61	Farmer - -	Hernia, 1 day. Peritonitis, 8 days. Certified.
June20	23	Slate quarryman	Injuries. Accident at Delabole slate quarry. Inquest.
July 10	81	Farmer - -	Not known. No medical attendant.
Aug. 2	31	Slate quarrier -	Congestion of brain, 4 weeks. Effusion, 5 days. Certified.
„ 28	64	Army officer -	Consumption. Not certified.
„ 21	68	Farmer - -	Paralysis, 3 months. Certified.
Sept.21	78	Agric. labourer	Not known. No medical attendant.
Aug.22	33	Draper - -	Consumption, 3 years. Certified.
Oct. 2	78	Slate quarrier -	General debility. Not certified.
Nov. 8	75	Cooper - -	Atrophy. Certified.
Dec. 5	56	Farmer - -	Dropsy, 1 month. Certified.
„ 10	65	Agric. labourer	Bronchitis, 6 days. Certified.
1860.			
Jan. 17	82	Farmer - -	Old age. Certified.
„ 23	67	Agric. labourer	Vertigo, 6 months. Exhaustion. Certified.
Jan. 21	75	Carpenter -	Diseased prostate gland. Certified.
Mar. 4	87	Farmer -	Debility. No medical attendant.
„ 8	46	Mason -	Stricture of intestines. Certified.
„ 11	42	Grocer -	Bronchitis, 2 days. Certified.
„ 14	82	Agric. labourer	Hemiphlegia, 4 weeks. Certified.
„ 21	79	Slate quarrier	Old age. Not certified.
Apr. 17	78	Slate quarrier	Bronchitis. Certified.
May 19	67	Agric. labourer	Phthisis, 4 months. Certified.
June19	32	Slate quarrier	Consumption, 7 years. Not certified.
Oct. 22	76	Slate quarrier	Asthma, 18 months. Dropsy, 3 months. Certified.
„ 28	61	Mason - -	Decline, 2 years. Not certified.
1861.			
Jan. 21	78	Agric. labourer	Ulcerated leg, 2 years. Certified.
„ 24	54	Farmer -	Decline. Certified.
Feb. 9	78	Agric. labourer	Dropsy. Certified.
Mar. 28	40	Quarryman -	Suicide by hanging. Inquest.
May 11	64	Agric. labourer	Phthisis, 6 months. Certified.
„ 9	70	Agric. labourer	Natural causes. Inquest.
„ 22	80	Sailor -	Enlarged prostate, 3 months. Certified.
June20	49	Agric. labourer	Accident, the wheels of a waggon passing over him. Inquest.
Sept. 19	23	Copper miner	Phthisis. Diarrhœa, 2 weeks. Certified.
Oct. 16	60	Farmer -	Diseased heart. Dropsy, 4 months. Certified.
„ 24	63	Agric. labourer	Phthisis, 8 months. Certified.
„ 24	53	Land agent -	Diseased liver, 18 months. Certified.
Nov. 27	75	Agric. labourer	Unknown. Not certified.
„ 26	37	Draper -	Asthma. Bronchitis, 6 days. Certified.
Dec. 14	58	Blacksmith -	Found dead in Growa Quarry. Inquest.
„ 19	63	Agric. labourer	Phthisis, 2 years. Certified.
„ 24	50	Carpenter -	Phthisis, 12 months. Certified.

Sub-District - 2. Camelford.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 2	69	Farmer - -	Mesenteric disease, 9 months. Certified.
„ 14	28	Labourer -	Accident, by a chain breaking in the Delabole Slate Quarry. Inquest.
Feb. 7	74	Agric. labourer	Bronchitis. Certified.
„ 8	26	Tailor, journeyman.	Consumption. Not certified.
„ 18	55	Linen draper -	Phthisis, Certified.
„ 24	60	High bailiff -	Cancer, stomach, 12 months. Certified.
Mar. 15	36	Farmer -	Diphtheria, 2 days. Certified.
Apr. 1	77	Farmer -	Diseased kidneys. Not certified.
Mar. 29	10	Son of farmer	Diphtheria, 2 days. Not certified.
Apr. 21	61	Chemist -	Erysipelas. Not certified.
May 12	15	Farm servant	Nephritis. Not certified.
„ 26	59	Innkeeper -	Consumption. No medical attendant.
June26	45	Slate quarrier	Cephalitis, 14 days. Certified.
Aug. 20	55	Agric. labourer	Nephritis, 4 years. Certified.
„ 17	82	Agric. labourer	Apoplexy, 4 days. Certified.
Sept. 2	45	Quarryman -	Accident. Fall of stone in Delabole Slate Quarry. Inquest.
„ 12	14	Son of farmer -	Scarlatina, 14 days.
„ 27	62	Landed proprietor.	Decline. No medical attendant.
„ 28	58	Agric. labourer	Phthisis, 12 months. Certified.
Nov. 8	77	Annuitant -	Diseased bladder, 3 years. Certified.
(unknown)		Mariner -	Drowning. Inquest.
„ 27	88	Blacksmith -	Diarrhœa, 14 days. Certified.
1860			
Jan. 13	71	Road labourer	Diarrhœa. Certified.
„ 6	77	Farmer -	Accident. Fracture of skull. Inquest.
„ 27	66	Agric. labourer	Phthisis, 7 weeks. Certified.
Feb. 1	16	Farm servant	Scarlatina, 4 days. Certified.
„ 3	35	Master mariner	Consumption, – months. Certified.
„ 22	30	Musician -	Consumption, 6 months. Certified.
Mar. 2	56	Slate quarrier	Phthisis. Certified.
Apr. 1	77	Agric. labourer	Gastritis, 5 weeks. Certified.
„ 2	58	Farmer -	Pneumonia, 6 days. Certified.
„ 13	10	Son of slate quarrier.	Typhoid fever, 3 weeks. Certified.
„ 22	20	Slate quarrier	Phthisis. Certified.
„ 26	73	Farmer -	Paralysis, 3 weeks. Apoplexy 2 days. Certified.
„ 29	45	Tailor - -	Consumption, 1 year. Certified.
May 2	67	Farmer -	Diseased heart. Certified.
„ 5	47	Miller - -	Typhoid fever, 16 days. Certified.
June 3	64	Agric. labourer	Unknown. Not certified.
„ 8	66	Agric. labourer	Diseased heart. Dropsy. Certified.
„ 12	24	Son of farmer -	Phthisis. Certified.
July 1	58	Farmer - -	Diseased heart. Dropsy, 10 months. Certified.
21	21	Shoemaker -	Cephalitis, 10 days. Certified.
Aug. 11	87	Agric. labourer	Age. Certified.
Sept. 1	34	Shoemaker, journeyman.	Tabes mesenterica. Certified.
„ 10	72	Tin streamer -	Diseased heart. Certified.
„ 28	20	Slate quarrier	Phthisis. Certified.
Oct. 8	81	Agric. labourer	General debility. Certified.
„ 20	20	Quarrier -	Accident. Killed in Delabole Quarry. Inquest.
„ 30	42	Slate quarrier	Accident, by a stone falling on him at Delabole Slate Quarry. Inquest.
Nov. 16	77	Agric. abourer	Paralysis, 12 months. Certified.
Dec. 18	80	Barber - -	Age. Certified.
1861.			
Jan. 10	53	Slate quarrier	Phthisis, 15 months. Certified.
„ 17	75	Mason - -	Natural causes. Inquest.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Jan. 22	85	Farmer -	Diseased heart. Dropsy, 2 months. Certified.
Feb. 19	41	Quarrier -	Accident, by falling into the Delabole Slate Quarry. Inquest.
Mar. 2	72	Agric. labourer	Paralysis, 6 months. Certified.
„ 20	71	Labourer -	Atrophy. Certified.
	unk.	Mariner -	Found drowned. Inquest.
Apr. 10	65	Landed proprietor.	Diseased heart. Palsy. Certified.
„ 12	73	Labourer -	Bronchitis, 3 months. Certified.
„ 12	83	Shoemaker -	Age. Certified.
„ 22	14	Son of slate quarrier.	Phthisis. Certified.
„ 28	23	Labourer -	Injuries received in a fight. Inquest.
May 4	38	Farmer -	Phthisis. Certified.
June 4	77	Agric. labourer	Bronchitis, 6 months. Certified.
„ 7	52	Slate quarrier	Diseased heart. Certified.
July 13	72	Farmer -	Bronchitis, 14 days. Certified.
„ 16	74	House proprietor	Ileus, 1 week. Certified.
„ 19	36	Slate quarrier	Diseased spine, abscess. Dropsy. Certified.
Aug. 5	14	Miller's loader	Congestion of brain, 2 weeks. Certified.
„ 9	68	Mole catcher -	Paralysis, 6 weeks. Certified.
Sept. 12	58	Agric. labourer	Hepatitis. Certified.
Oct. 9	24	Quarrier -	Accident by a chain striking him in Delabole Quarry. Inquest.
„ 25	12	Farm servant	Typhoid fever, 9 days. Certified.
„ 25	53	Farmer -	Hematemesis, 24 hours. Certified.
„ 27	54	Tin and copper miner.	Phthisis, 4 months. Certified.
Dec. 15	61	Farmer -	Phthisis. Certified.
„ 24	32	Slate quarrier	Diseased brain. Coma, 4 days Certified.

Superintendent Registrar's District.

LAUNCESTON.

Registrar's Sub-District.

1. Altarnon.
2. North Petherwin.
3. St. Stephen.
4. Launceston.
5. Northhill.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Altarnon.

1859.			
Jan. 16	70	Agric. labourer	Phrenitis, 6 days. Certified.
„ 31	66	Tin streamer -	Consumption. Not certified.
Feb. 7	29	Agric. labourer	Abscess of Thigh. Not certified.
„ 23	46	Agric. labourer	Pneumonia, 6 days. Certified.
Mar. 28	71	Yeoman -	Pneumonia. Not certified.
June 7	73	Agric. labourer	Cancer. Not certified.
May 6	76	Farmer -	Visitation of God. Inquest.
June 30	69	Yeoman -	Seizure. Not certified.
Aug. 11	13	Son of farmer	Phthisis 2 weeks. Fever 14 days. Certified.
Oct. 6	48	Mason - -	Apoplectic fit. Not certified.
„ 9	61	Farmer -	Pneumonia 5 days. Certified.
Nov. 14	80	Blacksmith -	Old age. No medical attendant.
„ 12	60	Mine agent -	Natural causes. Inquest.
1860.			
Feb. 19	70	Tin streamer -	Cancer of face. Not certified.
May 29	81	Agric. labourer	Old age. Not certified.
July 6	21	Carpenter, journeyman.	Fever. Certified.
Oct. 6	58	Farmer - -	Rheumatic gout. Not certified.
Nov. 1	29	Son of farmer	Diseased heart. Dropsy. Not certified.
„ 9	79	Farmer - -	Old age. Not certified,
Dec. 2	80	Yeoman -	Old age. Not certified.
„ 4	56	Cattle dealer -	Pneumonia and bursting of a blood vessel. Not certified.
Nov. 17	36	Miner - -	Visitation of God. Inquest.
1861.			
Jan. 2	30	Farmer - -	Small pox. Not certified.
Feb. 25	81	Farmer - -	Old age. Certified.
Mar. 7	46	Innkeeper -	Bronchitis. Certified.
June 7	41	Miner - -	Accidental death. Inquest.
Mar. 9	82	Chair maker -	Old age. Not certified.
„ 27	65	Yeoman -	Inflammatory fever. Certified.
„ 28	80	Agric. labourer	Old age. Not certified.
May 27	46	Farmer -	Consumption. Not certified.
„ 23	78	Cordwainer	Old age. Not certified.
„ 18	80	Hawker -	Apoplexy. Inquest.
July 14	76	Mason - -	Old age. Not certified.
„ 29	25	Dom. servant	Consumption. Not certified.
Sept. 11	71	Agric. labourer	Apoplexy. Not certified.
Dec. 24	83	Agric. labourer	Old age. Not certified.

Sub-District - 2. North Petherwin.

1859.			
Feb. 24	82	Agric. labourer	Chronic diarrhœa. Certified.
June 21	78	Yeoman -	Old age. Not certified.
July 19	74	Farmer -	Found dead in a field. Inquest.
„ 24	21	Son of agric. labourer.	Phthisis 12 weeks. Not certified.
Nov. 4	67	Yeoman -	Disease of liver and stomach. Certified.
„ 9	48	Son of Agric. labourer -	Emphysema, 2 years. Certified.
„ 21	72	Farmer -	Dropsy. Not certified.
1860.			
Jan. 9	82	Agric. labourer	Old age. No medical attendant.
„ 16	70	Carpenter, master.	Scirrhus ulceration of stomach. Certified.
„ 22	35	Shoemaker, master -	Fungus hematodes of eye. Scirrhus of liver. Certified.
Feb. 12	48	Agric. labourer	Emphysema, 5 years. Bronchitis. 10 days. Certified.
„ 29	72	Stonemason -	Diarrhœa. Influenza. Certified,
Mar. 12	74	Dealer in marine stores.	Bronchitis. Dropsy. Certified.
„ 24	83	Tailor - -	Old age. Not certified.
Feb. 27	81	Thatcher -	Old age. Not certified,
Apr. 13	75	Yeoman -	Pneumonia. Certified.
„ 23	57	Agric. labourer	Emphysema, 6 years. Bronchitis, 4 months. Certified.
„ 29	77	Yeoman -	Dropsy 4 years. Not certified.
Sept. 4	84	Agric. labourer	Peritonitis. Certified.
„ 24	71	Agric. labourer	Renal disease. Anasarca. Uræmia. Certified.
Oct. 14	74	Bargeman -	Asthma. Dropsy. Not certified.
Nov. 4	19	Son of carpenter, master.	Phthisis. Anasarca. Certified.
Dec. 14	70	Agric. labourer	Asthma. Anasarca. Certified.
„ 22	74	Farmer - -	Apoplexy. Certified.
„ 23	24	Carpenter -	Carcinoma of the lungs. Certified.
Dec. 31	76	Farmer -	Apoplexy. Certified.
1861.			
Jan. 24	56	Agric. labourer	Wound. Not certified.
„ 30	80	Agric. labourer	Old Age. Not certified.
Mar. 26	49	Farmer - -	Apoplexy. Inquest.
Apr. 14	76	Chelsea pensioner.	Bronchitis. Certified.
May 11	83	Butcher -	Visitation of God. Inquest.
„ 12	75	Agric. labourer	Cancer. Certified.
„ 25	24	Agric. labourer	Hepatitis. Pneumonia. Certified.
Oct. 17	31	Dom. servant	Congestion of brain, Inquest.
Nov. 14	64	Agric. labourer	Pneumonia. Certified.
„ 14	37	Agric. labourer	Sudden death. Not certified.
Dec. 3	87	Agric. labourer	Old age. Not certified.

Sub-District - 3. St. Stephen.

1859.			
Jan. 2	60	Farmer -	Phthisis. Not certified.
„ 5	73	Farm labourer	Old age. Not certified.
„ 14	77	Farm labourer	Fever and congestion of brain. Certified.
„ 17	68	Slate quarryman	Pneumonia. Typhus. Not certified.
„ 23	42	Son of farmer	Phthisis. Dropsy. Not certified.
Feb. ?	67	Agric. labourer	Pneumonia. Not certified.
Jan. 31	70	Gentleman -	Disease of heart. Not certified.
Feb. 22	30	Farm labourer	Small pox, 10 days. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Mar. 3	49	Farm labourer	Influenza. Certified
Apr. 9	37	Farmer -	Peritonitis, 9 days. Certified.
„ 3	50	Cooper - -	Injury of spine; a blow. Inquest.
„ 25	79	Gentleman -	Disease of kidneys. Not certified.
Aug. 18	21	Agric. labourer	Small pox, not vaccinated. Not certified.
Sept. 14	34	Agric. labourer	Fracture, by a wall falling in upon him. Inquest.
Oct. 5	74	Agric. labourer	Dropsy. Not certified.
Nov. 15	78	Garden labourer	Old age. Certified.
„ 22	59	Farm labourer	Apoplexy. Paralysis. Certified.
Oct. 13	10	Son of farmer	Fracture of skull; thrown from horse. Inquest.
Dec. 20	73	Farm labourer	Pneumonia. Not certified.
1860.			
Jan. 2	67	Garden labourer	Bronchitis. Pneumonia, 6 days. Certified.
„ 6	76	Farmer -	Old age. No medical attendant.
„ 22	75	Carpenter -	Anasarca, 1 year. Scirrhus of bladder, 8 months. Certified.
„ 29	68	Blacksmith -	Bronchitis, 3 weeks. Certified.
Feb. 13	10	Son of farmer	Injuries of bowels, jammed in a thrashing machine. Inquest.
Mar. 4	27	Farm labourer	Diseased brain, Certified.
„ 25	79	Farmer -	Old age. Certified.
„ 14	20	Sailor, apprentice	Phthisis. Not certified.
„ 23	79	Farm labourer	Influenza. Certified.
May 7	69	Toll collector	Bronchitis, 3 weeks. Endocarditis, 7 days. Certified.
„ 18	76	Farmer -	Bronchitis. Certified.
„ 25	66	Farm labourer	Bronchitis. Not certified.
„ 26	71	Farm labourer	Phlegmonous erysipelas, 5 days. Certified.
June 2	66	Mason - -	Accident. Drowned. Inquest.
July 6	88	Farmer -	Fever. Certified
Sept. 25	66	Farmer -	Pleuro-pneumonia, 12 days. Certified.
Oct. 13	32	Draper's assistant.	Phthisis. Not certified.
Nov. 26	66	Farm labourer	Fever, 14 weeks. Certified.
Dec. 23	68	Farm labourer	Asthma. Not certified.
1861.			
Jan. 23	71	Farm labourer	Bronchitis. Certified.
Feb. 6	84	Farm labourer	Bronchitis, 3 days. Certified.
„ 22	45	Garden labourer	Fits. Rheumatism in head. Certified.
„ 26	83	Farmer -	Old age. Not certified.
Apr. 12	74	Farm labourer	Bronchitis. Not certified.
„ 11	82	Farm labourer	Paralysis, 2 days. Certified.
„ 22	40	Farmer -	Congestion, liver and lungs. Certified.
May 17	71	Bailiff - -	Gout. Certified.
June 10	69	Farmer -	Cancer of the face, 3 years. Certified.
Sept. 5	16	Son of farm labourer.	Typhoid fever, 7 days. Certified.
Nov. 7	77	Woolcomber -	Paralysis, 7 years. Asthenia. Certified.
Dec. 5	75	Farm labourer	Bronchitis. Certified.
„ 17	76	Farm labourer	Emphysema Bronchitis. Not certified.
„ 31	17	Miller - -	Phthisis. Certified.

Sub-District - 4. Launceston.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 6	83	Painter and glazier.	Old age. Certified.
„ 25	64	Plasterer, master.	Phthisis pulmonalis. Certified.
„ 29	82	Blacksmith, master.	Paralysis. Certified.
Feb. 12	67	Agric. labourer	Heart disease, 6 years. Certified.
„ 19	14	Son of boot-maker.	Struma, 12 years. Certified.
Mar. 16	79	Agric. labourer	Paralysis. Certified.
„ 24	52	Ironmonger, master.	Internal gout. Certified.
„ 31	60	Waggoner -	Pericarditis. Anasarca. Certified.
Apr. 4	35	Agric. labourer	Pneumonia. Hypertrophy of heart. Certified.
May 7	86	Gardener -	Apoplexy. Certified.
„ 13	62	Innkeeper -	Apoplexy. Certified.
1859.			
„ 21	64	Agric. labourer	Pneumonia. Effusion on lungs. Certified.
„ 23	55	Dairyman -	Strangulated hernia. Certified.
June 30	83	Grocer - -	Advanced age. Certified.
July 3	42	Bible Christian minister.	Phthisis pulmonalis, 12 months. Certified.
Aug. 7	65	Miner - -	Phthisis. Certified.
„ 10	39	Labourer -	Phthisis. Certified.
„ 14	77	Gardener -	Colic and constipation. Certified.
„ 20	58	Labourer -	Erysipelas, 4 days. Pneumonia, 2 days. Certified.
Sept. 27	24	Sailor - -	Typhoid. Pneumonia, 16 days. Certified.
Oct. 18	33	Wheelwright	Typhus. Ulceration of bowels. Certified.
„ 28	19	Agric. labourer	Phthisis. Certified.
Dec. 25	78	Agric. labourer	Natural decay. Certified.
„ 31	30	Miner - -	Phthisis. Disease of heart. Dropsy. Certified.
1860.			
Jan. 17	66	Carpenter, master	Paralysis. Certified.
„ 28	58	Farmer - -	Diseased brain, 8 weeks. Certified.
Feb. 25	87	Land surveyor	Old age. Not certified.
Jan. 13	57	Agric. labourer	Injuries. Accident, thrashing machine. Inquest.
May 9	75	Agric. labourer	Paralysis. Certified.
„ 19	69	Brewer - -	Gout. Paralysis. Certified.
Aug. 13	19	Farm servant	Phthisis, 12 months. Certified.
June 20	72	Excise officer, superannuated	Congestion of lungs. Apoplexy of lungs. Certified.
Oct. 5	66	Clergyman -	Heart disease, 10 years. Hemoptysis, 10 days. Certified.
„ 8	18	Farm servant	Phthisis. Certified.
Nov. 9	74	Gentleman -	Old age. Jaundice. Certified.
„ 13	68	Cabinet-maker, journeyman.	Phthisis. Certified.
Sept. 30	58	Hatter - -	Accidental death. Inquest.
Nov. 21	57	Labourer - -	Phthisis. Certified.
„ 25	57	Agric. labourer	Diseased kidneys, 6 months. Certified.
„ 24	55	Cordwainer, journeyman.	Phthisis. Certified.
Dec. 4	54	Currier - -	Emphysema, 10 years. Pulmonary congestion. Certified.
„ 12	70	Yeoman -	Heart disease, 10 years. Certified.
Nov. 29	77	Tailor, master	Paralysis, 10 days. Certified.
„ 14	70	Agric. labourer	Paralysis. Certified.
1861.			
Jan. 12	83	Agric. labourer	Paralysis. Certified.
„ 15	58	Tanner, journeyman.	Bronchitis. Certified.
„ 30	78	Husbandman -	Diseased kidneys. Certified.
Mar. 17	34	Policeman -	Phthisis. Certified.
Jan. 22	58	Cattle dealer -	Accidental fall underneath a coach. Inquest.
Feb. 16	60	Labourer -	Suicide, by drowning. Inquest.
Apr. 14	47	Agric. labourer	Phthisis. Certified.
1860.			
Oct. 25	11	Son of watch-maker, master.	Hydrocephalus, 14 days. Certified.
1861.			
May 5	17	Coach painter, apprentice.	Phthisis pulmonatilis. Certified.
„ 18	65	Dairyman -	Phthisis pulmonatilis. Certified.
„ 23	65	Carpenter, journeyman	Malignant disease of leg. Asthma. Certified.
„ 25	65	Innkeeper -	Visitation of God. Inquest.
July 15	25	Solicitor -	Pulmonary consumption, 2 years. Certified.
„ 20	80	Agric. labourer	Gradual decay. Certified.
Aug. 30	86	Agric. labourer	Phrenitis. Anasarca. Certified
Sept. 23	78	Cordwainer -	Paralysis. Certified.
„ 28	59	Labourer -	Phthisis. Anasarca. Certified.
Oct. 19	72	Blacksmith -	Glandular diseased bowels. Certified.
Nov. 22	23	Cabinet-maker	Found dead. Natural causes. Inquest.
„ 28	61	Hatter, journeyman.	Emphysema. Certified.

COUNTY OF CORNWALL.

Launceston - 5. Northhill.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 7	72	Yeoman -	Old age. Certified.
„ 9	41	Copper miner	Fever, 1 month. Inflammation of liver and spleen, 1 week. Certified.
„ 20	65	Agric. labourer	Found dead, from natural causes. Inquest.
Feb. 2	84	Mason - -	Old age. Certified.
„ 2	51	Yeoman -	Disease of heart. Certified.
„ 3	77	Farmer - -	Inflammation of liver and jaundice. Certified.
„ 2	72	Farmer - -	Retention of urine, 14 days. Certified.
Mar. 11	60	Tanner - -	Pneumonia, 10 days. Certified.
„ 21	79	Agric. labourer	Old age. Not certified.
„ 21	58	Mason - -	Gangrene of lungs. Certified.
Apr. 5	48	Agric. labourer	Pneumonia, 9 days. Certified.
„ 11	67	Farmer - -	Diseased liver, 2 years. Certified.
„ 14	33	Cordwainer -	Pneumonia, 4 days. Certified.
„ 29	93	Linendraper, apprentice.	Phthisis pulmonalis. Certified.
„ 27	73	Yeoman -	Emphysema, 7 years. Dropsy. Certified.
June 5	54	Farmer and butcher	Gout, 10 years. Ascites, 3 months. Certified.
„ 12	83	Slate quarryman	Old age. Not certified.
July 16	34	Farmer and tailor	Diarrhœa, 5 days. Scarlatina, 3 days. Certified.
„ 20	64	Agric. labourer	Dropsy, 2 months. Certified.
„ 22	87	Carpenter -	Old age. Certified.
Aug. 17	72	Mason - -	Cephalitis. Certified.
„ 19	71	Agric. labourer	Asthma. Diseased heart, 5 years. Certified.
„ 24	54	Agric. labourer	Pneumonia, 9 days. Typhoid, 2 days. Certified.
Sept. 1	31	Labourer -	Phthisis, 2 or 3 years. Certified.
Oct. 1	42	Copper miner-	Phthisis pulmonatis, 3 weeks. Certified.
„ 9	44	Blacksmith -	Diseased heart. Dropsy. Certified.
Nov. 13	79	Agric. labourer	Ulcer of the toe, 5 months. Not certified.
„ 16	82	Agric. labourer	Bronchitis. Certified.
„ 26	27	Copper miner-	Injury to spinal cord, 20 months. Paralysis. Mortification, 3 days. Certified.
„ 26	70	Agric. labourer	Dyspepsia. Atrophy. Certified.
1860.			
Jan. 21	37	Carpenter -	Scrofula. Ulceration of bones, 3 years. Certified.
Feb. 4	52	Agric. labourer	Apoplexy. Certified.
„ 6	78	Yeoman -	Influenza. Certified.
Mar. 20	61	Mine labourer	Influenza, 14 days. Typhoid pneumonia. Certified.
Apr. 17	25	Carpenter, journeyman	Pulmonary consumption. Certified.
„ 22	12	Son of labourer, copper mine.	Phthisis, 6 months. Certified.
„ 13	47	Agric. labourer	Pleuro-pneumonia. Hepatitis. Certified.
May 2	74	Mason - -	Old age. Certified.
Apr. 27	35	Miner - -	Injuries. Accident Holmbush Mine. Inquest.
May 21	65	Agric. labourer	Emphysema. Jaundice. Certified.
June 1	23	Servant -	Hepatitis. Certified.
„ 2	47	Almsman -	Influenza. Convulsion. Certified.
„ 4	43	Miner -	Injuries received at a mine. Inquest.
„ 8	11	Son of yeoman	Albuminuria. Dropsy. Certified.
„ 19	57	Agric. labourer	Diseased heart. Certified.
„ 28	59	Copper miner	Bronchitis, 10 days. Certified.
July 7	16	Miner - -	Diseased brain. Congestion of lungs. Certified.
„ 18	35	Agric. labourer	Emphysema. Pneumonia. Certified.
„ 27	42	Licensed Vict.	Phthisis pulmonalis, 2 years. Certified.
„ 30	45	Copper miner	Hepatitis. Pneumonia. Nephria. Certified.
Aug. 22	10	Son of copper miner -	Small pox, 1 week (not vaccinated). Certified.
„ 17	20	Miner - -	Accident, falling down a shaft at Kithill mine. Inquest.
„ 28	66	Cordwainer -	Bronchitis. Diseased heart. Dropsy. Certified.
Sept. 22	21	Miner - -	Accident, killed. Inquest.
Oct. 1	77	Mason - -	Old age. Not certified.
Nov. 9	24	Copper miner	Confluent small pox, 18 days, vaccinated 18 days. Certified.
Dec. 2	25	Agric. labourer	Pneumonia. Congestion of brain and kidneys. Certified.
„ 25	72	Agric. labourer	Visitation of God. Inquest.
„ 26	73	Yeoman -	Apoplexy. Inquest.
1861.			
Feb. 16	70	Agric. labourer	Cystitis. Certified.
„ 18	24	Labourer, quarry	Cephalitis, 7 weeks. Effusion, 4 days. Certified.
„ 21	54	Miller and farmer.	Diseased heart. Inquest.
„ 24	73	Agric. labourer	Enteritis. Not certified.
Mar. 11	65	Shepherd -	Rheumatism. Old age. Not certified.
Apr. 8	19	Son of blacksmith.	Fever, 14 days. Typhoid, 6 days. Certified.
„ 24	36	Copper miner	Pneumonia, 12 days. Certified.
„ 29	27	Copper miner	Small pox, 11 days; vaccinated 20 years. Certified.
July 23	101	Agric. labourer	Old age. Not certified.
July 9	32	Agric. labourer	Phthisis, 2 years. Certified
Aug. 10	85	Farmer -	Climacteric decay. Certified.
Sept. 15	37	Marine, R.M.	Consumption. Not certified.
„ 19	76	Agric. labourer	Dropsy. Not certified.
„ 29	37	Miner - -	Gastro-enteritis. Inquest
Oct. 18	62	Agric. labourer	Cancer-stomach. Certified.
Dec. 4	52	Copper miner	Pneumonia, 7 days. Certified.
„ 21	72	Farmer - -	Cystitis, 10 years. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
St. Germans.	1. Antony. 2. St. Germans. 3. Saltash.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61.

Sub-District - 1. Antony.

When Died.	Age.	Occupation.	Cause of Death.
1858.			
Dec. 31	74	Agric. labourer	Old age. Certified.
1859.			
Jan. 3	59	Sulphuric acid maker.	Suffocation by the inhalation of nitrous acid gas. Inquest.
„ 4	31	Sulphuric acid maker.	Suffocation by the inhalation of nitrous acid gas. Inquest.
„ 21	40	Agric. labourer	Phlegmonous erysipilas, 5 weeks. Certified.
„ 6	32	Fisherman -	Nephria, 11 months. Asthma. Certified.
„ 10	53	Fisherman -	Ileus, 5 days. Certified.
Mar. 4	86	Dairyman -	Old age. Certified.
Jan. 27	72	Agric. labourer	Erysipelas, 1 month. Certified.
Mar. 9	21	Son of agric. labourer.	Fever, 3 weeks. Certified.
Jan. 26	74	Greenwich pensioner.	Congestion of lungs, 1 week. Certified.
Mar. 16	14	Son of Greenwich pensioner	Inflammation of bowels, 6 weeks. Certified.
Feb. 6	35	Waterman -	Typhoid fever,—weeks. Certified.
Mar. 14	66	Proprietor of houses.	Anthrax. Coma, some months. Certified.
1858.			
Dec. 31	74	Agric. labourer	Old age. Certified.
1859.			
Apr. 6	79	Waterman -	Incontinence of urine. Certified.
„ 15	10	Son of waterman.	Scarlatina, 10 days. Dropsy, 4 days. Certified.
„ 21	29	Seaman, coast guard.	Phthisis, 2 years. Certified.
„ 20	33	Agric. labourer	Congestion of brain, 14 days. ertified.
„ 23	47	Mason, master	Hypertrophy of liver, 3 years. Diseased heart and jaundice, 2 years. Sphacelus of leg, 4 days. Certified.
„ 15	40	Farm labourer	Self murder by hanging. Inquest.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
May 2	14	Labourer -	Retention of urine, and probably diseased bladder, 1 week. Certified.
„ 8	73	Blacksmith -	Heart disease. many months. Certified.
„ 17	30	Blacksmith -	Diseased brain, many years. Certified.
„ 27	76	Paymaster R.N.	Diseased prostate, 4 years. Cystitis, 1 year. Certified.
„ 26	53	Blacksmith -	Accident, killed in a steam engine. Fracture of ribs, aram, and compression of chest. Inquest.
June 17	12	Son of Lieutenant, R.N.	Peritonitis, 4 days. Certified.
„ 14	35	Greenwich pensioner.	Phthisis pulmonalis, 2 years. Certified.
„ 27	62	Agric. labourer	Phthisis pulmonalis, 2 years. Certified.
July 7	60	Superannuated coast guard.	Consumption, many months. Certified.
„ 26	10	Son of Paymaster, R.N.	Brain fever, 14 days. Certified.
Aug. 8	25	Seaman, R.N.	Phthisis, 10 months. Certified.
„ 23	33	Boat builder -	Typhus, 3 weeks. Certified.
„ 26	76	Greenwich pensioner.	General decay. Certified.
„ 25	44	Greenwich pensioner.	Phthisis, 10 months. Certified.
„ 6	71	Pilot - -	Accident. Drowned; boat upset. Inquest.
„ 23	43	Soldier - -	Found drowned. Inquest.
„ 30	82	Agric. labourer	Old age. Certified.
Sept. 6	57	Waterman -	Diseased heart, 12 months. Certified.
„ 18	84	Waterman -	Diarrhœa, 2 months. Certified.
Oct. 10	25	Son of magistrate	Phthisis, 12 months. Certified.
„ 19	77	Agric. labourer	Scrofulous abscess, — months. Certified.
„ 23	81	Waterman -	Old age. Certified.
„ 22	54	Licensed victualler -	Diseased heart, — months. Certified.
„ 28	46	Storekeeper -	Hypertrophy of heart. Syncope. Certified.
Nov. 13	91	Fisherman -	Old age. Certified.
„ 13	62	Shipwright, H.M.'s dockyd.	Phthisis, — months. Certified.
Dec. 10	74	Agric. labourer	Diseased heart. Certified.
„ 21	21	Blacksmith, apprentice.	Phthisis pulmonalis, 1 years. Certified.
1860.			
Jan. 7	24	Baker, journeyman.	Typhus, 14 days. Certified.
„ 12	22	Butcher, journeyman.	Typhus, 14 days. Certified.
„ 17	41	Labourer -	Fever, 1 week. Certified.
„ 23	79	Fisherman -	Old age. Certified.
„ 31	83	Bargeman -	Old age. Certified.
„ 29	72	Foreman of shipwrights, H.M.'s dockyard.	Diarrhœa, — months. Certified.
Feb. 5	84	Greenwich pensioner.	Old age. Certified.
„ 28	47	Agric. labourer	Pneumonia, 3 weeks. Certified.
„ 27	63	Labourer -	Found dead. Asthma. Inquest.
Mar. 9	58	Working jeweller.	Phthisis, 6 months. Certified.
„ 18	69	Waterman -	Bronchitis. — months. Certified.
„ 9	64	Labourer -	Sudden visitation of God. Inquest.
„ 31	31	Seaman rigger R.N., H.M.'s dockyard.	Variola, con., 5 weeks after vaccination. Certified.
„ 31	47	Sailor - -	Accident. Dislocation of neck. Inquest.
Apr. 9	17	Ropemaker's apprentice.	Phthisis, 15 months. Certified.
„ 14	69	Shoemaker, journeyman.	Diseased prostate gland. Certified.
„ 17	49	Boatman -	Diseased brain. Certified.
„ 17	10	Timekeeper -	Phthisis, 2 months. Certified.
„ 13	79	Shoemaker -	Old age. Certified.
May 6	77	Cabinet maker	Old age. Certified.
„ 8	31	Agric. labourer	Variola, confluent, 9 days. Certified.
„ 5	83	Greenwich pensioner.	Fever, 1 week Certified.
„ 10	26	Labourer -	Pneumonia, 1 week. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
May 9	66	Sailor - -	Found dead. Inquest.
„ 13	77	Yeoman -	Stone, 5 months. Certified.
„ 16	23	Ropemaker, journeyman.	Bronchitis. Phthisis, 4 months. Certified.
„ 11	24	Labourer -	Concussion of spine from fighting. Inquest.
„ 11	35	Sailor - -	Found drowned; boat upset. Inquest.
„ 19	78	Labourer, superannuated, H.M.'s dockyd.	Old age. Certified.
„ 25	20	Seaman, R.N.	Phthisis pulmonalis, 3 months. Certified.
„ 29	70	Waterman -	Phthisis. Certified.
„ 11	unk.	Sailor -	Found drowned; boat upset. Inquest.
„ 11	unk.	Sailor -	Found drowned; boat upset. Inquest.
June 11	84	Agric. labourer	Old age. Certified.
„ 11	85	Master, R.N. -	Diseased brain. Certified.
May 11	unk.	Sailor - -	Found drowned; boat upset. Inquest.
June 21	69	Superannuated boatswain, R.N.	Old age. Certified.
„ 29	35	Greenwich pensioner.	Phthisis, many months. Certified.
July 8	67	Carpenter -	Diseased heart. Certified.
„ 9	70	Sawyer -	Diseased heart, 12 months. Anasarca, 3 months. Certified.
„ 12	52	Labourer -	Phthisis, 9 months. Certified.
„ 18	40	Agric. labourer	Variola, confluent, 9 days. Certified.
„ 17	67	Admiral, R.N.	General debility, 16 months. Certified.
„ 15	65	Labourer -	Apoplexy. Inquest.
„ 19	22	Son of ropemaker's labourer.	Phthisis pulmonalis, 6 months. Certified.
„ 25	15	Son of agricultural labourer.	Phthisis, 5 months. Certified.
Aug. 27	60	Greenwich pensioner.	Diseased heart, many months. Certified.
Sept. 8	32	Labourer, ordnance works.	Phthisis, 11 months. Certified.
„ 13	67	Boat builder -	Phthisis pulmonalis, 1 year. Certified.
„ 26	57	Agric. labourer	Inflammation of the lymphatics, 6 months. Abscess. Certified.
Oct. 13	78	Waterman -	Old age. Certified.
Nov. 14	51	Blacksmith -	Phthisis, 2 years. Certified.
„ 19	86	Waterman -	Old age. Certified.
„ 29	23	Shipwright, H.M.'s dockyd.	Abscess in the loins. Asthma, 13 months. Certified.
Dec. 5	42	Agric. labourer	Diseased heart, some months. Certified.
„ 4	45	Greenwich pensioner.	Abscess of the groin, 6 weeks. Certified.
„ 8	65	Coal merchant	Jaundice, 2 months. Certified.
„ 25	80	Agric. labourer	Phthisis, many months. Certified.
„ 30	87	Greenwich pensioner.	Old age. Certified.
„ 29	39	Master mariner	Drowned; boat upset. Inquest.
1861.			
Jan. 5	81	Seaman, merchant service	Old age. Certified.
„ 6	70	Agric. labourer	Bronchitis, — months. Certified.
„ 9	46	Agric. labourer	Diseased heart, several years. Certified.
1860.			
Dec. 29	26	Sailor - -	Drowned; boat upset. Inquest.
„ 29	37	Sailor - -	Drowned; boat upset. Inquest.
„ 29	18	Sailor - -	Drowned; boat upset. Inquest.
„ 29	18	Sailor -	Drowned; boat upset. Inquest.
1861			
Jan. 15	70	Agric. labourer	Old age. Certified.
„ 29	24	Labourer -	Congestion of spine, and phthisis, 2 months. Certified.
„ 28	78	Labourer -	General debility, 2 years. Certified.
„ 28	64	Sailor, merchant service.	Apoplexy, 5 days. Certified.
Feb. 6	60	Clock and watch maker.	Diseased brain. Apoplexy. Certified.
„ 25	15	Son of master mariner.	Sore throat, 2 months. Spasm of glottis. Certified.
„ 21	62	Captain, R.N.	Diseased liver. Certified.
„ 25	24	Labourer, H.M.'s dockyard.	Phthisis, 2 months. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Mar. 14	39	Waterman -	Phthisis, some years. Certified.
„ 9	59	Carpenter, R.N.	Apoplexy. Inquest.
„ 24	25	Labourer -	Meningitis, 1 week. Convulsions, 5 hours. Certified.
„ 22	75	Superannuated inland revenue officer.	Old age. Certified.
Apr. 9	82	Agric. labourer	Old age. Jaundice. Certified.
„ 15	61	Waterman -	Pneumonia, 4 months. Dropsy, 2 months. Certified.
„ 28	60	Mason, journeyman.	Diseased brain, — months. Certified.
May 12	69	Agric. labourer	Diseased stomach, — months. Certified.
„ 19	60	Major, R.M. -	Diseased heart. Pneumonia, 1 week. Congestion of brain. Certified.
„ 24	78	Greenwich pensioner.	Decay of nature, 6 months. Certified.
„ 23	57	Mason, master	Diseased brain, — months. Certified.
„ 29	75	Agric. labourer	Diseased brain, — months. Certified.
June 4	66	Farmer -	Cancer of pharynx, post mortem, 8 months. Certified.
„ 12	82	Butcher, master	Old age. Certified.
„ 18	60	Shipwright H.M.'s dockyd.	Diseased liver, 3 months. Certified.
July 2	76	Mason, journeyman.	Paralysis, — months. Certified.
„ 7	60	Gentleman -	Diseased heart, — months. Certified.
„ 14	78	Gardener, journeyman.	Paralysis, — months. Certified.
„ 11	40	Greenwich pensioner.	Apoplexy, 10 days. Certified.
„ 29	43	Labourer, H.M's dockyd.	Paralysis, 20 years. Apoplexy. Certified.
Aug. 31	28	Labourer -	Typhoid fever, 2 months. Phthisis. Certified.
Sept. 15	76	Superannuated ropemaker, H.M.'s dockyd.	Decay of nature, 1 month. Certified.
Oct. 10	27	Ropemaker, H.M.'s dockyd.	Phthisis, 2 years. Certified.
Oct. 29	66	Mason, journeyman.	Diseased heart, — months, Certified.
Nov. 1	85	Greenwich pensioner.	Old age. Certified.
„ 8	30	Cooper, journeyman.	Diseased brain, 2 years. Certified.
„ 7	27	Seaman, R.N.	Phthisis, 5 months. Certified.
„ 13	64	Licensed victualler.	Decay of nature, 2 weeks. Certified.
„ 15	88	Carpenter, master.	Decay of nature, 2 weeks. Certified.
„ 16	74	Carver and gilder, master.	Bronchitis, some months. Certified.
„ 22	16	Tailor, apprentice.	Diseased heart, many months. Certified.
„ 24	74	Greenwich pensioner.	Diseased heart. Debility, 1 month. Certified.
„ 29	26	Soldier, R.A.	Diseased heart. Inquest.
Dec. 10	40	Carpenter, master.	Epilepsy, diseased heart, and congestion of lungs, 3 days. Certified.
„ 25	52	Greenwich pensioner and waterman.	Bronchitis. Asthma, 34 days. Certified.
„ 30	65	Agric. labourer	Phthisis, many months. Certified.

Sub-District - 2. St. Germans.

1859.			
Jan. 11	68	Farmer -	Diseased heart, some years. Erysipelas, 3 weeks. Certified.
„ 21	75	Farm labourer	Erysipelas, 10 weeks. Not certified.
„ 19	25	Son of farmer	Consumption, 14 months. Not certified.
Feb. 1	88	Farm labourer	Old age. Not certified.
Mar. 10	88	Labourer -	Apoplexy. Not certified.
Apr. 2	56	Farm labourer	Peritonitis, 3 months. Certified.
„ 18	44	Farmer -	Diseased lungs. Tumour on liver. Not certified.
1859.			
Apr. 21	35	Draper's assistant.	Phthisis. Certified.
„ 25	51	Farmer -	Delirium, causing cerebral apoplexy, 6 days. Certified.
„ 11	42	Farmer -	Visitation of God. Fractured leg 3 weeks before death. Inquest.
May 4	48	Railwaylabourer	Phthisis 1 year. Hemopytysis. Certified.
June 5	20	Seaman -	Accident. Drowned while bathing, under water 12 hours. Inquest.
„ 27	21	Farm labourer	Phthisis. Not certified.
July 17	63	Grocer -	Epilepsy, 40 years. Certified.
„ 22	18	Son of coast guardsman.	Dropsy, 12 months. Not certified.
Aug. 6	62	Landed proprietor.	Paralysis. Certified.
„ 4	50	Wheelwright -	Dislocation of vertebræ. Inquest.
Sept. 8	81	Farm labourer	Age. Certified.
„ 12	38	Gardener -	Meningitis, 2 months. Effusion, 1 week. Certified.
Oct. 15	67	Farm labourer	Diseased brain, 3½ years. Certified.
„ 28	90	Farmer -	Old age. Certified.
Nov. 30	21	Blacksmith, journeyman.	Phthisis, 8 weeks. Certified.
Dec. 6	38	Farm labourer	Diseased brain, 6 months. Certified.
„ 24	73	Butcher, master	Asthma, 5 weeks. Not certified.
„ 29	23	Farm labourer	Phthisis, 3 months. Certified.
1860			
Jan. 5	79	Farm labourer	Decay of nature. Certified.
„ 6	76	Farm labourer	Decay of nature. Certified.
„ 8	73	Quarryman -	Fistula in perinæo, 20 years. Certified.
Mar. 4	50	Farmer -	Peritonitis. Certified.
Apr. 25	21	Seaman, merchant service	Hemoptysis, 10 months. Phthisis, 3 years. Certified.
June 12	unk.	Seaman -	Supposed shipwrecked. Inquest.
July 3	60	Farm labourer	Hydrothorax, several months. Certified.
„ 17	16	Seaman, R.N.	Phthisis, 9 weeks. Certified.
„ 18	67	Yeoman -	Prostate disease, — years. Certified.
„ 21	53	Farm labourer	Phthisis, 2 months. Certified.
„ 21	80	Boatman -	Diseased heart, — years. Dropsy, 5 weeks. Certified.
Aug. 11	65	Carpenter, master.	Apoplexy, 19 days. Certified.
Nov. 16	52	Cordwainer, master.	Intestinal obstruction, 1 week. Certified.
Dec. 24	57	Cordwainer, master.	Diseased brain. Certified.
„ 27	67	Farmer -	Peritonitis, 10 days. Certified.
1861			
Jan. 7	74	Farm labourer	Apoplexy, 10 days. Certified.
„ 7	56	Farm labourer	Bronchitis, 4 days. Congestion. Certified.
„ 18	66	Merchant -	Diseased heart. Angina pectoris, 24 hours. Certified.
„ 31	37	Farm labourer	Peritonitis, 6 months. Certified.
Feb. 12	10	Son of railway labourer.	Phthisis, 3 months. Certified.
„ 11	25	Carpenter, journeyman.	Phthisis, 5 years. Certified.
„ 8	29	Merchantseaman	Phthisis, 5 years. Certified.
„ 18	20	Shipwright, apprentice.	Phthisis, 1 year. Certified.
May 16	15	Son of Carpenter, master.	Diseased heart. Rheumatism, 4½ months. Certified.
June 14	18	Mason -	Confluent small pox, 11 days. Certified.
Oct. 6	84	Farm labourer	Old age. Not certified.
Nov. 28	40	Farmer -	Injury, fall from his horse, 19 days. Cerebritis, 10 days. Certified.
Dec. 26	68	Shoemaker, master -	Muco-Enteritis. Certified.
„ 26	81	Farmer -	Decay of nature. Certified.

COUNTY OF CORNWALL.

Sub-District - 3. Saltash.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 4	87	Agric. labourer	Fever, 3 weeks. Certified.
„ 21	62	Carpenter -	Arterial ossification. Certified.
„ 23	80	Blacksmith -	Age. Certified.
„ 30	69	Merchant -	Enlarged prostate. Pneumonia, 1 week. Certified,
Feb. 3	63	Shipwright, H.M.'s dockyd.	Fever, 14 days. Certified.
„ 7	88	Agric. labourer	Natural decay. Not certified.
„ 24	66	Farmer -	Pneumonia, 10 days. Certified.
„ 2	42	Labourer -	Accidental. Inquest.
Mar. 13	71	Boot and shoe-maker.	Ascites, 4 months. Paracentisis abdominis. Certified.
„ 6	66	Agric. labourer and sexton.	Diseased heart. Certified.
„ 13	77	Gardener -	Congestion of lungs, 6 weeks. Diseased heart, 5 years. Certified.
„ 29	40	Railway labourer	Typhoid fever, 18 days. Certified.
1858.			
Dec. 28	81	Pensioner H.M.'s dockyard.	Fever, 10 days. Pneumonia, 4 days. Certified.
1859.			
Apr. 4	76	Agric. labourer	Chronic bronchitis, 7 years. Acute, 10 days. Certified.
„ 16	33	Seaman, R.N.	Phthisis, 12 months. Certified.
„ 19	65	Blacksmith -	Chronic bronchitis, sub-acute, 2 weeks. Certified.
„ 29	50	Butcher -	Cancer of the cheek, 1 year. Certified.
May 6	21	Railway guard	Accident, killed on the Cornwall Railway. Fracture of skull, Concussion of brain. Inquest.
„ 6	31	Driver of engine Cornwall Railway.	Accident. Drowned and suffocated, by an engine falling off a viaduct belonging to the Cornwall Railway, into a creek of salt water and mud. Inquest.
„ 6	24	Engineman, Cornwall Railway.	Accident. Drowned and suffocated, by an engine falling off a viaduct belonging to the Cornwall Railway, into a creek of salt water and mud. Inquest.
„ 25	71	Farmer -	Febris continua. Congestion of lungs. Certified.
June 11	26	Butcher -	Pulmonary congestion, 2 days. Hemoptysis, 8 days. Tuberculosi, 5 years. Certified.
July 1	71	Farmer -	Pneumonia, 4 days. Certified.
„ 21	77	Hatter -	Senile fever, 1 week. Certified.
Aug. 2	41	Carpenter -	Phthisis, 9 months. Certified.
July 29	28	Miner -	Diarrhœa, 7 days. Certified.
Aug. 14	12	Farm labourer	Accident. Drowned, bathing. Inquest.
„ 18	87	Boatman -	Natural decay. Not certified.
Sept. 3	58	Seaman, R.N.	Suffocated and drowned. Inquest.
„ 24	75	Agric. labourer	Senile fever, 2 months. Certified.
„ 29	63	Agric. labourer	Diseased heart. Diarrhœa. Certified.
Oct. 17	83	Agric. labourer	Diarrhœa, 1 week. Certified.
„ 18	80	Agric. labourer	Senile fever, 14 days. Certified.
„ 31	80	Greenwich pensioner.	Senile fever, 3 months. Certified.
Nov. 9	74	Agric. labourer	Senile fever, 5 weeks. Certified.
„ 10	68	Agric. labourer	Cephalitis, 3 weeks. Certified.
„ 24	41	Market gardener	Sudden. Diseased heart. Inquest.
„ 10	66	Labourer -	Sudden. Visitation of God. Inquest.
„ 5	23	Seaman, R.N.	Suffocated by drowning. Inquest.
„ 28	72	Schoolmaster -	Acute bronchitis, 7 days. Chronobronchitis, 10 years. Certified
Dec. 5	51	Agric. labourer	Pneumonia, 1 year. Certified.
Nov. 29	82	Farmer -	Diseased kidneys. Enlarged prostate. Certified.
„ 30	87	Agric. labourer	Old age. Certified.
Dec. 12	44	Agric. labourer	Phthisis, 9 months. Certified.
„ 20	24	Bargeman -	Psoa abscess, 2 years. Congestion of lungs, 4 days. Certified.
1860.			
Jan. 3	68	Tailor -	Debility. Certified.
„ 5	65	Labourer -	Accidental fall. Concussion of spine, 12 hours. Inquest.
„ 3	59	County magistrate.	Diseased heart. Emphysema. Certified.
1860.			
Jan. 7	31	Butcher -	Diabetes, 3 months. Certified.
Feb. 1	23	Seaman, R.N.	Phthisis pulmonalis, 2 years. Certified.
„ 5	65	Harness mender	Diseased heart, long standing. Certified.
„ 26	64	Boatman -	Emphysema. Bronchitis. Certified.
Mar. 3	55	Agric. labourer	Pneumonia, 2 weeks. Certified.
„ 8	67	Shoemaker, master.	Diseased heart. Anasarca. Certified.
Apr. 17	84	Farmer -	Mild fever, 8 weeks. Bronchitis 1 week. Certified.
May 7	78	Sailor, R.N. -	Old age. Certified.
„ 8	35	Miner -	Phthisis. Certified.
„ 10	40	Miner -	Psoas abscess, 3 years. Certified.
„ 28	10	Son of agric. labourer.	Hydrocephalus. Not certified.
June 6	55	Gentleman -	Phthisis. Ulcerated intestines, 3 months. Certified.
May 7	40	Pensioner, Greenwich.	Diseased heart. Dropsy. Certified.
„ 10	45	Merchant -	Phthisis, 2 years. Certified.
„ 25	17	Farm servant	Phthisis, 4 months. Certified.
July 16	23	Seaman, R.N.	Dysentery, — months. Certified.
Aug. 14	23	Miner - -	Abscess, iliac. Enteritis, 14 days. Certified.
July 28	22	Agric. labourer	Pneumonia, 3 weeks. Typhus 2 weeks. Certified.
Aug. 13	66	Agric. labourer	Diseased heart. Dropsy, 6 months. Certified.
„ 14	73	Yeoman -	Bronchitis. Congestion of lungs. Certified.
Sept. 4	45	Agric. labourer	Rheumatics. Diseased heart. — weeks. Certified.
„ 7	19	Bargeman -	Suffocation by drowning. Inquest.
„ 22	75	Agric. labourer	Consumption, 9 months. Certified.
„ 29	76	Fisherman -	Cardiac disease,—years. Certified.
„ 26	21	Shoemaker, journeyman.	Fever. Abscess of lungs, 5 weeks. Certified.
„ 21	34	Stoker, R.N.	Drowned. Inquest.
Oct. 10	81	Watchman -	Senile infirmities. Certified.
„ 11	40	Greenwich pensioner.	Disordered brain, 2 years. Convulsed, 2 months. Certified.
„ 16	30	Mason - -	Paraplegia. Certified.
„ 21	75	Agric. labourer	Age. Certified.
„ 22	59	Agric. labourer	Bronchitis. Certified.
„ 20	75	Agric. labourer	Apoplexy, 3 months. Certified.
Nov. 4	36	Son of Greenwich pensioner.	Congestion of lungs, 4 days. Certified.
„ 11	95	Farmer -	Fever, 2 weeks. Certified.
„ 23	33	Farm labourer	Fever. Pneumonia, 5 days. Certified.
„ 25	62	General dealer	Fever, 13 weeks. Certified.
„ 28	67	Wheelwright	Bronchitis, 2 years. Certified.
Dec. 1	26	Butcher -	Phthisis, 2 years, Cardiac disease. Dropsy. Certified.
„ 21	44	Farm labourer	Diabetes, several years. Certified.
1861.			
unk.	unk.	Sailor - -	By drowning. Inquest.
Jan. 15	47	Farmer -	Disease of heart. Bronchitis, 9 months. Albuminuria, 2 months. Certified.
„ 20	66	General labour.	Acute bronchitis, 5 days. Certified.
Feb. 18	56	Farm labourer	Fever, 7 days. Pleuro-pneumonia, 4 days. Certified.
Mar. 2	68	Market gardener.	Phthisis pulmonalis, 2 years. Certified.
Feb. 22	84	Farm labourer	Natural decay. Certified.
Mar. 14	84	Farrier and farm labourer.	Phthisis pulmonalis, 18 months. Certified.
„ 19	73	Mason -	Fever, 10 days.
„ 31	53	Pensioner, R.N.	Drowned by accident. Inquest.
Apr. 2	63	Ropemaker, H.M.'s dockyd.	Peritonitis, 3 months. Post mortem. Certified.
„ 14	28	Son of labourer	Pneumonia, 4 weeks. Certified.
„ 20	21	Carpenter, journeyman.	Phthisis pulmonalis, 7 months. Certified.
May 11	30	Brickmaker.	Diseased heart. Rheumatics, 7 months. Dropsy, 1 month. Certified.
„ 23	63	Shoemaker, master.	Diseased liver and stomach, 1 year. Certified.
June 8	42	Fisherman -	Diseased heart and lungs. Diarrhœa, 4 days. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
June 9	27	Not stated -	Visitation of God. Inquest.
July 2	31	Labourer, H.M.'s dockyd.	Phthisis pulmonalis, 9 months. Certified.
,, 24	56	Seaman -	Visitation of God. Inquest.
,, 22	40	Bargeman -	Accidentally drowned, boat upset. Inquest.
Sept. 2	63	Mason, master	Fever, 19 days. Certified.
Aug. 28	82	House steward	Fractured thigh bone. Certified.
Sept. 29	72	Pensioner, H.M.'s dockyd.	Diseased prostate with retention of urine.
Oct. 11	76	Farm labourer	Old age. Certified.
,, 16	24	Mason, journeyman.	Fever, 3 weeks. Retention of urine, 5 days. Certified.
,, 16	10	Son of seaman, R.N.	Fever, 10 days. Certified.
,, 26	41	Farmer -	Cancer of jaw, 1 year. Certified.
Nov. 4	26	Miner - -	Accidentally killed in a mine. Inquest.
,, 12	87	Butcher and farmer.	Natural decay. Certified.
,, 23	25	Farm labourer	Phthisis pulmonalis, 1 year. Certified.
Dec. 1	68	Pensioner, H.M.'s dockyd.	Fever. Pulmonary congestion. Certified.
,, 19	72	Bargeman -	Bronchitis, 3 years. Acute, 6 weeks. Certified.
,, 20	69	Pensioner, H.M.s dockyd.	Apoplexy, 3 days. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
LISKEARD.	1. Callington. 2. Liskeard. 3. Looe. 4. Lerrin.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS, IN EACH OF THE YEARS 1859-61.

Sub-District - 1. Callington.

1859.			
Jan. 23	24	Copper miner	Small-pox, 10 days (confluent), never inoculated or vaccinated. Certified.
,, 19	46	Miner - -	Lacerated wound in the throat, caused by the explosion of gunpowder in a mine. Certified.
,, 24	79	Agric. labourer	Old age. Not certified.
,, 25	89	Agric. labourer	Old age. Not certified.
,, 31	26	Journeyman blacksmith.	Phthisis, 12 months. Certified.
Feb. 9	65	Woodman -	Hypercardia. Congestion of lungs. Pleuro-pneumonia of the right side. Certified.
,, 4	26	Copper miner	Pleuro-pneumonia, 5 days. Certified.
,, 12	30	Tin and copper miner.	Phthisis pulmonalis, 17 months. Certified.
,, 11	72	Agric. labourer	Age. Cachexia. Scirrhus of stomach. Certified.
Mar. 6	17	Son of farmer	Consumption, 6 months. Certified.
,, 3	48	Miner - -	Injuries, accidental, received by fall from a ladder. Inquest.
,, 8	19	Miner - -	Accident, falling down a shaft. Inquest.
,, 9	63	Copper miner	Asthma, 10 years. Bronchitis, 2 months. Certified.
,, 13	32	Coal yard labourer.	Typhoid fever, 2 weeks. Cerebral effusion, 19 hours. Certified.
,, 14	30	Miner - -	Accidentally killed. Inquest.
,, 14	17	Miner - -	Injuries received by accident at Phœnix mine. Inquest.
,, 16	15	Miner - -	Injuries. Accident at Drake Wall mine. Inquest.
,, 23	82	Farmer -	Old age. Congestion of brain. Certified.
Apr. 11	25	Copper miner, labourer.	Purpura hæmorrhagica. Certified.
,, 23	61	Copper miner	Senile phthisis. Certified.
1859			
Apr. 24	67	Farmer -	Tumour of neck. Congestion of brain. Certified.
,, 28	14	Carpenter, master.	Bronchitis. Edema of lungs. Certified.
,, 27	28	Copper miner	Pneumonia.
,, 27	80	Farmer -	Bronchitis. Certified.
May 5	49	Farmer -	Injury of intestine; kick of a horse. Inquest.
,, 7	17	Miner - -	Injury. Accident received at Wheal Calstock Consols Mine. Inquest.
,, 19	77	Tin and copper miner.	Asthma. Bronchitis. Certified.
,, 15	22	Quarryman -	Injury. Accident received at the Cheesewring Quarries. Inquest.
,, 28	60	Farmer -	Bronchitis. Edema of lungs. Certified.
,, 30	32	Agric. labourer	Emphysema. Diseased liver and kidney, 1 month. Certified.
,, 30	60	Tin and copper miner.	Cirrhosis of liver. Ascites. Certified.
June 5	50	Miller - -	Found dead. Natural causes. Inquest.
,, 8	53	Mine agent -	Visitation of God. Inquest.
,, 13	39	Agric. labourer	Rheumatism. Inflammation of brain, 5 days. Certified.
,, 5	55	Tin and copper miner.	Consumption. Certified.
,, 25	14	Son of Tin and copper miner.	Rheumatic fever. Diseased heart. Certified.
,, 26	22	Copper miner.	Phthisis. Certified.
July 8	41	Tin and copper miner.	Phthisis pulmonalis, 15 months. Certified.
,, 9	42	Shoemaker, journeyman.	Gastritis, 5 days. Excessive vomiting. Peritonitis. Certified.
,, 12	57	Copper miner	Bronchitis, 5 days. Certified.
,, 23	85	Yeoman -	Decay of nature. Certified.
,, 24	63	Copper miner	Apoplexy. Certified.
,, 17	40	Miner - -	Injuries. Accident at Drakeswall's Mine. Inquest.
Aug. 5	11	Son of bargeman	Consumption. Hemorrhage. Certified.
,, 1	34	Miner - -	Injuries. Accident at Drakewall's Mine. Inquest.
,, 5	31	Blacksmith -	Enteritis. Not certified.
,, 14	79	Agric. labourer	Old age. Not certified.
,, 13	60	Agric. labourer	Typhus, 5 weeks. Certified.
,, 14	72	Agric. labourer	Age. Certified.
,, 30	79	Pensioner and Agric. labourer	Apoplexy, 3 days. Certified.
Sept. 1	30	Policeman -	Phthisis. Certified.
,, 3	70	Labourer -	Natural causes. Inquest.
,, 6	30	Gardener -	Consumption. Certified.
,, 17	47	Copper miner	Pneumonia, 8 days. Hepatization. Certified.
,, 21	22	Miner - -	Accident in a mine. 20 tons of lead ore fell on his body. Inquest.
,, 22	45	Copper miner	Consumption, 3 years. Certified.
,, 19	48	Dissenting minister.	Pulmonary consumption. Hemoptysis. Certified.
,, 25	38	Master mason	Phthisis. Certified.
,, 23	23	Mason - -	Gun-shot wound. Accident. Inquest.
,, 30	20	Copper miner	Enteritis. Not certified.
Oct. 22	57	Agric. labourer	Bronchitis, 7 days. Certified.
,, 23	69	Cutler - -	Old age. Certified.
,, 30	58	Yeoman -	Bronchitis. Certified.
,, 31	33	Tin and copper miner.	Enteritis, 7 weeks. Certified.
Nov. 2	56	Tin miner -	Phthisis, 2 years. Not certified.
,, 15	73	Agric. labourer	Diseased heart. Anasarca. Certified.
Dec. 1	10	Son of carpenter	Typhoid fever, 3 weeks. Certified.
,, 5	63	Agric. labourer	Diseased heart, 2 years. Certified.
,, 23	33	Farmer -	Scrofula. Caries. Influenza. Certified.
,, 25	14	Son of shoemaker.	Typhus, 3 weeks. Certified.
,, 25	12	Son of maltster	Pneumonia. Certified.
,, 14	44	Miner - -	Accident. Killed in a mine. Fracture of ribs. Inquest.
,, 27	81	Tailor, master	Old age. Not certified.
,, 26	24	Tin and copper miner.	Consumption. Certified.
1860.			
Jan. 2	52	Yeoman -	Nervous exhaustion, 6 weeks. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 6	18	Copper miner	Typhus. Certified.
„ 8	69	Copper miner	Decline. Certified.
„ 11	69	Gentleman -	Apoplexy, 10 months. Necrosis. Certified.
„ 14	45	Agric.labourer	Influenza. Congestion of lungs. Certified.
Feb. 4	37	Sawyer -	Influenza. Erysipelas. Congestion of kidneys. Certified.
„ 2	20	Copper miner	Phthisis. Certified.
Jan. 24	18	Copper miner	Typhus, 6 weeks. Purpura hemorrhagica. Certified.
Feb. 7	89	Agric.labourer	Gangrene. Senilis. Certified.
„ 9	53	Copper miner	Chronic bronchitis. Certified.
„ 10	70	Agric.labourer	Bronchitis. Certified.
„ 20	73	Copper miner	Natural decay. Certified.
„ 16	49	Master shoemaker.	Emphysema. Bronchitis. Purulent expectoration. Certified.
22	60	Agric.labourer	Valvular disease of the heart. Certified.
„ 19	65	Draper - -	Sudden. Diseased heart. Inquest.
„ 22	59	Farmer - -	Accident. Killed in a mine. Fracture of skull. Inquest.
1859.			
Sept. 1	30	Policeman -	Phthisis. Certified.
1860.			
Feb. 29	28	Innkeeper -	Apoplexy, 4 days. Certified.
„ 9	22	Son of mine agent.	Phthisis. Certified.
Mar. 29	53	Farmer - -	Apoplexy. Certified.
„ 31	15	Son of copper miner.	Pulmonary consumption. Certified.
Apr. 19	39	Shoemaker, master.	Diseased heart. Congestion of lungs. Certified.
„ 3	20	Copper miner	Consumption. Certified.
„ 18	16	Son of farmer	Tetanus, 5 days. Certified.
„ 18	26	Miner - -	Accident at Drakewell Mine. Inquest.
„ 23	19	Farmer - -	Small pox, 2 days. Diarrhœa. Certified.
„ 26	42	Shoemaker, master.	Phthisis pulmonalis. Certified.
„ 26	46	Lead miner -	Phthisis pulmonalis. Certified.
„ 25	45	Stone cutter -	Phthisis pulmonalis. Certified.
„ 26	17	Miner - -	Accident. Injuries at Drakewall Mine. Inquest.
„ 26	75	Farmer - -	Old age. Certified.
„ 29	20	Farmer - -	Phthisis pulmonalis. Certified.
June 5	78	Farmer - -	Apoplexy. Paralysis. Certified.
„ 3	35	Miner - -	Tetanus from injuries at a mine. Inquest.
„ 10	63	Tin and copper miner.	Diseased lungs. Hemorrhage, 2 months. Certified.
„ 15	17	Copper miner	Explosion of a hole in a copper mine. Laceration of scalp, &c. Inquest.
„ 22	61	Copper miner	Diseased liver. Dropsy. Certified.
„ 27	62	Agric.labourer	Albuminuria. Certified.
July 6	85	Scaffold man, H.M.'s dockyard.	Ascites. Certified.
„ 4	30	Lead miner -	Phthisis. Certified.
„ 18	99	Agric.labourer	Old age. Certified.
„ 15	60	Copper miner	Bronchitis, 3 months. Certified.
„ 25	21	Copper miner	Phthisis, 2 years. Certified.
„ 25	74	Agric.labourer	Bronchitis. Emphysema. Pneumonia. Certified.
„ 21	21	Agric.labourer	Phthisis. Certified.
Aug. 3	71	Agric.labourer	Bronchitis. Certified.
July 23	27	Copper miner	Pneumonia. Certified.
Aug. 9	32	Tin and copper miner.	Hemoptysis. Certified.
July 24	54	Miner - -	Hemoptysis. Inquest.
„ 12	43	Agric.labourer	Phthisis. Certified.
May 11	16	Son of copper miner.	Phthisis, 9 months. Certified.
Aug 25	67	Farmer - -	Diseased heart, 5 years. Dropsy, 6 months. Certified.
„ 25	29	Agric.labourer	Phthisis pulmonalis. Certified.
„ 25	22	Miner - -	Injuries. Accident received at Drakewall Mine. Inquest.
„ 26	30	Engineman, tin mine.	Phthisis. Certified.
Sept. 1	20	Copper miner	Consumption. Certified.
Aug 25	35	Engineer - -	Accident. Drowned. Inquest.
Sept. 13	29	Copper miner	Killed in a copper mine; explosion of gunpowder. Inquest.
1860.			
Sept. 21	71	Farmer - -	Congestion of brain. Paralysis. Certified.
„ 29	22	Carpenter, journeyman.	Phthisis pulmonalis. Certified.
Oct. 15	76	Farmer - -	Apoplexy. Certified.
„ 31	64	Copper miner	Typhus. Certified.
Nov. 7	65	Copper miner	Bronchitis, 6 months. Certified.
„ 17	30	Agric.labourer	Fever. Pneumonia. Nephria. Certified.
„ 8	52	Tin and copper miner.	Bronchitis. Pneumonia. Not certified.
1861.			
Jan. 5	80	Yeoman -	Pneumonia, 10 days. Certified.
„ 14	69	Agric.labourer	Diseased kidneys. Certified.
Feb. 3	64	Agric. labourer	Emphysema. Bronchitis. Certified.
„ 5	92	Farmer - -	Old age. Certified.
„ 9	51	Copper mine agent.	Spasms of stomach. Certified.
„ 15	51	Copper miner	Consumption. Certified.
„ 9	42	Copper miner	Scurvy. Not certified.
Mar. 27	80	Agric. labourer	Congestion of brain, kidneys. Certified.
„ 15	71	Quarrier -	Old age. Not certified.
„ 29	26	Master butcher	Nephria. Ascites. Certified.
Apr. 2	19	Son of agric. labourer.	Typhus. Congestion of brain. Certified.
„ 2	38	Tin and copper miner	Phthisis pulmonalis. Certified.
„ 14	65	Agric. labourer	Asthma. Disease of the heart. Dropsy. Certified.
„ 25	36	Copper miner	Cachexia. Certified.
May 2	26	Farmer- -	Phthisis. Hemoptysis. Delirium, 14 days. Certified.
Apr. 27	14	Son of agric. labourer.	Gastro-enteritis. Certified.
May 16	82	Farmer - -	Disease of the heart. Certified.
„ 23	40	Carpenter, journeyman	Phthisis. Certified.
„ 21	69	Agric. labourer	Emphysema. Disease of the heart. Anasarca. Certified.
June 26	98	Clergyman -	Old age. Certified.
„ 13	91	Farmer -	Old age. Certified.
July 5	25	Copper miner	Phthisis. Certified.
„ 8	61	Yeoman -	Dropsy. Certified.
„ 10	79	Blacksmith, journeyman	Old age. Certified.
„ 22	88	Pensioner -	Old age. Certified.
„ 14	60	Labourer -	Epilepsy. Certified.
„ 21	44	Carpenter, master	Carbuncle. Certified.
Sept. 15	25	Copper miner	Injury from the blasting of rocks, 20 hours. Inquest.
Oct. 15	15	Miner - -	Found dead, supposed in a fit. Inquest.
„ 27	57	Lead mine agent	Bronchitis. Certified.
„ 27	40	Tin and copper miner	Phthisis pulmonalis, 2 years. Certified.
„ 29	66	Agric. labourer	Dropsy. Certified.
Nov. 18	14	Son of a miner	Disease of the heart. Inquest.
Dec. 6	19	Copper miner	Phthisis, 4 months. Certified.
„ 16	74	Farmer -	Cancer of lip, 3 years. Certified.
„ 22	67	Copper miner	Hematemesis. Certified.
„ 27	10	Son of agric. labourer	Enteritis, 7 days. Certified.
„ 27	53	Mason, master	Necrosis, — years. Certified.

Sub-District - 2. Liskeard.

1859.			
Jan. 8	70	Farmer - -	Asthma. Certified.
„ 11	42	Copper miner	Phthisis. Certified.
„ 5	76	Farmer - -	Bronchitis. Not certified.
„ 14	76	Agric. labourer	Decay of nature. Not certified.
„ 22	12	Son of labourer	Typhus fever. Certified.
„ 17	20	Miner - -	Suffocation in a mine by the fumes of gunpowder. Inquest.
„ 27	58	Labourer -	Bronchitis. Certified.
„ 29	52	Copper miner	Consumption Not certified.
„ 23	53	Miller - -	Cancer. Certified.
Feb. 10	68	Copper miner	Decay of nature. Certified.
„ 15	68	Gentleman -	Erysipelas. Certified.
„ 23	58	Labourer -	Fever. Certified.
Mar. 3	62	Agric. labourer	Diseased liver. Certified.
„ 4	45	Lead miner -	Pneumonia, 5 days. Certified.
Feb. 16	73	Labourer -	Mortification. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Mar. 4	27	Tailor - -	Phthisis. Certified.
Feb. 27	47	Miller - -	Fracture of skull, accidental fall from his horse. Inquest.
Mar. 14	85	Agric. labourer	Old age. Not certified.
„ 14	27	Miner -	Accidentally killed in a lead mine, fracture of leg and thigh, laceration of scalp. Inquest.
„ 29	71	Woolcomber -	Heart disease. Certified.
1858.			
Dec. 14	76	Agric. labourer	Decay of nature. Certified.
1859.			
Apr. 2	56	Copper miner	Pulmonary disease. Hemoptysis. Certified.
„ 9	19	Copper miner	Two carbuncles and an abscess. Certified.
„ 13	38	Agric. labourer	Obstruction in the bowels. Certified.
„ 13	45	Copper miner	Diseased lungs. Certified.
„ 25	64	Lead miner -	Chronic bronchitis. Certified.
„ 12	71	Farm labourer	Sudden visitation of God. Inquest.
May 8	75	Miner - -	Phthisis. Certified.
„ 18	53	Copper miner	Disease of the kidneys. Certified.
Apr. 19	63	Mason - -	Phthisis. Certified.
May 7	53	Miner - -	Phthisis. Certified.
June 20	44	Miner - -	Consumption. Certified.
„ 26	39	Farmer - -	Phthisis. Certified.
„ 21	33	A locomotive engine-man on the Cornwall railway.	Accidentally killed by an engine wheel passing over his body at the Liskeard station.
July 7	31	Lead miner -	Pneumonia. Certified.
„ 19	81	Farmer - -	Old age. Certified.
„ 17	82	Saddler - -	Hung himself. Suicide. Inquest.
„ 18	18	Miner - -	Contusion of body, fall of rock. Inquest.
„ 24	19	Lead miner -	Phthisis. Certified.
„ 25	54	Lead miner -	Phthisis. Certified.
Aug. 3	70	Auctioneer -	Stricture of rectum. Certified.
„ 4	57	Granite mason	Typhus. Certified.
„ 11	72	Grocer - -	Decay of nature. Certified.
„ 21	58	Toll-gate keeper	Paralysis. Certified.
Sept. 2	23	Draper - -	Consumption. Certified.
„ 12	59	Mason - -	Consumption. Not certified.
„ 3	66	Miner - -	Diseased heart. Certified.
„ 11	80	Agric. labourer	Debility. Certified.
„ 25	65	Servant -	Pleurisy Certified.
„ 30	36	Carpenter -	Phthisis. Certified.
Oct. 4	48	Confectioner -	Asthma, sudden. Inquest.
„ 9	46	Copper miner	Consumption. Certified.
„ 15	21	Miner - -	Fracture of skull, fell down a mine. Inquest.
„ 16	68	Farmer - -	Sudden. Disease of the heart. Inquest.
Nov. 2	59	Farmer - -	Pneumonia. Certified.
„ 24	15	Miner - -	Accidentally blown up with gunpowder deceased had in his pocket, 18 hours. Inquest.
„ 8	45	Hairdresser -	Aneurism of aorta. Certified.
„ 28	71	Farmer -	Diseased liver. Certified.
„ 22	62	Lead miner -	Phthisis. Certified.
Dec. 4	24	Lead miner -	Diabetes. Certified.
„ 7	71	Copper miner	Decay of nature. Certified.
„ 6	53	Mine agent -	Chronic bronchitis. Certified.
„ 12	75	Farmer - -	Retention of urine. Certified.
„ 31	15	Son of labourer	Hydrocephalus. Certified. -
1860.			
Jan. 6	70	Farmer - -	Cancer. Certified.
„ 3	54	Farmer - -	Accident by thrashing machine. Concussion of brain, 3 days. Inquest.
„ 13	55	Miner - -	Phthisis. Certified.
Feb. 1	59	Copper miner	Apoplexy. Certified.
„ 2	26	Lead miner -	Pleurisy. Certified.
„ 3	42	Agric. labourer	Diseased heart. Certified.
Jan. 26	73	Miller's labour.	Old age. Certified.
„ 29	53	Cordwainer -	Cancer of bowels. Certified.
Feb. 6	28	Railway labourer.	Accident. Knocked down by engine on Cornwall railway. Inquest.
„ 16	55	Lead miner -	Phthisis. Certified.
„ 23	20	School assist.	Obstruction of bowels. Not certified.
„ 26	18	Son of ironmonger.	Phrenitis. Certified.
„ 26	50	Labourer -	Found dead. Inquest.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Mar. 6	20	Lead miner -	Phthisis. Certified.
„ 12	27	Lead miner -	Internal abscesses. Not certified.
„ 14	61	Labourer -	Fits. Certified.
„ 14	62	Agric. labourer	Apoplexy. No medical attendant.
„ 21	29	Miner - -	Accident. Explosion of steam engine boiler. Fractures, scalds, tetanus. Inquest.
Apr. 16	17	Son of carpenter	Pneumonia. Fever. Certified.
„ 16	71	Agric. labourer	Dropsy. Not certified.
Mar. 27	74	Agric. labourer	Asthma. Certified.
Apr. 24	40	Copper miner	Pneumonia. Certified.
„ 26	73	Farmer -	Diseased heart. Certified.
„ 26	62	Agric. labourer	Fever. Pneumonia. Certified.
May 2	64	Farmer -	Cancer of the stomach. Not certified.
„ 5	85	Agric. labourer	Old age. Not certified.
Apr. 30	65	Blacksmith -	Bronchitis. Certified.
May 6	79	Agric. labourer	Old age. Not certified.
„ 15	56	Agric. labourer	Consumption. Not certified.
„ 14	48	Copper miner	Diseased lungs. Certified.
„ 22	15	Son of agric. labourer.	Typhus fever. Certified.
„ 27	64	Agric. labourer	Phthisis. Certified.
„ 28	29	Lead miner -	Phthisis. Certified.
„ 31	42	Carpenter -	Carcinoma. Certified.
June 2	19	Copper miner	Peritonitis. Certified.
„ 4	72	Agric. labourer	Decay of nature. Not certified.
„ 12	48	Tailor - -	Pneumonia. Certified.
„ 4	43	Attorney -	Inanition. Certified.
„ 15	66	Carpenter -	Paralysis. Certified.
„ 13	80	Farmer - -	Old age. No medical attendant.
July 7	62	Farmer - -	Phthisis. Certified.
„ 13	81	Surgeon -	Age. Certified.
„ 19	79	Agric. labourer	Age. Certified.
Aug. 9	30	Copper miner	Phthisis. Certified.
July 22	15	Son of lead miner	Typhus. Certified.
Aug 16	51	Mason - -	Fever. Certified.
„ 21	35	Agric. labourer	Phthisis. Certified.
„ 19	21	Clockmaker -	Typhus. Cerebral effusion, 10 hours. Certified.
Sep. 3	23	Lead miner -	Consumption. Certified.
„ 8	23	Lead miner -	Disease of kidneys. Certified.
„ 8	54	Farmer - -	Enteritis. Not certified.
„ 7	36	Copper miner	Accident in copper mine, explosion of powder, 4 hours. Inquest.
Aug 26	74	Labourer -	Debility. Certified.
Oct. 22	60	Copper mine agent.	Cancer. Certified.
„ 25	35	Copper miner	Consumption. Not certified.
„ 30	87	Labourer -	Old age. Certified.
Nov. 3	31	Mason - -	Dropsy. Certified.
„ 6	66	Farmer - -	Bleeding from the stomach. Certified.
„ 15	68	Agric. labourer	Dropsy. Certified.
„ 15	70	Agric. labourer	Dropsy. Certified.
„ 18	48	Copper miner	Diseased liver. Not certified.
„ 7	23	Miner - -	Fracture of skull, 1 hour. Inquest.
„ 22	23	Labourer, railway.	Hemoptysis. Certified.
„ 20	10	Son of lead miner	Pneumonia. Certified.
„ 24	54	Farmer - -	Consumption. Not certified.
„ 27	76	Mason - -	Paralysis. Certified.
„ 30	67	Lead miner -	Decay of nature. Not certified.
Dec. 6	44	Copper miner	Phthisis. Certified.
„ 9	97	Labourer -	Old age. No medical attendant.
„ 7	75	Innkeeper -	Dropsy. Certified.
„ 13	82	Farmer - -	Old age. Not certified.
„ 19	18	Son of blacksmith.	Phthisis. Certified.
„ 26	44	Copper miner	Typhus. Not certified.
„ 25	52	Farmer - -	Diseased heart. Certified.
„ 31	56	Cordwainer -	Debility. Certified.
1861.			
Jan. 4	73	Agric. labourer	Pneumonia. Not certified.
„ 5	36	Lead miner -	Consumption. Certified.
„ 7	22	Lead miner -	Consumption. No medical attend.
„ 8	52	Mine clerk -	Diseased heart. Certified.
„ 13	85	Farmer - -	Old age. No medical attendant.
„ 15	72	Agric. labourer	Old age. Certified.
„ 17	69	Farmer - -	Dropsy. Certified.
„ 21	62	Farmer - -	Pneumonia. Certified.
Feb. 4	39	Copper miner	Pulmonary consumption. Certified.
„ 10	64	Agric. labourer	Apoplexy. Inquest.
„ 20	52	Lead miner -	Consumption. Certified.
„ 18	11	Son of lead miner	Accident. Run over by cart. Inquest.
„ 24	18	Son of copper miner -	Phthisis. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Feb. 24	75	Agric. labourer	Paralysis. Certified.
Jan. 13	80	Agric. labourer	Old age. Certified.
Mar. 5	25	Lead miner -	Consumption. Certified.
„ 2	48	Veterinary surgeon - -	Fall from his horse, 27 hours. Inquest.
„ 7	71	Agric. labourer	Senile decay. Certified.
„ 17	38	Lead miner -	Diseased heart. Certified.
Jan. 29	22	Labourer -	Phthisis. Certified.
Feb. 1	36	Railway labourer	Phthisis. Certified.
„ 7	97	Not stated -	Fever and old age. Certified.
Mar. 25	57	Miner - -	Pulmonary consumption. Certified.
„ 18	14	Son of farmer	Accident. Killed in a mine. Fracture of skull. Inquest.
„ 29	17	Son of miner	Consumption. Certified.
„ 25	13	Son of labourer	Pneumonia. Not certified.
Apr. 19	23	Son of agric. labourer -	Phthisis. Certified.
May 5	38	Copper miner	Small-pox. Certified.
Apr. 24	52	Copper miner	Fall from an engine boiler. Concussion of brain, 2 days. Inquest.
„ 25	38	Labourer -	Explosion of powder in a mill, 3 days. Inquest.
„ 30	42	Copper miner	Concussion of brain. Inquest.
May 11	57	Grocer & draper	Diseased lungs. Certified.
„ 22	19	Son of miner	Pneumonia. Certified.
„ 25	73	Labourer -	Palsy. Certified.
„ 28	49	Gardener -	Cirrhosis. Hepatitis. Certified.
June 4	18	Son of miner -	Phthisis. Certified.
„ 8	63	Agric. labourer	Dropsy. Certified.
„ 12	52	Copper miner	Diseased spine. Certified.
„ 9	16	Son of cooper	Consumption. Certified.
„ 16	63	Farmer -	Enteritis. Certified.
„ 19	64	Gardener -	Decay of nature. Certified.
„ 18	67	Gardener -	Enteritis. Not certified.
„ 21	32	Labourer -	Apoplexy. Inquest.
July 3	12	Son of labourer	Enteritis. Certified.
„ 7	50	Labourer -	Jaundice. Certified.
„ 10	19	Son of shoemaker.	Variola. Certified.
„ 12	59	Mine clerk -	Softening of brain. Certified.
„ 15	53	Yeoman -	Suppression of urine. Certified.
„ 20	78	Labourer -	Gangrena senilis. Certified.
„ 29	83	Cordwainer -	Diseased heart. Certified.
Aug. 1	13	Son of servant	Crushed in a water wheel, 5 days. Inquest.
„ 12	11	Son of farmer	Consumption. Not certified.
„ 18	75	Cordwainer -	Abscess of the liver. Certified.
„ 22	20	Lead miner -	Measles. Certified.
„ 28	38	Lead miner -	Consumption. Certified.
Sept. 12	13	Son of tea dealer	Diseased spine. Certified.
„ 18	47	Farmer -	Self-murder by hanging. Inquest.
„ 22	41	Attorney's clerk	Consumption. Certified.
„ 1	12	Son of labourer	Fall from his horse. Inquest.
Oct. 19	44	Horsekeeper -	Pulmonary consumption. Certified.
„ 23	77	Labourer -	Old age. Certified.
„ 26	83	Labourer -	Suicide by hanging. Inquest.
Nov. 8	60	Cordwainer -	Chronic bronchitis. Certified.
„ 7	27	Miner - -	Killed in a lead mine, fractures. Inquest.
„ 16	79	Farmer -	Pneumonia. Certified.
„ 22	23	Miner - -	A rock fell on him, instant. Inquest.
„ 22	31	Mason - -	Gun-shot wound, 3 days. Inquest.
Nov. 29	82	Tin streamer	Senile decay. Certified.
Dec. 12	73	Labourer -	Pneumonia, 6 days. Certified.
„ 13	59	Lead miner -	Mesenteric disease. Certified.
„ 20	47	Copper miner	Diseased heart. Certified.
„ 23	82	Agric. labourer	Decay of nature. Not certified.
„ 28	46	Copper miner	Phthisis, 13 months. Certified.
„ 31	76	Thatcher -	Bronchitis. Certified.
„ 28	75	Hawker -	Diseased liver. Certified.

Sub-District - 3. Looe.

1859.			
Jan. 12	62	Farmer -	Hydrothorax. Certified.
„ 24	80	Labourer- -	Sudden death, natural causes. Inquest.
Feb. 8	70	General labourer	Unknown. Not certified.
„ 15	75	Miller and bargeman.	Asthma. Not certified.
„ 26	78	Farm labourer	Paralysis. Not certified.
„ 22	12	Son of blacksmith.	Pneumonia. Certified.
1859			
Feb. 28	65	Farm labourer	Dropsy on the chest. Not certified.
Apr. 4	64	Proprietor of land.	Diseased heart. Certified.
„ 15	18	Son of shoemaker.	Consumption. Not certified.
„ 24	82	Farmer -	Hydrothorax, 3 weeks. Certified.
„ 21	11	Son of labourer	Accident, killed in a bone mill. Inquest.
May 4	32	House carpenter	Consumption. Not certified.
„ 15	13	Farm servant	Accident, killed in a thrashing machine. Inquest.
June 18	33	Labourer -	Apoplexy. Inquest.
Aug. 11	55	Gardener -	Scrofulous disease of knee. Certified.
Sept. 24	16	Son of mason	Consumption. Not certified.
„ 29	65	Gentleman -	Palsy, 3 years. Apoplexy, 3 days. Certified.
Oct. 29	80	Farm labourer	Intussusceptio, 29 days. Certified.
Nov. 1	13	Son of labourer	Accident, drowned. Inquest.
„ 12	68	Limeburner -	Palsy, 3d attack. Not certified.
„ 21	unk.	Sailor - -	Found drowned on the beach. Inquest.
„ 9	76	General merchant.	Erysipelas from a wound. Not certified.
Dec. 15	19	Son of carpenter	Consumption. Not certified.
„ 23	39	Rope maker -	Natural decay. Not certified.
„ 23	36	Seaman, merchant service.	Albuminuria, 3 months. Certified.
„ 27	18	Carpenter's apprentice.	Consumption. Not certified.
1860.			
Jan. 7	76	Mason - -	Paralysis, 11 months. Certified.
„ 24	84	Carpenter -	Palsy. Certified.
Feb. 9	81	Farm labourer	Bronchitis, 3 weeks. Certified.
„ 19	72	Shoemaker -	Jaundice. Certified.
„ 20	22	Farm labourer	Diphtheria. Certified.
Mar. 14	71	Farmer -	Diseased heart, 2 years. Certified.
Apr. 10	62	Farm labourer	Pneumonia. Certified.
„ 27	35	Farm labourer	Lumbar abscess. Certified.
„ 30	52	Farm labourer	Consumption, 6 months. Certified.
„ 26	49	Seaman, R.N.	Abscess of thigh joint. Certified.
May 4	81	Draper - -	Natural decay. Certified
„ 10	72	Carpenter -	Consumption. Not certified.
„ 12	79	Carpenter -	Congestion of brain, 2 hours. Certified.
June 1	76	Fisherman -	Natural decay. Not certified.
„ 6	77	Gardener -	Natural decay. Not certified.
„ 19	77	Farmer -	Natural decay. Certified.
„ 27	60	Farm labourer	Apoplexy. Certified.
July 6	26	Farm labourer	Obstruction of bowels. Not certified.
„ 18	66	Seaman, merchant service.	Paralysis. Extravasation of urine, 5 days. Certified.
„ 21	83	Farm labourer	Injury from a fall, 5 weeks. Certified.
Aug. 5	18	Son of labourer	Scarlet fever, 3 days. Certified.
„ 24	71	Farmer -	Paralysis, small intestines. Not certified.
„ 25	70	Mason -	Paralysis, 2 years. Certified.
Sept. 7	43	Labourer -	Gastric fever, 3 weeks. Certified.
„ 16	74	Farm labourer	Pneumonia. Dropsy. Not certified.
„ 19	82	Farm labourer	Natural decay. No medical attendant.
„ 27	90	Farmer - -	Natural decay. No medical attendant.
Oct. 29	60	Labourer -	Diseased heart. Inquest.
„ 10	77	Farmer - -	Diarrhœa. Certified.
Nov. 18	37	Farm labourer	Diseased kidneys, 3 years. Certified.
Dec. 10	77	Mason, journeyman.	Natural decay. Not certified.
„ 19	52	Farmer -	Consumption. Not certified.
„ 25	61	Farmer -	Apoplexy. Inquest.
1861.			
Jan. 3	88	Seaman, R.N.	Natural decay. Not certified.
„ 22	88	Farm labourer	Natural decay. No medical attendant.
„ 27	83	Watchmaker -	Natural decay. Not certified.
„ 31	47	Master mariner	Cancer of face, 4 months. Certified.
Feb. 2	28	Poultry dealer	Asthma. Effusion of blood on chest. Inquest.
„ 12	61	Mason, journeyman.	Diseased kidneys. Certified.
„ 18	73	Superannuated coastguard.	Asthma. Certified.
„ 21	44	Shoemaker, master.	Necrosis. Anasarca. Certified

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861			
Mar. 6	71	General labourer.	Meningitis, 6 weeks. Carbuncle, 4 weeks. Certified.
„ 23	66	Farmer -	Paralysis, 13 months. Not certified.
„ 30	74	Farm labourer	Paralysis, 4 months. Not certified.
Apr. 12	77	Farm labourer	Colic, 7 days. Not certified.
„ 16	83	Farmer -	Apoplexy, 6 days. Certified.
„ 27	66	Superannuated coastguard.	Diseased kidneys. Not certified.
„ 27	83	Seaman, merchant service.	Natural decay. Not certified.
May 1	77	Superannuated coastguard.	Congestion of brain, 2 days. Certified.
June 5	23	Carpenter, journeyman.	Pulmonary consumption. Certified.
„ 9	24	Seaman, R.N.	Consumption. No medical attendant.
July 12	73	Seaman, merchant service.	Apoplexy, 48 hours. Certified.
„ 26	71	Farm labourer	Invagination of the bowel. Certified.
Aug. 1	11	Son of labourer	Gastric fever, 32 days. Hemorrhage from bowels, 3 days. Certified.
„ 13	22	Farm labourer	Consumption, 8 months Certified.
„ 23	65	Surgeon -	Diseased liver. Dropsy. Certified.
„ 25	15	Son of fisherman.	Lumbar abscess, 6 months. Certified.
„ 31	55	Sawyer -	Phthisis, 6 months. Certified.
Nov. 27	44	Seaman, merchant service.	Cancer of stomach. Not certified.
Dec. 2	23	Lead miner -	Diseased lungs. Certified.
„ 9	81	Seaman, merchant service.	Paralysis, 6 weeks. Certified.
„ 8	74	Farmer -	Sudden death. Inquest.

Sub-district - 4. Lerrin.

1858.			
Dec. 26	16	Son, coastguard service	Pneumonia. Not certified.
May 15	53	Farmer -	Ileus. Not certified.
1859.			
Apr. 5	80	Farmer -	Old age. Not certified.
May 8	81	Master mariner	Old age. Not certified.
June 16	27	Son of agricultural labourer.	Pneumonia. Not certified.
July 15	78	Farmer -	Ascites, 6 weeks. Certified.
Aug. 27	22	Carpenter, journeyman.	Phthisis, 4 months Certified.
Sept. 13	71	Agric. labourer	Age. Not certified.
Oct. 12	81	Butcher -	Age. Not certified.
„ 31	79	Farm labourer	Old age. Not certified.
Nov. 16	15	Son of shipwright.	Convulsion, 48 hours. Certified.
Dec. 9	81	Farm labourer	Old age. Not certified.
„ 15	52	Farm labourer	Dropsy. Certified.
„ 20	81	Farmer -	Dropsy. Not certified.
1860.			
Jan. 3	67	Farm labourer	Diseased heart. Not certified.
„ 4	44	Carpenter, master.	Phthisis. Not certified.
„ 8	53	Farm labourer	Phthisis. Not certified.
„ 23	74	Farmer and miller.	Cystitis. Bronchitis. Certified.
Feb. 28	55	Bargeman -	Consumption. Not certified.
Mar. 2	19	Wheelwright, apprentice.	Nephritis. Certified.
Jan. 28	19	Son of farmer	Phthisis. Not certified.
Mar. 12	78	Farmer -	Sudden visitation of God. Inquest.
„ 29	77	Master mariner	Nephritis. Not certified.
May 3	84	Bargeman -	Old age. Not certified.
„ 21	76	Grocer -	Congestion of lungs. Certified.
Apr. 27	21	Tailor, journeyman.	Consumption. Not certified.
„ 28	62	Farm labourer	Congestion of lungs. Certified.
June 15	75	Farm labourer	Old age. Not certified.
„ 28	72	Farmer -	Diseased prostate. Certified.
July 5	64	Farm labourer	Natural decay. Not certified.
Aug. 28	55	Farmer -	Paralysis. Not certified.
	Unknown	fisherman	Drowned. Inquest.
26	56	Farmer -	Pneumonia. Not certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Dec. 12	10	Son of blacksmith, master.	Quinsey. Not certified.
„ 22	81	Farm labourer	Bronchitis. Certified.
1861.			
Feb. 23	73	Farmer -	Dropsy. Not certified.
Mar. 22	82	Farmer -	Paralysis, 7 days. Not certified.
Apr. 27	40	Farm labourer	Phthisis. Certified.
May 4	80	Farmer -	Decay of nature. Not certified.
Apr. 17	12	Son of seaman, merchant service.	Unknown. Not certified.
June 2	70	Farm labourer	Bronchitis. Certified.
July 6	75	Farm labourer	Hemoptysis. Certified.
„ 10	10	Son of labourer	Accident. Drowned. Inquest.
„ 16	19	Shipwright, apprentice.	Tetanus. Not certified.
Aug. 12	70	Farmer -	Rheumatic gout. Not certified.
„ 27	21	Draper -	Consumption. Not certified.
Sept. 5	70	Fisherman -	Diseased liver. Certified
Nov. 7	26	Farm labourer	Phthisis. Certified.
„ 24	67	Farmer -	Unknown. Certified.
Dec. 20	50	Farm labourer	Internal abscess. No medical attendant.

Superintendent Registrar's District.	Registrar's Sub-Districts.
Bodmin.	1. Lanlivery. 2. St. Mabyn. 3. Bodmin. 4. Egloshayle.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61.

Sub-District - 1. Lanlivery.

1859.			
Jan. 1	79	Farmer -	Old age. Not certified.
Feb. 7	69	House proprietor	Apoplexy, 2 days. Certified.
„ 2	30	Stone dresser-	Phthisis pulmonalis, 3 years. Not certified.
„ 18	45	Farmer -	Consumption, 2 years. Not certified.
Mar. 9	18	Shoemaker's apprentice.	Disease of heart. Certified.
„ 21	70	Shoemaker -	Suicide, by cutting his throat. Inquest.
„ 23	23	Farm labourer	Measles. Not certified.
„ 21	33	Tailor, master	Consumption, 9 months. Not certified.
1858.			
Dec. 31	82	Farmer -	Old age. Not certified.
1859.			
Mar. 31	16	Iron miner -	Rheumatic fever, 14 days. Certified.
Apr. 8	62	Farm labourer	Pleurisy. Hemorrhage, 2 months. Certified.
„ 21	29	Copper miner-	Consumption, 16 months. Not certified.
May 13	66	Farm labourer	Hypertrophy of heart. Certified.
„ 22	51	Iron miner -	Pulmonary consumption. Certified.
„ 8	47	Farmer -	Injuries, jammed between two clay waggons. Inquest.
June 11	78	Bargeman -	Palsy. Not certified.
„ 9	06	Farm labourer	Asthma. Not certified.
Oct. 3	14	Son of labourer	Natural causes. Inquest.
„ 17	81	Farm labourer	Decay of nature. Certified.
„ 23	80	Stone quarryman.	Inflammation of throat. Not certified.
Nov. 1	28	Copper miner	Diseased heart, 8 months Certified.
„ 18	76	Farm labourer	Old age. No medical attendant.
„ 22	75	Accountant -	Strangulated ventral hernia. Certified.
„ 24	15	Son of farmer	Diabetes. Atrophy. Not certified
Dec. 24	56	Farm labourer	Palsy. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 3	42	Farm labourer	Phthisis, 12 months. Certified.
„ 18	60	Blacksmith, master.	Apoplexy. Certified.
„ 30	20	Farm servant	Scarlatina. Certified.
„ 30	54	Copper miner	Consumption. Not certified.
Feb. 23	82	Farmer	Old age. Not certified.
„ 24	71	Farm labourer	Gout in stomach. Not certified.
„ 29	52	Carpenter, master.	Phthisis, 6 months. Certified.
Mar. 6	24	Stone dresser	Ophthalmia. Not certified.
„ 24	79	Fundholder	Congestion of lungs, 14 days. Certified.
„ 19	50	Butler	Gout. Exhaustion. Certified.
Apr. 16	82	Carpenter	Old age. Not certified.
„ 17	13	Labourer	Fall of a stone roller. Inquest.
„ 25	74	Copper mine agent.	Paralysis, 7 weeks. Certified.
„ 23	87	Farm labourer	Old age. Not certified.
June 3	54	Farm labourer	Congestion of kidneys. Epilepsy. Certified.
„ 27	52	Iron and copper miner.	Effusion on chest. Asthma. Certified.
July 4	20	Errand boy	Consumption. Certified.
„ 12	70	Farm labourer	Phthisis pulmonalis. Certified.
Sept. 8	27	Engine worker, copper mine.	Consumption. Not certified.
„ 24	73	Farmer	Rupture, many years. Certified.
„ 27	46	Tin streamer	Diarrhœa, 10 days. Not certified.
Nov. 7	40	Labourer	Natural causes. Inquest.
„ 15	72	Potter, journeyman.	Enteritis, 3 days. Certified.
„ 19	78	Farmer	Diabetes. Certified.
Dec. 2	70	Farmer	Decay of nature. Certified.
„ 4	71	Painter, master	Bronchitis. Certified.
„ 5	81	Farmer	Paralysis. Not certified.
„ 10	45	Innkeeper	Apoplexy. Certified.
„ 14	26	Railway guard	Crushed in the doorway of a railway van. Inquest.
„ 26	82	Gardener	Bronchitis, 2 months. Apoplexy. Certified.
1861.			
Jan. 1	73	Farmer	Dropsy. Not certified.
„ 17	74	Chelsea pensioner.	Influenza, 1 month. Certified.
„ 20	57	Railway gauger	Congestion of lungs, 1 month. Certified.
Feb. 15	48	Farm labourer	Fever. Certified.
„ 7	24	Tailor, journeyman.	Consumption. Not certified.
Mar. 4	40	Sawyer	Typhus. Certified.
„ 28	64	Farm labourer	Influenza. Certified.
„ 26	80	Thatcher	Paralysis. Certified.
Apr. 1	59	Tin streamer	Chronic rheumatism. Not certified.
May 8	62	Copper miner	Hemorrhage. Debility, 6 weeks. Certified.
„ 16	56	Painter	Natural causes. Inquest.
June 18	75	Carpenter, master.	Paralysis. Certified.
„ 16	88	Farmer	Old age. No medical attendant.
„ 27	84	Farmer	Paralysis. No medical attendant.
July 6	49	Maltster, master	Diseased heart. Rheumatism, 4 weeks. Certified.
„ 17	16	Son of farm labourer.	Enlarged heart, 2 months. Hydrothorax, 8 days. Certified.
Aug 15	67	Copper miner	Phthisis pulmonalis. Certified.
„ 22	76	Farm labourer	Old age. Not certified.
Sept. 1	78	Carpenter, master.	General debility. Certified.
Oct. 18	82	Dom. servant	Influenza, 1 month. Certified.
„ 14	55	Farmer and mason.	Paralysis. Not certified.
„ 25	49	Lead miner	Pulmonary consumption, 2 years. Certified.
Nov. 1	23	Cabinet maker	Diseased heart. Asthma, 1 week. Certified.
Dec. 10	52	Innkeeper and farmer.	Ruptured blood vessel in the lungs. Certified.
„ 14	21	Shoemaker, journeyman.	Cephalitis. Coma, 10 days. Certified.
„ 19	19	Son of stonemason.	Accident by the wheel of a tram waggon passing over him. Inquest.
„ 24	72	Carpenter, RN.	Diseased heart. Certified.

Sub-District - 2. St. Mabyn.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Mar. 5	52	Miller	Phthisis pulmonalis. Certified.
Jan. 20	81	Road labourer	Hernia. Certified.
1858.			
Dec. 31	17	Cordwainer	Diseased heart. Dropsy. Certified.
1859.			
Apr. 28	15	Blacksmith	Obstruction of bowels. Certified.
Mar. 14	63	Rector of Helland.	Carbuncle. Certified.
Apr. 14	58	Agric. labourer	Diseased heart. Certified.
July 6	90	Land proprietor	Old age. Not certified.
Sept. 5	82	Farmer	Diseased heart. Not certified.
May 4	84	Land proprietor	Nephria. Certified.
„ 9	41	Son of land proprietor.	Diseased brain. Apoplexy. 5 days. Certified.
Sept. 30	24	Sawyer	Phthisis pulmonalis. Certified.
Nov. 25	28	Son of farmer	Scarlet fever. Not certified.
Dec. 9	10	Son of innkeeper.	Enteritis, 3 weeks. Ulceration, 3 days. Certified.
„ 27	65	Road labourer	Inflammation. Certified.
1860.			
Jan. 12	87	Road labourer	Diseased brain Delirium. Certified.
Feb. 3	91	Farm labourer	Old age. No medical attendant.
„ 4	75	Farmer	Apoplexy. Paralysis, 3 days. Certified.
Jan. 13	20	Miner	Accident, by rubbish falling on him in Treveddoc mine. Inquest.
1859.			
Dec. 14	82	Wood labourer	Paralysis. Certified.
1860.			
Mar. 23	80	Farm labourer	Old age. Certified.
May 10	29	Innkeeper	Phthisis. Certified.
„ 25	90	Farmer	Old age. Certified.
„ 12	48	Farmer	Paralysis. Not certified.
Apr. 29	26	Chelsea pensioner.	Phthisis. Certified.
July 11	77	Landed proprietor.	Paralysis. Certified.
Aug. 14	61	Farmer	Cancer of stomach. Certified.
Apr. 30	67	Farm labourer	Hepatitis. Certified.
Sept. 30	78	Gardener	Dropsy, 6 months. Certified.
Oct. 5	63	Farm labourer	Diseased heart. Dropsy. Certified.
„ 2	29	Labourer	Accident, fall of ground on him in Treveddoc mine. Inquest.
„ 2	25	Labourer	Accident, fall of ground on him in Treveddoc mine. Inquest.
Dec. 25	81	Road labourer	Dropsy. Certified.
1861.			
Jan. 2	17	Domestic servant.	Bronchitis. Not certified.
„ 10	10	Son of farmer	Diphtheria, 14 days. Certified.
„ 12	68	Farm labourer	Old age. Not certified.
Mar. 24	83	Landed proprietor.	Diseased brain. Certified.
Apr. 1	84	Labourer	Decay of nature. Certified.
„ 28	76	Labourer	Apoplexy. Certified.
„ 27	67	Carpenter	Dropsy. Certified.
May 16	52	Farmer	Natural Causes. Certified.
„ 15	80	Farmer	Old age. Not certified.
June 22	44	Son of captain, R.N.	Phthisis pulmonalis. Certified.
May 14	44	Mason	Accident, fall from a horse. Certified.
Aug 10	72	Mason	Decay of nature. Not certified.
„ 13	74	Landed proprietor.	Diseased brain. Certified.
Sept. 14	72	Farm labourer	Water complaint. Not certified.
„ 12	78	Farm labourer	Dropsy. Not certified.
„ 17	46	Farm labourer	Unknown. Not certified.

Sub-District - 3. Bodmin.

1859.			
Jan. 19	76	Boot and shoemaker.	Old age. Certified.
„ 30	58	Farmer	Natural decay. Inquest.
Feb. 8	64	Farm labourer	Diseased brain. Coma. Certified.
Jan. 31	21	Printer	Tuberculous. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Feb. 20	45	Innkeeper -	Paralysis. Certified.
„ 11	55	Mason - -	Epilepsy. Abscess on brain. Certified.
„ 25	83	Solicitor -	Bronchitis. Certified.
Apr. 5	60	Blockmaker -	Apoplexy Post mortem. Certified.
„ 21	33	Grocer -	Diseased brain and membrane. Certified.
„ 23	30	Solicitor -	Phthisis pulmonalis. Certified.
„ 28	49	Mason, master	Pneumonia. Certified.
May 21	55	Waggoner -	Accident, killed by the wheel of a waggon passing over him. Inquest.
„ 25	12	Son of blacksmith.	Injuries, clothes being entangled in a mill wheel. Inquest.
„ 21	39	Blacksmith -	Paralysis.
„ 21	32	Farm servant	Phthisis pulmonalis. Certified.
„ 9	28	Carpenter, journeyman.	Phthisis pulmonalis. Certified.
„ 16	12	Son of tailor -	Meningitis. Certified.
June 2	20	Farm servant	Phthisis pulmonalis. Certified.
May 27	61	Farmer -	Phthisis pulmonalis. Not certified.
June 2	48	Carrier -	Paralysis. Certified.
„ 17	76	Farmer -	Chronic Bronchitis. Certified.
„ 27	68	Toll collector	Old age. Certified.
„ 6	69	Innkeeper -	Old age. Not certified.
„ 30	50	Labourer -	Natural causes. Inquest.
July 1	56	Merchant -	Diseased lungs. Inquest.
„ 17	11	Son of farmer	Abscess of liver. Certified.
„ 17	51	Shoemaker, journeyman.	Diseased liver. Certified.
„ 28	64	Farm labourer	Pneumonia. Not certified.
Aug. 5	55	Miner - -	Paralysis. Certified.
„ 2	19	Linendraper's assistant.	Phthisis pulmonalis. Certified.
July 22	67	Copper miner	Apoplexy. Certified.
Aug. 14	63	Gardener -	Old age. Certified.
„ 8	54	Woolstapler -	Gout, metastasis to stomach. Certified.
„ 14	46	Wood labourer	Strictural disease of the stomach. Certified.
„ 5	78	Farmer - -	Fever. Certified.
„ 16	42	Farmer - -	Visitation of God. Inquest.
Sept. 9	85	Farmer - -	Old age. No medical attendant.
„ 6	62	Bailiff, county court.	Bright's disease. Certified.
„ 3	22	Tin miner -	Confluent small pox, not vaccinated. Fever. Certified.
„ 18	66	Shoemaker -	Paralysis. Certified.
„ 23	83	Farmer - -	Old age. Certified.
„ 26	83	Gardener -	Old age. Certified.
Oct. 13	21	Farm labourer	Debility. Phthisis. Not certified.
„ 2	25	Currier - -	Broncho-pneumonia. Certified.
„ 14	67	Farm labourer	Diseased liver. Certified.
„ 24	72	Labourer -	Disease of the heart. Inquest.
„ 20	68	Miner -	Chronic bronchitis. Certified.
„ 27	59	Farmer - -	Apoplexy. Certified.
„ 20	46	Painter -	Apoplexy. Certified.
„ 30	90	Brazier, journeyman.	Old age. Certified.
Nov. 11	72	Carpenter, journeyman.	Apoplexy. Certified.
„ 14	83	Groom - -	Old age. Not certified.
„ 29	30	Pensioner, shoemaker.	Phthisis pulmonalis. Not certified.
„ 19	43	Linendraper -	Strictural disease of stomach. Certified.
Dec. 5	52	Groom -	Palsy. Certified.
Nov. 23	34	Copper miner	Dropsy. Certified.
Dec. 4	68	Farm labourer	Old age. Not certified.
„ 11	66	Gardener, master	Chronic disease of stomach. Certified.
„ 23	21	Son of farmer	Phthisis pulmonalis. Certified.
„ 26	42	Fishmonger -	Disease of the heart. Dropsy. Certified.
„ 29	74	Farm labourer	Gangrene senilis. Certified.
1860.			
Jan. 28	35	Miner -	Paralysis. Certified.
Feb. 9	13	Son of farmer	Ascites. Hydrocephalus. Certified.
Jan. 30	70	Farm labourer	Schirrus of stomach. Certified.
„ 30	38	Farm labourer	Albuminuria. Dropsy. Certified.
Feb. 14	61	Miner -	Natural causes. Inquest.
„ 28	16	Miller's assistant	Scarlatina. Certified.
„ 24	65	Labourer -	Suicide, cut throat. Inquest.
„ 29	30	Farm labourer	Disease of the brain. Certified.
„ 27	46	Farm labourer	Paralysis. Certified.
Mar. 1	67	Farmer - -	Typhus fever. Not certified.
1860.			
Mar. 19	80	Farmer and butcher.	Old age. No medical attendant.
„ 26	55	Farm labourer	Paralysis. Certified.
„ 10	48	Whitesmith -	Disease of the heart. Dropsy. Certified.
Apr. 4	56	Farmer - -	Phthisis pulmonalis. Certified.
„ 7	38	Shoemaker -	Found dead. Suffocation. Inquest.
„ 9	45	Confectioner -	Paralysis. Certified.
Mar. 29	68	Waggoner -	Nephria. Certified.
Apr. 14	50	Hostler - -	Diseased brain. Post mortem. Certified.
„ 23	80	Carpenter -	Old age. Certified.
„ 27	70	Miner - -	Old age. Certified.
May 5	45	Miner - -	Diarrhœa. Certified.
Apr. 30	56	Mine purser -	Bronchitis. Certified.
May 4	73	Tinman -	Gastro-enteritis. Certified.
„ 20	82	Tin streamer -	Paralysis, 10 days. Certified.
June 6	75	Tin streamer -	Old age. not certified.
„ 6	40	Farm labourer	Disease of the heart. Certified.
„ 20	67	Wool sorter -	Paralysis. Certified.
July 8	49	Farm labourer	Disease of the heart. Certified.
„ 12	78	Shoemaker, master.	Paralysis. Certified.
„ 7	18	Linendraper, apprentice.	Inflammation of brain. Certified.
„ 9	28	Tailor -	Epilepsy. Certified.
„ 18	44	Farm labourer	Phthisis pulmonalis. Certified.
„ 15	72	Chelsea pensioner.	Hepatitis. Certified.
„ 31	70	Farmer - -	Paralysis. Certified.
Aug. 29	16	Coachbuilder, apprentice.	Convulsions. Certified.
„ 22	58	Stonemason, journeyman.	Paralysis. Certified.
Sept. 8	28	Mason, journeyman.	Phthisis pulmonalis. Certified.
„ 21	70	Innkeeper -	Softening of brain. Certified.
„ 23	52	Fisherman -	Broncho-pneumonia. Post mortem. Certified.
Oct. 11	70	Chief warder, prison.	Diseased kidneys. Certified.
„ 10	29	Shoemaker -	Paralysis. Certified.
„ 18	57	Butcher -	Fever. Disease of the heart. Post mortem. Certified.
„ 21	58	Blacksmith -	Diseased brain. Certified.
„ 30	82	Farm labourer	Old age. Not certified.
Nov. 4	71	Mason - -	Apoplexy. Certified.
„ 23	76	Farm labourer	Old age. Certified.
„ 8	77	Land proprietor	Natural decay. Certified.
„ 23	19	Copper miner	Fever. Certified.
Dec. 1	37	Mine labourer	Phthisis. Pneumonia. Certified.
„ 10	18	Saddler's apprentice.	Diphtheria. Certified.
„ 27	77	Farm labourer	Old age. Certified.
„ 1	71	Farm labourer	Diarrhœa. Certified.
„ 11	72	Painter and glazier, master.	Palsy. Certified.
1861.			
Jan. 12	39	Labourer -	Paralysis. Certified.
„ 14	51	Hotel porter -	Apoplexy. Inquest.
Feb. 2	41	Attorney's clerk	Phthisis pulmonalis. Certified.
Jan. 26	64	Shoemaker, master.	Diseased liver. Certified.
Feb. 11	35	Tin and copper miner	Phthisis pulmonalis. Certified.
„ 15	83	Carpenter, master.	Paralysis. Certified.
„ 15	40	Seaman -	Paralysis. Certified.
„ 14	50	Watchmaker -	Diarrhœa. Disease of intestinal glands. Certified.
„ 22	77	Farmer - -	Old age. Certified.
„ 26	60	Farm labourer	Phthisis pulmonalis. Certified.
Mar. 14	59	Farm labourer	Diseased heart. Inquest.
„ 23	22	Miner - -	Exhaustion. Certified.
„ 21	39	Wheelwright's	Phthisis pulmonalis. Certified.
„ 24	21	Seaman, R.N.	Phthisis pulmonalis. Certified.
„ 29	68	General labourer	Diseased heart. Dropsy. Certified.
Apr. 11	40	Ostler - -	Phthisis pulmonalis. Certified.
May 2	13	Son of copper miner.	Natural causes. Certified.
„ 12	77	Farm labourer	Diseased heart. Dropsy. Certified.
„ 22	32	Shoemaker -	Phthisis pulmonalis. Certified.
„ 22	42	Labourer -	Phthisis pulmonalis. Certified.
„ 17	41	Labourer -	Maniacal exhaustion. Certified.
„ 27	68	Fisherman -	Diseased brain. Certified.
„ 17	84	Farm labourer	Paralysis, 4 days. Certified.
June 7	46	Labourer -	Paralysis. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
June 8	81	Farmer - -	Old age. Not certified.
Apr. 26	25	Idiot - -	Accident. Drowned. Inquest.
June 20	85	Farm labourer	Exhaustion. Certified.
„ 18	74	Tailor, master	Paralysis. Certified.
„ 26	53	General labourer	Dropsy. Nephria. Certified.
„ 30	13	Not stated -	Epilepsy. Certified.
July 24	64	Mine agent -	Diseased heart. Certified.
„ 27	50	Farm labourer	Asthenia. Certified.
„ 14	38	Railway station master.	Phthisis pulmonalis. Certified.
„ 17	23	Farm labourer	Tumour. Peritonitis. Certified.
Aug 16	31	Not stated -	Suffocated while in an epileptic fit. Certified.
„ 14	80	Retailer of potatoes.	Paralysis. Certified.
Sept. 4	52	Stonemason -	Maniacal exhaustion. Certified.
„ 5	38	Not stated -	Diarrhœa. Certified.
„ 29	39	Messenger -	Delirium tremens. Certified.
Oct. 20	70	Mine agent -	Diseased heart. Certified.
„ 18	56	Miner - -	General exhaustion. Certified.
„ 14	66	Mason, journeyman.	Dropsy. Certified.
„ 29	57	Miner - -	Ascites. Certified.
Nov. 10	80	Innkeeper -	Old age. Certified.
„ 27	87	Patten maker	Old age. Not certified.
„ 13	79	Chelsea pensioner.	Old age. Certified.
„ 20	53	Tin streamer -	Paralysis. Certified.
Dec. 2	63	Gentleman -	Injury by a fall. Inquest.
„ 6	74	Clergyman -	Paralysis. Certified.
„ 11	14	Son of farmer	Diabetes. Certified.
„ 9	56	Roper - -	Diseased brain. Certified.
„ 17	37	Joiner - -	Palsy. Certified.
„ 10	84	Labourer -	Apoplexy. Certified.
„ 17	25	Labourer -	Phthisis pulmonalis. Certified.
„ 17	30	Labourer -	Ulceration of larynx. Certified.

Sub-district - 4. Egloshayle.

1859.			
Jan. 23	69	Shoemaker -	Natural decay. Not certified.
Feb. 4	68	Storekeeper -	Natural decay. Not certified.
Mar. 17	80	Agric. labourer	Natural decay. Not certified.
„ 20	12	Son of wood ranger.	Inflammation. Not certified.
Apr. 2	74	Agric. labourer	Visitation of God. Inquest.
„ 13	14	Son of blacksmith.	Nephritis. Certified.
May 12	80	Farmer -	Natural decay. Not certified.
„ 11	48	Labourer -	Accident. Killed falling down a shaft in Trewarn United Mine. Inquest.
„ 11	22	Mine agent -	Accident. Killed falling down a shaft in Trewarn United Mine. Inquest.
June 29	82	Agric. labourer	Natural decay. Not certified.
July 15	72	Yeoman -	Pneumonia. Certified.
Aug. 6	82	Miller - -	Natural decay. Not certified.
Sept. 9	86	Yeoman -	Natural decay. Not certified.
Aug 20	81	Agric. labourer	Natural decay. Not certified.
„ 3	66	Agric. labourer	Dropsy. Certified.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Nov. 20	78	Labourer -	Natural causes. Inquest.
„ 10	81	Yeoman -	Natural decay. Not certified.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Unknown		Supposed mariner.	Drowning. Inquest.
Nov. 17	84	Master mariner	Natural decay. Not certified.
„ 30	35	Master mariner	Consumption. Certified.
Dec. 20	85	Tailor - -	Natural decay. Not certified.
„ 28	32	Agric. labourer	Consumption. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 6	74	Coast guard -	Natural decay. Not certified.
„ 19	72	Farm labourer	Apoplexy. Certified.
„ 17	83	Innkeeper -	Natural decay. Not certified.
„ 17	58	Agric. labourer	Enteritis. Certified.
„ 15	42	Bargeman. -	Tumour in bowels. Certified.
Feb. 10	84	Agric. labourer	Diseased heart. Certified.
„ 15	77	Gardener -	Pneumonia. Certified.
„ 27	76	Carpenter -	Palsy. Certified.
Mar. 3	81	Mariner -	Natural decay. Not certified.
„ 20	82	Farmer -	Natural decay. Not certified.
„ 28	55	Agric. labourer	Enteritis. Certified.
„ 12	33	Farmer -	Fall from a waggon. Enteritis. Certified.
Apr. 15	65	Farmer -	Rupture of blood-vessel. Certified.
„ 28	73	Blacksmith -	Influenza. Certified.
„ 24	77	Agric. labourer	Dropsy. Certified.
May 15	78	Yeoman -	Cancer. Certified.
June 9	73	Master mariner	Cramp and spasms in stomach. Certified.
„ 18	88	Agric. labourer	Natural decay. Not certified.
July 8	21	Mariner, merchant service.	Consumption. Certified.
Aug. 26	84	Yeoman -	Natural decay. Not certified.
Oct. 9	56	Shipbuilder -	Natural causes. Inquest.
„ 4	47	Farmer -	Consumption. Certified.
Dec. 12	20	Son of agric. labourer.	Dropsy. Certified.
„ 13	16	Son of mariner, merchant service.	Consumption. Certified.
1861.			
Feb. 6	55	Agric. labourer	Dropsy. Not certified.
„ 21	unk.	Mariner merchant service.	Washed ashore. Inquest.
„ 25	unk.	Master mariner in a foreign service.	Washed ashore. Inquest.
Mar. 2	unk.	Mariner -	Washed ashore. Inquest.
„ 2	unk.	Mariner in a foreign service.	Washed ashore. Inquest.
„ 9	10	Son of farm labourer.	Pneumonia. Certified.
„ 13	unk.	Mariner.	Washed ashore. Inquest.
Apr. 23	82	Farm labourer	Natural Decay. Certified.
June 22	15	Son of labourer	Accident. Drowned bathing. Inquest.
July 22	65	Farmer -	Dropsy. Certified.
Aug. 5	67	Farmer -	Dropsy. Certified.
„ 8	79	Fishmonger -	Breaking blood-vessel. Certified.
„ 27	66	Labourer -	Fall of a rock on his leg. Fracture, &c. Inquest.
„ 26	62	Farmer -	Consumption. Not certified.
„ 20	92	Farm labourer	Natural decay. Certified.
Sep. 10	62	Farm labourer	Decline. Not certified.
Nov. 12	87	Farm labourer	Natural decay. Not medical attendant.
Oct. 16	80	Farm labourer	Natural decay. Certified.
Nov. 2	64	Farm labourer	Diseased heart. Certified.
„ 26	80	Tailor - -	Natural decay. Certified.
„ 20	19	Shoemaker's apprentice.	Decline. Not certified.
Dec. 15	35	Master mariner	Diseased heart caused by overexertion. Not certified.
„ 23	82	Farm labourer	Natural decay. Certified.
„ 8	60	Farm labourer	Typhus. Certified.

Superintendent Registrar's District.	Registrar's Sub-Districts.
St. Columb.	1. Padstow. 2. St. Columb. 3. Newlyn.

Deaths of Males aged 10 Years and Upwards in each of the Years 1859–61.

Sub-district - 1. Padstow.

1859.			
Jan. 18	87	Farmer -	Old age. Not certified.
Feb. 6	54	Master mason	Inflammation on brain. Not certified.
Mar. 3	84	Farmer -	Supposed pulmonary apoplexy. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Mar. 9	76	Agric. labourer	Old age No medical attendant.
Feb. 20	30	Master miller	Decline, 2 years. Not certified.
„ 26	50	Farmer - -	Decline. Not certified.
May 2	22	Son of agric. labourer -	Decline, 13 months. Not certified.
„ 22	66	Grocer - -	Decline. Not certified.
„ 22	81	Farmer - -	Bronchitis. Not certified.
1858.			
Oct. 10	75	Farmer - -	Inflammatory fever. Not certified.
1859.			
May 25	64	Farmer - -	Seizure, 4 hours. Not certified.
June 12	87	Servant -	Old age. Certified.
July 7	64	Mason - -	Effusion on the brain. Certified.
„ 12	77	Captain, R.N.	Old age. Certified.
„ 24	80	Agric. labourer	Old age. No medical attendant.
„ 13	18	Son of butcher	Decline, 10 months. No medical attendant.
„ 7	27	Collector of customs.	Rheumatism. Diseased heart. Certified.
„ 9	76	Farmer -	Old age. Not certified.
„ 27	71	Nurseryman -	Decline. Not certified.
Aug 27	85	Miller, master	Old age. No medical attendant.
Sept. 5	70	Officer inland revenue.	Hydrothorax. Dropsy. Certified.
Oct. 4	15	Son of agric. labourer.	Rheumatic fever. Certified.
„ 10	55	Farmer -	Concussion of brain, fall from his horse. Inquest.
„ 30	84	Cordwainer, master.	Old age. Certified.
	unk.	Supposed mariner.	Washed ashore. Inquest.
Dec. 1	43	Officer, inland revenue.	Phthisis. Certified.
Nov. 14	78	Agric. labourer	Old age. Not certified.
Dec. 4	64	Master mason	Diseased heart. Certified.
Nov. 23	76	Carpenter, master.	Apoplexy. Certified.
Dec. 11	75	Agric. labourer	Apoplexy. Certified.
„ 22	92	Cordwainer -	Old age. Certified.
„ 23	53	Agric. labourer	Mortification. Certified.
„ 11	77	Agric. labourer	Old age. Certified.
„ 23	32	Agric. labourer	Decline. Not certified.
„ 17	30	Iron miner -	Diseased heart. Not certified.
„ 17	17	Son of agricultural labourer.	Decline. Not certified.
„ 28	78	Independent -	Seizure. 2nd attack. Certified.
„ 29	21	Labourer -	Natural causes. Inquest.
1860.			
Jan. 1	87	Farmer -	Old age. No medical attendant.
„ 31	42	Farmer -	Decline. Not certified.
Feb. 25	67	Tailor, master	Pleurisy. Not certified.
Apr. 10	51	Miller, master	Decline. Not certified.
Mar. 12	60	Bargeman -	Accident. Drowned. Inquest.
Apr. 22	77	Sawyer -	Old age. Not certified.
May 4	39	Agric. labourer	Pneumonia. Certified.
June 18	85	Tailor - -	Influenza. Certified.
July 17	36	Miner - -	Decline. Not certified.
May 10	17	Labourer -	Accident. Falling into the Camel slate quarry. Inquest.
July 27	24	Miner - -	Accident by a rock falling on him in Pawton iron mine. Inquest.
„ 29	41	Farmer -	Abscess in abdomen. Not certified.
Aug. 12	63	Sawyer -	Hepatitis. Ulcer of stomach. Certified
„ 31	54	Agric. labourer	Abscess in the thigh. Not certified.
Sept. 8	82	Agric. labourer	Old age. Not certified,
Oct. 3	53	Agric. labourer	Consumption. Not certified.
„ 6	76	Blacksmith -	Stoppage in the bowels. Not certified.
„ 9	64	Agric. labourer	Natural causes. Inquest.
„ 16	70	Farmer -	Serous apoplexy. Certified.
„ 10	32	Ship carpenter	Decline. Not certified.
„ 29	11	Son of labourer	Accident. Wheel of a waggon passing over him. Inquest.
„ 26	43	Tailor -	Pneumonia. Certified.
Nov. 5	25	Shoemaker, journeyman.	Dropsy. Not certified.
Dec. 26	73	Farmer -	Cancer. Not certified.
„ 30	79	Shoemaker -	Bronchitis. Certified.
„ 30	79	Shoemaker -	Bronchitis. Certified.
1861			
Jan. 11	74	Labourer -	Pressure of brain. Not certified.
„ 15	76	Farmer -	Old age. Not certified.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Jan. 9	77	Mason - -	Old age. Not certified.
„ 20	41	Miner - -	Decline. Not certified.
„ 9	63	Labourer -	Diseased heart. Not certified.
„ 20	82	Gardener -	Old age. Not certified.
„ 5	74	Mason -	Old age. Not certified.
Feb. 7	83	Farm labourer	Old age. Not certified.
„ 12	53	Labour. farmer	Decline, 2 years. Certified.
„ 15	65	Farmer -	Hydrothorax, 7 weeks. Certified.
„ 25	59	Roper, master	Diseased heart. No medical attendant.
Mar. 15	19	Son of farm labourer.	Decline, 1 year. Certified.
„ 1	83	Clergyman -	Old age. Not certified.
„ 26	79	Farmer -	Paralysis. Not certified.
Apr. 18	64	Printer -	Pressure on the brain. Not certified.
May 7	83	Land proprietor.	Old age. Not certified.
„ 13	35	Son of mason, master.	Debility. Certified.
„ 30	31	Blacksmith -	Decline, 12 months. Certified.
„ 14	60	Farm labourer	Hydrothorax. Certified.
June 4	74	Farm labourer	Enteritis. Not certified.
July 12	88	Farmer -	Old age. No medical attendant.
„ 12	26	Farm labourer	Pressure on the brain. Not certified.
„ 17	72	Gentleman -	Rupture of a blood vessel. Certified.
„ 31	79	Quay porter -	Effusion on brain. Certified.
Aug. 10	40	French polisher	Rupture of blood vessel, caused by incessant drinking. Inquest.
May 29	40	Labourer -	Natural causes. Inquest.
Sept. 3	47	Labourer -	Accident by the wheel of a waggon passing over him. Inquest.
„ 16	72	Farm labourer	Dropsy. Not certified.
Oct. 22	81	Farm labourer	Old age. Not certified.
„ 24	73	Farmer -	A seizure. Debility. Certified.
„ 21	73	Farmer -	Consumption. Not certified.
Nov. 17	65	Seaman, merchant service.	Paralysis. Certified.
„ 19	28	Ship carpenter	Congestion of lungs. Certified.
„ 23	44	Printer - -	Decline. Not certified.

Sub-District. - 2. St. Columb.

1859.			
Jan. 10	71	Farmer -	Gangrene in the foot. Certified.
Mar. 5	68	Retired watchmaker.	Natural decay. Certified.
„ 20	23	Farm labourer	Consumption. Not certified.
„ 19	57	Flour merchant	Diseased heart. Dropsy. Not certified.
„ 22	23	Master miller	Consumption. Not certified.
„ 23	34	Farmer -	Diseased brain following inflammation of the kidneys. Certified.
Apr. 14	66	Farmer -	Congestion of lung. Certified.
„ 28	67	Farmer -	Delirium tremens. Certified.
„ 29	61	Tailor, master	Diseased heart. Dropsy. Not certified.
„ 27	65	Farm labourer	Pneumonia. Not certified.
„ 20	19	Farm servant	Consumption. Certified.
May 27	51	Postboy -	Diseased liver. Not certified.
„ 29	19	Clerk - -	Consumption. Certified.
„ 29	56	Miner - -	Natural causes. Inquest.
June 11	10	Son of steward of steam ship.	Consumption. Certified.
„ 20	61	Farm labourer	Paralysis. Certified.
„ 22	64	Farmer -	Diseased brain. Certified.
„ 28	97	Farm labourer	Apoplexy. Certified.
July 8	63	Master mason	Apoplexy. Certified.
May 31	49	Idiot - -	Paralysis. Certified.
July 12	84	Farm labourer	Affection of bladder. Certified.
„ 18	63	Labourer -	Diseased heart. Inquest.
Aug. 7	75	Farm labourer	Diseased brain. Certified.
„ 14	51	Farmer -	Apoplexy. Inquest.
„ 28	25	Not stated -	Drowned bathing. Inquest.
Sept. 4	66	Road labourer	Asthma. Not certified.
„ 6	66	Farmer -	Diseased stomach. Certified.
„ 14	38	Master maltster	Consumption. Certified.
Nov. 29	28	Tin miner -	Consumption. Certified.
Dec. 1	19	Carpenter's apprentice.	Consumption. Not certified.
„ 1	21	Mariner -	Suffocation by inhaling carbonic acid gas in his sleeping cabin on board a vessel. Inquest.
„ 8	97	Farm labourer	Natural decay. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Dec. 27	77	Farm labourer	Natural decay. Not certified.
„ 26	33	Farmer -	Lock jaw, after amputation of leg. Not certified.
„ 28	66	Farmer -	Apoplexy. Inquest.
1860.			
Jan. 15	47	Farm labourer	Asthma. Diseased heart. Certified.
„ 22	75	Farm labourer	Natural decay. Not certified.
„ 31	69	Farm labourer	Bronchitis. Certified.
Feb. 1	76	General labourer	Softening of brain. Mortification. Certified.
„ 2	55	Farm labourer	General decline. Not certified.
„ 28	60	General labourer	Asthma and fits. Not certified.
„ 25	63	Boatman, Coast Guard.	Paralysis. Certified.
Mar. 11	38	Mason, master	Diseased liver and kidneys. Certified.
„ 31	68	Blacksmith, master.	General decline. Not certified.
Apr. 14	73	Farmer -	Pneumonia. Certified.
„ 29	89	Late officer in Customs.	General debility. Certified.
May 1	46	Farm labourer	Consumption. Certified.
„ 13	77	Cabinet maker	Age. Not certified.
„ 16	70	Farm labourer	Age. Certified.
„ 19	91	Farmer -	Age. Certified.
„ 23	65	Tin miner -	General decline. Certified.
„ 29	34	Farm servant	Pneumonia. Certified.
„ 28	62	Blacksmith -	Diseased heart. Certified.
June 1	59	Commission agent.	Effusion of blood on the lungs. Certified.
„ 2	74	Innkeeper -	Apoplexy. Asthma. Certified.
„ 3	74	Labourer -	Diseased heart. Certified.
„ 2	83	Farmer -	Natural decay. No medical attendant.
„ 13	21	Son of farmer	Cephalitis. Certified.
„ 12	69	Labourer -	Tumour in the bowels. Certified.
„ 30	45	Miner - -	Apoplexy. Not certified.
July 17	56	Farm labourer	Diseased heart. Not certified.
„ 24	72	Farmer - -	Influenza. Not certified.
„ 23	61	Farmer -	Hepatitis. Certified.
„ 31	57	Woolcomber -	Apoplexy. Certified.
Sept. 14	42	Soldier -	Natural causes. Inquest.
„ 17	64	Farmer -	Diseased heart. Not certified.
„ 28	73	Solicitor -	Cystitis. Diseased brain. Certified.
„ 26	22	Carpenter -	Leg crushed between the beaters and grater of a steam thrashing machine. Inquest.
Nov. 6	82	Land proprietor	Dropsy. Not certified.
Oct. 12	33	Master mariner	Slow typhus. Affection of brain. Certified.
Dec. 18	81	Farmer -	Gangrene foot. Not certified.
Sept. 30	81	Farmer -	Natural decay. Not certified.
1861.			
Jan. 3	70	Farm labourer	Cancer in the neck. Certified.
„ 9	80	Farm labourer	Paralysis. Not Certified.
„ 16	74	Tin miner -	Dropsy. Certified.
„ 26	54	Woolcomber, journeyman.	Pneumonia. Mortification. Certified.
„ 27	85	Farmer -	Natural decay. Not certified.
Feb. 4	74	Labourer -	Bronchitis. Certified.
„ 26	79	Labourer -	Bronchitis. Diseased lungs. Certified.
Mar. 11	84	Farm labourer	Debility and cough. Certified.
„ 17	84	Farm labourer	General debility. Certified.
Feb. 5	69	Farm labourer	Natural decay. Not certified.
Jan. 9	58	Farmer -	Natural decay. Not certified.
Feb. 3	55	Workman on board vessels	Decline. Not certified.
Mar. 26	83	Farmer -	Natural decay. Not certified.
„ 29	92	Farmer -	Natural decay. Not certified.
„ 29	82	Farmer -	Natural decay. Not certified.
Apr. 10	73	Wool merchant	Diarrhœa. Gout. Certified.
„ 10	85	Farm labourer	Natural decay. Not certified.
May 9	41	Farm labourer	Abscess in the groin. Not certified.
„ 17	47	Woolcomber, journeyman.	Diseased liver. Consumption. Certified.
„ 18	85	Blacksmith, master.	Natural decay. Not certified.
June 2	61	Farmer -	Hepatitis. Not certified.
„ 3	55	Farmer -	Brain fever. Certified.
„ 12	86	Farmer -	Natural decay. Not certified.
„ 17	80	Farmer -	Natural decay. Certified.
„ 29	22	Farmer -	Consumption. Certified.
1861			
July 6	15	Son of farm labourer.	Idiopathic tetanus. Certified.
„ 12	63	Farm labourer	Decline. Not certified.
„ 19	71	Farmer -	General debility. Not certified.
Aug. 3	58	Farmer -	Enlargement of heart. Certified.
„ 6	78	Tailor, master	Dropsy. Certified.
„ 10	68	Carpenter, master.	Chronic rheumatism. Not certified.
Sept. 7	86	Farmer -	Old age. Not certified.
„ 21	82	Farmer -	Natural decay. Not certified.
„ 25	65	Farmer -	Low fever. Pneumonia. Not certified.
Oct. 4	34	Carpenter, journeyman.	Consumption. Not certified.
„ 4	35	Draper's assistant.	Consumption. Certified.
„ 15	83	Farmer -	Old age. No medical attendant.
„ 24	74	Farm labourer	General decay. Not certified.
Nov. 19	76	Mason, master	Diseased heart. Certified.
Dec. 24	57	Woolsorter -	Abscess on the back. Not certified.
„ 27	61	Farm labourer	Apoplexy. Certified.

Sub-district - 3. Newlyn.

1859.			
Feb. 1	12	Son of agric. labourer.	Head crushed between the span beam and the stay of an arm of the cog-wheel of a thrashing machine. Inquest.
May 1	57	Farmer -	Decline. No medical attendant.
June 12	54	Blacksmith -	Lacerated wound of hand. Tetanus. Certified.
July 6	76	Agric. labourer	Old age. Certified.
Aug. 8	84	Farmer -	Old age. Not certified.
Oct. 15	26	Son of carpenter.	Debility. A cripple from infancy. Certified.
„ 23	74	Farmer -	Natural decay. No medical attendant.
„ 29	66	Postmaster -	Apoplexy. Certified.
Nov. 20	69	Gardener, master.	Pleuro-pneumonia. Certified.
„ 28	68	Agric. labourer	Dropsy. Certified.
1860.			
Jan. 29	52	Stone cutter -	Enteritis. Not certified.
Feb. 9	88	Carpenter -	Old age. Not certified.
Mar. 9	15	Son of agric. labourer.	Apoplexy. Certified.
„ 21	30	Lead-mine labourer.	Pulmonary consumption. Certified.
„ 31	71	Farmer -	Diseased heart. Certified.
Apr. 1	40	Agric. labourer	Phthisis. Hæmorrhage. Certified.
„ 11	10	Son of miller -	Fracture of skull. Certified.
„ 26	56	Lead-mine agent	Paralysis. Certified.
June 8	53	Agric. labourer	Debility. Not certified.
May 31	76	Agric. labourer	Natural decay. Not certified.
June 30	45	Carpenter -	Cancer, 2 years. Certified.
July 1	18	Son of lead-mine labourer.	Pulmonary consumption. Certified.
„ 24	50	Mason's assistant.	Killed by a cob wall falling upon him. Inquest.
„ 31	69	Lead - mine agent.	Bronchitis. Pulmonary disease. Certified.
„ 24	32	Mason -	Cystitis. Not certified.
Sept. 3	57	Engine worker	Pulmonary consumption. Certified.
Nov. 11	20	Lead miner -	Small-pox, 14 days. Certified.
„ 21	71	Farmer -	Dropsical effusion. Not certified.
1861.			
Jan. 4	20	Soldier -	Pulmonary disease. Certified.
„ 15	78	Lead miner, labourer.	Natural decay. No medical attendant.
Feb. 6	68	Farm labourer	Dropsical effusion. Certified.
Mar. 23	39	Farm labourer	Consumption. Certified.
May 5	80	Farm labourer	Natural decay. No medical attendant.
„ 7	75	Farmer -	Natural decay. No medical attendant.
July 5	55	Yeoman -	Diseased heart and liver. Certified.
„ 16	54	Lead dresser -	Diseased heart. Certified.
Oct. 5	68	Farm labourer	Hernia. Certified.
Nov 29	71	Agric. labourer	Apoplexy. Inquest.
Dec. 12	79	Blacksmith -	Retention of urine. Certified.
„ 18	68	Lead miner -	Suicide, by hanging. Inquest.

COUNTY OF CORNWALL.

Superintendent Registrar's District.

ST. AUSTELL.

Registrar's Sub-District.

1. Fowey.
2. St. Austell.
3. Mevagissey.
4. Grampound.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Fowey.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 2	73	Sawyer - -	Diseased kidney. Certified.
„ 8	59	Tanner -	Enlarged liver. Certified.
„ 15	64	Agric.labourer	Fever, 3 weeks. Erysipelas, 4 days. Certified.
„ 27	29	Copper miner	Pulmonic disease and hæmorrhage. Certified.
„ 8	55	Copper miner	Pulmonic disease and hydrothorax. Certified.
„ 15	60	Copper miner	Consumption, 12 months. Certified.
„ 25	41	Cordwainer, master.	Diseased lungs. Certified.
Mar. 23	55	Labourer -	Natural causes. Inquest.
Apr. 12	12	Son of miner -	Accident. Killed by falling down the shaft. Inquest.
„ 12	67	Labourer -	Natural decay. Certified.
„ 17	80	Druggist -	Natural causes. Certified.
„ 21	38	Copper miner	Consumption, 8 months. Certified.
„ 26	44	Ship carpenter	Dropsy. Not certified.
May 18	17	Son of wharfinger.	Typhus. Certified.
„ 18	15	Son of miner -	Accident. Killed falling down a shaft in West Fowey Consols Mine. Inquest.
„ 20	87	Agric.labourer	Old age. Not certified.
„ 21	49	Copper miner	Bronchitis. Certified.
„ 27	12	Son of butcher, master.	Typhus. Hydrocephalus, 3 days. Certified.
June 5	55	Copper miner	Fever. Certified.
„ 6	51	Copper miner	Diseased lungs. Gangrene. Certified.
„ 17	68	Shipwright -	Cancer in stomach. Certified.
„ 21	26	Seaman -	Phthisis. Certified.
„ 28	12	Son of copper miner.	Diphtheria. Certified.
July 25	44	Cordwainer, master.	Diphtheria, 2 days. Certified.
Aug 31	57	Copper miner	Apoplexy. Certified.
„ 26	57	Mine labourer	Asiatic cholera. Certified.
„ 31	69	Copper miner	Consumption, 2 years. Certified.
Sept. 1	14	Son of copper miner.	Enteritis. Certified.
„ 10	79	Agric.labourer	Water on chest, 4 years. Cramp in stomach. Certified.
„ 10	75	Farmer -	Paralysis. Apoplexy. Certified.
„ 17	11	Son of copper miner.	Low fever, 5 weeks. Cancrum oris, 1 week. Certified.
„ 17	13	Son of copper miner.	Scarlatina. Certified.
„ 20	72	Superannuated, Coast Guard.	Natural decay. Not certified.
„ 24	10	Son of copper miner.	Scarlatina, 3 weeks. Congestion of brain, 24 hours. Certified.
„ 30	49	Farmer -	Pericarditis effusion. Certified.
Oct. 17	52	Mine accountant	Atrophy. Certified.
„ 21	11	Son of copper miner.	Scarlatina. Certified.
Nov. 1	20	Copper miner	Pulmonary consumption. Certified.
Oct. 31	22	Copper miner	Typhus fever. Certified.
Nov. 5	54	Farmer -	Pulmonic disease. Rupture of blood vessel. Certified.
„ 5	66	Copper miner	Accident. Killed by falling down the shaft in Par Consols Mine. Inquest.
„ 30	18	Copper miner	Consumption. Certified.
„ 25	86	Proprietor of houses.	Old age. Not certified.
Dec. 5	65	Proprietor of houses.	Consumption. Not certified.
„ 6	68	Farmer - -	Congestive of lungs. Certified.
1859.			
Dec. 8	45	Coast Guard -	Nephritis. Certified.
„ 25	66	Copper miner	Asthma. Not certified.
„ 25	70	Shoemaker, journeyman.	Paralysis. Certified.
„ 28	17	Copper miner	Purpura hæmorrhagica. Certified.
„ 30	69	Copper miner	Tubercle hæmoptysis. Not certified.
1860.			
Jan. 15	57	Copper miner	Dropsy. Certified.
„ 22	21	Miner - -	Accident. Falling down a shaft in the Consols Mine. Inquest.
„ 26	75	Farmer -	Consumption. Not certified.
Feb. 2	58	Copper miner	Diseased lungs. Gout. Certified.
„ 3	77	Copper miner	Diarrhœa. Certified.
„ 1	72	Farm labourer	Natural decay. Certified.
„ 16	32	Mine agent -	Spasms of bowels. Certified.
„ 17	15	Son of labourer	Injuries: kick from a horse. Inquest.
„ 19	66	Farm labourer	Consumption, 18 months. Certified.
„ 22	70	Copper miner	Natural decay. Not certified.
„ 23	87	Shoemaker -	Diseased bladder. Certified.
Mar. 5	66	Copper miner	Hydrothorax. Certified.
„ 10	36	Tailor, journeyman.	Diseased lungs. Certified.
„ 21	75	Blacksmith -	Dropsy. Certified.
„ 24	68	Mine labourer	Pulmonic disease. Certified.
„ 22	45	Post messenger	Ulcerated intestines. Certified.
„ 28	58	Copper miner	Cancer. Certified.
Apr. 2	52	Copper miner	Pulmonic disease. Certified.
„ 4	64	Carpenter -	Congestion of liver and bowels from a fall. Inquest.
„ 8	68	Seaman, R.N.	Dropsy. Certified.
„ 22	64	Copper miner	Pulmonic disease. Certified.
May 3	76	Farmer - -	Water on chest and brain. Certified.
„ 18	37	Copper miner	Dropsy, 6 months. Certified.
„ 25	78	Farm labourer	Water on the chest. Certified.
„ 22	58	House proprietor	Cancer in stomach. Certified.
„ 30	24	Copper miner	Typhus. Certified.
June 15	23	Copper miner	Diseased lungs, 3 months. Certified.
„ 15	14	Son of copper miner.	Effusion of the brain. Certified.
„ 23	25	Shoemaker -	Consumption. Certified.
„ 24	70	Labourer -	Anasarca. Erysipelas. Certified.
July 1	75	Stonemason -	Bronchitis. Certified.
„ 5	16	Son of copper miner.	Typhus fever. Certified.
„ 8	24	Copper miner	Hydrothorax. Certified.
„ 2	85	Mine labourer	Natural decay. Not certified.
„ 9	15	Son of cordwainer.	Fever, 2 weeks. Congestion of brain, 12 hours. Certified.
„ 10	50	Copper miner	Pulmonic disease. Certified.
„ 15	23	Farm labourer	Typhoid fever, 7 weeks. Congestion of lungs. Certified.
„ 5	51	Innkeeper -	Suicide by hanging. Inquest.
„ 8	69	Mariner, master	Bronchitis, Dysentery. Certified.
„ 23	68	Proprietor of houses.	Heart disease, — years. Certified.
„ 24	61	Currier, master	Pulmonic disease. Certified.
Aug 14	21	Copper miner -	Consumption. Not certified.
Sept. 3	93	Mine agent -	Natural decay. Certified.
„ 6	68	Farmer -	Natural causes. Inquest.
„ 18	17	Son of copper miner.	Consumption, 6 weeks. Certified.
„ 20	21	Seaman, merchant service.	Typhus fever. Certified.
„ 20	22	Farm labourer	Accident; by his hand being caught in a thrashing machine. Inquest.
„ 27	66	Innkeeper and farmer.	Fever and pulmonic disease. Certified.
„ 22	18	Son of cooper, master.	Consumption. Certified.
Oct. 15	55	Copper miner -	Consumption. Certified.
„ 17	29	Grocer and farmer.	Fever. Certified.
„ 17	21	Miner -	Accident. Falling of ground on him in East Crinnis Mine. Inquest.
„ 23	51	Copper miner	Consumption. Certified.
Nov. 21	64	Farmer -	Consumption, 3 years. Certified.
Dec. 18	63	Copper miner -	Pulmonic disease. Certified.
1861			
Jan. 2	35	Son of copper miner.	Lepra, &c. Certified.
„ 3	83	Farmer -	Old age. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861			
Jan. 15	19	Son of gardener	Consumption, 11 months. Certified.
„ 29	62	Tailor, master	Phthisis, — years. Certified.
„ 22	10	Son of mine agent.	Peritonits. Certified.
„ 31	34	Mine carpenter	Pulmonic disease. Certified.
Feb. 12	33	Copper miner	Pulmonic disease. Certified.
Mar. 3	76	Carpenter, master.	Cancer of stomach, 7 years. Certified
„ 8	60	Barber, master	Pulmonic disease. Certified.
„ 9	87	Ropemaker, master.	Natural decay. Not certified.
„ 18	78	Mason, journeyman.	Paralysis. Certified.
„ 26	73	Miner -	Visitation of God. Inquest.
Apr. 1	69	Miner -	Pneumonia. Not certified.
„ 3	18	Tin miner -	Malignant smallpox, 17 days Certified.
„ 18	36	Miner -	Accident. Killed in Par Consols Mine. Inquest.
„ 26	69	Mine labourer	Stricture of œsophagus. Certified.
„ 28	32	Shipwright -	Pneumonia. Certified.
May 8	24	Lead smelter -	Pulmonary consumption. Certified.
„ 16	62	Mine labourer	Consumption. Not certified.
„ 23	53	Copper miner -	Consumption, 2 years. Certified.
„ 22	44	Gunner, R.A. -	Dropsy. Not certified.
June 4	23	Copper miner -	Consumption. Certified.
„ 17	45	Copper miner -	Ulceration of stomach. Certified.
„ 20	10	Son of copper miner.	Malignant typhus fever, 30 hours. Certified.
„ 23	45	Tin-plate worker master.	Hydrothorax. Certified.
July 8	38	Solicitor -	Phthisis. Certified.
„ 15	52	Copper miner -	Consumption, 12 months. Certified.
„ 28	50	Ropemaker, journeyman.	Malignant diseased intestines. Certified.
Aug. 9	58	Coast Guard -	Diseased brain. Certified.
„ 17	14	Son of tin dresser	Confluent smallpox. Certified.
„ 18	60	Mine carpenter	Pulmonary apoplexy. Certified.
„ 25	50	Copper miner -	Pulmonic disease. Certified.
„ 29	91	Agric. labourer	Old age. Certified.
„ 29	66	Mine labourer	Diseased heart, 3 years. Paralysis, 12 hours. Certified.
Sept 10	18	Son of copper miner.	Confluent smallpox. Certified.
„ 15	77	Carpenter, master.	Natural decay. Not certified.
„ 20	75	Mine labourer	Natural decay. Certified.
„ 14	35	Mine agent -	Accident. Wheel of a waggon passing over him. Inquest.
„ 29	19	Miner -	Explosion of gunpowder in West Fowey Consols. Inquest.
Oct. 2	77	Gardener, master.	Diseased heart. Dropsy. Certified.
„ 1	49	Cordwainer, master.	Diabetes. Certified.
„ 5	24	Copper miner -	Confluent smallpox. Certified.
„ 7	69	Farmer -	Hydrothorax. Certified.
„ 18	72	Road labourer	Diseased heart. Anasarca. Certified.
Nov. 7	62	Copper miner -	Pulmonic disease. Certified.
„ 30	23	Copper miner -	Consumption. Certified.
Dec. 1	69	Farm labourer	Epilepsy. Certified.
„ 16	10	Son of copper miner.	Effusion on the brain. Certified.
„ 26	70	Cordwainer, master.	Cystitis. Certified.
„ 25	54	Copper miner -	Consumption, 15 years. Certified.

Sub-District - 2. St. Austell.

1859.			
Jan. 3	80	Tin streamer -	Old age. No medical attendant.
„ 7	44	Gardener -	Organic disease of abdomen, 8 years. Fever, 4 weeks. Certified.
„ 8	32	Tin miner -	Phthisis. Certified.
„ 13	29	Son of saddler	Fit. Not certified.
„ 18	56	Miner -	Consumption, 2 years. Certified.
„ 17	63	Merchant	Malignant disease of bowels. Certified.
„ 22	68	Tin miner -	Bronchitis. Certified.
„ 28	47	Blacksmith -	Consumption. Not certified.
1859			
Feb. 5	61	Tailor -	Dropsy. Not certified.
„ 14	70	Carpenter -	Cancer of the liver. Certified.
„ 18	35	Farm labourer	Decline. Not certified.
„ 17	67	Miner - -	Inflammation of bowels. Not certified.
„ 19	74	Mine agent -	Cancer of the stomach. Certified.
„ 23	62	Surgeon -	Gout. Epilepsy. Certified.
„ 26	82	Labourer -	Old age. Not certified.
„ 25	23	Farm labourer	Pulmonary consumption, 1 year. Certified.
„ 25	63	Saddler -	Diseased brain, 2 years. Paralysis, 6 hours. Certified.
Mar. 1	12	Son of miller -	Injuries. Accident, falling near a cart wheel in motion, passed over his head. Inquest.
„ 17	80	Labourer -	Paralysis. Certified.
„ 20	79	Labourer -	Diseased brain, some months. Certified.
„ 24	13	Son of labourer	Consumption. Certified.
„ 29	87	Shoemaker -	Old age. Certified.
Apr. 6	77	Farm labourer	Suicide by hanging. Inquest.
„ 8	33	Miner - -	Pulmonary consumption, 3 years. Certified.
„ 17	76	Miner - -	Bronchitis, 1 week. Certified.
„ 15	70	Tin streamer -	Old age. Certified.
„ 11	11	Son of tin miner	Killed by falling into an open mine shaft while in search of birds' nests. Inquest.
„ 20	58	Farm labourer	Disease of stomach. No medical attendant.
May 1	38	Clay labourer	Epileptic fits. No medical attendant.
„ 4	14	Son of carpenter	Congestion of liver. Apoplexy. Certified.
„ 6	38	Miner - -	Disease of stomach. Certified.
„ 2	19	Waggoner -	Accident: killed by the wheels of a waggon passing over him. Inquest.
„ 23	10	Son of clay labourer.	Phthisis. Certified.
„ 27	57	Rag gatherer -	Paralysis, 1 year. Softening of brain. Certified.
June 4	54	Labourer -	Phthisis. Certified.
„ 19	12	Son of blacksmith.	Pneumonia. Not certified.
„ 24	62	Miner - -	Accident: killed by a rock falling on him. Inquest.
„ 30	57	Miner - -	Seizure. Not certified.
July 7	32	Clay labourer	Diseased lungs. Not certified.
„ 8	76	Miner - -	Old age. No medical attendant.
„ 12	69	Miner - -	Diseased kidneys. Certified.
„ 19	27	Tin miner -	Fracture of spine, 15 weeks. Paralysis. Certified.
„ 23	77	Street pavior	Seizure. Not certified.
„ 27	70	Miner - -	Consumption. Certified.
„ 30	76	Clay labourer	Not known. No medical attendant
„ 30	68	Farmer - -	Dropsy. Not certified.
„ 31	24	Hair dresser -	Epilepsy. Certified.
Aug. 1	16	Son of farmer	Cephalitis. Not certified.
„ 2	21	Tin miner -	Phthisis. Certified.
„ 7	82	Woolcomber -	Old age. Certified.
„ 10	73	Husbandman	Decay of nature. Not certified.
„ 17	82	Miner - -	Decay of nature. No medical attendant.
„ 19	80	Shoemaker -	Paralysis. Certified.
„ 24	10	Son of labourer	Phthisis. Certified.
„ 26	43	Schoolmaster	Consumption. Certified.
„ 25	63	Mine blacksmith	Diseased heart, 1 year. Certified
Sept. 1	13	Son of farmer	Abscess. Certified.
Aug. 31	88	Parish clerk -	Senile decay. Certified.
Sept. 8	13	Son of miner	Scrofula. Certified.
„ 9	70	Carpenter -	Natural causes. Inquest.
„ 22	75	Farmer - -	Decay of nature. Not certified.
„ 28	27	Miner - -	Diseased lungs. Not certified.
„ 29	65	Labourer -	Cancer of the stomach. Certified.
„ 28	60	Labourer -	Diseased heart, 2 years. Asthma.
Oct. 1	27	Tin miner -	Fever. Certified.
„ 1	26	Carpenter -	Nephria. Coma, 2 days. Certified.
„ 14	19	Quarryman -	Consumption. No medical attendant.
„ 23	25	Labourer -	Diseased larynx. Certified.
„ 24	50	Tin streamer -	Chronic bronchitis. Dropsy. Certified.
„ 28	66	Annuitant -	Chronic gout. — years. Certified
Nov. 2	26	Clay labourer	Consumption. Not certified.
„ 5	75	Mine blacksmith	Bronchitis. Certified.
„ 4	54	Miner - -	Consumption. Not certified.
„ 8	89	Miller - -	Bronchitis, 3 weeks. Certified.
„ 7	50	Clay agent -	Typhoid fever, 1 week. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Nov. 8	62	Accountant -	Dropsy. Certified.
„ 13	28	Lead smelter -	Diphtheria. Certified.
„ 17	78	Confectioner -	Old age. No medical attendant.
„ 15	21	Copper miner	Consumption, 1 year. Certified.
„ 19	54	Miner - -	Bronchitis, 1 year. Certified.
„ 23	23	Clay labourer	Lumbar abscess, — years. Certified.
Dec. 2	76	Engineer -	Natural causes. Inquest.
„ 6	10	Son of quarryman.	Fever. Pneumonia. Not certified.
„ 6	74	Farmer - -	Phlegmon, 1 week. Certified.
„ 13	38	Miner - -	Phthisis. Certified.
„ 13	22	Clay labourer	Consumption. No medical attendant.
„ 17	13	Tin streamer -	Scarlatina. Not certified.
„ 18	17	Mine labourer	Scarlatina, 5 weeks. Renal epilepsy, 3 weeks. Certified.
„ 27	37	Clay labourer	Diseased heart, 3 years. Bronchitis. Certified.
1860			
Jan. 3	59	Baker - -	Epilepsy. Apoplexy. Certified.
„ 7	54	Farmer -	Pneumonia. Not certified.
„ 18	24	Clay labourer	Diphtheria, 10 days. Phthisis, 11 months. Certified.
„ 21	29	Shopkeeper -	Abscess. Not certified.
„ 21	64	Miner - -	Apoplexy, 8 hours. Certified.
„ 30	83	Shoemaker -	Old age. Not certified.
Feb. 4	15	Not stated -	Diseases of spine, 15 years. Certified.
„ 10	80	Tin streamer -	Old age. No medical attendant.
„ 16	53	Farmer -	Consumption. Certified.
„ 14	77	Mason - -	Senile decay. Certified.
„ 19	74	Tallow chandler	Diseased heart. Bronchitis. Certified.
„ 23	74	Malster -	Strangulated hernia. Certified.
„ 23	56	Farmer -	Bronchitis, 14 days. Certified.
„ 28	77	Farmer -	Hydrothorax. Certified.
Mar. 8	50	Miner - -	Gangrene of lungs. Certified.
„ 8	76	Tin streamer -	Seizure. Not certified.
„ 10	46	Engine worker	Pneumonia, 14 days. Certified.
„ 15	89	Farmer -	Old age. No medical attendant.
„ 17	11	Son of miner	Diarrhœa and fever. Certified.
„ 18	42	Land surveyor	Suppression of urine. Dropsy. Certified.
„ 22	74	Farm labourer	Senile decay. Certified.
Apr. 5	55	Tin miner -	Diseased heart and lungs. Certified.
Mar. 16	70	Agent of clay works.	Natural causes. Inquest.
Apr. 10	50	Miner - -	Miners' consumption. Not certified.
„ 8	53	Wheelwright -	Tuberculosis. Certified.
„ 18	43	Dealer in marine stores.	Abscess on brain, 14 days. Certified.
„ 21	45	Labourer -	Diseased kidneys. Certified.
May 19	40	Sawyer -	Pulmonary consumption, 1 year. Certified.
„ 19	82	Labourer -	Senile decay. Certified.
„ 30	26	Miner - -	Consumption. Certified.
June 8	52	Miner - -	Miners' consumption. Gangrene of lungs. Certified.
„ 4	18	Mariner -	Congestion of lungs. Inquest.
„ 13	70	Miner - -	Bronchitis. Certified.
„ 25	55	Miner - -	Hepatitis, 6 years. Certified.
July 4	78	Labourer -	Old age. Certified.
„ 8	34	Farmer -	Fever. Not certified.
„ 9	28	Tin miner -	Softening of brain. Certified.
„ 13	61	Miner - -	Consumption, 2 years. Certified.
„ 16	14	Tin smelter -	Fever. Certified.
„ 13	79	Miller - -	Old age. Not certified.
„ 16	28	Blacksmith -	Accident. Falling from the bob flat in North Codra Mine. Inquest.
Aug. 3	27	Tin miner -	Fever. Certified.
„ 4	15	Mine labourer	Fever. Certified.
„ 14	44	Engine worker	Consumption. No medical attendant.
Sept. 13	53	Mine labourer	Diseased heart. Dropsy. Certified.
„ 22	37	Veterinary surgeon.	Obstruction of bowels, 24 hours. Enteritis. Certified.
„ 26	41	Marine pensioner.	Consumption. Not certified.
„ 27	66	Farm labourer	Senile decay. Certified.
Oct. 22	22	Miner - -	Accident. Falling over a cliff. Inquest.
Nov. 7	46	Clergyman -	Phrenitis, 3 days. Serous effusion. Certified.
„ 19	71	Ship carpenter	Old age. Not certified.
1860.			
Nov. 21	54	Clay labourer	Pneumonia, 6 months. Dropsy. Certified.
Dec. 4	13	Son of tin miner.	Diseased kidneys. Not certified.
Nov. 23	61	Miner - -	Accident. Killed in St. Crinnis mine. Inquest.
„ 27	40	Miner - -	Accident. Falling down a shaft in Cuddra mine. Inquest.
Dec. 11	42	Master mariner	Heart disease, 1 year, Certified.
„ 22	43	Carpenter -	Abscess, 10 years. Dropsy. Certified.
„ 24	49	Farm labourer	Phthisis, 8 years. Certified.
„ 26	70	Tin streamer -	Old age. Not certified.
„ 26	63	Miner - -	Asthma, Miner's consumption. Certified.
„ 29	56	Imbecile -	Softening of brain. Certified.
„ 30	82	Shoemaker -	Bronchitis. Certified.
„ 20	27	Miner - -	Accident. Falling down a mine shaft. Inquest.
„ 27	66	Tailor - -	Found dead. Inquest.
1861			
Jan. 1	75	Labourer -	Stricture of œsophagus. Certified.
„ 4	60	General labourer	Chronic bronchitis, 3 years. Certified.
„ 5	88	Mine labourer	Old age. Not certified.
„ 7	49	Cooper - -	Accident. Shot himself. Inquest.
„ 10	53	Miner - -	Miners' consumption. No medical attendant.
„ 10	47	Miner - -	Tumour on the back. Not certified.
„ 18	93	Farm labourer	Senile decay. Certified.
„ 24	65	Blacksmith -	Carbuncle. Certified.
„ 24	83	Farmer -	Old age. Not certified.
„ 24	43	Mason - -	Consumption, 2 years. Certified.
Feb. 1	69	Mine carpenter	Epilepsy. Apoplexy. Certified.
Jan. 22	40	Miner - -	Accident. Fall down a shaft in Charlestown United Mines. Inquest.
Feb. 5	79	Farmer - -	General dropsy. Certified.
„ 14	58	Tin miner -	Consumption, — years. Certified.
„ 11	66	Iron founder -	Bronchitis. Debility. Certified.
Jan. 13	73	Labourer -	Natural causes. Inquest.
Mar. 6	71	Farmer - -	Old age. Not certified.
„ 12	32	Seaman, merchant service.	Consumption. Certified.
„ 19	71	Labourer -	Old age. Not certified.
„ 21	49	Miner - -	Fever. Disease of liver. Certified.
„ 23	106	Carpenter -	Senile decay. Certified.
„ 26	47	Agric. labourer	Pulmonary congestion. Inquest.
„ 28	23	Clay labourer	Fever. Certified.
„ 28	28	Miner - -	Pulmonary consumption, 1 year. Certified.
Mar. 30	39	Vagrant -	Phthisis. Certified.
„ 31	47	Horsekeeper -	Bronchitis. Certified.
April 5	16	Tin streamer -	Accident. Killed on the Par and Newquay railway. Inquest.
„ 5	31	Moulder -	Consumption, 12 months. Certified.
„ 9	66	Tallow chandler	Over exertion. Congestion of liver, 1 day. Certified.
„ 11	54	Tin streamer	Seizure. Not certified.
„ 12	72	Carpenter -	Diseased heart, 2 years. Dropsy, 3 month. Certified.
„ 17	80	General labourer	Senile decay. Certified.
„ 18	28	Tin miner -	Consumption, 2 years. No medical attendant.
„ 18	18	Tin streamer	Consumption. No medical attendant.
„ 21	15	Son of clay labourer.	Consumption. Not certified.
„ 17	45	Labourer -	Natural causes. Inquest.
„ 30	55	Miner - -	Miners' consumption. Not certified.
„ 27	57	Clay labourer	Fever, 14 days. Gangrene of lungs. Certified.
May 7	68	Blacksmith -	Bronchitis. Certified.
„ 9	52	Tin miner -	Diseased spinal cord. Certified.
1860.			
Dec. 4	13	Son of tin miner	Diseased kidneys. Not certified.
1861.			
May 14	10	Son of mine proprietor.	Typhus fever. Not certified.
„ 25	71	Shoemaker -	Consumption. Certified.
„ 25	76	Farm labourer	Senile decay. Certified.
June 1	42	Engine worker	Enteritis. Not certified.
May 27	68	Carpenter -	Seizure. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861			
June 8	20	Generallabourer	Consumption. Not certified.
„ 12	57	Tin miner -	Consumption. No medical attendant.
„ 15	14	Farm labourer	Scrofula. Diseased hip joint, 3 months. Certified.
„ 18	20	Currier -	Consumption. No medical attendant.
„ 22	67	Woolstapler -	Jaundice, 10 days. Congestion of kidneys. Certified.
„ 25	17	Clay labourer	Consumption. Not certified.
„ 25	52	Shoemaker -	Chronic abscess. Phthisis. Certified.
July 1	66	Builder -	Diabetes, 18 months. Hæmorrhage from stomach and bowels, 12 hours. Certified.
„ 5	10	Son of copper miner.	Confluent small pox. Certified.
„ 17	71	Farm labourer	Senile decay. Certified.
„ 23	53	Miner -	Miners' consumption. Not certified.
„ 30	48	Clay labourer	Cancer. Not certified.
„ 31	27	Clay labourer	Typhoid fever, 10 days. Peritonitis, 3 days. Certified.
Aug. 1	68	Miner -	Consumption, 2 years. Certified.
„ 30	21	Miner -	Accident. Falling down a shaft in Gunbarrow Mine. Inquest.
Sept. 7	10	Son of tin miner	Phthisis, 3 months. Certified.
„ 12	65	Miner -	Paralysis, 2 years. Certified.
„ 12	15	Tin streamer	Typhus, 15 days. Certified.
„ 12	64	Farmer -	Natural causes. Inquest.
„ 26	64	Copper miner	Typhus, 3 weeks. Certified.
„ 27	18	Tin miner -	Fever. Congestion of brain. Certified.
„ 25	84	Farmer -	Old age. Certified.
Oct. 1	78	Tin streamer	Diarrhœa. Certified.
„ 3	26	Tin miner -	Diarrhœa. Bloody flux. Not certified.
„ 6	33	Miner -	Miners' consumption. Not certified.
„ 8	59	Farmer -	Enlargement of heart. Certified.
„ 18	67	Farmer -	Age. Not certified.
„ 16	21	Farm labourer	Diseased heart. Inquest.
Nov. 14	25	Mason -	Cephalitis. Not certified
„ 18	65	Tin streamer	Senile decay. Certified.
„ 19	51	Miner -	Bronchitis. Certified.
„ 20	59	Carpenter -	Decline. Not certified.
„ 23	19	Clay labourer	Typhus. Not certified.
„ 26	55	Miner -	Consumption, 15 months. Certified
„ 25	59	Schoolmaster	Pneumonia, 1 day. Suffocation, 2 hours. Certified.
„ 28	70	Wheelwright	Typhus, 14 days. Certified.
„ 30	22	Farm labourer	Tuberculosis. Peritonitis, 14 days, Certified.
Dec. 1	90	Gardener -	Old age. Not certified.
„ 8	61	Clay labourer	Dropsy. Not certified.
„ 10	39	Schoolmaster	Pneumonia. Not certified.
„ 11	85	Iron manufacturer.	Gangrene of feet. Certified.
„ 20	20	Shoemaker -	Diseased heart. Dropsy, 3 weeks. Certified.
„ 20	26	Miner -	Accident by rubble falling on him in Gunbarrow Mine. Inquest.
30	52	Tin streamer	Cancer of stomach, 2 years. Certified.

Sub-district - 3. Mevagissey.

1859.			
Jan. 28	85	Land owner -	Old age. Certified.
Mar 22	45	Farm labourer	Consumption. Not certified.
„ 24	21	Farm labourer	Phthisis. Certified.
April 1	73	Farm labourer	Natural decay. Certified.
„ 24	69	Farmer -	Phthisis. Certified.
May 12	40	Gardener -	Extensial ulcer. Certified.
„ 17	75	Farmer -	Dropsy. Certified.
„ 15	38	Shipwright -	Phthisis, Certified.
July 10	82	Farmer -	Natural decay. No medical attendant.
„ 16	30	Tin miner -	Thigh crushed between the cog wheels of a steam stamping engine. Inquest.
Aug. 3	72	Mason - -	Retention of urine, 9 days. Cystitis, 3 days. Certified.
Sept. 11	27	Blacksmith -	Drowned by the upsetting of a boat through drunkenness. Inquest.
1859			
Sept. 11	20	Tailor -	Drowned by the upsetting of a boat through drunkenness. Inquest.
„ 11	18	Copper miner	Drowned by the upsetting of a boat through drunkenness. Inquest.
„ 11	21	Carrier -	Drowned by the upsetting of a boat through drunkenness. Inquest.
„ 18	73	Agric. labour.	Sudden. Inquest.
Nov. 11	22	Tin miner -	Slow typhus. Certified.
„ 25	59	Victualler -	Cancer. Certified.
1860.			
Jan. 1	82	Farm labourer	Natural decay. No medical attendant.
„ 7	29	Tin miner -	Pneumonia. Certified.
„ 31	19	Son of farm labourer -	Phrenitis. Certified.
„ 28	65	Tin miner -	Hepatitis. Certified.
Feb. 17	68	Farm labourer	Phthisis. Certified.
„ 18	26	Farmer -	Consumption. No medical attendant.
„ 22	79	Farm labourer	Natural decay. Certified.
Mar. 9	19	Farm labourer	Abscess on the brain. Certified.
April 3	13	Son of fisherman	Injury. Accidental cut. Tetanus. Inquest.
„ 5	62	Farm labourer	Decline. No medical attendant.
„ 29	25	Farmer -	Phthisis. Certified.
„ 28	70	Ropemaker -	Bronchitis. Certified.
May 22	27	Farm labourer	Phthisis. Certified.
June 8	80	Sawyer- -	Palsy. Certified.
July 8	70	Cooper - -	Natural decay. No medical attendant.
„ 22	24	Blacksmith -	Abscess in the side. Certified.
Oct. 2	76	Farmer -	Dropsy. No medical attendant.
„ 6	75	Yeoman -	Hydrothorax. Certified.
„ 10	79	Fisherman -	Ascites. Certified.
Nov. 6	81	Fisherman -	Ascites. Certified.
„ 11	86	Fisherman -	Natural decay. No medical attendant.
„ 15	33	Farmer -	Gastralgia. Certified.
„ 27	59	Tin miner -	Decline. Asthma. Not certified.
1861.			
Jan. 6	85	Carpenter -	Natural decay. Certified.
Mar. 1	21	Carpenter -	Scrofula. Certified.
„ 21	47	Tin miner -	Apoplexy. Certified.
„ 30	16	Son of Coast Guard.	Phthisis. Certified.
Apr. 9	76	Farm labourer	Hydrothorax. Certified.
„ 15	12	Son of farmer	Ileus. Certified.
„ 17	25	Carpenter -	Consumption. Certified
May 14	73	Farmer -	Paralysis. Certified.
„ 26	18	Son of fisherman.	Epilepsy. Certified.
June 19	72	Ship carpenter	Diseased heart. Inquest.
July 1	74	Farm labourer	Natural decay. Not certified.
„ 19	61	Woodman -	Hepatitis. Certified.
„ 28	60	Master, merchant seaman.	Cancer of stomach. Certified.
Aug. 4	36	Fish carrier -	Phthisis. Certified.
„ 12	72	Farm labourer	Pressure on brain. Not certified.
„ 27	27	Farm labourer	Congestion of brain. Certified.
Oct. 7	79	Farm labourer	Rupture of bloodvesssel. Certified.
„ 10	54	Farm labourer	Natural decay. No medical attendant.
Nov. 13	20	Tin miner -	Lumbar abscess. Certified.
„ 27	34	Fisherman -	Phthisis. Certified.

Sub-district - 4. Grampound.

1859.			
Jan. 14	77	Agric. labourer	Old age. No medical attendant.
Feb. 8	64	Farmer -	Organic disease of stomach. Certified.
„ 7	29	Tin miner -	Injuries while at work under ground in St. Austell's Consols Mine by a rock falling on him. Inquest.
„ 23	41	Shoemaker, master.	Asthma, and diseased heart. Certified.
„ 28	78	Master mason	Old age. Fracture of thigh bone. Certified.

COUNTY OF CORNWALL.

Superintendent Registrar's District.	Registrar's Sub-District.
TRURO.	1. Probus. 2. St. Just. 3. St. Agnes. 4. St. Clement. 5. Kenwyn. 6. Kea.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Probus.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Jan. 4	56	Farmer -	Debility after fever. Certified.
Feb. 9	22	Seaman, merchant service.	Bilious fever. Not certified.
May 7	77	Agric. labourer	Paralysis. No medical attendant.
June 6	62	Farmer -	Atrophy. Certified.
Sept. 5	25	Blacksmith, journeyman.	Consumption. Certified.
„ 11	24	Farmer -	Scarlet fever. Certified.
„ 24	86	Tailor, master	Age. Not certified.
Oct. 4	77	Agric. labourer	Typhus, 2 weeks. Certified.
„ 10	78	Agric. labourer	Old age. Certified.
„ 31	77	Agric. labourer	Old age. No medical attendant.
Nov. 12	13	Son of agricultural labourer.	Typhus. Certified.
1860			
Feb. 15	71	Agric. labourer	Paralysis. Certified.
„ 15	53	Agric. labourer	Asthma. Certified.
„ 20	66	Basket maker	Bronchitis. Certified.
Mar. 7	11	Son of agricultural labourer	Scarlatina. Dropsy. Certified.
„ 28	35	Policeman -	Consumption. Not certified.
Apr. 23	82	Gardener -	Age. No medical attendant.
June 20	15	Agric. labourer	Abscess in groin. No medical attendant.
July 30	31	Mason, journeyman.	Typhus. Certified.
Oct. 17	78	Watchmaker, master.	Paralysis. Not certified.
Nov. 11	75	Farmer -	Bronchitis. Certified.
„ 18	73	Dealer in marine stores.	Found dead. Inquest.
Dec. 12	18	Agric. labourer	Abscess on brain. Not certified.
1861			
Jan. 2	70	Agric. labourer	Dropsy. Certified.
„ 15	61	Agric. labourer	Typhus fever. Certified.
„ 11	87	Farmer -	Age. No medical attendant.
Mar. 22	79	Agric. labourer	Age. No medical attendant.
Apr. 2	27	Farmer -	Pneumonia. Certified.
„ 30	79	Agric. labourer	Age. Certified.
May 2	39	Agric. labourer	Typhus. Certified.
„ 9	48	Shoemaker -	Fever. Certified.
June 4	68	Farmer -	Fever. Certified.
„ 5	62	Agric. labourer	Asthma. Certified.
„ 9	10	Son of shoemaker.	Phthisis, many months. Certified.
July 5	67	Agric. labourer	Fever. Certified.
„ 20	78	Farmer -	Diseased, prostate. Certified.
„ 20	18	Carpenter -	Brain fever. Certified.
Aug. 23	59	Mason, master	Injury to spine. Certified.
Nov. 21	88	Clergyman -	Age. Certified.
Dec. 4	23	Agric. labourer	Typhus. Certified.
„ 6	62	Agric. labourer	Pneumonia. Not certified.
„ 20	86	Farmer -	Age. No medical attendant.

Sub-District - 2. St. Just.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Jan. 23	58	Farm labourer	Congestion of brain. Certified.
„ 21	51	Gamekeeper -	Accident. Drowned by falling into a mill pond. Inquest.
Feb. 3	75	Farm labourer	Malignant ulceration. Certified.
„ 12	88	Farm labourer	Old age. Not certified.
Apr. 9	66	Ship carpenter	Scirrhus : stomach. Certified.
„ 26	20	Son of farm labourer.	Small pox. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1859			
Feb. 28	43	Tin miner -	Convulsions. Not certified.
Apr. 1	25	Tin miner -	Decline. Not certified.
„ 7	74	Tin miner -	Decline. No medical attendant.
„ 25	77	Carpenter, master.	Old age. No medical attendant.
„ 27	75	Tin miner -	Consumption. Not certified.
July 13	75	Farmer -	Old age. Not certified.
„ 17	33	Master miller	Diseased kidneys, 1 year. Certified.
Aug. 22	66	Agric. labourer	Decline. Not certified.
„ 30	79	Farmer -	Decline. Not certified.
Sept. 4	57	Agric. labourer	Suffocation, Disease of windpipe. Inquest.
„ 25	63	Agric. labourer	Internal cancer, 10 months. Certified.
„ 30	76	Grocer - -	Diseased kidneys. Certified.
Oct. 29	40	Clay labourer-	Injuries in a clay pit by some ground falling on him. Inquest.
Nov. 19	39	Stone quarry labourer.	Consumption. Not certified.
„ 21	11	Son of cattle dealer.	Concussion of brain: thrown from a horse. Inquest.
Dec. 1	77	Farmer -	Old age. Not certified.
1860.			
Jan. 3	78	Farmer -	Old age. No medical attendant.
„ 11	43	Grocer -	Decline. Not certified.
„ 13	90	Agric. labourer	Asthma. Old age. Certified.
„ 30	83	Woolcomber -	Old age. No medical attendant.
Feb. 8	90	Innkeeper -	Old age. No medical attendant.
„ 8	36	Tin miner -	Decline. Not certified.
„ 14	88	Agric. labourer	Old age. Certified.
Mar. 3	65	Agric. labourer	Decline. Not certified.
„ 14	66	Carpenter, master.	Bronchitis. Certified.
Apr. 3	61	Blacksmith -	Diseased liver. Not certified.
„ 6	66	Innkeeper -	Cephalitis. Certified.
„ 15	63	Tin miner -	Diseased kidneys. Certified.
„ 26	62	Mining clerk-	Diseased heart. Inquest.
May 8	67	Farmer -	Decline. Not certified.
„ 28	76	Farmer -	Congestion of lungs. Certified.
June 9	10	Son of miner -	Pneumonia. Congestion. Certified.
„ 30	37	China clay labourer.	Fever. Not certified.
Aug. 23	75	Farmer -	Old age. Not certified.
„ 26	27	China clay labourer.	Typhus. Not certified.
Sept. 6	73	Farmer -	Dropsy. Not certified.
„ 16	68	Seaman -	Old age. Not certified.
„ 30	38	Tin miner -	Diseased heart. Not certified.
Oct. 7	96	Agric. labourer	Old age. Not certified.
„ 24	34	Tin miner -	Decline. Not certified.
„ 29	28	Tin miner -	Diseased kidneys and consumption. Certified.
Nov. 28	75	Carpenter, master.	Old age. Not certified.
Dec. 4	56	Agric. labourer	Paralysis. Certified.
„ 21	59	Tin miner -	Decline. Not certified.
1861.			
Jan. 6	71	Farmer -	Old age. Not certified.
„ 29	74	Agric. labourer	Dropsy. Certified.
Feb. 14	74	Quarryman -	Pneumonia. Not certified.
Mar. 1	76	Carpenter,	Old age. Not certified.
„ 20	87	Woolstapler -	Old age. Not certified.
Apr. 7	64	Farmer -	Injuries: thrown out of a carriage. Inquest.
„ 20	15	Son of farmer	Typhus fever. Not certified.
„ 29	60	Agric. labourer	Pneumonia. Not certified.
May 8	52	Shoemaker, master.	Cancer. Not certified.
„ 14	45	Clay labourer	Smallpox. Certified.
„ 31	37	Agric. labourer	Smallpox. Not certified
„ 31	77	Clay labourer	Old age. No medical attendant.
June 11	28	Farmer -	Strumous disease of brain. Certified.
„ 18	48	Quarryman -	Smallpox. Not certified
„ 20	28	Clay labourer	Inflammation. Certified.
Aug. 6	59	Clay labourer	Diseased heart. Not certified.
„ 13	55	Farmer -	Decline. Not certified.
Oct. 9	67	Butcher -	Endocarditis. Certified.
„ 13	81	Agric. labourer	Decline. Not certified.
Nov. 5	73	Agric. labourer	Diarrhœa. Certified.
„ 17	50	Farmer -	Dropsy. Not certified.
Dec. 5	11	Son of miller -	Pressure of the brain. Not certified.

COUNTY OF CORNWALL.

When Died.	Age	Occupation.	Cause of Death.
1859			
May 6	56	Greenwich pensioner.	Hydrothorax Certified.
„ 12	79	Farm labourer	Old age. Not certified.
„ 22	75	Boatman -	Small pox. Certified.
„ 21	19	Son of boat builder.	Small pox. Certified.
„ 9	58	Fisherman -	Disease of stomach. Certified.
„ 22	82	Landed proprietor.	Infirmities of age. Certified.
June 9	17	Son of innkeeper.	Typhus fever. Certified.
July 7	80	Innkeeper -	Paralysis. Certified.
„ 7	84	Boatbuilder -	Old age. Certified.
„ 14	78	Farmer -	Old age. Certified.
Aug. 14	47	Farm labourer	Peritonitis. Certified.
„ 16	78	Farm labourer	Old age. Certified.
„ 25	78	Farmer -	Dropsy. Certified.
Dec. 29	86	Farm labourer	Age. Certified.
„ 31	11	Son of farm labourer.	Hydrocephalus. Certified.
1860			
Jan. 18	41	Farmer -	Consumption, 2 months. Certified.
„ 27	12	Son of shoemaker	Concussion of brain. Effusion. Certified.
Feb. 17	62	Farmer -	Gastritis. Certified.
„ 26	83	Miller - -	Age. Certified.
Mar. 15	23	Son of farmer	Phthisis. Certified.
„ 22	36	Farmer -	Phthisis. Not certified.
„ 22	60	Farmer -	General decay. Certified.
„ 23	88	Farmer -	Old age. Certified.
Apr. 4	83	Cordwainer -	Retention of urine. Certified.
„ 7	76	Farmer -	Age. No medical attendant.
„ 23	77	Mason - -	Age. Certified.
May 29	21	Mariner -	Concussion of brain. Certified.
June 5	77	Road labourer	Erysipelas. Certified.
„ 8	69	Farmer -	Apoplexy. Certified.
„ 15	20	Farm labourer	Rheumatism. Certified.
„ 15	31	Farm labourer	Phthisis. Certified.
„ 16	14	Son of fisherman	Phthisis. Certified.
„ 2	64	Mason, master	Decay of nature. Certified.
July 16	67	Butcher -	Gastralgia. Certified.
June 30	23	Seaman, merchant service	Phthisis, 5 months. Certified.
Aug. 2	47	Farmer -	Scirrhus of pylorus. Certified.
„ 19	83	Farmer and butcher.	Old age. Not certified.
„ 26	25	Policeman -	Diseased heart. Certified.
Sept. 2	82	Farmer -	Age. Certified.
„ 10	41	Farm labourer	Mesenteric disease. Certified.
„ 30	72	Farmer -	Paralysis. Certified.
Oct. 10	13	Son of fisherman	Consumption. Not certified.
Sept. 29	31	Shoemaker, journeyman.	Fever. Certified.
Nov. 27	68	Not stated -	Paralysis. Certified.
Dec. 5	77	Blacksmith -	Natural causes. Certified.
„ 9	84	Farm labourer	Paralysis. Not certified.
„ 9	83	Tailor, master	Age. Certified.
„ 4	76	Master, R.N.	Bronchitis. Certified.
1861			
Jan. 14	25	Farm labourer	Phthisis. Certified.
„ 25	18	Son of naval officer.	Affection of lungs. Certified.
Feb. 3	40	Farm labourer	Bronchitis. Pneumonia. Certified.
„ 3	61	Farmer -	Sphacelus. Certified.
„ 5	77	Farmer -	Natural causes. Certified.
„ 23	89	Tin-plate worker	Old age. Certified.
„ 27	87	Pilot - -	Old age. Certified.
Mar. 19	34	Mariner -	Constipation. Certified.
Apr. 3	45	Greenwich pensioner.	Diseased heart. Dropsy. Certified.
„ 18	27	Mariner -	Diseased heart. Certified.
„ 20	70	Farmer -	Paralysis. Certified.
May 23	54	Road labourer	Scirrhus stomach. Certified.
„ 31	86	Farmer -	Old age. Certified.
June 9	20	Gardener -	Consumption. Certified.
July 1	16	Agric. labourer	Fall from a waggon. Inquest.
„ 20	50	Mariner -	Found drowned. Inquest.
„ 25	75	Farm labourer	Palsy. Certified.
„ 22	20	Sailor - -	Accident. Drowned. Inquest.
„ 29	79	Boatman -	Age. Not certified.
Sept. 2	72	Miller and farmer.	Age. Not certified.
Oct. 11	67	Maltster -	Tumour. Certified.
„ 22	72	Sexton -	Suicide by hanging. Inquest.
Nov. 12	78	Superannuated, Coast Guard.	Natural causes. Certified.
„ 9	65	Fisherman -	Diseased heart. Certified.
1861			
Nov. 23	78	Boatman -	Diarrhœa. Certified.
„ 28	13	Son of mariner	Internal abscess. Certified.
Dec. 14	64	Farmer -	Bronchitis. Phthisis. Certified.
„ 14	34	Farmer -	Gastric fever. Certified.
„ 17	70	Master mason	Age. Not certified.
„ 3	80	Pilot - -	Bronchitis. Certified.
„ 12	79	Shoemaker -	Age. certified.

Sub-District - 3. St. Agnes.

1858			
Dec. 55	25	Copper miner -	Apoplexy. Inquest.
1859			
Jan. 8	74	Copper miner -	Natural decay. No medical attendant.
„ 9	70	Tin miner -	Decay of nature. Certified.
„ 11	58	Blacksmith -	Consumption, 5 years. No medical attendant.
Feb. 20	79	Agric. labourer	Cerebral paralysis, 8 weeks. Certified.
„ 26	54	Agric. labourer	Suffocated by hanging. Suicide. Inquest.
Mar. 9	55	Coal carrier -	Pneumonia, 7 days. Certified.
„ 19	21	Tin miner -	Miners' consumption. Certified.
„ 25	22	Agric. labourer	Inflammation of the bowels, 12 hours. Not certified.
Apr. 20	21	Blacksmith, master.	Rupture of a blood vessel, 12 months. Not certified.
May 12	84	Chelsea pensioner -	Paralysis, 6 years. No medical attendant.
„ 21	11	Son of yeoman	Fever. Cephatitis. Certified.
„ 24	51	Tailor, master	Paralysis, 6 months. Not certified.
„ 31	65	Agric. labourer	Natural decay. No medical attendant.
June 15	80	Road labourer	Erysipelas. Certified.
„ 22	60	Chelsea pensioner -	Diseased heart and kidneys. Certified.
July 9	56	Tin miner -	Consumption. Certified.
„ 11	42	Copper miner -	Injury of the kidneys, 2 years. No medical attendant.
„ 23	66	Agric. labourer	Natural decay. No medical attendant.
„ 24	36	Spirit merchant	Bronchitis. Congestion of lungs, 2 years. Certified.
Aug. 2	52	Blacksmith -	Pneumonia, 3 weeks. Certified.
„ 26	45	Copper miner	Miners' consumption, 2 years. No medical attendant.
Sept. 1	56	Tin miner -	Bronchitis. Effusion on brain. Certified.
„ 16	64	Copper miner	Dropsy, 1 year. Not certified.
„ 18	64	Copper miner	Consumption. No medical attendant.
„ 29	57	Copper miner	Consumption, 4 months. Not certified.
„ 28	72	Lead miner -	Ileus. Certified.
Oct. 9	30	Copper miner	Enteritis, 5 weeks. Certified.
„ 19	80	Tin miner -	Natural decay. No medical attendant.
„ 21	70	Tin miner -	Diseased bladder. No medical attendant.
„ 31	16	Copper miner	Diseased liver, 7 months. Certified.
Nov. 1	17	Tin miner -	Injury to abdomen. Peritonitis, 3 days. Certified.
„ 1	25	Engine driver	Nephria, 2 years. Certified.
„ 3	28	Blacksmith -	Smallpox, 9 days. Certified.
„ 3	69	Yeoman -	Natural decay. No medical attendant.
„ 10	62	Copper miner	Consumption, 8 weeks. No medical attendant.
„ 14	55	Copper miner	Consumption, 2 years. No medical attendant.
„ 16	59	Copper miner	Consumption, 1 year. No medical attendant.
„ 18	35	Copper miner	Consumption, 1 year. Not certified.
„ 22	75	Innkeeper -	Paralysis. Retention of wind. Certified.
„ 20	63	Tin miner -	Consumption, 2 years. No medical attendant.
„ 28	14	Tin dresser -	Fever. Effusion on brain. Certified.
Dec. 10	21	Copper miner	Bronchitis, 14 days. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Dec. 4	15	Copper miner	Epileptic convulsions. Certified.
„ 15	42	Carpenter, master.	Consumption. Certified.
„ 15	80	Tin miner -	Natural decay. No medical attendant.
„ 20	40	Lead miner -	Consumption. Not certified.
„ 29	22	Agric. labourer	Asthma. Phthisis. No medical attendant.
„ 31	57	Copper miner	Consumption, 2 years. Not certified.
1860			
Jan. 5	63	Tin miner -	Consumption, 3 years. No medical attendant.
„ 9	55	Copper miner	Consumption. Certified.
„ 21	68	Mine agent -	Bronchitis, 5 months. Certified.
„ 23	42	Farmer -	Burns. Inquest.
Feb. 10	63	Copper miner	Consumption, 3 months. Not certified.
„ 16	77	Coal porter -	Bronchitis. Certified.
„ 17	60	Tin miner -	Consumption, 2 years. No medical attendant.
„ 15	61	Tin miner -	Diseased heart, 3 months. Not certified.
„ 19	51	Tin miner -	Consumption. Certified.
„ 17	59	Tin miner -	Diseased liver. Certified.
„ 18	51	Copper miner	Consumption, 2 years. Not certified.
„ 26	24	Copper miner	Fever, 3 weeks. Meningitis, 14 days. Certified.
Mar. 13	75	Mine labourer	Paralysis, 3 months. No medical attendant.
„ 17	19	Copper miner	Typhoid fever, 17 days. Certified.
„ 19	65	Tin miner -	Consumption. Not certified.
„ 31	15	Copper miner	Typhus, 4 weeks. Not certified.
Apr. 5	86	Tin miner -	Natural decay. No medical attendant.
„ 7	67	Tin miner -	Bronchitis. Certified.
„ 16	70	Mine agent -	Laryngitis, 10 days. Certified.
„ 17	59	Tin miner -	Consumption, 3 months. No medical attendant.
„ 21	17	Copper miner	Typhus, 4 weeks. Certified.
„ 27	83	Copper miner	Natural decay. No medical attendant.
May 2	25	Tin miner -	Consumption. Certified.
„ 6	56	Tin miner -	Phthisis, 8 months. Certified.
„ 5	78	Tin miner -	Paralysis, 1 week. Not certified.
„ 14	55	Copper miner	Congestion of lungs and brain. Certified.
„ 13	36	Carpenter -	Fistula, 3 years. Not certified.
„ 17	42	Lead miner -	Bursting of a blood vessel. Inquest.
„ 29	60	Tin miner -	Congestion of lungs, 4 weeks. Certified.
June 6	71	Agric. labourer	Bronchitis. Certified.
—	Male	- -	Found washed ashore. Inquest.
„ 26	15	Copper miner	Bronchitis. Certified.
„ 27	42	Engine driver	Diseased heart. Dropsy. No medical attendant.
July 10	69	Lead miner -	Natural decay. No medical attendant.
„ 10	30	Copper miner	Rupture of bloodvessel. No medical attendant.
„ 11	72	Tin miner -	Natural decay. No medical attendant.
„ 11	66	Tin miner -	Consumption, 6 months. No medical attendant.
Aug. 2	20	Copper miner	Falling out of a kibble in returning up from underground. Inquest.
Sep. 13	58	Blacksmith -	Diseased heart. Dropsy. Certified.
„ 17	20	Tin miner -	Consumption. Hæmoptysis. Not certified.
„ 20	47	Tin miner -	Consumption. Not certified.
Oct. 3	88	Tin miner -	Decay of nature. No medical attendant.
„ 9	18	Tin miner -	Consumption. Not certified.
„ 11	53	Tin miner -	Bronchitis. Certified.
„ 16	78	Carpenter -	Age. No medical attendant.
„ 18	73	Husbandman -	Age. Certified.
„ 20	21	Tin miner -	Diseased heart. Phthisis, 13 months. Not certified.
Nov. 6	74	Tin miner -	Natural decay. No medical attendant.
„ 16	63	Copper miner	Consumption. Certified.
„ 21	68	Yeoman -	Jaundice. Certified.
Dec. 3	74	Copper miner	Old age. Certified.
16	62	Tin miner -	Myelitis, 5 months. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860			
Dec. 21	26	Sawyer -	Phthisis, 7 months. Certified.
„ 19	12	Son of a tailor	Killed by a steam-crushing machine. Inquest.
1861.			
Jan. 3	19	Copper miner	Injuries by the blasting of a hole in Penhais Mine. Inquest.
„ 9	82	Yeomen -	Paralysis, 8 months. Certified.
„ 10	72	Yeoman -	Natural decay. No medical attendant.
„ 13	24	Yeoman -	Peritonitis, 9 days. Certified.
„ 20	71	Tin miner -	Natural decay. No medical attendant.
„ 22	27	Yeoman -	Rheumatic fever. Jaundice, 1 week. Not certified.
„ 25	55	Tin miner -	Consumption, 1 year. No medical attendant.
„ 31	70	Agric. labourer	Age. No medical attendant.
Feb. 10	68	Copper miner	Consumption, 1 year. Not certified.
„ 11	37	Tin miner -	Consumption, 1 year. No medical attendant.
„ 19	66	Gamekeeper -	Pleuro-pneumonia. Certified.
„ 19	66	Tin Dresser -	Natural decay. Not certified.
„ 22	20	Tin miner -	Consumption, 1 year. Not certified.
„ 23	69	Copper miner	Congestion of lungs. Certified
„ 27	56	Copper miner	Consumption, 4 months. Not certified.
Mar. 1	78	Tin miner -	Natural decay. No medical attendant.
„ 5	64	Copper miner	Consumption. No medical attendant.
„ 8	62	Tin miner -	Consumption, 3 years. No medical attendant.
„ 10	65	Tin miner -	Consumption, 3 months. No medical attendant.
„ 18	31	Innkeeper -	Hypertrophy of heart. Certified.
„ 29	11	Son of a mason	Scarlatina, 7 days. Certified.
Apr. 15	54	Yeoman -	Hepatitis, 11 weeks. Not certified.
„ 26	64	Tin miner -	Consumption, 7 months. No medical attendant.
„ 28	63	Mine labourer	Diseased stomach. Certified.
„ 28	27	Mariner -	Diseased heart. Certified.
May 2	46	Agric. labourer	Abscess. Ulceration of intestines. Certified.
„ 6	43	Tin miner -	Consumption, 15 months. No medical attendant.
„ 9	80	Agric. labourer	Natural decay. No medical attendant.
„ 10	20	Copper miner	Phthisis. Certified.
June 21	67	Yeoman -	Consumption, 1 year. No medical attendant.
„ 19	23	Carpenter -	Consumption. No medical attendant.
July 1	16	Agric. labourer	Fall from a waggon. Inquest.
„ 8	77	Copper miner	Visitation of God. Inquest.
„ 19	15	Tin dresser -	Diseased joints. Certified.
„ 26	66	Engine driver	Pneumonia. Not certified.
Aug. 5	77	Mason, master	Gangrene. Certified.
„ 5	25	Copper miner	Consumption, 9 months. Not certified.
„ 13	32	Agric. labourer	Small pox, 14 days. No medical attendant.
„ 22	24	Wesleyan minister	Phthisis, 4 months. Not certified.
„ 23	27	Copper miner	Palsy, 9 months. No medical attendant.
„ 25	70	Cordwainer -	Diseased heart. Certified.
„ 26	61	Tin miner -	Consumption. Certified.
Sept. 2	21	Tin miner -	Typhus, 5 weeks. Certified.
„ 17	11	Son of a mine agent	General debility. No medical attendant.
„ 25	53	Mine labourer	Dropsy, 6 months. Not certified.
„ 27	79	Agric. labourer	Natural decay. No medical attendant.
Oct. 6	35	Mine manager	Phthisis, 3 years. No medical attendant.
„ 14	16	Copper miner	Phthisis, 11 months. Certified.
Nov. 8	31	Yeoman -	Abscess on hip joint. Certified.
„ 9	40	Servant -	Diseased heart. Certified.
„ 20	71	Yeoman -	Palsy, 1 year. Certified.
„ 25	83	Yeoman -	Natural decay. No medical attendant.
Dec. 5	84	Solicitor -	Dropsy. Certified.
„ 16	48	Lead miner -	Smallpox, 14 days. No medical attendant.
„ 15	13	Copper dresser	Scarlatina. Dropsy. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861			
Dec. 22	21	Yeoman -	Bronchitis, 1 year. Not certified.
„ 28	66	Copper miner	Natural decay. No medical attendant.
„ 31	77	Tin miner -	Incontinence of urine. Certified.

Sub-District - 4. St. Clement.

1859.			
Jan. 7	49	Carrier - -	Visitation of God. Disease of heart. Inquest.
„ 30	20	Labourer -	Tuberculosis. Certified.
Feb. 10	76	Farmer -	Natural decay. Not certified.
„ 24	57	Butcher, master	Disease of heart, 2 years. Hydropericardium. Certified.
„ 27	18	An idiot -	Epilepsy. Congenital. Certified.
Mar. 12	66	Superannuated supervisor of excise.	Diseased kidneys. Hydrothorax. Certified.
„ 12	35	Farmer and carrier.	Diseased brain. Certified.
„ 17	45	Painter, journeyman.	Pneumonia. Suppuration of lungs, 2 weeks. Certified.
„ 21	47	Shoemaker -	Diseased liver, stomach, and kidneys, — years. Certified.
Apr. 7	65	Shoemaker, journeyman.	Bronchitis, 2 weeks. Certified.
„ 13	49	Serjeant, militia	Phthisis. Certified.
„ 17	62	Banker - -	Phthisis pulmonalis. Certified.
May 4	66	Banker's clerk	Pneumonia, left lung, 14 days. Certified.
„ 2	25	Servant -	Knocked off the mail coach in passing under a temporary arch, wheels passing over him. Inquest.
„ 1	27	Lead miner -	Decline. Not certified.
„ 3	43	General labourer	Diphtheria, 1 week. Not certified.
„ 15	80	Miner - -	Natural decay. Certified.
„ 25	35	Tanner and currier.	Morbus cerebri, — months. Certified.
„ 27	76	Labourer -	Hæmoptysis, 14 days. Certified.
June 1	32	Turner and carver.	Phthisis. Certified.
„ 5	31	Farmer - -	Malignant sore throat, 7 days. Not certified.
„ 9	67	Farm labourer	Diseased heart. Dropsy. Certified.
May 27	20	Carpenter, journeyman.	Phthisis. Certified.
June 8	69	Dairyman -	Diseased heart. Dropsy. Not certified.
„ 13	60	Farmer's hind	Diseased heart. Anasarca, 3 months. Certified.
21	42	Commercial traveller.	Chronic rheumatism. Pericarditis, 2 days. Certified.
„ 27	81	Bookbinder -	Old age. No medical attendant.
„ 27	63	Mason, master	Abdominal tumour. Certified.
July 13	73	Sailor - -	Diseased heart. Certified.
„ 13	49	Shoemaker, master.	Apoplexy. Certified.
„ 15	13	Son of horse-keeper.	Decline. No medical attendant.
„ 14	57	Surgeon -	Diseased heart. Dropsy. Certified.
„ 27	61	Farm labourer	Apoplexy. Certified.
„ 26	50	Master mariner	Diseased heart. Certified.
Aug 15	57	Shoemaker, master.	Pneumonia, 10 days. Certified.
„ 21	18	Cabinet maker, apprentice.	Drowned, bathing. Inquest.
„ 25	25	Labourer -	Consumption, 1 year. Certified.
Sept. 3	76	Bargeman -	Consumption, 2 years. Certified.
„ 23	62	Pensioner, R.N.	Diseased heart. Anasarca, 3 months. Certified.
Oct. 2	10	Son of coachman	Tabes mesenterica, 1 year. Certified.
„ 5	81	Lime burner -	Age. Certified.
„ 8	73	Farm labourer	Age. Certified.
„ 9	56	Hotel keeper -	Dysthetica. Certified.
„ 11	31	Grocer - -	Diseased heart. No medical attendant.
„ 14	72	Shoemaker, master.	Dementia. Certified.
„ 16	65	Chelsea pensioner.	Œdema of lungs, 13 weeks. Certified.
„ 28	55	Schoolmaster	Bronchitis, 6 months. Certified.
1859.			
Nov. 26	52	Labourer -	Malignant ulcer, 12 months. Certified.
„ 24	73	Brush maker, journeyman.	Diseased kidneys. Serous effusion on brain. Certified.
„ 30	77	Miner - -	Natural decay. No medical attendant.
Dec. 4	70	Printer and bookseller.	Bronchitis, 18 days. Certified.
„ 15	60	Mason, master	Apoplexy. Palsy, 7 weeks. Certified.
„ 19	52	Farmer - -	Phthisis, 5 years. Certified.
„ 31	76	Tailor, master	Apoplexy, 3 days. Certified.
1860.			
Jan. 6	50	Gardener -	Visitation of God. Inquest.
„ 14	56	Farm labourer	Phthisis. No medical attendant.
„ 30	64	Farm labourer	Unknown. No medical attendant.
„ 30	73	Farm labourer	Diseased heart. Anasarca, 3 weeks. Certified.
Feb. 7	33	Soldier - -	Pneumonia, 10 weeks. Certified.
„ 13	93	Butcher, master	Paralysis. Pneumonia. Certified.
„ 21	77	Farmer - -	Natural decay. Not certified.
„ 18	72	Tinman -	Consumption, 6 months. Certified.
„ 22	48	Hatter, journeyman.	Decline. Not certified.
Mar. 3	72	House proprietor.	Diseased liver. Dropsy. Certified.
„ 2	39	Farmer - -	Phthisis. Certified.
„ 5	74	Chelsea pensioner.	Diseased heart. Anasarca, 2 months. Certified.
„ 6	84	Mine agent -	Natural decay. No medical attendant.
„ 7	11	Son of statuary	Phthisis. Certified.
„ 17	67	Gardener -	Dropsy, 11 months. Certified.
„ 21	73	Master mariner	Hepatic abscess. Certified.
„ 31	12	Son of farm labourer.	Phthisis. Certified.
Apr. 6	53	Sawyer - -	Psoas abscess. Certified.
„ 5	42	Accountant -	Epilepsy. Certified.
„ 13	20	Lead miner -	Phthisis, 18 months. Certified.
„ 18	76	Shoemaker, master.	Bronchitis. Certified.
„ 23	16	Blacksmith's apprentice.	Injury to spine. Tetanus, 3 days. Certified.
„ 26	21	Plumber, journeyman.	Phthisis, 8 months. Certified.
May 11	57	Gardener -	Phthisis. Certified.
„ 15	15	Shoemaker, apprentice.	Diseased kidneys. Not certified.
„ 14	70	Carrier - -	Paralysis, 3 years. Not certified.
„ 24	29	Painter, journeyman.	Pneumonia, 2 years. Consumption. Certified.
„ 25	67	Arsenic smelter	Bronchitis. Certified.
June 17	71	Carrier - -	Morbus cordis. Certified.
„ 19	25	Bookbinder -	Phthisis, 6 months. Certified.
July 2	65	Shoemaker -	Diseased kidneys, 3 years. Dropsy. Certified.
„ 3	54	Eating-house keeper.	Diseased liver. Certified.
„ 18	12	Son of farm labourer.	Meningitis. Certified.
„ 26	10	Son of lead miner.	Peritonitis, 7 days. Certified.
„ 26	22	Tailor, journeyman.	Peritonitis, 5 days. Certified.
Aug. 1	44	Brewer - -	Pneumonia. Abscess on lungs, 6 weeks. Certified.
„ 3	78	Miner - -	Natural decay. Certified.
„ 12	86	Pensioner -	Paralysis, — months. Certified.
„ 31	35	Shoemaker, journeyman	Abscess. Certified.
„ 29	33	Tailor - -	Diseased heart. Inquest.
„ 29	54	Wharfinger -	Abscess of rectum, 12 months. Certified.
Sept. 9	34	Innkeeper -	Diseased heart. Inquest.
„ 18	42	Innkeeper -	Diseased brain. Certified.
„ 26	75	Gardener -	Dropsy. Asthma. Certified.
Oct. 1	74	Potter, master	Paralysis, 4 months. Certified.
Sept. 28	65	Shoemaker journeyman	Natural decay. Certified.
Oct. 18	74	Shoemaker, master.	Bronchitis, 8 months. Dropsy. Certified.
„ 24	60	Builder -	Diseased liver. Dropsy. Certified.
Nov. 6	22	Farm labourer	Epilepsy, 1 hour. Certified.
„ 4	52	Upholsterer -	Decline. No medical attendant.
„ 8	47	Greengrocer -	Phthisis, — years. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Nov. 20	60	Postman -	Diseased liver. Dropsy. Certified.
„ 30	56	Farm labourer	Natural decay. Certified.
Dec. 4	21	Wheelwright	Phthisis. Certified.
„ 7	74	Rate collector	Apoplexy, 2 hours. Certified.
„ 10	53	Tidewaiter -	Apoplexy, 3 days. Certified.
1861.			
Jan. 4	85	Roadman -	Morbus cordis. Certified.
„ 2	83	Drainer -	Dropsy. No medical attendant.
„ 20	87	Fisherman -	Palsy. Certified.
„ 26	67	Farm labourer	Dropsy. Not certified.
„ 17	40	Groom - -	Aneurism. Inquest.
Feb. 11	39	Painter -	Found drowned. Inquest.
„ 22	75	Miner - -	Enteritis. Diarrhœa, Certified.
„ 24	83	Miner - -	Enteritis. Diarrhœa. 2 months. Certified.
„ 26	27	Sailor - -	Accident. Drowned. Inquest.
Mar. 1	65	Glover, master	Natural decay. No medical attendant.
„ 11	32	Carpenter, journeyman.	Phthisis. Certified.
„ 19	75	Miner -	Phthisis. Certified.
„ 20	73	Boarding-house keeper.	Natural decay. No medical attendant.
„ 23	66	Labourer -	Apoplexy, 20 hours. Not certified.
„ 30	22	Baker - -	Phthisis. Certified.
„ 21	76	Wheelwright	Hæmoptysis, 4 days. Certified.
April 8	36	Tailor - -	Softening of brain, 3 years. Certified.
„ 3	74	Superannuated postman.	Hydropericardium. Certified.
„ 17	49	Dyer, master	Morbus cordis. Certified.
„ 20	67	Mason - -	Visitation of God. Inquest.
„ 26	66	Mineralogist -	Paralysis, 2 years. No medical attendant.
„ 29	56	Gamekeeper -	Decline. No medical attendant.
May 2	55	Carpenter -	Anthrax, 3 weeks. Certified.
„ 15	67	Bargeman -	Pleuro-pneumonia. Certified.
„ 22	100	Pedlar - -	Natural decay. Certified.
„ 21	36	Pavior -	Fever, 6 days. Certified.
„ 30	55	Mining carpenter.	Phthisis, — months. Certified.
June 1	79	Cooper - -	Natural decay. Certified.
„ 7	15	Son of smith -	Convulsions, 4 years. No medical attendant.
„ 13	82	Waggoner -	Bronchitis. Certified.
„ 15	25	Labourer -	Small pox, 14 days. Certified.
„ 18	70	Cutler - -	Renal disease. Certified.
„ 23	81	Town sergeant	Paralysis, 11 months. Certified.
July 5	48	Labourer -	Phthisis. Certified.
„ 10	41	An idiot -	Epilepsy. Certified
„ 19	23	Shoemaker -	Small pox, 12 days. Certified.
„ 22	50	Farm labourer	Phthisis. Diarrhœa. Certified.
Aug. 2	84	Chelsea pensioner.	Natural decay. No medial attendant.
„ 3	76	Admiral, R.N.	Nephria. Diseased heart. Certified.
„ 6	65	Chelsea pensioner.	Hepatitis, 9 months. Certified.
„ 11	40	Draper - -	Delirium tremens. Certified.
„ 12	10	Son of groom	Small pox. No medical attendant.
„ 9	87	Foreman in factory.	Age. Certified.
„ 16	19	Cooper, journeyman.	Peritonitis. Certified.
Sept. 6	79	Shipwright -	Diseased bladder. Certified.
„ 7	74	Farm labourer	Natural decay. Certified.
„ 12	69	Farm labourer	Dropsy. No medical attendant.
„ 26	20	Brushmaker, journeyman.	Typhus, 5 weeks. Certified.
„ 27	10	Son of shoemaker, journeyman.	Meningitis. Certified.
„ 23		Bootmaker, journeyman.	Typhoid, 4 weeks. Peritonitis. Certified.
„ 27		Son of farmer	Nephritis, 9 days. Certified.
Oct. 10		Waggoner -	Typhus. Certified.
" 19		Grocer - -	Phthisis, 9 months. Certified.
„ 23		Farm labourer	Diarrhœa 9 days. Certified.
„ 20		Labourer -	Decline. Not certified.
Nov. 4		Carpenter -	Diarrhœa, 17 days. Certified.
„ 4		Mason, journeyman.	Phthisis. Certified.
„ 22		Farm labourer	Asthma. Pneumonia, 10 days. Certified.
„ 15	12	Son of miner	Typhoid fever, 6 weeks. Certified.
1861.			
Nov. 22	13	Son of mine worker.	Ascites. Certified.
„ 24	74	Farm labourer	Diseased kidneys, 2 years. Certified.
„ 26	36	Mining engineer	Phthisis. Certified.
„ 29	59	Ostler - -	Paralysis. Certified.
Dec. 3	23	Soldier - -	Suicide, by shooting himself. Inquest.
„ 4	68	Innkeeper -	Diseased heart. Inquest.
„ 17	44	Shoemaker, journeyman.	Aneurism. Certified.
Dec. 19	22	Draper's assistant.	Pleurisy. Certified.
„ 21	39	Machinist -	Injury to finger, 17 days. Tetanus, 8 days. Certified.
„ 19	37	Captain 36th regiment.	Apoplexy. Certified.
„ 23	74	Farm labourer	Phthisis. Certified.

Sub-district - 5. Kenwyn.

1858			
Dec. 25	55	Farmer -	Ruptured blood vessel of brain. Inquest.
1859			
Jan. 7	70	Proprietor of iron mines.	Unknown. No medical attendant.
„ 9	87	Proprietor of money.	Old age. Not certified.
„ 15	83	Copper miner	Old age. Not certified.
1858			
Dec. 30	62	Copper miner	Bronchitis, 4 months. Certified.
1859			
Jan. 17	33	Copper miner	Injuries at Great Wheal Busy Mine by falling into a winze. Inquest.
Feb. 7	29	Butcher, master	Epilepsy. Certified.
„ 8	49	Copper miner	Consumption, 6 months. Not certified.
Jan. 30	61	Copper miner	Bronchitis, 6 months. Certified.
„ 17	34	Copper miner	Consumption, many weeks. Not certified.
„ 28	64	Copper miner	Inflammation of lungs. Not certified.
Feb. 22	46	Draper -	Disease of liver. Dropsy. Certified.
„ 23	49	House painter	Disease of heart. Inquest.
Mar. 6	11	Son of agric. labourer.	Inflammation of lungs, 14 days. Certified.
Feb. 21	28	Copper miner	Consumption, 10 months. Certified.
Mar. 1	75	Copper miner	Old age. Not certified.
Feb. 10	37	Copper miner	Consumption. Not certified.
„ 18	26	Carpenter, journeyman.	Diseased heart, 5 years. Certified.
Mar. 17	74	Copper miner	Old age. Not certified.
Apr. 17	48	Copper miner	Bronchitis. Diarrhœa, — months. Certified.
„ 3	57	Mine agent -	Pneumonia, left lung, partly consolidated. Certified.
„ 16	59	Druggist -	Induration of liver, — years. Certified.
„ 27	81	Greenwich pensioner.	Morbus cordis. Certified.
May 4	66	Tinman, journeyman.	Diarrhœa. Exhaustion. Certified.
„ 6	59	Solicitor -	Unknown. No medical attendant.
„ 12	17	Lead miner -	Skull fractured, falling from the 50 to the 70-fathom level through the whim shaft. Inquest.
„ 13	64	Butcher, master	Œdema of lungs, 5 months. Certified.
„ 13	85	Agric. labourer	Natural decay. Certified.
„ 1	23	Servant -	Scrofula, — years. Bronchitis. Certified.
„ 23	81	Agric. labourer	Old age. Certified.
„ 27	28	Railway labourer.	Broncho-pneumonia. Certified.
„ 23	47	Railway contractor.	Pneumonia, — weeks. Certified.
June 4	45	Mason -	Injuries received by a fall from a ladder, knocked from under him by a passing cart.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
June 8	65	Mason -	Apoplexy. Paralysis, 12 months. Certified.
„ 10	78	Copper miner	Old age. Not certified.
July 17	63	Auctioneer -	Diseased bladder, &c. Certified.
Aug. 1	21	Copper miner	Killed under ground, by a rock falling on him from the back of his pitch. Inquest.
„ 23	46	Malster, journeyman.	Pleurisy. Phthisis, 3½ months. Certified.
„ 28	20	Copper miner	Consumption, 9 months. Not certified.
„ 24	35	Agric. labourer	Diseased kidneys. Dropsy, — months. Certified.
„ 31	26	Policeman -	Hepatitis. Dropsy. Certified.
Sept. 1	46	Lead miner -	Accident. Falling down the engine shaft. Inquest.
Aug 31	18	Lead miner -	Accident. Falling down the engine shaft. Inquest.
Sept. 6	30	Shoemaker, journeyman.	Cancer in abdomen, 6 months. Certified.
„ 4	37	Carpenter, journeyman.	Consumption. Certified.
„ 1	29	Copper miner	Consumption, some years. Not certified.
Oct. 7	59	Copper miner	Consumption, 9 months. Not certified.
„ 16	34	Mason, master	Retention of urine, laceration of bladder, 3 days. Certified.
„ 30	64	Grocer, master	Consumption, — months. Not certified.
Nov. 12	19	Agric. labourer	Diseased knee joint, 3 years. Certified.
„ 6	75	Master mariner	Apoplexy, 24 hours. Certified.
„ 18	52	Shoemaker, master.	Diseased heart, 1 year. Certified.
„ 8	71	Copper miner	Old age. Not certified.
Dec. 7	74	Seaman, merchant service	Old age. Certified.
„ 18	35	Copper miner	Bronchitis, 1 year. Dropsy. Certified.
„ 31	64	Greenwich pensioner -	Diseased heart, 3 years. Certified.
1860			
Jan. 17	15	Son of seaman, merchant service	Not stated. No medical attendant.
„ 19	78	Chelsea pensioner.	Bronchitis. Certified.
„ 25	88	Blacksmith -	Old age. Not certified.
„ 25	88	Blacksmith -	Old age and infirmity. Not certified.
Feb. 5	25	Sawyer, journeyman.	Phthisis. Certified.
„ 13	77	Chelsea pensioner.	Bronchitis. Certified.
„ 11	17	Tin miner -	Suffocation and scalds, from the bursting of a boiler. Inquest.
„ 21	60	Farmer -	Purpura, 1 week. Certified.
„ 7	55	Farmer -	Dispepsia, 6 months. Diseased lungs. Certified.
„ 25	13	Son of copper miner.	Typhus. Certified.
„ 15	40	Copper miner	Consumption. Not certified.
Mar. 3	84	Agric. labourer	Old age. Certified.
Feb 21	62	Shoemaker, journeyman.	Gangrene senilis, 4 weeks. Certified.
„ 21	25	Copper miner	Typhus fever. Certified.
Mar. 5	24	Copper miner	Injury in Wheal Unity Wood Mine, a slide of earth falling. Inquest.
„ 10	82	Agric. labourer	Diseased bladder. Certified.
„ 12	28	Copper miner	Scarlatina. Certified.
Feb. 23	51	Blacksmith, journeyman.	Bronchitis. Certified.
Mar. 18	59	Sawyer -	Diseased heart. Dropsy. Certified.
„ 27	50	Copper miner	Paralysis. Certified.
Apr. 4	61	Solicitor -	Morbus Brightii, 18 months. Certified.
„ 7	20	Seaman, merchant service	Phthisis, 2 years. Certified.
Mar. 31	48	Copper miner	Pneumonia. Dropsy. Certified.
„ 28	36	Copper miner	Typhus, 6 weeks. Cystitis. Certified.
Apr. 11	53	Solicitor -	Diseased heart. Dropsy. Certified.
May 4	49	Proprietor of money.	Bronchitis. Certified.
1860.			
May 1	28	Blacksmith, journeyman.	Pneumonia, 2 years. Hæmoptysis. Certified.
„ 17	69	Barber -	Diseased heart. Inquest.
„ 26	68	Shoemaker, master	Bronchitis. Pneumonia. Certified.
„ 10	12	Son of copper miner.	Meningitis. Certified.
June 5	51	Copper miner	Bronchitis. Certified.
„ 2	42	Son of copper miner.	Bronchitis. Scrofula. Certified.
„ 19	78	Shoemaker -	Visitation of God. Inquest.
July 30	40	Soldier -	Cancer of intestines. Post mortem. Certified.
„ 14	70	Carpenter, journeyman	Diseased liver and pleura, 5 months. Certified.
„ 15	83	House proprietor	Morbus cordis. Certified.
„ 2	22	Son of copper miner.	Injury of hip. Dropsy Certified.
Aug. 22	82	Solicitor -	Old age. Certified.
„ 9	51	Mine engineer	Diseased liver and kidneys. Certified.
„ 29	67	Agric. labourer	Paralysis, 18 months. Certified.
„ 6	59	Copper miner	Bronchitis. Certified.
Sept. 9	60	Copper miner	Tumour. Dropsy. Certified.
Oct. 3	68	Tallow chandler	Diarrhœa. Epistaxis Certified.
Sept. 27	51	Maltster -	Accident. Thrown out of a gig Inquest.
Oct. 5	62	Copper miner	Consumption, 3 years. Certified.
„ 7	74	Pensioner -	Pneumonia. Certified.
„ 12	32	Mason, journeyman.	Diseased heart, 4 years. Certified.
„ 20	74	Blacksmith, master.	General decay. Not certified.
„ 27	91	Miller, master	Asthma. Certified.
„ 26	70	Carpenter -	Asphyxia. Inquest.
„ 31	27	Labourer -	Visitation of God. Inquest.
Nov. 15	84	Servant -	Age. Certified
„ 23	46	Agric. labourer	Phthisis, 12 months. Certified.
„ 10	71	Copper miner	Old age. Not certified.
„ 9	68	Shoemaker, journeyman.	Fracture. Diseased heart, — years. Certified.
„ 19	40	Copper miner	Injuries from fall of a barrel of water. Inquest.
Dec. 15	83	Butcher, master	Diseased prostate gland. Certified.
„ 26	71	Servant -	Asthma, — years. Not certified.
„ 23	38	Engine man -	Bursting of a steam engine boiler. Inquest.
„ 22	64	Copper miner	Consumption, 9 months. Not certified.
„ 27	75	Agric. labourer	Bronchitis. Certified.
„ 28	69	Pensioner, Chelsea.	Broncho-pneumonia. Certified.
„ 28	38	Copper miner	Bronchitis. Diseased heart. Inquest.
1861			
Jan. 7	62	Copper miner	Consumption, 2 years. Not certified.
„ 10	12	Son of copper miner.	Rheumatism. Pericarditis. Certified.
„ 12	58	Carpenter, master.	Bronchitis, 6 weeks. Certified.
„ 17	16	Son of copper miner.	Ascites. Certified.
„ 18	54	Labourer -	Carcinoma. Certified.
1860.			
Dec. 18	75	Farmer -	Old age. Not certified.
1861.			
Jan. 23	71	Coach smith -	Bronchitis, 14 days. Certified.
Feb. 18	64	Shoemaker -	Phthisis. Certified.
„ 25	16	Carpenter, apprentice.	Scrofulous disease of knee, 15 months. Certified.
Mar. 5	83	Malster -	Dropsy, 2 months. Certified.
„ 11	58	Mason - -	Paralysis. Certified.
„ 8	28	Copper miner	Consumption, 6 months. Not certified.
„ 12	38	Iron moulder -	Tumour. Certified.
„ 18	33	Victualler -	Anasarca. Certified.
„ 26	68	Mine broker -	Apoplexy, 2 days. Certified.
Apr. 2	12	Son of van proprietor.	Scrofula, 3 years. Certified.
„ 18	76	Carpenter -	Paralysis. Certified.
„ 19	74	Copper miner	Old age. Not certified.
„ 23	69	Copper miner	Pleuro-pneumonia. Certified.
„ 24	43	Copper miner	Dysentery. Certified.
„ 23	77	Agric. labourer	Bronchitis. Certified.
May 15	26	Copper miner	Tubercular peritonitis, 3 months. Certified.
June 6	18	Son of carrier	Smallpox, 13 days. Vaccinated. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
June 14	61	Shoemaker, journeyman.	Paralysis, 9 weeks. Certified.
„ 17	24	Blacksmith -	Smallpox. Vaccinated. Certified.
„ 28	40	Copper miner	Consumption, 14 weeks. Not certified.
July 7	40	Copper miner	Diseased ankle joint, 6 months. Certified.
„ 7	62	Clerk - -	Diseased liver. Certified.
„ 15	30	Copper miner	Killed by the breaking of capstan ropes. Inquest.
Aug. 2	84	Agric. labourer	Old age. Not certified.
„ 2	41	Ship broker -	Consumption, 6 months. Not certified.
„ 9	86	Waggoner -	Bronchitis. Certified.
„ 5	66	Road labourer	Cancer in face. Certified.
„ 18	22	Porter - -	Typhus, 15 days. Certified.
July 15	78	Copper miner	Bronchitis. Certified.
Aug. 25	19	Son of copper miner.	Phthisis. Certified.
„ 11	12	Son of mine agent.	Peritonitis, 7 days. Certified.
July 18	46	Copper miner	Bronchitis, 2 years. Certified.
Aug. 18	25	Postboy -	Diabetes, 7 months. Certified.
„ 30	55	Agric. labourer	Phthisis, 3 years. Certified.
„ 31	68	Watchmaker, master.	Apoplexy, 3 days. Certified.
Sept. 2	13	Son of tinman, master.	Scrofula, 3 years. Certified.
„ 5	10	Son of copper miner.	Unknown. No medical attendant
Oct. 2	30	Copper miner	Confluent smallpox. Certified.
„ 5	26	Malster - -	Hepatitis. Certified.
Sept. 29	15	Tin miner -	Injury by fall from a ladder in going underground in Cregbraws Mine. Inquest.
„ 9	64	Copper miner	Natural decay. Not certified.
Oct. 9	10	Son of copper miner.	Small pox. Certified.
„ 20	42	Copper miner	Consumption. Certified.
„ 25	61	Linen draper -	Diseased brain, — years. Certified.
Nov. 5	24	Tailor, journeyman.	Typhoid fever, 9 weeks. Certified.
„ 14	46	Agric. labourer	Phthisis, — months. Certified.
Dec. 16	13	Son of hostler	Run over by omnibus. Inquest.
Nov. 22	20	Blacksmith -	Phthisis, 11 months. Certified.
„ 13	26	Copper miner	Phthisis. Certified.
„ 26	69	House proprietor	Ileus, 3 weeks. Certified.
Feb. 7	13	Son of chair maker.	Typhoid, 15 days. Certified.
„ 7	60	Tinman, journeyman.	Bronchitis, 4 years. Certified.
„ 12	70	House agent -	Bronchitis. Certified.
„ 22	10	Son of agricultural labourer	Fever, 9 days. Certified.
„ 21	14	Son of carpenter	Fever, 2 weeks. Melæna, 4 days. Certified.

Sub-district - 6. Kea.

When Died.	Age.	Occupation.	Cause of Death.
1858.			
Dec. 29	29	Waterman -	Psoas abscess, 2 years. Certified.
„ 27	13	Son of copper miner.	Unknown. Not certified.
„ 29	64	Copper miner-	Abscess on thigh. Not certified.
„ 23	39	Copper miner-	Unknown. Not certified.
1859.			
Feb. 10	15	Copper miner-	Visitation of God. Inquest.
„ 22	89	Agric. labourer	Debility. No medical attendant.
Apr. 9	40	Shipwright -	Diseased heart. Dropsy. Certified.
„ 27	76	Agric. labourer	Unknown. Not certified.
May 24	19	Statuary -	Drowned by falling out of a boat, supposed in a fit. Inquest.
June 5	64	Farmer -	Diseased heart. Asthma. Not certified.
„ 7	18	Mason -	Accidental discharge of a loaded gun. Inquest.
„ 16	11	Son of waterman.	Decline. Not certified.
July 28	69	Engineer -	Diseased heart. Not certified.
„ 29	19	Carver and gilder.	Phthisis. Certified.
1859.			
Sep. 26	33	Miller - -	Dropsy. Not certified.
July 12	56	Copper miner-	Consumption. Certified.
Oct. 4	17	Copper miner-	Cephalitis. Certified.
Nov. 9	43	Copper miner-	Consumption. Not certified.
Oct. 13	51	Copper miner-	Consumption. Not certified.
„ 16	65	Farmer -	Sciatica. Not certified.
Nov. 22	88	Woodman -	Debility. Not certified.
1860.			
Jan. 3	50	Carpenter -	Diseased heart. Not certified.
„ 7	80	Servant -	Debility. No medical attendant.
„ 14	84	Agric. labourer	Debility. No medical attendant.
„ 29	51	Woodman -	Apoplexy. Not certified.
Feb. 4	45	Master mariner	Diseased heart. Not certified.
„ 23	23	Carpenter -	Consumption. Not certified.
Mar. 10	76	Grocer - -	Dropsy. No medical attendant.
Feb. 2	15	Son of tailor -	Typhus fever. Not certified.
„ 11	14	Son of cattle dealer.	Typhus fever. Not certified.
Apr. 4	82	Labourer -	Debility. No medical attendant.
„ 5	76	Mariner -	Debility. Not certified.
„ 18	58	Copper miner-	Consumption. Not certified.
„ 23	14	Son of shipwright.	Diphtheria. Not certified.
„ 4	54	Copper miner-	Fever. Not certified.
May 24	12	Son of copper miner.	Fracture from falling from the engine bob-flat. Inquest.
„ 29	33	Tin miner -	Killed underground, a rock falling on him from the back of a stull. Inquest.
Apr. 15	85	Gentleman -	Debility. Not certified.
July 30	21	Shipwright -	Phthisis. Certified.
Aug. 4	51	Agric. labourer	Malignant disease of testicle. Certified.
Sep. 23	57	Lead smelter -	Dropsy. Not certified.
—	64	Cooper - -	Found drowned. Inquest.
Aug 30	96	Farmer -	Debility. No medical attendant
Sep. 27	51	Innkeeper -	Thrown from a gig. Inquest.
„ 6	87	Lead smelter -	Diseased heart. Certified.
„ 5	64	Copper miner-	Paralysis. Certified.
Dec. 8	32	Schoolmaster-	Consumption. Not certified.
„ 23	43	Agric. labourer	Found dead. Pneumonia. Inquest.
1861.			
Jan. 13	14	Son of mine agent.	Rheumatism. Diseased hear. Certified.
1860.			
Dec. 27	82	Mariner -	Debility. No medical attendant.
„ 17	55	Copper miner-	Consumption. Not certified.
„ 25	73	Copper miner-	Debility. No medical attendant.
1861.			
Jan. 16	23	Copper miner-	Consumption. Not certified.
„ 23	78	Sexton - -	Pneumonia. Not certified.
Mar. 3	86	Farmer -	Debility. No medical attendant.
„ 4	82	Agric. labourer	Debility. No medical attendant.
„ 7	82	Blacksmith -	Water on chest. Not certified.
„ 31	26	Mariner -	Phthisis, 12 months. Certified.
Feb. 25	46	Copper miner-	Pneumonia. Not certified.
June 1	64	Copper miner-	Consumption. No medical attendant.
May	73	Labourer -	Dropsy. Not certified.
June 19	68	Copper miner-	Phthisis. Certified.
July 29	69	Agric. labourer	Diseased heart. Inquest.
„ 21	24	Carpenter -	Bursting blood vessel. Not certified.
Sep. 9	35	Sawyer -	Consumption. Not certified.
„ 22	25	Copper miner-	Smallpox. Not certified.
„ 23	66	Mason - -	Dropsy. Certified.
„ 19	54	Copper miner-	Consumption. Not certified.
Nov. 10	18	Cordwainer's apprentice.	Consumption. Not certified.
„ 28	53	Copper miner-	Broncho-pneumonia. Certified.
„ 29	40	Farmer -	Consumption. No medical attendant.
„ 29	73	Copper miner-	Debility. No medical attendant.
Dec. 17	57	Farmer -	Consumption. No medical attendant.
„ 20	17	Son of lead smelter.	Typhus. Not certified.
„ 14	53	Waterman -	Delirium tremens. Certified.
„ 1	52	Copper miner-	Pneumonia. Not certified.

COUNTY OF CORNWALL.

Superintendent Registrar's District.

FALMOUTH.

Registrar's Sub-district.

1. Mylor.
2. Falmouth.
3. Penryn.
4. Constantine.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Mylor.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Feb. 15	18	Son of farmer	Dropsy and general debility. Certified.
„ 25	20	Foundry smith	Small pox. Vaccinated. Not certified.
Mar. 10	77	Mason - -	Contraction of œsophagus, 6 months. Certified.
„ 3	22	Engine man (mine).	Scalds: bursting of a steam engine boiler at the United Mines, Gwennap. Inquest.
Apr. 5	26	Boiler smith -	Consumption, 8 weeks. Not certified.
May 2	45	Waterman -	Dropsy. Certified.
„ 19	32	Farmer -	Peritonitis, 7 days. Certified.
Aug. 3	19	Son of farm labourer.	Consumption, 6 months. Not certified.
July 10	56	Master mariner	Suicide by drowning. Inquest.
Sept. 23	17	Son of Greenwich pensioner.	Peritonitis, 11 days. Certified.
„ 27	61	Gentleman -	Diabetes, 10 years. Certified.
„ 13	40	Fisherman -	Drowned by falling out of a boat. Inquest.
Oct. 14	33	Sawyer -	Apoplexy, 6 days. Certified.
Dec. 9	53	Copper miner	Consumption, 12 months. Not certified.
„ 17	64	Agric. labourer	Diseased heart. Inquest.
„ 27	66	Chelsea pensioner.	Diseased liver. Certified.
1860.			
Jan. 27	51	Farm labourer	Consumption, 3 months. Not certified.
Feb. 2	44	Sailor, merchant service.	Concussion of brain. Certified.
„ 4	81	Farmer -	Old age. No medical attendant.
„ 9	54	Foundry smith	Asthma. Not certified.
Mar. 1	68	Ferry master -	Erysipelas. Not certified.
May 31	57	Labourer -	Asthma. Dropsy. Certified.
July 3	79	Agent - -	Old age. Not Certified.
„ 20	46	Copper miner	Rheumatic fever. Not certified.
Aug 17	69	Labourer -	Cystitis. Certified.
Sept. 12	78	Farmer -	Diseased heart. Bronchitis. Certified.
„ 14	60	Gentleman -	Diseased heart, 10 years. Certified.
„ 15	70	Innkeeper -	Unknown. No medical attendant.
June 29	66	Superannuated Excise officer.	Paralysis. Not certified.
Dec. 4	24	Wheelwright	Diseased heart, 1 year. Certified.
„ 9	31	Farm servant	Peritonitis, 2 weeks. Certified.
1861.			
Jan. 5	64	Labourer -	Palsy, 2 weeks. Certified.
„ 13	43	Carpenter -	Consumption. Not certified.
„ 14	51	Tin miner -	Asthma. No medical attendant.
„ 16	65	Farmer -	Asthma. No medical attendant.
Feb. 20	59	Engine driver	Consumption. Not certified.
April 2	86	Shipwright -	Diseased prostate glands. Certified.
„ 26	97	Labourer -	Old age. Not certified.
May 4	62	Shipowner -	Apoplexy. Certified.
„ 7	68	Farmer -	Consumption. Not certified.
„ 19	22	Carter -	Consumption. Not certified.
„ 25	60	Cooper -	Scrofula. Not certified.
July 9	21	Son of labourer	Consumption. Not certified.
Aug 28	58	Carrier -	Dropsy. Certified.
„ 29	88	Master, merchant seaman	Old age. No medical attendant.
Sep. 1	27	Copper miner	Rheumatic fever, 17 days. Certified.
Oct. 9	78	Baker -	Synectus Certified.
Nov. 5	18	Copper miner	Typhus. Ulcerated intestines. Certified.
„ 11	71	Grocer -	Fever, 4 weeks. Bronchitis. Certified.
Nov. 25	87	Tailor - -	Old age. Not certified.
„ 28	68	Chelsea pensioner -	Diseased heart. Not certified.
„ 30	51	Copper miner	Consumption. Not certified.
Dec. 17	22	Labourer -	Rheumatic fever, 12 weeks. Certified.
„ 25	24	Copper miner	Typhus. Certified.
„ 30	42	Greenwich pensioner -	Pulmonia. Certified.

Falmouth - 2. Falmouth.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 4	16	Merchant seaman's apprentice -	Skull fractured by falling from the mast head of the bark Fairy. Inquest.
„ 14	20	Sailor, merchant service	Abscesses on thigh. Certified.
„ 20	20	Sailor -	Sea scurvy. Low fever. Abscesses. Certified.
„ 23	77	Ship builder -	Diseased heart. Dropsy, 3 years. Certified.
Feb. 1	57	Music master	Apoplexy. Certified.
„ 8	50	Sailor merchant service	Bronchitis. Certified.
„ 3	43	Master mariner	Visitation of God. Inquest.
„ 14	16	Seaman -	Accidental death. Inquest.
„ 27	36	Seaman -	Rupture of blood vessel of lungs. Inquest.
Mar. 1	14	Son of porter	Variola. Certified.
„ 8	51	Shipwright -	Phthisis. Certified.
„ 20	20	Merchant's clerk -	Consumption, 2 months. Certified.
„ 27	74	Captain, R.N.	Gravel. Intermittent fever. Certified.
April 1	63	Cordwainer -	Atrophy. Certified.
„ 2	61	Mariner -	Apoplexy. Disease heart. Certified.
„ 5	88	Sexton -	Paralysis. Certified.
Mar. 31	70	Cordwainer -	Paralysis, 3 months. Certified.
April 6	80	Superannuated Excise officer	Apoplexy, half an hour. Certified.
„ 11	74	Ironmonger -	Diseased heart. Certified.
„ 14	24	Tin miner -	Skull fractured in Swanpool Mine by a stone falling down the shaft. Inquest.
„ 27	78	Stonemason -	Bronchitis. Certified.
„ 29	72	Porter -	Dysentery. Certified.
May 7	52	Mariner, master	Phthisis, 10 months. Certified.
„ 11	34	Director of the Kew Observatory -	Phthisis, 9 months. Certified.
„ 10	49	Carpenter -	Compression of brain. Extravasation of blood, the result of a fall.
„ 20	62	Labourer -	Paralysis, 4 days. Certified.
„ 22	75	Mason -	Infirmities of age. Certified.
June 2	87	Officer, H.M.'s Customs -	Bronchitis. Certified.
„ 6	25	Roper -	Consumption, 12 months. Certified.
„ 3	73	Mason -	Bronchial affection. Congestion of brain. Paralysis. Certified.
„ 25	52	Van driver -	Hæmoptysis. Certified.
„ 26	16	Son of pilot -	Phthisis pulmonalis. Certified.
July 2	52	Pensioner -	Bronchitis. Certified.
„ 8	38	Carpenter -	Pericarditis, 4 weeks. Certified.
June 23	72	Master, R.N.	Stabs in thigh, wilful murder. Inquest.
July 10	76	Paper maker	Natural decay. Certified.
„ 15	34	Miner -	Fatty liver, 9 months. Certified.
„ 22	36	Pensioner -	Aneurism. Certified.
„ 22	11	Son of master mariner.	Enteritis, 4 days. Certified.
Aug 10	24	Boatman -	Phthisis. Certified.
„ 13	41	Mate, merchant seaman.	Diseased kidneys. Anasarca. Certified.
„ 15	49	Fisherman -	Gastritis. Certified.
„ 22	43	Collector of rates	Diarrhœa. Certified.
Sept. 2	55	Miner -	Phthisis, 3 years. Certified.
„ 7	84	Solicitor -	Diseased heart, 2 years. Certified.
„ 24	92	Fisherman -	Apoplexy. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Oct. 1	74	Mariner -	Hepatitis, 2 months. Certified.
„ 5	84	Merchant -	Asthenic senilis. Certified.
„ 7	68	Superannuated Custom House officer.	Diseased stomach. Gout. Certified.
„ 11	26	Sailor -	Dysentery, 2 years. Phthisis, 1 year. Certified.
„ 12	22	Accountant -	Febris, 14 days. Certified.
„ 14	84	Mason -	Gangrene senilis, 3 months. Certified.
„ 15	75	Chelsea pensioner.	Bronchitis. Certified.
„ 22	40	Master seaman	Wound in the throat inflicted wilfully by Chas. Arons. Inquest.
„ 26	75	Labourer -	Natural causes. Inquest.
„ 30	54	Master mariner	Diseased heart. Certified.
Nov. 3	25	Miner -	Phthisis, 2 years. Certified.
„ 5	38	Cordwainer -	Phthisis, 2 years. Certified.
„ 7	65	Surveyor of shipping -	Atrophy. Certified.
„ 17	27	Sailor -	Phthisis, 4 years. Certified.
„ 17	64	Labourer -	Ascites. Certified.
„ 24	95	Baker -	Age. Certified.
„ 27	23	Sailor -	Phthisis, 10 months. Certified.
„ 28	71	Farmer -	Pneumonia, 9 days. Certified.
„ 30	38	Sailor -	Dysentery, — months. Certified.
„ 30	72	Labourer -	Diarrhœa. Certified.
Dec. 3	31	LieutenantR.N.	Delirium with tremor. Certified.
„ 10	33	Sailor -	Fracture. Suppurative phlebitis. Certified.
„ 18	85	Bootmaker -	Old age. Certified.
„ 27	86	Labourer -	Old age. Certified.
„ 28	33	Sailor -	Sea scurvy. Certified.
1860.			
Jan. 3	81	Labourer -	Diarrhœa. Not certified.
„ 4	42	Labourer -	Spasm of the heart. Certified.
„ 5	47	Druggist -	Rheumatic fever. Certified.
„ 8	42	Gardener -	Pulmonary consumption. Certified.
„ 16	19	Son of smith -	Phthisis, 2 years. Certified.
„ 25	96	Labourer -	Old age. Certified.
Feb. 14	47	Jeweller -	Phthisis, 10 months. Certified.
„ 19	73	Cordwainer -	Bronchitis. Certified.
„ 21	71	Labourer -	Age. Certified.
„ 19	27	Farm labourer	Consumption. Certified.
„ 23	70	Labourer -	Diarrhœa. Certified.
„ 22	78	Coalporter -	Gangrene of foot. Certified.
„ 26	32	Ship cook -	Consumption. No medical attendance.
„ 27	73	Blacksmith -	Old age. Certified.
„ 28	23	Sailor -	Dysentery Certified.
Mar. 1	81	Gardener -	Old age. Certified.
Apr. 2	27	Sailor -	Diseased heart. Dropsy. Certified.
„ 4	50	Solicitor -	Ischuria, 40 hours. Certified.
„ 17	71	Tinman -	Old age. Certified.
„ 16	60	Labourer -	Hydrothorax, 5 years. Certified.
„ 16	10	Son of farmer	Necrosis, 4 months. Hydrops, 2 months. Certified.
„ 16	34	Labourer -	Stone of granite falling on him. Inquest.
„ 30	50	Horsekeeper -	Bronchitis, Certified.
„ 30	70	Carpenter -	Asthma, 10 years. Certified.
May 1	84	Gardener -	Influenza, 1 week. Certified.
„ 8	23	Labourer -	Fever, 3 weeks. Certified.
„ 14	12	Son of mariner	Dropsy. Certified.
„ 23	19	Son of labourer	Diseased heart. Not certified.
„ 23	71	Merchant -	Softening of brain. Certified.
„ 21	33	Innkeeper -	Phthisis, 4 months. Certified.
June18	54	Porter -	Asthma. Certified.
„ 18	65	Waterman -	Phthisis, 8 months. Certified.
„ 29	68	Superannuated Excise officer.	Paralysis. Not certified.
July 1	46	Tailor -	Hepatitis, 5 weeks. Certified.
„ 3	31	Gentleman -	Phthisis. Certified.
„ 11	53	Sailor -	Stricture of œsophagus, 7 months. Certified.
„ 20	65	Pensioner -	Pneumonia, 4 weeks. Certified.
„ 22	74	Shipwright -	Old age. Certified.
„ 26	66	Farmer -	Paralysis, 3 weeks. Certified.
„ 30	22	Soldier -	Psoas abscess, 11 months. Certified.
Aug. 4	59	Porter -	Bronchitis, 4 months. Certified.
„ 4	60	Boatman -	Phthisis, 6 months. Certified.
„ 3	64	Cabinetmaker	General debility. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Aug. 4	21	Sailor -	Typhus. Pneumonia Certified.
„ 10	30	Surgeon -	Fever, 9 weeks. Certified.
„ 14	90	Cordwainer -	Age. Certified.
„ 17	66	Mariner -	Severe cold. Certified.
„ 19	82	Waterman -	Age. Certified.
„ 21	82	Schoolmaster-	Natural decay. Certified.
„ 28	36	Mariner -	Sea scurvy. Certified.
„ 31	19	Mariner -	Scurvy. Bronchitis. Certified.
Sep. 19	36	Solicitor -	Diseased brain. Apoplexy. Certified.
„ 26	19	Son of labourer	Morbus cordis. Certified.
Oct. 15	31	Coachman -	Phthisis, 1 year. Certified.
„ 28	28	Sailmaker -	Apoplexy, 10 days. Certified.
„ 26	35	Farmer -	Injuries: thrown from a horse. Inquest.
„ 29	76	Sailor -	Age. Certified.
„ 28	27	Solicitor -	Apoplexy, 7 days. Certified.
Nov. 2	26	Sailor -	Dysentery. Certified.
„ 4	43	Master mariner	Phthisis, 22 months. Certified.
„ 8	58	Cordwainer -	Paralysis. Certified.
„ 20	43	Master mariner	Sudden death. Inquest.
„ 22	72	Mine engineer	Paralysis. Certified.
„ 27	21	Sailor -	Fever. Phthisis. Certified.
Dec. 9	18	Sailor -	Exæma. Anæmia. Certified.
„ 7	79	Commander, R.N.	Hydrothorax, 12 months. Certified.
„ 9	45	Farmer -	Phthisis, 1 year. Certified.
„ 14	38	Sailor -	Scurvy. Certified.
„ 18	55	Lieutenant, R.N.	Jaundice, 3 days. Melæna, 2 days. Certified.
„ 28	76	Chelsea pensioner	Bronchitis, 2 weeks. Certified.
„ 27	27	Mariner -	Diseased heart, 4 years. Certified.
„ 31	63	Gentleman -	Diseased stomach. Certified.
1861.			
Jan. 1	81	Agric. labourer	Visitation of God. Inquest.
„ 12	93	Sexton -	Old age. No medical attendant.
„ 16	22	Labourer -	Apoplexy, 6 days. Certified.
„ 18	70	Boatman -	Pneumonia, 4 days. Certified.
„ 23	46	Engineer, R.N.	Epilepsy. Apoplexy. Certified.
„ 27	63	Grocer - -	Dropsy. Certified.
„ 31	85	Ropemaker -	Old age. No medical attendant.
„ 28	24	Sailor - -	From eating water hemlock. Inquest.
„ 28	27	Sailor - -	From eating water hemlock. Inquest.
Feb. 6	32	Locker,H.M.'s Customs.	Enlarged liver, 3 months. Certified.
„ 6	21	Tailor - -	Phthisis, 6 months. Certified.
„ 8	69	Mariner -	Diseased heart, 7 months. Certified.
„ 11	42	Surgeon -	Diseased liver, 12 months. Certified.
„ 20	83	Solicitor -	Age. Certified.
„ 21	52	Carrier - -	Diseased liver. Ascites. Certified.
„ 21	42	Cellarman -	Dropsy. Not certified.
„ 25	62	Carpenter -	Accident. Inquest.
„ 27	65	Surveyor -	Visitation of God. Inquest.
Mar. 1	61	Spirit merchant	Found drowned. Inquest.
„ 14	28	Mariner -	Dysentery. Not certified.
„ 15	23	Mariner -	Dysentery. Not certified.
„ 18	75	Gentleman -	Apoplexy, 30 hours. Certified.
„ 23	88	Labourer -	Old age. Certified.
„ 24	58	Labourer -	Diseased liver. Jaundice, 4 days. Certified.
„ 23	18	Sailor - -	Fall from maintopsail. Inquest.
„ 27	74	Ironmonger -	Diseased heart. Certified.
„ 25	20	Sailor - -	Accident: drowned. Inquest.
Apr.12	71	Shoemaker -	Age. Certified.
„ 17	77	Waterman -	Paralysis. Certified.
„ 24	17	Son of gardener	Scrofula, 10 years. Certified.
„ 26	28	Sailor - -	Apoplexy. Certified.
May 1	17	Sailor - -	Consumption. Certified.
„ 3	90	Shoemaker -	Old age. Certified.
„ 18	42	Sailor - -	Rheumatism. Certified.
„ 18	77	Cooper - -	Diseased prostrate gland. Certified.
„ 16	19	Seaman, R.N.	Phthisis. Certified.
„ 26	72	Labourer -	Age. Certified.
„ 30	30	Carpenter -	Dropsy. No medical attendant.
June13	30	Sailor - -	Fever, 2 months. Certified.
„ 4	15	Seaman's apprentice.	Fall from the mast head. Inquest.
„ 17	54	Sailor - -	Pneumonia. Phthisis. Certified.
„ 21	38	Steward, R.N.	Ileus. Certified.
„ 22	16	Son of innkeeper	Diseased ankles. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
July 6	43	Sailor - -	Diseased liver. Ascites. Certified.
„ 9	85	Engineer -	Diseased liver. Certified.
„ 17	79	Butcher -	Old age. Certified.
„ 22	39	Gentleman -	Delirium tremens. Certified.
Aug. 3	19	Sailor - -	Synochus, 10 days. Meningitis, 2 days. Certified.
„ 7	41	Gunner, R.A.	Gangrene of lungs. Certified.
„ 15	28	Groom - -	Typhoid fever, 10 days. Certified.
„ 17	22	Master mariner	Phthisis. Certified.
„ 25	52	Engine driver	Accident. Drowned. Inquest.
Sept. 2	64	Labourer -	Consumption, 10 months. Certified.
„ 10	74	Pilot - -	Cancer. Certified.
„ 10	70	Chelsea pensioner.	Suicide by hanging. Inquest.
„ 13	72	Mariner -	Dysentery, 14 days. Certified.
„ 13	15	Son of shipwright.	Scrofula, 12 years. Certified.
„ 20	77	Labourer - -	Old age. Certified.
„ 22	63	Mariner -	Old age. Certified.
„ 23	69	Mariner -	Anasarca, 2 months. Certified.
Oct. 4	24	Mariner -	Paralysis. Certified.
„ 8	20	Shipwright -	Phthisis, 1½ years. Certified.
„ 10	32	Ship carpenter	Nephritis, 1 year. Hydrops, 2 months. Certified.
„ 8	15	Shipwright -	Fever. Internal hæmorrhage. Certified.
„ 10	43	Mason - -	Fever. Certified.
„ 13	84	Cordwainer -	Age. Certified.
„ 25	72	Coast Guard -	Paralysis. Certified.
Nov. 7	23	Sailor - -	Scorbutus. Dysenteria. Certified.
„ 10	19	Seaman -	Accident: fall from aloft. Inquest.
„ 17	60	General agent	Insanity, 2 years. Certified.
„ 16	74	Builder - -	Diseased heart. Certified.
„ 22	42	Greenwich pensioner.	Icterus, 14 days. Certified.
„ 20	79	Solicitor -	Paralysis. 1 month. Certified.
„ 23	42	Labourer -	Phthisis, 5 years. Certified.
„ 24	83	Labourer -	Old age. Certified.
„ 25	63	Gentleman -	Asthma, 6 years. Certified.
Dec. 1	25	Sailor - -	Pneumonia, 24 hours. Certified.
„ 3	31	Sailor - -	Diseased heart. Certified.
„ 5	64	Gentleman -	Apoplexy, 16 hours. Certified.
„ 7	33	Sailor - -	Fractured thigh, 12 days. Certified.
„ 9	15	Son of labourer	Hepatitis. Bronchitis. Certified.
„ 11	37	Cabinet maker	Hydrothorax, 18 months. Certified.
„ 18	64	Pensioner -	Apoplexy, 12 hours. Certified.
„ 23	81	Mariner -	Old age. Certified.
„ 25	69	Surgeon -	Phthisis. Certified.
„ 26	34	Ironmonger -	Phthisis. Certified.

Sub-District - 3. Penryn.

1859.			
Jan. 2	50	Vagrant -	Diseased heart, 5 months. Certified.
„ 6	12	Son of porter -	Typhus, 3 weeks. Certified.
„ 30	20	Son of miner -	Typhus. Pneumonia, 3 weeks. Certified.
Apr. 9	80	Superannuated Excise officer	Palsy, 4 years. Certified.
„ 26	42	Cordwainer, journeyman.	Consumption, 6 months. Certified.
May 23	54	Joiner - -	Paralysis, 10 days. Certified.
July 15	43	Master butcher	Concussion of the brain, 9 days. Certified.
Sept. 8	19	Son of porter	Consumption, 1 year. Not certified.
„ 11	25	Cordwainer -	Consumption, 2 years. Certified.
Oct. 3	56	Husbandman -	Paralysis, 2 weeks. Certified.
„ 12	15	Son of porter -	Diseased heart, 1 year. Not certified.
„ 21	21	Son of joiner -	Epilepsy, 9 years. Certified.
Nov. 2	84	Farmer - -	Age. No medical attendant.
„ 14	37	Stonemason -	Phthisis pulmonalis, 1 year. Certified.
„ 20	30	Husbandman	Diseased heart, 14 months. Certified.
1860.			
Jan. 6	32	Seaman, merchant service	Ulcer, 13 years. Certified.
„ 23	66	Tinker - -	Paralysis, 3 days. Certified.
1860.			
Feb. 16	47	Sawyer - -	Phthsis, 2 years. Certified.
„ 23	21	Mariner, merchant service	Ague, 2 weeks. Certified.
„ 22	45	Master mariner	Dysentery, 8 months. Certified.
Mar. 11	73	Tallowchandler	Apoplexy, 1 week. Certified.
„ 15	17	Son of schoolmaster.	Peritonitis, 6 weeks. Certified.
„ 17	80	Millwright -	Old age, 2 weeks. No medical attendant.
„ 18	64	Millwright -	Diseased heart, 3 months. Certified.
„ 28	65	Gardener -	Diseased heart, 3 months. Certified.
Apr. 1	60	Whitesmith -	Suicide by hanging. Inquest.
„ 5	63	Joiner, journeyman.	Scirrhus of stomach, 5 months. Certified.
„ 9	82	Stonemason -	Paralysis, 3 weeks. Certified.
„ 11	41	Mason, journeyman.	Diseased heart. Certified.
„ 16	13	Son of agricultural labourer	Scrofula, 4 years. Certified.
„ 30	67	Master mariner	Paralysis, 2 years. Certified.
May 17	59	Agric. labourer	Consumption, 2 weeks. Certified.
„ 24	75	Porter - -	Old age, 12 weeks. Certified.
June 13	79	Brazier - -	Bronchitis, 1 month. Certified.
July 2	53	Saddler, master	Dropsy, 7 months. Certified.
„ 11	77	Farmer - -	Decay of nature. No medical attendant.
„ 31	75	Farmer - -	Decay of nature. Certified.
Aug. 15	74	Baker - -	Hydrothorax, 5 months. Certified.
Sept. 13	66	Farmer -	Palsy, 1 week. Certified.
Nov. 2	60	Porter - -	Cancer of stomach, 6 months. Certified.
„ 4	46	Husbandman -	Palsy, 3 weeks. Certified.
„ 8	33	Copper miner	Fall of killas in the United Mines. Inquest.
Dec. 24	21	Tailor, apprentice.	Phthisis, 14 months. Certified.
„ 27	29	Seamen, R.N.	Ileus, 9 days. Certified.
„ 27	27	Printer, journeyman.	Consumption, 18 months. Certified.
1861.			
Jan. 10	48	Husbandman -	Hæmorrhage, 3 days. Certified.
Mar. 24	39	Farmer -	Diseased heart, 4 weeks. Certified.
Apr. 6	11	Son of farm labourer.	Consumption, 15 months. Certified.
„ 17	84	Millwright -	Old age. Certified.
„ 14	59	Mason - -	Fall from a ladder. Inquest.
„ 30	41	Cordwainer, journeyman.	Phthisis, 1 year. Certified.
May 16	62	Cordwainer -	Diseased brain, 2 years. Certified.
June 17	66	Tailor - -	Cancer, 1 year. Certified.
July 1	76	Landed proprietor.	Gangrene, 2 months. Certified.
„ 8	66	Copper miner	Consumption, 3 years. No medical attendant.
„ 12	10	Son of joiner -	Peritonitis, 5 days. Certified.
Aug. 13	64	Labourer -	Paralysis, 3 days. Certified.
Oct. 2	48	Draper - -	Consumption, 6 months. Certified.
„ 5	87	Agric. labourer	Age. No medical attendant.
„ 8	15	Son of agricultural labourer	Typhus, 11 days. Certified.
„ 13	23	Millwright -	Typhus, 3 weeks. Certified.
Dec. 21	56	Saddler, journeyman.	Diseased kidneys, 1 year. Certified.

Sub-District - 4. Constantine.

1859			
Jan. 10	35	Copper miner	Phthisis pulmonalis, 3 years. Certified.
Feb. 1	53	Farmer -	Diseased heart, 9 months. Not certified.
Mar. 16	76	Miller -	Hæmaturia, 3 months. Certified.
„ 19	78	Carrier -	Stoppage and inflammation of bowels. Not certified.
„ 21	65	Agric. labourer	Pneumonia, 6 days. Certified.
Apr. 8	54	Farmer -	Diseased stomach. Certified.
„ 25	57	Labourer -	Killed while at work in a stone quarry, by a fall of overburden. Inquest.
June 6	77	Farmer -	Melæna, 14 days. Certified.
July 31	19	Son of wheelwright.	Intussusception, 3 days. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Aug. 6	17	Son of labourer.	Phthisis, 6 months. Certified.
Sept. 4	77	Parish clerk -	Scirrhus of stomach, 1 year. Certified.
Dec. 20	72	Innkeeper -	Unknown. No medical attendant.
1860			
Jan. 6	74	Agric. labourer	Paralysis. No medical attendant.
„ 13	53	Agric. labourer	Diseased heart. Certified.
„ 27	79	Blacksmith -	Paralysis. No medical attendant.
„ 26	90	Fishmonger -	Injuries. Fall down stairs. Inquest.
Feb. 8	22	Stone cutter -	Dropsy. Certified.
May 15	26	Agric. labourer	Abscess in leg. Not certified.
„ 31	81	Agric. labourer	Apoplexy. No medical attendant.
June 11	22	Farmer -	Phthisis. Certified.
„ 18	22	Seaman, merchant service	Phthisis, 2 years. Certified.
July 30	37	Solicitor -	Diseased brain. Certified.
Aug. 8	72	Agric. labourer	Apoplexy. Inquest.
„ 29	51	Plumber -	Drowned. Fall into a well. Inquest.
Sept 29	52	Farrier -	Hæmorrhage from lungs. Not certified.
„ 28	62	Waggon driver	Found drowned. Inquest.
Oct. 22	40	Sexton -	Phthisis, 15 months. Certified.
Nov. 18	57	Blacksmith -	Phthisis, 1 year. Certified.
„ 24	79	Yeoman -	Unknown. No medical attendant.
Dec. 9	72	Agric. labourer	Diseased stomach. No medical attendant.
„ 25	70	Agric. labourer	Unknown. No medical attendant
1861			
Jan. 15	67	Agric. labourer	Rheumatism. Certified.
Feb. 11	46	Tin miner -	Hæmoptysis. Certified.
Mar. 7	19	Son of farmer	Phthisis, 8 months. Certified.
Apr. 1	62	Farmer -	Gastric fever, 5 weeks. Certified.
„ 8	66	Agric. labourer	Ulcered legs, 2 months. Gangrene. Certified.
„ 23	69	Tin miner -	Cancer, 1 year. Not certified.
May 12	19	Son of labourer -	Caries of spine. Certified.
Aug 10	66	Farmer -	Diseased liver. Certified.
„ 22	48	Farmer -	Ulcered intestine. Certified.
Nov. 8	65	Agric. labourer	Ascites, 6 months. Certified.
Oct. 15	19	Son of farmer	Phthisis, 12 months. Not certified.
Nov. 14	45	Shoemaker -	Phthisis. Certified.
Dec. 24	47	Farmer -	Sarcoma of stomach. Certified.
„ 25	28	Carpenter -	Phthisis pulmonalis, 6 months. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
HELSTON.	1. Wendron. 2. Helston. 3. St. Keverne. 4. Breage. 5. Crowan.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Wendron.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan	22	Fisherman -	Consumption, 12 months. Not certified.
„ 3	28	Tin miner -	Consumption, 18 months. Not certified.
„ 13	70	Farm labourer	Erysipelas, 7 years. Abscess in seat, 4 weeks. Not certified.
„ 12	66	Farmer -	Consumption, 12 months. Not certified.
„ 26	11	Son of blacksmith.	Typhus, 7 days. Not certified.
„ 29	48	Tin miner -	Enteritis, 5 days. Not certified.
„ 31	64	Tin miner -	Hæmaturia, 1 year. Certified.
Feb. 17	62	Farm labourer	Dyspepsia, 4 months. Not certified.
Feb. 21	85	Tin miner -	Consumption, 7 years. Not certified.
Mar. 6	50	Tin miner -	Consumption, 12 months. No medical attendant.
„ 12	38	Agric. labourer	Consumption, 4 years. Not certified.
„ 16	21	Copper miner	Consumption, 12 months. Not certified.
„ 17	22	Tin miner -	Consumption, 18 months. Not certified.
„ 23	55	Tin miner -	Asthma, 12 months. Pneumonia, 7 days. Not certified.
Apr. 2	18	Shipwright, apprentice.	Consumption, 8 months. Not certified.
„ 18	10	Son of tailor -	Abscess on lungs, 10 days. Not certified.
„ 22	66	Farmer -	Dropsy, 6 months. Not certified.
May 20	61	Tin miner -	Consumption, 18 months. Not certified.
„ 21	78	Stone mason -	Old age. No medical attendant.
June 9	52	Tin miner -	Consumption, 8 months. Not certified.
„ 21	48	Copper miner	Consumption, 3 years. Not certified.
July 3	76	Fisherman -	Dyspepsia, 3 months. Not certified.
„ 7	25	Mariner -	Consumption, 6 months. Not certified.
„ 13	21	Miner - -	Natural death. Inquest.
Aug. 5	49	Tin miner -	Consumption. Not certified.
„ 3	51	Tin miner -	Apoplexy, 9 days. Not certified.
„ 17	58	Miller - -	Consumption, 6 years. Not certified.
Sept. 30	63	Farmer - -	Ulcered leg, 30 years. Dropsy, 6 weeks. Not certified.
Oct. 4	76	Tin miner -	Old age. Not certified.
„ 5	61	Farm labourer	Pneumonia, 3 weeks. No certified.
„ 6	53	Tin miner -	Consumption, 10 months. Not certified.
„ 16	54	Farm labourer	Ulcered leg, 2 years. Certified.
„ 30	57	Tin miner -	Mania, 2 years. Not certified.
Nov. 1	40	Mariner -	Shipwreck. Accidentally drowned. Inquest.
„ 13	66	Farm labourer	Pneumonia, 4 days. Not certified.
„ 16	49	Copper miner	Consumption, 8 months. Not certified.
Dec. 4	44	Copper miner	Consumption, 6 months. Not certified.
„ 24	44	Tin miner -	Diseased liver, 5 months. Not certified.
1860.			
Jan. 16	69	Cordwainer -	Paralysis, 2 years. Not certified.
„ 26	30	Farmer -	Pneumonia. Phthisis, 2 weeks. Not certified.
„ 26	44	Tin miner -	Fits, 20 years. Not certified.
„ 31	73	Farm labourer	Paralysis, 3 years. Not certified.
„ 30	86	Farmer -	Old age. Not certified.
Feb. 4	19	Tin miner -	Typhus, 3 weeks. Not certified.
„ 8	60	Tin miner -	Concussion of brain. Certified.
„ 20	56	Farmer -	Diseased heart. Asthma, 2 years. Not certified.
Mar. 4	61	Tin miner -	Consumption, 18 months. Not certified.
„ 8	62	Tin miner -	Consumption, 12 months. Not certified.
„ 15	72	Miller - -	Natural debility. No medical attendant.
„ 18	53	Gentleman -	Apoplexy, 2 days. Certified.
„ 18	74	Tin miner -	Consumption. Asthma, 2 years. No medical attendant.
Apr. 1	33	Gardener -	Consumption, 2 years. Certified.
„ 11	79	Copper miner	Old age. No medical attendant.
„ 10	77	Fisherman -	Old age. Not certified.
„ 17	78	Farmer - -	Hydrocephalus, 5 weeks. Not certified.
„ 30	19	Son of mason	Fits, 6 years. Not certified.
May 8	19	Tin miner -	Dropsy. Diseased kidneys, 2 weeks. Not certified.
„ 22	80	Farmer - -	Old age. No medical attendant.
„ 29	74	Farmer - -	Natural debility. Not certified.
June 15	69	Copper miner	Asthma, 2 years. Not certified.
„ 16	69	Farm labourer	Consumption. No medical attendant.
„ 18	12	Son of engine smith.	Diarrhœa, 3 weeks. Fistula. Certified.
July 2	13	Tin miner -	Typhus, 7 weeks. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
July 2	60	Tin miner -	Consumption, 2 years. Not certified.
„ 7	10	Son of tin miner.	Pneumonia. 8 days. Certified.
Aug. 6	59	Fisherman -	Consumption, 2 years. Certified.
„ 10	63	Tin miner -	Consumption, 2 years. Not certified.
„ 13	41	Tin miner -	Consumption, 2 years. Not certified.
„ 14	49	Tin miner -	Consumption, 2 years. Not certified.
„ 27	75	Farmer - -	Consumption, 12 months. No medical attendant.
Sept. 16	53	Cordwainer -	Stone, 2 years. Not certified.
„ 30	16	Son of farm labourer.	Consumption, 2 years. Not certified.
Oct. 3	14	Son of miner	Fall into a shaft. Inquest.
„ 20	66	Road labourer	Consumption, 12 months. Not certified.
„ 26	43	Farm labourer	Spasms of stomach, 6 days. Not certified.
Nov. 5	73	Farmer - -	Paralysis, 4 days. No medical attendant.
„ 5	11	Son of miner	Fall into a shaft. Inquest.
„ 14	13	Son of road labourer.	Typhus, 4 weeks. Not certified.
„ 16	62	Farmer - -	Ulcered intestines, 5 weeks. Not certified.
1861.			
Jan. 21	43	Tin miner -	Consumption, 10 months. Not certified.
„ 23	85	Farmer -	Old age. No medical attendant.
„ 28	51	Tin and copper miner.	Consumption, 12 months. Not certified.
„ 29	26	Blacksmith -	Consumption, 2 years. Not certified.
„ 29	68	Farmer -	Paralysis, 9 days. Not certified.
Feb. 4	80	Tin miner -	Old age. No medical attendant.
„ 9	56	Farmer -	Natural death. Inquest.
„ 18	63	Tin miner -	Consumption, 12 months. Not certified.
„ 25	70	Tin miner -	Debility. No medical attendant.
Mar. 18	76	Tin miner -	Debility. No medical attendant.
Apr. 5	69	Farm labourer	Rupture of blood vessel, 10 days. Not certified.
„ 22	61	Accountant -	Diseased heart. Certified.
„ 30	59	Tin miner -	Consumption, 3 months. Not certified.
May 5	20	Engine smith.	Consumption, 6 months. Not certified.
„ 10	75	Mason - -	Natural debility. No medical attendant,
„ 19			
„ 23	10	Son of tin dresser.	Bronchitis, 2 weeks. Not certified.
„ 27	33	Miner - -	Internal injuries. Inquest.
„ 28	19	Blacksmith, apprentice.	Ulcered intestines, 14 weeks. Certified.
June 3	14	Son of copper miner.	Dropsy, 3 months. Not certified.
„ 5	79	Tin miner -	Old age. No medical attendant.
„ 16	60	Tin miner -	Pneumonia, 6 weeks. Certified.
„ 18	21	Tin miner -	Consumption, 10 months. Not certified.
„ 21	14	Son of tin miner.	Injured spine, 2 months. Not Certified.
„ 26	13	Son of tin miner.	Consumption, 12 months. Not certified.
July 10	77	Labourer -	Injuries by a cart. Inquest.
„ 23	64	Farmer -	Diseased liver. Certified.
Aug. 1	34	Tin miner -	Injuries received under ground, 5 weeks. Not certified.
„ 20	69	Farm labourer	Carbuncle, 10 days. Certified.
„ 22	51	Tin miner -	Consumption, 12 months. Not certified.
Sept. 6	46	Tin miner -	Ulcers, 11 months. Not certified.
„ 21	36	Mine agent -	Abscess on lungs, 6 weeks. Certified.
„ 28	20	Fisherman -	Enteritis, 7 days. Certified.
Oct. 2	54	Mine labourer	Enteritis, 4 days. Certified.
„ 4	50	Copper miner-	Consumption, 9 months. Certified.
„ 6	33	Miner - -	Found dead in a shaft. Inquest.
Nov. 3	49	Stone mason -	Natural death. Inquest.
„ 6	62	Tin miner -	Consumption, 2 years. Not certified.
„ 7	87	Farmer -	Old age. No medical attendant.
„ 27	46	Copper miner-	Consumption, 12 months. Not certified.
Dec. 1	65	Tin miner -	Consumption, 12 months. Not certified.
1861.			
Dec. 5	38	Cordwainer -	Dropsy, 4 months. Not certified.
„ 12	86	Stone mason -	Old age. No medical attendant.
„ 20	76	Tin miner -	Old age. No medical attendant.
„ 25	49	Tin miner -	Pneumonia, 9 days. Not certified.

Sub-district - 2. Helston.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 9	71	Butcher -	Old age. Certified.
Feb. 7	90	Chelsea pensioner.	Concussion of brain: falling off a scaffold. Certified.
„ 10	70	Carpenter -	Disease of heart. Dropsy. Certified.
„ 24	40	Labourer -	Lock-jaw. Inquest.
Mar. 19	77	Labourer -	Natural decay. No medical attendant.
„ 22	28	Tin miner -	Phthisis. Certified.
Apr. 12	49	Cordwainer, journeyman.	Carbuncle. Paralysis, 12 months. Certified.
„ 30	36	Innkeeper -	Phthisis, 2 years. Certified.
May 7	90	Tin miner -	Old age. Not certified.
„ 27	78	Labourer -	Natural decay. No medical attendant.
June 18	83	Farmer -	Old age. No medical attendant.
„ 24	74	Labourer -	Old age. Not certified.
„ 26	70	Miner - -	Hanged himself: suicide. Inquest.
July 12	37	Carpenter, journeyman.	Consumption. No medical attendant.
„ 14	25	Draper's assistant.	Phthisis, 2 years. Certified.
„ 24	90	Farmer -	Decay of nature. Not certified.
„ 28	39	Tin miner -	Abscess of the lungs. Certified.
Aug. 1	80	Not stated -	Decay of nature. Not certified.
„ 19	77	Malster -	Natural decay. Not certified.
Sept. 8	76	Labourer -	Natural causes. Inquest.
„ 17	21	Tailor, journeyman.	Nephria. Certified.
„ 19	61	Farm labourer	General debility. Certified.
„ 25	84	Farm labourer	General debility. Not certified.
Oct. 5	78	Farm labourer	Natural decay. No medical attendant.
„ 8	67	Cordwainer -	Hepatitis, 3 months. Certified.
Nov. 3	63	Farmer -	Bronchitis. Certified.
„ 7	25	Mariner -	Shipwreck. Accident: drowned. Inquest.
„ 7	25	Mariner -	Shipwreck. Accident: drowned. Inquest.
„ 7	25	Mariner -	Shipwreck. Accident: drowned. Inquest.
„ 14	48	Wheelwright, master.	Diseased liver, 10 years. Certified.
„ 18	32	Farm labourer	Diseased heart. Certified.
„ 22	66	Farm labourer	Diseased heart. Certified.
Dec. 4	54	Farm labourer	Softening of brain, 6 weeks. Certified.
„ 6	49	Greenwich pensioner.	Consumption. Certified.
„ 17	66	Music master -	Retention of urine. Certified.
„ 26	84	Farm labourer	Old age. No medical attendant.
1860.			
Jan. 19	43	Tin miner -	Consumption, 4 years. Certified.
„ 21	45	Draper -	Gout. Certified.
„ 31	25	Farm labourer	Intussusception. Mortification. Certified.
„ 30	56	Auctioneer -	Epilepsy. Certified.
„ 31	32	Coachman -	Diseased kidneys. Certified.
Feb. 8	86	Mason - -	Old age. Not certified.
„ 17	68	Cordwainer -	Paralysis. Certified.
„ 21	81	Tin miner -	Age. Not certified.
„ 27	33	Tailor, master	Consumption, 3 months. Certified.
Mar. 12	81	Seaman, merchant seaman.	Age. Not certified.
„ 21	76	Farm labourer	Age. Not certified.
„ 25	80	Farmer -	Bronchitis. Certified.
Apr. 3	74	Tin miner -	Bronchitis. Certified.
„ 28	49	Millwright -	Consumption. Not certified.
May 3	61	Tinman -	Cancer. Certified.
„ 13	78	Currier, master	Bronchitis. Certified.
„ 24	61	Farm labourer	Influenza, 3 weeks. Certified.
„ 26	63	Gardener -	Pneumonia. Certified.
„ 29	58	Mason, master	Fracture of leg. Mortification. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
May 29	84	Mason, master	Old age. No medical attendant.
June 11	18	Son of tailor	Consumption. No medical attendant.
„ 20	77	Wesleyan minister.	Paralysis. Not certified.
July 20	10	Son of farm labourer.	Diseased brain. Not certified.
Aug. 6	63	Tin miner -	Dropsy. Certified.
„ 19	70	Carpenter, master.	Sciatica. Certified.
„ 19	78	Chelsea pensioner.	Natural decay. No medical attendant.
„ 27	75	Carpenter, journeyman.	Natural decay. Not certified.
Sept 25	78	Labourer -	Found dead. Inquest.
Oct. 9	76	Cordwainer -	Old age. Certified.
„ 16	79	Seaman, merchant service.	Natural decay. No medical attendant.
„ 15	48	Son of captain, R.N.	Epilepsy, almost from birth. Certified.
Nov. 9	80	Coiner - -	Gangrene senilis. Not certified
Dec. 7	80	Labourer -	Old age. Certified.
„ 16	31	Butcher, master	Ulceration of windpipe. Certified.
„ 22	71	Farm labourer	Old age. Certified.
„ 31	30	Mason, journeyman.	Phthisis. Certified.
1861.			
Jan. 14	81	Farmer -	Natural decay. No medical attention.
„ 14	64	Chelsea pensioner.	Diseased heart. No medical attendant.
„ 26	84	Farmer -	Natural decay. No medical attendant.
„ 28	69	Labourer -	Natural decay. Not certified.
„ 27	56	Innkeeper -	Diseased liver. Certified
„ 27	62	Farm labourer	Consumption. Not certified.
„ 2	19	Groom - -	Accident: fall from a horse. Inquest.
Mar. 1	54	Tin miner -	Phthisis. Certified.
„ 3	73	Labourer -	Cancer. Certified.
„ 31	20	Chaise driver	Consumption. No medical attendant.
Apr. 19	80	Cordwainer -	Old age. No medical attendant.
„ 23	74	Gardener -	Hydrothorax, 4 months. Certified.
May 1	28	Omnibus driver	Enteritis. Certified.
Apr. 30	20	Son of farmer	Diseased stomach. Certified.
May 16	14	Son of mason	Scrofula, 6 months. Certified.
„ 28	21	Farm labourer	Consumption. No medical attendant.
„ 31	70	Farm labourer	Bronchitis. Certified.
June 13	62	Tailor - -	Suppression of urine. Not certified.
„ 29	58	Miner - -	Apoplexy. Not certified.
July 3	16	Son of tailor	Phthisis, 12 months. Certified.
June 29	58	Miner - -	Apoplexy. Not certified.
July 4	8	Son of farmer	Diseased lungs. Certified.
„ 15	60	Farm labourer	Natural decay. Not certified.
„ 25	71	Cordwainer -	Diseased kidneys. Certified.
Aug. 5	45	Farm labourer	Diabetes, 1 month. certified.
„ 5	45	Commission agent.	Paralysis. Certified.
„ 19	20	Printer -	Phthisis, 2 years. Certified.
Sept 19	72	Carpenter -	Anæmia. Certified.
„ 26	52	Greenwich pensioner.	Diseased brain. Not certified.
Nov. 6	65	Farm labourer	Dropsy. Not certified.
„ 7	36	Tailor, journeyman.	Apoplexy. Certified.
„ 7	32	Mason, journeyman.	Phthisis. Certified.
Dec. 21	72	Farmer -	Old age. Not certified.
„ 27	71	Farmer -	Pneumonia. Not certified.
„ 16	41	Colt breaker -	Bursting a blood vessel. Inquest.

Sub-district - 3. St. Keverne.

1859.			
Jan. 5	25	Son of farmer	Phthisis. Certified.
„ 20	80	Carpenter -	Disease of stomach. Not certified.
„ 22	17	Son of farmer	Phthisis. Not certified.
„ 27	31	Agric. labourer	Hæmoptysis. Certified.
„ 30	24	Agric. labourer	Ulceration of shoulder. Not certified.
Jan. 26	62	Retired military officer.	Natural death. Inquest.
„ 25	45	Miller - -	Cut his throat: suicide. Inquest.
„ 22	35	Master mariner	Drowned. Shipwreck. Inquest.
Feb. 21	48	Miller - -	Phthisis.
Mar. 21	26	Son of farmer	Disease of liver. Not certified.
„ 23	76	Agric. labourer	Unknown. No medical attendant.
Apr. 2	85	Farmer - -	Old age. Not certified.
„ 2	36	Engine grinder	Diseased lungs and bowels. Certified.
„ 5	27	Wheelwright	Nephria and diseased lungs. Certified.
„ 21	32	Agric. labourer	Phthisis. Certified.
May 1	83	Farmer -	Paralysis, 14 days. Certified.
„ 4	54	Superannuated, Coast Guard.	Diseased stomach. Not certified.
„ 12	71	Superannuated, Coast Guard.	Consumption. Not certified.
„ 29	82	Farmer -	Old age. Not certified.
June 18	47	Fisherman -	Diseased stomach. Not certified.
July 4	25	Stone mason -	Consumption. Not certified.
Aug. 19	82	Master mariner	Bronchitis. Certified.
„ 17	33	Blacksmith -	Accident: gun shot wound. Inquest.
„ 22	53	Agric. labourer	Pleuro-pneumonia. Certified.
„ 25	74	Farmer -	Old age. Not certified.
„ 29	26	Greenwich pensioner.	Diseased hip joint. Not certified.
Sept. 10	40	Farmer -	Concussion of brain: fall from horse. Inquest.
„ 15	16	Son of farmer	Consumption. Not certified.
„ 28	70	Farmer -	Diseased stomach. Not certified.
Oct. 4	74	Farmer -	Anasarca. Certified.
Sept. 29	37	Mariner -	Drowned: washed out of a boat. Inquest.
Oct. 17	16	Son of blacksmith.	Consumption. Not certified.
„ 26	79	Agric. labourer	Paralysis. Not certified.
Nov. 8	70	Farmer -	Found dead in bed. Inquest.
1860.			
Jan. 6	84	Stone mason -	Old age. Not certified.
„ 8	37	Agric. labourer	Consumption, 12 months. Not certified.
„ 13	72	Farmer -	Dropsy, 6 months. Not certified.
Feb. 5	14	Son of thatcher	Phthisis. Certified.
Jan. 23	80	Parish clerk -	Wet and exposure to the weather. Inquest.
Feb. 8	21	Agric. labourer	Consumption, 19 months. Certified.
„ 22	80	Farmer -	Dropsy, 1 year. Certified.
Mar. 9	76	Farmer -	Bronchitis. Certified.
„ 17	76	Agric. labourer	Consumption, 10 years. Not certified.
„ 8	35	Stone mason -	Consumption, 9 months. Not certified.
„ 24	64	Cordwainer -	Stomach complaint. Certified.
„ 28	44	Agric. labourer	Consumption, 6 weeks. Not certified.
May 7	83	Stone mason -	Old age. Not certified.
June 2	91	Agric. labourer	Old age. Not certified.
„ 4	67	Farmer -	Bronchitis, 5 weeks. Not certified.
„ 10	23	Farmer -	Consumption. Not certified.
„ 16	56	Farmer -	Diseased lungs. Certified.
„ 30	35	Poulterer -	Drowned. Inquest.
Aug. 1	76	Agric. labourer	Ascites. Certified.
„ 5	30	Seamen, merchant service	Diseased lungs and liver. Certified.
„ 29	75	Stonemason -	Diseased stomach. Not certified.
Oct. 3	13	Son of agricultural labourer	Rheumatic fever. Certified.
„ 9	85	Stone mason -	Old age. Not certified.
„ 9	31	Farmer -	Phthisis. Certified.
„ 14	19	Son of butcher	Fistula in urethra. Phthisis. Certified.
„ 20	44	Shoemaker, journeyman.	Diseased liver. Ascites. Certified.
„ 27	19	Son of farmer	Consumption, 16 months. Not certified.
Nov. 9	24	Agric. labourer	Diseased heart. Certified.
„ 19	87	Miller - -	Old age. Not certified.
„ 29	30	Seaman -	Drowned. Inquest.
Dec. 20	21	Agric. labourer	Consumption, 3 months. Not certified.
„ 22	58	Farmer -	Diseased stomach. Certified.
„ 26	24	Seaman, R.N.	Phthisis. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Jan. 12	74	Seaman, R.N.	Old age. Not certified.
„ 28	88	Farmer -	Diseased stomach. Not certified.
Feb. 18	77	Agric. labourer	Old age. Not certified.
Mar. 3	46	Agric. labourer	Dropsy, 3 months. Not certified.
„ 4	56	Farmer -	Debility. Not certified.
„ 4	64	Agric. labourer	Bronchitis, 8 days. Certified.
„ 19	35	Farmer -	Consumption, 12 months. Not certified.
„ 21	78	Agric. labourer	Consumption, 12 months. Not certified.
Apr. 2	75	Agric. labourer	Old age. Not certified.
May 4	25	Seamen, R.N.	Consumption. Not certified.
„ 20	45	Farmer -	Diseased stomach. Not certified.
„ 25	70	Carpenter -	Ileus, 3 days. Certified.
June 1	21	Cabinet maker, apprentice.	Remittent fever. Certified.
„ 8	16	Son of farmer	Bronchitis, 6 weeks. Certified.
July 20	90	Farmer -	Old age. Not certified.
Aug. 18	36	Miller - -	Phthisis. Certified.
„ 25	60	Surveyor -	Consumption. Not certified.
„ 27	83	Farmer -	Disease of foot. Not certified.
Sept. 4	61	Farmer -	Apoplexy. Certified.
„ 6	68	Farmer -	Paralysis, 5 days. Not certified.
Oct. 4	79	Agric. labourer	Bronchitis. Certified
„ 12	70	Farmer -	Apoplexy. Certified.
Nov. 1	45	Postman -	Consumption, 2 years. Not certified.
„ 6	90	Farmer -	Age. Not certified.
„ 19	74	Agric. labourer	Age. Not certified.
„ 24	65	Blacksmith, master.	Softening of brain. Not certified.
Dec. 19	79	Farmer	Dropsy. Not certified.
„ 20	13	Son of pilot -	Typhus fever, 2 weeks. Not certified.
„ 19	58	Labourer -	Natural causes. Inquest.

Sub-district - 4. Breage.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan 13	44	Miner - -	Phthisis, 4 years. No medical attendant.
Feb. 14	39	Tin miner -	Phthisis, 11 weeks. Not certified.
„ 28	68	Farmer - -	Cystitis, 6 days. Not certified.
„ 26	41	Tin miner -	Phthisis, 6 months. Not certified.
Mar. 1	22	Tin miner -	Phthisis, 3 years. Certified.
„ 19	57	Tin miner -	Phthisis, 6 months. Not certified.
Apr. 2	53	Tin miner -	Apoplexy, 48 hours. Certified.
„ 5	54	Tin miner -	Paralysis, 6 weeks. Certified.
„ 19	20	Tin miner -	Phthisis, 3 months. Not certified.
May 7	38	Farmer - -	Phthisis, 12 months. Not certified.
„ 25	82	Tin dresser -	Apoplexy, 3 hours. Certified.
June 22	36	Tin miner -	Diseased lungs, 5 months. Certified.
July 8	58	Mine labourer	Inguinal hernia, 10 days. Certified.
„ 8	30	Tin miner -	Phthisis, 3 years. Certified.
„ 12	26	Miner - -	Injuries, falling into a shaft. Inquest.
„ 17	18	Waggon driver	Drowned: bathing. Inquest.
„ 25	58	Tin miner -	Phthisis, 4 months. Hæmoptysis, 24 hours. Certified.
„ 31	42	Tin miner -	Phthisis, 2 years. No medical attendant.
Aug 13	58	Tin miner -	Phthisis, 12 months. No medical attendant.
„ 22	26	Lead miner -	Phthisis, 6 months. Not certified.
„ 21	18	Tin miner -	Scrofula, 12 months. Dropsy, 3 weeks. Certified.
„ 28	66	Tin miner -	Phthisis, 8 months. No medical attendant.
Sept. 5	20	Tin miner -	Diseased heart, 16 months. Certified.
„ 7	55	Tin miner -	Phthisis, 12 months. Certified.
Oct. 1	43	Mine agent -	Suffocated: buried under a mass of rubbish. Inquest.
„ 1	33	Tin miner -	Suffocated: buried under a mass of rubbish. Inquest.
„ 14	68	Mine blacksmith	Anasarca, 6 months. Certified.
„ 26	50	Mine blacksmith	Phthisis, 6 months. No medical attendant.
Nov. 9	55	Tin miner -	Phthisis, 2 years. No medical attendant.
„ 3	42	Miner - -	Diseased heart. Inquest.
„ 21	23	Blacksmith, master.	Phthisis, 9 months. Not certified.
1859.			
Nov. 30	45	Shoemaker, master.	Diseased kidneys, 5 months. Not certified.
Dec. 11	33	Tin miner -	Phthisis, 3 months. Certified.
„ 16	86	Farmer -	Old age. No medical attendant.
„ 22	30	Tin miner -	Phthisis, 2 years. Certified.
1860.			
Jan. 7	82	Sawyer - -	Old age. No medical attendant.
„ 8	23	Miner - -	Found dead. Inquest.
„ 21	72	Tin dresser -	Amputation of finger. General pain and debility, 3 months Not certified
„ 23	61	Yeoman -	Natural death. Inquest.
„ 30	59	Miner - -	Phthisis, 7 months. Not certified.
Feb. 8	72	Farm labourer	Natural death. Inquest.
„ 28	49	Tin miner -	Phthisis, 3 years. Not certified.
Mar. 9	80	Miner - -	Old age. No medical attendant.
„ 16	58	Dissenting minister.	Natural death. Inquest.
„ 29	62	Miner - -	Phthisis, 3 years. Not certified.
Apr. 6	69	Farmer - -	Pneumonia, 2 weeks. Certified.
Mar. 29	62	Miner - -	Phthisis, 3 years. Certified.
Apr. 6	69	Farmer - -	Pneumonia, 2 weeks. Certified.
„ 9	40	Miner - -	Phthisis, 18 months. Certified.
„ 17	22	Tin miner -	Phthisis, 2 years. Certified.
„ 21	53	Miner - -	Phthisis, 12 months. Certified.
„ 28	37	Miner - -	Phthisis, 4 years. Not certified.
May 10	66	Agric. labourer	Influenza, 3 weeks. Not certified.
„ 31	40	Tin miner -	Phthisis, 6 months. Certified.
June 7	89	Agric. labourer	Old age. No medical attendant.
„ 12	35	Tin miner -	Dropsy, 12 months. Not certified.
July 4	34	Miner - -	Phthisis. Certified.
„ 6	30	Miner - -	Natural death. Inquest.
„ 19	79	Miner - -	Old age. No medical attendant.
„ 18	75	Miner - -	Old age. No medical attendant.
„ 18	68	Miner - -	Apoplexy, 5 days. Certified.
„ 24	43	Miner - -	Phthisis, 10 months. Not certified.
„ 25	65	Mine blacksmith	Hydrothorax, 3 weeks. Not certified.
Aug 17	75	Lime burner -	Old age. No medical attendant.
Oct. 4	64	Tin dresser -	Polypus in nostril, 30 years. Not certified
„ 14	62	Tin miner -	Diseased liver, 3 months. Not certified.
Nov. 16	71	Farmer - -	Dyspepsia, 2 months. Not certified.
Dec. 1	unk.	Seaman - -	Found drowned. Inquest.
„ 4	55	Tin miner -	Gastri enteric, 9 weeks. Certified.
„ 4	24	Tin dresser -	Fever, 7 weeks. Not certified.
„ 24	55	Tin dresser -	Epilepsy, 10 years. Certified.
„ 28	54	Tin miner -	Asthma, 4 years. Not certified.
„ 31	17	Son of tin miner	Peritonitis, 7 days. Certified.
1861.			
Feb. 9	69	Engine worker in mine.	Fracture: fall against an engine cistern. Inquest.
„ 14	81	Agric. labourer	Old age. Certified.
Mar. 14	68	Tin miner -	Diseased lungs. Certified.
„ 28	70	Tin miner -	Old age. Not certified.
Apr. 24	40	Tin miner -	Phthisis, 5 months. Certified.
May 17	86	Greenwich pensioner.	Old age. No medical attendant.
„ 20	71	Labourer in a mine.	Old age. Not certified.
„ 30	54	Tin miner -	Phthisis, 8 months. Not certified.
June 7	54	Inspector of mines.	Splenitis, 2 months. Certified.
July 1	15	Son of tin miner	Phthisis, 6 months. Not certified.
„ 2	11	Son of tin miner	Fall from a horse. Inquest.
„ 20	46	Miner - -	Fractured skull. Inquest.
„ 26	12	Son of tin miner	Phthisis, 8 months. Certified.
Aug. 1	81	Agric. labourer	Old age. No medical attendant.
„ 3	35	Labourer - -	Found dead. Inquest.
„ 4	17	Joiner - -	Drowned: bathing. Inquest.
„ 31	47	Farmer - -	English cholera, 6 days. Certified.
Sept. 19	22	Tin miner -	Phthisis, 17 months. Not certified.
Oct. 11	56	Blacksmith, master.	Apoplexy, 3 days. Certified
„ 16	75	Farmer - -	Old age. Not certified.
Nov. 10	54	Tin miner -	Diseased heart. Pneumonia. Certified.
„ 10	61	Farmer - -	Pneumonia, 6 days. Not certified
Dec. 3	44	Seaman -	Found drowned. Inquest
„ 10	19	Son of blacksmith.	Phthisis, 7 weeks. Not certified
„ 28	47	Tin miner -	Phthisis, 6 months. Not certified.

COUNTY OF CORNWALL.

Sub-district - 5. Crowan.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 14	58	Tin miner -	Diseased liver, several years. Not certified.
„ 23	20	Tin miner -	Cold. Phthisis, 5 months. Certified.
„ 26	60	Tin miner -	Consumption, 12 months. Not certified.
Mar. 8	40	Tea dealer -	Consumption, 10 months. Not certified.
Apr. 18	19	Tin miner -	Consumption, 7 months. Not certified.
„ 26	36	Tin miner -	Fever, 6 weeks. Meningitis, 1 week. Certified.
May 21	37	Blacksmith -	Paralysis, — years. Not certified.
„ 22	14	Son of farmer	Bathing feet in cold water, 6 days. Phrenitis. Certified.
June 1	14	Son of tin miner -	Typhus, 13 days. Congestion of brain, 3 days. Certified.
„ 14	78	Road labourer	Decay of nature. No medical attendance.
„ 18	13	Son of tin miner	Consumption, 2 years. Not certified.
Aug. 17	51	Farmer -	General debility. Certified.
„ 8	30	Labourer -	Injuries from being crushed. Inquest.
Sept. 15	60	Blacksmith -	Dropsy, 4 weeks. Not certified.
Oct. 9	49	Farmer -	Consumption, 12 months. Not certified.
„ 23	88	Farmer -	Age. No medical attendant.
Nov. 3	11	Son of tin miner	Lumbar abscess, 2 years. Certified.
„ 14	11	Son of copper miner.	Phrenitis, 8 days. Certified.
Dec. 2	53	Engine worker in a copper mine.	Consumption, 6 months. Not certified.
„ 9	26	Copper miner	Enteritis, 7 days. Certified.
„ 10	16	Son of copper miner.	Typhus, 4 weeks. Certified.
„ 17	68	Copper miner	Phthisis, 6 months. Certified.
1860.			
Jan. 5	62	Tin miner -	Paralysis. Certified.
„ 6	15	Son of copper miner.	Typhus, 24 days. Certified.
Feb. 27	40	Copper miner	Pneumonia. Bronchitis. Certified.
Mar. 8	64	Fisherman -	Pneumonia. Certified.
„ 17	77	Tin miner -	Cancer in neck, 6 months. No medical attendant.
„ 16	10	Son of miner	Fall into a shaft at New Wheal Vor Mine. Inquest.
Apr. 6	87	Farmer -	Apoplexy, 43 hours. Certified.
May 31	29	Sawyer -	Lumbar abscess, 6 months. Certified.
July 8	60	Grocer and draper.	Cancer, 12 months. Certified.
Sept. 23	53	Tin miner -	Phthisis, 4 months. Certified.
„ 30	64	Farmer -	Hydrothorax, 3 weeks. Certified.
Oct. 15	24	Miner - -	Injuries by falling into a shaft. Inquest.
„ 17	56	Farmer -	Pleuro - pneumonia. Effusion. Certified.
Nov. 12	66	Tin miner -	Asthma, 3 years. Not certified.
„ 28	32	Copper miner	Fever. Pneumonia, 12 days. Certified.
Dec. 4	76	Tin miner -	Diseased lungs, 10 months. Diarrhœa. Certified.
„ 5	54	Copper miner	Diseased liver. Certified.
„ 9	72	Copper miner	Hemiplegia, 2 days. Certified.
„ 27	10	Son of tin miner	Scarlatina. Certified.
1861.			
Jan. 17	59	Tin miner -	Consumption, 2 years. Not certified.
„ 19	65	Blacksmith -	Gastric disease, 8 months. Certified.
„ 30	65	Farmer -	Bronchitis, 4 months. Certified.
Feb. 19	83	Copper miner	Decay of nature. No medical attendant.
„ 27	19	Son of copper miner.	Scarlatina, 4 days, Certified.
„ 28	17	Son of copper miner.	Scarlatina. Certified.
Mar. 9	79	Yeoman -	Natural cause. Inquest.
„ 23	47	Copper miner	Phthisis, 12 months. Certified.
Apr. 19	59	Copper miner	Phthisis, 3 months. Not certified.
„ 27	49	Tin miner -	Phthisis, 11 months. Certified.
1861.			
Aug. 17	45	Tin and copper miner.	Diseased brain. Certified.
Sept. 4	25	Tin miner -	Consumption, 4 months. Not certified.
„ 10	32	Sawyer - -	Pneumonia, 4 months. Certified.
„ 21	70	Copper miner	Age. Not certified.
„ 23	30	Miner - -	Fall into a shaft. Inquest.
Oct. 16	70	Copper miner	Hydrothorax, 3 months. Certified.
Nov. 2	64	Copper miner	Asthma. Dropsy. Certified.
„ 7	64	Farmer -	Dropsy, 3 months. No medical attendant.
„ 10	76	Farmer -	Decay of nature. No medical attendant.
„ 15	54	Copper miner	Consumption, 9 months. Not certified.
„ 17	24	Copper miner	Consumption, 12 months. Certified.
„ 18	62	Miner - -	Injury to his head. Inquest.
„ 24	66	Copper miner	Asthma. Not certified.
Dec. 9	55	Copper miner	Injuries received to his head, 13 months. Certified.
„ 12	72	Cordwainer -	Paralysis, 1 week. Certified.
„ 20	60	Thatcher -	Dropsy. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
REDRUTH.	1. Gwennap. 2. Redruth. 3. Illogan. 4. Camborne. 5. Phillack.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Gwennap.

1859.			
Jan. 5	49	Copper miner	Contusion of leg. Certified.
„ 15	70	Mine engineman	Old age. Not certified.
„ 17	71	Copper miner	Old age, Not certified.
„ 17	45	Mine engineman	Phthisis, 6 months. Certified.
„ 21	55	Copper miner	Gastro-intestinal derangement, 1 week. Certified,
Feb. 3	62	Copper miner	Phthisis, 18 months. Certified.
„ 4	55	Farmer -	Diseased heart. Inquest.
„ 10	48	Tin miner -	Injuries in Pednandret Mine: rock falling on him. Inquest.
„ 16	20	Cordwainer -	Diseased hip joint, 12 months. Certified.
„ 22	80	Copper ore dresser.	Senile gangrene, 3 months. Certified.
„ 22	75	Copper miner	Old age. Not certified.
Mar. 3	50	Copper miner	Fractured skull, 8 days. Certified.
„ 20	56	Copper miner	Phthisis. Not certified.
„ 22	48	Copper miner	Phthisis. Not certified.
„ 30	28	Copper miner	Phthisis. Not certified.
„ 30	44	Copper miner	Phthisis. Not certified.
Apr. 14	76	Butcher -	Debility. Certified.
„ 18	53	Copper miner	Bronchitis. Certified.
„ 28	33	Farmer -	Phthisis. Not certified.
May 1	64	Copper miner	Seizure. Not certified.
„ 1	71	Farm labourer	Old age. Not certified.
„ 3	13	Son of copper miner.	Throat fever. Not certified.
„ 9	64	Mine engineer	Phthisis. Not certified.
„ 19	36	Copper miner	Killed by a fall of ground on him from the back of his pitch. Inquest.
„ 6	33	Copper miner	Fall from 160 fathom level to the 190. Inquest.
„ 14	30	Copper miner	Phthisis, 4 months. Certified.
„ 19	59	Copper miner	Stricture of œsophagus. Asthma. Certified.
„ 18	54	Copper miner	Consumption. Certified.
„ 26	49	Copper miner	Phthisis. Not certified.
June 27	23	Son of farmer	Phthitis. Not certified.
July 3	60	Stone mason -	Pneumonia, 10 days. Certified.
„ 7	45	Copper miner	Diseased liver. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
859.			
July 19	68	Saddler -	Phthisis. Not certified.
„ 20	46	Coal carrier -	Concussion of brain: fall from a cart. Inquest.
Aug. 7	56	Copper miner	Phthisis. Not certified.
„ 14	69	Copper miner	Phthisis Certified.
„ 22	62	Copper miner	Phthisis. Not certified.
Sept. 4	57	Mine engineer	Bronchitis. Not certified.
„ 6	60	Copper miner	Phthisis. Not certified.
„ 21	42	Copper miner	Phthisis. Not certified.
Oct. 7	78	Forester -	Phthisis. Not certified.
„ 14	43	Copper miner	Killed underground by being buried underneath a fall of stuff. Inquest.
„ 22	27	Powder maker	Congestion of liver. Ischuria. Certified.
„ 27	38	Copper miner	Phthisis. Not certified.
„ 29	56	Copper miner	Diseased stomach. Not certified.
Nov. 3	35	Yeoman -	Hydrocephalus. Not certified.
„ 5	67	Copper miner	Phthisis. Not certified.
„ 13	79	Copper ore dresser.	Old age. Not certified.
„ 18	54	Copper miner	Diseased stomach. Certified.
„ 8	28	Gunpowder maker.	Explosion of gunpowder in the breaking-house at Kennal Vale mills. Inquest.
„ 17	33	Copper miner	Killed underground by a stull falling on him. Inquest.
„ 29	31	Stone mason -	Phthisis. Not certified.
Dec. 7	67	Farm labourer	Phthisis. Not certified.
„ 15	38	Copper miner	Phthisis. Not certified.
„ 16	19	Copper miner	Smallpox. Not certified.
„ 22	68	Copper miner	Phthisis. Not certified.
„ 12	60	Gunpowder maker.	Explosion of gunpowder in the mixing-house at Kennal Vale mills. Inquest.
„ 24	74	Mine engine man	Old age. Not certified.
1860.			
Jan. 7	40	Copper miner	Phthisis. Not certified.
„ 11	14	Son of copper miner.	Hydrocephalus, 2 weeks. Certified.
„ 16	11	Son of servant	Diphtheria. Not certified.
„ 15	13	Copper miner	Scalds: bursting of a boiler. Inquest.
„ 27	66	Farm labourer	Peritonitis. Certified.
„ 25	82	Cordwainer -	Old age Not certified.
Feb. 5	53	Copper miner	Phthisis. Not certified.
„ 27	34	Copper miner	Fall down a shaft. Inquest.
„ 16	11	Son of yeoman	Bronchitis. Fever. Certified.
„ 19	68	Copper miner	Old age. Not certified.
„ 24	23	Copper miner	Typhoid fever, 3 weeks. Certified.
„ 26	84	Grocer -	Old age. Not certified.
Mar. 7	81	Farm labourer	Old age. Not certified.
„ 6	18	Copper miner	Killed underground by fall of rock. Inquest.
„ 11	48	Copper miner	Phthisis. Not certified.
„ 9	37	Copper miner	Killed by a fall from the 70 fathom level to the 150 fathom level. Inquest.
„ 19	18	Copper miner	Phthisis. Not certified.
„ 21	53	Copper miner	Seizure. Not certified.
Feb. 14	67	Copper agent	Pneumonia. Not certified.
April 6	38	Tea dealer -	Consumption. Certified.
„ 21	50	Copper miner	Fever. Certified.
„ 25	70	Farmer -	Old age. Not certified.
„ 23	89	Farmer -	Old age. Not certified.
„ 25	59	Mathematical instrument maker -	Diseased stomach. Not certified.
„ 26	16	Copper miner-	Killed by falling from the 194 to the 208-fathom level. Inquest.
„ 28	62	Copper miner-	Phthisis. Not certified.
May 5	37	Copper miner-	Suffocated: a waste heap falling on him. Inquest.
„ 16	12	Son of copper miner.	Fever, 3 weeks. Effusion on brain, 6 days. Certified.
„ 21	74	Chelsea pensioner.	Phthisis. Not certified.
„ 22	87	Farmer -	Phthisis. Not certified.
„ 21	55	Copper miner-	Phthisis. Not certified.
„ 29	68	Shopman -	Phthisis. Not certified.
June 16	48	Copper miner-	Consumption. Not certified.
„ 30	47	Copper miner-	Phthisis. Not certified.
July 12	78	Coal weigher-	Phthisis. Not certified.
„ 15	60	Copper miner-	Phthisis. Not certified.
„ 17	50	Farmer -	Bronchitis. Not certified.
„ 19	24	Copper miner-	Fever, 4 weeks. Certified.
„ 23	77	Mine engine man.	Old age. Not certified.
1860.			
Aug 22	66	Copper miner-	Phthisis. Not certified.
Sep. 4	13	Son of copper miner.	Fall from the shaft of a cart and run over. Inquest.
„ 5	37	Copper miner-	Phthisis. Not certified.
„ 17	27	Copper miner-	Phthisis. Not certified.
„ 17	41	Copper miner-	Phthisis. Not certified.
„ 22	21	Carpenter -	Phthisis, 1 year. Not certified.
„ 17	11	Son of grocer	Gastro-enteritis. Certified.
„ 30	79	Copper miner-	Old age. No medical attendant.
„ 29	48	Copper miner-	Phthisis. Not certified.
Oct. 18	54	Copper miner-	Phthisis, 18 months. Not certified.
„ 28	28	Copper miner-	Phthisis. Not certified.
Nov. 5	72	Farmer -	Decay of nature. Certified.
„ 24	91	Chandler -	Diseased heart. Not certified.
Dec. 4	36	Farmer -	Phthisis. Not certified.
„ 8	58	Agent - -	Asthma. Pleurisy. Not certified.
„ 9	43	Mine engine man.	Phthisis. Not certified.
„ 12	38	Farmer -	Asthma. Not certified.
„ 19	52	Copper miner-	Consumption. Not certified.
„ 22	16	Hatter - -	Phthisis, 2 years. Not certified.
1861.			
Jan. 11	82	Malster -	Old age. Not certified.
„ 19	54	Copper miner	Phthisis. Not certified.
„ 19	55	Copper mine agent.	Catarrh. Fever, 9 days. Certified.
„ 27	60	Farmer -	Cancer. Certified.
„ 23	66	Gentleman -	Diseased heart, 6 months. Certified.
Feb. 5	70	Mine labourer	Apoplexy, 6 days. Certified.
„ 8	88	Cooper - -	Old age. Not certified.
„ 5	13	Son of cooper	Pneumonia. Congestion of lungs. Certified.
„ 13	50	Copper miner-	Consumption, 15 months. Not certified.
Mar. 13	66	Mine engine man.	Fever. Not certified.
„ 13	50	Copper miner-	Phthisis. Not certified.
„ 17	71	Copper miner-	Old age. Not certified.
„ 19	16	Labourer -	Quinsey, 12 days. Certified.
„ 20	66	Engine man -	Scalds by a jet of steam. Inquest.
„ 22	18	Copper miner-	Injuries by a fall from 170 to 190 fathom level in whin shaft. Inquest.
„ 26	25	Stone mason -	Paralysis. Not certified.
Apr. 1	52	Farmer -	Dropsy. Not certified.
„ 7	54	Mine agent -	Phthisis. Not certified.
„ 8	64	Copper miner-	Bronchitis, 18 months. Certified.
„ 10	50	Mine agent -	Phthisis. Not certified.
„ 12	18	Clerk - -	Phthisis. Not certified.
„ 19	23	Farm labourer	Phthisis, 22 months. Not certified.
„ 22	45	Copper miner-	Fractured spine, 9 months. Certified.
Mar. 16	10	Son of yeoman	Hydrocephalus. Not certified.
May 5	20	Farm labourer	Phthisis, 4 months. Certified.
„ 14	40	Copper miner-	Phthisis. Certified.
„ 14	51	Copper miner-	Decline, 9 years. Certified.
„ 19	38	Copper miner-	Decline, 9 months. Not certified.
„ 19	56	Innkeeper -	Pneumonia, 3 weeks. Not certified.
„ 19	56	Mine agent -	Bronchitis. Not certified.
June 4	23	Blacksmith -	Bronchitis. Not certified.
„ 6	22	Copper miner-	Diseased heart. Not certified.
„ 10	58	Blacksmith -	Phthisis. Not certified.
„ 11	57	Copper miner-	Decline. Not certified
„ 21	13	Son of copper miner.	Fall from the 80 to 110 fathom level. Inquest.
July 3	72	Mine agent -	Dropsy. Certified.
„ 3	63	Copper miner-	Consumption. Not certified.
„ 9	64	Copper miner-	Phthisis. Not certified.
„ 16	64	Copper miner-	Consumption. Not certified.
Aug 19	24	Copper miner-	Consumption. Not certified.
„ 17	22	Miner - -	Accident. Drowned: bathing. Inquest.
„ 21	22	Miner - -	Accident by the bursting of a hole in St. Day United Mine. Inquest.
Sep. 19	57	Copper miner-	Consumption. Not certified.
„ 21	60	Copper miner-	Apoplexy, 2 hours. Certified.
„ 26	59	Copper miner-	Decline. Not certified.
Oct. 3	24	Draper - -	Decline, 2 years. Not certified.
„ 2	57	Miller - -	Decline. Asthma. Not certified.
„ 11	58	Copper miner-	Fever. Not certified.
„ 12	71	Copper miner-	Old age. Not certified.
„ 21	21	Copper miner-	Fever. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Oct. 29	17	Copper miner-	Fever, 8 days. Certified.
Nov. 4	59	Copper miner-	Consumption. Not certified.
„ 8	78	Copper miner-	Old age. Not certified.
„ 10	25	Copper miner-	Typhus. Not certified.
„ 10	77	Mine agent -	Decay of nature. Not certified.
„ 17	47	Copper miner-	Consumption. Not certified.
„ 17	21	Merchant's clerk.	Ileus. Not certified.
„ 21	10	Son of farmer	Decline. Not certified.
„ 20	18	Copper miner-	Killed by falling into a winze. Inquest.
„ 26	24	Copper miner-	Abscess on lungs. Certified.
Dec. 8	26	Copper miner-	Typhus. Not certified.
„ 9	20	Copper miner-	Typhus. Not certified.
„ 11	43	Copper miner-	Phthisis, 2 years. Not certified.
„ 15	58	Copper miner-	Cardiac disease. Certified.
„ 15	14	Son of copper miner.	Fever. Not certified.
„ 27	11	Son of copper miner.	Variola, 5 days. Certified.

Sub-district - 2. Redruth.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 8	38	Mason -	Epilepsy. Certified.
„ 27	73	Gardener, master.	Ossification of heart. Hydropericardium. Not certified.
Feb. 2	13	Son of copper miner.	Phthisis, 6 weeks. Certified.
„ 3	62	Copper miner	Bronchitis, 4 years. Certified.
„ 11	51	Copper miner	Phthisis, 2 years. Not certified.
„ 19	75	Engine worker at a mine.	Debility. Certified.
„ 21	36	Innkeeper -	Bronchitis. Certified.
25	22	Copper miner	Dropsy. Not certified.
Mar. 2	55	Copper miner	Phthisis, 3 years. Not certified.
„ 9	16	Blacksmith -	Fever. Bronchitis, 3 months. Certified.
„ 6	65	Copper miner	Febris intermittent, — years. Certified.
„ 13	42	Copper miner	Phthisis, 2½ years. Certified.
„ 21	58	Copper miner	Phthisis. Certified.
„ 27	71	Farmer -	Disease of heart. Anasarca, Certified.
Apr. 14	71	Innkeeper -	Hemiplegia, 4 months. Bronchitis, 1 week. Certified.
„ 22	65	Chemist -	Bronchitis, 4 weeks. Certified.
May 1	39	Copper miner	Phthisis, 4 months. Not certified.
Apr. 27	20	Tin miner -	Killed underground, a rock falling on him from the back of level. Inquest.
May 5	14	Son of currier	Phthisis, 4 months. Certified.
„ 14	60	Copper miner	Chronic bronchitis, 2 years. Certified.
„ 17	62	Dresser of copper ores.	Pulmonary consumption. Certified.
„ 20	49	Copper miner	Bronchitis, 12 months. Certified.
„ 26	46	Copper miner	Phthisis. Certified.
June 8	40	Copper miner	Phthisis. Certified.
„ 22	59	Mine labourer	Debility. Certified.
„ 26	69	Confectioner -	Paralysis, 5 years. Apoplexy, 7 days. Certified.
„ 29	53	Ostler - -	Pleurisy. Certified.
July 9	20	Copper miner	Phthisis, 12 months. Not certified.
„ 9	73	Mine labourer	Diseased liver, many years. Certified.
„ 13	44	Copper miner	Phthisis, 4 years. Certified.
„ 15	60	Copper miner	Phthisis, 2 years. Not certified.
„ 16	24	Clerk - -	Phthisis, 18 months. Certified.
„ 19	52	Copper miner	Diseased lungs, 18 months. Certified.
„ 20	34	Copper miner	Phthisis, 12 months. Certified.
„ 22	93	Hawker -	Fever, 7 days. Certified.
Aug. 4	59	Carrier -	Carditis. Dropsy Certified.
„ 4	48	Copper miner	Abscess of lungs, 5 months Certified.
„ 18	65	Farmer -	Pneumonia. Certified.
„ 16	60	Copper miner	Phthisis. Certified.
„ 18	15	Copper miner	Fall from a kibble in returning to surface. Inquest.
„ 24	24	Copper miner	Smallpox. Certified.
Sept. 1	50	Copper miner	Diseased liver, 6 months. Certified.
„ 8	57	Copper miner	Phthisis, 5 months. Certified.
„ 7	63	Cordwainer -	Carditis. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Sept. 4	14	Son of copper miner.	Fall from a footway ladder in going underground at Copperhill Mine. Inquest.
„ 15	54	Copper miner	Diseased stomach. Perforation. Certified.
„ 28	38	Copper miner	Paralysis, 7 years. Not certified.
Oct. 6	57	Greengrocer -	Phthisis, — months. Certified.
„ 8	28	Copper miner	Phthisis, 9 months. Not certified.
„ 10	60	Copper miner	Diseased heart. Certified.
„ 16	65	Engineer -	Bronchitis, — years. Certified.
„ 16	66	Butcher -	Ruptured blood vessel of lungs. Inquest.
„ 21	59	Copper miner	Fall down a shaft. Inquest.
„ 16	47	Copper miner	Phthisis, 2 years. Not certified.
„ 31	17	Copper miner	Smallpox, 9 days. Certified.
„ 28	37	Carpenter, journeyman.	Asthma, 9 months. Certified.
Nov. 6	37	Copper miner	Phthisis. Certified.
„ 4	19	Tailor, journeyman.	Phthisis, 8 months. Not certified.
„ 30	29	Assayer -	Confluent smallpox, 14 days. Certified.
Dec. 2	42	Copper miner	Diseased lungs, 8 weeks. Certified.
„ 2	58	Copper miner	Phthisis, 12 months. Not certified.
Nov. 30	35	Agric. labourer	Fits. Inquest.
Dec. 6	20	Mine labourer	Epilepsy. Certified.
„ 12	19	Stoker, railway	Diseased liver. Certified.
„ 22	26	Watchmaker, journeyman.	Catarrh, 2 months. Certified.
„ 21	28	Tinman -	Phthisis, 6 months. Certified.
„ 23	47	Copper miner	Phthisis, 4 months. Not certified.
„ 20	63	Accountant -	Pneumonia, 10 days. Certified.
„ 27	85	House agent -	Old age, Certified.
„ 30	11	Son of copper miner.	Rheumatic carditis, 3 weeks Certified.
„ 28	74	Engraver -	Diseased kidneys, 12 months. No medical attendant.
1860.			
Jan. 3	22	Tin miner -	Killed underground; fall from a ladder. Inquest.
„ 16	76	Seedsman -	Cardiac disease. Certified.
„ 23	45	Copper miner	Pulmonary consumption. Certified.
„ 25	27	Draper - -	Diseased heart, 14 months. Certified.
Feb. 2	58	Copper miner	Phthisis, 5 years. Not certified.
„ 2	60	Copper miner	Pneumonia. Certified.
„ 5	73	Copper miner	Old age. No medical attendant.
„ 5	45	Copper miner	Bronchitis, 2 years. Certified.
„ 8	66	Printer - -	Diseased heart. Certified.
„ 10	19	Copper miner	Pericarditis, 3 months. Not certified.
„ 11	47	Copper miner	Phthisis. Certified.
„ 18	56	Farmer - -	Fall into an open mine shaft. Inquest.
„ 29	50	Copper miner	Abscess, 2 years. Certified.
Mar. 3	38	Cellarman -	Pleuro-pneumonia, 4 weeks. Certified.
„ 6	38	Copper miner	Phthisis. Certified.
„ 17	42	Copper miner	Diseased lungs, 3 months. Certified.
„ 17	49	Copper miner	Phthisis. Certified.
„ 27	48	Grocer - -	Phthisis, 12 months. Certified.
Apr. 12	10	Son of agricultural labourer.	Fall into an open shaft. Inquest.
„ 25	69	Gardener, journeyman.	Pneumonia, 7 days. Certified.
„ 21	58	Itinerant draper	Internal hæmorrhage. Inquest.
„ 23	12	Tin washer -	Crushed by a water wheel. Inquest.
May 2	78	Grocer - -	Bronchitis, 4 days. Certified.
„ 15	55	Baker, &c. -	Diseased heart. No medical attendant.
„ 14	66	Farmer -	Phthisis, 2 years. No medical attendant.
„ 18	60	Groom - -	Bronchitis. Certified.
„ 18	40	Mine labourer	Pyæmia. Certified.
„ 22	87	Builder -	Debility. Certified.
June 7	60	Copper miner	Phthisis, 7 months. Certified.
„ 11	65	Mine agent -	Diseased heart. Certified.
„ 20	77	Labourer -	Mortification. Certified.
„ 21	39	Copper miner	Injuries underground: arm broken by the engine rod. Inquest.
July 9	56	Copper miner	Cancer. Not certified.
„ 15	43	Mine agent -	Phthisis, 3 years. Certified.
Aug. 3	42	Printer -	Phthisis, 8 months. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Aug. 7	80	Engineer -	Influenza, 2 months. Certified.
„ 8	44	Copper miner	Killed underground by a stone falling down the shaft. Inquest.
Sept. 4	71	Draper -	Diseased heart, many months. Certified.
„ 7	42	Labourer -	Pneumonia, 20 days. Certified.
„ 20	66	Copper miner	Fever, 7 weeks. Certified.
Oct. 1	22	Mine engine man.	Scrofula of hip joint. Not certified.
Sept.30	19	Copper miner	Pneumonia, 15 days. Certified.
Oct. 1	55	Copper miner	Bronchitis. Certified.
„ 19	41	Copper miner	Consumption. Certified.
„ 25	11	Son of copper miner.	Convulsions. Certified.
„ 25	76	Assayer -	Decay of nature. Not certified.
„ 28	36	Copper miner	Phthisis. Certified.
Oct. 22	75	Mason, master	Bronchitis. Certified.
Nov. 13	47	Pawnbroker -	Cancer of liver, 12 months. Certified.
„ 20	17	Billiard marker.	Scarlatina, 3 weeks. Certified.
Dec. 2	21	Telegraph clerk.	Phthisis, 12 months. Certified.
„ 5	59	Carrier - -	Phthisis, 9 months. Not certified,
„ 7	54	Copper miner	Phthisis, 14 months. Certified.
„ 4	28	Copper miner	Phthisis, 8 months. Certified.
„ 3	76	Retired excise officer.	Cardiac disease. Certified.
„ 3	35	Copper miner.	Rupture of blood vessels. Inquest.
„ 10	50	Copper miner	Bronchitis. Certified.
„ 12	14	Son of copper miner.	Fever, 3 days. Certified.
„ 14	23	Blacksmith, journeyman.	Typhus. Certified.
„ 31	46	Copper miner	Cancer. Certified.
„ 23	20	Copper miner	Phthisis, 18 months. Certified.
Dec. 24	40	Draper, master	Cardiac disease. Dropsy. Certified.
30	77	Farm labourer.	Paralysis, 4 months. Not certified.
1861.			
Jan. 5	11	Son of dressmaker.	Fever, 14 days. Certified.
„ 5	35	Gold miner -	Pneumonia, 3 weeks. Certified.
„ 14	67	Mine agent -	Pneumonia. Certified.
„ 16	30	Mine labourer	Cardiac disease, 9 years. Not certified.
„ 20	53	Copper miner	Phthisis, 3 years. Certified.
„ 19	24	Blacksmith, master.	Typhus, 4 weeks. Certified.
Feb. 2	23	Blacksmith, journeyman.	Consumption. Certified.
„ 2	39	Mine agent -	Diseased lungs, 4 months. Certified.
„ 4	52	Copper miner	Apoplexy. Certified.
„ 17	57	Greengrocer -	Cardiac disease. Dropsy. Certified.
„ 27	52	Mine agent -	Phthisis. Certified.
Mar. 24	66	Baker, master	Diseased stomach. Certified.
Apr. 1	36	Copper miner	Bronchitis, 2 years. Certified.
„ 6	78	Cordwainer -	Diseased kidneys. Certified.
„ 13	62	Copper miner	Bronchitis, 7 years. Certified.
„ 13	67	Mason - -	Cardiac disease. Certified.
„ 19	64	Engineer -	Bronchitis. Certified.
„ 29	45	Malster -	Cardiac disease, 2 years. Certified.
May 1	59	Carrier -	Phthisis, 12 months. Certified.
„ 14	86	Mason - -	Bronchitis. Certified.
„ 15	48	Copper miner	Phthisis. Certified.
„ 23	40	Waggoner -	Phthisis. Certified.
„ 25	54	Fishmonger -	Catarrh. Certified.
„ 22	35	Copper miner	Diseased heart. Inquest.
„ 26	46	Innkeeper -	Pneumonia. Certified.
„ 30	80	Farm labourer	Old age. No medical attendant.
June 14	62	Cordwainer -	Pleuro-pneumonia, 7 days. Certified.
„ 18	65	Mine accountant.	Nephria.
July 9	89	Tin dresser -	Old age. Not certified.
„ 18	66	Copper miner	Diseased lungs. Hæmoptysis. Certified.
„ 15	27	Copper miner	Injuries by a rock falling on him in South Tolgus Mine. Inquest.
„ 23	26	Copper miner	Rheumatic carditis, 6 months. Certified.
Aug. 5	66	Tin miner -	Bronchitis, 2 years. Certified.
„ 7	52	Copper miner	Phthisis, 7 years. Certified.
1861.			
Aug. 6	72	Innkeeper -	Diarrhœa, 1 month. Certified.
„ 6	32	Chaise driver	Injuries from a fall in climbing a cliff. Inquest.
„ 9	57	Copper miner	Rheumatism, 15 years. Not certified.
„ 12	55	Copper miner	Phthisis, 2 years. Not certified.
Sept. 4	36	Copper miner	Phthisis. Certified.
„ 15	30	Copper miner	Syphilis. Rupia, 2 years. Certified.
„ 17	66	Mine agent -	Malignant diseased lungs. Certified.
Oct. 7	57	Farmer - -	Cardiac disease. Dropsy, 12 months. Certified.
„ 9	21	Copper miner	Phthisis, 9 months. Certified.
„ 12	34	Glass blower -	Phthisis, 2 years, Certified.
„ 15	36	Copper miner	Killed by the explosion of a hole. Inquest.
„ 31	17	Son of mine broker.	Scrotula, 3 years. Certified.
Nov. 19	62	Copper miner	Bronchitis, 10 years. Certified.
„ 24	62	Engine worker	Diseased kidneys, 8 years. Certified.
Dec. 2	33	Copper miner	Pelvis abscess, 8 weeks. Certified.
„ 13	60	Copper miner	Pneumonia, 10 days. Certified.
„ 22	47	Copper miner	Diseased liver, 2½ years. Certified.
„ 21	16	Son of copper miner.	Crushed by a water-wheel. Inquest.

Sub-district - 3. Illogan.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 1	56	Copper miner	Phthisis. Not certified.
„ 1	65	Copper miner	Paralysis. Epileptic fit, 2½ hours. Certified.
„ 6	40	Copper miner	Phthisis, 9 months. Certified.
„ 6	45	Mine engineman.	Found dead. Sudden. Inquest.
„ 11	10	Son of agent -	Fistula in arm, Certified.
„ 14	49	Copper miner	Decline, 12 years. Not certified.
Feb. 13	12	Son of copper miner.	Phthisis. Certified.
„ 15	61	Copper miner	Decline, — years. Not certified.
„ 23	74	Labourer -	Old age. Not certified.
Mar. 20	67	Labourer in copper mine.	Bronchitis. Certified.
Apr. 11	53	Copper miner	Fever. Certified.
„ 17	17	Son of copper miner.	Phthisis. Certified.
„ 16	27	Son of copper miner.	Decline. Not certfied.
May 6	12	Son of mine agent.	Fits from the fright of a dog. Not certified.
„ 9	73	Copper miner	Decline, 4 years. Not certified.
„ 9	26	Son of farm labourer.	Phthisis. Certified.
„ 10	62	Tin dresser -	Decline. Not certified.
„ 10	66	Copper miner	Chronic disease of liver. Certified.
„ 17	65	Copper miner	Bronchitis. Certified.
„ 20	65	Copper miner	Bronchitis. Certified.
„ 21	21	Copper miner	Injury from falling into a shaft in South Basset Copper Mine. Inquest.
„ 22	42	Miner - -	Natural death. Inquest.
„ 27	63	Copper miner	Pneumonia, 4 weeks. Abscess, 2 weeks. Certified.
„ 31	21	Copper miner	Phthisis, 3 years. Certified.
June 3	16	Son of copper miner.	Phthisis. Certified.
„ 8	73	Mine agent -	Pneumonia. Certified.
July 5	65	Copper mine agent.	Bronchitis. Certified.
„ 9	16	Son of labourer.	Accidental fall. Inquest.
„ 21	44	Copper miner	Pleuro-pneumonia. Certified.
Aug. 3	62	Copper miner	Phthisis. Certified.
„ 10	20	Copper miner	Pneumonia, 4 weeks. Certified.
Sept. 4	51	Sailor - -	Aneurism. Certified.
„ 10	17	Tin and copper miner.	Crushed to death. Inquest.
„ 16	43	Farm labourer	Smallpox, 12 days. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Sept 19	57	Mine agent -	Pneumonia. Gangrene. Certified.
„ 22	60	Copper miner	Decline, many years. Not certified.
„ 24	73	Painter -	Natural decay. Certified.
„ 27	75	Engineman in mine.	Fracture of leg, 12 days. Paralysis, 11 days. Certified.
„ 26	25	Son of copper miner.	Phthisis. Certified.
Oct. 5	60	Farmer -	Hæmoptysis. Certified.
„ 7	63	Copper miner	Apoplexy. Certified.
„ 17	66	Copper miner	Diseased heart. Certified.
„ 17	70	Farm labourer	Asthma. Certified.
„ 27	22	Son of gamekeeper.	Phthisis, 3 months.
„ 27	24	Mariner -	Found drowned. Inquest.
„ 27	45	Master mariner	Found drowned. Inquest.
„ 27	13	Mariner -	Found drowned. Inquest.
„ 27	27	Mariner -	Found drowned. Inquest.
„ 6	20	Son of copper miner.	Cancer in stomach. Certified.
„ 13	60	Copper miner -	Consumption. Certified.
„ 14	50	Copper miner -	Consumption. Not certified.
„ 17	44	Copper miner -	Bronchitis. Certified.
„ 22	13	Son of copper miner.	Decline. Not certified.
„ 24	35	Copper miner -	Killed underground, by falling from the 66-fathom level to the 145-fathom level. Inquest.
Dec. 14	58	Copper miner -	Bronchitis. Certified.
„ 16	61	Engineer -	Diseased liver. Jaundice. Certified.
„ 14	66	Surface miner	Pneumonia. Certified.
„ 18	55	Miner - -	Found dead in bed. Inquest.
„ 21	65	Copper miner	Miners' decline. Certified.
„ 24	22	Copper miner -	Fever, 23 days. Certified.
„ 23	61	Ostler - -	Congestion of lungs. Certified.
„ 29	45	Copper miner	Decline. Not certified.
„ 26	75	Mason - -	Natural decay. Not certified.
„ 22	17	Son of miner -	Accident. Injuries on head. Inquest.
„ 31	84	Copper miner	Natural decay. Certified.
1860.			
Jan. 4	67	Labourer -	Injuries to spine of long standing. Certified.
„ 6	34	Engine worker in mine.	Phthisis. Not certified.
„ 18	70	Copper miner	Old age. Not certified.
„ 20	69	Farm labourer	Ileus. No medical attendant.
„ 20	72	Farmer -	Decline. No medical attendant.
„ 25	40	Copper miner	Miners' decline, 2 years. No medical attendant.
„ 25	73	Farm labourer	Natural decay. Certified.
„ 21	46	Copper miner	Fracture from an iron pulley falling on him from the puppet head over a whin shaft. Inquest.
Feb. 2	29	Copper miner	Phthisis. Certified.
„ 4	49	Stud groom -	Bronchitis. Certified.
„ 9	48	Copper miner	Decline, 2 years. Not certified.
„ 7	23	Copper miner	Decline. Not certified.
„ 11	73	Farmer -	Cancer of liver. Certified.
„ 18	61	Copper miner	Bronchitis. Certified.
Ma. 1	49	Copper miner	Apoplexy. Bronchitis, 18 days. Certified.
„ 5	66	Mine labourer	Decline, 5 years. No medical attendant.
„ 5	75	Baker - -	Bronchitis. Certified.
„ 8	65	Engineman -	Diseased heart. Certified.
„ 10	35	Labourer -	Acute phthisis, 3 months. Certified.
„ 11	62	Shoemaker -	Bronchitis. Certified.
„ 15	21	Son of mason	Scarlatina, 3 weeks. Certified.
„ 16	47	Blacksmith -	Aneurism. Certified.
„ 25	73	Copper miner	Decline. No medical attendant.
„ 27	59	Labourer -	Gastritis, — years. Certified.
Apr. 2	29	Copper miner	Diarrhœa. Paralysis. Certified.
„ 4	80	Farmer -	Apoplexy, 4 days. Certified.
„ 13	18	Son of copper miner.	Phthisis. Certified.
„ 26	78	Copper miner	Old age. No medical attendant.
May 2	52	Copper miner	Bronchitis, 5 years. Certified.
„ 10	58	Copper miner	Dropsy. Certified.
„ 19	49	Farmer -	Fever, 13 days. Bronchitis, 6 months. Certified.
„ 17	53	Copper miner	Bronchitis, 5 years. Certified.
1860.			
May 23	67	Farm labourer	Decline, 2 years. No medical attendant.
„ 31	18	Son of copper miner.	Phthisis. Certified.
June 8	23	Son of copper miner.	Phthisis. Certified.
„ 12	73	Copper miner	Bronchitis. Certified.
„ 23	62	Copper miner	Bronchitis. Certified.
„ 25	53	Copper miner	Bronchitis. Certified.
„ 30	33	Copper miner	Decline. Not certified.
July 4	83	Labourer -	Debility. Certified.
„ 9	21	Son of copper miner.	Phthisis. Certified.
„ 12	64	Labourer -	Bronchitis. Certified.
„ 13	46	Miner - -	Injuries: crushed under some rubbish. Inquest.
„ 16	21	Miner -	Visitation of God. Inquest.
„ 21	24	Son of labourer	Phthisis. Certified.
Aug. 2	35	Copper miner	Bronchitis. Certified.
„ 2	47	Copper miner	Paralysis, 3 years. Certified.
„ 8	14	Son of beer-seller.	Rheumatic carditis, 8 days. Certified.
„ 10	12	Son of miner	Fracture: fall into a shaft. Inquest.
„ 18	40	Copper miner	Phthisis. Certified.
„ 24	21	Miner -	Supposed from fright occasioned by falling 4 fathoms in Tin Croft mine. Inquest.
„ 29	47	Copper miner	Bronchitis. Certified.
Sept. 6	64	Copper miner	Bronchitis. Certified.
„ 6	56	Copper miner	Phthisis, some months. Certified.
„ 22	49	Copper miner	Diseased liver, 4 years. Certified.
„ 26	36	Copper miner	Breaking of a blood-vessel. Not certified.
„ 27	60	Copper miner	Bronchitis. Certified.
„ 27	43	Copper miner	Diseased heart, 8 years. Not certified.
„ 29	54	Labourer -	Enteritis. Certified.
Oct. 6	43	Copper miner	Cerebritis, 7 days. Certified.
„ 7	56	Copper miner	Phthisis. Certified.
„ 12	42	Copper miner	Phthisis, 2 years. Certified.
„ 21	33	Copper miner	Phthisis, 12 months. Certified.
„ 25	37	Son of labourer	Diseased heart. Congestion of lungs. Certified.
Nov. 2	38	Copper miner	Cancer. Certified.
„ 4	81	Copper miner and farmer.	Old age. Not certified.
„ 12	48	Miner -	Fractured skull. Inquest.
„ 19	75	Drover -	Old age. Certified.
Dec. 4	50	Blacksmith -	Pneumonia, 5 days. Certified.
„ 12	80	Copper miner	Old age. Certified.
„ 13	14	Son of copper	Scarlatina. Certified.
„ 15	18	Mariner -	Accidentally drowned. Inquest.
„ 19	34	Copper miner	Phthisis. Certified.
„ 25	75	Farm labourer	Old age. No medical attendant.
„ 30	27	Copper miner	Phthisis. Certified.
„ 30	75	Cart driver -	Old age. Certified.
1861.			
Jan. 1	29	Copper miner	Diseased kidneys. Dropsy. Certified.
„ 1	32	Miner -	Injuries to his head. Inquest.
„ 4	57	Copper miner	Phthisis. Certified.
„ 11	11	Son of copper miner	Typhus. Not certified.
„ 16	22	Copper miner	Consumption. Not certified.
„ 19	23	Copper miner	Phthisis. Certified.
„ 22	90	Labourer -	Old age. No medical attendant.
„ 25	18	Son of copper miner	Phthisis. Certified.
„ 24	65	Butcher -	Visitation of God. Inquest.
Feb. 1	59	Copper miner	Diarrhœa Certified.
„ 8	39	Copper miner	Consumption. Not certified.
„ 9	10	Son of copper miner	Scarlatina. Certified.
„ 11	42	Copper miner	Decline, 2 years. Not certified.
„ 12	25	Copper miner	Phthisis. Certified.
„ 8	32	Copper miner	Skip falling down the shaft on him. Inquest.
„ 19	16	Son of copper miner	Phthisis. Certified.
„ 24	17	Son of copper miner	Scarlatina. Certified.
Mar. 20	68	Copper miner	Bronchitis. Certified.
Apr. 3	53	Boatmen -	Suffocation. Inquest.
„ 10	14	Engine driver	Accident: explosion of a safety fuse manufactory. Inquest.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Apr. 18	34	Copper miner	Pleurisy, 8 weeks. Certified.
„ 18	38	Pilot - -	Diseased lungs, 3 weeks. Inquest.
„ 23	67	Copper miner	Pneumonia. Certified.
„ 18	25	Miner -	Fractured skull. Inquest.
May 2	59	Farm labourer	Consumption. Not certified.
„ 4	71	Labourer -	Old age. Not certified.
„ 8	42	Servant -	Hypertrophy of heart. Certified.
„ 13	35	Copper miner	Consumption. Certified.
„ 14	60	Labourer -	Bronchitis. Certified.
„ 18	57	Barber -	Dropsy. Certified.
„ 22	54	Engineman -	Phthisis. Certified.
„ 26	72	Farmer -	Diseased heart. Certified.
„ 29	18	Son of copper miner.	Smallpox. Certified.
June 11	52	Copper-mine agent.	Diseased kidneys, 6 months. Certified.
„ 13	51	Copper miner	Meningitis, 9 weeks. Certified.
„ 14	67	Copper miner	Bronchitis, 24 days. Certified.
„ 21	20	Copper miner	Fever. Certified.
„ 23	42	Copper miner	Decline. Not certified.
July 3	67	Labourer -	Decline. No medical attendant.
„ 4	16	Son of copper miner.	Epilepsia. Not certified.
„ 16	58	Copper miner	Diarrhœa. Certified.
„ 11	35	Copper miner	Killed underground by a stull giving way on which he was standing.
„ 21	86	Coast Guard -	Old age. Not certified.
„ 24	21	Miner - -	Fall into a shaft. Inquest.
„ 25	15	Son of copper miner.	Jaundice, 1 month. Certified.
Aug. 1	17	Miner - -	Fall into a shaft. Inquest.
„ 7	13	Son of labourer	Variola. Purpura. Certified.
„ 5	15	Son of miner -	Found dead. Inquest.
„ 8	77	Copper miner	Dropsy. Certified.
„ 26	72	Sexton - -	Diarrhœa. Certified.
Sept. 13	75	Farm labourer	Old age. Not certified.
„ 19	31	Copper miner	Phthisis. Certified.
„ 22	22	Son of copper miner.	Typhus, 2 days. Certified.
Oct. 7	62	Copper miner	Old age. No medical attendant.
„ 6	54	Copper miner	Decline. Not certified.
„ 7	40	Copper miner	Phthisis. Certified.
„ 17	75	Copper miner	Diseased heart. Certified.
Nov. 6	64	Copper miner	Diseased heart. Certified.
„ 14	54	Copper miner	Decline and dropsy. Not certified.
Dec. 8	60	Copper miner	Phthisis. Certified.
„ 7	62	Mine clerk -	Found dead. Inquest.
„ 17	17	Sailor - -	Phthisis. Certified.
„ 16	71	Copper miner	Cancer. Certified.
„ 25	10	Son of copper miner.	Rheumatic fever. Certified.
„ 27	77	Labourer -	Old age. No medical attendant.
Aug. 30	28	Miner - -	Injuries from the explosion of a hole whilst preparing for blasting. Inquest.

Sub-district - 4. Camborne.

1859.			
Jan. 8	54	Tin miner -	Phthisis. Certified.
„ 11	50	Mine agent -	Phthisis. Certified.
„ 11	19	Copper miner	Injuries from explosion of gunpowder. Inquest.
„ 10	65	Waggoner -	Spasm of the stomach. Certified.
„ 16	30	Copper miner	Acute rheumatism, Pericarditis. 5 weeks. Certified.
„ 17	55	Farmer -	Chronic bronchitis. Certified.
„ 18	47	Tin miner -	Natural death. Inquest.
„ 21	29	Tin miner -	Accident. Injury in Dolcoath Mine. Inquest.
„ 23	14	Blacksmith -	Typhus, 15 days. Certified.
„ 25	10	Son of copper miner.	Catarrh, 2 weeks. Diphtheritis, 5 days. Certified.
Feb. 12	39	Tin miner -	Phthisis, — years. Certified.
„ 16	55	Grocer - -	Phthisis, 3 months. Certified.
„ 21	48	Tin miner -	Diseased heart. Dropsy. Certified.
„ 21	12	Son of copper miner.	Phthisis. Certified.
„ 23	36	Copper miner -	Phthisis, 10 months. Certified.
„ 23	59	Moulder -	Carditis. Ascites. Certified.
„ 23	65	Tin miner -	Diseased brain, 6 weeks. Certified.
„ 22	48	Copper miner	Phthisis, 16 months. Certified.
1859.			
Feb. 26	59	Copper miner	Bronchitis, 2 days. Certified.
„ 28	28	Moulder -	Phthisis. Certified.
Mar. 3	69	Tin miner -	Bronchitis, 3 days. Certified.
„ 4	25	Shoemaker -	Phthisis. Certified.
„ 6	74	Mine labourer	Stricture of Pylorus. Certified.
„ 12	75	Engine man -	Old age. No medical attendant.
„ 25	70	Mat maker -	Unknown. No medical attendant.
„ 25	50	Farm labourer	Chronic hepatitis. Certified.
„ 31	53	Shoemaker -	Phthisis. Certified.
„ 30	57	Copper miner	Accident. Killed falling into a shaft. Inquest.
Apr. 3	65	Copper miner	Affection of liver, 4 months. Certified.
„ 7	22	Tin miner -	Phthisis, 10 months. Certified.
„ 12	59	Copper miner	Phthisis, 7 months. Certified.
„ 16	22	Tin miner -	Phthisis. Certified.
„ 23	27	Copper miner	Smallpox (natural), 3 weeks. Certified.
„ 24	25	Copper miner	Pleurisy, 5 days. Certified.
„ 21	19	Accountant -	Phthisis. Certified.
„ 28	47	Copper miner	Pneumonia. Typhus, 12 days.
May 11	16	Copper miner	Tubercular peritonitis. Certified.
„ 16	65	Farm labourer	Bronchitis, 7 days. Certified.
„ 20	69	Copper miner	Phthisis. Certified.
„ 22	67	Sawyer -	Diseased heart. Dropsy. Certified.
„ 25	60	Engineman -	Phthisis. Certified.
„ 25	22	Copper miner	Phlebitis of femoral vein, purulent absorption. Certified.
„ 27	28	Copper miner	Phthisis. Certified.
June 4	74	Tin miner -	Phthisis. Certified.
„ 18	65	Tin miner -	Scirrhus of stomach. Certified.
„ 20	20	Tin miner -	Phthisis. Dropsy. Certified.
„ 21	57	Blacksmith -	Phthisis. Certified.
„ 26	60	Road labourer	Epilepsy. Certified.
„ 27	17	Son of merchant	Emphysema. Low fever. Certified.
July 1	20	Copper miner	Phthisis. Certified.
„ 2	48	Copper miner	Phthisis. Certified.
June 30	50	Copper miner	Hepatitis. Certified.
July 4	49	Tin miner -	Typhoid fever, 8 days. Certified.
„ 18	56	Copper miner	Phthisis, 3 years. Certified.
Aug. 17	42	Copper miner	Diseased liver, 7 months. Certified.
Sept. 4	67	Copper miner	Paralysis, 9 days. Certified.
„ 10	17	Copper miner	Phthisis. Certified.
„ 14	86	Mine agent -	Old age. No medical attendant.
„ 14	59	Tin miner -	Phthisis. Certified.
„ 28	66	Carpenter -	Anasarca. Certified.
„ 27	69	Fund holder, &c.	Insanity, 29 years. Paralysis, 5 weeks. Certified.
Oct. 10	29	Copper miner	Phthisis. Certified.
„ 9	36	Miner - -	Injury. Accident in Dolcoath Mine. Inquest.
Nov. 4	47	Tin miner -	Phthisis. Certified.
„ 5	34	Tin miner -	Pleuro-pneumonia, 7 days. Certified.
„ 10	62	Tin miner -	Diseased brain, 6 months. Certified.
„ 17	47	Tin miner -	Phthisis, 3 years. Certified.
„ 21	24	Seaman -	Drowned. Inquest.
Dec. 2	34	Gold miner -	Hepatitis, 4 weeks. Congestion of lungs. Certified.
„ 4	17	Copper miner	Scarlatina maligna, 24 hours. Certified.
„ 3	14	Copper miner	Typhoid fever. Certified.
„ 9	52	Tin miner -	Bronchitis. Certified.
„ 17	22	Copper miner	Scrofula. Certified.
„ 19	68	Copper miner	Phthisis, 12 months. Certified.
„ 27	57	Tin miner -	Phthisis. Certified.
„ 31	15	Copper miner	Scarlatina, 4 weeks. Certified.
„ 30	31	Tailor - -	Diseased heart. Dropsy. Certified.
1860.			
Jan. 1	61	Tin miner -	Phthisis. Certified.
„ 3	35	Tin miner -	Diabetes, 4 months. Certified.
„ 5	14	Mine labourer	Scarlatina, 3 weeks. Œdema of lungs, 24 hours. Certified.
„ 8	19	Mine labourer	Phthisis. Certified.
„ 14	59	Hatter - -	Diseased heart. Dropsy. Certified.
„ 20	17	Farm labourer	Diseased spine. Anasarca. Certified.
„ 19	43	Copper miner	Phthisis. Certsfied.
„ 20	77	Tin miner -	Old age. No medical attendant.
„ 23	36	Mason - -	Bronchitis, 14 days. Certified.
„ 24	32	Copper miner	Phthisis. Certified.
„ 25	44	Engine man -	Diseased brain, 18 months. Certified.
„ 28	52	Tin miner -	Typhus, 10 days. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 24	40	Mine labourer	Fractures. Tetanus. Inquest.
Feb. 10	54	Copper miner	Phthisis. Certified.
„ 12	21	Copper miner	Phthisis. Certified.
„ 13	18	Copper miner	Typhoid fever, 14 days. Certified.
„ 17	49	Tin miner -	Diseased heart. Dropsy. Certified.
„ 17	23	Miner - -	Injury from rock falling on him. Inquest.
„ 24	16	Son of copper miner.	Fever, 15 days. Certified.
„ 25	70	Tin miner -	Phthisis. Certified.
„ 26	61	Farm labourer	Pleurisy, 3 days. Certified.
„ 27	14	Mine labourer	Laryngitis, 6 days. Certified.
Mar. 3	54	Tin miner -	Bronchitis, 7 days. Certified.
„ 6	18	Mason - -	Phthisis, 4 months. Certified.
„ 8	59	Copper miner	Phthisis, 4 months. Certified.
„ 8	28	Blacksmith -	Pneumonia. Certified.
„ 16	24	Copper miner	Hepatitis, 14 days. Certified.
„ 23	46	Mason - -	Phthisis. Certified.
„ 26	13	Plasterer -	Diphtheria, 2 days. Certified.
„ 28	50	Grocer - -	Diseased kidneys. Certified.
„ 26	59	Schoolmaster	Ileus, 7 days. Certified
Apr. 2	50	Farmer - -	Phthisis, 2 years. Certified.
„ 8	59	Tin miner -	Bronchitis. Certified.
„ 14	65	Mine proprietor	Apoplexy, 36 hours. Certified.
„ 25	73	Sawyer -	Dropsy. Certified.
May 1	50	Copper miner	Phthisis. Certified.
„ 4	11	Son of copper miner.	Cerebritis, 7 days. Certified.
„ 5	18	Waggoner -	Phthisis, 3 months. Certified.
„ 9	58	Tin dresser -	Diseased liver. Certified.
„ 11	68	Engine man -	Bronchitis, 8 days. Certified.
„ 17	41	Copper miner	Hepatitis, 6 weeks. Certified.
„ 24	62	Copper miner	Phthisis, 2 years. Certified.
„ 29	80	Railway gate keeper.	Cancer, 12 months. Certified.
„ 29	45	Tin miner -	Phthisis. Certified.
June 9	22	Copper miner	Phthisis, 18 months. Certified.
„ 13	17	Mine labourer	Typhus, 3 weeks. Certified.
„ 9	66	Copper miner	Phthisis. Certified.
„ 20	62	Copper miner	Bronchitis. Certified.
July 28	52	Copper miner	Phthisis. Certified.
Aug. 6	29	Miner - -	Injuries from fall into a shaft. Inquest.
„ 7	60	Butcher -	Apoplexy, 3 days. Certified.
„ 10	24	Miner - -	Accident. Injuries in blasting a rock. Inquest.
„ 20	55	Tin miner -	Pneumonia. Certified.
„ 26	68	Copper miner	Congestion of lungs. Certified.
„ 24	64	Copper miner	Phthisis, 9 months. Certified.
„ 31	65	Farm labourer	Pneumonia, 8 days. Certified.
Sept 21	10	Son of tailor -	Diseased lungs. Epistaxis. Certified.
Oct. 3	53	Copper miner	Diseased liver. Certified.
„ 8	85	Farm labourer	Old age. No medical attendant.
„ 6	54	Tin miner -	Diseased brain, 5 months. Certified.
„ 19	75	Farmer -	Diseased brain. Certified
„ 30	20	Tin miner -	Typhus, 5 weeks. Certified.
Nov. 4	65	Copper miner	Bronchitis, 5 weeks. Certified.
„ 6	36	Copper miner	Phthisis, 10 months. Certified.
„ 6	10	Mine labourer	Erysipelas. Certified.
„ 12	48	Tin miner -	Phthisis, 12 months. Certified.
„ 13	61	Tin miner -	Phthisis. Certified.
„ 18	52	Copper miner	Bronchitis, 4 days. Certified.
„ 23	63	Tin miner -	Phthisis. Certified.
Dec. 2	46	Copper miner	Phthisis, 3 years. Certified.
„ 4	31	Copper miner	Phthisis. Certified.
„ 6	45	Tin miner -	Phthisis, 18 months. Certified.
„ 6	63	Engineman -	Phthisis. Certified.
„ 6	35	Copper miner	Fever, 5 weeks. Certified.
„ 6	21	Tin miner -	Pneumonia, 7 days. Certified.
„ 16	76	Farmer -	Gangrene senilis. Certified.
„ 17	36	Farmer -	Diseased liver. Certified.
„ 19	68	Copper miner	Phthisis. Certified.
„ 17	87	Mine labourer	Old age. No medical attendant.
„ 23	38	Copper miner	Diseased spleen. Anasarca. Certified.
„ 25	33	Copper miner	Phthisis. Certified.
„ 25	18	Mine labourer	Phthisis, 4 months. Certified.
„ 30	61	Shoemaker -	Old age. Certified.
1861.			
Jan. 6	22	Copper miner	Typhus. Certified.
„ 9	49	Copper miner	Bronchitis, 6 months. Certified.
„ 17	60	Farm labourer	Phthisis. Certified.
„ 20	40	Copper miner	Phthisis. Certified.
„ 21	60	Surgeon -	Epilepsy, 8 years. Certified.
1861.			
Jan. 23	14	Son of miner	Injuries from fall into a shaft. Inquest.
„ 28	68	Tin miner -	Bronchitis. Certified.
Feb. 5	86	Tin miner -	Old age. No medical attendant.
„ 12	17	Tin miner -	Typhus, 5 weeks. Certified.
„ 19	15	Tin miner -	Pneumonia. Certified.
„ 19	62	Copper miner	Palsy. Certified.
„ 18	73	Engine man -	Old age. No medical attendant.
„ 26	15	Copper miner	Fever, 4 weeks. Certified.
Mar. 6	11	Mine labourer	Scarlatina. Certified.
„ 9	28	Tin miner -	Phthisis. Certified.
„ 15	70	Copper miner	Old age. No medical attendant.
„ 25	55	Tin miner -	Phthisis. Certified.
„ 26	50	Copper miner	Diseased heart. Dropsy. Certified.
„ 28	25	Miner - -	Fall into a shaft in descending to his labour. Inquest.
„ 30	66	Tin miner -	Paralysis. Certified.
April 6	71	Farmer -	Phthisis. Certified.
„ 9	65	Tin miner -	Bronchitis. Certified.
„ 9	66	Copper miner	Phthisis. Certified.
„ 9	50	Copper miner	Phthisis. Certified.
„ 10	16	Copper miner	Pneumonia, 10 days. Certified.
„ 9	68	Mine agent -	Congestion of lungs. Certified.
„ 15	53	Copper miner	Fever, 7 weeks. Certified.
„ 22	47	Copper miner	Phthisis. Certified.
„ 25	52	Miner - -	Rock falling on him. Inquest.
„ 30	63	Copper miner	Phthisis. Certified.
May 7	17	Copper miner	Peritonitis, 21 days. Certified.
„ 7	21	Mine labourer	Typhus. Bronchitis, 14 days. Certified.
„ 4	84	Farmer -	Old age. Certified.
„ 10	80	Tin miner -	Old age. Certified.
„ 18	19	Accountant -	Enteritis, 48 hours. Certified.
June 2	13	Son of tin miner	Scrofula. Certified.
„ 2	69	Farmer -	Old age. Certified.
„ 5	72	Tin miner -	Old age. No medical attendant.
„ 6	32	Copper miner	Nephria. Certified.
„ 20	57	Tin miner -	Diseased brain. Certified.
„ 20	17	Tin miner -	Hæmorrhage from bowels. Certified.
„ 25	58	Mine labourer	Diseased brain. Certified.
„ 27	61	Carpenter -	Diseased lungs. Certified.
July 5	73	Manager copper works.	Apoplexy, 11 hours. Certified.
„ 7	34	Copper miner	Phthisis, 12 months. Certified.
„ 10	11	Son of dentist	Diseased heart. Certified.
„ 24	20	Copper miner	Accident. Killed. Not certified.
„ 23	21	Copper miner	Hematemesis, 3 days. Certified.
„ 27	62	Copper miner	Phthisis. Certified.
Aug. 2	26	Copper miner	Phthisis. Certified.
„ 3	19	Son of chair maker.	Scrofula. Certified.
„ 8	36	Engine man -	Phthisis. Certified.
„ 5	77	Baker - -	Asthma. Certified.
„ 16	63	Tin miner -	Phthisis, 8 weeks. Certified.
„ 20	10	Son of tin miner	Phthisis. Certified.
„ 23	55	Miner - -	Natural death. Inquest.
Sept. 2	65	Tin miner -	Phthisis. Aneurism. Certified.
„ 1	51	Copper miner	Diseased heart. Dropsy. Certified
„ 6	56	Copper miner	Phthisis. Certified.
„ 7	77	Farm labourer	Age. Certified.
„ 13	11	Son of gardener	Diarrhœa. Certified.
„ 26	39	Copper miner	Diseased brain. Certified.
Oct. 3	23	Waggoner -	Scarlatina. Certified.
„ 9	20	Copper miner	Phthisis. Certified.
„ 18	53	Copper miner	Diseased kidneys. Certified.
„ 20	90	Cooper - -	Old age. No medical attendant
„ 19	31	Copper miner	Meningitis, 4 weeks. Certified.
„ 24	54	Copper miner	Remittent fever. Certified.
„ 26	34	Miner - -	Injuries by falling into a shaft. Inquest.
„ 31	62	Tin miner -	Phthisis, 2 weeks. Certified.
Nov. 8	63	Copper miner	Phthisis, 2 years. Certified.
„ 5	60	Mine agent.	Diseased liver. Certified.
„ 11	46	Copper miner	Phthisis, 18 months. Certified.
„ 8	45	Banker's clerk	Epilepsy. Certified.
„ 24	58	Copper miner	Phthisis. Certified.
„ 26	59	Copper miner	Phthisis, 6 months. Certified.
„ 25	35	Copper miner	Diseased hip joint. Nephria. Certified.
Dec. 8	21	Tin miner -	Phthisis. Certified.
„ 11	24	Copper miner	Phthisis. Certified.
„ 21	66	Shoemaker -	Phthisis. Certified.
„ 26	67	Tin miner -	Phthisis. Certified.
„ 26	16	Mine labourer	Typhus, 8 days. Certified.

COUNTY OF CORNWALL.

Sub-district - 5. Phillack.

When Died.	Age.	Occupation.	Cause of Death.
1858			
Dec. 29	38	Innkeeper -	Apoplexy, 32 hours. Certified.
1859.			
Jan. 2	65	Labourer -	Intussusception. Certified.
„ 5	38	Innkeeper -	Meningitis. Certified.
„ 7	51	Copper miner-	Asthma. No medical attendant.
„ 21	28	Copper miner-	Phthisis, 2 years. Diarrhœa, 3 months. Certified.
Feb. 11	100	Miner - -	Natural decay. No medical attendant.
„ 17	80	Miner - -	Natural decay. No medical attendant.
„ 26	33	Labourer -	Accident. Injuries to his head from a fall. Inquest.
„ 28	64	Dyer - -	Bronchitis. Certified.
Mar. 15	68	Miner - -	General debility. No medical attendant.
„ 22	80	Farmer -	Decay of nature. No medical tendant.
Apr. 6	17	Son of mason	Consumption. No medical attendant.
„ 23	76	Cordwainer -	Decay of nature. No medical attendant.
„ 23	11	Son of miner-	Typhus. Certified.
May 13	15	Son of farmer	Hydrocephalus. Certified.
„ 16	22	Miner - -	Fractured skull. Inquest.
„ 28	16	Copper miner-	Fall into a shaft. Inquest.
„ 29	60	Farmer -	Consumption. Not certified.
June 2	20	Son of labourer	Typhoid pneumonia, 10 days. Certified.
„ 3	83	Sawyer - -	Natural decay. No medical attendant.
„ 25	77	Farmer -	Natural decay. No medical attendant.
July 3	67	Miner - -	Bronchitis. Certified.
„ 7	65	Farm bailiff -	Enteritis. Certified.
„ 5	29	Accountant -	Phthisis. Certified.
„ 17	22	Blacksmith -	Diseased lungs. Certified,
„ 18	52	Copper miner-	Apoplexy, 2 months. Certified.
„ 27	80	Draper - -	Decay of nature. Certified.
„ 28	35	Accountant -	Diseased lungs. Certified.
Aug 27	60	Carpenter -	Diseased liver, bronchitis, 3 years. Certified.
Sept. 9	12	Tin and copper miner.	Fractured skull from falling into a shaft. Inquest.
„ 15	75	Copper miner-	General debility. No medical attendant.
Oct. 9	73	Mason - -	Gastritis. Certified.
„ 19	75	Mine agent -	Natural decay. No medical attendant.
„ 26	14	Son of miner-	Epilepsy. Certified.
„ 29	25	Mariner -	Accident. Drowned. Inquest.
Nov. 4	20	Seaman -	Found drowned. Inquest.
„ 6	75	Hawker -	Hydrothorax. Certified.
„ 8	84	Copper miner-	Palsy. Not certified.
„ 17	78	Labourer -	Natural decay. No medical attendant.
„ 23	74	Labourer -	Icterus. Certified.
„ 25	67	Shipwright -	Natural death. Inquest.
„ 27	25	Seaman -	Drowned. Inquest.
Dec. 1	30	Seaman -	Drowned Inquest.
„ 11	82	Copper miner-	Bronchitis. Certified.
„ 18	71	Mariner -	Asthma. No medical attendant.
„ 22	20	Son of iron moulder.	Typhus. Certified.
„ 27	72	Copper miner-	Natural decay. No medical attendant.
„ 28	25	Copper miner-	Pneumonia. Certified.
1860.			
Jan. 4	27	Copper miner-	Pneumonia. Certified.
„ 12	83	Copper miner-	Age. No medical attendant.
Feb. 8	27	Miner - -	Fall into a shaft in Wheal Unity Mine. Inquest.
„ 18	25	Shipwright -	Phthisis. Certified.
„ 23	20	Copper miner-	Phthisis. Certified.
Mar. 9	57	Copper miner-	Atrophy. Certified.
„ 9	48	Gentleman -	Ascites. Certified.
„ 10	72	Labourer -	Age. No medical attendant.
„ 10	56	Labourer -	Consumption. Certified.
„ 17	57	Coal porter -	Consumption. Certified.
„ 21	69	Copper miner-	Consumption. Not certified.
„ 21	42	Stoker, steam boat.	Consumption. Certified.
„ 28	76	Labourer -	Cancer in face. Certified.
Apr. 17	76	Blacksmith -	Bronchitis, 10 days. Certified.
„ 21	53	Mariner -	Apoplexy. Certified.
1860.			
Apr. 25	21	Boiler builder	Cephalitis, 10 days. Certified.
„ 28	69	Copper miner-	Hæmoptysis, 3 weeks. Certified.
May 1	48	Miner - -	Pneumonia, 1¾ years. Certified.
„ 6	21	Agric. labourer	Consumption. Certified.
„ 10	52	Blacksmith -	Pleurisy, 10 days. Certified.
„ 26	73	Carpenter -	Cancer. Certified.
June 7	33	Engine smith-	Apoplexy. Certified.
„ 12	80	Miner - -	Natural decay. No medical attendant.
„ 14	77	Miner - -	Natural decay. No medical attendant.
„ 15	65	Miner - -	Apoplexy. Certified.
„ 25	13	Son of railway porter.	Cephalitis. Certified.
„ 27	21	Miner - -	Injuries to his head. Inquest.
July 4	60	Miner - -	Consumption. No medical attendant.
„ 8	26	Mariner -	Consumption. Certified.
„ 14	87	Coast Guard -	Decay of nature. Certified.
„ 28	54	Miner - -	Bronchitis. Certified.
Aug 11	41	Miner - -	Fall into a shaft. Inquest.
Sept. 1	22	Miner - -	Typhoid pneumonia. Certified.
„ 5	40	Miner - -	Diseased kidneys. Certified.
„ 5	58	Mariner -	Erysipelas. Certified.
„ 17	35	Pattern maker	Phthisis, 11 months. Certified.
Oct. 6	54	Miner - -	Consumption. Certified.
„ 20	62	Shoemaker, master.	Hepatitis, 4 weeks. Certified.
Nov. 4	79	Farmer -	Natural decay. No medical attendant.
„ 14	20	Son of miner -	Meningitis, 14 days. Certified.
„ 23	19	Son of miner -	Consumption. Not certified.
„ 26	65	Engineman -	Hydrothorax. Certified.
Dec. 5	29	Son of labourer.	Consumption. Certified.
„ 2	85	Gentleman -	Natural decay. Not certified.
„ 3	10	Son of miner -	Fractured skull. Inquest.
„ 10	66	Miner - -	Diseased spinal marrow. Not certified.
„ 12	12	Son of stoker -	Enteritis. Certified.
„ 16	16	Son of blacksmith.	Phthisis. Certified.
„ 22	59	Farmer - -	Vomiting of blood. No medical attendant.
„ 28	86	Farmer - -	Natural decay. No medical attendant.
„ 29	39	Chemist -	Scrofula. Meningitis, 3 months. Certified.
1861.			
Jan. 1	11	Son of miner -	Cephalitis, 2 weeks. Certified.
„ 6	74	Miner - -	Age. Certified.
„ 3	22	Engineer -	Pleuro-pneumonia. Certified.
„ 6	72	Miner - -	Age Certified.
—	39	Miner - -	Loss of blood from a fractured leg. Inquest.
„ 29	45	Miner - -	A rock falling on him. Inquest.
„ 30	47	Boiler builder	Cancer. Certified.
Feb. 11	54	Miner - -	Fractured ribs. Certified.
„ 21	26	Mariner -	Drowned. Inquest.
„ 26	76	Yeoman -	Natural death. Inquest.
„ 25	55	Blacksmith -	Cancer. Certified.
Mar. 3	61	Schoolmaster -	Hydrothorax. Certified.
„ 30	78	Carpenter -	Old age. Certified.
Apr. 4	69	Gentleman -	Bronchitis. Certified.
„ 7	20	Son of labourer.	Consumption. Not certified.
„ 20	17	Son of miner -	Phthisis, 4 months. Certified.
„ 18	73	Copper miner	Age. Certified.
„ 25	81	Agric. labourer	Natural decay. No medical attendant.
May 1	11	Son of miner -	Consumption. Certified.
Apr. 29	59	Miner - -	Consumption. Certified.
May 5	22	Copper miner	Hæmorrhage. Certified.
„ 6	30	Acountant -	Consumption. Certified.
June 3	14	Son of engineman.	Diseased liver, 9 months. Diarrhœa. Certified.
„ 6	63	Miner - -	Bronchitis. Certified.
„ 14	84	Shipwright -	Age. Certified.
„ 25	60	Mine agent -	Consumption. Not certified.
Aug 21	85	Cordwainer -	Natural decay. No medical attendant.
Sept. 8	48	Engine smith	Phthisis. Certified.
„ 13	65	Agric. labourer	Cancer. Certified.
„ 30	77	Mine agent -	Natural decay. No medical attendant.
„ 30	64	Pattern maker	Diseased heart. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Oct. 17	21	Miner - -	Injuries from an explosion. Inquest.
Nov. 3	71	Agric. labourer	Enlarged prostate gland. Certified.
„ 18	74	Carpenter -	Paralysis. No medical attendant.
„ 27	77	Miner - -	Decay of nature. Certified.
Dec. 3	65	Mariner -	Bronchitis. Certified.
„ 14	64	Porter - -	Cancer. Not certified.

Superintendent Registrar's District.

PENZANCE.

Registrar's Sub-District.

1. Uny Lelant.
2. St. Ives.
3. Marazion.
4. Penzance.
5. St. Just-in-Penwith.
6. St. Buryan.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–1861.

Sub-district - 1. Uny Lelant.

1859.			
Jan. 7	42	Labourer -	Pneumonia. Certified.
„ 10	21	Tin miner -	Diabetes, 2 years. Not certified.
„ 10	64	Agric. labourer	Old age. Certified.
„ 10	72	Tin miner -	Consumption, 6 weeks. Not certified.
„ 16	28	Chelsea pensioner.	Phthisis, 12 months. Certified.
„ 22	38	Miner - -	Suffocated. Buried in a mass of rubbish. Inquest
Feb. 7	21	Tin miner -	Diseased heart. Dropsy. Certified.
„ 14	53	Tin miner -	Diseased heart. Certified.
„ 23	54	Miner - -	Consumption, 12 months. No medical attendant.
„ 27	58	Agric. labourer	Pneumonia. Certified.
Mar. 6	25	Tin miner -	Phthisis, 6 months. Certified
„ 29	68	Tin miner -	Consumption, 4 years. Not certified.
Apr. 6	11	Son of tin miner.	Cephalitis. Certified.
Mar. 29	16	Son of labourer.	Consumption, 2 years. No medical attendant.
Apr. 9	14	Mine labourer	Natural death. Inquest.
„ 12	83	Farmer - -	Old age. Not certified.
„ 14	90	Agric. labourer	Old age. No medical attendant.
„ 27	57	Mason - -	Bronchitis. Pleuro-pneumonia. Certified.
May 10	83	Not stated -	Age. Not certified.
„ 9	60	Tin miner -	Fever. Certified.
„ 13	63	Tin miner -	Consumption, 2 years. Not certified.
„ 18	54	Tin miner -	Suffocated from being buried under a large quantity of rubbish. Inquest.
„ 22	59	Tin miner -	Natural decay. Certified.
June 11	49	Tin miner -	Consumption, 3 years. Not certified.
„ 14	33	Tin smelter -	Diseased liver. Ulcerated throat, 1 week. Certified.
„ 17	22	Copper miner	Accident. Explosion of gunpowder. Inquest.
Aug 11	29	Blacksmith -	Phthisis. Certified.
„ 21	50	Tin miner -	Consumption, 1 year. No medical attendance.
„ 22	32	Tin miner -	Consumption, 4 months. Not certified.
„ 23	65	Mariner -	Ascites. Hydrothorax. Certified.
Sept. 6	26	Mariner -	Diseased brain, 3 weeks. Not certified.
Oct. 4	31	Tin miner -	Phthisis, 5 years. Certified.
„ 26	61	Tin miner -	Consumption, 3 months. Not certified.
Nov. 1	51	Tin miner -	Consumption, 3 months. Not certified.
„ 2	25	Seaman -	Drowned. Inquest.
„ 10	88	Agric. labourer	Old age. Not certified.
Nov. 17	53	Tin miner -	Consumption, 2 months. Not certified.
July 6	13	Son of miner -	Fall into a shaft at Wheal Mary Mine. Inquest.
Nov. 29	49	Agric. labourer	Pleurisy, 8 days. Certified.
Dec. 4	34	Tin miner -	Aneurism. Certified.
„ 16	22	Tin miner -	Consumption, 2 years. Not certified.
„ 22	44	Tin miner -	Pneumonia. Certified.
„ 27	85	Farmer - -	General debility. Certified.
1860.			
Jan. 3	43	Tin miner -	Consumption, 2 years. Not certified.
„ 23	19	Miner - -	Natural death. Inquest.
„ 23	70	Miner - -	Pneumonia, 1 week. Certified.
„ 25	32	Labourer -	Natural death. Inquest.
Feb. 4	49	Tin dresser -	Enteritis. Certified.
„ 10	76	Agric. labourer	Old age. No medical attendant.
„ 24	18	Agric. labourer	Consumption, 2 years. No medical attendant.
Mar. 1	45	Tin miner -	Phthisis, 2 years. Certified.
Feb. 24	38	Mason, master	Diseased heart. Certified.
„ 23	85	Labourer, farm	Old age. No medical attendant.
„ 29	48	Coal porter -	Consumption. Certified.
Mar. 5	24	Tin miner -	Consumption, 2 years. Not certified.
„ 15	48	Copper miner	Diseased liver, 4 years. Diarrhœa, 3 weeks. Certified.
„ 20	67	Farmer - -	Consumption. Certified.
„ 23	43	Tin miner -	Consumption, 2 years. Not certified.
„ 16	75	Tin miner -	Consumption, 2 years. Not certified.
Apr. 17	54	Tin miner -	Consumption, 8 weeks. Not certified,
„ 17	59	Tin miner -	Consumption, 6 months. No medical attendant.
May 1	60	Tin miner -	Consumption, 4 years. No medical attendant.
„ 13	55	Miner - -	Found dead in bed. Inquest.
„ 26	52	Tin miner -	Pneumonia, 4 days, Certified.
„ 26	52	Agric. labourer	Bronchitis, 4 weeks. Certified.
„ 26	21	Agric. labourer	Fever. Empyema. Certified.
„ 28	65	Mason - -	Manslaughter. Inquest,
June 3	23	Tin miner -	Consumption, 3 months. Not certified.
„ 9	17	Son of mine agent.	Consumption, 4 months. Not certified.
„ 3	61	Tin miner -	Stricture of œsophagus. Certified.
„ 14	32	Tin miner -	Consumption, 6 months. Not certified.
„ 29	56	Farmer - -	Diseased stomach, 2 years. Certified.
July	41	Butcher -	Diseased brain. Certified.
„	21	Miner - -	Accident Fall. Inquest.
Aug. 1	93	Farmer -	Old age. No medical attendant.
„ 23	48	Tin miner -	Consumption, 12 months. Not certified.
Sept. 8	26	Farmer -	Pleurisy. Certified.
„ 13	10	Son of cordwainer.	Diphtheria. Certified.
„ 20	57	Tin miner -	Consumption. Certified.
Oct. 7	55	Tin miner -	Consumption. Certified.
Nov. 3	17	Shipwright -	Typhoid fever. Certified.
Oct. 26	44	Tin miner -	Consumption, 6 months. Not certified.
Nov. 24	24	Tin miner -	Dropsy, 3 months. Not certified.
Dec. 6	15	Miner - -	Injuries from falling into a shaft. Inquest.
„ 10	43	Tin miner -	Consumption, 12 months. Not certified.
„ 23	24	Sawyer -	Pneumonia, 6 days. Not certified.
„ 27	13	Son of miner -	Injuries from fall into a shaft. Inquest.
1861.			
Jan. 2	53	Farmer -	Consumption. No medical attendant.
„ 13	14	Son of tin miner.	Typhus, 2 weeks. Certified.
„ 4	48	Tin miner -	Consumption. Certified.
„ 8	65	Miner - -	Consumption. Not certified.
„ 7	60	Farmer - -	Natural death. Inquest.
„ 9	73	Farmer - -	Old age. Not certified.
Feb. 16	22	Tin miner -	Fever. Certified.
„ 21	80	Sawyer -	Old age. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1851.			
Feb. 22	21	Copper miner	Consumption, 12 months. Certified.
„ 23	51	Miner - -	Consumption. Not certified.
Mar. 3	58	Mine agent -	Consumption. Certified.
„ 20	51	Engine worker	Consumption, 2 years. Certified.
„ 25	51	Tin miner -	Consumption, 2 years. Not certified.
„ 25	43	Tin miner -	Consumption, 3 years. Not certified.
„ 28	19	Tin miner -	Fever. Not certified.
Apr. 1	65	Farmer -	Fever, 3 weeks. Not certified.
„ 10	70	Tin miner -	Palsy, 2 years. No medical attendant.
„ 17	58	Tin miner -	Consumption, 3 years. No medical attendant.
„ 17	30	Miner - -	Injuries from explosion of a hole. Inquest.
„ 20	22	Tin miner -	Enterites. Certified.
„ 22	78	Farmer -	Bronchitis. Certified.
May 3	66	Agric. labourer	Nephria. Certified.
„ 3	56	Grocer - -	Hæmoptysis. Certified.
„ 6	32	Basket maker	Pyæmia. Certified.
„ 17	70	Farmer -	Old age. Not certified.
„ 25	79	Farmer -	Dispepsia. Certified.
„ 31	18	Son of tin miner.	Phthisis. Certified.
June 19	12	Son of tin miner.	Injury from the kick of a donkey. Inquest.
July 4	13	Son of tin miner.	Consumption. No medical attendant.
„ 15	20	Tin miner -	Consumption, 6 months. Not certified.
„ 23	60	Farmer -	Jaundice, 12 months. Certified.
„ 20	23	Miner - -	Fractured skull. Inquest.
„ 24	36	Agric. labourer	Peritonitis, 1 month. Certified.
Aug. 29	10	Son of miner	Injuries received in a mine. Inquest.
„ 30	63	Mine agent -	Softening of brain. Certified.
Sept. 16	91	Tin miner -	Phthisis, 9 months. Certified.
Oct. 6	60	Miner - -	Consumption, 3 years. Certified.
„ 5	58	Tin miner -	Bronchitis. Certified.
„ 16	19	Tin miner -	Fall into a shaft. Inquest.
„ 21	24	Tin miner -	Enteritis. Certified.
„ 25	80	Blacksmith -	Decay of nature. Certified.
„ 25	57	Farmer - -	Suffocated by being buried. Inquest.
„ 31	34	Tin miner -	Fever. Certified.
Nov. 4	56	Tin miner -	Consumption, 9 months. Not certified.
„ 4	19	Son of tin miner.	Consumption, 12 months. Certified.
„ 5	14	Son of farmer	Cephalitis, 14 days. Certified.
„ 4	55	Tin miner -	Consumption, 12 months. Not certified.
„ 6	72	Miller - -	Consumption. Certified.
„ 21	33	Miner - -	Injuries to the head. Inquest.
Dec. 9	20	Son of mine agent.	Phthisis. Certified.
„ 23	67	Agric. labourer	Debility. Certified.

Sub-district - 2. St. Ives.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 9	33	Miner - -	Accident. Drowned by falling into a pool of water in a fit. Inquest.
„ 21	32	Omnibus proprietor.	Pneumonia, 2 years. Not certified.
„ 27	65	Mine agent -	Phthisis, 12 months. Not certified.
„ 31	12	Son of master mariner.	Atrophy. Not certified.
Mar. 8	59	Joiner - -	Natural death. Inquest.
„ 11	51	Labourer -	Accident. Fractured skull. Inquest.
„ 19	55	Tin miner -	Fever, 10 days. Not certified.
„ 23	75	Gardener -	Dropsy, 12 months. Phthisis, 3 months. Certified.
Apr. 8	49	Fisherman -	Congestion of lungs. Not certified.
„ 16	52	Tin miner -	Fever, 1 week. Not certified.
May 13	31	Tailor - -	Diseased vertebræ. Softening of brain. Certified.
„ 13	20	Seaman -	Phthisis, 5 months. Certified.
„ 24	82	Son of tin dresser	Croup, 6 days. Not certified.
„ 25	30	Shoemaker -	Dropsy. Pneumonia. Not certified.
July 3	49	Tin miner -	Tubercular peritonitis, 3 months. Certified.
„ 4	73	Fisherman -	Cancer in stomach, 6 months. Not certified.
„ 6	12	Miner - -	Fall into a shaft at Wheal Mary Mine. Inquest.
„ 14	68	Fisherman -	Asthma, 8 years. Not certified.
Aug. 5	22	Shipwright, apprentice.	Accident. Drowned, bathing. Inquest.
Oct. 9	79	Master mariner	Old age. Not certified.
„ 13	38	Tin dresser -	Diarrhœa, 6 days. Dysentery, 4 days. Not certified.
„ 16	53	Labourer -	Injuries from a fall. Inquest.
„ 19	81	Fisherman -	Old age. Not certified.
„ 21	62	Fisherman -	Dropsy, 6 months. Not certified.
„ 23	68	Van driver -	Apoplexy, 2 days. Certified.
„ 23	25	Tin miner -	Phthisis, 3 weeks. Not certified.
„ 27	52	Tin miner -	Phthisis, 2 years. Not certified.
Nov. 14	57	Tin miner .	Phthisis, 5 months. Certified.
„ 23	62	Miller - -	Suicide (not stated how). Inquest.
Dec. 1	79	Fisherman -	Old age. No medical attendant.
„ 12	50	Fisherman -	Dropsy. Certified.
„ 24	79	Carpenter -	Old age. No medical attendant.
„ 29	61	Tin miner -	Diseased brain. Not certified.
1860.			
Jan. 11	36	Tin miner -	Phthisis, 2 years. Certified.
„ 29	15	Son of tin miner	Smallpox, 12 days. Certified.
„ 26	82	Shoemaker -	Old age. No medical attendant.
Feb. 2	84	Fisherman -	Old age. No medical attendant.
„ 7	36	Seaman, merchant service.	Phthisis, 9 months. Certified.
„ 11	16	Son of cooper	Diseased liver, 4 weeks. Not certified.
„ 20	43	Fisherman -	Cancer. Certified.
„ 20	62	Master mariner	Natural death. Inquest.
„ 20	80	Fisherman -	Paralysis, 24 hours. Certified.
„ 28	66	Yeoman -	Phthisis, 6 months. Certified.
Mar. 7	59	Tin miner -	Phthisis, 7 years. Certified.
„ 4	70	Coast Guard -	Diseased stomach. Dropsy. Certified.
„ 12	12	Son of carpenter	Purpura, 7 days. Certified.
May 2	65	Copper miner	Phthisis, 9 months. Certified.
June 4	15	Son of tin miner	Phthisis, 2 years. Not certified.
„ 17	52	Shipwright -	Diseased heart, 12 months. Certified.
July 12	50	Mine agent -	Phthisis, 5 months. Certified.
„ 12	24	Tin miner -	Meningitis, 2 weeks. Certified.
„ 21	73	Seaman, merchant service.	Paralysis, 3 years. No medical attendant.
Aug. 19	15	Tin dresser -	Diseased joints, 5 months. No medical attendant.
„ 25	70	Labourer -	Atrophia. Certified.
„ 28	66	Agric. labourer	Diseased stomach, 3 months. Not certified.
„ 23	56	Tin miner -	Pneumonia, 2 years. Certified.
„ 25	80	Fisherman -	Old age. No medical attendant.
„ 29	38	Tin miner -	Abscesses, 12 months. Certified.
Oct. 18	71	Tin miner -	Phthisis, 12 months. Not certified.
„ 23	77	Fisherman -	Old age. No medical attendant.
Nov. 11	55	Tin miner -	Phthisis, 3 months. Not certified.
„ 21	71	Carpenter -	Apoplexy. Certified.
„ 23	83	Farmer -	Old age. Not certified.
„ 25	51	Tin miner -	Bronchitis, 3 years. Phthisis. Certified,
„ 30	70	Fisherman -	Age. Certified.
Dec. 22	85	Shoemaker -	Age. No medical attendant.
„ 27	78	Carpenter -	Bronchitis, 7 years. Certified.
1861.			
Jan. 4	48	Tin miner -	Phthisis, 3 years. Certified.
„ 4	48	Fisherman -	Cancer. Certified.
„ 11	80	Hotel keeper -	Old age. Not certified.
„ 30	57	Tin miner -	Phthisis, 6 months. No medical attendant.
„ 29	43	Tin miner -	Diseased kidneys, 18 months. Certified.
Feb. 6	42	Coast Guard -	Natural death. Inquest.
„ 9	80	Seaman, merchant service.	Palsy, 9 months. Not certified.
„ 27	62	Tin miner -	Epilepsy, 12 hours. Apoplexy. Certified.
„ 27	41	Fisherman -	Phthisis, 2 years. Certified.
Mar. 5	34	Tin miner -	Phthisis, 6 months. Not certified.
„ 13	10	Son of grocer	Gastric fever, 14 days. Certified.
„ 27	48	Tin miner -	Hepatitis. Certified
„ 27	81	Farmer -	Old age. No medical attendant.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Apr. 2	13	Son of seaman, merchant service.	Diseased bowels, 3 months. Certified.
„ 6	60	Seaman, merchant service.	Phthisis, 3 months. Certified.
„ 15	37	Mine engine worker.	Dropsy, 12 months. Not certified
„ 18	24	Tin miner -	Phthisis, 5 months. Certified.
„ 24	81	Farmer -	Old age. No medical attendant.
May 4	74	Engine worker	Cystitis, 1 weeks. Certified.
„ 12	23	Tin miner -	Enteritis, 7 days. Not certified.
„ 13	74	Farmer - -	Palsy, 5 days. Certified.
„ 14	41	Tin miner -	Purpura, 7 days. Certified.
„ 20	74	Town crier -	Phthisis, 6 months. Certified.
„ 21	78	Fisherman -	Old age. No medical attendant.
„ 27	78	Labourer -	Old age. No medical attendant.
„ 30	55	Tin miner -	Phthisis, 12 months. Not certified.
July 6	42	Miner - -	Fall from the flat. Inquest.
„ 12	40	Miner - -	Fracture from a kibble falling on him. Inquest.
„ 18	82	Fisherman -	Old age. Not certified.
„ 20	68	Fisherman -	Apoplexy, 7 hours. Certified.
Aug. 18	70	Labourer -	Tumour in stomach, 6 months. Certified.
„ 24	72	Tin dresser -	Diseased liver. Jaundice. Certified.
Sep. 11	21	Tin miner -	Fever, 4 days. Apoplexy, 6 hours. Certified.
„ 13	35	Chemist -	Natural causes. Inquest.
„ 25	73	Fisherman -	Natural causes. Inquest.
„ 29	31	Tin miner -	Cholera, 20 hours. Certified.
„ 30	65	Tin dresser -	Phthisis, 3 years. Certified.
„ 27	76	Mason - -	Found dead. Inquest.
Oct. 8	59	Shipwright -	Natural causes. Inquest.
„ 17	45	Tin miner -	Bronchitis, 6 months. Certified.
Nov. 11	61	Tin miner -	Pneumonia, 3 days. Certified.
„ 29	63	Gardener -	Natural decay. No medical attendant.
Dec. 19	27	Seaman, merchant service	Typhoid Bronchitis. Certified.
„ 26	25	Tin miner -	Phthisis, 6 months. Not certified.
„ 29	77	Farmer - -	Old age. No medical attendant.

Sub-district - 3. Marazion.

1859.			
Jan. 24	14	Son of tin miner	Phthisis pulmonalis, 2 years. Certified.
„ 29	31	Tin miner -	Enlargement of liver, 12 months. Certified.
Feb. 6	76	Agric. labourer	Old age. No medical attendant.
„ 21	60	Blacksmith -	Palsy, 6 months. Certified
Mar. 21	11	Son of copper miner.	Rheumatic fever, 11 weeks. Certified.
Apr. 2	54	Farmer - -	Fever, 1 week. Certified.
„ 4	33	Tin miner -	Phthisis, 3 years. Certified.
„ 13	68	Tin miner -	Phthisis, 3 years. Certified.
„ 26	14	Son of tin miner	Cephalitis, 1 week. Certified.
May 7	27	Engineer -	Phthisis, 5 months. Certified.
Apr. 26	14	Son of miner	Cephalitis. Certified.
May 2	73	Market gardener.	Found dead, cause unknown. Inquest.
June 30	50	Tin miner -	Phthisis, 2 years. Certified.
July 4	24	Tin miner -	Not stated.
„ 10	62	Copper miner	Hepatitis, 5 weeks. Certified.
„ 24	20	Son of tin miner	Congestive fever, 1 week Certified.
„ 28	72	Gardener -	Paralysis, 1 year. Certified.
Aug. 22	66	Tin miner -	Hepatitis. Juandice, 6 months. Certified.
„ 25	16	Son of tin miner	Apoplexy, 5 weeks. Certified,
Sept. 5	34	Mariner, merchant service.	Consumption, 3 years. Certified.
„ 20	57	Mine agent -	Phthisis, 3 months. Certified.
Oct. 9	23	Son of baker -	Phthisis, 4 weeks. Certified.
„ 9	84	Farm labourer	Dysentery, 1 week. Certified.
„ 24	15	Miner - -	Fall through a shaft at Wheal Ann Mine. Inquest.
„ 24	56	Miller - -	Diseased heart, 1 year. Certified.
Nov. 6	25	Son of carpenter	Phthisis, 3 months. Certified.
„ 12	61	Farmer - -	Diseased heart, 8 years. Asthma, 4 weeks. Certified.
„ 26	10	Son of miner -	Pleurisy, 10 days. Certified,
Dec. 2	20	Miner - -	Fractured skull. Inquest.
„ 18	75	Farmer - -	Jaundice, 5 months. Certified.
„ 18	45	Tin miner -	Phthisis pulmonalis, 2 years. Certified.
24	44	Miner - -	Accident: run over by a cart. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 2	82	Carpenter -	Paralysis, 3 weeks. Certified.
„ 5	63	Copper miner	Phthisis, 3 months. Certified.
„ 9	80	Copper miner	Age. No medical attendant.
„ 10	84	Blacksmith -	Age. No medical attendant.
„ 13	41	Copper miner	Phthisis, 6 months. Certified.
„ 21	48	Blacksmith -	Diseased liver, 12 months. Certified.
„ 22	61	Copper miner	Phthisis, 1 year. Certified.
Feb. 4	45	Tin miner -	Phthisis, 3 years. Certified.
„ 24	84	Watchmaker -	Age. No medical attendant.
Mar. 12	18	Son of mariner	Phthisis, 2 years. Certified.
„ 16	83	Husbandman	Age. No medical attendant.
„ 16	54	Innkeeper -	Dropsy, 1 year. Certified.
„ 26	57	Copper miner	Diseased brain, 2 years. No medical attendant.
Apr. 11	80	Tin miner -	Old age. Certified.
May 5	50	Tin miner -	Phthisis, 2 years. Certified.
„ 18	25	Son of baker -	Phthisis, 3 months. Certified.
June 10	29	Son of copper miner.	Dropsy. No medjcal attendant.
„ 17	18	Son of farmer	Diseased heart, 6 years. Certified.
„ 21	56	Husbandman -	Locked jaw, 3 weeks. Certified.
„ 27	69	Copper miner	Phthisis, 2 years. Certified.
July 3	30	Son of tin miner	General debility. Certified.
„ 22	52	Tin miner -	Phthisis, 2 years. Certified.
„ 18	18	Son of carpenter.	Diphtheria, 13 days. Certified.
Aug. 18	19	Son of tin miner	Epilepsy, 3 hours. No medical attendant.
„ 23	55	Civil engineer	Injuries from being crushed. Inquest.
Sep. 15	62	Tin miner -	Phthisis, 2 years. Certified.
„ 25	61	Thatcher -	Found dead in bed. Inquest.
Oct. 13	17	Ore dresser -	Accident. Scalded. Inquest.
„ 14	20	Miner - -	Accident. Scalded. Inquest.
„ 29	33	Copper miner	Accident. Scalded, 16 days. Not certified.
Nov. 15	44	Copper miner	Phthisis, 1 year, Certified.
„ 24	55	Copper miner	Diseased heart. Asthma. Certified.
Dec. 9	63	Innkeeper -	Phthisis, 10 months. Certified.
„ 26	41	Tin miner -	Phthisis, 2 years. Certified.
1861.			
Jan. 16	69	Mariner -	Phthisis, 2 years. Certified.
„ 19	67	Grocer - -	Ulcerated intestines, 6 months. Certified.
„ 26	15	Son of porter	Diseased heart, 12 months. Certified.
Feb. 7	46	Husbandman -	Phthisis, 1 year. Certified.
„ 12	53	Engineer -	Diseased heart, 2 years. Certified.
„ 22	60	Miller -	Fever, 2 weeks. Certified.
„ 24	51	Copper miner	Diseased heart, 2 years. Certified.
„ 25	17	Son of tin miner	Scrofula, 12 months. Certified.
Apr. 9	16	Son of tin miner	Phthisis, 6 months. Certified.
May 12	43	Copper miner	Scirrhus of liver, 6 months. Certified.
„ 18	22	Son of tin miner	Injury of finger, 1 week. Tetanus, 2 days. Certified.
„ 22	56	Tin miner -	Phthisis, 2 years. Certified.
June 12	23	Copper miner	Diseased heart, 4 months. Certified.
„ 4	53	Butcher -	Phthisis. Certified.
Aug. 13	52	Copper miner	Phthisis, 3 years. Certified.
„ 19	25	Copper miner	Drowned. Inquest.
Sept. 16	78	Coast Guard pensioner.	Old age. Certified.
Nov. 10	72	Mason - -	Natural death. Inquest.
Dec. 15	22	Son of tin miner	Scrofula. Certified.

Sub-district - 4. Penzance.

1858.			
Dec. 31	25	Druggist's shopman.	Phthisis. Certified.
„ 29	53	Farm labourer	Fever. Certified.
1859.			
Jan. 6	79	Carpenter . -	Age. Certified.
„ 12	10	Son of tin dresser	Hydrocephalus, 4 weeks. Certified.
„ 10	61	Ropemaker -	Cut his throat. Suicide. Inquest.
„ 14	18	Draper's assistant.	Diabetes. Certified.
„ 15	70	Fisherman -	Dry gangrene of toes. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 22	86	Formerly tide-waiter H.M's C.	Old age. No medical attendant.
„ 27	89	Farm labourer	Old age. No medical attendant.
„ 30	17	Fisherman -	Pneumonia. Pleurisy, 18 days. Certified.
Feb. 1	19	Mariner -	Fall from rigging. Inquest.
„ 4	52	Fisherman -	Diseased liver. Certified.
„ 6	39	Coast Guard -	Diseased brain, 12 months. Certified.
„ 8	50	Tailor, master	Diseased liver. Ascites, 2 months, Jaundice, 4 days. Certified.
„ 9	26	Labourer -	Pulmonary consumption, 6 months. Certified.
„ 15	58	Farmer - -	Apoplexy, 2 days. Certified.
„ 13	71	Fisherman -	Hæmatemesis, 5 weeks. Certified.
„ 22	19	Shoemaker, journeyman.	Necrosis, 2 years. Dropsy, 2 months. Certified.
„ 24	54	Labourer -	Pneumonia. Certified.
„ 24	37	Mason, journeyman.	Diseased kidneys, 4 months. Diabetes. Certified.
„ 27	61	Labourer -	Rheumatism, 7 days. Pleurisy, 2 days. Certified.
„ 27	17	Seaman -	Found drowned. Inquest.
„ 28	14	Son of labourer	Injuries: crushed under a cart wheel. Inquest.
Mar. 9	23	Farm labourer	Decline, 6 years. Not certified.
„ 14	23	Mariner -	Phthisis. Not certified.
„ 14	23	Blacksmith, journeyman.	Consumption, 6 months. Certified.
„ 16	28	Gold miner -	Hepatization of lungs, 12 months. Pleurisy, 3 weeks. Certified.
„ 20	69	Innkeeper -	Diseased liver, — years. Certified.
1858.			
Dec. 28	72	Mariner, merchant service.	Paralysis. Certified.
1859.			
Mar. 22	80	Clerk - -	Congestion of brain. Certified.
„ 28	66	Shoemaker, journeyman.	Hypertrophy of heart. Certified.
29	61	Sailmaker -	Paralysis, 4 months. Certified.
„ 30	66	Fisherman -	Diseased heart. Certified.
„ 29	73	Farmer -	Old age. No medical attendant.
Apr. 2	70	Farm bailiff -	Diseased heart. Certified.
„ 3	77	Fisherman -	Mortification of legs. Certified.
„ 11	20	Shoemaker, journeyman.	Consumption, 9 months. Certified.
„ 8	68	Millwright -	Chronic bronchitis, 5 years. Certified.
„ 7	25	Blacksmith -	Consumption, 4 months. Not certified.
„ 8	30	Cooper, master	Phthisis, 3 years. Certified.
„ 13	52	Farm labourer	Diseased heart, 1 year. Not certified
„ 14	41	Clown at a travelling circus	Hypertrophy of heart. Certified.
„ 15	25	Clerk - -	Consumption, 4 years. Not certified.
„ 22	45	Carpenter -	Hypertrophy of heart. Certified.
„ 25	18	Seaman -	Phthisis. Rupture of blood vessel. Certified.
„ 27	40	Farm labourer	Hydrothorax, 3 weeks. Certified.
„ 29	50	Tinman, master	Diseased heart, 18 months. Dropsy, 6 months. Certified.
May 8	77	Seaman, R.N.	Morbus cordis. Certified.
„ 11	87	Fisherman -	Old age. Not certified.
„ 13	76	Tanner -	Bronchitis. Certified.
„ 15	52	Farmer -	Palsy, 3 years. Not certified.
„ 22	31	Master mariner	Phthisis pulmonalis. Certified.
June 12	74	Thatcher -	Myelitis, 3 months. Certified.
„ 19	37	Ostler - -	Nephria. Palsy. Certified.
„ 19	62	Farm labourer	Age. Certified.
„ 21	22	Clerk - -	Phthisis. Certified.
25	16	Shoemaker's apprentice.	Tubercular peritonitis, 3 months. certified.
27	74	Shoemaker -	Bronchitis, 3 months. Certified.
„ 26	54	Grocer - -	Diseased kidneys. Abscess in pelvis. Certified.
„ 28	76	Farmer and miller.	Gout. Epilepsy. Certified.
July 5	54	Farm labourer	Consumption, 18 months. Certified.
„ 20	43	Labourer -	Encephalitis. Certified.
„ 21	30	Farm labourer	Phthisis, 18 months. Certified.
„ 21	80	Farm labourer	Old age. No medical attendant.
„ 23	69	Wheelwright	Apoplexy. Certified.
„ 29	65	Shoemaker, master.	Paralysis, 9 years. Certified.
„ 27	98	Master mariner	Bronchitis. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
July 30	27	Butcher -	Diseased heart. Certified.
„ 30	66	Fisherman -	Paralysis, 11 months. Not certified.
Aug. 4	69	Tin miner -	Fever. Certified.
„ 11	52	Blacksmith -	Phthisis, 12 months. Certified.
„ 17	19	Ropemaker's apprentice.	Rheumatism. Pericarditis. Certified.
„ 23	65	Postmaster -	Carbuncles. Certified.
„ 25	58	Brewer, journeyman.	Phthisis, 8 months. Certified.
„ 27	51	Coast Guard -	English cholera, 11 days. Certified.
„ 26	14	Son of mariner	Accident. Drowned. Inquest.
„ 29	17	Son of blacksmith.	Phthisis. Certified.
„ 27	55	Fundholder -	Rheumatic gout. Bronchitis. Certified.
„ 26	19	Carpenter's apprentice.	Phthisis, 3 months. Certified.
Sept. 1	80	Shoemaker -	Old age. No medical attendant.
„ 6	31	Painter - -	Diseased kidneys. Phthisis. Certified.
„ 9	82	Paper maker -	Old age. Certified.
„ 1	58	Printer - -	Suicide. Strangulation. Inquest.
„ 11	51	Fisherman	Diseased heart, 12 months. Certified.
„ 13	73	Ropemaker, master.	Paralysis, 14 months. Certified.
„ 13	67	Farmer - -	Premature old age. Certified.
„ 10	63	Shoemaker, master.	Rheumatism. Certified.
„ 15	81	Shoemaker, master.	Old age. Not certified.
„ 18	28	Tin miner -	Diseased brain. Certified.
„ 29	29	Clerk - -	Unknown. Certified.
„ 26	64	Farmer - -	Paralysis. Certified.
Oct. 5	22	Mariner, merchant service.	Consumption, 11 weeks. Not certified.
„ 4	36	Dealer in marine stores.	Palsy, 12 months. Certified.
„ 8	56	Blacksmith, journeyman.	Palsy, 2 years. Diarrhœa, 2 months. Certified.
„ 11	71	Fisherman -	Stomach complaint. Not certified.
„ 11	62	Farmer -	Phthisis, 6 months. Certified.
„ 17	54	Labourer -	Dropsy, 4 months. Certified.
„ 20	38	Master mariner	Typhoid fever, 11 days. Certified.
„ 16	69	Schoolmaster	Apoplexy, 2 hours. Certified.
„ 24	77	Wheelwright	Diseased heart. Certified.
„ 29	74	Street sweeper	Old age. Certified.
Nov. 2	74	Miner - -	Old age. No medical attendant.
„ 2	18	Tanner's apprentice.	Typhus, 8 weeks. Certified.
„ 5	37	Shoemaker, journeyman.	Phthisis, 3½ years. Diarrhœa, 3 months. Certified.
„ 8	31	Farm labourer	Typhoid fever, 6 months. Certified.
„ 16	49	Son of farm labourer.	Epilepsy. Idiotic from infancy. Certified.
„ 7	22	Son of farmer	Pleurisy. Dropsy. Certified.
„ 20	57	Farm labourer	Hydrothorax, 6 months. Certified.
„ 24	81	Clockmaker, master.	Influenza, 5 days. Bronchitis. Certified.
„ 25	65	Innkeeper -	Hypertrophy of heart. Fever. Certified.
„ 21	37	Seaman, R.N.	Diseased heart, 12 months. Certified.
„ 23	11	Son of yeoman	Typhus, 20 days. Congestion of brain, 12 days. Certified.
„ 27	59	Cabinet maker	Paralysis. No medical attendant.
„ 27	38	Groom - -	Phthisis, 5 months. Certified.
Dec. 1	85	Farm labourer	Old age. Certified.
„ 1	83	Fisherman -	Palsy. Certified.
Nov. 23	80	Seaman, R.N.	Paralysis. Certified.
Dec. 5	83	Shoemaker, master.	Old age. Certified.
„ 6	21	Thread manufacturer.	Phthisis. Certified.
„ 8	78	Superannuated, Coast Guard.	Old age. Not certified.
„ 10	78	Farm labourer	Old age. Not certified.
„ 12	21	Miner - -	Injuries in a mine. Inquest.
„ 15	28	Barrister -	Consumption, 3 years. Certified.
„ 12	56	Farmer - -	Phthisis, 18 months. Certified.
„ 19	19	Butcher -	Phthisis, 7 months. Certified.
„ 20	36	Farmer - -	Congestion of lungs. Certified.
„ 20	21	Fisherman -	Consumption, 1 year. Certified.
„ 25	64	Farmer - -	Pneumonia, 14 days. Certified.
„ 29	75	Fisherman -	Stomach complaint, 2 years. Not certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Dec. 30	79	Fisherman -	Senile gangrene, 11 weeks. Certified.
„ 30	30	Stonemason, journeyman.	Pneumonia. Jaundice. Certified.
„ 30	63	Shoemaker -	Paralysis, 2 months. Certified.
1860.			
Jan. 7	87	Groom - -	Old age. No medical attendant.
„ 13	75	Fisherman -	In consequence of a fall. Certified.
„ 21	61	Soldier, pensioner.	Injury of knee. Diarrhœa. Certified.
„ 23	47	Farm labourer	Pneumonia, 2 days. Certified.
„ 24	64	Shipwright -	Softening of brain, 2 years. Certified.
„ 16	85	Soldier, pensioner.	Age. Certified.
„ 26	76	Tin miner -	Age No medical attendant.
Feb. 1	81	Sawyer - -	Paralysis. Certified.
Jan. 28	68	Hatter - -	Consumption, 12 months. Certified.
Feb. 9	20	Son of clergyman.	Phthisis, 5 years. Certified
„ 15	74	Builder -	Influenza. Certified.
„ 16	82	Fisherman -	Paralysis. Certified.
„ 15	59	Collector of poor rates.	Paralysis, 8 months. Certified.
„ 16	51	Labourer -	Consumption. Certified.
„ 17	76	Farm labourer	Age. Certified.
„ 19	76	Mason - -	Age. Certified.
„ 22	85	Cellarman -	Dementia. Certified.
„ 25	75	Farm labourer	Pneumonia. Certified.
„ 27	92	Mariner -	Bronchitis, 10 days. Certified.
„ 28	74	Shoemaker, master.	Asthma. Certified.
Mar. 3	27	Tanner -	Scrofula. Certified.
„ 10	47	Clergyman -	Diseased liver, 18 months. Certified.
„ 12	43	Waggon driver	Fever, 6 weeks. Certified.
„ 16	76	Farmer - -	Pneumonia, 8 days. Certified.
„ 16	23	Gardener, journeyman.	Cephalitis, 3 days. Certified.
„ 11	20	Seaman -	Found drowned. Inquest.
„ 27	66	Clerk - -	Congestion of lungs, 8 days. Certified.
„ 28	63	Market gardener.	Diseased stomach, 1 year. Certified.
April 3	53	Labourer -	Phthisis, 16 months. Certified.
„ 3	60	Farm labourer	Bronchitis. Influenza, 2 months. Certified.
„ 5	72	Tanner, journeyman.	Apoplexy. Certified.
„ 11	15	Son of farmer	Cephalitis, 2 days. Certified.
„ 14	85	Solicitor -	Old age. Certified.
„ 15	68	Farmer - -	Bronchitis. Influenza. Certified.
„ 22	32	Mariner, merchant service	Diseased liver, 2 years. Dropsy, 9 months. Certified.
„ 23	65	Farm labourer	Consumption, 3 years. Certified.
„ 23	59	Farm labourer	Phrenitis. Certified.
„ 21	14	Son of tin miner	Epilepsy, 6 years. Certified.
„ 27	55	Dealer in marine stores.	Bronchitis. Diseased heart. Certified.
„ 26	90	Carpenter, master.	Age. Certified.
„ 27	80	Farm labourer	Age. Certified.
„ 28	76	Yeoman -	Age. Certified.
May 1	57	Labourer -	Diseased brain. Certified.
„ 7	66	Gardener -	Dyspepsia, 1 year. Certified.
„ 5	62	Tin streamer	Cancer. Certified.
„ 11	65	Gardener -	Bronchitis. Certified.
„ 20	67	Fisherman -	Hydrothorax. Certified.
„ 24	58	Fisherman -	Diseased stomach. Certified.
„ 24	16	Carpenter's apprentice.	Intermittent fever. Certified.
June 4	72	Carpenter -	Diseased heart. Inquest.
„ 10	93	Landed proprietor.	Age. Certified.
„ 11	57	Labourer -	Fracture of skull. Inquest.
„ 17	82	Superannuated, Coast Guard	Old age. Certified.
„ 20	42	Farmer - -	Natural death. Inquest.
„ 26	20	Seaman, R.N.	Phthisis, 12 months. Certified.
„ 28	11	Son of solicitor	Tracheitis, 6 days. Certified.
„ 27	66	Labourer -	Hydrothorax. Certified.
July 16	65	Sawyer - -	Cerebritis. Certified..
„ 25	43	Fisherman -	Found dead in bed. Inquest.
Aug. 1	43	Mason, journeyman.	Pleurisy, 6 days. Certified.
July 31	74	Farm labourer	Age. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Aug. 11	16	Son of fisherman	Phthisis, 2 years. Certified.
„ 17	44	Tin miner -	Decline, 12 months. Not certified.
„ 23	11	Son of hawker	Diseased hip joint. Certified.
„ 28	49	Wheelwright, master.	Diseased heart, 4 months. Certified.
Sept. 1	82	Seaman, R.N.	Old age. No medical attendant.
„ 6	74	Gardener -	Hydrothorax. Certified.
„ 7	35	Farmer - -	Consumption, 12 months. Certified.
„ 9	66	Gentleman -	Diseased heart. Certified.
„ 15	78	Fisherman -	Age. Certified.
„ 19	70	Chimney sweep	Age. Certified.
„ 22	59	Schoolmaster	Hydrothorax. Certified.
„ 28	89	Tin streamer -	Old age. Certified.
Oct. 2	25	Clerk - -	Phthisis, 6 months. Certified.
„ 4	69	Baker, master	Unknown. No medical attendant.
„ 2	66	Carpenter -	Phthisis, 2 years. Certified.
Oct. 7	66	Tanner, journeyman.	Albuminuria. Certified.
„ 10	51	Copper miner	Phthisis, 6 months. Certified
„ 10	62	Mason, master	Cancer. Certified.
„ 5	41	Mason, journeyman.	Paralysis. Certified.
„ 12	33	Policeman -	Typhus, 4 weeks. Certified.
„ 20	60	Gentleman -	Visitation of God. Inquest.
„ 22	62	Corn factor -	Paralysis. Certified
„ 20	43	Tin miner -	Consumption. Certified
„ 20	39	Engine man -	Suicide, not stated how. Inquest.
„ 30	33	Coast Guard -	Consumption, 12 months, Certified.
Nov. 14	46	Farmer -	Pneumonia. Certified.
„ 18	77	Jewish Rabbi	Apoplexy. Certified.
„ 23	32	Officer, Inland Revenue.	Phthisis. Certified.
„ 13	33	Jeweller - -	Diseased prostate gland. Certified.
„ 28	77	Fisherman -	Diseased stomach, 12 months. Certified.
Dec. 1	66	Fisherman -	Incontinence of urine, 12 months. Certified.
„ 4	40	Tin miner -	Hydrothorax, 12 months. Certified.
„ 8	27	Stone cleaver -	Contusions. Tetanus, 2 days. Certified.
„ 6	19	Carpenter, apprentice.	Pulmonary consumption. Certified.
„ 9	85	Labourer, farm	Old age. Certified.
„ 18	65	Gardener -	Fever. Certified.
„ 24	50	Carpenter, master	Hydrothorax, 6 months. Certified.
„ 25	35	Mariner, merchant service.	Paralysis, 9 months. Certified.
„ 26	57	Mariner, merchant service.	Phthisis, 6 months. Certified.
„ 27	68	Smith, master	Dyspepsia, 1 year. Certified.
1861.			
Jan. 1	69	Cooper -	Diseased bladder. Certified,
„ 1	88	Farmer -	Old age. Not certified.
„ 1	45	Mine purser	Abscess, 9 months. Certified.
Jan. 5	32	Solicitor -	Consumption. Certified.
„ 15	89	Gardener -	Old age. Certified.
„ 14	46	Labourer -	Fever, 17 days. Certified.
„ 16	73	Wesleyan minister. - -	Congestion of lungs. Certified.
„ 14	66	Tin Miner -	Bronchitis. Phthisis. Certified.
„ 20	68	Fisherman -	Diseased prostate gland, 16 months. Certified.
„ 23	70	Lieut.Col.,R.A.	Phthisis. Certified.
„ 25	42	Fisherman -	Ulcered intestines. Certified.
„ 29	16	Tin miner -	Phthisis. Certified.
Feb. 6	66	Mariner, merchant service.	Hepatitis, 5 months. Certified.
„ 8	16	Son of surgeon	Phthisis, 2 years. Certified.
„ 21	77	Postmaster -	Bronchitis. Certified.
„ 18	35	Seaman -	Drowned. Inquest.
„ 18	30	Master mariner	Drowned. Inquest.
„ 23	66	Carpenter -	Hydrothorax. Certified.
„ 18	31	Mariner -	Accident. Drowned. Inquest.
„ 18	34	Mariner -	Accident. Drowned. Inquest.
„ 18	18	Mariner -	Accident. Drowned. Inquest.
„ 28	17	Mariner -	Injuries. Fall from mast. Inquest.
„ 28	45	Seaman -	Found drowned. Inquest.
„ 18	24	Seaman -	Found drowned. Inquest.
Mar. 2	29	Clerk - -	Typhus, 18 days. Certified.
„ 6	54	Mariner -	Bronchitis. Certified.
„ 9	37	Gardener -	Diseased brain. Certified.
„ 10	73	Labourer -	Old age. No medical attendant.
„ 14	21	Pupil teacher-	Epilepsy. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Mar. 14	63	Idiot - -	Apoplexy. Certified.
„ 20	19	Son of innkeeper	Typhus, 11 days. Certified.
„ 21	39	Artist - -	Consumption, 3 months. Certified.
„ 21	76	Land owner -	Jaundice. Certified.
„ 23	84	Fisherman -	Old age. Certified.
„ 25	25	Shoemaker, journeyman.	Phthisis, 5 months. Certified.
„ 27	41	Fisherman -	Diseased kidneys, 2 months. Certified.
„ 27	63	Printer - -	Ulcerated intestines, 12 months. Certified.
Apr. 3	17	Son of farmer	Phthisis, 3 years. Certified.
„ 6	23	Jewish Rabbi-	Ileus. Certified.
„ 12	10	Son of fisherman.	Meningitis, 4 days. Certified.
„ 16	26	Farm labourer	Consumption, 1 year. Certified.
„ 18	33	Master mariner	Suicide by hanging. Inquest.
„ 27	88	Master mariner	Hæmoptysis. Certified.
„ 30	80	Porter - -	Old age. Certified.
May 10	44	Painter, master	Phthisis, 3 months. Certified.
„ 9	52	Fisherman -	Caries. Certified.
„ 10	46	Farmer -	Typhus. Cancer.
„ 10	72	Builder -	Cancer. Certified.
„ 11	79	Woolstapler -	Age. Certified.
„ 11	73	Shoemaker -	Morbus cordis. Certified.
„ 14	19	Carpenter, apprentice.	Pneumonia, 12 days.
„ 19	39	Farmer -	Suicide by hanging. Inquest.
June 9	67	Shipwright, master.	Hernia. Certified.
„ 14	68	Coast Guard, superannuated.	Cancer. Certified.
„ 17	19	Serpentine turner.	Phthisis, 10 months. Certified.
„ 19	47	Mason - -	Fractured skull. Inquest.
„ 19	35	Shoemaker, journeyman.	Phthisis. Certified.
„ 21	20	Millwright, journeyman.	Typhus, 20 days. Certified.
„ 24	70	Shoemaker, master.	Paralysis. Certified.
July 2	30	Coach smith -	Consumption, 8 months. Certified.
„ 13	70	Farm labourer	Paralysis, 10 days. Certified.
„ 15	71	Mason, master	Stricture of intestine. Certified.
„ 20	67	Shoemaker -	Paralysis. Certified.
„ 23	80	Fisherman -	Diseased stomach, 3 years. Certified.
„ 28	25	Carrier - -	Drowned: upset out of a boat. Inquest.
Aug. 3	46	Solicitor -	Cancer. Certified.
„ 4	75	Farmer -	Paralysis, 10 days. Certified.
„ 8	67	Farm labourer	Phlegmon. Certified.
„ 18	60	Bailiff, County Court.	Diarrhœa, 5 days. Certified.
„ 21	71	Ropemaker, journeyman.	Pneumonia, 7 weeks. Certified.
„ 22	26	Printer, master	Phthisis, 9 months. Certified.
„ 23	76	Groom - -	English cholera. Certified.
„ 24	46	Fisherman -	Consumption, 9 months. No medical attendant.
„ 31	75	Builder, master	Jaundice, 3 weeks. Certified.
Sept. 6	20	Sailmaker, journeyman.	Consumption. Certified.
„ 14	19	Son of farmer	Fever, 14 days. Certified.
„ 15	31	General broker	Phthisis, 3 months. Certified.
„ 20	39	Beer-house keeper.	Diseased prostate gland, 6 years. Certified.
„ 22	25	Fisherman -	Diseased heart. Asthma, 6 months. Certified.
„ 29	24	Draper's assistant.	Phthisis, 3 years. Certified.
„ 29	71	Leather seller	Pneumonia. Certified.
„ 23	63	Fisherman -	Drowned. Inquest.
„ 29	19	Shoemaker, journeyman.	Typhus, 14 days. Certified.
„ 20	13	Son of chemist	Epilepsy, 10 years. Certified.
Oct. 7	85	Superannuated, Coast Guard.	Sudden. Age. Certified.
„ 8	18	Blacksmith -	Typhus. Certified.
Sept 23	13	Fisherman -	Accident. Drowned. Inquest.
Oct. 15	59	Carpenter, journeyman.	Fever, 8 weeks. Diseased kidneys. Post-mortem. Certified.
„ 22	41	Mariner, merchant service.	Consumption, 12 months. Certified.
„ 21	49	Cart driver -	Nephria, 10 months. Certified.
„ 26	74	Captain, R.N.	Enteritis, 4 weeks. Certified.
„ 25	17	Shipwright -	Typhus, 16 days. Certified.
1861.			
Oct. 28	68	Shoemaker -	Diseased heart. Certified.
„ 29	53	Labourer -	Aneurism. Certified.
„ 31	72	Cabinet maker	Pulmonary congestion, 4 days. Certified.
Nov. 2	50	Tin miner -	Consumption, 12 months. Certified.
„ 3	78	Fisherman -	Diarrhœa. Certified.
„ 9	78	Fisherman -	Old age. No medical attendant.
„ 17	21	Gardener -	Typhus, 18 days. Certified.
„ 25	55	Coal porter -	Dropsy. Certified.
„ 19	60	Pedlar - -	Palsy. Certified.
„ 23	67	Builder, master	Tumour in neck. Certified.
„ 29	45	Barrister -	Œdema of glottis. Certified.
„ 26	40	Tin miner -	Bronchitis. Certified.
Dec. 14	32	Clergyman -	Phthisis. Certified.
„ 18	80	Cooper, master	Old age. No medical attendant.
„ 16	72	Bootmaker -	Palsy. Certified.
„ 22	67	Commander, R.N.	Apoplexy. Certified.
„ 28	75	Fisherman -	Old age. No medical atendant.
„ 22	67	Commander, R.N.	Sudden. Inquest.

Sub-district - 5. St. Just-in-Penwith.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 12	44	Tin miner -	Phthisis. Hæmorrhage, 8 months. Certified.
„ 20	13	Son of labourer.	Accidental death: crushed. Inquest.
„ 29	50	Farmer - -	Laryngitis. Certified.
„ 29	13	Son of miner	Bronchitis. Certified.
Feb. 4	61	Miner - -	Apoplexy. Inquest.
„ 20	15	Son of miner	Rheumatic fever. Endocarditis. Certified.
„ 19	22	Mine labourer	Found dead in a shaft; supposed to have fallen in. Inquest
Mar. 9	25	Son of tin miner.	Scrofula. Certified.
„ 21	64	Schoolmaster -	Diseased prostate gland, 2 years. Cystitis, 6 weeks.
„ 31	48	Mine engine driver.	Phthisis pulmonalis. Certified.
Apr. 1	50	Tin miner -	Bronchitis. Certified.
„ 3	44	Tin miner -	Asthma. Anasarca. Certified.
„ 8	62	Tin miner -	Debility. Certified.
„ 12	50	Tin miner -	Debility. Certified.
„ 17	64	Tin miner -	Dyspepsia. Certified.
„ 27	66	Farmer - -	Bronchitis. Certified.
„ 29	74	Farm labourer	Senile gangrene. Certified.
May 4	27	Son of tin miner	Consumption. Certified.
„ 23	67	Mine agent -	Consumption. Not certified.
„ 30	41	Tin miner -	Phthisis, 6 months. Certified.
June 12	57	Tin miner -	Myelitis. Certified.
„ 11	35	Tin miner -	Nephria. Coma. Certified.
„ 19	66	Tin miner -	Synochâ. Bronchitis. Certified.
„ 22	58	Tin miner -	Dropsy. Certified.
„ 25	26	Tin dresser -	Irritant poisoning by arsenic, 7 weeks. Epileptic convulsions, 8 days. Certified.
„ 25	43	Cart driver -	Accidental death. Upset with his cart while riding thereon. Inquest.
„ 29	32	Tin miner -	Phthisis. Certified.
July 18	38	Tin miner -	Bronchitis. Typhus. Certified.
„ 21	58	Miner - -	Accident. Crushed under a mass of rubbish. Inquest.
„ 25	68	Tin miner -	Anasarca. Certified.
„ 28	95	Farmer - -	Unknown. No medical attendant.
Aug 11	55	Farm labourer	Bronchitis. Phthisis. Certified.
„ 7	26	Son of clergyman.	Phthisis. Certified.
„ 29	25	Son of farmer	Phthisis, 8 months. Certified.
Sept. 4	39	Tin miner -	Phthisis. Certified.
„ 3	42	Civil engineer	Scalded. Inquest.
„ 20	37	Farmer - -	Consumption. Not certified.
„ 16	48	Merchant -	Natural death. Inquest.
Oct. 6	40	Tin miner -	Injury. Broken rib. Gastritis. Certified.
„ 6	57	Carpenter -	Enteritis. Ileus. Certified.
„ 11	96	Farmer - -	Senectus. Certified.
„ 16	49	Tin miner -	Bronchitis. Phthisis. Certified.
Nov. 6	66	Tin miner -	Jaundice. Certified.
„ 14	46	Tin miner -	Pneumonia. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Nov. 19	55	Tin miner -	Pneumonia, 7 days. Certified.
„ 21	68	Tin miner -	Fever, 6 days. Certified.
Dec. 8	53	Tin miner -	Asthma, 2 years. Certified.
„ 28	93	Farmer - -	Unknown. No medical attendant.
1860			
Jan. 10	35	Son of miner	Fever. Certified.
„ 26	49	Blacksmith -	Sudden death. Inquest.
Feb. 2	52	Tin miner -	Phthisis. Certified.
„ 7	23	Son of miner	Consumption. Certified.
„ 10	34	Tin dresser -	Phthisis. Hydrocephalus. Certified.
„ 20	88	Farmer - -	Old age. Certified.
„ 21	21	Miner - -	Injuries to his head. Inquest.
„ 26	23	Tin miner -	Scrofula, 1 year. Certified.
„ 26	45	Tin miner -	Phthisis. Certified.
„ 28	86	Tin miner -	Unknown. No medical attendant.
Mar. 2	59	Tin miner -	Phthisis. Certified.
„ 4	57	Farmer -	Debility. Certified.
„ 9	10	Son of mine labourer.	Croup. Certified.
„ 17	30	Tin miner -	Ulceration of stomach. Certified.
Apr. 1	22	Son of miner	Typhus. Certified.
„ 6	77	Farmer -	Debility. Certified.
„ 19	48	Farm labourer	Phthisis, 8 months. Certified.
„ 22	60	Tin miner -	Lumbar abscess. Certified.
„ 23	37	Tin miner -	Fever. Pneumonia. Certified.
„ 26	20	Tin miner -	Injuries. Crushed under a mass of rubbish. Inquest.
May 1	18	Son of tin miner	Fever, Certified.
„ 4	36	Son of farmer	Cancer of liver. Certified.
„ 14	66	Shoemaker -	Unknown. No medical attendant.
„ 11	43	Grocer and draper.	Diseased lungs, 2 years. Hæmoptysis. Certified.
„ 28	54	Farmer -	Influenza. Certified.
„ 29	49	Tin miner -	Unknown. No medical attendant.
„ 31	10	Son of miner -	Accident. Falling into a shaft. Inquest.
June 4	77	Tin miner -	Bronchitis, 2 months. Certified.
„ 12	55	Tin miner -	Diseased heart. Asthma. Certified.
„ 23	19	Miner - -	Injuries from fall into a shaft. Inquest.
July 6	50	Tin miner -	Bronchitis. Certified.
„ 7	49	Mine labourer	Paralysis. Certified.
„ 6	50	Farmer -	Enteritis, 3 weeks. Certified.
„ 25	34	Tin dresser -	Pneumonia. Phthisis. Certified.
„ 26	37	Tin miner -	Phthisis. Bronchitis. Certified.
„ 27	63	Tin miner -	Unknown. No medical attendant.
„ 29	45	Tin miner -	Phthisis. Certified.
Aug. 10	40	Tin miner -	Hepatitis. Ascites. Certified.
„ 20	17	Miner - -	Injuries by rubbish falling on him. Inquest.
Sept. 1	66	Tin miner -	Phthisis. Certified.
„ 6	42	Carpenter -	Dropsy. Certified.
„ 4	29	Miner - -	Injuries by the explosion of a hole in Spearn Consols Mine. Inquest.
„ 10	44	Tin miner -	Hypertrophy of heart. Certified.
„ 10	60	Tin miner -	Phthisis. Certified.
„ 6	38	Miner - -	Natural death. Inquest.
„ 25	56	Tin miner -	Phthisis. Certified.
„ 27	14	Son of miner -	Accident. Fall into a shaft. Inquest.
Oct. 18	36	Mine labourer	Atrophy of liver. Certified.
„ 27	16	Miner - -	Suffocated. Buried under a mass of rubbish. Inquest.
„ 29	54	Tin miner -	Bronchitis. Phthisis. Certified.
„ 30	20	Son of tin miner	Pneumonia. Certified.
Nov. 29	45	Farmer -	Hepatic disease. Certified.
Dec. 17	70	Farmer -	Paralysis. Not certified.
„ 23	80	Tin miner -	Bronchitis. Certified.
„ 25	72	Tin miner -	Angina pectoris. Certified.
„ 28	77	Farmer -	Ileus. Typhus. Certified.
„ 30	66	Tin miner -	Dropsy. Certified.
1861.			
Jan. 2	25	Seaman -	Drowned Inquest.
„ 5	10	Son of tin miner	Fever. Certified.
„ 6	62	Tin miner -	Debility. Certified.
„ 5	20	Labourer -	Accident. Drowned. Inquest.
„ 12	64	Tin miner -	Asthma, 4 years. Certified.
„ 12	53	Miner - -	Natural death. Inquest.
„ 11	17	Seaman -	Drowned. Inquest,
„ 13	45	Seaman -	Drowned. Inquest.
„ 6	35	Seaman -	Drowned. Inquest.
1861.			
Jan. 7	25	Seaman -	Drowned. Inquest.
„ 8	25	Seaman -	Drowned. Inquest.
Jan. 24	51	Mine agent -	Killed whilst ascending in man engine, Levant Mine. Inquest.
„ 31	67	Tin miner -	Debility. Certified.
Feb. 7	63	Farmer - -	Bronchitis. Certified.
„ 22	83	Farmer - -	Unknown. No medical altendant.
„ 24	52	Tin miner -	Phthisis. Certified.
„ 27	55	Tin miner -	Neuralgia. Certified.
Mar. 5	89	Tin miner -	Unknown. No medical attendant.
„ 18	70	Tin miner -	Debility. Certified.
„ 25	48	Tin miner -	Asthma. Certified.
„ 27	48	Tin miner -	Bronchitis. Certified.
„ 30	48	Tin miner -	Phthisis. Certified.
Apr. 11	59	Tin miner -	Diseased heart. Asthma. Certified.
„ 24	44	Shoemaker -	Phthisis. Certified.
„ 26	19	Son of tin miner	Phthisis. Certified.
„ 26	59	Tin miner -	Abscess of liver. Certified.
May 31	12	Son of blacksmith.	Fever. Certified.
June 8	82	Farmer -	Diseased heart. Dropsy. Certified.
„ 8	40	Miner - -	Injuries to his back. Inquest.
July 2	18	Son of farmer	Phthisis. Certified.
„ 4	68	Gentleman -	Diseased liver and heart. Certified.
„ 9	51	Labourer -	Rupture of the lungs. Inquest.
„ 17	85	Farm labourer	Old age. Not certified.
„ 31	47	Tin miner -	Diseased heart. Bronchitis. Certified.
Aug 30	51	Mine agent -	Typhus. Carditis. Certified.
Sep. 20	37	Tin miner -	Phthisis. Asthma. Certified.
Oct. 2	50	Tin miner -	Bronchitis. Certified.
„ 3	21	Tin miner -	Phthisis, 1 year. Certified.
„ 4	45	Tin miner -	Diseased heart. Certified.
„ 10	41	Mine agent -	Found dead. Inquest.
Nov. 5	46	Tin miner -	Bronchitis. Certified.
„ 1	29	Tin miner -	Phthisis. Certified.
„ 9	61	Tin miner -	Bronchitis. Certified.
„ 23	44	Tin miner -	Phthisis pulmonalis. Certified.
„ 25	35	Civil engineer	Natural death. Inquest.
„ 30	77	Mine engine driver.	Bronchitis. Apnœa. Certified.
Dec. 8	57	Miner - -	Accident: falling down a flight of steps. Inquest.
„ 14	59	Tin miner -	Bronchitis Not certified.
„ 25	21	Tin Miner -	Phthisis. Diarrhœa. Certified.
„ 27	72	Blacksmith -	Paralysis. Certified.

Sub-district - 6. St. Buryan.

1859.			
Jan. 7	11	Son of farm labourer.	Diphtheria. Certified.
„ 6	10	Son of farmer	Cynanche maligna. Certified.
„ 15	13	Son of farmer	Cynanche maligna. Certified.
Feb 18	29	Fisherman -	Phthisis. Certified.
Mar. 5	84	Farm labourer	Diarrhœa. No medical attendant.
Apr. 1	69	Farm labourer	Debility. No medical certificate.
„ 29	70	Farmer -	Phthisis. No medical attendant.
„ 27	65	Son of farmer	Disease of stomach, Not certified.
May 19	69	Farmer -	Ulcerated stomach. Certified.
„ 36	19	Son of farm labourer.	Diarrhœa. Not certified.
June 3	76	Farmer -	Retention of urine. No medical attendant.
„ 10	38	Farm labourer	Synocha, 7 days. Pleurisy, 5 days. Certified.
July 7	83	Farmer -	Phlegmon. No medical attendant.
„ 9	72	Farmer -	Cancer of stomach. Certified.
Aug. 15	79	Fisherman -	Debility. No medical attendant.
Oct. 4	57	Farm labourer	Dyspepsia. Certified.
Dec. 3	19	Farmer -	Accident. Discharge of a gun. Inquest.
„ 20	59	Farmer -	Cancer of stomach. Certified.
„ 24	36	Farm labourer	Phthisis. Not certified.
1860.			
Mar. 23	74	Farm labourer	Retention of urine. Certified.
Apr. 21	69	Farm labourer	Dyspepsia. Certified.
May 2	45	Carpenter -	Consumption, 3 months. Certified.
„ 31	49	Farm labourer	Phthisis. No medical attendant.
June 21	64	Farm labourer	Debility. No medical attendant.
July 1	77	Farm labourer	Enteritis. Certified.
„ 1	66	Gardener -	Paralysis. Certified.

COUNTY OF CORNWALL.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
July 29	69	Farmer -	Debility. No medical attendant.
Aug. 31	67	Farm labourer	Bronchitis. Certified.
Sept. 15	63	Farmer -	Fever. Certified.
Aug. 4	87	Shoemaker -	Old age. Certified.
Oct. 5	18	Farm labourer	Injuries from the wheel of a waggon passing over him. Certified.
„ 6	48	Lieut., R.N. -	Consumption, 6 months. Certified.
Nov. 12	45	Farm labourer	Congestion of liver. Certified.
Dec. 18	84	Farm labourer	Debility. No medical attendant.
1861.			
Jan. 3	56	Farmer -	Typhoid. Abscess. Certified.
„ 10	90	Farm labourer	Debility. No medical attendant.
1861.			
„ 11	95	Farmer -	Debility. Certified.
„ 9	77	Farm labourer	Debility. No medical attendant.
„ 17	29	Farm labourer	Phthisis. Certified.
May 15	78	Farm labourer	Idiotcy. Scrofula. Not certified.
July 12	81	Farmer -	Debility. No medical attendant.
„ 15	65	Fisherman -	Debility. No medical attendant.
„ 18	64	Farm labourer	Apoplexy. Certified.
Aug. 15	71	Thatcher -	Diseased stomach. No medical attendant.
„ 29	85	Farm labourer	Cancer. No medical attendant.
„ 30	26	Labourer -	Found dead. Inquest.
Sept. 28	37	Lighthouse keeper.	Suicide by stabbing. Inquest.
Dec. 23	69	Farmer -	Jaundice. Certified.
„ 30	78	Farm labourer	Debility. No medical attendant.

DISTRICTS IN NORTH OF ENGLAND.

COUNTY OF LANCASTER.

Superintendent Registrar's District. — 486. ULVERSTONE.

Registrar's Sub-District. — 3. Ulverstone.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–60–61.

Sub-district - 3. Ulverstone.

1859.			
Jan. 9	75	Agric. labourer	Influenza. Certified.
„ 15	65	Farmer -	Hypertrophy of heart. Certified.
„ 27	42	Agric. labourer	Disease of brain. Certified.
„ 27	23	Agric. labourer	Phthisis, 9 months. Certified.
„ 29	51	Agric. labourer	Dropsy, 2 weeks. Certified.
Feb. 5	68	Carpenter -	Palsy, many years. Certified.
„ 8	49	Farmer -	Diseased heart. Certified.
„ 12	84	Farmer -	Influenza, 3 weeks. Certified.
„ 13	73	Agric. labourer	Old age. Certified.
„ 18	45	Joiner - -	Phthisis, 2 years. Certified.
„ 24	70	Cooper - -	Senile decay. Certified.
„ 21	19	Labourer iron mine.	Struck by something falling down an iron-ore pit at Lindale Moor in the parish of Dalton. Inquest.
„ 28	70	Horsebreaker	Diseased heart. Certified.
Mar. 1	80	Farmer -	Senile decay. Certified.
„ 6	77	Flax dresser -	Old age. Not certified.
„ 12	25	Iron miner -	Pneumonia. Certified.
„ 7	66	Labourer iron mine.	Natural causes. Not Certified.
„ 25	76	Mariner -	Hemiplegia. Certified.
„ 24	50	Mariner -	Diseased liver, 6 months. Certified.
„ 29	85	Master mariner	Senile decay. Certified.
„ 30	50	An idiot -	Gastritis, 6 months.
Apr. 8	41	Shoemaker, journeyman.	Diarrhœa, 14 days. Gastritis, 4 days. Certified.
„ 9	53	Agric. labourer	Phthisis, 2 years. Certified.
„ 15	57	Painter -	Phthisis, 1 year. Certified.
„ 20	61	Iron miner -	Diseased brain. Certified.
„ 25	71	Basket maker	Phthisis. Certified.
„ 25	49	Railway labourer	Phthisis, 2 years. Certified.
„ 24	13	Son of hawker	Phthisis. Certified.
May 1	73	Gentleman -	Peritonitis. Certified.
„ 24	59	Watchmaker -	Delirium tremens. Certified.
July 6	73	Greenwich Pensioner.	Asthma, 3 months. Certified.
„ 4	10	Son of engineer.	Accident. Drowned. Inquest.
„ 19	46	Cabinet maker, master.	Disease of liver. Ascites. Certified.
„ 30	14	Son of labourer	Scrofula, 2 years. Certified.
Aug. 4	27	Agric. labourer	Scrofula. Certified.
„ 11	19	Son of farmer	Phthisis. Certified.
„ 15	84	Labourer -	Visitation of God. Inquest.
„ 18	75	Carrier -	Decay of nature. Certified.
„ 22	82	Agric. labourer	Decay of nature. Certified.
Sep. 12	68	Seller of small wares.	Asthma, 3 months. Certified.
1859.			
Sep. 15	77	Brickmaker, master.	Senile decay. Certified.
„ 18	69	Tailor, master	Febris. Certified.
„ 17	15	Son of slate dresser.	Phthisis, 2 years. Certified.
Oct. 2	64	Agric. labourer	Palsy. Certified.
„ 6	30	Agric. labourer	Arthritis. Certified.
„ 5	77	Cotton manufacturer.	Decay of nature. Certified.
„ 26	51	Solicitor -	Phthisis, 2 years. Certified.
Nov. 13	42	Cotton spinner	Diseased lungs. Certified.
„ 17	82	Wool carder -	Stricture of œsophagus. Certified.
Dec. 3	73	Tailor - -	Phthisis. Certified.
„ 1	37	Draper, master	Diseased liver. Certified.
„ 4	61	Solicitor -	Palsy, 3 years. Certified.
„ 18	70	Labourer -	Diseased heart. Certified.
„ 19	19	Waller, apprentice -	Pneumonia, 9 days. Certified.
„ 25	78	Spade-shaft maker.	Senile decay. Certified.
„ 25	61	Nail maker, journeyman.	Phthisis, 6 months. Certified.
„ 26	72	Tailor, master	Sudden visitation of God. Inquest.
1860			
Jan. 1	79	Labourer	Old age. Certified.
„ 7	79	Tailor -	Old age. Certified.
„ 7	31	Carpenter, journeyman.	Phthisis, 18 months. Certified.
„ 15	72	Agric. labourer	Old age. Certified.
„ 19	66	Tailor, journeyman.	Paralysis, 2 years. Certified.
„ 21	83	Carpenter -	Senile decay. Certified.
Feb. 2	40	Tile maker -	Abscess. Certified.
„ 3	75	Labourer -	Asthma. Debility. Certified.
„ 6	73	Labourer -	Senile decay. Certified.
„ 5	61	Labourer -	Senile decay. Certified.
„ 5	81	Hand loom weaver.	Senile decay. Certified.
Mar. 2	74	Master mariner	Congestion of lungs. Certified.
„ 6	71	Basket maker journeyman.	Old age. Certified.
„ 4	75	Farmer -	Paralysis. Certified.
„ 23	53	Brewer -	Cirrhosis apoplexy. Certified.
„ 22	53	Stone mason -	Diseased heart, 2 years. Certified.
„ 30	59	Brewer -	Diseased liver, 2 years. Certified.
Apr. 8	46	Iron miner -	Fever, 2 weeks. Certified.
„ 17	42	Labourer -	Epilepsy, 6 months. Certified.
„ 26	22	Clog maker -	Phthisis, 3 months. Certified.
„ 27	19	Confectioner's apprentice.	Phthisis, 3 months. Certified.
„ 30	59	Tanner -	Gangrene. Certified.
May 6	44	Sawyer -	Elephantiasis, 8 years. Certified.
„ 6	71	Gentleman -	Parotitis. Gangrene. Certified.
„ 9	75	Shoemaker -	Old age. No medical attendant.
„ 12	32	Blacksmith -	Phthisis, 6 months. Certified.
„ 15	77	Shoemaker, journeyman.	Asthma. Bronchitis, 1 week. Certified.
„ 16	45	Servant -	Diarrhœa, 1 month. Certified.
„ 16	76	Landed proprietor.	Natural decay. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
May 17	52	Spade maker -	Pneumonia, 5 days. Certified.
„ 9	39	Station-master	Diseased liver, 1 year. Certified.
„ 25	70	Joiner - -	Senile decay. Certified.
„ 30	72	Shoemaker, master.	Senile decay. Certified.
June 3	22	Son of hawker	Phthisis, 2 months. Certified.
„ 3	76	Agric.labourer	Senile decay. Certified.
„ 12	71	Shoemaker, journeyman.	Dyspepsia. Certified.
„ 15	60	Engine-driver	Hemiplegia, 1 year. Certified.
July 4	48	Iron miner -	Pneumonia, 7 days. Certified.
„ 3	55	Agric.labourer	Diseased liver. Certified.
„ 4	29	Iron miner -	Pneumonia. Certified.
„ 5	90	Labourer -	Decay of nature. Certified.
June30	34	Farmer -	Fall of ore in iron-ore pit. Inquest.
July 7	84	Labourer -	Decay of nature. Certified.
„ 19	65	Carpenter, journeyman.	Diseased heart, 5 years. Certified.
„ 19	57	Labourer -	Phthisis, 6 months. Certified.
„ 28	50	Agric.labourer	Phthisis, 6 months. Certified.
Aug. 3	80	Land proprietor	Senile decay. Certified.
„ 8	64	Handloom weaver.	Typhus fever, 7 days. Certified.
„ 13	68	Wesleyan missionary.	Diseased heart. Certified.
„ 13	81	Farmer -	Old age. Not certified.
„ 14	28	Tailor - -	Phthisis, 6 months. Not certified.
„ 17	40	Iron miner -	Pleuro-pneumonia, 6 days. Certified.
„ 27	27	Son of land proprietor.	Typhus. Certified.
Sep. 12	56	Painter -	Phthisis, 12 months. Certified.
Oct. 3	31	General labourer.	Phthisis, 12 months. Certified.
„ 5	71	General labourer.	Cancer, 12 months. Certified.
„ 10	77	Landed proprietor.	Paralysis, 14 days. Certified.
„ 14	90	Farmer -	Decay of nature. Certified.
„ 15	55	Labourer -	Typhus fever, 9 days. Certified.
„ 16	21	Son of carpenter.	Phthisis. Certified.
„ 21	68	Cooper, master	Phthisis. Certified.
„ 24	23	Iron miner -	Emphysema, 6 weeks. Certified.
Nov.14	81	Farmer -	Decay of nature. Certified.
„ 24	23	Son of labourer	Phthisis, 8 months. Certified.
Dec. 1	74	Mariner -	Bronchitis, 2 weeks. Certified.
„ 3	90	Sawyer journeyman.	Senile decay. Certified.
„ 5	36	Iron miner -	Pleuro-pneumonia, 3 days. Certified.
„ 14	92	Labourer -	Senile decay. Certified.
„ 19	39	Labourer at iron mine.	Fall down a shaft. Inquest.
„ 27	43	Innkeeper -	Cephalitis, 24 hours. Certified.
„ 29	13	Son of iron miner.	Phthisis, 5 months. Certified.
„ 31	75	Hawker -	Asthma, some years. Certified.
1861.			
Jan. 7	25	Iron miner -	Pericarditis. Certified.
„ 4	74	Hawker -	Asthma, 12 months. Certified.
„ 4	64	Block maker, master.	Disease of heart. Certified.
„ 12	36	Woollen draper, assistant.	Diabetes. Certified.
„ 15	74	Agric. labourer	Diseased liver, 3 weeks. Not certified.
Jan. 15	40	Labourer -	Disease of heart. Certified.
„ 20	66	Cellarman -	Pneumonia, 4 days. Certified.
„ 21	57	Labourer -	Ulcerated legs. Certified.
„ 24	31	Cabinet maker	Phthisis, 6 months. Certified.
„ 25	88	Greenwich pensioner.	Old age. Certified.
Feb. 5	12	Son of blacksmith.	Diseased spine, 6 years. Certified.
„ 15	73	Farmer -	Heart disease. Certified.
„ 17	76	Landed proprietor.	Diseased heart, some years. Certified.
„ 26	80	Forgeman, journeyman.	Diarrhœa, 3 months. Certified.
Mar. 2	28	Veterinary surgeon, master.	Delirium tremens. Typhus. Certified.
„ 5	79	Labourer -	Senile decay. Certified.
„ 6	36	Nail maker -	Natural causes. Inquest.
„ 21	52	Gardener -	Typhus fever. Certified.
„ 22	23	Tailor, journeyman.	Phthisis. Certified.
Apr. 2	66	Cotton carder	Dyspepsia, 16 years. Certified.
„ 8	42	Iron miner -	Chronic rheumatism, 9 months. Certified.
„ 12	48	Gardener -	Phthisis. Certified.
„ 13	68	Weaver -	Diseased bladder, 3 weeks. Certified.
„ 22	67	Weaver -	Paralysis, 3 months. Certified.
„ 22	61	Ostler - -	Phthisis. Certified.
May 18	74	Basket maker	Old age. Certified.
„ 22	81	Landed proprietor.	Decay of nature. Certified.
„ 21	44	Iron miner	Fall down an iron-ore shaft. Inquest.
„ 29	18	Son of nail maker.	Phthisis. Certified.
„ 31	48	Solicitor -	Diarrhœa, 1 month. Certified.
June15	54	Basket maker	Diseased heart, 6 months. Certified.
„ 15	74	Agric. labourer	Decay of nature. Certified.
„ 14	48	Tanner -	Cut his throat (suicide). Inquest.
May 1	75	Joiner, master	Bronchitis, 6 days. Certified.
July 20	21	Son of butcher	Phthisis. Certified.
„ 27	82	Formerly a soldier.	Natural causes. Inquest.
„ 31	13	Son of a waller	Dragged by a cow. Inquest.
Aug 13	75	Handloom weaver.	Paralysis. Certified.
„ 19	36	Stonemason, journeyman.	Phthisis, 18 months. Certified.
„ 29	59	Blacksmith, journeyman.	Axillary abscess, 3 months. Certified.
Sept. 6	81	Labourer -	Senile decay. Certified.
„ 19	46	Mariner -	Abscess of the thigh. Certified.
„ 28	70	Labourer -	Asthma. Certified
Oct. 13	71	Labourer -	Old age. Not certified.
Nov. 4	49	Agric. labourer	Intussusceptio, 4 days. Certified.
„ 14	19	Son of ironmonger, master.	Phthisis, 16 months. Certified.
„ 13	55	Iron miner -	Accident. Fall down the shaft of an iron-ore pit. Inquest.
„ 19	72	Joiner, journeyman.	Chronic cystitis, 4 months. Certified.
„ 25	37	Plasterer -	Cirrhosis. Certified.
„ 28	71	Surgeon -	Diseased brain, 2 years. Certified.
Dec. 10	16	Son of Surgeon	Synochus, 9 days. Certified.
„ 19	79	Labourer -	Senile gangrene, 2 weeks. Certified.

COUNTY OF YORK.

Superintendent Registrar's District.	Registrar's Sub-District.
522. SKIRLAUGH.	2. Skirlaugh.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–1861.

Sub-district - 2. Skirlaugh.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 2	13	Agric.labourer	Enteritis, 1 week. Certified.
Feb. 15	69	Agric.labourer	Diarrhœa, 7 days. Certified.
Mar 1	73	Farmer -	Diseased heart. Not certified.
June12	67	Agric.labourer	Apoplexy, 14 hours. Certified.
Aug. 3	30	Agric.labourer	Diseased heart Certified.
„ 18	42	Agric.labourer	Cholera, 2 days. Certified.
Sept.13	81	Agric.labourer	Old age. Diarrhœa. Certified.
„ 19	62	Agric.labourer	Diarrhœa. Not certified.
Oct. 6	22	Wheelwright	Phthisis, 5 months. Certified.
„ 24	82	Agric.labourer	Apoplexy. Certified.
Nov. 2	85	Agric.labourer	General decay. Not certified.
Dec. 18	11	Son of Grocer	Nephritis, 14 days. Certified.
1860.			
Jan. 3	79	Agric.labourer	Gradual decay. No medical attendant.
Feb. 21	66	Tailor, master	Hydrothorax, 12 months. Certified.
„ 24	81	Agric.labourer	Bronchitis, 2 days. Certified.
Mar. 2	86	Agric.labourer	Cerebral congestion. Certified.
Apr. 2	64	Agric.labourer	Diseased heart ; anasarca. Certified.
„ 10	79	Farmer -	Apoplexy, 5 hours. Certified.
July 3	12	Son of servant	Rubeola, 9 days. Certified.
„ 25	56	Tailor, master	Hepatitis. Certified.
„ 28	56	Agric.labourer	Femoral hernia, 11 days. Certified.
Aug.14	77	Agric.labourer	Apoplexy, 4 days. Certified.
Sep. 12	55	Farmer -	Cephalitis. Certified.
Oct. 15	62	Innkeeper -	Angina pectoris. Certified.
Nov.30	27	Son of agricultural labourer.	Diabetes, 3 years. Certified.
Dec. 13	11	Son of tailor -	Convulsions, 4 days. Certified.
„ 13	48	Agric.labourer	Diarrhœa, 3 months. Certified.
„ 30	72	Agric.labourer	Low fever. Certified.
1861.			
Jan. 16	79	Gentleman -	Hanged himself. Inquest.
Apr. 25	77	Farmer -	Gradual decay. No medical attendant.
May 5	80	Grocer -	Gradual decay. No medical attendant.
„ 20	41	Labourer -	Accident. Fall from a tree. Inquest.
June15	44	Innkeeper -	Delirium tremens, 3 days. Certified.
July 2	64	Tailor, master	Paraplegia. Certified.
„ 15	77	Agric.labourer	Anasarca, 3 months. Certified.
„ 18	30	Agric.labourer	Bronchitis, 4 days. Certified.
Aug 16	76	Wheelwright -	Gastric fever. Certified.
„ 30	67	Agric.labourer	Bronchitis, 12 months. Certified.
Sep. 25	54	Farmer -	Inflammation. Certified.
Nov. 1	46	Cordwainer, journeyman.	Phthisis. Certified.
„ 30	78	Agric.labourer	Dysentery, 7 days. Certified.
„ 30	60	Farmer -	Apoplexy, 5 hours. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
532. GUISBOROUGH.	2. Marske. 3. Kirkleatham.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 2. Marske.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 10	22	Agric.labourer	Low fever. Certified.
Feb. 6	82	Agric.labourer	Old age. Not certified.
„ 5	86	Farmer -	Old age. Not certified.
„ 14	63	Pilot -	Atrophy, 1 year. Certified.
„ 18	52	Farmer -	Pneumonia. Certified.
Mar.20	15	Son of iron miner.	Epilepsy. Certified.
Apr.21	30	Ironstone miner	Consumption, 6 months. Certified.
„ 19	12	Son of tailor -	Scarlatina. Not certified.
„ 27	67	Fisherman -	Senile gangrene. Certified.
May 7	32	Mine labourer	Consumption. Certified.
„ 20	10	Son of ironstone miner.	Jaundice, 10 days. Certified.
„ 4	40	Farmer -	Found drowned. Inquest.
„ 10	24	Miner - -	Accident. Fall of iron stone in Upleatham Iron Mines. Inquest.
July 12	70	Farmer -	Asthma ; dropsy. Certified.
Aug.21	48	Gardener -	Consumption. Certified.
Sep. 1	45	Shoemaker -	Stone. Not certified.
Oct. 4	38	Ironstone miner	By fall of ironstone. Inquest.
„ 11	60	Clergyman -	Apoplexy. Certified.
„ 12	64	Spirit merchant	Orchitis. Certified.
„ 16	67	Butcher -	Cancer. Certified.
„ 28	29	Ironstone miner	Fall of ironstone in Upleatham Mines. Inquest.
„ 30	44	Fishmonger -	Rheumatic fever. Diseased heart. Certified.
Nov.18	72	Farmer - -	Age. Certified.
„ 18	26	Seaman -	Found drowned on the shore. Inquest.
Dec.31	67	Farmer - -	General decay. Not certified.
1860.			
Jan. 1	10	Son of labourer	Scrofula. Certified.
„ 5	68	Mariner -	Bronchitis. Certified.
„ 29	51	Tailor - -	Consumption, 2 years. Certified.
Mar. 1	84	Agric. labourer	General decay. Not certified.
Feb.16	58	Stonemason -	Asthma. Certified.
Jan. 19	20	Ironstone miner	Accident. Fall of ironstone in the Upleatham Iron Mines. Inquest.
Mar.29	25	Ironstone miner	Accident. Fall of ironstone in the Upleatham Iron Mines. Inquest.
Apr. 5	29	Ironstone miner	Fever. Certified.
„ 26	67	Pilot - -	Phthisis, 12 weeks. Certified.
May 4	76	Farmer - -	Diseased bladder. Certified.
June23	93	Agric. labourer	General decay. No medical attendant.
„ 25	72	Agric. labourer	Visitation of God. Inquest.
July 9	66	Shoemaker, master.	Ileus, 11 days. Certified.
„ 16	56	Shoemaker, master.	Diabetes. Certified.
„ 24	unk.	Mariner -	Found drowned. Inquest.
Nov.18	57	Agric. labourer	Palsy, 6 weeks. Certified.
Dec. 17	37	Builder - -	Consumption. Certified.
1861.			
Jan. 16	40	Mariner -	Found drowned. Inquest.
„ 16	50	Mariner -	Found drowned. Inquest.
„ 16	17	Mariner -	Found drowned. Inquest.
„ 22	33	Butcher's servant.	Chorea-fever, 9 weeks. Certified.
Feb. 6	77	Agric. labourer	Diseased heart. Certified.
12	35	- - -	Found drowned in the German Ocean. Inquest.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Feb. 13	22	- - -	Found drowned in the German Ocean. Inquest.
„ 14	22	- - -	Found drowned in the German Ocean. Inquest.
„ 25	25	Farmer -	Encephalitis, 3 weeks. Certified.
Mar. 20	72	Pilot - -	Bronchitis, 4 weeks. Certified.
„ 14	18	Son of ship-owner.	Phthisis. Certified.
„ 20	72	Pilot - -	Bronchitis, 4 weeks. Certified.
Apr. 24	26	Shoemaker -	Diseased lungs. Certified.
„ 24	unk.	Mariner -	Found drowned. Inquest.
„ 24	unk.	Mariner -	Found drowned. Inquest.
May 20	22	Ironstone miner	Accident. Fall of ironstone. Inquest.
„ 29	37	Stone mason, journeyman.	Tuberculosis. Certified.
June 3	43	Ironstone miner	Tuberculosis. Certified.
May 31	77	Farmer -	Diseased prostate gland, ischuria. Certified.
June 18	unk.	Mariner -	Found drowned. Inquest.
July 5	17	Clerk - -	Accidentally drowned, bathing. Inquest.
„ 5	22	Ironstone miner	Accident. Fall of ironstone in Upleatham Mine. Inquest.
„ 5	60	Publican -	Visitation of God. Inquest.
Sep. 18	24	Joiner - -	Phthisis, 9 months. Certified.
Oct. 18	76	Fisherman -	Old age. Certified.
„ 20	62	Shoemaker, master.	Anæmia. Certified.
Nov. 13	49	Clergyman -	Apoplexy. Certified.
„ 14	80	Farmer -	Old age. Certified.
„ 15	56	Agric. labourer	Mortification. Certified.
„ 30	71	Shopkeeper -	Diseased heart. Dropsy. Certified.
Dec. 16	68	Plate layer -	Diseased heart. Certified.
„ 19	66	Shoemaker -	Low fever. Certified.
„ 20	98	Agric. labourer	Old age. Not certified.

Sub-District - 3. Kirkleatham.

1859.			
Jan. 1	34	Iron miner -	Fall of ironstone in the Eaton Iron Mines. Inquest.
„ 13	16	Farm servant	Scarlatina. Certified.
„ 16	65	Builder -	Diseased stomach. Certified.
„ 23	10	Son of carter -	Scarlatina. Certified.
Feb. 22	81	Agric. labourer	Asthma. Certified.
Mar. 11	60	Stone mason -	Diseased heart. Certified.
„ 11	40	Iron miner -	Fever. Certified.
„ 25	20	Blacksmith -	Fever. Apoplexy. Certified.
„ 30	30	Labourer at furnaces.	Pneumonia. Certified.
Apr. 17	19	Joiner -	Consumption. Not certified.
„ 19	25	Agric. labourer	Rheumatism and diseased heart. Certified.
„ 12	40	Ironstone miner	Consumption. Certified.
May 10	15	Agric. labourer	Kicked by a horse. Inquest.
„ 15	40	Ironstone miner	Fever. Pneumonia. Certified.
„ 19	11	Son of blacksmith.	Hydrocephalus. Certified.
„ 24	35	Ironstone miner	Smallpox. Certified.
June 14	25	Iron moulder	Pneumonia. Certified.
„ 17	38	Ironstone miner	Scarlatina. Certified.
„ 15	46	Ironstone miner	A quantity of shale falling on him at Eston Iron Mines. Inquest.
„ 17	25	Labourer at iron works.	Shot himself (suicide). Inquest.
July 4	24	Labourer -	Scarlatina. Smallpox. Certified.
„ 5	19	Labourer, ironstone mine.	Phthisis. Certified.
„ 6	10	Son of contractor.	Smallpox. Certified.
„ 10	30	Ironstone miner	Smallpox. Certified.
„ 7	18	Fireman -	Fractures by railway waggon. Inquest.
„ 17	20	Blacksmith -	Smallpox. Certified.
Aug. 5	28	Ironstone miner	Erysipelas. Certified.
„ 13	22	Printer -	Phthisis. Certified.
„ 13	16	Waggon driver	Smallpox. Certified.
„ 15	47	Plate layer -	Accident. Fall of a stone. Certified.
„ 18	56	Farmer -	Phthisis. Certified.
„ 18	21	Ironstone miner	Fall of ironstone in the Eston Mines. Inquest.
„ 29	23	Ironstone miner	Smallpox. Diarrhœa. Certified.
1859.			
Aug 30	20	Miner - -	Fall from a gangway in the Eston Works. Inquest.
„ 31	10	Son of miner -	Run over by waggons. Inquest.
Sep. 11	53	Ironstone miner	Smallpox. Certified.
„ 27	41	Tidewaiter -	Confluent smallpox. Certified.
„ 26	71	Agric. labourer	Paralysis. Not certified.
Oct. 5	10	Son of smith -	Scarlatina. Certified.
„ 6	49	Ironstone miner	Hernia. Certified.
„ 7	21	Labourer at furnaces.	Pneumonia. Certified.
„ 12	22	Ironstone labourer.	Run over by railway waggon. Inquest.
„ 18	35	Ironstone miner	Fever. Certified.
Nov. 11	56	Labourer, ironstone mines.	Apoplexy. Certified.
„ 14	12	Son of labourer, ironstone mines.	Run over by waggons on a tramway. Inquest.
„ 15	36	Farm servant	Smallpox. Certified.
Dec. 5	34	Ironstone miner	By a fall of ironstone. Inquest.
„ 5	40	Master mariner	Found drowned. Inquest.
1860.			
Jan. 11	31	Butcher -	Delirium tremens. Certified.
„ 12	63	Carter - -	Apoplexy. Certified.
„ 16	11	Son of ironstone miner.	Remittent fever. Certified.
Feb. 28	17	Son of ironstone miner.	Fever. Certified.
„ 24	35	Furnace labourer.	Cephalitis. Certified.
Mar. 23	20	Ironstone miner	Diseased heart. Certified.
Apr. 19	27	Ironstone miner	Accident. Fall of ironstone in Eston Iron Mines. Inquest.
„ 19	28	Ironstone miner	Accident. Fall of ironstone in Eston Iron Mines. Inquest.
„ 29	14	Son of ironstone miner.	Fever. Certified.
„ 28	21	Ironstone miner	Accident. Fall of ironstone in Eston Iron Mines. Inquest.
May 7	36	Ironstone miner	Pneumonia. Certified.
May 4	85	Farmer -	Old age. Certified.
„ 9	46	Ironstone miner	Pneumonia. Certified.
„ 9	66	Jeweller, journeyman.	Diseased liver. Certified.
„ 22	66	Farmer -	Abscess of liver. Certified.
„ 23	42	Platelayer -	Bronchitis. Diseased liver. Certified.
„ 28	47	Mariner -	Found drowned. Inquest.
June 10	14	Waggon driver	Diseased brain from injury. Certified.
„ 7	21	Ironstone miner	Phthisis. Certified.
„ 13	26	Labourer -	Ulcered intestines. Certified.
„ 15	86	Agric. labourer	Gangrene of foot. Certified.
July 15	23	Joiner - -	Accident. Breaking of scaffold. Inquest.
„ 18	24	Ironstone miner	Accident. Fall of ironstone at Eston. Inquest.
„ 18	58	Overlooker in ironstone mine.	Apoplexy. Certified.
„ 25	30	Engine driver.	Abscess of head. Certified.
„ 27	42	Horsekeeper -	Accident. Run over by waggon. Inquest.
Aug. 2	69	Labourer -	Pneumonia. Certified.
„ 14	30	Engine fireman	Accident. Run over by a railway waggon. Inquest.
„ 24	28	Ironstone miner	Phthisis pulmonalis. Certified.
„ 26	42	Bricklayer -	Typhus fever Certified.
Sep. 21	75	Coastguard -	Dropsy. Certified.
„ 30	45	Farm servant	Epilepsy. Certified.
Nov. 3	27	Butcher -	Gastric fever. Certified.
„ 7	76	Agric. labourer	Disease of bladder. Certified.
„ 14	15	Son of ironstone miner.	Accident. Fall of ironstone in the Eston Mines. Inquest.
„ 24	35	Grocer -	Fever. Certified.
Dec. 12	31	Ironstone miner	Phthisis. Certified.
„ 10	13	Driver - -	Accident. Run over by waggon. Inquest.
„ 14	48	Gardener -	Hepatitis. Certified.
„ 20	37	Shoemaker, master.	Disease of kidneys. Certified.
„ 29	60	Rag gatherer	Visitation of God. Inquest.
1861.			
Jan. 9	49	Coal carter -	Fever. Certified.
„ 17	20	Ironstone miner	Fever. Certified
Feb. 13	68	Dealer in game	Hemiplegia. Certified.
„ 13	31	Ironstone miner	Fever. Certified.
„ 16	35	Ironstone miner	Rheumatism. Fever. Certified.
„ 14	51	- - -	Found drowned. Inquest.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Feb. 13	18	- - -	Found drowned. Inquest.
„ 28	11	Son of blacksmith.	Spinal affection. Certified.
Mar. 9	11	Son of iron miner.	Fever. Pneumonia. Certified.
„ 17	11	Son of iron miner.	Marasmus. Certified.
Apr. 3	57	Ironstone miner	Constitutional debility. Certified.
„ 9	27	Ironstone miner	Accidental fall of ironstone in Eston Iron Mines. Inquest.
„ 13	37	Ironstone miner	Accidental fall of ironstone in Eston Iron Mines. Inquest.
„ 17	37	Ironstone miner	Accidental fall of ironstone in Eston Iron Mines. Inquest.
„ 18	15	Labourer in ironstone mine.	Lockjaw from accidental injuries in Eston Iron Mines. Inquest.
„ 23	21	Iron moulder	Phthisis. Diarrhœa. Certified.
„ 26	49	Ironstone miner	Delirium tremens. Certified.
„ 24	75	Under steward	Diseased heart. Certified.
„ 30	26	Miner -	Accidental fall of stone at Eston Mines. Inquest.
May 13	64	Curate -	Bright's disease. Certified.
„ 31	44	Farmer -	Exhaustion. Certified.
June 13	36	Inspector of railway waggons.	Phthisis. Certified.
July 20	22	Miner -	Accidental fall of ironstone. Inquest.
„ 23	27	Platelayer -	Visitation of God. Inquest.
Aug. 7	80	Farmer -	Bronchitis. Certified.
„ 23	37	Iron miner -	Accidental explosion of powder in blasting. Inquest.
„ 22	82	Seaman -	Old age. Not certified.
„ 21	23	Iron moulder	Phthisis. Not certified.
Sept. 6	64	Agric. labourer	Pneumonia. Certified.
„ 2	72	Carpenter -	Diseased kidneys. Not certified.
„ 5	49	Iron moulder	Excessive drinking. Inquest.
„ 19	68	Labourer -	Gastritis. Certified.
„ 20	35	Seaman -	Fever. Not certified.
„ 20	19	Labourer, iron mines.	Accident by a waggon on a tramway. Inquest.
„ 20	25	Labourer, iron works.	Accident. Breaking of a chain. Inquest.
„ 28	34	Coal agent -	Fever. Certified.
„ 26	62	Labourer, iron furnaces.	Apoplexy. Certified.
„ 29	21	Bricklayer -	Typhus fever. Certified.
Oct. 11	37	Agric. labourer	Nephritis. Certified.
„ 17	11	Son of labourer	Ricketts. Certified.
„ 17	22	Blacksmith, journeyman.	Diabetes. Certified.
„ 25	19	Labourer -	Accident; fall of shale at Eston Bank. Inquest.
Nov. 4	unk.	A man; unknown.	Found dead in the German Ocean. Inquest.
„ 6	40	Miner - -	Accident by a fall of ironstone. Inquest.
„ 13	28	Fireman -	Accident. Run over by a train. Inquest.
„ 24	48	Labourer at furnaces.	Typhus. Apoplexy. Certified.
„ 29	72	Gardener -	Diseased brain. Certified.
Dec. 10	27	Ironstone miner	Accident by fall of ironstone at Eston Mine. Inquest.
„ 18	29	Labourer -	Fever. Certified.
„ 13	17	Puddler -	Accident by the explosion of a slag ball. Inquest.

Superintendent Registrar's District.	Registrar's Sub-District.
535. BEDALE.	1. Bedale. 2. Masham.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district. - 1. Bedale.

1859.			
Jan. 14	81	Agric. labourer	Bronchitis, 2 days. Certified.
„ 27	86	Agric. blaourer	Diseased heart. Not certified.
„ 25	42	Draper's servant	Diarrhœa. Not certified.
Feb. 2	72	Agric. labourer	Diseased heart. Not certified.
1859.			
Mar. 10	36	Schoolmaster	Diphtheria, 2 months. Certified.
„ 16	62	Farmer -	Consumption. Not certified.
Apr. 8	43	Surgeon -	Scrofula, 3 months. Certified.
„ 9	80	Independent -	Paralysis, 18 days. Certified.
„ 18	76	Independent -	Decay of nature. Certified.
May 9	44	Brick and tile maker.	Consumption, 2 years. Certified.
„ 12	77	Shoemaker, journeyman.	Old Age. Not certified.
„ 15	41	Joiner - -	Renal dropsy, 6 months. Certified.
„ 22	82	Agric. labourer	Old age. Not certified.
„ 30	23	Son of brewer	Epilepsy. Certified.
June 7	36	Farmer -	Phthisis, 3½ years. Certified.
„ 10	79	Labourer -	Diseased heart. Not certified.
„ 27	42	Agric. labourer	Phthisis, — month. Certified.
July 3	39	Agric. labourer	Convulsions, 1 week. Certified.
„ 24	71	Farmer -	Paralysis, 10 days. Certified.
Aug. 1	44	Brick and tile maker, journeyman.	Dysentery, 3 days. Certified.
„ 1	64	Agric. labourer	Accidental Injury, 50 hours. Inquest.
„ 4	81	Gardener -	Anasarca, many months. Certified.
„ 17	78	Butler - -	Palsy, 20 months. Certified.
„ 15	80	Rag gatherer	Old age. Certified.
„ 13	80	Innkeeper -	Sudden death. Inquest.
Sept. 7	83	Farmer -	Old age. Certified.
„ 22	68	Agric. labourer	Enteritis, 3 days.
Oct. 15	80	Agric. labourer	Diseased prostate gland, 12 months. Certified.
„ 6	82	Woolcomber -	Old age. Not certified.
„ 24	53	House proprietor.	Cancer, 3 months. Certified.
„ 31	25	Innkeeper -	Consumption, 4 years. Certified.
Nov. 8	75	Farmer -	Diseased heart. Certified.
„ 22	52	Agric. hind -	Diseased heart. Certified.
„ 26	84	Agric. labourer	Old age. Certified.
„ 30	56	Horse breaker	Pneumonia. Certified.
„ 30	50	Corn dealer -	Diseased heart,—years. Certified.
Dec. 20	58	Brewer - -	Diseased lungs. Certified.
1860.			
Jan. 2	76	Bricklayer -	Old age. No medical attendant.
„ 8	73	Schoolmaster	Old age. Certified.
„ 10	37	Butler (servant)	Diseased lungs. Certified.
„ 19	18	Tailor, apprentice.	Fever. Certified.
Feb. 3	71	Agric. labourer	General decay. Certified.
„ 2	26	Agric. labourer	Diseased lungs, 12 months. Certified.
„ 5	12	Son of shoemaker.	Diphtheria, 9 days. Certified.
Mar. 18	14	Son of agric. labourer.	Measles. Certified.
Apr. 25	62	Innkeeper -	Diseased heart. Certified.
May 3	60	Farmer -	Irritation of spinal chord. Certified.
„ 8	16	Son of corn dealer.	Diphtheria, 8 days. Certified.
„ 8	93	Bricklayer -	Old age. Not certified.
„ 12	59	Independent -	Hepatitis, jaundice. Certified.
„ 18	82	Fellmonger -	Old age. Certified.
May 18	70	Grocer, master	Decay of nature. Certified.
June 5	78	Agric. labourer	Decay of nature. Certified.
„ 2	60	Wood turner -	Ulceration of face, 12 months. Certified.
„ 18	74	Stonemason -	Spinal irritation, 12 months. Certified.
July 5	31	Joiner - -	Phthisis pulmonalis. Certified.
„ 6	50	Whitesmith -	By hanging (suicide). Inquest.
Aug. 8	73	Carpenter, master.	Bronchitis, 2 months. Certified.
„ 15	29	Shoemaker, master.	Phthisis pulmonalis, 12 months. Certified.
„ 17	62	Agric. labourer	General decay. Certified.
„ 26	78	Bricklayer -	Pulmonary apoplexy, 3 days. Certified.
„ 29	54	Blacksmith -	Diseased heart, 3 years. Certified.
Sep. 10	39	Farmer - -	Diseased heart. Inquest.
Oct. 2	71	Farmer - -	Decay of nature. Not certified.
Sep. 28	19	Labourer -	Consumption. Not certified.
Oct. 30	71	County magistrate.	Suicide by drowning. Inquest.
Dec. 25	12	Son of farmer	Catarrh, 3 days. Certified.
1861			
Jan. 9	83	Agric. labourer	Old age. Certified

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Jan. 14	85	Shoemaker -	Old age. No medical attendant.
„ 14	76	Proprietor of houses.	Natural decay. Certified.
„ 15	23	Carpenter -	Phrenitis, 14 days. Certified.
Feb. 3	81	Agric. labourer	Enteritis. Certified.
Apr. 15	78	Agric. labourer	Diseased heart. Certified.
„ 23	15	Son of farmer	Synochus, 3 weeks. Certified.
„ 29	79	Carpenter -	Old age. Not certified.
May 13	74	Proprietor of houses.	Cystitis, 3 weeks. Certified.
„ 21	65	Agric. labourer	Pneumonitis, 10 months. Certified.
„ 15	25	Butler, servant	Phthisis, 6 months. Certified.
„ 28	76	Proprietor of houses.	Diphtheria, 6 days. Certified.
June 3	12	Son of agric. labourer.	Scarlatina, 8 days. Certified.
„ 4	57	Farmer -	Accident by a thrashing machine. Inquest.
„ 17	24	Butler, servant	Phthisis. Certified.
„ 24	74	Blacksmith -	Diseased liver, 2 or 3 years. Certified.
„ 21	20	Son of butler	Consumption, 2 years. Not certified.
July 1	86	Dealer in hardware.	Natural decay. Certified.
„ 11	41	Agric. labourer	Diseased lungs. Certified.
„ 22	61	Agric. labourer	Apoplexy, 35 hours. Certified.
„ 31	72	Farmer -	Phthisis, 2 months. Certified.
„ 31	30	Agric labourer	Hæmoptysis. Certified.
„ 31	70	Clergyman -	Diseased heart, 10 years. Certified.
Aug. 13	33	Agric. labourer	Ulcered stomach. Certified.
Sept. 2	79	Letter-carrier	Decay of nature. Certified.
„ 3	81	Agric. labourer	Old age. No medical attendant.
„ 15	81	Blacksmith -	Old age. No medical attendant.
„ 14	63	Agric. labourer	Cancer. Certified.
„ 21	50	Farmer -	Cancer. Certified.
„ 26	52	Agric. labourer	Angina pectoris. Certified.
Oct. 8	59	Esquire -	Congestion of lungs, 14 days. Certified.
Nov. 6	67	Butcher -	Decay of nature. Certified.
„ 20	74	Agric. labourer	Old age. No medical attendant.
Dec. 23	47	Innkeeper -	Apoplexy. Inquest.

Sub-district - 2. Masham.

1859.			
Jan. 14	81	Shoemaker -	Natural decay. Not certified.
„ 20	57	Labourer -	Bronchitis. Certified.
Feb. 16	21	Tallow chandler	Phthisis. Certified.
„ 24	64	Farmer -	Diseased heart. Not certified.
Apr. 11	63	Sawyer -	Decay of nature. Certified.
„ 19	75	Labourer -	Apoplexy. Certified.
„ 30	80	Agric. labourer	Apoplexy. Certified.
„ 30	66	Agric. labourer	Consumption, 1 year. Certified.
June 5	73	Farmer -	Apoplexy. Not certified.
„ 28	60	Agric. labourer	Asthma and dropsy. Not certified.
July 12	60	Schoolmaster	Diseased liver, 2 years. Certfied.
Sep. 5	30	Plumber and glazier.	Phthisis, 2 years. Certified.
„ 6	28	Agric. labourer	Phthisis, 16 months. Certified.
„ 13	60	Agric. labourer	Phthisis, 2 years. Certified.
„ 24	36	Butcher -	Delirium tremens. Certified.
Dec. 7	35	Carpenter -	Bronchitis, 10 days. Certified.
1860.			
Jan. 4	80	Agric. labourer	Decay of nature. Not certified.
„ 19	22	Son of glazier	Phthisis, 7 months. Certified.
„ 25	53	Agric. labourer	Diarrhœa. No medical attendant.
Feb. 3	76	Lime burner -	Cancer, 12 months. Certified.
„ 5	82	Agric. labourer	Decay of nature. Certified.
Mar. 20	81	Agric. labourer	Dropsy, 3 years. No medical attendant.
„ 22	64	Stone mason -	Bronchitis. Certified.
„ 28	73	Blacksmith, master.	Apoplexy, 2 weeks. Certified.
Apr 18	63	Innkeeper -	Morbus cordis. Certified.
„ 27	82	Groom -	Apoplexy, 3 hours. Certified.
June 14	78	Farmer -	Decay of nature. Certified.
July 16	60	Butcher -	Apoplexy.
„ 24	31	Grocer -	Delirium tremens, 2 days. Certified.
„ 25	80	Chelsea pensioner.	Senile gangrene, 2 years. Certified.
1860.			
July 26	25	Porter -	Phthisis, 5 months. Certified.
Aug 17	29	Coach trimmer	Enteritic fever. Certified.
Sep. 28	67	Proprietor of houses.	Decay of nature, 12 months. Certified.
Nov. 5	73	Shoemaker, master.	Decay of nature, 12 months. Certified.
„ 27	66	Joiner, master	Diseased liver. Certified.
1861.			
Jan. 5	28	Agric. labourer	Accident. Killed by a brewer's dray. Inquest.
„ 11	62	Flax dresser -	Bronchitis, 4 months. Certified.
Feb. 13	39	Agric. labourer	Psoas abscess. Certified.
Mar. 8	72	Farmer -	Diseased kidneys, 10 months. Certified.
„ 12	95	Farmer -	Decay of nature. Not certified.
„ 16	73	Agric. labourer	Diseased prostate gland. Certified.
„ 29	70	Woolstapler -	General debility. Certified.
Apr. 2	58	Stonemason -	Consumption, 2 years. Certified.
June 5	43	Agric. labourer	Natural causes. Inquest.
Sept. 6	50	Woolcomber, journeyman.	Debility. Certified.
Nov. 4	67	Stonemason, master.	Apoplexy. Inquest.
„ 11	15	Son of labourer	Tubercular arachnitis, 5 days. Certified.
Dec. 1	76	Ironmonger -	Softening of brain, 2 years. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
536. Leyburn.	1. Middleham. 2. Leyburn.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–60–61.

Sub-District - 1. Middleham.

1859.			
Feb. 7	56	Grocer - -	Bronchitis, 14 days. Certified.
„ 20	80	Tailor, master	Natural decay. Not certified.
„ 7	78	Farmer -	Chronic diarrhœa. Certified.
Apr. 7	82	Agric. labourer	Natural decay. Not certified.
„ 11	78	Agric. labourer	Natural decay. Not certified.
„ 29	68	Farmer -	Enteritis, 5 days. Certified.
May 9	61	Farmer -	Hernia. Peritonitis. Certified.
„ 15	68	Farmer -	Epilepsy, 3 days. Certified.
„ 26	74	Farmer -	Natural decay. Not certified.
June 24	30	Farmer -	Consumption, 4 years. Not certified.
„ 11	78	Agric. labourer	Epistaxis, 10 days. Certified.
July 7	30	Coal miner -	Typhus fever, 7 days. Certified.
„ 11	27	Race horse trainer.	Delirium tremens, 6 days. Certified.
„ 17	18	Labourer -	Accident. Drowned, bathing. Inquest.
„ 26	61	Draper - -	Natural decay. Not certified.
„ 27	77	Agric. labourer	Natural decay. Not certified.
Sep. 11	26	Joiner, journeyman.	Consumption, 2 years. Not certified.
„ 16	67	Stonemason, master.	Diarrhœa, 6 years. Not certified.
„ 4	69	Agric. labourer	Dropsy. Not certified.
„ 29	81	Farmer -	Diarrhœa, 7 days. Not certified.
Oct. 22	76	Farmer -	Natural decay. Not certified.
„ 29	21	Farmer -	Consumption, 15 weeks. Not certified.
Dec. 15	20	Farmer -	Brain fever, 3 weeks. Not certified.
1860.			
Jan. 6	40	Lead miner -	Pneumonia, 1 month. Not certified.
„ 12	11	Son of tailor, master.	Measles, 2 weeks. Certified.
„ 15	91	Farmer -	Old age. No medical attendant.
„ 17	23	Engine worker	Consumption, 2 months. Not certified.
„ 30	25	Lead miner -	Consumption, 3 months. Certified.
Feb. 2	65	Agric. labourer	Bronchitis, 6 years. Certified.
„ 16	20	Farm servant	Amputation. Pneumonia, 1 week. Certified.
Jan. 21	74	Landed proprietor.	Pneumonia, 7 days. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Feb. 24	80	Agric. labourer	Bronchitis. Certified.
Mar. 18	84	Tailor, master	Natural decay. Certified.
„ 20	44	Linen draper, assistant.	Phthisis, 2 years. Certified.
Apr. 14	17	Son of agric. labourer.	Diabetes, 1 year. Certified.
May 12	18	Son of school-master.	Consumption. Not certified.
„ 17	56	Registrar of births and deaths.	Consumption. Not certified.
June 10	53	Farmer -	Disease of kidneys. Certified.
„ 17	67	Revenue officer	Apoplexy. Inquest.
„ 23	75	Stonemason -	Enlarged prostate gland. Certified.
July 10	83	Agric. labourer	Dropsy, 3 months. Certified.
„ 14	31	Son of joiner -	Epilepsy, many years. Certified.
„ 29	88	Farmer -	Mitral disease, 10 years. Certified.
Aug. 1	44	Farmer -	Apoplexy. Certified.
Sep. 20	12	Son of farmer	Phthisis pulmonalis, 1 year. Certified.
„ 24	61	Stone quarrier	Diseased heart. Not certified.
„ 29	74	Stonemason, master.	Gastritis. Certified.
Oct. 12	32	Lead miner -	Phthisis. Not certified.
„ 16	50	Shoemaker -	Drowned (suicide). Inquest.
„ 23	73	Agric. labourer	Natural death. No medical attendant.
„ 5	82	Agric. labourer	Natural decay. No medical attendant.
Nov. 4	78	Agric. labourer	Natural decay. Not certified.
„ 3	43	Saddler -	Enteritis, 6 days. Certified.
„ 14	21	Son of agric. labourer.	Abscess, many years. Not certified.
Dec. 2	34	Leadminer -	Accident; fall. Inquest.
„ 8	75	Agric. labourer	Dropsy, 3 months. No medical attendant.
„ 10	82	Porter -	Dysentery, 3 months. Certified.
„ 7	51	Wheelwright -	Morbus Brightii. Certified.
1861.			
Jan. 14	21	Son of farmer	Bronchitis. Certified.
„ 24	77	Blacksmith -	Inguinal hernia. Certified.
Mar. 6	93	Slate quarrier	Natural decay. No medical attendant.
Apr. 5	15	Son of joiner -	Phthisis pulmonalis, 5 months. Certified.
„ 9	72	Plumber and glazier.	Gout. Pneumonia. Certified.
„ 21	87	Farmer -	Decay of nature, 4 months. Certified.
„ 23	17	Son of shoe-maker.	Consumption, 10 weeks. Not certified.
„ 23	64	Farmer -	Diseased heart, 18 months. Certified.
May 9	65	Coal miner -	Asthma. Bronchitis. Certified.
„ 11	68	Innkeeper -	Hydrothorax, 3 months. Certified.
„ 25	76	Parish clerk -	Enteritis, 7 days. Certified.
June 22	57	Coachman -	Cerebral softening, 1 year. Certified.
„ 25	70	Farmer -	Dysentery, 3 weeks. Certified.
July 6	28	Groom -	Phthisis pulmonalis, 2 years. Certified.
„ 16	56	Innkeeper -	Fever, 14 days. Not certified.
Aug. 7	42	Trainer of race horses.	Gastritis, 14 days. Certified.
Sept. 3	56	Farmer -	Cancer of throat. Inquest.
„ 21	41	Slate quarrier	Peritonitis. Certified.
„ 21	77	Tailor, master	Senile decay. No medical attendant.
Oct. 6	80	Discharged soldier.	Congestion of lungs, 2 months. Certified.
„ 12	23	Draper -	Phthisis, 3 years. Certified.
Nov. 6	41	Agric. labourer	Typhus, 5 weeks. Certified
„ 21	54	Farmer -	Apoplexy. Certified.
Dec. 25	33	Farmer -	Diseased heart, 6 years. Certified.

Sub-district - 2 Leyburn.

1858.			
Dec. 30	28	Lead miner -	Scrofula. Not certified.
1859.			
Jan. 16	61	Farmer -	Diseased bladder. Not certified.
„ 26	56	Farmer -	Diseased heart. Not certified.
„ 11	41	Farmer -	Diseased heart. Not certified.
Feb. 18	69	Farmer -	Apoplexy. Not certified.
1859.			
Feb. 27	57	Agric. labourer	Diseased lungs. Not certified.
Mar. 15	63	Groom -	Natural decay. Certified.
Apr. 3	74	Agric. labourer	Natural decay. Not certified.
„ 16	66	Agric. labourer	Epilepsy. Certified.
„ 14	71	Yeoman -	Natural decay. Not certified.
May 2	39	Wood cutter -	Brain fever, 9 days. Not certified.
„ 4	75	Gardener -	Pneumonia. Certified.
„ 12	70	Schoolmaster	Natural decay. Not certified.
June 22	39	Tea dealer -	Fever, 3 months. Certified.
„ 23	74	Agric. labourer	Old age. Certified.
July 4	73	Agric. labourer	Old age. Certified.
Aug. 4	62	Agric. labourer	Enteritis. Not certified.
„ 12	65	Yeoman -	Dropsy. Not certified.
„ 13	86	Grocer -	Old age. Certified.
„ 19	34	Agric. labourer	Consumption. Not certified.
„ 20	75	Horsebreaker	Old age. Certified.
„ 26	78	Agric. labourer	Dropsy. Not certified.
„ 25	76	Agric. labourer	Sudden. Found dead in bed. Inquest.
„ 25	64	Farmer -	Sciatica, some months. Certified.
Sept. 1	73	Lead miner -	Natural decay. No medical attendant.
„ 3	19	Stonemason, journeyman.	Typhus fever, 14 days. Certified.
„ 12	29	Agric. labourer	Accident; Fall from a horse, 32 hours. Inquest.
„ 24	27	Lead miner -	Pneumonia. Not certified.
„ 30	65	Agric. labourer	Natural decay. Not certified.
Oct. 5	27	Farm servant	Paralysis. Not certified.
„ 4	40	Gentleman -	Enteritis. Not certified.
„ 24	75	Agric. labourer	Natural decay. No medical attendant.
Nov. 1	75	Agric. labourer	Natural decay. Not certified.
„ 6	84	Auctioneer -	Natural decay. No medical attendant.
„ 11	52	Cattle jobber	Insanity, 2 years. Certified.
„ 21	56	Farmer -	Enteritis. Not certified.
„ 22	27	Butcher, master	Phthisis. Certified.
Dec. 2	35	Tailor, master	Phthisis. Certified.
„ 6	10	Son of joiner -	Hydrocephalus, 10 days. Not certified.
„ 26	81	Farmer -	Natural decay. Not certified.
„ 29	73	Innkeeper -	Natural decay. Not certified.
1860.			
Jan. 4	71	Agric. labourer	Old age. Certified.
„ 11	71	Agric. labourer	Old age. No medical attendant.
„ 13	85	Shoemaker, master.	Old age. Certified.
„ 22	71	Tailor, master	Anasarca. Certified.
Feb. 13	91	Farm servant	Old age. Certified.
„ 22	18	Farm servant	Abscess in liver. Certified.
„ 29	50	Farmer -	Diseased liver. Not certified.
„ 14	20	Engine stoker	Accident. Injuries. Inquest.
Mar. 3	80	Esquire -	Concussion of spine, 20 months. Certified.
„ 12	76	Farmer -	Dropsy, many weeks. Certified.
„ 9	67	Agric. labourer	Paralysis, 2 weeks. Certified.
„ 18	60	Lead miner -	Typhus fever. Not certified.
„ 19	87	Agric. labourer	Natural decay. Not certified.
„ 31	84	Agric. labourer	Natural decay. Not certified.
Apr. 10	80	Shoemaker, master.	Natural decay. Certified.
„ 14	62	Draper, master	Diseased liver. Certified.
„ 18	68	Agric. labourer	Epilepsy. Certified.
„ 23	54	Farmer -	Mitral disease, Certified.
„ 23	32	Lead miner -	Scrofula. Certified.
June 5	86	Tailor, master	Natural decay. Certified.
„ 5	84	Agric. labourer	Natural decay. Certified.
„ 10	20	Agric. labourer	Consumption. Not certified.
„ 15	47	Lead miner -	Diseased kidneys. Not certified.
„ 18	19	Carpenter -	Congestion of lungs, 6 days. Certified.
„ 23	66	Agric. labourer	Dropsy. Not certified.
July 1	13	Son of joiner -	Consumption. Certified.
„ 7	48	Chelsea pensioner.	Phthisis, 2 years. Certified.
„ 8	28	Grocer - -	Consumption. Not certified.
Aug 25	78	Agric. labourer	Accident. Injuries to head. Inquest.
Sept. 1	55	Farmer -	Accident. Fractures. Inquest.
„ 13	77	Farmer -	Natural decay. Not certified.
„ 10	74	Agric. labourer	Mortification of back. Certified.
„ 12	22	Son of farmer	Consumption. Not certified.
„ 25	17	Lead miner -	Pneumonia. Not certified.
Oct. 25	67	Butler (servant)	Natural decay. Not certified.
Nov. 1	35	Farmer -	Diseased bladder. Not certified.
„ 22	70	Stonemason, master.	Pneumonia. Not certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Dec. 13	75	Farmer -	Dropsy. Not certified.
„ 21	16	Son of gardener	Hydrocephalus. Not certified.
„ 27	56	Excise officer	Diseased liver. Not certified.
1861.			
Jan. 1	83	Agric. labourer	Natural decay. No medical attendant.
1860.			
Dec. 27	74	Agric. labourer	Diseased heart. Certified.
1861.			
Jan. 19	49	Lead miner -	Rupture, blood vessel. Not certified.
Feb. 11	71	Farm labourer	Natural decay. No medical attendant.
„ 23	65	Farmer -	Asthma. Not certified.
„ 24	71	Farmer -	Diseased bladder. Not certified.
Mar. 16	66	Agric. labourer	Consumption. Not certified.
„ 29	58	Shoemaker, master.	Ileus. Certified.
„ 31	86	Innkeeper -	Natural decay. Not certified.
June 3	28	Groom -	Phthisis. Certified.
„ 7	80	Agric. labourer	Old age. Certified.
„ 24	73	Agric. labourer	Abscess, many months. Certified.
„ 24	80	Stonemason -	Ileus, 2 weeks. Certified.
„ 20	46	Agric. labourer	Scarlet fever, 1 week. Certified.
July 5	72	Landed proprietor.	Diseased heart. Not certified.
„ 12	75	Farmer -	Natural decay. Not certified.
„ 13	23	Agric. labourer	Diabetes, 2 years. Certified.
Aug. 4	62	Schoolmaster	Apoplexy, 36 hours. Certified.
„ 3	54	Ostler - -	Consumption. Not certified.
„ 20	55	Farmer -	Dropsy. Not certified.
„ 23	70	Agric. labourer	Accidental fall of earth. Inquest.
„ 30	75	Agric. labourer	Natural decay. Not certified.
Sept 11	66	Landed proprietor.	Diseased liver. Not certified.
Oct. 7	35	Agric. labourer	Glanders, 5 months. Inquest.
„ 12	50	Schoolmaster	Diseased kidneys. Not certified.
„ 26	32	Farmer -	Consumption. Not certified.
Nov. 1	47	Agric. labourer	Accidental fall from a cart. Inquest.
„ 5	74	Agric. labourer	Erysipelas. Not certified.
„ 3	41	Tailor, master	Consumption. Not certified.
„ 14	77	Lead miner -	Natural decay. Not certified.
Dec. 4	68	Agric. labourer	Decay of nature. Certified.
„ 3	79	Shoemaker, master.	Natural decay. Not certified.
„ 17	89	Farmer -	Natural decay. Not certified.
„ 24	33	Agric. labourer	Phthisis, many months. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
537 ASKRIGG.	1 Askrigg. 2 Hawes.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1 Askrigg.

1859.			
Jan. 29	64	Farmer -	Hydrothorax. Certified.
Feb. 7	81	Yeoman -	Decay of nature. Not certified.
„ 23	79	Farmer -	Diseased prostrate gland. Certified.
„ 26	81	Lead miner -	Decay of nature Not certified.
Mar. 11	47	Shoemaker -	Consumption. Certified.
Apr. 4	66	Barber -	Diseased prostrate gland. Certified.
„ 27	95	Late a lead miner.	Decay of nature. Certified.
May 4	70	Butcher -	Found dead in bed. Inquest.
June 25	47	Farmer -	Consumption. Certified.
July 1	74	Stoker -	Decay of nature. Not certified.
„ 12	10	Son of farmer	Pneumonia. Certified.
„ 15	89	Late a tailor -	Decay of nature. Certified.
„ 18	30	- - -	Dropsy. Certified.
Sept. 8	77	Lead miner -	Decay of nature. Not certified.
Oct. 1	66	Joiner -	Decay of nature. Certified.
Nov. 21	30	Farmer -	Diseased heart. Certified.
Dec. 7	99	Late a rag dea'er	Decay of nature. Not certified.
1859.			
Dec. 19	35	Waggoner -	Hæmatemesis. Certified.
„ 30	41	Woollen manufacturer.	Cystitis. Certified.
1860.			
Jan. 2	17	Son of agricultural labourer.	Diphtheria. Certified.
„ 14	77	Grocer -	Natural decay. Certified.
Jan. 16	68	Gentleman -	Apoplexy, 11 days. Certified.
„ 24	30	Agric. labourer	Diaphragmitis. Certified.
Feb. 1	50	Agric. labourer	Consumption. Not certified.
„ 16	46	- - -	General debility. Certified.
„ 16	69	Stonemason -	Decay of nature. Certified.
„ 26	62	Lime burner -	Pneumonia. Certified.
Mar. 10	74	Schoolmaster-	Natural decay. Certified.
„ 12	86	Shoemaker -	Decay of nature. Not certified.
„ 11	44	Yeoman -	Consumption. Certified.
„ 25	40	Farmer -	Consumption. Certified.
May 18	82	Farmer -	Natural decay. Not certified.
„ 24	35	Coal miner -	Consumption. Certified.
June 21	49	Farmer -	Diseased heart. Certified.
July 12	54	Agric. labourer	Enteritis. Certified.
Aug 12	65	Yeoman -	Neuralgia. Certified.
„ 23	76	Cheesemonger	Decay of nature. Not certified.
Oct. 2	70	Hawker -	Decay of nature. Not certified.
„ 4	88	Yeoman -	Decay of nature. Certified.
„ 13	76	Blacksmith -	Cancer. Certified.
Dec. 3	87	Farmer -	Decay of nature. Not specified.
„ 5	78	Tailor -	Natural decay. Certified.
„ 23	85	Coal miner -	Decay of nature. Not specified.
„ 30	71	Cattle dealer -	Bronchitis. Certified.
„ 30	31	Shoemaker -	Carditis. Certified.
1861.			
Jan. 12	65	Shoemaker -	Asthma. Certified.
„ 21	22	- - -	Consumption. Certified.
„ 29	83	Farmer -	Natural decay. Certified.
„ 28	51	Innkeeper -	Cancer. Certified.
Feb. 18	40	Shoemaker -	Phrenitis. Certified.
Mar. 22	12	Son of tailor -	Bronchitis. Certified.
„ 30	81	Farmer -	Decay of nature. Certified.
Apr. 16	57	Agric. labourer	Bronchitis. Diseased heart. Certified.
May 2	71	Yeoman -	Apoplexia. Certified.
„ 10	80	Innkeeper -	Decay of nature. Certified.
„ 7	14	Son of lead miner.	Asthma. Certified.
Aug 30	29	Son of farmer	Diseased liver. Certified.
Sep. 23	62	Clockmaker -	Scirrhus of liver. Certified.
Oct. 14	10	Son of lead miner.	Hydrocephalus. Certified.
„ 16	71	Lead miner -	Decay of nature. Certified.
Nov. 6	38	Stone mason -	Consumption. Certified.
„ 5	79	Farmer -	Natural decay. Certified.
„ 16	72	Schoolmaster-	Apoplexy. Not certified.
„ 15	98	Labourer -	Natural decay. Not certified.
„ 25	31	Farmer's Son	Phthisis. Certified.
Dec. 1	27	Son of joiner -	Diseased liver. Dropsy. Certified.
—	81	Lead miner -	Natural decay. Not certified.

Sub-district - 2. Hawes.

1859.			
Feb 4	17	Son of farmer	Consumption. Not certified.
„ 19	71	Farmer -	Hydrothorax. Certified.
Mar. 21	89	Farmer -	Old age. Certified.
„ 23	31	Farmer -	Bronchitis. Not certified.
„ 23	75	Farmer -	Paralysis. Certified.
„ 30	79	Yeoman -	Unknown. Not certified.
Apr. 4	25	Tinner and brazier.	Unknown. Not certified.
„ 1	81	Farmer -	Apoplexy. Certified.
„ 28	24	Son of farmer	Apoplexy. Certified.
May 11	82	Watchmaker	Dropsy. Not certified,
June 2	71	Yeoman -	Atony of the stomach. Certified.
„ 18	10	Son of joiner	Bronchitis. Certified.
„ 26	77	Farmer -	Unknown. Not certified.
July 3	84	Labourer -	Apoplexy. Certified.
Aug 18	34	Draper -	Fungus tumour of the testicle. Not certified.
Sept. 24	64	Builder, master	Stricture of intestine. Certified.
Oct. 3	70	Farmer -	Ulcered intestines.
„ 4	31	Farmer -	Diseased heart. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 14	87	Yeoman -	Old Age. Certified.
„ 30	60	Coachman -	Paralysis. Certified.
Feb. 20	71	Farmer -	Unknown. No medical attendant.
Mar. 1	21	Son of collier	Lumbar abscess. Certified.
„ 7	82	Hawker -	Paralysis. Certified.
„ 21	41	Cowkeeper -	Scrofula. Certified.
„ 20	81	Farmer -	O'd age. Certified.
„ 23	74	Woolcomber -	Atony of stomach. Certified.
May 11	17	Son of farmer	Diseased heart. Certified.
June 8	23	Son of nail-maker.	Diseased heart. Certified.
July 14	65	Greengrocer -	Accident. Injury to spine. Inquest.
Sept. 22	73	Road maker -	Spasmodic affection of bowels. Certified.
„ 28	16	Son of farmer	Typhus gravior. Certified.
Oct. 18	14	Son of woolcomber.	Typhus fever. Certified.
„ 21	57	Farmer -	Ileus, 14 days. Certified.
Nov. 6	71	Quarryman -	Atony of the stomach. Certified.
„ 21	31	Farmer -	Asthma. Dropsy. Certified.
„ 24	60	Hosier -	Typhus fever. Certified.
Dec. 13	69	Dyer - -	Debility. Certified.
„ 12	48	Joiner - -	Mortification of lungs. Certified.
„ 29	77	Clerk in orders	Paralysis. Certified.
1861.			
Feb. 3	77	Farmer -	Dropsy. Certified.
„ 6	31	Draper -	Epilepsy. Certified.
Mar. 27	73	Knitter -	Anasarca. Certified.
Apr. 5	27	Labourer -	Ulcered intestine. Certified.
„ 20	44	Stone mason -	Consumption. Certified.
„ 28	53	Spirit merchant	Atony of stomach. Certified.
May 5	84	Yeoman -	Retention of urine. Certified.
„ 29	19	Son of joiner	Pneumonia. Certified.
June 6	71	Farmer -	Diseased bladder. Certified.
Sept. 3	73	Mole catcher	Diarrhœa. Certified.
Oct. 4	72	Farmer -	Paralysis. Certified.
„ 10	69	Farmer -	Dysentery. Certified.
Dec. 1	45	Tailor, master	Diseased heart. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
538. Reeth.	1. Muker. 2. Reeth.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61.

Sub-district - 1. Muker.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 26	43	Lead miner -	Bronchitis, 3 weeks. Certified.
„ 31	54	Lead miner -	Diseased liver, 6 months. Certified.
Feb. 26	54	Lead miner -	Bronchitis, 2 months. Certified.
Mar. 10	62	Lead miner -	Age and debility. No medical attendant.
„ 10	46	Lead ore smelter	Bronchitis, 2 months. Certified.
„ 9	61	Lead miner -	Bronchitis, 12 days. Certified.
„ 15	78	Farmer -	Diseased heart. Not certified.
„ 22	80	Landed proprietor.	Old age. No medical attendant.
Apr. 5	36	Lead miner -	Consumption, 6 months. Certified.
Mar. 31	68	Landed proprietor.	Natural decay. Certified.
Apr. 17	51	Lead miner -	Abscess of lung, 2 months. Certified.
May 15	62	Farmer -	Abscess of right lung. Certified.
„ 19	82	Farmer -	Age and debility. Certified.
„ 24	45	Farmer -	Ileus, 24 hours. Certified.
June 5	76	Lead miner -	Pneumonia, 7 days. No medical attendant.
„ 10	18	Miner - -	Fall of a stone in a lead mine. Inquest.
„ 14	69	Cordwainer -	Bronchitis, 10 days. Certified.
July 12	89	Landed proprietor.	Age and debility. No medical attendant.
Aug 27	40	Schoolmaster	Apoplexy, 36 hours. Certified.
Sept. 3	32	Lead miner -	Enteritis, 7 days. Not certified.
Oct. 22	49	Schoolmaster	Accidental fall. Inquest.
Nov. 22	76	Lead miner -	Pleurisy, 7 days. Not certified.
Dec. 4	44	Lead miner -	Diseased heart. Certified.
Jan. 6	17	Farm servant	Meningitis, 10 days. Certified.
„ 12	69	Lead miner -	Asthma, 6 years. No medical attendant.
Feb. 10	72	Agric. labourer	Old age. No medical attendant.
Mar. 24	21	Lead miner -	Disease of brain, 7 weeks. Certified.
Apr. 29	67	Farmer -	Bronchitis, 9 days. Certified.
June 5	41	Lead miner -	Consumption, 3 months. Certified.
„ 14	76	Agric. labourer	Diseased bladder. Certified.
„ 20	59	Lead miner -	Apoplexy, 2 days. Certified.
„ 20	68	Lead miner -	Debility and age. Certified.
„ 28	16	Lead miner -	Consumption, 6 months. No medical attendant.
„ 30	11	Lead miner -	Abscess, 5 months. Not certified.
„ 24	22	Joiner - -	Pneumonia, 14 days. Not certified.
Aug. 9	35	Lead miner -	Epistaxis, 14 months. Certified.
Oct. 24	37	Lead miner -	Pleurisy, 11 days. Certified.
„ 29	87	Landed proprietor.	Natural decay. No medical attendant.
Nov 12	26	Lead miner -	Accident. Fall of earth in a lead mine. Inquest.
1861.			
Jan. 11	53	Lead miner -	Bronchitis, 2 years. Certified.
„ 22	10	Son of lead miner.	Consumption, 6 months. Certified.
Feb. 9	26	Lead miner -	Pneumonia, 8 days. Certified.
„ 9	17	Lead miner -	Consumption, 3 months. Certified.
Mar. 14	70	Lead ore smelter	Bronchitis, 6 weeks. Certified.
„ 17	51	Lead ore smelter	Bronchitis, 14 days. Certified.
„ 25	80	Butcher -	Bronchitis, 14 days. Certified.
„ 26	81	Farmer -	Bronchitis, 3 weeks. Certified.
Apr. 4	57	Lead miner -	Bronchitis, 10 days. Certified.
„ 11	28	Farmer -	Cut his throat (suicide). Inquest.
„ 30	39	Lead miner -	Consumption, 6 months. Certified.
May 1	61	Farmer -	Bronchitis, 10 weeks. Certified.
July 7	70	Farmer -	Pneumonia, 6 days. Certified.
Oct. 8	75	Publican -	Natural decay. No medical attendant.
„ 14	80	Tailor - -	Age and debility. Certified.
„ 28	49	Lead miner -	Consumption, 6 months. Not certified.
Nov. 20	70	Landed proprietor.	Diseased stomach, 3 months. Certified.

Sub-district - 2. Reeth.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 15	88	Butcher -	Nephritis, 3 weeks. Certified.
„ 24	50	Lead miner -	Consumption, 12 months. No medical attendant.
„ 25	46	Lead miner -	Pneumonia, 6 days. Certified.
Feb. 1	85	Farmer -	Apoplexy, 5 days. Certified.
„ 11	76	Surveyor -	Cancer of face, 12 months. Certified.
„ 24	49	Lead miner -	Abscess on lung, 3 months. Certified.
Mar. 16	13	Son of clogger	Scarlatina, 6 days. Certified.
„ 29	53	Lead miner -	Consumption, 12 months. Certified.
Apr. 20	87	Lead mine agent	Ileus, 3 weeks. Certified.
„ 24	28	Son of carpenter	Epileptic fits, 6 months. Certified.
May 21	23	Farmer -	Abscess in the throat. Certified.
„ 22	38	Lead miner -	Consumption, 1 year. Certified.
„ 26	72	Carrier -	Bronchitis, 3 months. Certified.
„ 31	57	Lead miner -	Cephalitis, 5 days. Certified.
July 1	53	Lead miner -	Cancer, 6 months. Certified.
Aug 15	50	Lead miner -	Cephalitis, 4 days. Certified.
Oct. 5	37	Lead miner -	Consumption, 5 months. No medical attendant.
„ 16	47	Lead miner -	Miners' asthma, 6 months. Certified.
„ 17	49	Lead miner -	Consumption, 8 months. Certified.
„ 23	42	Lead miner -	Diseased lungs, 3 months. Certified.
„ 25	33	Lead miner -	Consumption, 8 months. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Nov. 5	82	Carpenter, master.	Diseased liver, 6 months. Certified.
„ 17	20	Son of carpenter	Consumption, 7 months. Certified.
„ 28	58	Stonemason -	Palsy, 3 months. Certified.
Dec. 1	16	Son of lead miner.	Scrofula. Certified.
„ 4	50	Agric. labourer	Enteritis, 3 days. Certified.
„ 8	65	Lead ore smelter	Paralysis, 12 months. Certified.
„ 8	44	Lead ore carrier	Cephalitis, 10 days. Certified.
„ 15	45	Lead miner -	Consumption, 6 months. Certified.
„ 17	83	Agric. labourer	Pneumonia, 9 days. Certified.
1860.			
Jan. 20	57	Lead miner -	Consumption, 6 months. Certified.
„ 28	40	Lead miner -	Consumption, 8 months. Certified.
Feb. 6	60	Lead miner -	Consumption, 12 months. Certified.
„ 10	48	Labourer -	Consumption, 4 months. Certified.
„ 19	36	Lead miner -	Diseased kidneys, 7 months. Certified.
„ 17	33	Lead miner -	Consumption, 6 months. Certified.
Mar. 7	28	Lead miner -	Consumption, 7 months. Certified.
„ 10	36	Farmer -	Nephritis, 10 days. Certified.
Apr. 1	55	Lead miner -	Bronchitis, 6 months. Certified.
„ 4	71	Labourer -	Diseased lungs, 7 months. Certified.
„ 27	37	Lead miner -	Pneumonia, 7 days. No medical attendant.
May 7	60	Lead miner -	Paralysis. Certified.
„ 8	67	Lead miner -	Diseased heart, 6 months. Certified.
„ 11	17	Lead miner -	Consumption, 6 months. Certified.
„ 25	23	Labourer -	Diseased heart, 6 months. Certified.
„ 28	69	Lead miner -	Miners' asthma. Certified.
June 1	81	Agric. labourer	Diseased heart. Certified.
„ 9	75	Lead ore smelter	Bronchitis, 3 weeks. Certified.
„ 16	55	Lead miner -	Diseased joints, 12 months. Certified.
„ 22	67	Agric. labourer	Bronchitis, 3 months. Certified.
„ 24	69	Carpenter	Cancer, 6 months. Certified.
July 2	58	Lead miner -	Diseased lungs, 8 months. Certified.
„ 23	32	Shoemaker -	Abscess in lungs, 8 weeks. Certified.
Aug 15	38	Lead miner -	Fever, 8 days. Certified.
„ 24	53	Lead miner -	Bronchitis, 14 days. Certified.
„ 30	63	Farmer -	Cut his throat (suicide). Inquest.
Sep. 22	62	Lead miner -	Consumption, 8 months. No medical attendant.
Dec. 18	57	Shoemaker, master.	Bronchitis, 6 weeks. Certified.
1861.			
Jan. 30	49	Lead miner -	Consumption, 9 months. Certified.
Feb. 28	80	Lead ore smelter.	Mortification of feet, 3 months. Certified.
Mar. 7	31	Lead miner -	Consumption, 2 years. Certified.
„ 21	29	Lead miner -	Diseased heart, 7 months. Certified.
„ 23	54	Lead miner -	Consumption, 6 months. Certified.
Apr. 4	37	Lead miner -	Consumption, 12 months. Certified.
„ 3	32	Lead miner -	Diseased heart. Inquest.
„ 16	80	Agric. labourer	Diseased heart, 3 months. Certified.
„ 24	68	Lead miner -	Miners' asthma, 3 years. Certified.
„ 25	22	Lead miner -	Consumption, 4 months. No medical attendant.
„ 25	50	Lead miner -	Diseased kidneys, 8 months. Certified.
May 11	67	Stonemason -	Pneumonia, 8 days. Certified.
„ 13	43	Lead miner -	Acute meningitis, 5 days. Certified.
„ 21	73	Agric. labourer	Diseased bladder, 3 months. Certified.
June 17	33	Lead miner -	Cephalitis, 14 days. Certified.
17	61	Lead miner -	Diabetes, 6 months. Certified.
1861.			
June 19	10	Son of lead miner.	Consumption, 8 months. Certified.
„ 24	27	Lead miner -	Consumption, 12 months. Certified.
„ 27	15	Son of lead miner.	Consumption, 6 months. Certified.
July	39	Lead miner -	Consumption, 18 months. Certified.
„ 19	12	Son of lead miner.	Diseased lungs, 6 months. Certified.
Aug 13	47	Lead miner -	Consumption, 8 months. Certified.
„ 28	26	Lead miner -	Diseased heart, 8 months. Certified.
Oct. 7	34	Lead miner -	Consumption, 14 months. Certified.
„ 22	84	Mining agent	Diseased heart, 2 years. Certified.
Nov. 4	11	Son of lead miner.	Accident. Fracture of skull. Inquest.
„ 28	70	Lead miner -	Bronchitis, 3 weeks. Certified.
Dec. 18	91	Farmer -	Anasarca, 6 months. Certified.

Superintendent Registrar's District.	Registrar's Sub-district.
489. SKIPTON.	1. Kettlewell. 5. Skipton. 7. Grassington.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Kettlewell.

1859.			
Jan. 31	87	Cattle dealer -	Old age. Not certified.
May 23	32	Farmer -	Enteritis. Certified.
June 6	39	Innkeeper -	Consumption, 6 months. Not certified.
July 8	68	Farmer -	Dropsy, 1 month. Not certified.
„ 19	28	Stonemason -	Cephalitis, 4 days. Not certified.
„ 20	39	Schoolmaster -	Diseased kidneys, 6 months. Not certified.
Aug. 2	67	Lead miner -	Hypercarditis, 16 days. Certified.
„ 30	60	Labourer -	Sudden. Visitation of God. Inquest.
Oct. 8	73	Farmer -	Natural decay. Certified.
Nov. 3	68	Farmer -	Hepatitis, 9 days. Certified.
1860.			
Feb. 2	16	Farm servant	Accident. Discharge of a gun. Inquest.
„ 21	82	Labourer -	Visitation of God. Inquest.
Mar. 18	84	Lead miner -	Old age. Not certified.
Apr. 16	68	Innkeeper -	Dropsy, 3 months. Certified.
May 31	19	Son of farmer	Scrofula, 3 years. Certified.
July 8	77	Joiner - -	Hydrocele, 2 years. Certified.
Nov. 6	36	Joiner -	Consumption, 7 months. Certified.
„ 14	69	Draper - -	Natural decay, 12 months. Certified.
1861.			
Jan. 27	68	Joiner - -	Phthisis. Certified.
Feb. 9	25	Agric. labourer	Exposure to the weather. Inquest.
„ 9	55	Tailor - -	Exposure to the weather. Inquest.
May 4	61	Farmer -	Paralysis, 5 years. Certified.
„ 15	43	Cordwainer -	Erysipelas, 12 days. Certified.
July 5	47	Agric. labourer	Ascites, 1 year. Certified.
Aug 24	87	Farmer - -	Natural decay. No medical attendant.
Sept. 5	77	Agric. labourer	Natural decay. Not certified.
„ 19	74	Agric. labourer	Natural decay. Not certified.

Sub-district - 5. Skipton.

1859.			
Jan. 10	61	Wine merchant	Diseased heart, 12 months. Certified.
„ 11	60	Farmer -	Debility; bedsores. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 29	73	Manager of waterworks.	Dropsy. Certified.
Feb. 10	63	Boatman -	Diseased heart. Certified.
Mar. 3	32	Clogger -	Phthisis, 2 years. Certified.
„ 7	62	Boat builder, master.	Chronic gastritis, 4 months. Certified.
„ 8	75	Innkeeper -	Gangrene senilis, 3 months. Certified.
„ 11	73	Labourer -	Bronchitis, 3 weeks. Certified.
„ 28	55	Farmer -	Ischuria, 3 weeks. Certified.
Apr. 2	61	Stonemason -	Bronchitis, 9 months. Certified.
„ 14	59	Joiner -	Icterus, 9 weeks. Certified.
„ 20	45	Bailiff assistant	Phthisis, 3 months. Certified.
„ 24	78	Grocer -	Jaundice. Certified.
„ 29	13	Son of carder	Phthisis, 6 months. Certified.
May 14	47	Shoemaker -	Nephria. Certified.
„ 14	76	Weaver -	Dropsy, 10 weeks. Certified.
„ 29	53	Surgeon -	Phthisis. Certified.
June 19	48	Spindle grinder	Bronchitis. Certified.
„ 21	65	Agric. labourer	Hernia. Certified.
„ 25	73	Agric. labourer	Mortification, 3 weeks. Certified.
„ 28	59	Post messenger	Diseased heart. Certified.
„ 24	59	Labourer -	Intemperance. Inquest.
July 1	67	Labourer -	Asthma. Certified.
June 30	42	Porter - -	Phthisis. Certified.
July 8	38	Innkeeper -	Diabetes some months. Certified.
„ 12	77	Hawker -	Diseased heart, asthma. Certified.
„ 28	18	Tinner -	Phthisis, 6 months. Certified.
„ 27	40	Shoemaker -	Suicide, cut his throat. Inquest.
Aug. 12	59	Shoemaker -	Phthisis. Certified.
„ 7	16	Son of printer	Congestion of brain from drinking spirituous liquors. Inquest.
„ 16	34	Shoemaker -	Phthisis pulmonalis. Certified.
„ 19	81	Labourer -	Apoplexy. Certified.
„ 21	74	Iron moulder -	General debility. Certified.
Sept. 6	55	Cabinet-maker	Diseased heart. Certified.
„ 11	53	Farmer -	Diseased heart. Certified.
„ 11	70	Shoemaker -	Typhoid fever, 4 weeks. Certified.
Oct. 12	42	Stone mason -	Phthisis, 2 years. Certified.
„ 8	21	Mechanic -	Phthisis, 2 years. Certified.
„ 29	37	Chimney sweep	Ileus. Certified.
„ 27	21	Labourer -	Phthisis pulmonalis. Certified.
Nov. 8	78	Woolcomber -	Old age. Not certified.
„ 19	86	Labourer -	Bronchitis. Certified.
Dec. 3	33	Delver - -	Compound fracture and wound on the left leg. Inquest.
„ 6	32	Woolcomber -	Phthisis. Tracheatis. Certified.
„ 11	49	Labourer -	Bronchitis. Asthma, 2 years. Certified.
„ 13	62	Labourer -	Pneumonia, 6 days. Certified.
„ 15	61	Railway porter	Abscess, 3 years. Certified.
„ 14	60	Boatman -	Inguinal hernia. Certified.
1860.			
Jan. 2	23	Cotton weaver	Phthisis. Certified.
„ 4	72	Carrier -	Pneumonia, 6 weeks. Certified.
„ 4	57	Painter -	Diseased heart. Anasarca. Certified.
„ 12	41	Coach builder	Hernia. Acute bronchitis. Certified.
„ 17	80	Farmer -	Diseased heart. Palsy. Certified.
„ 21	67	Cordwainer -	Diseased heart and kidneys. Certified.
„ 21	76	Watchmaker -	Old age. Certified.
„ 27	24	Whitesmith -	Phthisis pulmonalis. Certified.
Feb. 4	76	Shoemaker -	Old age. Certified.
„ 4	44	Schoolmaster	Asthma. Bronchitis. Carditis. Certified.
„ 15	61	Agric. labourer	Bronchitis. Asthma. Certified.
„ 18	80	Carter - -	Paralysis. Certified.
„ 20	21	Joiner -	Hemiplegia Phthisis.
„ 27	54	Labourer -	Diseased liver. Dropsy. Certified.
Mar. 1	66	Blacksmith -	Bronchitis. Certified.
„ 23	14	Son of blacksmith.	Hernia and enteritis. Certified.
„ 27	39	Innkeeper -	Diseased kidneys and epileptic coma. Certified.
„ 31	69	Toll collector	Apoplexy, 3 days. Certified.
Apr. 2	64	Cotton twister	Found drowned. Inquest.
„ 6	75	Carter -	Asthma. Dropsy, 6 months. Certified.
„ 22	19	Agric. labourer	Phthisis pulmonalis, 6 months. Certified.
May 6	48	Post messenger	Phthisis pulmonalis, 6 months. Certified.
„ 12	21	Saddler -	Diseased heart. Certified.
„ 12	15	Son of iron moulder.	Diphtheria, 9 weeks. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
May 18	46	Carter - -	Pulmonary apoplexy. Certified.
„ 21	89	Yeoman -	Senectus. Certified.
„ 28	72	Lead roller -	Icterus, 3 months. Certified.
„ 29	59	Labourer -	Dementic debility. Certified.
June 1	61	Delver -	Pulmonary apoplexy.
„ 13	70	Drainer -	Suddenly. Certified.
„ 19	63	Stone mason -	Hydrothorax. Certified.
„ 23	55	Brewer's carter	Accident. Run over by a cart. Inquest.
„ 27	70	Blacksmith -	Dyspepsia. Bronchitis. Certified.
July 2	20	Carter - -	Phthisis pulmonalis. Certified.
„ 3	70	Wheelwright -	Hydrothorax, 3 months. Certified.
„ 21	59	Weaver -	Epilepsy. Certified.
„ 21	74	Blacksmith -	Debility. Not certified.
„ 23	42	Farm servant	Asthma. Bronchitis. Certified.
Aug. 9	48	Agric. labourer	Fracture of skull. Certified.
„ 12	51	Innkeeper -	Diseased liver. Certified.
Sep. 10	67	Gentleman -	Diseased heart. Certified.
„ 12	55	Stonemason -	Bronchitis. Certified.
„ 25	79	Gentleman -	Diseased liver. Certified.
Oct. 9	54	Power-loom weaver.	Dropsy. Certified.
„ 19	69	Gardener -	Diseased heart. Certified.
Nov. 2	50	Groom -	Bronchitis. Diarrhœa. Certified.
„ 11	19	Son of gardener	Phthisis pulmonalis, 3 years. Certified.
„ 16	18	Son of tailor -	Phthisis pulmonalis, 3 years. Certified.
Dec. 23	72	Agric. labourer	Bronchitis. Certified.
„ 21	82	Sawyer -	Bronchitis. Certified.
„ 26	73	Hatter -	Cirrhosis bronchitis. Certified.
Nov. 6	17	Stonemason -	Diseased liver. Inquest.
1861.			
Jan. 2	57	Draper -	Paralysis, 2 years. Certified.
„ 21	80	Delver -	Hernia, many years. Certified.
„ 29	82	Shoemaker -	Natural decay. Certified.
Feb. 5	73	Farmer -	Paralysis and dropsy, 2 years. Certified.
„ 15	84	Shoemaker -	Suddenly supposed to be a fit. Not certified.
„ 19	27	Cotton weaver	Phthisis pulmonia. Certified.
„ 18	12	Son of delver	Scrofula. Certified.
„ 20	84	Handloom weaver.	Pneumonia, 4 weeks. Certified.
„ 25	60	Joiner -	Cancer of the palate. Certified.
Mar. 11	65	Miller - -	Asthma. Bronchitis. Certified.
„ 7	83	Cabinet maker	Senectus. Certified.
„ 16	86	Farmer -	Old age. Certified.
„ 21	14	Son of printer	Phthisis, 1 month. Certified.
„ 23	64	Agric. labourer	Diseased heart. Certified.
Apr. 22	29	Cabinet maker	Phthisis pulmonalis, 4 months. Certified.
„ 30	12	Son of pointsman.	Phthisis pulmonalis, 4 months. Certified.
May 3	59	Engine tenter -	Gangrene of lung, 1 month. Certified.
„ 8	62	Farmer -	Cancer of stomach. Certified.
„ 13	24	Tailor -	Pneumonia, 1 week. Certified.
„ 15	10	Son of hawker	Diseased heart. Dropsy. Certified.
„ 24	74	Delver -	Diseased heart. Not certified.
„ 31	74	Butcher -	Dropsy. Not certified.
June 6	72	Boatman -	Bronchitis. Certified.
July 15	37	Hatter - -	Ulcered intestines. Certified.
Aug. 1	37	Woolcomber -	Apoplexy.
„ 1	40	Lead-miner -	Phthisis pulmonalis, 6 months. Certified.
„ 8	51	Sawyer -	Anasarca, 3 months. Certified.
„ 18	32	Agric. labourer	Continued fever, 14 days. Not certified.
„ 27	34	Handloom weaver.	Diseased heart. Anasarca, 14 days. Certified.
Sept. 1	67	Farmer -	Bronchitis. Diarrhœa. Certified.
Sept. 2	69	Farmer - -	Ileus, 4 weeks. Certified.
„ 8	62	Blacksmith -	Diarrhœa. Certified.
„ 16	67	Weaver -	Catarrhus vesicæ.
„ 21	53	Stonemason -	Phthisis pulmonalis, 10 months. Certified.
Oct. 2	46	Agric. labourer	Fever, 3 weeks. Certified.
„ 4	46	Overlooker in a cotton mill.	Stone. Certified.
„ 3	71	Land surveyor	Decay of nature. Certified.
„ 7	40	Delver - -	Diarrhœa, many months. Certified.
„ 14	67	Drover - -	Paralysis, 3 days. Certified.
„ 29	16	Spindle maker apprentice.	Pulmonary consumption. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Nov. 6	65	Stonemason -	Pleuro-pneumonia, 6 days. Certified.
„ 9	34	Cotton warper	Diseased spine and lungs. Certified.
„ 9	14	Son of labourer	Phthisis pulmonalis, 2 years. Certified.
„ 13	67	Scavenger -	Ileus, 72 hours. Certified.
„ 18	55	Labourer -	Chronic bronchitis. Certified.
„ 17	70	Toll collector	Apoplexy, 6 weeks. Old age. Certified.
Dec. 4	76	Farmer - -	Apoplexy. Certified.
„ 15	68	Schoolmaster -	Bronchitis. Certified.
„ 19	78	Labourer -	Anasarca, 3 months. Certified.
„ 19	37	Servant -	Enteritis, 14 days. Certified.
„ 21	78	Hawker -	Apoplexy, 72 hours. Certified.
„ 23	87	Labourer -	Bronchitis. Certified.
„ 27	50	Hawker -	Carbuncles. Certified.

Sub-district - 7. Grassington.

1859			
Jan. 13	59	Stonemason -	Asthma. Influenza. Certified.
Feb. 10	52	Lime burner -	Paralysis, 20 years. Not certified.
„ 9	58	Agric. labourer	Phthisis, 11 months. Certified.
„ 11	69	Cattle driver -	Laryngitis, 9 months. Certified.
„ 8	48	Lead miner -	Phthisis, 13 weeks. Certified.
Mar. 13	46	Labourer -	Asthma, 8 years. No medical attendant.
June 3	17	Son of lead miner	Consumption, 3 months. Not certified.
„ 11	51	Labourer -	Rheumatics and stone. Not certified.
July 20	25	Book keeper -	Consumption, 5 months. Certified.
Sept 28	63	Assayer -	Phthisis, 3 weeks. Certified.
Oct. 17	80	Proprietor of land.	Diseased kidneys, 3 weeks. Certified.
Dec. 3	83	Blacksmith -	Diarrhœa, 2 months. Certified.
„ 4	78	Joiner, master	Ulceration of the body. Certified.
„ 5	60	Farmer -	Ulcerated throat, 6 months. Certified.
„ 2	66	Surgeon -	Unknown. No medical attendant.
„ 29	77	Farmer - -	Pneumonia, 2 weeks. Certified.
1860			
Jan. 10	70	Stonemason -	Old age. Not certified.
„ 7	60	Farmer - -	Diarrhœa, 9 days. Certified.
1859			
Dec. 19	84	Cordwainer, master.	Old age. No medical attendant.
1860			
Jan. 26	28	Farmer - -	Pneumonia. Typhus, 2 weeks. Certified.
Feb. 4	51	Lead miner -	Miners' asthma, 2 years. Certified.
Mar. 17	34	Farmer - -	Consumption, 4 months. Certified,
„ 19	77	Lead miner -	Diseased heart. Certified.
Apr. 21	35	Lead ore smelter	Phthisis, 5 years. Certified.
June 14	47	Farmer - -	Phthisis, 5 years. Certified.
„ 10	73	Wool comber	Wound of the leg, 2 years. Certified.
„ 26	46	Excavator -	Atrophy, 3 weeks. Certified.
July 7	23	Repairer of rails	Typhus. Phthisis. Certified.
Aug 26	48	Labourer -	Consumption, 9 months. Certified.
Oct. 12	88	Landed proprietor.	Old age. No medical attendant.
Dec. 5	73	Landed proprietor.	Asthma, 6 years. Certified.
1861.			
Jan. 5	39	Coal miner -	Phthisis, 2 years. Certified.
Apr. 4	20	Draper, assistant.	Phthisis, 6 months. Certified.
„ 10	83	Proprietor of houses.	Senectus. Certified.
May 14	71	Clogger, master	Asthma. Not certified.
Apr. 22	16	Son of joiner, master.	Consumption, 3 months. Not certified.
„ 21	38	Tea dealer -	Hæmoptysis. No medical attendant.
June 6	25	Son of farmer	Consumption, 3 years. Not certified.
„ 13	20	Shoemaker -	Accident. Drowned. Inquest.
„ 9	70	Lead miner -	Asthma, 4 years. Certified.
1861.			
May 22	32	Joiner, master	Consumption, 7 months. Not certified.
June 27	15	Son of lead miner.	Psoas abscess, 1 year. Certified.
„ 29	11	Son of farmer	Gastric irritation and effusion on the brain. Certified.
July 2	43	Lead miner -	Consumption, 3 months. Certified.
„ 15	81	Farmer -	Senectus. Certified.
Aug 21	14	Son of lead ore smelter.	Diphtheria, 1 week. Certified.
Sept. 5	38	Lead miner -	Lumbar abscess, 2 years. Certified.
„ 13	54	Farmer -	Pneumonia, 6 days. Certified.
Dec. 2	15	Son of farmer	Diphtheria, 8 days. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
490. PATELEY BRIDGE.	1. Ramsgill. 2. Pateley Bridge.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Ramsgill.

1859.			
Feb. 14	80	Agric. labourer	Apoplexy. No medical attendant.
June 10	66	Farmer -	Stone, 12 days. Not certified.
„ 15	26	Stonemason -	Pneumonia, 13 days. Certified.
July 22	68	Agric. labourer	Dropsy, 2 months. Certified.
1860.			
Mar. 16	54	Farmer -	Scirrhus liver, 2 years. Certified.
„ 22	50	Stonemason -	Hydrocephalus, 7 days. Coma, 3 days. Certified.
Apr. 23	59	Farmer -	Paralysis, 3 years. Certified.
„ 28	56	Farmer -	Typhoid fever, 16 days. Certified.
May 12	63	Farmer -	Phthisis, 12 months. Not certified.
Nov. 15	74	Stonemason -	Bronchitis, 4 weeks. Not certified.
„ 25	70	Farmer -	Diseased brain, 6 months. Certified.
Dec. 22	76	Farmer -	Synochus, 14 days. Bronchitis, 7 days. Certified.
1861.			
Jan. 24	12	Son of labourer	Suffocated by carbonic acid gas in a coal pit. Inquest.
Mar. 8	72	Farmer -	Pneumonia, 7 days. Not certified.
„ 23	71	Agric. labourer	Chronic rheumatism, some years. Certified.
May 12	75	Farmer -	Hepatitis. Jaundice, 6 weeks. Certified.
Aug 13	44	Cordwainer -	Consumption, 13 months. Certified.

Sub-District - 2. Pateley Bridge.

1859.			
Jan. 2	81	Blacksmith -	Paralysis. Certified.
„ 24	23	Agric. labourer	Phthisis. Certified.
Feb. 1	18	Son of farmer	Pneumonia. Not certified.
„ 15	50	Lead-miner -	Rheumatic fever. Not certified
Mar. 3	75	Farmer -	Fever, 3 weeks. Certified.
„ 18	52	Slater - -	Acute bronchitis. Certified.
„ 23	74	Gentleman -	Ileus, 14 days. Certified.
„ 30	50	Flax-dresser -	Phlegmon, 7 weeks. Certified.
Apr. 11	47	Lead miner -	Consumption. Not certified.
„ 19	61	Agric. labourer	Influenza. Not certified
May 8	78	Agric. labourer	Dysentery, 5 weeks. Certified.
„ 16	16	Mechanic -	Phthisis, 12 months. Certified.
June 1	24	Son of lead miner.	Pneumonia. Not certified.
„ 26	68	Farmer - -	Pneumonia. Not certified.
„ 28	56	Labourer -	Injuries. Fall under the wheels of a waggon. Inquest.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
June 28	46	Labourer -	Injuries. Fall under the wheels of a waggon. Inquest.
July 28	42	Shoemaker -	Hepatitis, 16 years. Certified.
„ 29	27	- - -	Phthisis, 1 year. Certified.
Sept. 26	57	Labourer -	Dropsy. Not certified.
Oct. 3	70	Farmer -	Asthma. Not certified.
Nov. 25	20	Son of lead miner.	Consumption. Not certified.
Dec. 19	68	Lead miner -	Dropsy. Not certified.
1860.			
Jan. 8	30	Stonemason -	Consumption. Certified.
„ 16	71	Linen weaver	Cystitis, 3 months. Certified.
„ 21	82	Agric. labourer	Natural decay. Certified.
„ 28	68	Lead miner -	Ramolissement of brain, 3 years. Certified.
Feb. 7	74	Agric. labourer	Diseased heart. Not certified.
May 27	59	Lead miner -	Diseased heart, dropsy. Certified.
May 12	15	Son of labourer	Smallpox. Not certified.
„ 26	23	Son of flax dresser.	Consumption. Not certified.
„ 27	23	Lead miner -	Typhus fever, 9 days. Certified.
June 8	73	Joiner - -	Diseased heart. Dropsy. Certified.
July 24	24	Bobbin turner	Enteritis, 10 days. Certified.
Aug. 21	62	Lead miner -	Hematuria. Certified.
„ 22	30	Son of farmer	Consumption. Certified.
Sept. 8	33	Farmer - -	Phthisis. Hæmoptysis. Certified.
„ 30	72	Farmer - -	Apoplexy. Not certified.
Oct. 3	74	Lead miner -	Paralysis. Certified.
Nov. 7	73	Yarn dyer -	Gastritis. Certified.
„ 28	18	- - -	Phthisis pulmonalis, 10 months. Certified.

When Died.	Age.	Occupation	Cause of Death.
1861.			
Jan. 10	58	Lead miner -	Diseased heart. Certified.
„ 15	59	Farmer -	Diseased spine. Certified.
„ 24	77	Lead miner -	Natural decay. Not certified.
„ 23	38	Cattle dealer -	Diseased lungs. Not certified.
Feb. 3	77	Farmer -	Apoplexy, 5 days. Certified.
„ 12	37	Lead miner -	Phthisis pulmonalis. Certified.
Mar. 19	33	Flax dresser -	Phthisis pulmonalis, 12 months. Certified.
„ 20	77	Gentleman -	Encephalitis. Certified.
Apr. 2	60	Farmer -	Diseased heart. Certified.
„ 18	13	Son of farmer	Scarlatina, 4 days. Certified.
May 10	85	Weaver	Dementia. Old age. Certified.
„ 8	32	Stonemason -	Consumption. Not certified.
„ 14	47	Lead miner -	Meningitis, 12 months. Certified.
„ 15	16	Son of lead miner	Phthisis, some years. Certified.
„ 12	73	Corn miller -	Bronchitis. Certified.
„ 16	84	Labourer -	Natural decay. Not certified.
„ 19	84	Farmer -	Senectus. Certified.
„ 26	20	Son of farmer	Pleuritis, 3 months. Certified.
„ 27	45	Quarryman -	Cancer of pylorus, 2 years. Certified.
June 5	63	Lead miner -	Diseased heart. Bronchitis. Certified.
„ 6	22	Joiner -	Consumption. Not certified.
„ 11	78	Hawker -	Softening of brain. Certified.
Aug. 2	55	Lead miner -	Bronchitis. Certified.
„ 3	38	Lead miner -	Phthisis pulmonalis. Certified.
Oct. 3	70	Farmer -	Diseased heart. Certified.
„ 5	87	Farmer -	Bronchitis. Certified.
Nov. 5	76	Linen weaver	Apoplexy. Certified.
Dec. 15	67	Lead miner -	Bronchitis, 4 months. Certified.
„ 23	66	Linen weaver	Diarrhœa, 56 hours. Certified.

COUNTY OF DURHAM.

Superintent Registrar's District.	Registrar's Sub-District.
543 TEESDALE.	3. Middleton.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 3. Middleton.

1859.			
Jan. 2	22	Son of shoemaker.	Consumption. Certified.
„ 9	77	Grocer -	Apoplexy. Not certified.
„ 13	45	Farmer -	Pneumonia. Gastro-enteritis. Certified.
Feb. 3	22	Tailor -	Consumption. Certified.
„ 3	63	Grocer -	Diseased heart. No medical attendant.
„ 7	80	Gardener -	Ileus. Not certified.
„ 9	62	Shoemaker -	Diseased lungs. Certified.
Mar. 1	75	Farmer -	Natural decay. Not certified.
„ 30	40	Draper -	Diseased liver, 2 months. Certified.
„ 26	67	Farmer and lead miner.	Natural decay. Not certified.
Apr. 20	26	Lead miner -	Consumption. Certified.
„ 28	31	Son of farmer	Found dead. Cause unknown. Inquest.
„ 27	78	Farmer -	Natural decay. Certified.
May 14	55	Farmer -	Consumption. Not certified.
„ 21	36	Lead miner -	Consumption. Certified.
„ 22	12	Son of schoolmaster.	Enteritis. Not certified.
June 1	33	Groom -	Consumption. Certified.
„ 17	58	Lead miner -	Diseased lungs, 6 months. Certified.
„ 6	57	Lead miner -	Diseased kidneys, 2 months. Certified.
„ 20	36	Farmer -	Erysipelas. Certified.
„ 17	53	Labourer -	Pneumonia. Certified.
Aug 10	64	Yeoman -	Apoplexy. Certified.
„ 20	69	Overlooker, wood yard.	Bronchitis. Certified.
„ 10	54	Lead miner -	Bronchitis. Not certified.
„ 19	88	Farmer -	Natural decay. Certified.
1859.			
Sept 13	19	Son of lead miner.	Apoplexy. Not certified.
Oct. 13	80	Farmer -	Natural decay. Certified.
„ 21	58	Yeoman -	Abscess in the thigh. Certified.
„ 12	48	Lead miner -	Consumption. Not certified.
Nov. 10	20	Lead ore smelter	Diseased lungs. Certified.
„ 11	61	Lead miner -	Consumption. Not certified.
Dec. 11	30	Solicitor -	Diphtheria. Certified.
„ 22	85	Tailor - -	Gangrene. Not certified.
„ 24	45	Lead miner -	Consumption. Certified.
„ 28	20	Son of lead miner.	Accident. Fall of stone in a lead mine. Inquest.
1860.			
Jan. 10	63	Carrier -	Diseased stomach, 3 days. Certified.
Feb. 10	76	Lead miner -	Bronchitis, 5 days. Certified.
„ 5	10	Son of farmer	Pneumonia. Certified.
„ 17	75	Agric. labourer	Diseased stomach. Certified.
„ 12	23	Son of lead ore smelter.	Consumption. Certified.
„ 27	71	Labourer -	Cancer of lip. Certified.
Mar. 12	69	Farmer -	Cancer of face. Certified.
„ 14	52	Lead miner -	Diseased lungs, 12 months. Certified.
Apr. 8	61	Lead miner -	Consumption. Certified.
„ 21	50	Lead miner -	Diseased lungs, 1 year. Certified.
„ 29	42	Lead miner -	Consumption. Certified.
May 12	72	Lead miner -	Pneumonia. Certified.
„ 5	23	Son of lead miner.	Diseased joints, 5 months. Certified.
„ 17	18	Son of farmer	Consumption. Certified.
„ 30	43	Lead miner -	Diseased lungs, 3 months. Certified.
June 13	60	Blacksmith -	Consumption. Certified.
„ 10	41	Stonemason -	Consumption. Certified.
July 5	57	Lead miner -	Dropsy. Certified.
„ 23	39	Lead miner -	Diseased lungs. Certified.
Aug 15	73	Pensioner -	Paralysis. Certified.
„ 15	57	Lead miner -	Diseased heart, 10 years. Certified.
„ 20	39	Farmer -	Peritonitis. Certified.
„ 20	86	Farmer -	Natural decay. Certified.
„ 23	11	Labourer -	Severe shock to the general system. Inquest.
Sept. 1	63	Lead miner -	Diseased lungs. Certified.
„ 16	34	Joiner - -	Diseased brain, 2 years. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When died.	Age.	Occupation.	Cause of Death.
1860.			
Sept 22	49	Lead miner -	Phthisis. Certified.
Oct. 14	64	Lead miner -	Diseased heart. Certified.
„ 21	27	Schoolmaster	Consumption. Certified.
„ 29	71	Farmer -	Natural decay. Certified.
Nov. 4	85	Sawyer -	Natural decay. Certified.
„ 11	56	Lead miner -	Diseased lungs, 3 weeks. Certified.
„ 9	49	Lead miner -	Dropsy. Certified.
„ 21	50	Lead miner -	Diseased lungs, 2 years. Certified.
Dec. 1	61	Farmer -	Diseased heart. Certified.
Nov. 26	53	Farmer -	Diseased heart. Certified.
Dec. 12	59	Farmer -	Peritonitis. Certified.
„ 21	61	Lead miner -	Lumbar abscess. Certified.
„ 27	52	Lead miner -	Diseased lungs. Certified.
1861.			
Jan. 2	83	Farmer -	Pneumonia. Certified.
„ 5	50	Son of farmer	Hæmaturia. Certified.
Feb. 13	83	Blacksmith -	Natural decay. Certified.
„ 13	39	Innkeeper -	Myelitis. Certified.
Mar. 6	84	Landed proprietor.	Cystitis. Certified.
„ 5	25	Lead miner -	Diseased brain. Certified.
„ 16	25	Shoemaker -	Consumption. Certified.
Apr. 2	11	Son of farmer	Scarlatina. No certified.
„ 2	86	Tailor - -	Natural decay. Certified.
Mar. 29	19	Shoemaker, apprentice.	Consumption. Certified.
„ 29	65	Farmer -	Pneumonia. Not certified.
„ 31	17	Lead miner -	Scarlatina. Certified.
Apr. 4	83	Lead ore smelter.	Pneumonia. Certified.
„ 9	72	Farmer -	Natural decay. Certified.
„ 11	26	Joiner -	Hepatitis, 14 days. Certified.
„ 7	48	Blacksmith -	Pleurisy. Certified.
„ 23	33	Lead miner -	Consumption. certified.
„ 21	85	Farmer -	Influenza. Certified.
„ 22	29	Lead miner -	Diseased lungs. Certified.
„ 25	45	Overlooker of lead mines.	Diseased lungs, 6 months. Certified.
May 4	59	Lead miner -	Diseased lungs, 18 months. Certified.
„ 7	63	Lead miner -	Epilepsy, 3 weeks. Certified.
„ 24	66	Lead miner -	Bronchitis. Certified.
„ 15	86	Farmer -	Natural decay. Certified.
„ 26	11	Son of lead ore smelter.	Pneumonitis. Peritonitis. Certified.
„ 30	22	Lead miner -	Cephalitis. Certified.
June 4	19	Son of lead miner.	Consumption. Certified.
„ 9	83	Farmer -	Natural decay. Certified.
„ 22	76	Lead miner -	Natural decay. Certified.
„ 24	16	Son of tailor -	Pneumonia. Certified.
„ 29	24	Lead ore smelter.	Diseased lungs, 4 months. Certified.
July 4	18	Son of stonemason.	Diseased brain. Certified.
„ 18	62	Lead miner -	Diseased brain, 1 year. Certified.
June 30	68	Farmer -	Diseased heart. Certified.
July 24	72	Lead miner -	Diseased spine. Certified.
Aug 22	16	Son of servant	Disease of heart. Certified.
Sept 20	39	Lead miner -	Diseased lungs, 2 years. Certified.
Oct. 2	78	Farmer -	Natural decay. Certified.
„ 2	32	Lead miner -	Accident. Gun shot wound. Inquest.
„ 11	68	Stonemason -	Diseased heart. Certified.
„ 29	10	Son of washerwoman.	Scarlatina. Certified.
Nov. 21	82	Landed proprietor.	Natural decay. Certified.
„ 24	12	Son of lead miner.	Diseased brain, 3 days. Certified.
„ 29	68	Farmer -	Pneumonia. Not certified.
Dec. 4	24	Lead miner -	Consumption. Certified.
„ 17	34	Lead miner -	Consumption. Certified.

Superintendent Registrar's District.

544. WEARDALE.

Registrar's Sub-District.

1. St. John.
2. Stanhope.
3. Wolsingham.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. St. John.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 1	53	Lead miner -	Hæmoptysis, 48 hours. No medical attendant.
„ 2	71	Stone mason -	Debility from age. Certified.
„ 5	76	Farmer -	Influenza, 2 months. No medical attendant.
„ 14	49	Lead miner -	Influenza, 8 days. Certified.
„ 31	74	Lead miner -	Paralysis. Certified.
Feb. 16	13	Son of cartman	Pleuro-pneumonia. Certified.
„ 17	56	Lead miner -	Pneumonia. Certified.
„ 21	22	Iron miner -	Pneumonia typhoides. Certified.
„ 21	18	Lead miner -	Typhus. Certified.
„ 23	25	Lead miner -	Consumption. Certified.
Mar. 3	61	Ragman -	Cystirrhea. Certified.
„ 13	94	Gentleman -	Old age. Certified.
Feb. 22	34	Farmer and miller.	Suicide (cut throat). Inquest.
Mar. 21	41	Millwright -	Diseased heart. Certified.
„ 30	82	Shoemaker -	Old age. Cerlified.
Apr. 5	55	Lead miner -	Bronchitis. Certified.
„ 22	52	Registrar of births and deaths.	Consumption. Not certified.
„ 21	36	Lead miner -	Consumption, 4 months. Certified
„ 28	38	Lead miner -	Angina pectoris. Certified.
May 1	60	Lead miner -	Pleurisy, 4 days. Certified.
„ 6	15	Son of lead miner.	Diphtheria, 10 days. Certified.
„ 17	59	Lead miner -	Bronchitis, 6 days. Certified.
June 2	40	Lead miner -	Asthma. Certified.
„ 11	51	Lead miner -	Bronchitis. Certified.
„ 12	22	Lead miner -	Hepatitis. Certified.
„ 17	22	Lead miner -	Diseased heart. Certified.
„ 25	52	Lead miner -	Phthisis. Certified.
„ 26	57	Shoemaker, master.	Phthisis. Certified.
July 15	20	Lead miner -	Phthisis. Certified.
„ 29	48	Lead miner -	Phthisis. Certified.
„ 30	34	Lead miner -	Diseased liver. Certified.
Sep. 19	59	Iron miner -	Accident. Fall of stone in West Slit Mine. Inquest.
Oct. 2	64	Road labourer	Influenza. Certified.
„ 18	40	Farmer -	Dropsy. Certified.
„ 20	62	Lead miner -	Bronchitis. Certified.
Nov. 30	66	Toll collector	Pneumonia. Certified.
Dec. 11	35	Lead miner -	Phthisis. Certified.
„ 22	25	Iron miner -	Phthisis. Certified.
1860.			
Feb. 6	51	Lead miner -	Phthisis. Certified.
„ 11	29	Joiner, journeyman.	Phthisis. Certified.
„ 17	55	Lead miner -	Phthisis. Certified.
„ 20	28	Lead miner -	Cirrhosis of liver. Certified.
Jan. 29	22	Lead miner -	Cold and exaustion. Inquest.
Mar. 21	27	Stonemason, master.	Phthisis, 1 year. Certified.
„ 24	71	Lead miner -	Fever. 14 days. Certified.
Apr. 3	34	Lead miner -	Phthisis. Certified.
„ 9	22	Lead miner -	Pneumonia. Fever, 7 days. Certified.
„ 11	16	Son of lead miner.	Phthisis. Certified.
„ 9	14	Son of iron miner.	Fractures. Trismus. Inquest.
„ 16	23	Lead miner -	Typhus. Certified.
„ 16	23	Lead miner -	Acute peritonitis, 11 days. Certified.
„ 18	64	Gentleman -	Hypertrophy with hydrothorax. Certified.
„ 17	19	Lead miner -	Found dead at the bottom of shaft in Botts Burn Lead Mine. Inquest.
May 28	24	Lead miner -	Typhus. Certified.
June 21	59	Lead miner -	Otitis. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
June 25	43	Draper and grocer.	Phthisis pulmonalis, 1 month. Certified.
„ 29	21	Carman -	Gastritis. Certified.
„ 30	71	Lead miner -	Cancer, 2 years. Certified.
July 20	12	Son of lead miner.	Typhus. Certified.
„ 20	24	Joiner - -	Diabetes, 8 months. Certified.
Aug 11	49	Lead miner -	Cancer. Certified.
Sep. 6	19	Lead miner -	Pleuro-pneumonia, 9 days. Certified.
„ 6	28	Blacksmith, journeyman.	Ileus, 5 days. Certified.
„ 16	38	Lead miner -	Phthisis pulmonalis, 8 months. Certified.
Oct. 27	72	Lead miner -	Pneumonia, 3 days. Certified.
„ 23	22	Engine stoker	Accident. Run over by waggons. Inquest.
Nov. 19	38	Lead miner -	Phthisis. Certified.
„ 22	66	Gentleman -	Consumption, 3 months. Certified.
„ 24	45	Lead miner -	Consumption, 4 months. Certified.
Dec. 22	70	Lead miner -	Chronic bronchitis, 8 months. Certified.
„ 28	12	Son of lead miner.	Scarlatina maligna, 4 days. Certified.
„ 29	15	Son of lead miner.	Scarlatina maligna, 6 days. Certified.
„ 29	33	Lead miner -	Pneumonia. Certified.
„ 31	59	Lead miner -	Bronchitis senilis. Certified.
1861.			
Jan. 16	49	Lead miner -	Erysipelas. Mortification. Certified.
„ 18	52	Farm servant	Phthisis pulmonalis, 4 months. Certified.
„ 26	56	Schoolmaster -	Catarrh, 15 days. Certified.
„ 31	72	Lead miner -	Old age. Certified.
Feb. 8	34	Lead miner -	Phthisis. Certified.
„ 12	45	Iron miner -	Phthisis pulmonalis. Certified.
„ 13	42	Lead miner -	Bronchitis. No medical attendant.
„ 19	72	Gentleman -	Bronchitis senilis, 20 years. Certified.
„ 27	55	Lead miner -	Bronchitis senilis. Certified.
Mar. 8	22	Shoemaker, master.	Fever, 6 weeks. Certified.
„ 22	20	Son of lead miner.	Hæmoptysis. Certified.
„ 28	11	Son of lead miner.	Hydrocephalus, 8 days. Certified.
Apr. 1	19	Shoemaker, apprentice.	Epilepsy. Certified.
„ 5	50	Lead miner -	Influenza. No medical attendant.
„ 17	16	Lead miner -	Scarlatina. Pneumonia. Certified.
„ 21	63	Lead miner -	Fever, 3 weeks. Certified.
„ 30	62	Lead miner -	Bronchitis. Certified.
„ 30	70	Lead miner -	Influenza, 11 days. Certified.
„ 29	34	Engine smith	Phthisis, 3 months. Certified.
May 14	58	Lead miner -	Hepatitis, 4 months. Certified.
June 23	43	Draper - -	Mitral disease of heart. Certified.
July 14	85	Schoolmaster -	Old age. No medical attendant.
Aug. 8	46	Lead miner -	Endocarditis. Certified.
„ 17	38	Lead miner -	Congestion of brain, 4 months. Certified.
Sep. 18	57	Lead miner -	Chronic hepatitis. Certified.
Oct. 14	47	Lead miner -	Intermittent fever, 12 months. Certified.
„ 19	24	Lead miner -	Disease of heart. Certified.
Nov. 20	66	Landed proprietor.	Gangrene of lungs, 12 days. Certified.
Dec. 3	21	Lead miner -	Caries. Certified.
„ 7	46	Lead miner -	Phthisis pulmonalis. Certified.
„ 12	29	Lead miner -	Typhus, 5 days. Certified.
„ 23	45	Lead miner -	Pleuro-pneumonia, 15 days. Certified.

Sub-District - 2. Stanhope.

1859.			
Jan. 12	86	Shepherd -	Old age. Certified.
1858.			
Dec. 20	60	Farmer -	Nephria, 2 years. Certified.
1859.			
Jan. 23	70	Lead miner -	Bronchitis, 8 days. Certified.
„ 24	32	Lead miner -	Pneumonia, 2 weeks. Not certified.
„ 24	21	Iron miner -	Pneumonia. Typhoides. Certified.
Feb. 7	71	Iron mine agent	Broncho-pneumonia, 5 days. Certified.
„ 25	59	Lead miner -	Asthma. Dropsy, 6 months. Certified.
Mar. 13	48	Farmer -	Pneumonia, 5 days. Certified.
„ 23	16	Mason's apprentice.	Diphtheria, 3 weeks. Certified.
„ 24	12	Son of slate quarrier.	Diphtheria, 2 weeks. Certified.
Apr. 11	24	Railway engine Driver.	Phthisis, 1½ years. Certified.
Mar. 23	27	Lead miner -	Consumption. Not certified.
May 9	39	Lead miner -	Phthisis pulmonalis. Certified.
June 5	55	Lead miner -	Bronchitis. Certified.
„ 17	53	Innkeeper -	Consumption. Not certified.
„ 27	66	Agric. labourer	Bronchitis. Certified.
„ 29	41	Iron miner -	Diabetes, 1 year. Certified.
July 2	45	Ironstone quarrier.	Phthisis pulmonalis, 2 months. Certified.
„ 2	71	Mason and miller.	Bronchitis, 6 months. Certified.
„ 9	12	Son of station master.	Phthisis. Certified.
„ 9	22	Iron miner -	Psoas abscess, 6 months. Certified.
„ 20	66	Lead ore smelter.	Apoplexy. Not certified.
Aug 17	52	Butcher and farmer.	Meningitis. Certified.
„ 26	62	Mason, master	Phthisis. Certified.
Sept. 8	17	Shepherd -	Typhus, 14 days. Certified.
„ 18	44	Lead miner -	Phthisis pulmonalis. Certified.
„ 21	67	Lead miner -	Diseased heart, 1 week. Certified.
„ 18	20	Lead ore washer.	Epilepsy, 3 years. Not certified.
„ 24	46	Butter merchant.	Upset of cart. Inquest.
Oct. 2	77	Agric. labourer	Old age. Not certified.
„ 10	27	Railway labourer.	Acute peritonitis. Certified.
„ 8	22	Lead miner -	Lumbar abscess. Certified.
„ 26	32	Iron miner -	Pneumonia, 6 days. Certified.
Nov. 2	48	Lead miner -	Pleuro-pneumonia, 6 days. Certified.
Oct. 21	59	Agric. labourer	Pneumonia, 6 days. Certified.
Nov. 19	27	Mason, journeyman.	Phthisis. Certified.
„ 19	83	Farmer -	Old age. Not certified.
Dec. 6	36	Limestone quarrier.	Crushed between two railway waggons, 15 minutes. No medical attendant.
„ 13	38	Railway engine worker.	Enteritis, 2 months. Certified.
„ 14	64	Lead miner -	Typhoid pneumonia, 2 months. Certified.
„ 15	13	Son of lead ore smelter.	Bronchitis, 3 weeks. Certified.
„ 26	37	Iron miner -	Congestion of brain. Certified.
1860.			
Jan. 9	19	Coal carrier -	Unknown. No medical attendant.
„ 22	34	Agric. labourer	Phthisis, 3 months. Certified.
„ 28	64	Lead miner -	Cancer. Certified.
Feb. 7	17	Son of lead ore washer -	Debility. Certified.
Apr. 2	78	Farmer -	Old age. Not certified.
„ 14	52	Lead ore smelter.	Nephria. Apoplexy. Certified.
May 3	24	Limestone quarrier.	Compound fractures. Inquest.
„ 8	58	Iron miner -	Phthisis pulmonalis. Certified.
Apr. 30	31	Ironstone miner.	Accident. Fall of stone at Red Vein Mine. Inquest.
May 17	84	Cartwright, master.	Diseased heart. Certified.
„ 16	23	Police officer -	Cholera biliosa. Certified.
„ 8	42	Blacksmith, master.	Phthisis, 6 years. Certified.
June 1	14	Son of lead-mine agent.	Peritonitis, 4 days. Certified
„ 3	79	Toll collector -	Enteritis. Not certified.
„ 9	64	Servant -	Hepatitis. Certified.
„ 12	29	Farmer -	Consumption. Not certified.

DISTRICTS IN NORTH OF ENGLAND.

Sub-district - 2. Wolsingham.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
June12	43	Lead miner -	Emphysema, 3 years. Certified.
„ 23	39	Railway plate layer.	Typhus fever, 4 weeks. Certified.
„ 29	72	Waggon man	Paralysis. Certified.
July 8	45	Iron miner -	Phthisis pulmonalis. Certified.
„ 11	41	Lead miner -	Bronchitis. Phthisis. 4 years. Certified.
Aug. 9	39	Iron miner -	Phthisis pulmonalis, 12 months. Certified.
„ 6	33	Lead ore washer	Diseased kidneys, 9 months. Certified.
Sept. 6	40	Limestone quarrier.	Fractures by blasting. Inquest.
„ 14	80	Labourer -	Old age. Not certified.
Aug 30	79	Farmer -	Old age. Not certified.
Sept. 8	36	Lead miner -	Phthisis pulmonalis. Certified.
„ 25	38	Lead miner -	Phthisis pulmonalis, 7 months. Certified.
Oct. 12	60	Landed proprietor.	Unknown. No medical attendant.
„ 5	50	Lead miner -	Phthisis, 1 year. Certified.
„ 29	72	Land agent -	Asthma. Certified.
„ 31	79	Agric. labourer	Influenza, 5 days. Certified.
Nov. 4	53	Farmer -	Enteritis. Not certified.
„ 23	44	Farmer -	Gastralgia, 6 days. Certified.
Dec. 2	44	Lead ore smelter.	Pleurisy. Not certified.
„ 11	49	Lead miner -	Consumption. Not certified.
„ 13	20	Lead miner -	Cerebritis. Certified.
1861.			
Jan. 9	47	Woodman -	Cardiac disease, 3 months. Certified.
„ 10	68	Lead ore smelter.	Fever. Apoplexy. Certified.
„ 28	24	Mason, journeyman.	Phthisis pulmonalis. Certified.
Feb. 4	14	Son of mason	Consumption. Not certified.
„ 5	11	Son of lead miner.	Asthma. Certified.
„ 24	13	Tramp -	Found dead. Exhaustion and cold. Inquest
„ 26	68	Joiner, journeyman.	Bronchitis. Certified.
Mar. 3	49	Farmer -	Pleuro-pneumonia, 21 days. Certified.
„ 14	28	Lead miner -	Consumption. Not certified.
„ 17	32	Lead miner -	Scirrhus of stomach. Certified.
Feb. 27	82	Farmer -	Old age. Certified.
„ 25	33	Lead miner -	Phthisis pulmonalis. Certified.
Mar. 17	80	Lead miner -	Old age. Certified.
Apr. 11	37	Tea dealer -	Stricture of œsophagus. Certified
„ 7	74	Lead miner -	Gangrene senilis. Certified.
„ 28	50	Lead miner -	General decay. Certified.
May 3	62	Farmer -	Bronchitis, 20 years. Certified.
„ 22	49	Iron miner -	Hepatitis. Certified.
June 9	55	Landed proprietor.	Apoplexy. Certified.
„ 8	72	Joiner, journeyman.	Pneumonia. Certified.
„ 10	55	Farmer and lead miner.	Hanged himself (suicide). Inquest.
„ 14	18	Lead miner -	Scarlatina maligna. Certified.
„ 6	19	Lead miner -	Scrofulous abscess. Certified.
July 8	34	Labourer -	Enteritis. Certified.
„ 13	77	Lead ore smelter.	Senile paralysis, 3 years. Certified.
„ 17	76	Proprietor of houses.	Diseased prostrate gland, 10 years. Certified.
Aug 15	28	Quarrier -	Phthisis pulmonalis. Certified.
„ 22	10	Son of grocer	Scarlatina. Not certified.
„ 26	63	Lead ore smelter.	Natural decay. Not certified.
Sept 11	21	Stoker -	Run over by a waggon. Inquest.
„ 21	61	Shepherd -	Diseased liver. Certified.
Oct. 6	21	Draper's assistant.	Intemperance. Inquest.
„ 31	43	Lead miner -	Diarrhœa. Certified.
Nov. 8	77	Farmer -	Diseased heart, 12 days. Certified.
„ 13	44	Blacksmith, journeyman.	Asthma. Phthisis. 4 weeks. Certified.
„ 18	66	Shepherd -	Scirrhus of stomach. Certified.
„ 22	59	Lead miner -	Asthma. Not certified.
„ 21	27	Mason, journeyman.	Concussion of brain. Not certified.
„ 29	38	Lead miner -	Hepatitis, 21 days. Certified.
Dec. 7	23	Labourer -	Pneumonia. Not certified.
„ 1	72	Mason, master	Catarrh, 3 days. Certified.
„ 1	76	Innkeeper -	Old age. Not certified.
„ 24	74	Innkeeper -	Paralysis, many years. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 15	46	Stone quarrior	Peritonitis, 2 days. Certified.
Feb. 2	45	Miller - -	Bronchitis, 6 months. Certified.
„ 5	44	Farmer -	Diphtheria. Certified.
„ 8	28	Miller, journeyman.	Pneumonia, 4 days. Certified.
Mar. 20	16	Son of coal miner.	Bronchitis, 8 days. Certified.
„ 30	58	Farmer -	Chronic bronchitis. Certified.
Apr. 12	79	Agric. labourer	Influenza. Certified.
May 3	18	Son of coal miner.	Insanity, 6 months. Phthisis. Certified.
„ 6	80	Joiner - -	Bronchitis, 7 days. Certified.
„ 12	11	Son of agric. labourer.	Atrophy, 3 months. Certified.
June 4	49	Iron furnace charger.	Accident. Burnt, 21 days. Certified.
„ 4	61	Colliery overman.	Apoplexy. Certified.
„ 16	71	Lead miner -	Phthisis. Certified.
„ 19	59	Furnaceman -	Compound fractures, 4 days. Inquest.
„ 17	14	Son of coal miner.	Pneumonia, 6 days. Certified.
„ 29	18	Son of farmer	Phthisis. Certified.
July 15	62	Agric. labourer	Peripneumonia. Notha. Certified.
„ 15	67	Ostler - -	Paralysis, 2 weeks. Certified.
„ 27	21	Furnaceman -	Phthisis. Certified.
Aug. 2	16	Son of agric. labourer.	Diseased lungs. Certified.
„ 24	50	Cutler - -	Diarrhœa, 2 days. Certified.
„ 5	20	Son of farmer	Typhus, 10 days. Trismus. Certified.
„ 29	69	Lead miner -	Asthma, 2 years. Certified.
„ 30	44	Agric. labourer	Phthisis. Certified.
Sep. 7	59	Farmer -	Cancer. Certified.
„ 22	49	Agric. labourer	Pneumonia, 7 days. Certified.
Oct. 24	67	Draper -	Peripneumonia, 4 days. Certified.
Nov. 3	40	Engineman -	Fracture by steam-engine. Inquest.
Oct. 29	27	Commercial traveller.	Typhus, 7 days. Certified.
Nov. 11	35	Farmer -	Pneumonia, 5 days. Certified.
„ 11	35	Farmer -	Pneumonia, 5 days. Certified.
„ 26	69	Miller - -	Synochus, 10 days. Certified.
Dec. 5	52	Farmer -	Synochus, 10 days. Peripneumonia. Certified.
„ 9	43	Iron furnace man.	Pleuro-pneumonia, 5 days. Certified.
„ 29	65	Agric. labourer	Necrosis. Certified.
1860.			
Jan. 19	12	Son of farmer	Diphtheria, 2 days. Certified.
Feb. 21	43	Coal miner -	Diseased liver. Certified.
„ 23	71	Plasterer -	Bronchitis. Certified.
Mar. 8	79	Miller - -	Bronchitis. Certified.
„ 26	55	Agric. labourer	Phthisis, 18 months. Certified.
„ 20	74	Agric. labourer	Hydrothorax, 2 weeks. Certified.
Apr. 30	19	Son of clerk -	Phthisis pulmonalis. Certified.
May 8	25	Coal miner -	Phthisis, 2 years. Certified.
June 1	58	Shepherd -	Hanged himself (suicide). Inquest.
„ 12	26	Farmer -	Phthisis, 2 years. Certified.
Aug 13	31	Blacksmith -	Anasarca. Diseased heart. Certified.
„ 19	64	Coal miner -	Phthisis. Certified.
Sept. 8	57	Coal miner -	Asthma. Certified.
„ 26	94	Agric. labourer	Old age. Certified.
„ 29	60	Labourer -	Abscess and diseased ankle joint. Certified.
Oct. 6	82	Miller - -	Senectus. Certified.
„ 12	52	Joiner -	Accident. Blow from a waggon at Headly Hope Colliery. Inquest.
Nov. 4	80	Agric. labourer	Bronchitis. Certified.
„ 10	58	Woodman -	Bronchitis. Certified.
Dec. 18	20	Coal miner -	Fall of stone in coal pit. Inquest.
„ 20	53	Mason, journeyman.	Injury to spine, 20 days. Inquest.
„ 20	68	Agric. labourer	Marasmus, 4 months. Certified.
1861.			
Jan. 16	18	Coal miner -	Typhoid fever, 3 weeks. Certified.
„ 9	30	Farmer -	Phthisis. Certified.
„ 22	61	Agric. labourer	Diseased liver. Bronchitis. Certified.
„ 31	35	Coal miner -	Pleuro-pneumonia. Phthisis. Certified.
Mar. 10	41	Labourer -	Apoplexy, 46 hours. Certified.
„ 28	24	Son of agricultural labourer	Phthisis. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Apr. 9	56	Lead miner -	Suppression of urine. Certified.
„ 10	46	Joiner, journeyman.	Typhus, 30 days. Certified.
„ 30	45	Carter - -	Phthisis. Ascites. Certified.
May 16	73	Shoemaker, journeyman.	Diseased prostate gland. Certified.
„ 17	19	Son of farmer	Phthisis pulmonalis, 5 months. Certified.
„ 16	51	Shoemaker -	Anasarca, 7 months. Certified.
„ 22	78	Agric. labourer	Old age. No medical attendant.
June 10	17	Son of labourer	Epilepsy. Certified.
„ 21	52	Innkeeper -	Scirrhus of stomach. Certified.
„ 23	60	Farmer -	Diseased heart. Certified.
1861.			
June 26	18	Son of Farmer	Phthisis pulmonalis. Certified.
„ 27	51	Farmer -	Diseased lungs. Certified.
„ 26	65	Farmer -	Hanged himself (suicide). Inquest.
Aug 17	90	Butcher -	Old age. Certified.
„ 21	48	Hurdle maker	Diseased heart. Certified.
Sept. 1	78	Blacksmith -	Climacteric decay. Certified.
„ 5	34	Railway platelayer.	Phthisis. Certified.
Oct. 8	74	Engine wright	Cardiac affection. Certified.
Nov. 5	66	Coal miner -	Chronic bronchitis. Certified
„ 8	28	Woollen draper	Phthisis pulmonalis, 7 months. Certified.
„ 14	14	Son of farmer	Phthisis. Certified.

COUNTY OF NORTHUMBERLAND.

Superintendent Registrar's District.	Registrar's Sub-District.
555. HEXHAM.	1. Bywell. 2. Hexham. 3. Allendale.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Bywell.

1859.			
Jan. 1	31	Schoolmaster	Hypertrophia cordis. Certified.
„ 8	34	Clerk - -	Diseased lungs and liver. Certified.
„ 27	74	Carrier - -	Dropsy, 7 weeks. Certified.
Feb. 7	85	Coal miner -	Old age. Not certified.
„ 8	67	Farmer - -	Cancer. Not certified.
„ 14	18	Lead ore miner	Diabetes, 1 year. Not certified.
Mar. 2	84	Farmer - -	Palsy, 14 days. Certified.
„ 10	74	Farmer - -	Unknown. Not certified.
„ 2	14	Driver - -	Wounded leg. Inquest.
„ 30	89	Agric. labourer	Old age. Certified.
Apr. 10	43	Agric. labourer	Inflammation. Not certified.
„ 20	53	Blacksmith, journeyman.	Encephalitis, 2 years. Certified.
„ 21	46	Cartman -	Hypertrophy of heart. Certified.
May 18	61	Gardener -	Diseased heart. Certified.
„ 22	13	Son of brakesman.	Typhus fever, 14 days. Certified.
June 2	53	Under viewer, colliery.	Cancer. Consumption. Certified.
„ 26	56	Shoemaker, journeyman.	Paralysis. Certified.
„ 27	23	Engine feeder	Phthisis, 8 months. Certified.
„ 30	78	Coal miner -	Diseased lungs, 8 weeks. Certified.
July 17	10	Son of cartman	Pleuritis. Certified.
„ 20	36	Cartman -	Phthisis pulmonalis. Certified.
July 12	96	Toll collector	Old age. Not certified.
„ 16	37	Agric. labourer	Pneumonitis. Certified.
„ 31	18	Coal miner - -	Consumption, 12 months. Certified.
Aug. 4	83	Labourer -	Bronchitis. Certified.
„ 11	49	Surgeon -	Diseased liver. Not certified.
„ 16	82	Agric. labourer	Natural decay. Not certified.
„ 19	71	Agric. labourer	Peritonitis. Certified.
„ 27	63	Agric. labourer	Consumption. Not certified.
Sept 25	69	Agric. labourer	Fungus hæmatodes, 6 months. Certified.
Oct. 5	16	Linen draper's apprentice.	Diseased brain, 5 days. Certified.
Nov. 10	58	Coal miner -	Diseased heart. Certified.
„ 28	26	Railway labourer.	Fever, 3 months. Certified.
Dec. 2	15	Son of blacksmith, journeyman.	Consumption, 6 months. Certified.
„ 14	47	Coal miner -	Diseased heart, 6 months. Certified.
„ 9	68	Farmer -	Paralysis. Certified.
„ 7	43	Drainer -	Cancer. Certified.
„ 18	81	Farmer -	Diseased heart. Certified.
1860.			
Jan. 2	59	Son of farmer	Epilepsy. Certified.
„ 8	70	Agric. labourer	Apoplexy. Certified.
„ 26	70	Servant -	Diseased heart. Certified.
„ 18	74	Carrier -	Old age. Not certified.
„ 30	50	Coal miner -	Consumption. Certified.
„ 30	21	Labourer -	Consumption, 6 months. Certified.
Feb. 9	11	Driver -	Tubs going over him. Inquest.
„ 23	66	Labourer at colliery.	Hernia. Certified.
„ 25	83	Agric. labourer	Paralysis. Certified.
Mar. 3	26	Coal miner -	Typhus fever, 18 days. Certified.
„ 5	51	Drainer -	Peritonitis. Certified.
„ 6	30	Carrier -	Typhoid fever, 4 weeks. Certified.
Mar. 7	49	Coal miner -	Pneumonia, 2 years. Certified.
„ 9	42	Besom maker	Phthisis. Certified.
„ 12	31	Gentleman -	Pulmonary disease, 1 year. Not certified.
„ 9	37	Coal miner -	Accident. Run over by tubs. Inquest.
Apr 15	88	Coal miner -	Diseased prostate gland. Certified.
„ 16	51	Tailor - -	Smallpox, 8 days. Certified.
„ 9	60	Lead ore miner	Cancer, 10 months. Certified.
„ 25	59	Schoolmaster	Diseased heart. Not certified.
„ 28	79	Shoemaker, master.	Heart disease. Certified.
May 2	71	Farmer -	Pneumonia. Certified.
„ 7	74	Farmer -	Paraplexy. Certified.
„ 13	51	Labourer -	Heart disease. Hepatitis. Certified.
„ 14	38	Lead ore miner	Consumption, 6 months. Not certified.
„ 18	72	Letter carrier	Old age. Not certified.
„ 20	71	Stone quarrier	Diseased heart, 3 years. Certified.
„ 19	83	Nurseryman -	Old age. Not certified.
„ 22	60	Sub-postman -	Bronchitis. Certified.
„ 23	81	Woodman -	Paralysis, 4 days. Certified.
„ 22	16	Tailor, apprentice.	Apoplexy. Certified.
„ 26	72	Fisherman -	Bronchitis. Certified.
June 1	60	Agric. labourer	Heart disease. Certified.
„ 23	30	Coal miner -	Typhus, 6 days. Certified.
„ 25	39	Lead ore miner	Bronchitis. Influenza, 5 days. Certified.
July 8	28	Farm servant	Diseased stomach. Certified.
„ 10	49	Lead ore miner	Phthisis. Certified.
„ 11	40	Labourer -	Run over by waggon. Certified.
Aug. 9	37	Labourer -	Drowning. Inquest.
„ 18	50	Farmer -	Apoplexy. Inquest.
Sep. 3	53	Schoolmaster	Cephalitis. Certified.
„ 18	71	Hawker -	Old age. Not certified.
„ 24	88	Agric. labourer	Dropsy. No medical attendant.
„ 28	32	Coal miner -	Consumption, 3 years. Certified.
Oct. 9	84	Civil engineer	Apoplexy. Certified.
„ 9	90	Agric. labourer	Old age. Not certified.
„ 20	76	Coal miner -	Cancer. Not certified.
„ 20	60	Farmer -	Diseased heart. Anasarca. Certified.
„ 27	57	Shoemaker, master.	Diseased heart. Albuminuria. Certified.
„ 27	37	Coal miner -	Consumption, 6 months. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Oct. 31	34	Surgeon -	Phthisis pulmonalis, 4 months. Certified.
Nov. 4	67	Cartwright, master.	Cancer, 9 months. Certified.
„ 12	23	Stonemason, journeyman.	Consumption, 6 months. Not certified.
„ 21	73	Farm servant	Dropsy. Certified.
„ 24	73	Farmer -	Heart affection, 6 months. Certified.
Dec. 4	54	Stonemason -	Pleurisy and peritonitis. Certified.
„ 7	61	Joiner, journeyman.	Synochus. Certified.
„ 9	92	Tailor, master	Natural decay. Certified.
„ 14	22	Coal miner -	Phthisis, 8 months. Certified.
„ 22	56	Coal miner -	Died suddenly. Inquest.
1861.			
Jan. 3	31	Game watcher	Typhoid fever, 3 days. Certified.
„ 3	71	Coal miner -	Pneumonia, 7 days. Certified.
„ 15	85	Blacksmith, journeyman.	Diarrhœa. Certified.
„ 16	59	Coal miner -	Pneumonia, 10 days. Certified.
„ 14	29	Pitman -	Fall of stone. Inquest.
„ 16	84	Agric. labourer	Old age. Certified.
Feb. 19	66	Gardener -	Bronchitis. Certified.
Mar. 3	61	Pitman - -	Fall down pit shaft. Inquest.
„ 19	64	Farm hind -	Pneumonia, 4 days. Certified.
„ 25	12	Son of farmer	Consumption, 6 months. Certified.
Apr. 8	14	Son of tailor -	Typhus. Certified.
„ 16	48	Coal miner -	Heart disease, 9 months. Certified.
„ 18	86	Farmer - -	Typhoid fever, 1 month. Certified.
„ 23	55	Stonemason -	Albuminuria. Certified.
May 11	79	Joiner, journeyman.	Cancer, 8 years. Certified.
„ 15	79	Farmer - -	Bronchitis. Certified.
„ 21	76	Farmer - -	Ramollissement. Certified.
„ 26	66	Gardener -	Diseased heart. Certified.
June 8	54	Labourer -	Accident. Fall of sheer legs. Inquest.
„ 30	71	Proprietor of houses.	Enteritis, 7 days. Certified.
July 2	90	Farmer - -	Natural decay. Certified.
„ 18	68	Farmer - -	Natural decay. Not certified.
Aug. 2	86	Farmer - -	Natural decay. Not certified.
„ 21	43	Grocer - -	Gastritis. Certified.
Sept 27	71	Woodman -	Paralysis. Certified.
Oct. 17	23	Joiner, journeyman.	Cephalitis, 11 days. Certified.
Nov 13	19	Labourer -	Phthisis, 2 years. Certified.
Dec. 13	36	Farmer - -	Diseased heart. Dropsy. Certified.
„ 22	39	Policeman -	Pleuro-pneumonia, 4 days. Certified.

Sub-District - 2. Hexham.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 3	80	Shoemaker, journeyman.	Apoplexia. Certified.
„ 1	69	Watchmaker, master.	Disease of stomach, 7 months. Certified.
„ 1	58	Labourer -	Suffocated by a piece of beef in his throat. Inquest.
„ 17	84	Agric. labourer	Asthma. Certified.
Feb. 4	53	Stone mason, master.	Chronic bronchitis. Certified.
„ 10	37	Stone mason, journeyman.	Phthisis. Certified.
„ 12	60	Gentleman -	Fall into a quarry. Inquest.
„ 22	68	Drainer -	Natural decay. Certified.
„ 28	71	Currier, journeyman.	Natural decay. Certified.
Mar. 1	48	Cordwainer, master.	Marasmus. Certified.
„ 3	80	Chelsea pensioner.	Anasarca. Certified.
„ 24	66	Glover, journeyman.	Age. Certified.
„ 28	74	Farmer -	Paralysis. Certified.
Apr. 19	57	Agric. labourer	Pulmonary apoplexy. Certified.
„ 18	57	Gardener -	Paralysis. Certified.
„ 20	80	Agric. labourer	Natural decay. Certified.
„ 23	59	Cartman -	Hypertrophia cordis. Certified.
May 5	23	Cartman -	Phthisis. Certified.
1859.			
„ 4	73	Farmer -	Fall down stairs, 10 days. Inquest.
„ 17	28	Hawker -	Aneurism. Inquest.
„ 21	10	Son of farmer	Hydrocephalus. Certified.
„ 23	30	Labourer -	Compound fractures. Inquest.
„ 29	67	Gardener -	Cancer. Certified.
June 9	74	Farmer -	Diseased heart. Certified.
„ 12	42	Hawker -	Diseased brain. Pneumonia. Certified.
„ 14	36	Linen draper	Phthisis. Certified.
„ 11	78	Agric. labourer	Paralysis. Certified.
„ 20	65	Skinner, journeyman.	Bronchitis. Certified.
July 17	10	Son of cartman	Tuberculous pleuritis, 2 years. Certified.
„ 20	36	Cartman -	Phthisis. Certified.
July 27	34	Draper, master	Paralysis. Certified.
„ 31	28	Shoemaker -	Phthisis. Certified.
Aug. 7	49	Draper - -	Diseased brain. Certified.
„ 10	69	Accountant -	Old age. Certified.
„ 11	26	Mason's labourer.	Typhus. Certified.
„ 12	70	Stonemason, journeyman.	Emphysema of lungs. Certified.
„ 16	71	Lead ore roaster	Cancer. Melæna. Certified.
„ 23	27	Son of farmer	Tabes mesenterica. Certified.
Sept 21	18	Draper's apprentice.	Phthisis. Bronchitis. Certified.
„ 23	62	Gardener -	Bronchitis. Diseased heart. Certified.
„ 27	76	Waller - -	Hypertrophia cordis. Certified.
Oct. 10	13	Son of labourer	Albuminuria. Certified.
„ 19	76	Wood keeper	Decay of nature. Certified.
„ 22	61	Agric. labourer	Diseased liver. Certified.
„ 28	63	Quarrier -	Cardiac dropsy. Certified.
„ 25	74	Clergyman -	Bronchitis. Certified.
Nov. 5	45	Drover -	Exhaustion and exposure to cold and wet. Inquest.
„ 19	14	Farm servant	Fever. Not certified.
„ 25	53	Cartman -	Cardiac dropsy. Certified.
„ 25	103	Chelsea pensioner.	Fracture of femur. Certified.
„ 24	34	Spirit merchant	Dysentery. Certified.
„ 27	65	Hawker -	Natural decay. Certified.
„ 29	55	Shoe repairer	Diseased stomach and liver. Certified.
„ 29	54	Linendraper -	Cardiac dropsy. Certified.
„ 29	68	Chelsea pensioner.	Hæmoptysis, 14 days. Certified.
„ 30	50	Lodging-house keeper.	Cerebral disease. Certified.
Dec. 8	74	Agric. labourer	Natural decay. Certified.
„ 10	37	Agric. labourer	Phthisis, 2 years. Certified.
„ 23	93	Lead ore smelter.	Natural decay. No medical attendant.
„ 27	18	Draper's clerk	Phthisis. Not certified.
„ 29	86	Blacksmith -	Diarrhœa. Certified.
1860.			
Jan. 3	75	A capitalist -	Paraplexy. Certified.
„ 14	83	Gardener -	Decay of nature. Certified.
„ 29	10	Son of joiner -	Necrosis. Certified.
Feb. 12	82	Slippermaker-	Natural decay. Certified.
„ 11	76	Shoemaker, master.	Hypertrophia cordis. Certified.
„ 12	19	Grocer -	Phthisis. Certified.
„ 15	84	Gardner -	Natural decay. No medical attendant.
„ 15	48	Farm hind -	Hæmoptysis. Certified.
„ 18	46	Agric, labourer	Suffocated by hanging. Inquest.
„ 20	59	Inn keeper -	Bronchitis. Certified.
Mar. 8	75	Cattle drover -	Natural decay. No medical attendant.
„ 8	21	Painter, journeyman.	Phthisis. Certified.
„ 9	63	Lead ore miner	Suicide by strangling. Inquest.
„ 25	54	Cartman -	Phthisis. Certified.
„ 25	63	Blacksmith -	Natural decay. Certified.
„ 30	67	Moneyed proprietor.	Natural decay. Certified.
Apr. 1	79	Farmer -	Scirrhus of rectum. Certified.
„ 10	14	Son of farm hind.	Hypertrophia cordis. Certified.
„ 12	42	Millstone dresser.	Found dead (sudden). Inquest.
„ 23	26	Stone mason -	Phthisis. Certified.
„ 24	19	Joiner, apprentice.	Phthisis pulmonalis. Certified.
„ 24	73	Drainer -	Cancer of mouth and tongue. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Apr. 26	68	Tinsmith -	Cardiac dropsy. Certified.
„ 30	45	Agric. labourer	Enlarged glands. Debility. Certified.
May 4	28	Agric. labourer	Bronchitis. Certified.
„ 4	70	Farmer -	Paralysis, 24 hours. Certified.
„ 8	72	Agric. labourer	Found dead (sudden). Inquest.
„ 22	57	Dealer in earthenware.	Valvular disease of heart. Certified.
„ 23	37	Blacksmith, master.	Phthisis. Certified.
, 30	79	Monied proprietor.	Hypertrophia cordis. Certified.
, 27	76	Hawker -	Cold and intoxication. Inquest.
June 5	77	Labourer -	Bronchitis. Certified.
, 6	61	Farmer -	Necrosis. Phthisis. Certified.
„ 13	85	Draper, master	Natural decay. Certified.
„ 13	18	Son of farmer	Consumption. Certified.
„ 15	44	Farmer -	General organic disease. Certified.
„ 29	84	Servant -	Diarrhœa. Certified.
July 3	51	Butcher, journeyman.	Diseased heart. Certified.
„ 12	74	Innkeeper -	Bronchitis. Certified.
„ 19	19	Labourer -	Meningitis. Certified.
Aug. 4	55	Glover, journeyman.	Ulcered intestine. Certified.
„ 13	82	Hawker -	Old age. Certified.
„ 16	51	Paper maker, journeyman.	Cancer. Certified.
„ 18	74	Labourer -	Natural decay Certified.
„ 19	18	Chemist -	Phthisis. Certified.
„ 25	34	Banksman at a pit.	Hypertrophia cordis. Certified.
, 24	78	Soldier -	Heart disease. Certified.
, 27	70	Glover, journeyman.	Diseased heart. Certified.
„ 18	54	Methodist minister.	Dilatation of heart. Certified.
Sept. 8	69	Nut, cress, and mushroom gatherer.	Phthisis. Certified.
„ 10	70	Quack doctor -	Bronchitis. Certified.
„ 7	10	Not stated -	Crushed by a mill water wheel. Inquest.
„ 15	45	Hawker -	Pulmonary disease. Certified.
Oct. 1	55	Labourer -	Hemiplegia. Certified.
„ 10	76	House proprietor.	Diseased liver. Certified.
„ 15	66	Agric. labourer	Phthisis pulmonalis. Certified.
„ 16	20	Chemist -	Phthisis pulmonalis. Certified.
Nov. 17	74	Agric. labourer	Bronchitis. Certified.
„ 22	31	Hatter, journeyman.	Caries. Certified.
„ 25	33	Lead-ore smelter.	Bronchitis. Certified.
„ 26	70	Chelsea pensioner.	Hemiplegia.- Coma. Certified.
Dec. 1	24	Son of labourer	Diseased heart. Dropsy. Certified.
„ 8	71	Farm labourer	Consumption. Not certified.
„ 10	77	Labourer -	Paraplexy. Certified.
„ 9	19	Labourer -	Heart disease. Dropsy. Certified.
„ 18	67	Proprietor of land.	Apoplexia. Certified.
„ 26	64	Farmer -	Diseased heart. Dropsy. Certified.
„ 28	79	Millwright -	Hepatitis. Certified.
, 28	74	Agric. labourer	Old age. Certified.
1861.			
Jan. 4	80	Agric. labourer	Bronchitis. Certified.
„ 8	65	Shoemaker, master.	Febris typhoides. Certified.
„ 10	81	Toll-bar keeper	Apoplexy. Certified.
„ 21	78	House proprietor.	Dropsy. Certified.
„ 22	66	Monied proprietor.	Chronic bronchitis. Certified.
Feb. 13	63	Tanner, master	Diseased heart, Paralysis. Certified.
„ 16	67	Agric. labourer	Paralysis, 40 hours. Certified.
„ 20	45	Collier -	Phthisis pulmonalis. Certified.
„ 21	77	Cartwright -	Natural decay. Certified.
Mar. 4	19	Lead ore miner	Phthisis pulmonalis. Certified.
„ 16	73	Agric. labourer	Stricture of urethra. Certified.
„ 24	49	Son of labourer	Epilepsy. Certified.
„ 26	69	Saddler -	Natural causes. Inquest.
„ 27	65	Farmer -	Phthisis. Certified.
„ 28	27	Lead ore miner	Phthisis, 3 years. Not certified.
„ 29	42	Plumber -	Paralysis. Certified.
1861.			
Mar. 30	70	Gardene -	Remolissement of brain. Certified.
April 2	51	Idiotic -	Gastro-enteritis. Certified.
„ 5	40	Railroad labourer.	Pneumonia. Certified.
„ 5	82	Glazier, master	Hypertrophia Cordis. Certified.
„ 9	57	Hawker -	Asthma. Phthisis. Certified.
May 3	48	Hawker -	Fever. Bronchitis. Certified.
„ 4	28	Labourer -	Phthisis. Certified.
„ 18	52	Coal carman -	Apoplexia. Certified.
„ 26	16	Son of blacksmith.	Lumbar abscess, 3 years. Certified.
„ 21	69	Agric. labourer	Natural decay. Not certified.
June 3	55	Shoemaker, journeyman.	Paralysis. Certified.
„ 5	77	Farmer -	Natural decay. Certified.
„ 6	40	Land agent -	Apoplexy. Certified.
„ 8	73	Farm manager	Cancer, 14 months. Certified.
„ 13	11	Son of sawyer	Cerebral congestion. Certified.
„ 19	73	Tea dealer -	Cancer in stomach. Certified.
July 2	72	Painter -	Apoplexia. Certified.
„ 13	69	Lead ore miner	Cardiac. Dropsy. Certified.
„ 23	16	Farm servant	Synochus. Meningitis. Certified.
„ 23	70	Agric. labourer	Heart disease and dropsy. Certified.
„ 28	49	Gardener -	Disease of heart. No medical attendant.
Aug. 5	27	Railway guard	Typhus fever. Certified.
„ 5	50	Labourer -	Phthisis pulmonalis. Certified.
„ 7	59	Tailor, master	Diseased heart. Dropsy. Certified.
„ 10	70	Collier -	Natural decay. Certified.
„ 12	87	Ostler -	Paralysis. Certified.
„ 24	65	Blacksmith, journeyman.	Diseased heart. Anasarca. Certified.
Sept. 5	29	A cordial manufacturer.	Phthisis. Certified.
„ 6	36	Labourer -	Pneumonia. Certified.
„ 17	37	Iron founder -	Injury. Bronchitis, 5 days. Certified.
„ 19	52	Labourer -	Hepatic disease. Certified.
„ 20	82	Hawker -	Diseased heart. Certified.
„ 26	56	Stonemason -	Diabetes. Certified.
Oct. 18	64	Farm labourer	Apoplexy. Certified.
Nov. 2	40	Cattle drover	Accident. Fall. Inquest.
„ 5	78	Roper -	Paralysis, 11 hours. Certified.
„ 7	43	Hawker -	Diseased heart. Dropsy. Certified.
„ 6	63	Farmer -	Compression of brain from a fall. Inquest.
„ 7	40	Surgeon -	Hypertrophia cordis. Certified.
„ 21	80	Baker -	Natural decay. Certified.
„ 23	33	Butcher -	Phthisis pulmonalis. Certified.
„ 30	60	Wood keeper	Phthisis. Certified.
Dec. 8	95	Agric. labourer	Old age. No medical attendant.
„ 12	12	Son of farmer	Typhus, 25 days. Certified.
„ 14	75	Not known -	Natural decay. Certified.
„ 17	73	Slater - -	Pleuro-pneumonia. Certified.
„ 19	78	Agric. labourer	Natural decay. Certified.
„ 27	31	Tobacconist -	Phthisis. Certified.

Sub-District - 3. Allendale.

1859.			
Jan. 2	82	Farmer -	Natural decay. Certified.
„ 5	72	Lead ore smelter	Bronchitis, 2 weeks. Certified.
„ 9	27	Lead ore miner	Phthisis, 10 months. Certified.
„ 2	70	Farmer -	Enteritis. Not certified.
„ 12	69	Lead ore smelter	Diseased liver. Anasarca. Certified.
„ 16	76	Coal miner -	Apoplexy. Not certified.
„ 19	80	Butcher, master	Old age. Not certified.
„ 30	22	Butcher, journeyman.	Pneumonia. Not certified.
Feb. 6	65	Lead miner -	Phthisis pulmonalis. Certified.
„ 6	27	Lead miner -	Phthisis, 7 days. Pneumonia. Certified.
„ 5	82	Proprietor of money, formerly a lead miner.	Bronchitis, 6 months. Certified.
„ 12	32	Lead miner -	Rheumatic fever, 5 days. Certified.
Mar. 10	26	Lead miner -	Pleuritis, 6 days. Certified.
„ 14	18	Lead miner -	Typhus, 16 days. Certified.
Apr. 4	19	Son of a farmer	Consumption. Not certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Mar.12	23	Shoemaker -	Typhus, 14 days. Certified.
„ 26	20	Servant -	Phthisis, 18 weeks. Certified.
Apr. 9	27	Woodman -	Accident. Fall of a tree. Inquest.
„ 13	52	Lead ore smelter	Phthisis pulmonalis, 1 year. Certified.
May 4	35	Lead miner -	Consumption, 2½ years. Not certified.
„ 15	31	Agric. labourer	Hepatitis. Certified.
„ 15	22	Waggon driver	Caries. Phthisis. Certified.
„ 21	28	Lead miner -	Tubercular peritonitis, 3 years. Certified.
„ 17	27	Farmer -	Phthisis, 9 months. Certified.
„ 22	83	Smelting agent	Bronchitis, 6 days. Certified.
„ 29	55	Lead weigher	Fever, 13 weeks. Certified.
June 2	67	Lead ore smelter	Pleuritis. Phthisis. Certified.
„ 12	24	Labourer -	Drowning. Inquest.
„ 14	16	Labourer, lead mine.	Continued fever, 16 days. Certified.
„ 19	14	Mason's labourer.	Scarlatina, 2 days. Certified.
„ 25	51	Lead miner -	Bronchitis, 7 days. Certified.
„ 21	35	Draper, grocer	Diseased liver, 8 weeks. Certified.
„ 22	72	Labourer -	Natural decay. Certified.
July 5	85	Labourer -	Paralysis. Certified.
June28	62	Shoemaker, maker.	Diseased heart. Certified.
„ 20	17	Lead miner -	Fever. Enteritis, 3 months. Certified.
July11	46	Lead miner -	Pulmonary phthisis, 2 years. Certified.
„ 14	29	Lead miner -	Phthisis, 7 months. Certified.
„ 29	86	Lead miner -	Old age. No medical attendant.
„ 25	38	Lead miner -	Spinal disease, 3 years. Certified.
Aug. 1	70	Agric. labourer	Natural decay. Certified.
„ 17	42	Labourer -	Lupus exedens of face, 1 year. Certified.
„ 17	63	Tailor -	Accident fall from a wall. Inquest.
Sept.15	15	Son of blacksmith.	Meningitis, 6 months. Certified.
„ 27	70	Lead ore smelter.	General debility. No medical attendant.
Oct. 4	39	Draper and grocer.	Phthisis. Certified.
„ 3	33	Grocer, lead miner.	Consumption. Certified.
Sept.30	84	Blacksmith, master.	Old age. No medical attendant.
Oct. 28	62	Lead miner -	Bronchitis. Diseased heart, 6 months. Certified.
Nov. 6	30	Lead miner -	Abscess in hip joint, 8 months. Certified.
„ 18	52	Lead miner -	Pleuritis. Certified.
„ 22	63	Stonemason, master.	Dropsy, 1 year. Certified.
„ 16	70	Blacksmith, master.	Gastritis. Not certified.
„ 25	79	Farmer -	Natural causes. Inquest.
„ 30	65	Landed proprietor.	Cancer. Certified.
Dec. 16	62	Shepherd, formerly a miner.	Dropsy, several years. Not certified.
„ 24	82	Farmer -	Bronchitis. Certified.
„ 16	25	Lead miner -	Typhoid fever, 1 month. Certified.
„ 21	21	Lead miner -	Phthisis, 2 years. Certified.
1860.			
Jan. 10	32	Lead miner -	Phthisis, 3 years. Certified.
„ 16	40	Medical practitioner.	Phthisis, 3 years. Certified.
„ 21	64	Gardener -	Disease of liver. Certified.
„ 26	53	Lead miner -	Bronchitis, 3 months. Certified.
„ 18	29	Lead miner -	Phthisis, 3 months. Certified.
Feb. 4	64	Landed proprietor.	Nervous debility, 1 year. Not certified.
„ 11	62	Farmer -	Diseased liver. Dropsy. Certified.
„ 11	60	Grocer -	Influenza. Not certified.
„ 13	48	Lead miner -	Bronchitis, 12 months. Certified.
„ 22	70	Farmer -	Heart disease. Certified.
„ 19	62	Lead miner -	Bronchitis, 3 months. Not certified.
„ 6	45	Lead ore smelter.	Consumption, 3 months. Certified.
„ 22	45	Lead miner -	Consumption, 1 year. Certified.
Mar.15	72	Lead miner -	Phthisis, 5 months. Certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Mar.17	79	Joiner, master	Constipation. Certified.
Apr. 2	55	Ordnance surveyor.	Diseased liver. Certified.
„ 2	83	Farmer -	Diseased heart. Certified.
Mar.30	64	Formerly lead miner.	Chronic bronchitis, 2 years. Certified.
Apr. 1	47	Lead miner -	Phthisis, 12 months. Certified.
„ 19	36	Lead miner -	Phthisis, 13 months. Certified.
„ 21	57	Lead miner -	Consumption, 6 months. Certified.
„ 17	21	Lead miner -	Consumption, 2 years. Certified.
„ 16	72	Formerly lead miner.	Old age. No medical attendant.
„ 23	22	Policeman -	Consumption. Not certified.
May 5	53	Lead ore smelter.	Nephria. Certified.
„ 14	61	Lead ore smelter.	Neparia, 12 months. Certified.
„ 15	52	Landed proprietor.	Apoplexy, 29 hours. Certified.
„ 8	63	Platelayer in lead mines.	Typhoid fever, 7 days. Certified.
June 3	55	Lead miner -	Phthisis pulmonalis, 6 months. Certified.
„ 10	55	Blacksmith -	Diarrhœa, 7 days. Certified.
„ 10	50	Agric. labourer	Consumption, some months. Certified.
„ 13	45	Lead ore washer.	Pneumonia and pleuritis. Certified.
„ 25	68	Innkeeper -	Paralysis, 1 week. Certified.
„ 21	49	Lead miner -	Pneumonia, 7 months. Certified.
„ 13	52	Lead miner -	Anasarca. Certified.
July12	39	Farmer -	Diseased stomach. Certified.
„ 11	70	Lead ore smelter.	Heart disease. Certified.
„ 26	61	Lead miner -	Asthma. Certified.
Aug 20	19	Shoemaker, apprentice.	Phthisis. Certified.
„ 25	77	Lime burner -	Enlarged prostate gland. Certified.
Sept 10	82	Blacksmith -	Ileus. Certified.
„ 4	16	Lead ore washer.	Bronchitis, 2 weeks. Certified.
Aug 12	28	Platelayer in lead mine.	Congestion of liver, 5 weeks. Certified.
Sept 18	36	Grocer - -	Muco-enteritis. Certified.
„ 18	63	Lead miner -	Bronchitis. Certified.
Oct. 5	89	Farmer -	Paralysis. Certified.
„ 15	34	Shoemaker, master.	Phthisis pulmonalis, 6 months. Certified.
„ 19	60	Landed proprietor.	Heart disease. Certified.
„ 27	22	Lead miner -	Phthisis, 12 months. Certified.
Dec. 6	13	Son of farm hind.	Continued fever, 10 days. Certified.
„ 12	46	Lead miner -	Continued fever, 10 days. Certified.
„ 22	56	Stonemason, master.	Pneumonia. Certified.
„ 20	16	Lead ore washer.	Tyhus fever. Not certified.
1861.			
Jan. 2	84	Joiner - -	Paralysis, 10 days. Not certified.
„ 22	66	Farm hind -	Cancer. Not certified.
Feb. 4	39	Lead ore smelter.	Phthisis, 6 months. Certified.
Jan. 30	65	Lead miner -	Enteritis, 2 days. Certified.
Feb. 23	61	Blacksmith, master.	Scirrhus of rectum. Certified.
„ 18	38	Farmer -	Liver complaint. Dropsy. Certified.
Feb. 16	75	Farmer - -	Fall from a cart. Inquest.
Mar. 1	67	Railway labourer.	Enteritis. Not certified.
Feb. 25	49	Lead miner -	Bronchitis, 7 days. Certified.
Mar. 7	28	Agric. labourer	Diseased heart. Certified.
„ 13	54	Shopkeeper -	Fall from a cart. Inquest.
„ 19	62	Lead miner -	Bronchitis, 8 days. Certified.
„ 24	32	Lead miner -	Hepatitis, 2 years. Certified.
„ 27	36	Cooper, master	Bronchitis. Certified.
„ 28	57	Farmer - -	Apoplexia, 3 hours. Certified.
„ 27	52	Tailor - -	Phthisis pulmonalis. Certified.
Apr. 17	65	Coal miner -	Disease of heart, 6 weeks. Certified.
„ 15	90	Farmer - -	Hemiplegia, 3 weeks. Certified.
„ 18	57	Agric. labourer	Bronchitis, 18 months. Certified.
„ 23	65	Farmer - -	Hemiplegia. Certified.
May 2	62	Butcher -	Hemiplegia, 6 days. Certified.
„ 4	72	Farmer - -	Bronchitis, 11 weeks. Certified.
„ 12	57	Lead miner -	Bronchitis. Certified.
„ 13	18	Pattern maker	Consumption, 7 months. Certified.
„ 24	68	Labourer -	Pneumonia. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
May 27	67	Farmer - -	Gangrene senilis, 26 days. Certified.
June 10	12	Son of coal miner	Diphtheria. Certified.
„ 8	66	Lead miner -	Chronic bronchitis, 12 months. Certified.
„ 9	36	Lead miner -	Diphtheria. Certified.
„ 18	11	Son of coal miner	Diphtheria. Certified.
„ 24	66	Lead miner -	Apoplexy. No medical attendant.
„ 24	52	Besom maker	Apoplexy, 1 hour. Certified.
„ 21	40	Farmer - -	Accident. Fall of a stone. Inquest.
„ 30	73	Lead ore smelter	Phthisis, 6 months. Certified.
July 2	66	Lead miner -	Influenza. Not certified.
June 25	49	Lead miner -	Consumption. Certified.
July 7	36	Lead miner -	Phthisis. Certified.
„ 29	82	Farmer - -	Old age. Not certified.
Aug 12	33	Blacksmith, journeyman.	Consumption, 12 months. Not certified.
„ 8	45	Railway labourer.	Diseased heart. Certified.
Sept 2	33	Lead miner -	Tabes mesenterica, 2 years. Certified.
„ 5	72	Proprietor of land and a lead ore washer.	Muco-enteritis, 12 months. Certified.
Sept. 7	59	Farmer - -	Diarrhœa, 16 days. Certified.
„ 8	22	Farmer - -	Consumption, 3 years. Certified.
„ 23	57	Lead miner -	Cancer, 6 months. Certified.
„ 28	34	Lead miner -	Natural causes. Inquest.
Oct. 2	78	Lead ore smelter	Diseased heart. Certified.
Nov. 14	55	Lead miner -	Typhus, 2 weeks. Diarrhœa. Certified.
„ 14	78	Agric. labourer	Old age. Not certified.
„ 19	61	Lead miner -	Softening of brain, 8 months. Certified.
Dec. 1	18	Son of lead ore smelter.	Diseased heart. Dropsy. Certified.
Nov. 29	68	Farmer - -	Hepatitis. Phthisis. Certified.
„ 28	41	Coal miner -	Consumption, 12 months. Not certified.
Dec 13	28	Esquire -	Meningitis. Certified.
„ 22	57	Lead miner -	Bronchitis, 4 months. Certified.
„ 26	67	Farmer - -	Bronchitis, 3 weeks. Apoplexy, 3 hours. Certified.

COUNTY OF CUMBERLAND.

Superintendent Registrar's District. — 564. ALSTON.

Registrar's Sub-District. — 1. Alston.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 1. Alston.

1859.			
Jan. 15	51	Lead miner -	Miners' asthma. No medical attendant.
„ 14	71	Farmer -	Bronchitis. Not certified.
„ 4	23	Lead ore miner	Accident. Fall of stone in Cabel Cleugh Mine. Inquest.
„ 19	61	Lead miner -	Miners' asthma, 5 years. Certified.
„ 23	21	Lead ore smelter	Encephalitis. Certified.
Feb. 4	50	Lead miner	Bronchitis. Certified.
„ 4	58	Cordwainer, master.	Diseased heart. Certified.
„ 6	39	Lead miner -	Consumption. Not certified.
„ 12	42	Lead miner -	Catarrh, 3 days. Certified.
Mar. 2	24	Lead miner -	Tabes mesenterica, 4 weeks. Certified.
„ 15	64	Stonemason -	Bronchitis, 2 years. Certified.
„ 17	36	Lead miner -	Meningitis. Bronchitis. Certified.
„ 19	57	Lead miner -	Bronchitis. Certified.
„ 20	64	Clogger -	Bronchitis, 2 months. Certified.
Apr. 29	24	Lead miner -	Pneumonia, 3 months. Certified,
„ 27	69	Lead miner -	Bronchitis, 14 days. Certified.
„ 30	69	Blacksmith, journeyman.	Cirrhosis of liver. Certified.
May 1	58	Farmer -	Bronchitis. Certified.
„ 11	72	Yeoman -	Bronchitis. Not certified.
„ 15	23	Lead miner -	Phthisis, 6 months. Certified.
„ 19	64	Lead miner -	Bronchitis, 6 months. Certified.
„ 27	59	Lead miner -	Bronchitis, 6 months. Certified.
June 8	28	Tailor, journeyman.	Epilepsy, 6 months. Certified.
„ 9	54	Lead mine agent.	Rheumatic pericarditis, 1 year. Certified.
„ 10	21	Lead miner -	Ascites. Certified.
„ 25	56	Lead miner -	Dyspepsia. Dropsy. Certified.
July 5	67	Butcher -	Diseased kidneys. Certified.
„ 16	56	Lead miner -	Miners' asthma. No medical attendant.
Aug. 4	74	Carrier - -	Anasarca, 9 months. Certified.
„ 2	38	Quarryman -	Accident. Fall of stone. Inquest.
Sept. 8	18	Son of lead-miner.	Phthisis. Certified.
1859.			
Oct. 11	27	Smelter of lead ore.	Cerebritis, 5 days. Certified.
„ 31	64	Agric. labourer	Angina pectoris. Certified.
Nov. 2	29	Stonemason -	Consumption, 18 months. No medical attendant.
„ 7	22	Lead miner -	Pneumonia. Certified.
„ 12	19	Lead miner -	Nephritis, 14 days. Certified.
„ 13	30	Carrier - -	Cynanche maligna. Certified.
„ 28	57	Smelter, lead ore.	Diseased heart. Certified.
Dec. 1	58	Tallow chandler, journeyman.	Intussusceptio, 24 hours. Certified.
„ 16	10	Son of farmer	Consumption, 3 months. Not certified.
„ 20	58	Lead miner -	Melanosis of lungs. Certified.
„ 20	70	Lead miner -	Diseased heart. Dropsy. Certified.
„ 23	34	Lead miner -	Phthisis pulmonalis. Certified.
1860.			
Jan. 2	22	Son of lead miner.	Scrofulous abscess. No medical attendant.
„ 14	64	Smelter of lead ore.	Tetanus from lead. Certified.
Feb. 7	70	Farmer - -	Paralysis, 6 years. Certified.
„ 9	55	Lead miner -	Miners' consumption. Certified.
„ 12	60	Lead mine agent.	Bronchitis. Certified.
„ 16	54	Draper - -	Scirrhus of liver. Certified.
„ 24	16	Son of farmer	Cephalitis, 2 weeks. Certified.
Mar. 6	30	Carter - -	Tabes mesenterica, 4 months. Certified.
„ 10	17	Lead miner -	Bronchitis, 5 years. No medical attendant.
„ 14	20	Son of dissenting minister.	Cephalitis. Certified.
Apr. 3	50	Lead miner -	Miners' asthma. Certified.
„ 4	80	Lead miner -	Apoplexy, 3 weeks. Certified.
„ 4	49	Lead miner -	Bronchitis. Consumption. Certified.
„ 13	63	Lead miner -	Bronchitis. Certified.
„ 9	62	Stonemason -	Bronchitis. Certified.
„ 14	48	Lead miner -	Miners' bronchitis, 12 months. Certified.
„ 15	23	Lead miner -	Consumption, 6 months. Certified.
„ 16	40	Police officer -	Miners' bronchitis, 2 years. Certified.
„ 14	41	Architect -	Excessive drinking of ardent spirits and laudanum. Inquest.
„ 24	39	Lead miner -	Bronchitis. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
May 8	30	Lead miner -	Enlarged liver. Certified.
June17	50	Lead miner -	Cancer. Certified.
„ 18	33	Miner - -	Accident. Fall of stone from roof of lead mine. Inquest.
„ 29	14	Son of lead miner.	Consumption. No medical attendant.
July 2	61	Lead miner -	Paraplexy. Certified.
„ 3	63	Grocer -	Bronchitis, 3 weeks. Certified.
„ 8	18	Lead miner -	Phthisis pulmonalis. Certified.
„ 8	65	Woollen weaver	Dropsy, 2 years. Certified.
„ 11	42	Farmer -	Heart disease. No medical attendant.
„ 16	34	Lead miner -	Nephria. Certified.
Aug. 1	77	Flax dresser -	Apoplexy, 12 hours. Certified.
„ 8	59	Innkeeper -	Enlarged liver. Not certified.
„ 8	66	Lead miner -	Miners' consumption. Certified.
„ 23	67	Lead miner -	Cirrhosis. Certified.
„ 27	23	Lead miner -	Phthisis pulmonalis, 6 months. Certified.
Sept.10	58	Lead miner -	Phthisis, 2 months. Certified.
„ 13	17	Son of lead miner.	Nephria. Dropsy. Coma. Certified.
„ 15	37	Stone mason -	Ileus, 24 hours. Certified.
„ 17	32	Draper -	Ileus, 10 days. Certified.
Oct. 4	15	Son of lead miner.	Chorea. Certified.
„ 20	71	Lead miner -	Senile debility. No medical attendant.
Nov. 1	33	Lead miner -	Phthisis. Certified.
„ 6	43	Innkeeper -	Phthisis pulmonatis, 4 months. Certified.
„ 17	37	Lead miner -	Phthisis pulmonalis, 2 months. Certified.
Dec. 2	23	Lead miner -	Partial dislocation of spine, 30 weeks. Certified.
„ 22	66	Workhouse master.	Chronic Bronchitis, 1 year. Certified.
1861.			
Jan. 2	41	Lead miner -	Pulmonary abscess, 1 year. Certified.
1860.			
Dec. 31	46	Lead miner -	Cirrhosis. Certified.
1861.			
Jan. 5	76	Yeoman -	Pneumonia. Certified.
„ 11	49	Lead miner -	Bronchitis. Dropsy. Certified.
„ 18	61	Lead miner -	Miners' asthma. Certified.
„ 24	53	Farmer -	Pleuro-pneumonia. Certified.
„ 26	53	Tailor, master	Phthisis pulmonalis, 2 years. Certified.
„ 30	11	Son of tailor -	Scarlatina, 2 weeks. Certified.
Feb. 7	18	Son of farmer	Scrofula. No medical attendant.
„ 7	42	Lead miner -	Scrofula. Diarrhœa. Certified.
„ 16	53	Lead miner -	Miner's phthisis. Certified.
„ 20	56	Lead miner -	Asthma. Diarrhœa. Certified.
Mar. 4	63	Lead miner -	Chronic bronchiiis, 4 years. Certified.
„ 6	43	Lead miner -	Miners consumption. Certified.
„ 16	12	Lead miner -	Miner's diarrhœa. Certified.
„ 24	52	Lead miner -	Chronic bronchitis. Certified.
„ 26	58	Farmer -	Emphysema, 4 years. Certified.
Apr. 4	71	Lead miner -	Emphysema. Certified.
„ 7	70	Lead miner -	Scirrhus.
„ 16	38	Lead miner -	Phthisis. Certified.
„ 19	66	Coal miner -	Pneumonia, 2 weeks. Certified.
„ 21	52	Plate layer -	Hemiplegia. Certified.
„ 23	23	Lead miner -	Enlargement of liver. Certified.
„ 27	62	Lead miner -	Miners' asthma. Certified.
„ 30	22	Lead miner -	Scarlatina. Certified.
May 5	25	Lead miner -	Diseased liver, 2 years. Certified.
„ 13	26	Lead miner -	Influenza, 1 month. Certified.
„ 13	60	Lead miner -	Senile debility. Certified.
„ 15	52	Lead miner -	Miners' asthma. Certified.
June23	77	Farmer -	Senile debility. No medical attendant.
„ 21	40	Lead miner -	Cynanche maligna. Certified.
„ 13	20	Waggon driver	Accident. Drowned. Inquest.
„ 29	20	Lead miner -	Gastric fever. Certified.
July 9	21	Clogger, journeyman.	Scrofula. Certified.
„ 11	28	Schoolmaster	Phthisis. Diarrhœa. Certified.
„ 10	29	Miner - -	Accident by the falling in of an arch. Inquest.
„ 20	27	Lead miner -	Phthisis pulmonalis. Certified.
Aug. 1	19	Blacksmith, apprentice	Parotitis, 10 days. Certified.
„ 31	61	Lead miner -	Cirrhosis. Certified.
„ 31	67	Lead miner -	Senile debility. Certified.
Sep. 4	60	Lead miner -	Diseased heart, 2 months. Anasarca. Certified.
1861.			
Sep. 6	31	Lead miner -	Bronchitis. Certified.
„ 24	19	Lead miner -	Phthisis, 1 year. Certified.
Oct. 27	12	Son of lead miner.	Phthisis pulmonalis, 6 months. Certified.
Nov.30	45	Lead miner -	Insanitas, 2 years. Certified.
Dec.13	55	Lead miner -	Bronchitis. Certified.
„ 26	64	Lead miner -	Bronchitis. Certified.

Superintendent Registrar's District. — Registrar's Sub-district.

570. COCKERMOUTH. — 1. Keswick.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-district - 1. Keswick.

1859.			
Jan. 9	83	Woollen weaver	Decay of nature. Certified.
„ 10	66	Woollen weaver	Stricture of œsophagus. Certified.
„ 10	45	Attorney -	Diseased heart. Dropsy, 2 months. Certified.
„ 20	88	Butcher -	Decay of nature, 8 weeks. No medical attendant.
„ 23	26	Farm servant	Phthisis, 6 weeks. Certified.
Feb. 11	36	Agric.labourer	Diseased liver, 3 months. Not certified.
„ 11	73	Lead miner -	Asthma, 15 months. No medical attendant.
„ 16	38	Lead miner -	Typhus, 3 weeks. Certified.
Mar. 7	74	Shoemaker -	Sudden death. Inquest.
„ 14	30	Lead miner -	Phthisis pulmonalis, 9 months. Certified.
„ 15	63	Woollen spinner	Nephria, 2 years. Certified.
„ 20	44	Farmer -	Diseased stomach, 2 years Certified.
Apr. 4	31	Miller, master	Phthisis pulmonalis, 18 month Certified
„ 28	52	Lead miner -	Cirrhosis of liver. Certified.
May 1	25	Mining agent	Phthisis, 6 weeks. Certified.
„ 7	18	Chemist's apprentice.	Enteritis, 1 week. Certified.
„ 17	23	Waller -	Phthisis, 3 months. Certified.
„ 18	62	Lead miner -	Bronchitis, 3 years. Certified.
„ 24	49	Farmer -	Diseased liver, 3 years. Certified.
June 3	16	Tailor's apprentice.	Phthisis pulmonalis, 6 months. Certified.
„ 7	21	Son of farmer	Consumption, 3 years. No medical attendant.
„ 8	79	Land steward	Decay of nature. Certified.
„ 11	77	Farmer -	Dropsy, 1 month. Not certified.
„ 22	79	Servant -	Diseased heart, 3 weeks. Certified.
„ 11	45	Butler -	Suicide by hanging. Inquest.
July31	54	Gentleman -	Rheumatic fever. Pericarditis. Certified.
„ 31	59	Gentleman -	Diabetes, 2 years. Certified.
„ 25	34	Stonemason -	Fracture of spine, 4 days. Certified.
Aug. 7	56	Agric. labourer	Fever, 3 weeks. Certified.
„ 26	66	Woollen weaver	Dysentery, 1 week. Certified.
Sept. 6	73	Woollen weaver	Dropsy, 6 weeks. Certified.
„ 28	58	Skinner -	Nephria. Certified.
Oct. 8	84	Farm servant	Decay of nature, 6 months. Certified.
„ 18	65	Labourer -	Found drowned. Inquest.
„ 31	57	Farmer -	Peritonitis and enteritis. Certified.
Nov. 3	76	Agric. labourer	Decay of nature, 12 months. Not certified.
„ 16	82	Joiner, journeyman.	Decay of nature, 2 years. Not certified.
„ 18	56	Lead miner -	Bronchitis, 18 months. Certified.
Dec. 1	32	Farmer -	Scarlatina, 3 days. Certified.
„ 15	34	Lead miner -	Typhus fever, 14 days. Certified.
„ 16	67	Cowkeeper -	Apoplexy. Certified.
„ 18	77	Yeoman -	Hydrothorax, 3 weeks. Certified.
1860.			
Jan. 13	80	Woollen manufacture.	Decay of nature, 4 years.
„ 18	75	Lead miner -	Nephria, 12 months. Certified.
„ 21	77	Waller, journeyman.	Influenza, 5 weeks. Bronchitis, 14 days. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Jan. 27	62	Joiner, journeyman.	Unknown. No medical attendant.
„ 28	75	Shoemaker, journeyman.	Cirrhosis of liver. Certified.
„ 30	67	Agric. labourer	Decay of nature, 4 years. Certified.
Feb. 8	77	Slate quarrier	Decay of nature, 1 year. Certified.
„ 5	67	Retired revenue officer.	Angina pectoris. Certified.
„ 2	15	Son of miner	Accident. Drowned. Inquest.
„ 10	75	Silversmith -	Bronchitis. Certified.
„ 28	22	Son of agric. labourer.	Consumption, 6 months. Certified.
„ 27	61	Son of agric. labourer.	Pneumonia, 10 days. Certified.
Mar. 13	64	Land proprietor.	Diseased heart, 2 months. Certified.
„ 17	56	Hotel keeper -	Apoplexy, 3 weeks. Certified.
„ 14	73	Farmer -	Decay of nature. No medical attendant.
„ 26	60	Farmer -	Pulmonary apoplexy, 5 days. Certified.
„ 25	20	Printer's apprentice.	Pleuritis, 12 months. Certified.
Apr. 17	67	Yeoman -	Diseased heart. Certified.
„ 19	56	Schoolmaster	Apoplexy. Certified.
May 4	42	Skinner, journeyman.	Phthisis pulmonalis. Certified.
„ 30	50	Lead miner -	Pelvic abcess, 2 years. Certified.
June 4	53	Agric. labourer	Consumption. No medical attendant.
„ 2	53	Blacklead pencil maker.	Apoplexy, 6 hours. Certified.
„ 4	68	Ostler - -	Cardiac disease, 2 years. Certified.
„ 6	52	Innkeeper -	Hepatic abscess, 16 weeks. Certified.
„ 9	67	Agric. labourer	Stricture of intestines. Certified.
„ 5	23	Farm servant	Accident. Drowned. Inquest.
„ 16	19	Tin-plate worker, journeyman.	Phthisis pulmonalis, 12 months. Certified.
„ 19	33	Lead miner -	Nephria, 3 years. Certified.
„ 24	50	Grocer - -	Emphysema, 4 years. Certified.
„ 15	64	Yeoman -	Diseased heart. Certified.
July 7	77	Woolsorter -	Cardiac disease, 2 months, Certified.
„ 23	72	Woollen weaver	Diseased heart. Dropsy. Certified.
„ 16	73	Farmer -	Bronchitis, 2 years. Certified.
„ 24	78	Farmer -	Chronic bronchitis, 9 months. Certified.
„ 26	77	Yeoman -	Cardiac disease, 2 years. Certified.
„ 28	73	Woollen manufacture.	Diseased heart, 3 months. Certified.
„ 29	56	Earthenware dealer.	Cirrhosis of liver. Certified.
Aug 13	60	Yeoman -	Pneumonia, 4 days. Certified.
„ 16	56	Landed proprietor.	Epileptic fits, 4 years. Certified.
„ 28	35	Landed proprietor.	Epilepsy, 2 years. Certified.
Sept 19	79	Proprietor of houses.	Senile bronchitis, 12 months. Certified.
Oct. 17	16	Son of bobbin turner.	Laryngitis, 5 weeks. Certified.
„ 24	80	Agric. labourer	Decay of nature, 3 months. Certified.
„ 27	43	Miner - -	Hanged himself. Temporary insane. Inquest.
„ 31	54	Agric. labourer	Nephritis. Certified.
Nov. 4	75	Carpenter, master.	Pneumonia, 8 months. Certified.
„ 7	44	Lead miner -	Cancer, 4 months. Certified.
„ 29	73	Blacksmith, journeyman.	Apoplexy. Certified.
„ 30	59	Dyer, master -	Cancer, 4 years. Certified.
Dec. 18	53	Landed proprietor.	Diseased heart, 18 months. Certified.
„ 29	73	Woollen weaver	Decay of nature, 3 months. Certified.
1861.			
Jan. 13	84	Formerly a butler.	Bronchitis, 8 days. Certified.
„ 9	72	Agric. labourer	Stricture of urethra, 6 years. No medical attendant.
Feb. 12	30	Lucendraper -	Apoplexy, 3 days. Certified.
1861.			
Feb. 5	42	Drayman -	Found drowned. Inquest.
„ 12	30	Warehouseman	Phthisis pulmonalis, 4 years. Certified.
„ 24	77	Agric. labourer	Diseased bladder, 2 years. Certified.
Mar. 13	72	Woollen weaver	Pulmonary œdema. Certified.
„ 20	67	Agric. labourer	Diseased liver, 3 months. Certified.
Apr. 23	67	Shoemaker, master.	Dropsy, 3 months. No medical attendant.
„ 26	51	Farmer -	Psoas abscess, 3 years. Certified.
May 8	87	Shoemaker -	Decay of nature, 3 years. No medical attendant.
„ 15	76	Labourer -	Paralysis of bladder. Certified.
June 12	78	Farmer -	Decay of nature. 6 months. Certified.
„ 23	79	Agric. labourer	Decay of nature. Certified.
„ 28	78	Farmer -	Asthma, 3 years. Certified.
July 10	64	Miller, master	Consumption, 6 weeks. Certified.
„ 5	64	Farmer -	Diseased heart. Dropsy, 4 months. Certified.
„ 16	73	Labourer -	Paralysis, 4 days. Certified.
Sept. 1	44	Farmer and innkeeper.	Intemperance. Certified.
„ 4	76	Woollen spinner	Bronchitis. Heart disease, 15 weeks. Certified.
„ 25	29	Tailor, journeyman.	Consumption, 9 months. Certified.
Oct. 1	25	Lead miner -	Pneumonia, 3 weeks. Certified.
„ 6	76	Sorter of black lead pencils.	Decay of nature, 3 months. Certified.
„ 21	46	Woollen manufacture.	Typhoid fever, 3 weeks. Certified.
„ 21	69	Clogg maker -	Diarrhœa, 3 months. Certified.
Nov. 5	42	Agric. labourer	Pneumonia. Hepatized lung, 3 weeks. Certified.
„ 5	12	Driver in lead-mine.	Fall over a wall at Greenside Lead Mines. Inquest.
„ 15	46	Stationer -	Bronchitis, 1 week. Certified.
„ 19	76	Woollen spinner	Apoplexy, 6 days. Certified.
„ 26	50	Engraver -	Abscess on lungs, 3 months. Certified.
„ 30	31	Blacksmith -	Convulsive fits, 3 days. Certified.
Dec. 15	84	Bacon curer -	Decay of nature, 1 month. Certified.

Superintendent Registrar's District.	Registrar's Sub-District.
571. WHITEHAVEN.	2. Whitehaven.

DEATHS OF MALES AGED 10 YEARS AND UPWARDS IN EACH OF THE YEARS 1859–61.

Sub-District - 2. Whitehaven.

1859.			
Jan. 8	74	Plasterer -	Diarrhœa, 8 days. Certified.
„ 13	17	Son of mariner	Paraplegia, 13 weeks. Certified.
„ 16	61	Mariner -	Paralysis. Certified.
„ 18	49	Miller - -	Found drowned. Inquest.
„ 19	45	Master mariner	Cardiac and pleuritic effusion. Certified.
„ 26	61	Progrietor of houses.	Chronic bronchitis. Certified.
Feb. 9	76	Mariner -	Natural decay. Certified.
„ 11	35	Stonemason -	Phthisis. Certified.
„ 10	47	Solicitor -	Diseased heart. Hepatitis. Certified.
„ 14	55	Clogger, master	Phthisis. Certified.
„ 17	69	Mariner -	Diseased heart, some years. Certified.
„ 20	50	Cordwainer -	Exhaustion. Certified.
„ 24	14	Son of cordwainer.	Typhoid fever, 19 days. Certified.
Mar. 4	19	Son of master mariner.	Phthisis. Certified.
„ 18	32	Nail maker -	Phthisis, 4 years. Certified.
„ 26	47	Mariner -	Pleuro-pneumonia, 19 days. Certified.
„ 30	70	Accountant -	Asthma. Certified.
Apr. 7	61	Labourer -	Exhaustion. Certified.
„ 5	68	Labourer -	Apoplexy, 65 hours. Certified.
„ 9	25	Stonemason -	Phthisis, 2 years. Certified.
„ 11	51	Mariner -	Morbus cordis, 10 weeks. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Apr. 16	79	Coal trimmer	Bronchitis. Certified.
„ 24	79	Farmer	Old age. Certified.
„ 25	12	Son of mariner	Scrofula, 3 years. Certified.
„ 25	79	Innkeeper	Gastric fever, 14 days. Certified.
„ 24	25	Son of ship-joiner.	Phthisis. Certified.
„ 24	44	Blacksmith	Morbus cordis, 10 days. Certified.
„ 26	47	Carter	Accident. Fall from a flight of steps. Inquest.
May 16	42	Mariner	Diseased heart. Certified.
„ 8	37	Labourer	Convulsions. Certified.
„ 11	71	Tailor, master	Old age. Certified.
„ 17	65	Stonemason	Pneumonia, 7 days. Certified.
„ 22	60	Accountant	Accident. Fall. Inquest.
„ 27	55	Rope maker	Bronchitis. Dropsy. Certified.
„ 26	62	Stone mason	Angina pectoris. Certified.
June 2	79	Cotton weaver	Rheumatism. Certified.
„ 10	46	Labourer	Nephritis. Certified.
„ 12	74	General labourer.	Cystitis. Certified.
„ 23	72	Mariner	General debility. Not certified.
„ 26	49	Iron miner	Phthisis, 3 months. Certified.
„ 25	69	Nail maker	Phthisis, 4 years. Certified.
July 2	86	Labourer	Intussusceptio. Certified.
„ 3	64	Agric. labourer	Pneumonia, 6 days. Certified.
„ 11	72	Mariner	Diarrhœa, 3 days. Certified.
„ 16	84	Chelsea pensioner.	General debility. Not certified.
„ 17	66	Nail maker	Bronchitis. Certified.
„ 19	79	Millwright	Old age. Certified.
„ 21	69	Mariner, master	Mollities cerebri. Certified.
„ 21	18	Son of labourer	Phthisis, 12 months. Certified.
„ 25	36	Proprietor of land.	Delirium tremens. Certified.
„ 26	67	Tailor, journeyman.	Phthisis, 3 months. Certified.
„ 29	59	Mariner	Diseased heart. Certified.
Aug. 3	82	Tailor, master	Diarrhœa, 4 days. Certified.
„ 8	72	Labourer	General debility. Certified.
„ 13	53	Groom and innkeeper.	Stricture of intestines. Certified.
„ 17	49	Labourer.	Diseased heart. Certified.
„ 20	62	Labourer.	Pneumonia, 8 days. Certified.
Sept. 3	70	Labourer, coal pit.	Morbus cordis, 4 months. Certified.
„ 14	41	Wood turner	Phthisis. Certified.
„ 21	16	Son of weaver	Phthisis, 4 months. Certified.
„ 24	66	Tobacconist	Gastritis. Certified.
Oct. 3	27	Labourer	Cephalitis. 1 month. Certified.
„ 3	62	General dealer	General debility. Not certified.
„ 4	43	Joiner, journeyman.	Rheumatic affection of heart. Certified.
„ 10	71	Shipwright	Apoplexy, 2 days. Certified.
„ 10	45	Painter	Accident. Fall from ladder. Inquest.
„ 28	40	Labourer	Synovitis. Fever. Certified.
„ 29	10	Son of labourer	Scarlatina, 1 month. Certified.
„ 29	39	Mariner	Accident. Drowned. Inquest.
„ 30	61	Timber merchant.	Paralysis, 2½ years. Certified.
Nov. 1	12	Son of coachman	Scarlatina, 3 days. Certified.
„ 8	77	Accountant	General debility. No medical attendant.
„ 8	88	Proprietor of houses.	Apoplexia, 3 days. Certified.
„ 14	15	Son of blacksmith.	Accident. Thrown from a horse. Inquest.
„ 16	74	Shipwright	Apoplexy. Certified.
„ 17	55	Plasterer	Phthisis, 3 months. Not certified.
„ 24	80	Hammerman	Old age. Certified.
Dec. 5	18	Tailor's apprentice.	Diseased heart, 7 weeks. Certified.
„ 7	21	House painter	Lumbar abscess, 5 months. Certified.
„ 17	31	Engine man	Natural causes. Inquest.
„ 21	69	Coal miner	Bronchitis, 3 months. Certified.
„ 23	52	Labourer	Natural causes. Inquest.
„ 25	61	Labourer	Scirrhus. Certified.
„ 25	69	Labourer	Accident. Fall down stairs. Inquest.
„ 28	75	Cabinet-maker, master.	Bronchitis, 10 weeks. Certified.
„ 29	74	Cotton weaver	General debility. Not certified.
1860.			
Jan. 11	75	Shipwright	Bronchitis, 5 weeks. Certified.
„ 15	55	House proprietor.	Hepatitis, 12 months. Certified.
„ 17	10	Son of potter	Croup, 4 days. Certified.
„ 20	64	Mariner	Diseased heart. Certified.
Jan. 20	64	Master mariner	Apoplexy and paralysis. Certified.
„ 27	11	Son of hairdresser.	Phthisis, 8 months. Certified.
„ 30	11	Son of earthenware maker.	Scarlatina, 1 month. Certified.
Feb. 2	11	Son of blacksmith.	Tabes mesenterica, 2 years. Certified.
„ 2	51	Mariner	Diseased heart. Certified.
„ 3	51	Agric. labourer	Diseased heart. Certified.
„ 6	30	Banker, coal pit.	Phthisis pulmonalis. Certified.
„ 8	42	Farmer	Hepatitis, 4 months. Certified.
„ 9	48	Stonemason	Bronchitis. Certified.
„ 12	40	Coal miner	Dropsy. Certified.
„ 12	77	Tailor	General debility, 1 year. Certified.
„ 19	46	Joiner	Chronic anemia. Certified.
„ 19	77	Flax dresser	Burn, 3 weeks. Certified.
„ 23	73	Baker	Bronchitis. Certified.
„ 25	22	Son of cabinet-maker.	Phthisis, 12 months. Certified.
Mar. 9	71	Pavior	Senile gangrene. Certified.
„ 9	34	Sawyer	Bronchitis, 1 month. Certified.
„ 10	64	Bookseller	Suicide (cut throat). Inquest.
„ 12	10	Son of stoker	Atrophy. Certified.
„ 22	28	Mariner	Diarrhœa. Certified.
Apr. 2	59	Blacksmith	Cancer. Certified.
„ 4	87	Labourer	Bronchitis, 5 months. Certified.
„ 6	46	Mariner	Asthma. Not certified.
„ 6	14	Son of provision dealer	Phthisis. Certified.
„ 7	62	Mariner	Diarrhœa, 6 weeks. Certified.
„ 7	18	Son of nail-maker.	Phthisis, 3 months. Certified.
„ 13	38	Coal miner	Bronchitis, 10 days. Certified.
„ 14	60	Mariner	Apoplexy. Certified.
„ 13	70	Builder, master	Natural decay. Not certified.
„ 17	46	Soldier	Tympanites, 1 week. Certified.
„ 20	75	Labourer	Bronchitis. Certified.
May 5	58	Cellarman	Phthisis, 6 months. Certified.
„ 11	75	Mariner, master	Diseased heart. Bronchitis. Certified.
„ 12	79	Mariner, master	Gastralgia, 3 months. Certified.
„ 18	22	Engine fitter	Phthisis, 10 weeks. Certified.
„ 18	26	Cordwainer	Phthisis, 10 weeks. Certified.
„ 27	59	Mariner	Bronchitis, 3 weeks. Certified.
June 7	59	Shoemaker, journeyman.	Asthma, Certified.
„ 9	69	Butcher	Exhaustion. Certified.
„ 11	73	Coal miner	Intussusception. Certified.
„ 20	62	Butcher, master	Bronchitis, 3 years. Certified.
July 6	30	Boot and shoemaker.	Phthisis, 6 months. Certified.
„ 7	41	Tea dealer	Phthisis pulmonalis, 2 years. Certified.
„ 6	84	Farmer	Natural decay. Certified.
„ 8	66	Carman, master	Diseased heart — years. Certified.
„ 16	46	Engine feeder	Diseased heart. Dropsy. Certified.
Aug. 6	11	Son of seaman	Tabes mesenterica, 2 months. Certified.
„ 5	65	Shipwright	Morbus cordis, 6 months. Certified.
„ 9	19	Bootmaker, apprentice.	Phthisis. Certified.
„ 14	80	Coal miner	Bronchitis, 2 months. Certified.
„ 18	21	Son of stonemason.	Phthisis. Certified.
„ 24	57	Bailiff	Apoplexy, 36 hours. Certified.
Sept. 1	54	Blacksmith	Fever, 3 weeks. Certified.
„ 5	63	Accountant	Apoplexy. Certified.
„ 20	13	Son of clerk	Scarlatina, 4 weeks. Certified.
„ 20	33	Wine merchant	Fever with delirium. Certified.
„ 20	unk.	Mariner	Accident. Fall from rigging. Inquest.
„ 23	52	Dentist	Dropsy, 2 years. Certified.
Oct. 8	49	Mariner	Phthisis. Diarrhœa. Certified.
„ 16	30	Watch maker	Pneumonia, 8 days. Certified.
„ 17	30	Labourer	Phthisis. Certified.
„ 19	18	Seaman	Phthisis, 2 months. Certified.
„ 20	68	Seaman	General debility. Not certified.
„ 27	55	Assistant overseer.	Typhus fever, 12 days. Certified.
Nov. 3	54	Rope maker, journeyman.	Phthisis. Certified.
Oct. 5	30	Shipwright	Dysentery. Certified.
Nov. 12	75	Corn miller	Bronchitis. Certified.
„ 14	75	Labourer	Morbus cordis. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age	Occupation.	Cause of Death.
1860.			
Nov. 17	21	Seaman -	Accident. Fall from ladder. Inquest.
„ 20	44	Wine merchant	Apoplexy. Certified.
„ 28	59	Coal miner -	Diseased heart. Dropsy, 4 months. Certified.
Dec. 7	50	Painter -	Cancer. Certified.
„ 5	75	Cab driver -	Asthma. Certified.
„ 12	26	Mariner -	Phthisis pulmonalis. Certified.
„ 13	67	Butcher, journeyman.	Icterus. Certified.
„ 14	unk.	Mariner -	Fell down on the quay and died instantly. Inquest.
„ 17	81	Shipwright -	Old age. Certified.
„ 22	74	Grocer -	Natural decay. Certified.
„ 22	29	Labourer -	Bronchitis, 14 days. Certified.
Dec. 30	16	Labourer -	Accident by machinery. Inquest.
1861.			
Jan. 5	61	Cordwainer -	Bronchitis. Certified.
„ 12	28	Labourer -	Bronchitis, 3 weeks. Certified.
„ 14	83	Labourer -	Old age. Not certified.
„ 21	57	Coal miner -	Apoplexy. Certified.
„ 23	65	Mariner -	Bronchitis, 6 days. Certified.
„ 26	55	Coal trimmer	Necrosis. Certified.
„ 26	49	Cartwright -	Accident. Fall of timber. Inquest.
„ 28	20	Iron ore miner	Fall of stone from No. 3 pit in Parkside Mine. Inquest.
„ 31	51	Pensioner -	Phthisis pulmonalis, 5 weeks. Certified.
Feb. 2	47	Mariner, master	Phthisis. Certified.
„ 3	52	Mariner, master	Cancer, 13 months. Certified.
„ 12	33	Mariner, master	Consumption, 3 months. Certified.
„ 17	22	Painter, journeyman.	Phthisis. Certified.
„ 18	62	Linendraper -	Morbus cordis, 12 months. Certified.
„ 23	58	Bootmaker -	Cirrhosis, 14 months. Certified.
Mar. 8	74	Banker - -	Bronchitis, 3 weeks. Certified.
„ 13	32	Labourer -	Accident. Drowned. Inquest.
„ 15	12	Son of brickmaker.	Mesenteric disease. Certified.
„ 29	39	Corn merchant	Apoplexy, 44 hours Certified.
Apr. 3	79	Quarryman -	Bronchitis, 7 days. Certified.
„ 10	76	Chelsea pensioner.	Apoplexy. Certified.
„ 15	47	Shoemaker, journeyman.	Phthisis. Certified.
„ 15	52	Corn merchant	Paralysis. Certified.
„ 17	78	Hatter -	Bronchitis. Certified.
„ 19	34	Mariner -	Cut his throat (suicide). Inquest.
May 4	13	Son of fish curer.	Phthisis. Certified.
„ 8	42	Labourer -	Accident in a bone-mill. Inquest.
„ 27	34	Coal miner -	Diseased heart. Dropsy. Certified.
1861.			
May 27	63	Stoker - -	Bronchitis. Certified.
June 1	17	Tailor - -	Accident by machinery in a mine. Inquest.
„ 14	13	Driver - -	Accident. Kick of a horse. Inquest.
„ 20	50	Shoemaker -	Natural causes. Sudden. Inquest.
„ 24	25	Brazier, journeyman.	Phthisis, 6 months. Certified.
„ 29	82	Coal miner -	General debility. Certified.
„ 30	34	Stoker, coal-pit	Phthisis. Certified.
July 3	59	House joiner -	Dropsy. Certified.
„ 10	17	Son of labourer	Phthisis, 3 years. Certified.
„ 15	83	Nail-maker -	Icterus. Certified.
Aug. 8	71	Mariner -	Apoplexy, 12 hours. Certified.
„ 14	63	Shoemaker, journeyman.	Enlarged prostate gland. Certified.
„ 16	40	Labourer -	Phthisis. Certified.
„ 26	62	Sawyer -	Bronchitis. Certified.
Sept. 7	25	Coach proprietor.	Icterus, 2 week. Certified.
„ 6	35	Landed proprietor.	Unknown. No medical attendant.
„ 14	27	Joiner, journeyman.	Lumbar abscess, 8 months. Certified.
„ 18	100	Stonemason -	Old age. Certified.
—	unk.	Labourer -	Found drowned. Inquest.
„ 29	43	Innkeeper -	Hepatitis. Anasarca. Certified.
Oct. 11	67	Joiner, master	Bronchitis, 1 year. Certified.
„ 14	76	Master mariner	Natural decay, 1 year. Certified.
„ 16	78	Agric. labourer	Old age. Certified.
Oct. 19	43	Coal miner -	Ascites. Certified.
Nov. 1	46	Innkeeper -	Accident. Drowned. Inquest.
„ 2	13	Son of plumber, master.	Spinal disease. Certified.
„ 3	49	Butcher, master	Bronchitis, 3 months. Certified.
„ 7	69	Mariner -	General debility. Not certified.
„ 10	45	Labourer -	Bronchitis. Certified.
„ 10	32	Mariner -	Phthisis, 10 months. Certified.
„ 17	61	Coach maker, journeyman.	Dysentery Certified.
„ 77	35	Cabinet maker, journeyman.	Phthisis, 6 months. Certified.
„ 20	18	Son of shipwright.	Convulsions. Certified.
Nov. 22	71	Labourer -	Natural decay. Not certified.
„ 25	52	Mariner, master.	Diseased heart. Dropsy. 4 months. Certified.
„ 29	41	Pawnbroker -	Cirrhosis, 4 months. Certified.
Dec. 1	29	Policeman -	Remittent fever, 9 days. Certified.
„ 2	26	Sawyer -	Phthisis, 1 year Certified
„ 4	56	Joiner, journeyman.	Bronchitis. Certified.
„ 10	10	Son of sawyer	Accident Drowned. Inquest.
„ 12	64	Shipwright -	Bronchitis, 2 years. Certified.
„ 16	11	Son of servant	Anasarca. Certified.
„ 22	45	Brazier -	Diseased heart. Anasarca. Certified.

COUNTY OF WESTMORELAND.

Superintendent Registrar's District.	Registrar's Sub-District.
574 West Ward.	2 Lowther.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61.

Sub-District - 2 Lowther.

When Died.	Age	Occupation.	Cause of Death.
1858.			
Dec. 22	46	Corn miller -	Fall from a loft. Inquest.
1859.			
Feb. 5	24	Lead miner -	Consumption. Certified.
Mar. 22	66	Railway labourer.	Typhus fever. Not certified.
Apr. 14	86	Mole catcher	Natural decay. Certified.
„ 23	29	Road repairer	Phthisis, 1 year. Certified.
May 4	91	Farmer -	Natural decay. Not certified.
Apr. 28	65	Road repairer	Erysipelas. Not certified.
1859.			
May 10	72	Mole catcher	Natural decay. Not certified.
„ 13	36	Labourer -	Fever. Certified.
„ 13	81	Agric. labourer	Dropsy and diseased heart. Certified.
„ 23	27	Miner - -	Accident. Explosion from blasting in mine. Inquest.
June 2	70	Gentleman -	Apoplexy, 9 hours. Certified.
May 22	54	Saddler -	Found drowned. Inquest.
June 14	67	Farmer - -	Hernia. Not certified.
July 10	66	Groom - -	Cancer. Certified.
June 18	67	Innkeeper -	Natural decay. Not certified.
July 18	52	Clog maker -	Decline. Not certified.
„ 31	57	Lead miner -	Consumption. Not certified.
Aug 13	74	Farmer - -	Natural decay. Not certified.
„ 20	35	Stonemason -	Enteritis. Not certified.
Sept 24	56	Railway labourer.	Sudden death. Inquest.
Oct. 16	36	Agric. labourer	Dropsy, 6 months. Certified.
„ 18	39	Farmer - -	Consumption. Certified.
„ 24	40	Lead miner -	Consumption. Not certified.
„ 19	40	Mole catcher -	Suffocation, Lime kiln. Inquest.
Nov. 18	13	Son of agric. labourer.	Scarlatina. Certified.

DISTRICTS IN NORTH OF ENGLAND.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Nov. 23	30	Butcher -	Phthisis. Certified.
„ 21	59	Labourer -	Found drowned. Inquest.
Dec. 12	28	Carpenter -	Decline. Not certified.
„ 21	25	Copper miner	Consumption. Not certified.
„ 22	52	Farmer -	Dropsy. Not certified.
„ 1	41	Gentleman -	Cephalitis. Not certified.
1860.			
Feb. 4	12	Son of gentleman.	Hydrocephalus. Not certified.
„ 18	39	Farmer -	Phrenitis, 7 days. Certified.
„ 28	74	Groom -	Dropsy. Inquest.
Mar. 5	79	Agric. labourer	Natural decay. Certified.
„ 7	74	Carrier -	Natural decay. Certified.
„ 27	48	Agric. labourer	Insanity. Not certified.
Apr. 1	82	Blacksmith -	Natural decay. Not certified.
Mar. 31	78	Farmer -	Natural decay. Not certified.
Apr. 5	20	Son of farmer	Consumption. Not certified.
„ 7	54	Parish clerk -	Diseased heart. Not certified.
„ 19	54	Innkeeper -	Pneumonia. Certified.
May 16	83	Farmer -	Natural decay. Certified.
„ 15	10	Son of farmer	Diphtheria. Not certified.
„ 17	84	Groom -	Found dead in a stable. Inquest.
June 4	48	Doorkeeper -	Apoplexy. Not certified.
„ 11	61	Land proprietor.	Pneumonia. Not certified.
July 9	88	Land proprietor.	Old age. Not certified.
„ 16	79	Gentleman -	Old age. Not certified.
„ 16	61	Agric. labourer	Cut his throat (insane). Inquest.
Aug. 3	54	Farmer -	Diseased lungs. Certified.
„ 15	80	Farmer -	Natural decay. Not certified.
„ 15	34	Innkeeper -	Consumption. Not certified.
„ 29	29	Joiner -	Consumption. Not certified.
Oct. 15	76	Plasterer -	Hernia. Certified.
„ 19	87	Farmer -	Natural decay. Certified.
Nov. 7	85	Farmer -	Dropsy. Not certified.
„ 12	77	Weaver -	Natural decay. Certified.
„ 21	78	Agric. labourer	Natural decay. Not certified.
„ 5	60	Labourer -	Found drowned. Inquest.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Nov. 26	79	Gentleman -	Natural decay. Certified.
1861.			
Jan. 20	60	Farmer -	Typhus. Bronchitis. Certified.
„ 21	13	Son of ostler	Not stated.
1860.			
Dec. 17	33	Gentleman -	Consumption. Not certified.
1861.			
Jan. 28	88	Farmer -	Natural decay. Certified.
Feb. 3	73	Mason - -	Natural decay. Not certified.
Jan. 28	69	Book dealer -	Diseased heart. Certified.
„ 31	55	Vagrant -	Natural causes. Inquest.
Mar. 11	41	Farm servant	Ileus. Certified.
„ 27	66	Farm servant	Pneumonia. Not certified.
Apr. 10	59	Gentleman -	Cirrhosis of liver, 3 months. Certified.
„ 15	59	Farmer - -	Dropsy. Not certified.
May 1	63	Carpenter -	Compression of brain. Certified.
Apr. 20	31	Schoolmaster-	Found drowned. Inquest.
June 7	84	Clergyman -	Natural decay. Not certified.
„ 1	78	Gentleman -	Natural decay. Not certified.
„ 24	33	Carpenter -	Consumption. Certified.
July 18	10	Son of agric. labourer.	Water in the head. Not certified.
Aug. 16	82	Blacksmith -	Natural decay. Not certified.
Sep. 16	73	Farmer -	Apoplexy. Certified.
Oct. 2	55	Farmer -	Dropsy. Certified.
„ 6	49	Husbandman	Hanged himself (suicide). Inquest.
Nov. 2	68	Vicar of Bampton.	Diseased heart, 2 years. Inquest.
„ 25	39	Earthenware maker.	Accidentally drowned. Inquest.
Dec. 7	46	Drayman -	Accident. Run over by horse and cart. Inquest.
„ 16	19	Lead ore washer.	Consumption. Not certified.

DISTRICTS IN NORTH WALES.—COUNTY OF FLINT.

Superintendent Registrar's District.	Registrar's Sub-District.
610. Holywell.	1. Whitford. 2. Holywell. 3. Flint. 4. Mold.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61.

Sub-District. 1. Whitford.

1859.			
Jan. 5	10	Son of house joiner.	Scarlet fever. Not certified.
„ 15	65	Lead smelter	Palsy. Confined to bed 8 years. Not certified.
„ 22	89	Road labourer	Decay of nature. Not certified.
Feb. 2	47	General labourer	Consumption, 3 months. Certified.
„ 10	61	General labourer	Consumption, 3 months. Certified.
„ 19	15	Son of carpenter	Consumption, 12 months. Certified.
Mar. 20	39	Fireman -	Consumption, 6 months. Not certified.
„ 20	17	Farm servant	Supposed to have fallen from the back of a young colt. Inquest.
1859.			
Mar. 22	27	Collier - -	Inflammation of lungs. Not certified.
„ 28	72	Errand man -	Palsy, second attack. Not certified.
Apr. 3	55	Farmer -	Dropsy. Certified.
„ 4	57	Collier - -	Consumption. Not certified.
„ 14	90	Labourer -	Decay of nature. Not certified.
„ 18	59	Lead miner -	Dropsy, 2 months. Not certified.
„ 22	63	Labourer -	Asthma, 12 months. Certified.
„ 25	24	Collier - -	Consumption, 6 months. Certified
May 4	73	Collier - -	Decay of nature. Not certified.
„ 7	70	Farmer - -	Apoplexy. Not certified.
„ 12	70	General labourer	Decay of nature. Certified.
„ 15	24	Journeyman baker.	Consumption, 6 months. Certified.
„ 12	77	Lead miner -	Decay of nature. Not certified.
June 3	82	Farmer -	Decay of nature. Not certified.
„ 1	72	Agricultural labourer.	Decay of nature. Certified.
„ 9	51	Agric. labourer	Not known. Not certified.
„ 10	59	Farmer -	Consumption. Not certified.
„ 22	82	Slater - -	Decay of nature. Not certified.
„ 22	52	Mason - -	Consumption, 14 months. Certified.
„ 28	67	Collier - -	Not known. No medical attendant.
July 3	74	Lead miner -	Decay of nature. Not certified.
„ 10	85	General labourer	Decay of nature. Not certified.
„ 11	20	Husbandman -	Fever, 7 days. Not certified.
Aug. 2	40	General labourer	Typhus fever, 7 days. Certified.
„ 5	10	Son of sailor -	Slow fever, 3 weeks. Not certified.
„ 4	46	Farmer -	Consumption, 6 months. Certified.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Aug. 5	65	Farmer -	Cancer on the face, 4 years, Not certified.
„ 19	59	Labourer -	Asthma. Not certified.
Sept. 1	50	General labourer	Consumption, 6 months. Certified.
Aug. 21	16	Son of farmer	Typhus fever, 4 weeks. Certified.
Sept. 19	29	Collier - -	Consumption, 6 months. Certified.
„ 17	42	Clerk - -	Jaundice, 2 years. Not certified.
„ 24	49	Publican -	Consumption. Not certified.
„ 28	30	Mason - -	Consumption. Not certified.
Oct. 20	65	General labourer	Convulsions. Not certified.
Nov. 9	42	Warehouseman	Consumption, 6 months. Not certified
„ 22	25	Coal miner -	Consumption, 4 months. Not certified.
„ 29	59	Coal miner -	Asthma, 12 months. Certified.
Dec. 20	19	Lead miner -	Scarlet fever, 3 weeks. Certified.
„ 24	60	Carpenter -	Injury to spine. Not certified.
1860.			
Jan. 7	54	Grocer - -	Asthma, 5 years. Not certified.
„ 15	31	Collier - -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 21	82	General labourer	Decay of nature. Not certified.
Feb. 2	86	Labourer -	Decay of nature. Certified.
„ 9	70	Lead miner -	Asthma. Not certified.
„ 12	47	Wheelwright	Brain fever, 3 days. Not certified.
„ 17	19	Collier - -	Consumption, 9 months. Certified.
„ 16	18	Sailor - -	Drowned in the River Dee.
„ 20	68	Lead miner -	Asthma. Not certified.
„ 25	55	Horse dealer -	Died suddenly by the visitation of God in a natural way. Inquest.
Mar. 2	17	Son of lead miner.	Scarlet fever, 14 days. Not certified.
„ 7	85	Farmer -	Decay of nature. Not certified.
„ 8	67	Lead miner -	Dropsy. Not certified.
„ 13	31	Lead ore miner	Accidentally killed by falling down to the bottom of a lead ore mine shaft. Inquest.
„ 18	70	Wheelwright	Water on the chest. Not certified.
„ 18	52	Gentleman -	Palsy, second attack. Not certified.
„ 27	58	Lead miner -	Consumption. Not certified.
„ 31	57	Farmer -	Asthma. Not certified.
Apr. 2	57	Lead miner -	Asthma, 2 years. Not certified.
„ 10	73	Labourer -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 9	40	Mason - -	Consumption, 9 months. Certified.
„ 15	78	Wool spinner	Decay of nature. Not certified.
May 1	87	Butcher -	Decay of nature. Not certified.
„ 8	62	Mine agent -	Palsy. Not certified.
„ 9	44	Collier - -	Not known. No medical attendant.
„ 9	50	Labourer -	Consumption, 3 months. Certified.
„ 11	39	Engineer -	Consumption, 11 months. Not certified.
„ 15	70	Husbandman -	Decay of nature. Not certified.
June 12	36	Farmer -	Consumption, 10 months. Not certified.
„ 23	84	Collier - -	Decay of nature. Not certified.
„ 24	78	Shoemaker -	Do.
July 4	75	Farmer -	Do.
„ 7	76	Farmer -	Do.
„ 12	80	Farmer -	Do.
„ 8	25	Footman -	Consumption, 12 months. Certified.
„ 21	78	Collier - -	Decay of nature. Not certified.
„ 19	54	Lead miner -	Consumption. Not certified.
„ 25	61	Innkeeper -	Consumption, 6 months. Certified.
„ 28	40	Collier - -	Disease of the heart. Certified.
Aug. 10	63	General labourer	Consumption. Not certified.
„ 12	33	Husbandman -	Fever, 14 days. Not certified.
„ 13	42	Lead miner -	Consumption, 12 months. Certified.
„ 13	55	Carpenter -	Fistula. Not certified.
„ 25	70	Sawyer -	Decay of nature. Not certified.
Sept. 10	56	Farmer -	Being subject to fits, was drowned accidentally in a ditch. Inquest.
„ 13	48	Shoemaker -	Consumption. Not certified.
Oct. 8	20	Coal miner -	Consumption. Certified.
„ 31	11	Son of blacksmith	Fever, 9 days. Not certified.
Nov. 3	23	Schoolmaster	Consumption. Certified.
„ 13	34	Coal miner -	Consumption. Not certified.
„ 15	74	Coal miner -	Decay of nature. Not certified.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Nov. 30	34	Farmer -	Consumption, 12 months. Not certified.
" 25	22	Butter merchant.	Consumption, 6 months. Not certified.
Dec. 14	54	Coal miner -	Inflammation of lungs. Certified.
„ 15	62	Coal miner -	Asthma, 12 months. Certified.
„ 16	12	Son of lead miner.	No medical attendant. Not certified.
„ 21	94	Coal miner.	Decay of nature. Not certified.
„ 27	64	General labourer	Dropsy. Certified.
1861.			
Jan. 6	67	Coal miner -	Not known. No medical attendant.
„ 14	78	Mug dealer -	Decay of nature. Not certified.
„ 16	58	General labourer	Consumption. Not certified.
„ 16	84	Shoemaker -	Decay of nature. Certified.
Feb. 9	38	Labourer -	Consumption, 12 months. Certified.
„ 12	14	Labourer -	Decay of nature. Not certified.
„ 9	72	Farmer -	Slow fever. Not certified.
„ 12	80	Farmer -	Decay of nature. Not certified.
„ 26	74	Blacksmith -	Decay of nature. Not certified.
„ 27	39	Journeyman printer.	Consumption. Not certified.
Mar. 14	53	Lead miner -	Miners' asthma. Certified.
„ 17	68	Farmer -	Decay of nature. Not certified.
„ 24	16	Son of lead miner.	Not known. Not certified.
Apr. 6	17	Son of coal miner.	Consumption, 6 months. Certified.
„ 13	70	Lead miner -	Decay of nature. Not certified.
„ 20	11	Son of farmer	Diphtheria. Certified.
„ 23	50	Lead miner -	Consumption, 12 months. Certified.
May 14	61	Lead miner -	Asthma. Not certified.
„ 11	68	Gentleman -	Malignant disease of stomach. Certified.
„ 18	76	Farmer -	Dropsy. Not certified.
„ 20	63	Coal miner -	Consumption. Not certified.
„ 11	36	Coal miner -	Consumption. Certified.
„ 10	55	Farmer -	Consumption. Certified.
„ 26	71	Shopkeeper -	Obstruction of the bowels. Certified.
„ 18	56	Lead miner -	Miner's asthma. Not certified.
„ 10	72	General labourer	Decay of nature. Not certified.
„ 21	62	Farmer -	Decay of nature. Not certified.
July 3	52	Mason - -	Rheumatism, 6 months. Certified.
„ 6	55	Farmer -	Consumption, 8 months. Certified.
Aug. 1	31	Miner - -	Accidentally killed by falling down a shaft. Inquest.
Mar. 28	32	Collier -	Accidentally killed by a large lump of coal falling on his head. Inquest.
Aug. 4	71	Butcher -	Decay of nature. Not certified.
„ 13	64	Farmer -	Consumption. Certified.
Sept. 11	52	Lead miner -	Cancer on the face. Certified.
„ 10	66	Farmer -	Accidentally killed by falling down stairs. Inquest.
Oct. 1	19	Coal miner -	Consumption, Not certified.
„ 1	37	Husbandman	Consumption, 6 months. Not certified.
„ 4	67	Tailor -	Dropsy. Certified.
„ 4	14	Son of platelayer.	Consumption, 6 months. Certified.
„ 10	67	Farmer -	Decay of nature. Certified.
„ 11	70	Farmer -	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 10	77	Shepherd -	Decay of nature. Not certified.
„ 13	53	Wheelwright	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 27	69	Agric. labourer	Decay of nature. Not certified.
„ 30	22	General labourer	Not known. No medical attendant.
„ 26	23	Collier -	Accidentally suffocated and smothered. Inquest.
„	45	Do. -	Do.
„	24	Do. -	Do.
„	36	Do. -	Do.
„	32	Do. -	Do.
„	38	Do. -	Do.
„	39	Do. -	Do.
„	35	Do. -	Do.
„	49	Do. -	Do.
„	24	Do. -	Do.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Nov. 15	41	Mason - -	Consumption, 12 months. Certified.
„ 17	35	Sailor - -	Drowned in the river Dee. Inquest.
„ 22	86	Labourer -	Decay of nature. Not certified.
„ 19	15	Carter -	Accidentally killed by a chaff-cutting engine. Inquest.
„ 21	66	Fishmonger -	Palsy. Not certified.
Dec. 2	63	Lead miner -	Miner's asthma.
„ 7	19	Farm labourer	Fever, 9 days. Not certified.
„ 19	20	Journeyman draper.	Consumption. Certified.
„ 26	18	Son of lead miner.	Consumption. Not certified.

Sub-District. 2. Holywell.

1859.			
Jan. 1	58	Labourer -	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 14	72	Farmer -	Chronic disease of stomach. Certified.
„ 9	77	Miner -	Asthma. Certified.
„ 19	80	Shopkeeper -	Asthma. Certified.
„ 19	65	Miner -	Asthma and dropsy. Certified.
„ 28	17	Sailor -	Consumption. Certified.
„ 28	65	Collier -	Consumption. Certified.
Feb. 5	15	Farm servant	Typhus fever. Certified.
„ 6	37	Bricklayer -	Dropsy.
„ 12	86	Farmer -	Decline of age. Not certified.
„ 16	76	Miller and publican.	Decline of age. Not certified.
„ 20	66	Lead smelter	Chronic disease of stomach. Certified.
„ 26	58	Miner - -	Consumption. Certified.
„ 27	23	Miner - -	Disease of hip. Certified.
Mar. 2	70	Stone mason and farmer.	Dropsy. Certified.
„ 4	53	Miner - -	Fever. Certified.
„ 14	83	Lead ore washer	Palsy. Certified.
„ 17	55	Mine agent -	Dropsy. Certified.
„ 21	52	Farmer and publican.	Asthma. Certified.
„ 23	35	Son of collier, idiot.	Ulceration of the bowels. Certified.
Apr. 13	64	Forgeman in copper works.	Softening of the brain. Certified.
„ 17	49	Gardener -	Consumption. Certified.
„ 22	54	Miner -	Asthma. Certified.
„ 22	42	Farmer -	Consumption. Certified.
„ 21	60	Pauper -	Ulcerated legs. Certified.
„ 1	17	Son of collier	Had his fingers accidentally entangled in machinery, which produced lockjaw and death. Inquest.
Apr. 1	11	Son of printer	Accidentally killed by the wild beasts' carriages of Mrs. Ann Wombwell falling upon him during a very heavy wind. Inquest.
„ 1	32	Keeper at Mrs. Wombwell's.	Do.
„ 1	14	Son of blacksmith.	Do.
„ 1	13	Printer - -	Do.
„ 2	49	Lead ore miner	Accidentally killed by part of the roof of the Lead Ore Mine falling upon him. Inquest.
„ 16	14	Collier - -	Accidentally burned to death by the fire damp in Coleshill Colliery. Inquest.
„ 29	24	Joiner -	Consumption. Certified.
May 7	79	Labourer -	Palsy. Certified.
„ 10	70	Labourer -	Chronic bronchitis. Certified.
„ 12	22	Copper worker	Consumption. Certified.
„ 14	78	Smelter -	Decline of age. Not certified.
„ 20	61	Engineer -	Diseased heart and asthma. Certified.
„ 20	10	——	Hydrocephalus. Certified.
„ 22	24	Ship broker's clerk.	Consumption. Certified.
„ 24	65	Coal miner -	Asthma. Certified.
„ 26	45	Farmer and road surveyor.	Enteritis. Certified.
1861.			
May 17	68	Gardener -	Not being of sound mind, memory, and understanding, did hang himself with a rope to the roof of a bedroom in his own house until he was dead. Inquest.
„ 19	65	Surgeon -	Diseased kidneys and dropsy. Certified.
June 3	44	Mine agent -	Typhoid fever. Certified.
„ 2	72	Farmer -	Bronchitis. Certified.
„ 2	56	Paper maker -	Dropsy. Certified.
„ 30	53	Baptist minister	Struck by a flash of lightning, and from the effect of such did instantly die. Inquest.
„ 7	31	Collier - -	Consumption. Certified.
„ 7	60	Miner - -	Consumption. Certified.
„ 17	60	Labourer -	Cancer. Certified.
„ 30	77	Smelter -	Dropsy. Certified.
July 17	73	Labourer -	Rheumatism. Not certified.
Aug. 6	51	Miner - -	Asthma. Certified.
„ 10	41	Collier - -	Epilepsy. Certified.
„ 16	32	Labourer -	Asthma. Certified.
„ 19	79	Formerly copper shearer.	Decline of age. Not certified.
„ 28	58	Miner - -	Chronic disease of stomach. Certified.
Sept. 3	19	Copper roller	Consumption. Certified.
„ 13	10	Son of farmer	Died suddenly by the visitation of God while in a fit. Inquest.
„ 16	24	Lead worker -	Consumption. Certified.
„ 21	32	Labourer -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 26	72	Miner - -	Palsy. Certified.
Oct. 3	20	Farm servant	Consumption. Certified.
„ 7	57	Rope drawer -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 11	55	Miner - -	Consumption. Certified.
„ 14	75	Miner - -	Asthma. Certified.
„ 19	66	Labourer -	Ileus. Certified.
„ 22	50	Shoemaker -	Phthisis. Certified.
„ 24	55	Labourer -	Scrofula. Certified.
„ 21	58	Farmer -	Found dead in the bottom of a mine shaft in Holywell Mountain on the 23rd of October 1859. Inquest.
„ 27	11	Son of labourer	Accidentally killed by falling from the back of a donkey which he was riding. Inquest.
„ 26	47	Ostler - -	Consumption. Certified.
Nov. 3	59	Smelter -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 10	81	Farmer -	Pneumonia. Certified.
„ 11	29	Railway labourer	Consumption. Certified.
„ 12	72	Smith - -	Bronchitis. Certified.
„ 13	75	Carpenter -	Decline of age. Certified.
„ 18	72	Labourer -	Dropsy. Certified.
„ 3	59	Smelter -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 24	29	Labourer -	Consumption. Certified.
„ 21	75	Schoolmaster	Gout and diseased liver. Certified.
„ 26	51	Labourer -	Cancer. Certified.
„ 29	71	Joiner - -	Chronic diseased bladder. Certified.
Dec. 4	51	Collier - -	Bronchitis. Certified.
„ 5	65	Farmer -	Palsy. Certified.
„ 5	55	Miner - -	Consumption. Certified.
„ 13	36	Carpenter -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 28	56	Miner - -	Chronic bronchitis. Certified.
„ 23	65	Labourer -	Died suddenly by the visitation of God from the effect of the bursting of a varicose vein of the leg. Inquest.
1860.			
Jan. 2	55	Miner and shoemaker.	Pneumonia. Certified.
„ 5	30	Shoemaker -	Consumption. Certified.
„ 19	49	Joiner and publican.	Diseased liver. Certified.
„ 23	68	Clerk and overlooker.	Asthma. Certified.
„ 25	62	Miner - -	Strangulated hernia. Certified.
„ 25	70	Miner - -	Asthma. Certified.
„ 27	60	Foreman in wine vaults.	Chronic bronchitis. Certified
Feb. 4	37	Miner - -	Disease of the heart. Certified.
„ 6	55	Collier -	Palsy. Certified.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Feb. 8	77	Paper lighter	Died suddenly by the visitation of God in a natural way. Inquest.
„ 15	85	Husbandman	Decline of age. Certified.
„ 15	72	Stonemason -	Dropsy. Certified.
„ 19	66	Carter - -	Consumption. Certified.
„ 28	39	Miner -	Pneumonia. Certified.
Mar. 7	59	Lead roller -	Fistula.
„ 7	38	Stonemason -	Inflammation of lungs. Certified.
„ 6	80	Formerly manager in lead works.	Decline of age. Not certified.
„ 10	31	Miner - -	Consumption. Certified.
„ 15	83	Farmer -	Decline of age. Certified.
„ 18	11	- - -	Scarlet fever. Certified.
„ 23	65	Labourer -	Consumption. Certified.
Apr. 3	60	Miner - -	Fever. Certified.
„ 1	73	Miner - -	Died suddenly by the visitation of God in a natural decay. Inquest.
„ 5	35	Clerk to Holywell Union.	Bronchitis. Certified.
„ 6	77	Formerly gardener.	Decline of age. Certified.
„ 9	62	Farmer - -	Asthma and dropsy. Certified.
„ 14	72	Smelter - -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 16	66	Formerly clerk and relieving officer.	Palsy. Decline.
May 2	76	Thatcher -	Decline of age. Certified.
Apr. 30	44	Labourer -	Died suddenly by the visitation of God in a natural way. Inquest.
May 3	71	Watchmaker -	Fever. Certified.
„ 13	30	Publican -	Pneumonia. Certified.
„ 16	42	Farm labourer	Bronchitis. Certified.
„ 16	26	Collier - -	Consumption. Certified.
„ 26	22	Draper - -	Consumption. Certified.
„ 30	15	- - -	Dropsy. Certified.
June 8	68	Formerly cotton spinner.	Asthma and dropsy. Certified.
„ 5	11	Son of miner -	Consumption. Certified.
„ 9	64	Labourer -	Killed by a tree falling upon him. Inquest.
„ 14	72	Smelter and publican.	Palsy. Certified.
„ 16	80	Joiner - -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 18	51	Labourer -	Consumption. Certified.
„ 19	60	Stonemason -	Pneumonia. Certified.
„ 29	79	Farmer - -	Decline of age. Certified.
„ 30	32	Collier - -	Effects of a burn. Certified.
„ 30	32	Collier - -	Accidentally burned to death by an explosion of fire damp. Inquest.
July 7	54	Publican -	Died suddenly from the effects of excessive drinking. Inquest.
„ 19	60	Slater - -	Chronic dirrahœa. Certified.
„ 21	31	Attorney's clerk	Consumption. Certified.
Aug. 3	42	Labourer -	Fever. Certified.
„ 4	63	Labourer -	Chronic disease of stomach. Certified.
„ 1	72	Collier - -	Dropsy. Certified.
„ 7	50	Collier - -	Asthma. Certified.
„ 9	28	Attorney's clerk	Consumption. Certified.
„ 25	32	Tailor - -	Enteritis. Certified.
„ 28	60	Hawker -	Paralysis. Certified.
„ 31	72	Baker - -	Dropsy. Certified.
Sept. 1	14	Son of lead miner.	Diphtheria. Certified.
„ 16	30	Discharged soldier.	Serous apoplexy. Certified.
„ 19	66	Collier - -	Dropsy. Certified.
„ 19	23	Butcher -	Consumption. Not certified.
„ 23	48	Labourer -	Scirrhus of the throat. Certified.
Oct. 1	73	Copper roller -	Decline of age. Certified.
„ 15	86	Farmer - -	Do.
„ 19	71	Smelter - -	Disease of the heart. Certified.
„ 22	23	Smelter - -	Consumption. Certified.
„ 28	83	Smelter - -	Strangulated hernia. Certified.
„ 31	56	Smelter - -	Disease of the heart and dropsy. Certified.
„ 31	50	Smelter - -	Paralysis. Certified.
Nov. 4	86	Formerly joiner	Apoplexy. Certified.
„ 24	54	Weaver & toll-gate keeper.	Disease of liver and kidneys. Certified.

When Died.	Age	Occupation.	Cause of Death.
1860.			
Nov. 24	68	Mine agent -	Chronic bronchitis. Certified.
Dec. 7	67	Farm bailiff -	Apoplexy. Certified.
„ 10	20	In service -	Abscess of the brain. Certified.
„ 25	54	Farmer - -	Diseased liver and dropsy. Certified.
1861.			
Jan. 5	43	Miner - -	Asthma and dropsy. Certified.
„ 5	24	Son of husbandman.	Scrofula. Certified.
„ 7	24	Butcher -	Decline of age. Certified.
„ 8	43	Brewer's traveller.	Disease of the heart and dropsy. Certified.
„ 1	24	Collier - -	Accidentally burned to death from the effects of an explosion at the Englefield colliery on the 18th Dec. 1860. Inquest.
„ 14	88	Copper shearer	Strangulated hernia. Certified.
„ 14	66	Farmer - -	Bronchitis. Not certified.
„ 19	72	Farmer - -	Dropsy. Certified.
„ 19	57	Miner - -	Consumption. Certified.
„ 17	72	Labourer -	Accidentally killed by falling against an iron bedstead. Inquest.
„ 20	25	Hair dresser -	Bronchitis. Certified.
„ 29	26	Son of shoemaker.	Consumption. Certified.
1860.			
Dec. 6	78	Lime burner -	Asthma. Certified.
1861.			
Jan. 27	40	Tailor - -	Not being of sound mind, memory, and understanding, but lunatic and distracted, did kill himself by drinking 2 ounces of laudanum. Inquest.
„ 26	49	Collier - -	Accidentally killed by a stone from the side of the level falling upon him at Coleshill coa pit. Inquest.
Feb. 1	13	Carter - -	Accidentally crushed to death by a railway waggon. Inquest.
„ 9	32	Miner - -	Bronchitis. Certified.
„ 15	81	Miner - -	Decline of age. Certified.
„ 14	70	Draper and brewer.	Disease of liver and dropsy. Certified.
„ 22	68	Coal carrier -	Dropsy. Certified.
„ 25	43	Labourer -	Chronic disease of the stomach Certified.
„ 27	62	Smelter - -	Asthma and dropsy. Certified.
„ 27	18	Fuller - -	Cardiac disease and dropsy. Certified.
„ 28	54	Nurseryman & gardener.	Pneumonia. Certified.
„ 28	10	Son of timber merchant.	Diphtheria. Certified.
Mar. 4	74	Earthenware hawker.	Decline of age. Certified.
„ 15	68	Collier - -	Asthma and dropsy. Certified
„ 18	75	Stonemason -	Convulsions. Not certified.
„ 24	77	Farmer - -	Asthma. Certified.
„ 28	51	Labourer -	Asthma. Certified.
„ 29	21	Son of miner -	Consumption. Certified.
„ 30	42	Brass smelter -	Consumption. Certified.
„ 30	46	Smelter -	Pneumonia. Certified.
April 5	47	Labourer -	Consumption. Certified.
„ 5	63	Smelter -	Disease of stomach and bowels. Certified.
„ 7	78	Labourer -	Asthma. Certified.
„ 10	83	Farmer - -	Decline of age. Certified.
„ 30	63	Labourer -	Congestion of the lungs. Certified.
„ 18	89	Miner - -	Decline of age. Certified.
„ 20	60	Farmer - -	Dropsy. Certified.
„ 22	82	Hawker -	Decline of age. Certified.
„ 24	10	Son of joiner -	Accidentally burned to death. Inquest.
May 1	54	Groom and coachman.	Pneumonia. Certified.
„ 3	27	Agric. labourer	Consumption. Certified.
„ 9	53	Miner - -	Asthma. Certified.
„	33	Farmer and corn dealer's agent.	Pneumonia. Certified.
„ 8	47	Grocer - -	Consumption. Certified.
„ 17	68	Labourer -	Dropsy. Certified.
„ 20	69	Collier - -	Paralysis. Certified.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
May 22	80	Nailor - -	Verdict. Murder against Sarah Edwards, who feloniously and maliciously cut her husband's throat with a razor. Inquest.
„ 28	55	Collier - -	Consumption. Certified.
„ 30	65	Collier - -	Fever. Certified.
June 1	27	Shoemaker -	Pneumonia. Certified.
„ 3	46	Miner - -	Cancer of the stomach. Certified.
„ 14	82	Retired copper works agent	Decline of age. Certified.
„ 15	58	Formerly stone mason.	Chronic disease of stomach. Certified.
„ 15	56	Clothier -	Consumption. Certified.
„ 20	54	Pitman in a colliery.	Consumption. Certified.
„ 27	14	Grocer's apprentice.	Fever. Certified.
„ 30	71	Farmer -	Paralysis. Certified.
July 5	29	Joiner - -	Consumption. Certified.
„ 2	32	Fish hawker -	Consumption. Certified.
„ 8	25	Miner - -	Phrenitis. Certified.
„ 11	22	Labourer -	Typhus fever. Certified.
„ 7	56	Farmer -	Consumption. Certified.
„ 18	20	Blacksmith -	Consumption. Certified.
„ 21	63	Joiner - -	Consumption. Not certified.
„ 22	12	Son of labourer	Died suddenly by the visitation of God in a natural way. Inquest.
„ 30	28	Coal carrier -	Disease of the lungs and dropsy. Certified.
„ 29	68	Miner - -	Asthma and Dropsy. Certified.
Aug. 4	69	Overlooker in lead smelting works.	Dropsy. Certified.
„ 13	76	Shoemaker -	Disease of the kidneys. Certified.
„ 13	52	Miner - -	Disease of the liver. Certified.
„ 17	70	Journeyman tanner.	Asthma and Dropsy. Certified.
„ 20	72	Collier - -	Paralysis. Certified.
„ 31	50	Shoemaker -	Acute anasarca. Certified.
Sept. 3	63	Collier - -	Cancer of the stomach. Certified.
„ 7	74	Miner - -	Asthma and dropsy. Certified.
„ 6	18	Carter - -	Accidentally killed by two wheels of a tramroad waggon going over his leg. Inquest.
„ 9	54	Labourer -	Bronchitis and dropsy. Certified.
„ 11	79	Artist - -	Palsy and decline of age. Certified.
„ 10	57	Miner - -	Asthma and dropsy. Certified.
„ 11	78	Farmer -	Apoplexy. Certified.
„ 17	73	Formerly farmer	Enteritis. Certified.
„ 18	54	Joiner and publican.	Consumption. Certified.
„ 3	44	Butcher and publican.	Bronchitis. Certified.
Oct. 10	57	Labourer in lead smelting works.	Diseased liver. Certified.
„ 16	24	Assayer in lead works.	Diseased heart. Certified.
„ 16	36	Miner - -	Consumption and pulmonary hæmorrhage. Certified.
„ 17	11	Miner - -	Consumption. Certified.
„ 18	11	Collier - -	Asthma. Certified.
„ 28	59	Farmer -	Bronchitis. Not certified.
„ 19	55	Collier - -	Asthma. Not certified.
Nov. 7	50	Independent minister.	Died suddenly by the visitation of God in a natural way. Inquest.
„ 6	68	Farmer -	Cancerous tumour in the neck. Certified.
„ 28	27	Collier - -	Accidentally killed by falling down a coal pit while in the act of coming up from his work. Inquest.
„ 25	65	Saddler -	Debility. Certified.
Dec. 10	70	Formerly farmer	Asthma. Certified.
„ 21	28	Tailor - -	Consumption. Certified.

Sub-District. 3. Flint.

1859.			
Jan. 13	14	Son of lead miner	Scarlet fever. Not certified.
„ 14	85	Wood sawyer	Debilty from age. Not certified.
1859.			
Jan. 12	69	Formerly a publican.	Paralysis. Not certified.
„ 27	32	Lead miner -	Verdict, accidentally killed by the roof of clay in the bottom of a lead ore mine shaft falling upon him. Inquest.
Feb. 6	83	Gamekeeper -	Debility from age. Certified.
„ 12	62	Fisherman -	Hæmaturia. Certified.
Mar. 1	35	Fisherman -	Inflammation of bowels. Certified.
„ 4	74	Tallow chandler	Gastritis. Certified.
„ 6	37	Lead miner -	Consumption, Not certified.
„ 12	59	Lead miner -	Apoplexy. Certified.
„ 16	91	Farmer -	Debility from age. Not certified.
Apr. 10	72	Landed proprietor.	Diseased heart. Not certified.
„ 26	14	Son of lead miner	Consumption. Certified.
„ 24	51	Fisherman -	Pneumonia. Certified.
May 3	16	Son of coal miner	Consumption. Certified.
„ 3	63	Lead miner -	Disease of stomach. Certified.
„ 15	36	Lead miner -	Consumption. Not certified.
June 20	50	Lead miner -	Consumption. Not certified.
„ 23	32	Seaman, merchant service.	Consumption. Certified.
„ 15	15	Lead ore miner	Verdict, accidentally killed by falling down to the bottom of a lead ore mine shaft. Inquest.
July 12	81	Farmer -	Debility from age. Not certified.
„ 14	34	Lead miner -	Consumption. Not certified.
„ 24	80	Lead miner -	Debility from age. Not certified.
Aug. 6	63	Lead miner -	Cancer of stomach. Not certified.
„ 12	54	Lead miner -	Consumption. Not certified.
„ 12	40	Blacksmith -	Apoplexy. Not certified.
Sept.	60	Coal miner -	Debility from age. Not certified.
Sept. 8	13	Sailor -	Verdict, accidentally drowned in the river Dee. Inquest.
„ 22	55	Farmer -	Consumption. Not certified.
„ 29	22	Joiner -	Inflammation of brain. Certified.
Oct. 1	14	Lead miner -	Disease of heart. Certified.
„ 2	25	Lead miner -	Disease of stomach. Certified.
„ 4	49	Lead miner -	Cancer in the lip. Not certified.
„ 15	45	Seaman, merchant service	Consumption. Certified.
„ 15	11	Son of a lime burner.	Inflammation of brain. Certified.
„ 27	72	Cordwainer -	Consumption. Certified.
„ 28	45	Lead miner -	Consumption. Certified.
„ 31	42	Carter -	Consumption. Not certified.
Nov. 5	72	Agric. labourer	Cancer of the lip. Not certified.
„ 3	85	Basket maker	Paralysis. Certified.
„ 28	54	Timber merchant.	Disease of heart. Not certified.
Dec. 21	25	Lead miner -	Typhus fever. Certified.
„ 20	70	Agric. labourer	Palsy. Certified.
„ 28	34	Lead miner -	Consumption. Not certified.
„ 24	28	Grocer -	Consumption. Not certified.
„ 26	58	Solicitor -	Disease of the heart. Not certified.
„ 25	45	Farmer -	Debility from age. Not certified.
„ 28	85	Assistant surgeon.	Verdict, accidentaly killed by a goods train going over him at the Flint Railway Station. Inquest.
1860.			
Jan. 15	22	Son of joiner -	Consumption, 11 months. Not certified.
„ 16	55	Coal carrier -	Shaking palsy. Not certified. quest.
„ 18	27	Ship's carpenter	Died suddenly by the visitation of God in a natural way. Inquest.
„ 26	72	Coal miner -	Dropsy. Not certified.
„ 24	56	Lead miner -	Consumption. Not certified.
Feb. 7	56	Farmer -	Consumption, 3 months. Not certified.
„ 22	75	Agric. labourer	Debility from age. Not certified.
Mar. 1	20	Linen handloom weaver	Debility from age. Not certified.
„ 12	81	Farmer -	Debility from age. Not certified.
Apr. 9	39	Chemical labourer.	Consumption, 3 months. Certified.
„ 14	72	Exciseman -	Inflammation of chest. Certified.
„ 20	32	Farmer -	Consumption and cramp in legs. Certified.
„ 22	38	Blacksmith -	Verdict, accidentally killed by the handle of a turntree striking him on the head. Inquest.
„ 25	55	Chemical labourer.	Asthma, 2 years. Pneumonia, 6 days. Certified.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
Apr. 27	56	Agric. labourer	Consumption. Not certified.
May 1	79	Farmer	Debility from age. Not certified.
„ 4	56	Engine driver at lead mines.	Disease of brain. Not certified.
„ 9	73	Agric. labourer	Debility from age. Not certified.
„ 14	32	Joiner	Disease of stomach. Not certified.
„ 14	90	Slater and plasterer.	Debility from age. Not certified.
„ 26	40	Labourer	Died suddenly by the visitation of God in a natural way. Inquest.
June 4	54	Lead miner	Asthma, 18 months. Not certified.
„ 10	11	Sailor	Verdict, accidentally drowned in the river Dee. Inquest.
„ 17	66	Agric. labourer	Inflammation of stomach, 4 weeks. Ulceration of stomach, 3 weeks. Certified.
„ 16	38	Engine driver at coal mine.	Enlargement of liver, 5 months. Ulceration of liver, 3 months. Certified.
„ 19	20	Labourer	Verdict, died from the effect of drinking one eighth part of a pint of gas water, called ammonia water, thinking it was a good medicine for his ailment, and contrary to expectation, he as soon as he drank it, fell down, and did then and there instantly die. Inquest.
„ 21	17	Agric. labourer	Rupture, aneurism burst. Not certified.
„ 22	70	Agric. labourer	Debility from age. Not certified.
„ 22	48	Farmer	Consumption, 3 months. Not certified.
„ 24	44	Wheelwright	Died suddenly by the visitation of God in a natural way. Inquest.
July 1	60	Coal miner	Disease of stomach. Not certified.
„ 11	37	Lead miner	Disease of brain. Certified.
„ 14	24	Agric. labourer	Inflammation of brain. Not certified.
„ 17	70	Farmer	Debility from age. No medical attendant.
„ 29	55	Blacksmith	Dropsy. Not certified.
„ 28	69	Agent in lead mines.	Disease of heart and dropsy. Not certified.
Aug. 4	71	Lead miner	Asthma, 6 years. No medical attendant.
„ 21	38	Pilot, river Dee	Consumption, 6 months. Not certified.
Sept. 3	20	Son of lead miner.	Consumption, 8 months. Not certified.
„ 16	32	Lead miner	Consumption, 8 months. Not certified.
„ 27	71	Agric. labourer	Disease of the stomach and debility from age. Certified.
Oct. 6	78	Lead miner	Debility from age. Not certified.
„ 11	67	Perpetual curate of St. Mark's, Connah's Quay	Anœmia and chronic mentagra, some months acute mentagra, followed by extreme debility, 11 days. Certified.
„ 13	56	Lead miner	Miner's asthma, 3 years. No medical attendant.
Nov. 5	12	Son of coal miner	Inflammation of the lungs, 3 days. Not certified.
14	30	Lead miner	Congestion of the lungs. Certified.
24	66	Publican and coal mine agent	Bronchitis, 16 days. Certified.
Dec. 7	54	Lead miner	Consumption. Certified.
„ 17	14	Son of seaman, merchant service.	Quinsy. Not certified.
„ 17	22	Son of stone mason.	Scarlet fever, 17 days. Certified.
„ 23	90	Journeyman carpenter.	Debility from old age. No medical attendant.
1861.			
Jan. 4	86	Labourer in a brick work.	Debility from age. No medical attendant.
„ 7	73	Coal miner	Debility and old age. Certified.
„ 10	84	Cordwainer	Cancer on the lip to the throat, 3 years. Not certified.
„ 11	83	Agric. labourer	Debility from age. Not certified.
„ 27	80	Plasterer and slater.	Paralysis, 3 months. Not certified.
Feb. 3	63	Policeman	Chronic bronchitis, 13 years; active bronchitis, 1 month. Certified.
1861.			
Feb. 7	65	Journeyman tanner.	Asthma, 12 years. Certified.
„ 12	58	Wholesale butter dealer.	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 25	92	Farmer	Debility from age. Certified.
„ 25	35	Agric. servant	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
Mar. 1	51	Lead miner	Phthisis, 3 months. Not certified.
„ 4	38	Seaman, merchant service	Bronchitis, 9 months; consumption, 3 months. Certified.
„ 7	77	Blacksmith	Debility from age. Dropsy (acute), 9 days. No medical attendant.
„ 4	73	Tanner	Disease of heart. Congestion of lungs, 5 days. Certified.
„ 14	34	Cordwainer	Disease of the brain. Certified.
„ 19	51	Lead miner	Consumption, 8 months. No medical attendant.
„ 24	75	Coal miner	Inflammation of the lungs. Not certified.
Apr. 21	55	Lead miner	Miner's asthma. Certified.
„ 19	73	Miller	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 30	22	Son of lead miner	Brain fever. Certified.
May 2	44	Gentleman	Consumption, 10 weeks. Not certified.
„ 7	59	Lead miner	Lead miner's asthma, 2 months. No medical attendant.
„ 17	76	Agric. labourer	Asthma, 12 months. No medical attendant.
„ 21	56	Cattle dealer	Asthma, 15 months. Dropsy (acute). Not certified.
June 1	89	Lead miner	Debility from age. No medical attendant.
„ 10	52	Agric. labourer	Valvular disease of the heart. Certified.
„ 14	13	Turner	Verdict, accidentally drowned, while bathing in the River Dee. Inquest.
„ 23	45	Lead and coal miner.	Consumption, 9 months. Certified.
„ 26	81	Agric. labourer	Debility from age. No medical attendant.
July 28	20	Son of a labourer in a wood-turning mill	Phthisis pulmonalis, 6 months. Certified.
„ 30	57	Cordwainer	Disease of the liver. Certified.
Aug. 28	72	Lead miner	Lead miner's asthma, 3 years. No medical attendant.
Sept. 3	72	Bricklayer	Verdict, accidentally killed by falling against the ground. Inquest.
„ 12	22	Agric. labourer	Consumption, 7 months. Certified.
„ 20	23	Son of a labourer under River Dee Company.	Tabes mesenterica. Certified.
„ 29	13	Son of a blacksmith.	Consumption, 12 months. Not certified.
Oct. 10	62	Lead miner	Consumption, 18 months. Not certified.
„ 8	27	Wood sawyer	Consumption. Certified.
„ 12	60	Farmer	Cancer on the cheek. Not certified.
„ 16	67	Coal miner	Asthma, 6 months. Not certified.
Nov. 19	51	Miner	Verdict, died suddenly by the visitation of God in a natural way. Inquest.
„ 24	38	Railway fireman.	Verdict, accidentally killed by a railway train going over him. Inquest.
„ 21	53	Agric. labourer	Disease of the brain. Not certified.
„ 26	60	Chemical labourer.	Fatty degeneration of the heart, 4 years. Certified.
Dec. 4	20	Son of agricultural labourer	Phthisis, 4 months. Certified.
„ 8	38	Tanner	Chronic disease of the stomach, 7 months. Certified.
„ 25	50	Agric. labourer	Chronic bronchitis. Certified.

DISTRICTS IN NORTH WALES.

Sub-District. 4. Mold.

When Died.	Age.	Occupation.	Cause of Death.
1859.			
Jan. 5	21	Agric. labourer	Consumption, 6 months. Not certified.
„ 16	56	Lead miner -	Consumption, 18 months. No medical attendant.
„ 28	54	Coal miner -	Chronic bronchitis, 3 years. Certified.
Feb. 3	64	Innkeeper -	Disease of arteries. Gangrene of foot, 2 weeks. Certified.
„ 3	23	Farmer -	Unknown. No medical attendant.
„ 1	74	General labourer.	Chronic asthma, 10 years. Not certified.
„ 17	32	Brickmaker -	Consumption, 6 months. Certified.
„ 22	11	Son of grocer	Pleurisy, 5 weeks. Certified.
Mar. 3	28	General labourer.	Heart disease. Certified.
„ 4	76	Lead miner -	Old age. Not certified.
„ 2	78	Joiner - -	Paralysis, 14 days. Certified.
„ 4	56	General labourer.	Consumption. Certified.
„ 11	62	Coal miner -	Bronchitis, 6 days. Not certified.
„ 14	59	Journeyman tailor.	Consumption, 18 months. Not certified.
„ 16	42	Painter - -	Capillary. Bronchitis. Certified.
„ 18	71	Lead miner -	Chronic bronchitis, 3 years. Not certified.
„ 20	57	Lead miner -	Chronic bronchitis, 3 years. Not certified.
„ 18	32	Journeyman draper.	Consumption, 2 years. No medical attendant.
„ 21	58	Labourer -	Bronchitis, 6 days. No medical attendant.
„ 22	51	Serjeant in Flintshire Militia.	Heart disease, 9 weeks. Not certified.
„ 22	51	Lead miner -	Unknown. Not certified.
„ 26	68	Lead miner -	Chronic bronchitis, 5 years. No medical attendant.
„ 27	57	Lead miner -	Bronchitis. Not certified.
Apr. 2	56	Labourer -	Died suddenly by the visitation of God, without any marks of violence. Inquest.
„ 23	56	General labourer.	Chronic bronchitis. Not certified.
May 3	75	Lead miner -	Unknown. No medical attendant.
„ 6	24	General labourer.	Unknown. Not certified.
„ 6	53	General labourer.	Asthma. Certified.
„ 10	61	Pauper -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 15	73	Lead miner -	Chronic bronchitis. No medical attendant.
„ 20	10	Son of coal miner.	Fever, 6 weeks. Certified.
„ 25	54	Mine agent -	Valvular disease of heart. Certified.
„ 26	31	Lead miner -	Meningitis, 7 days. Certified.
„ 31	69	Coal miner -	Chronic bronchitis. Not certified.
une14	75	Colliery agent	Died suddenly by the visitation of God in a natural way. Inquest.
„ 27	25	General labourer.	Typhus fever. Certified.
„ 28	18	General labourer.	Fever, with heart disease. Certified.
„ 29	47	Lead miner -	Pleurisy. Fever. Certified.
„ 21	16	Agric. servant	Typhus fever.
uly 4	79	Stonemason.	Old age. No medical attendant.
„ 7	58	Lead ore miner.	Chronic asthma, 10 years. Not certified.
„ 17	57	Agric. labourer	Unknown. No medical attendant.
ug.10	33	Coal miner.	Consumption, 18 months. No medical attendant.
„ 9	26	Farmer.	Consumption. Not certified.
ept. 2	82	Agric. labourer	Old age. No medical attendant.
„ 5	76	Farmer.	Bronchitis. No medical attendant.
„ 7	65	Hatter.	Died suddenly by the visitation of God in a natural way. Inquest.
Sep. 17	57	Coal miner.	Chronic asthma. Not certified.
„ 17	75	Mine agent.	Chronic bronchitis, 6 months. Certified.
„ 28	65	Genl. labourer	Unknown. Not certified.
Oct. 18	47	Farmer.	Dropsy, 3 months. Certified.
„ 18	63	Farmer.	Paralysis, 2 years. Not certified.
„ 22	79	Tailor.	Bronchitis, 2 weeks. Certified.
Nov. 1	59	Physician and general practitioner.	Fatty degeneration of kidneys. Bright's disease. Certified.
„ 7	28	Gardener -	Typhoid fever, 14 days. Pneumonia, 7 days. Certified.
„ 13	19	Porter at a warehouse.	Unknown. Not certified.
„ 14	66	Coal miner -	Chronic asthma, 3 years. Not certified.
„ 16	60	Coal miner -	Chronic bronchitis. No medical attendant.
„ 16	35	Hostler -	Consumption. Certified.
Dec. 4	69	Common carrier.	Sloughing of foot, 4 months. Certified.
„ 10	52	Farmer and landsurveyor.	Cancerous disease of liver. Certified.
„ 11	71	Agric.labourer	Paralysis, 24 hours. Certified.
„ 4	65	Formerly overlooker at foundry.	Diabetes. Certified.
„ 21	60	General labourer	Unknown. Not certified.
„ 27	56	General labourer	Unknown. Not certified.
„ 31	73	General labourer	Chronic asthma. Certified.
1860.			
Jan. 7.	27	Coal miner -	Lumbar abscess, 2 years. Certified.
„ 16	70	Farmer -	Unknown. No medical attendant.
„ 21	78	Formerly blacksmith.	Cancer of mouth, 18 months. No medical attendant.
Feb. 6	27	Cashier in draper's shop.	Phthisis, 2 years! Certified.
„ 10	74	Agric.labourer	Unknown. Not certified.
„ 12	14	Son of lead miner.	Typhus fever, 14 days. Certified.
„ 15	83	Formerly private 1st Roy. Artillery.	Asthma. Certified.
„ 15	50	Labourer -	Accidentally killed by a tree falling on him. Inquest.
„ 17	80	Broker -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 29	59	Miller.	Chronic bronchitis. Certified.
Mar. 4	61	Quarryman -	Palsy. Not certified.
„ 6	56	Coal miner	Bronchitis, 8 days. Certified.
„ 9	68	Journeyman miller.	Chronic asthma. No medical attendant.
„ 11	66	Agric. labourer	Chronic asthma. No medical attendant.
„ 12	17	Son of tailor.	Unknown. Not certified.
„ 16	70	Journeyman joiner.	Anasarca, 3 months. Certified.
„ 15	12	Son of carter	Consumption. Not certified.
„ 24	54	Journeyman shoemaker.	Chronic asthma, 5 years. Not certified.
Apr. 4	45	Farmer -	Hanged himself to the top of a hayloft. Inquest.
„ 17	61	Farmer - -	Died suddenly on a footpath on the mountain by the visitation of God in a natural way. Inquest.
„ 19	48	Wine and spirit merchant.	Died suddenly by the visitation of God in a natural way. Inquest.
„ 24	16	Son of coal miner.	Consumption, 18 months. Certified.
„ 24	21	Lead miner -	Consumption, 6 months. Certified.
May 2	72	Brickmaker -	Unknown. Not certified.
Apr.30	20	Engine driver at colliery.	Fever. Certified.
May 7	68	Farmer -	Unknown. Not certified.
„ 16	70	General merchant.	Purpura. Heart disease, 6 weeks.
June 3	23	Carter - -	Consumption, 6 months. Certified.
„ 15	80	General labourer	Old age. Not certified.
„ 18	60	Musician -	Chronic bronchitis. Certified.
„ 14	63	Journeyman mason.	Chronic bronchitis, 9 months. Not certified.
„ 27	77	General labourer	Chronic bronchitis. Not certified.

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1860.			
June 26	72	Attorney -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 27	61	Farmer - -	Died suddenly by the visitation of God in a natural way. Inquest.
„ 30	68	Butcher -	Accidentally drowned in a ditch. Inquest.
July 6	80	Agric. labourer	Old age. Not certified.
„ 6	70	Coal miner -	Unknown. Not certified.
„ 9	84	General labourer	Chronic bronchitis. Certified.
„ 8	21	Coal miner -	Consumption, 7 months. Certified.
„ 11	85	Engine driver, lead mine.	Old age. Not certified.
„ 26	55	Publican -	Fatty degeneration of the heart. Certified.
„ 29	32	Painter- -	Died suddenly by the visitation of God in a natural way. Inquest.
Aug. 18	73	Formerly schoolmaster.	Unknown. Not certified.
„ 24	20	Coal miner -	Disease of the stomach. Not certified.
Sept. 3	65	Coal miner -	Chronic bronchitis. Certified.
„ 5	65	Retired innkeeper.	Chronic bronchitis. Certified.
„ 9	77	Formerly journeyman shoemaker.	Congestion of the brain. Certified.
„ 22	21	Journeyman blacksmith.	Diphtheria, 5 days. Certified.
Oct. 30	38	Lead miner -	Chronic bronchitis. Not certified.
Nov. 5	75	Formerly coal proprietor.	Old age. Not certified.
„ 10	73	Retired farmer	Cancer of throat. Not certified.
„ 16	56	General labourer	Bronchitis, 14 days. Not certified.
„ 26	60	Lead ore miner	Died suddenly by the visitation of God in a natural way by the bursting of a blood vessel in his chest. Inquest.
„ 30	57	Wheelwright-	Disease of the heart. Not certified.
Dec. 4	69	Late surgeon to the Royal Merioneth militia.	Old age. Certified.
„ 8	80	Formerly journeyman wheelwright.	Old age. Not certified.
„ 8	75	Lead ore miner	Heart disease, 9 months. Certified.
„ 17	67	Formerly a saddler.	Paralysis, 6 months. Certified.
„ 23	28	General labourer	Consumption, 2 years. Certified.
1861.			
Jan. 1	16	Son of coal miner.	Consumption, 2 years. Not certified.
„ 8	52	General labourer	Inflammation of lungs, 14 days. Certified.
„ 10	69	Journeyman shoemaker.	Chronic asthma. Not certified.
„ 9	76	Public baker -	Chronic bronchitis. No medical attendant.
„ 12	82	Farmer -	Old age. Not certified.
„ 17	83	Journeyman shoemaker.	Old age. Certified.
„ 26	32	Journeyman bricklayer.	Inflammation of the brain. Not certified.
„ 23	53	Farmer -	Bronchitis, 3 weeks. Certified.
„ 25	64	Manager at a colliery.	Disease of the heart. Certified.
Feb. 12	67	General labourer	Heart disease. Not certified.
„ 10	78	Farmer -	Old age. No medical attendant.
„ 12	46	Farmer -	Consumption, 12 months. Certified.
„ 13	71	Farmer -	Unknown. Not certified.
„ 18	72	General labourer	Old age. Certified.
„ 18	68	General labourer	Unknown. Not certified.
„ 20	65	General labourer	Bronchitis, 8 days. Certified.
„ 10	22	Lead ore miner	Accidentally fell to within 20 yards of the bottom of a lead ore mine shaft, and instantly killed.
„ 20	80	Lead ore miner	Old age. Certified.
„ 21	62	Proprietor of coal works.	Pneumonia, 6 months. Certified.
1861.			
Feb. 22	68	Lead miner.	Bronchitis, 2 months. Certified
„ 24	26	General labourer	Typhus fever, 14 days. Certified.
„ 19	45	Tailor & draper	Consumption, 12 months. Certified.
Mar. 5	11	Son of lead miner.	Consumption, 12 months. Certified.
„ 12	23	General labourer	Unknown. Not certified.
„ 16	70	Agric. labourer	Old age. Not certified.
„ 18	18	Coal miner	Typhus fever. Certified.
„ 19	20	Brickmaker	Diphtheria, 10 days. Not certified.
„ 23	34	General labourer	Fever. Not certified.
„ 22	70	General labourer	Bronchitis. Not certified.
„ 24	13	Son of warehouseman.	Consumption, 3 months. Not certified.
„ 29	17	General labourer	Consumption, 12 months. Certified.
„ 26	23	Clerk, Post Office.	Consumption. Not certified.
Apr. 1	14	Son of iron fitter	Low fever, 14 days. Not certified.
„ 5	41	Tanner	Disease of the heart. Certified.
„ 9	16	Son of general labourer.	Typhus fever, 14 days. Certified.
„ 13	21	General labourer	Typhoid fever. Certified.
„ 15	79	General labourer	Old age. Not certified.
„ 20	48	Lead Miner	Chronic liver disease. Certified.
„ 16	60	Coal miner	Chronic asthma, 5 years. Not certified.
„ 23	50	Farmer	Unknown. Not certified.
„ 16	14	Collier	Verdict. Manslaughter against Thomas Jones. Inquest.
„ 24	80	Sawyer	Old age. Not certified.
„ 29	17	Brickmaker	Consumption, 12 months. Not certified.
May 1	17	Son of farmer	Fever, 3 weeks.
„ 8	45	Currier	Dropsy, 6 weeks. Not certified.
„ 16	60	Farmer	Abscess of side. Exhaustion. Certified.
„ 31	21	Lead miner	Consumption, 3 months. Not certified.
June 17	19	Bricklayer	Brain fever, 9 days. Certified.
„ 18	18	Clerk at a colliery	Phthisis, 12 months. Certified.
July 6	43	Engine driver at a colliery.	Fever, 3 weeks. Certified.
„ 12	81	Agric. labourer	Old age. Certified.
„ 14	49	Lead miner	Inflammation of lungs. Not certified.
„ 15	58	Mine agent	Unknown. Not certified.
„ 19	73	Small farmer	Unknown. No medical attendant.
„ 18	15	Collier.	Accidentally killed by falling down to the bottom of a coal pit at Spon-Green colliery, while in the act of going down to his work. Inquest.
„ 25	40	Bricklayer's labourer.	Phthisis, 8 months. Certified.
Aug. 1	10	Son of general labourer.	Consumption. No medical attendant.
„ 3	25	Discharged soldier.	Consumption, 18 months. Not certified.
„ 22	21	General labourer	Bronchitis. Certified.
„ 26	83	Small farmer	Old age. Certified.
Sept. 13	35	Lead miner	Consumption. Not certified.
„ 15	15	Son of driver at an inn.	Hepatitis, 14 days. Certified.
„ 18	35	Waggoner	Verdict. Manslaughter against Joseph Evans. Inquest.
„ 17	66	Engineer	Verdict. Not being of sound mind, memory, and understanding, but lunatic and distracted, did kill himself by throwing himself down a coal pit. Inquest.
„ 23	16	Son of labourer	Consumption, 2 years. Certified.
„ 20	83	Surgeon (retired.)	Old age Certified.
„ 24	23	Engine fitter at a foundry.	Consumption, 18 months. Certified.
„ 25	55	Agric. labourer	Chronic asthma. Certified.
„ 29	36	Iron moulder	Consumption, 6 months. Certified.
Oct. 7	76	Shoemaker, journeyman.	Old age. Certified.
„ 7	80	Wheelwright	Old age. Certified.
„ 11	91	Miner	Verdict. Accidentally fell down to the bottom of a quarry on the 10th instant and died on the following morning from the effects of the injury. Inquest

DISTRICTS IN NORTH WALES.

When Died.	Age.	Occupation.	Cause of Death.
1861.			
Oct. 24	81	Formerly a farmer.	Old age. certified.
Nov. 4	35	Brickmaker	Consumption, 2 years. Not certified.
„ 14	72	Parish clerk	Bronchitis, 3 weeks. Certified.
„ 18	69	Formerly a cotton spinner.	Paralysis, 6 months. Certified.
Dec. 12	25	Agric. labourer	Typhoid fever, 14 days. Certified.
„ 25	44	General labourer	Disease of the heart. Certified.
„ 25	89	Labourer	Died suddenly by the visitation of God in a natural way. Inquest.
„ 31	60	Tinman.	Chronic bronchitis. Certified.

Deaths of Males aged 10 Years and upwards in each of the Years 1859–61 in the Chapelry of Tryddyn, being that Part of the Parish of Mold which is situated in the Hope Sub-District of Wrexham.

1859.			
Jan. 12	82	Agric. labourer	Palsy, 4 days. Certified.
„ 30	24	Coal miner	Phthisis. Certified.
Mar. 4	11	Son of coal miner.	Injury to his spine 4 years. Diarrhœa. Certified.
„ 19	66	Wheelwright	Inflammation of lungs. Not certified.
Apr. 23	53	Coal mine	Consumption. Not certified.
„ 28	14	Son of lead miner	Typhus fever. Certified.
May 17	60	Coal mine labourer.	Consumption. Not certified.
June 18	45	Coal miner	Asthma. Not certified.
July 10	55	Collier	Died suddenly by the visitation of God in a natural way.
Sept. 5	40	Coal miner	Fever. Certified.
„ 30	60	Agric. labourer	Fever. Not certified.
1859.			
Oct. 11	30	Collier	Accidentally killed by part of the roof of coal in the bottom of the coal pit falling upon him. Inquest.
„ 22	52	Carpenter, journeyman.	Asthma. Not certified.
Nov. 1	66	Farmer	Bronchitis, 10 days. Certified.
1860.			
Jan. 16	68	Engine driver at a coal mine.	Hepatitis. Certified.
Feb. 1	47	Coal miner	Jaundice. Not certified.
„ 7	73	Besom maker	Paralysis. Certified.
Mar. 3	47	Engine fitter, journeyman.	Consumption. Certified.
Apr. 30	62	Farm bailiff	Asthma. Not certified.
June 27	12	Son of farmer	Diphtheria, 6 days. Certified.
Oct. 17	14	Machine man at a colliery.	Accidentally killed by falling down a coal pit. Inquest.
„ 26	72	Drover	Died suddenly by the visitation of God. Inquest.
Nov. 14	28	Coal miner	Low fever. Typhus fever. Certified.
„ 26	91	Farmer	Old age. Certified.
Dec. 13	51	Coal miner	Consumption, 10 months. Certified.
„ 29	60	Blacksmith, journeyman.	Partial insanity. Exhaustion. Not certified.
1861.			
Jan. 22	72	Butcher	Catarrh. Not certified.
„ 31	71	Agric. labourer	Debility. Exhaustion. Certified.
Feb. 18	82	Farmer	Heart disease. Anarsarca, 1 year. Certified.
Mar. 28	84	Farmer	Old age. No medical attendant.
Apr. 23	27	Coal miner	Typhus fever. Certified.
May 8	27	Coal miner	Consumption. Certified.
„ 13	11	Son of coal miner.	Consumption, 3 months. Not certified.
June 6	54	Coal miner	Asthma. Certified.
July 8	73	Lead miner	Asthma. Not certified.
„ 19	39	Coal mine labourer.	Low fever. Typhus fever. Certified.
Nov. 3	28	Coal miner	Phthisis. Certified.
Dec. 5	30	Farmer	Consumption. No medical attendant.

X.

ABSTRACT of RETURNS of AGES of Underground Miners working in Mines in CORNWALL and DEVON.

Name of Mine.	Number of Men.	Total Years.	Average Age.	Name of Mine.	Number of Men.	Total Years.	Average Age.
Alfred Consols	131	4,460	34·04	Leeds and St. Aubyn	48	1,477	30·77
Balleswidden	192	5,542	28·86	Lelant Consols	26	787	30·26
Bedford United	109	3,072	28·18	Levant	198	5,597	28·26
Boscaswell	84	2,161	25·72	Marke Valley	119	3,583	30·109
Bosorn and Ballowall	13	410	31·53	Mill Pool	33	1,016	30·78
Boscean	134	3,665	27·35	New Treleigh	39	1,153	29·56
Botallack	274	7,097	25·901	New Wheal Seton	28	880	31·42
Burra Burra	34	1,004	29·52	New Wheal Vaddon	28	787	28·107
Calstock Consols	32	961	30·03	North Buller	15	435	29·
Calvadnack	135	3,706	27·45	North Crofty	68	2,018	29·68
Camborne Consols	24	694	28·91	North Dolcoath	9	355	34·4
Camborne Vean and Wheal Frances	85	2,551	30·01	North Downs	105	3,007	28·63
Caradon Consols	27	657	24·3	North Frances	24	634	26·41
Cargoll	122	3,721	30·5	North Great Work	12	341	28·41
Carn Brea	377	10,802	28·65	North Huel Trelawny	14	394	28·14
Carn Galver	94	2,350	25·	North Levant	43	1,115	25·93
Carn Vivian	13	464	35·69	North Phœnix	15	500	33·3
Carnyorth	111	2,960	26·6	North Roskear	147	4,401	29·93
Charlestown United	295	9,096	30·83	North Wheal Basset	100	3,047	30·47
Charlotte United	109	3,171	29·091	North Wheal Robert	67	1,930	28·805
Clifford Amalgamated	509	15,788	31·01	North Wrey	6	207	34·5
Clyjah	39	1,177	30·17	Okel Tor	36	1,078	29·94
Cook's Kitchen	134	3,446	25·71	Pednandrea United	154	4,282	27·805
Cuddra	25	744	29·76	Pendeen Consols	60	1,607	26·78
Devon Great Consols	426	13,419	31·5	Penhalls	57	1,769	31·03
Ding Dong	90	2,192	24·35	Phœnix	186	5,293	28·45
Dolcoath	479	12,525	26·14	Polberro	116	3,381	29·14
Drakewalls	113	2,988	26·44	Polbreen	59	1,579	26·76
Duchy and Peru	28	874	31·21	Polhigey Moor	37	976	26·37
Durlo	84	2,443	29·08	Praed Consols	13	448	34·46
East Alfred Consols	74	2,212	29·89	Prideaux Wood	23	716	31·13
East Budnick and Mount	16	485	30·31	Prosper United	136	4,279	41·46
East Caradon	89	2,632	29·57	Providence	141	4,263	30·23
East Gunnislake and South Bedford	75	2,109	28·12	Redmoor	39	1,110	28·46
East Phœnix	27	827	30·62	Rosewall and Ransom	83	2,251	27·12
East Providence	28	762	27·21	Rosewarne Consols	33	962	29·15
East Pool	139	3,665	26·36	Rosewarne United	103	2,951	28·65
East Rosewarne	62	1,971	31·79	St. Aubyn and Grylls	45	1,359	30·2
East Seton	6	190	31·6	St. Day United	243	7,500	30·86
East Trefusis	20	576	28·8	St. Ives Consols	167	4,847	29·02
East Treskerby	12	384	32·	St. Ives Wheal Allen	42	1,193	28·404
East Wheal Agar	15	413	27·53	St. Just United	38	951	25·02
East Wheal Basset	65	1,984	30·52	Sithney Wheal Metal	29	974	33·58
East Wheal Grenville	40	1,257	31·425	South Caradon	301	10,676	35·46
East Wheal Grylls	8	217	27·12	South Caradon Wheal Hooper	20	560	28·
East Wheal Tolgus	38	1,012	26·63	South Condurrow	18	411	22·83
Frank Mills	89	2,954	33·19	South Crenver	54	1,772	32·81
Fowey Consols	346	10,122	29·25	South Dolcoath	21	585	27·85
Giorlyn	88	2,339	26·57	South Exmouth	59	1,825	30·93
Gonamena	18	554	30·7	South Herodsfoot	11	301	27·36
Goonbarrow and Mollinnis	50	1,643	32·86	South Phœnix	21	644	30·64
Grambler and St. Aubyn	69	1,615	23·405	South Tresavean	6	238	39·6
Great Briggan	75	2,395	31·93	South Wheal Basset	29	722	24·89
Great Caradon	12	425	35·41	South Wheal Crofty	44	1,289	29·29
Great North Downs	78	2,329	29·85	South Wheal Francis	176	5,201	29·55
Great Retallack	14	537	38·35	South Wheal Seton	30	895	29·83
Great South Tolgus	102	3,234	31·705	South Wheal Tolgus	166	4,563	27·48
Great Tregune Consols	12	455	37·91	Spearne Consols	61	1,597	26·18
Great Treveddoe	26	845	32·5	Spearne Moor	58	1,513	26·08
Great Wheal Fortune	240	6,887	28·69	Stray Park	104	2,940	28·26
Great Wheal Vor United	109	3,232	29·65	Tolcarne	75	1,938	25·84
Great Work	247	7,311	29·59	Tolvadden	81	2,329	28·75
Gunnislake Clitters	41	1,204	29·36	Treloweth	54	1,628	30·14
Hawkmoor	29	862	29·72	Trelyon Consols	64	1,665	26·01
Herodsfoot	70	2,252	32·17	Trencrom	77	2,152	27·94
Hingston Down Consols	117	3,512	30·01	Tresavean and Thetharrup	41	935	22·80
Holmbush	122	3,528	28·91	Treweatha	22	655	29·77
Kelly Bray	48	1,427	29·72	Tywarnhaile	113	3,170	28·05
Kit Hill	55	1,537	27·94	United Mines Gwennap	278	8,483	30·51
				Wendron Consols	161	4,864	30·21

Name of Mine.	Number of Men.	Total Years.	Average Age.	Name of Mine.	Number of Men.	Total Years.	Average Age.
Wendron United -	51	1,429	28·01	Wheal Grylls - -	109	3,327	30·52
West Alfred Consols -	17	546	32·11	Wheal Harriett -	45	1,196	26·57
West Basset - -	232	6,662	28·71	Wheal Hearle - -	50	1,396	27·92
West Beam - -	56	1,766	31·53	Wheal Hope - -	22	562	25·54
West Caradon - -	265	7,384	27·86	Wheal Jane - -	145	3,840	26·48
West Chiverton and Wentworth Consols -	97	2,883	29·72	Wheal Kitty, St. Agnes	143	3,875	27·09
West Condarron -	32	960	30·	Wheal Kitty Uny, Lelant	98	2,792	28·48
West Fowey Consols -	147	3,935	26·76	Wheal Ludcott - -	146	4,374	29·95
West Great Work -	18	505	28·05	Wheal Maria and Fortescue - -	8	267	33·375
West Rosedown - -	21	667	31·76	Wheal Mary - -	111	3,229	29·09
West Sharp Tor -	19	597	31·42	Wheal Mary Ann -	167	4,645	27·83
West Stray Park -	48	1,429	39·77	Wheal Margaret -	102	2,896	28·39
West South Caradon -	9	258	28·6	Wheal Margery - -	106	3,201	30·19
West Trevelyan -	56	1,670	29·82	Wheal Moyle - -	52	1,473	28·32
West Wheal Seton -	241	7,469	30·99	Wheal Morris - -	51	1,492	29·25
Wheal Agar - -	74	2,142	28·94	Wheal Owles - -	204	5,357	26·25
Wheal Anna St. Hilary	67	1,932	28·83	Wheal Prosper - -	45	1,234	27·42
Wheal Arthur - -	50	1,429	28·58	Wheal Prospidnick -	37	1,255	33·91
Wheal Basset - -	248	6,096	24·58	Wheal Reeth - -	116	3,038	26·18
Wheal Basset and Grylls	164	4,553	27·76	Wheal Seton - -	175	4,930	22·45
Wheal Buller -	154	4,576	29·71	Wheal Sithney and Carnmeal United -	52	1,597	30·71
Wheal Caradon -	26	761	29·26	Wheal Tremayne -	109	2,930	26·88
Wheal Castle and Boswedden - -	81	2,201	27·17	Wheal Unity Consols -	25	973	34·75
Wheal Crelake - -	75	2,433	32·44	Wheal Uny - -	139	3,882	27·92
Wheal Edward - -	76	2,313	30·43				
Wheal Florence - -	16	454	28·37	Grand Total of 191 Mines - -	17,037	492,648	28·91
Wheal Friendship -	150	3,766	25·106				
Wheal Grenville -	65	1,852	28·49				

Ages of Miners working in Mines in Cornwall and Devon.

Ages.															Total.
–9.	10–14.	15–19.	20–24.	25–29.	30–34.	35–39.	40–44.	45–49.	50–54.	55–59.	60–64.	65–69.	70–74.	75–79.	80.	
1	665	3,556	3,785	2,412	1,672	1,477	1,210	931	711	378	173	55	8	2	1	17,037
·1	39·0	208·7	222·2	141·6	98·1	86·7	71·0	54·6	41·7	22·2	10·2	3·2	·5	·1	·1	1000

Abstract of Returns of Ages of Underground Miners working in Mines in the North of England.

Name of Mine.	Number of Men.	Total Ages.	Average Age.	Name of Mine.	Number of Men.	Total Ages.	Average Age.
Aithwaite End	11	358	32·54	Harehope Gill	19	623	32·78
Allergill	7	224	32·	Harwood	10	310	31·
Alston Moor, Lead Company	339	11,141	32·86	Hawes and Bainbridge	11	323	29·36
Appletreewick	32	907	28·34	Hebden Moor	41	1,283	31·29
Arkindale Mines :—				High Skears	4	131	32·75
Routh	4	103	25·75	Holm Bank	4	143	35·75
Danby	25	861	34·44	Howden Side	4	108	27·
Danrigg	7	176	25·14	Hudgill Burne	15	522	34·8
Moulds	29	705	24·31	Keldheads	91	3,206	35·23
Band and Hushes	12	404	33·66	Keswick	38	1,130	29·73
Foregill	65	1,824	28·06	Langdon	12	396	33·
Faggergill	3	94	31·33	Lodge Sike	6	271	45·16
Stang	33	1,027	31·15	Little Eggleshope	89	2,983	33·51
Windegg	7	209	29·85	Lune Head	48	1,580	32·91
Woodmen	3	104	34·66	Merryfield	11	380	34·54
Ashgillhead	10	403	40·3	Moor End	5	188	37·6
Beldihill	36	1,106	30·72	Mousell	37	1,294	34·97
Beldon	16	483	30·18	Nentsberry Greens	6	202	33·66
Bentyfield	30	1,019	33·96	Nether Hearth	6	149	24·83
Birchy Bank	40	1,216	30·4	Newbiggin	16	508	31·75
Blagill	7	265	37·85	Newton	11	388	35·27
Bolton Parks	10	387	38·7	Old Gang	229	6,834	29·84
Brownley Hill	49	1,568	32·	Old Providence	19	545	28·68
Buckden Gavle	10	290	29·	Red Groves	29	1,171	40·37
Calvert	10	290	29·	Rodderup Fell	115	3,614	31·42
Coalcleugh	264	7,988	20·25	Roughten Gill	40	1,611	40·27
Coldberry and Skears	151	5,292	35·04	Sharnberry	73	2,182	2 ·89
Coniston	158	5,430	34·36	Silverband, &c.	83	3,027	36·46
Coniston Out Moor	4	147	36·75	Silver Rake	7	251	35·85
Cononley	56	2,428	43·35	Stone Croft and Grey Side	91	2,844	31·25
Cornish Hush and Bollyhope Burn	48	1,618	33·708	Stoney Groves	16	596	37·25
Craven Moor	42	1,304	31·04	Stone Cragg	6	228	38·
Derwent	289	8,139	28·12	Summerlodge	7	189	27·
Dougang, &c.	20	635	31·75	Sunside	73	3,227	44·205
Driggith	15	506	33·73	Sunnyside	13	414	31·84
Ellerton Moor	18	621	34·5	Surrender	99	2,891	29·202
Fallowfield	77	2,363	30·68	Tynehead	10	276	27·6
Fellend and Guttezs	13	469	36·07	United Cams	7	237	33·85
Forest Moor	9	414	46·	West Burton	20	683	34·15
Galligill	13	462	35·53	West Thorngill	2	93	46·5
Goldscope and Yewthwaite	44	1,591	36·15	Wet Groves	4	130	32·5
Grassington	73	2,223	30·45	Whitaside	9	291	32·33
Grassfield	4	145	36·25	White Force	8	271	33·87
Greenbourne	4	180	45·	Whitriggs	56	1,685	30·09
Grimwett	4	119	29·75	Wire Gill	110	3,391	30·82
Hardshins	38	1,224	32·21	Yorkshire	10	322	32·2
				Total of 91 mines	3,759	121,583	32·34

Ages of Miners working underground in the North of England.

Ages.													Total.
10–14.	15–19.	20–24.	25–29.	30–34.	35–39.	40–44.	45–49.	50–54.	55–59.	60–64.	65–69.	70–74.	
76	370	813	593	509	439	332	266	164	107	61	22	7	3,759
20·2	98·4	216·3	157·7	135·4	116·8	88·3	70·8	43·6	28·5	16·2	5·9	1·9	1,000

ABSTRACT of RETURNS of AGES of Underground Miners working in Mines in NORTH WALES.

Name of Mine.	Number of Men.	Total Years.	Average Age.	Name of Mine.	Number of Men.	Total Years.	Average Age.
Billuis - - -	12	408	34·83	Long Rakes - -	60	2,166	36·1
Bryngwiog - -	70	2,352	33·6	Maes-y-Safn - -	211	7,441	35·26
Bwlch Consols - -	34	987	29·02	Minera - -	355	12,448	35·06
Bwlch Styllen - -	6	174	29·	Mona - - -	130	4,506	34·66
Cold Mawr Pool -	31	1,046	33·74	Park - - -	97	3,005	30·97
Cwm-Erfin - -	104	3,463	33·29	Parys - - -	228	7,913	34·706
Cwm-Ystwith - -	153	4,755	31·07	Pentre Lygan - -	10	335	33·5
East Darren - -	73	2,292	31·39	Rhosesmawr - -	68	2,594	38·14
Goginan - - -	43	1,353	31·46	Talargoch - -	296	10,346	34·95
Gelli Eirin - -	12	403	33·58	Westminster - -	50	2,043	40·86
Lisburne Mines -	344	10,386	30·19				
Llwynmalees - -	23	612	26·608	Total of 22 Mines -	2,410	81,028	33·62

AGES of MINERS working underground in Mines in WALES.

Ages.														Total.
-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60-64.	65-69.	70-74.	75-79.	
2	21	187	407	395	358	308	278	188	113	76	53	17	5	2	2,410
9	8·7	77·6	168·8	164·0	148·5	127·9	115·3	78·0	46·9	31·5	22·0	7·0	2·0	·9	1,000

ABSTRACT of RETURNS of AGES of Underground Miners working in the Ironstone Mines in the NORTH of ENGLAND.

Name of Mine.	Number of Men.	Total Years.	Average Age.	Name of Mine.	Number of Men.	Total Years.	Average Age.
Askham - - -	97	3,215	33·14	Roanhead - - -	51	1,646	32·27
Cleator - - -	84	2,531	30·13	Rowantree - -	59	1,675	28·38
Eston - - -	618	17,889	28·94	Skelton - - -	203	5,866	28·89
Groove Rake - -	34	1,258	37·0	Slit Pasture - -	18	626	34·77
Heights - - -	28	1,015	36·25	Stotsfield Burnhead -	4	112	28·0
Lindale Cote and Eure -	46	1,467	31·88	Upleatham - -	343	10,744	31·32
Lindale Moor - -	284	8,872	31·23	West Slit - -	16	482	30·12
Mousell - - -	37	1,294	34·97	West Pasture - -	5	144	28·8
Newton - - -	11	388	35·27	Whitriggs - -	56	1,685	30·09
Normanby - - -	136	4,104	30·17	Wood End and Gutterby	169	5,613	33·21
Parks - - -	241	7,998	33·18				
Parkside - - -	500	13,889	27·77	Total of 23 Mines -	3,081	93,995	30·507
Red Vein - -	41	1,482	36·14				

AGES of MINERS working in the Ironstone Mines in the NORTH of ENGLAND.

Ages.												Total.
10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60-64.	65-69.	70-74.	
76	244	636	647	494	414	267	139	99	35	20	5	5	3,081
24·7	79·2	206·4	210·0	160·3	134·4	86·7	45·1	32·1	11·4	6·5	1·6	1·6	1,000

XI.

CORNWALL.

RETURN of the AMOUNT of CANDLES and GUNPOWDER consumed in One Year in Mines.

Name of Mine.	CANDLES.					GUNPOWDER.					Total Profit on Candles and Powder.	Name of Mine.
	Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound.	Profit on Candles.	Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound.	Profit on Powder.		
				Cost. Sold.					Cost. Sold.			
	lbs.	£ s. d.	£ s. d.	d. d.	£ s. d.	lbs.	£ s. d.	£ s. d.	d. d.	£ s. d.	£ s. d.	
Alfred Consols	18,771	469 5 6	625 14 0	6 8	156 8 6	6,987	174 13 6	232 18 0	6 8	58 4 6	214 13 0	Alfred Consols.
Balleswidden	21,000	525 0 0	787 10 0	6 9	262 10 0	12,500	312 10 0	468 15 0	6 9	156 5 0	418 15 0	Balleswidden.
Bedford United	13,852	346 6 0	461 14 8	6 8	115 8 8	15,092	377 6 0	440 3 8	6 7	62 17 8	178 6 4	Bedford United.
Birch Tor	7,920	158 16 3	264 0 0	$5\frac{5}{12}$ 8	105 3 9	4,502	112 11 0	150 1 4	6 8	37 10 4	142 14 1	Birch Tor.
Bosweddan and Huel Castle	7,488	171 12 0	280 16 0	$5\frac{1}{2}$ 9	109 4 0	3,600	90 0 0	135 0 0	6 9	45 0 0	154 4 0	Bosweddan and Huel Castle.
Botallack	21,852	546 6 0	819 9 0	6 9	273 3 0	15,680	392 0 0	588 0 0	6 9	196 0 0	469 3 0	Bottallack.
Calstock Consols	1,567	39 3 6	58 15 3	6 9	19 11 9	2,500	62 10 0	93 15 0	6 9	31 5 0	50 16 9	Calstock Consols.
Camborne Consols	2,622	65 11 0	98 6 6	6 9	32 15 6	2,233	55 16 6	83 14 9	6 9	27 18 3	60 13 9	Camborne Consols.
Camborne Vean	9,240	231 0 0	308 0 0	6 8	77 0 0	8,848	221 4 0	294 18 8	6 8	73 14 8	150 14 8	Camborne Vean.
Caradon Consols	3,060	76 10 0	102 0 0	6 8	25 10 0	4,700	117 10 0	156 13 4	6 8	39 3 4	64 13 4	Caradon Consols.
Caradon Hill	808	20 4 0	26 18 8	6 8	6 14 8	786	19 13 0	26 4 0	6 8	6 11 0	13 5 8	Caradon Hill.
Caradon Vale	2,808	70 4 0	81 18 0	6 7	11 14 0	1,800	45 0 0	52 10 0	6 7	7 10 0	19 4 0	Caradon Vale.
Cargoll	12,849	321 4 6	428 6 0	6 8	107 1 6	5,136	128 8 0	192 12 0	6 9	64 4 0	171 5 6	Cargoll.
Carn Brea	45,318	1,132 19 0	1,510 12 0	6 8	377 13 0	25,686	642 3 0	856 4 0	6 8	214 1 0	591 14 0	Carn Brea.
Carn Galver	7,680	192 0 0	288 0 0	6 9	96 0 0	1,500	37 10 0	56 5 0	6 9	18 15 0	114 15 0	Carn Galver.
Charlestown United	29,779	744 9 $0\frac{1}{2}$	992 12 $0\frac{3}{5}$	6 8	248 3 $0\frac{1}{6}$	21,600	540 0 0	720 0 0	6 8	180 0 0	428 3 $0\frac{1}{6}$	Charlestown United.
Clijah	4,524	113 2 0	169 13 0	6 9	56 11 0	2,200	55 0 0	73 6 8	6 8	18 6 8	74 17 8	Clijah.
Copper Hill	8,556	213 18 0	285 4 0	6 8	71 6 0	8,000	200 0 0	266 13 4	6 8	66 13 4	137 19 4	Copper Hill.
Crelake	9,089	227 4 6	340 16 9	6 9	113 12 3	3,962	99 1 0	148 11 6	6 9	49 10 6	163 2 9	Crelake.
Cuddra	4,500	112 10 0	150 0 0	6 8	37 10 0	6,000	150 0 0	175 0 0	6 7	25 0 0	62 10 0	Cuddra.
Devon Great Consols	38,016	871 4 0	1,267 4 0	$5\frac{1}{2}$ 8	396 0 0	40,604	1,015 2 0	1,353 9 4	6 8	338 7 4	734 7 4	Devon Great Consols.
Ding Dong	9,766	244 3 0	284 16 10	6 7	40 13 10	4,755	118 17 6	178 6 3	6 9	59 8 9	100 2 7	Ding Dong.
Dolcoath	51,006	1,168 17 9	1,700 4 0	$5\frac{1}{2}$ 8	531 6 3	35,350	883 15 0	1,178 6 8	6 8	294 11 8	825 17 11	Dolcoath.
Drake Walls	15,388	384 14 0	512 18 8	6 8	128 4 8	31,000	775 0 0	1,033 6 8	6 8	258 6 8	386 11 4	Drake Walls.
Duchy and Peru	2,803	70 1 6	93 8 8	6 8	23 7 2	475	11 17 6	15 16 8	6 8	3 19 2	27 6 4	Duchy and Peru.
Durlo	9,495	237 7 6	316 10 0	6 8	79 2 6	3,275	81 17 6	95 10 5	6 7	13 12 11	92 15 5	Durlo.

East Caradon	10,097	252	8	6	294	9	11	6	7	42	1	5	7,839	195	19	6	228	12	9	6	7	32	13	3	74	14	8	East Caradon.
East Huel Agar	1,357	33	18	6	45	4	8	6	8	11	6	2	1,622	40	11	0	54	1	4	6	8	13	10	4	24	16	6	East Huel Agar.
East Huel Grenville	4,291	107	5	6	143	0	8	6	8	35	15	2	3,892	97	6	0	129	14	8	6	8	32	8	8	68	3	10	East Huel Grenville.
East Huel Grylls	960	24	0	0	32	0	0	6	8	8	0	0	400	10	0	0	13	6	8	6	8	3	6	8	11	6	8	East Huel Grylls.
East Huel Lovel	2,880	72	0	0	84	0	0	6	7	12	0	0	1,344	33	12	0	44	16	0	6	8	11	4	0	23	4	0	East Huel Lovel.
East Huel Tolgus	3,600	78	15	0	120	0	0	5¼	8	41	5	0	2,100	52	10	0	70	0	0	6	8	17	10	0	58	15	0	East Huel Tolgus.
East Margaret	7,996	199	18	0	266	10	8	6	8	66	12	8	6,400	160	0	0	213	6	8	6	8	53	6	8	119	19	4	East Margaret.
East Pool	13,831	345	15	6	691	11	0	6	12	345	15	6	14,256	356	8	0	475	4	0	6	8	118	16	0	464	11	6	East Pool.
East Rosewarne	6,936	173	8	0	231	4	0	6	8	57	16	0	3,900	97	10	0	130	0	0	6	8	32	10	0	90	6	0	East Rosewarne.
Frank Mills	9,000	243	15	0	375	0	0	6½	10	131	5	0	2,780	69	10	0	92	13	4	6	8	23	3	4	154	8	4	Frank Mills.
Fowey Consols	35,264	881	12	0	1,175	9	4	6	8	293	17	4	29,744	743	12	0	991	9	4	6	8	247	17	4	541	14	8	Fowey Consols.
Garden Mine	2,400	60	0	0	90	0	0	6	9	30	0	0	1,500	37	10	0	56	5	0	6	9	18	15	0	48	15	0	Garden Mine.
Gonamena	1,330	33	5	0	44	6	8	6	8	11	1	8	2,500	62	10	0	83	6	8	6	8	20	16	8	31	18	4	Gonamena.
Grambler and St. Aubyn	5,760	144	0	0	192	0	0	6	8	48	0	0	7,840	196	0	0	261	6	8	6	8	65	6	8	113	6	8	Grambler and St Aubyn.
Great Brigan	11,788	294	14	0	392	18	8	6	8	98	4	8	5,500	137	10	0	183	6	8	6	8	45	16	8	144	1	4	Great Brigan.
Great Caradon	1,490	37	5	0	49	13	4	6	8	12	8	4	2,000	50	0	0	66	13	4	6	8	16	13	4	29	1	8	Great Caradon.
Great Huel Busy United	39,456	986	8	0	1,315	4	0	6	8	328	16	0	22,000	550	0	0	733	6	8	6	8	183	6	8	512	2	8	Great Huel Busy United.
Great Huel Fortune	29,569	739	4	6	985	12	8	6	8	246	8	2	12,943	323	11	6	431	8	8	6	8	107	17	2	354	5	4	Great Huel Fortune.
Great Huel Vor	14,736	368	8	0	491	4	0	6	8	122	16	0	18,309	457	14	6	610	6	0	6	8	152	11	6	275	7	6	Great Huel Vor.
Great North Downs	9,360	234	0	0	312	0	0	6	8	78	0	0	4,000	100	0	0	133	6	8	6	8	33	6	8	111	6	8	Great North Downs.
Great Retallack	2,028	50	14	0	67	12	0	6	8	16	18	0	600	15	0	0	20	0	0	6	8	5	0	0	21	18	0	Great Retallack.
Great Tregune Consols	1,373	34	6	6	45	15	4	6	8	11	8	10	842	21	1	0	28	1	4	6	8	7	0	4	18	9	2	Great Tregune Consols.
Great Work	28,164	704	2	0	938	16	0	6	8	234	14	0	12,000	300	0	0	400	0	0	6	8	100	0	0	334	14	0	Great Work.
Gunnislake (Clithero)	3,588	89	14	0	119	12	0	6	8	29	18	0	5,500	137	10	0	183	6	8	6	8	45	16	8	75	14	8	Gunnislake (Clithero).
Hawkmoor	3,312	82	16	0	110	8	0	6	8	27	12	0	6,720	168	0	0	224	0	0	6	8	56	0	0	83	12	0	Hawkmoor.
Herodsfoot	9,600	240	0	0	240	0	0	6	6	-	-	-	8,960	224	0	0	224	0	0	6	6	——			——			Herodsfoot.
Hingston Down Consols	13,014	325	7	0	433	16	0	6	8	108	9	0	11,631	290	15	6	436	3	3	6	9	145	7	9	253	16	9	Hingston Down Consols.
Huel Bassett	29,808	683	2	0	869	8	0	5½	7	186	6	0	15,900	364	7	6	530	0	0	5½	8	165	12	6	351	18	6	Huel Bassett.
Huel Bassett and Grylls	16,608	415	4	0	622	16	0	6	9	207	12	0	5,820	145	10	0	218	5	0	6	9	72	15	0	280	7	0	Huel Bassett and Grylls.
Huel Buller	19,188	479	14	0	639	12	0	6	8	159	18	0	17,200	430	0	0	573	6	8	6	8	143	6	8	303	4	8	Huel Buller.
Huel Caradon	1,728	43	4	0	57	12	0	6	8	14	8	0	1,000	25	0	0	33	6	8	6	8	8	6	8	22	14	8	Huel Caradon.
Huel Clifford	63,936	1,465	4	0	1,864	16	0	5½	7	399	12	0	29,000	725	0	0	966	13	4	6	8	241	13	4	641	5	4	Huel Clifford.
Huel Friendship	15,587	389	13	6	454	12	5	6	7	64	18	11	16,907	422	13	6	422	13	6	6	6	——			64	18	11	Huel Friendship.
Huel Hope	2,268	56	14	0	75	12	0	6	8	18	18	0	700	17	10	0	23	6	8	6	8	5	16	8	24	14	8	Huel Hope.
Huel Kitty, St. Agnes	14,124	353	2	0	470	16	0	6	8	117	14	0	10,500	262	10	0	350	0	0	6	8	87	10	0	205	4	0	Huel Kitty, St. Agnes.
Huel Mary, Lelant	12,000	300	0	0	453	0	0	6	9	150	0	0	4,000	100	0	0	133	6	8	6	8	33	6	8	183	6	8	Huel Mary, Lelant.

(*continued*)

Return of the Amount of Candles and Gunpowder consumed in One Year in Mines—*continued.*

Name of Mine.	CANDLES.						GUNPOWDER.						Total Profit on Candles and Powder	Name of Mine.
	Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Candles.	Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Powder.		
				Cost.	Sold.					Cost.	Sold.			
	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	£ s. d.	
Huel Mary Ann	21,480	537 0 0	716 0 0	6	8	179 0 0	20,160	504 0 0	672 0 0	6	8	168 0 0	347 0 0	Huel Mary Ann.
Huel Mary Great Consols	3,500	87 10 0	116 13 4	6	8	29 3 4	4,600	115 0 0	153 6 8	6	8	38 6 8	67 10 0	Huel Mary Great Consols.
Huel Margaret	10,608	265 4 0	353 12 0	6	8	88 8 0	4,000	100 0 0	133 6 8	6	8	33 6 8	121 14 8	Huel Margaret.
Huel Margery	9,400	235 0 0	352 10 0	6	9	117 10 0	4,400	100 0 0	150 0 0	6	9	50 0 0	167 10 0	Huel Margery.
Huel Norris	5,616	140 8 0	187 4 0	6	8	46 16 0	3,500	87 10 0	116 13 4	6	8	29 3 4	75 19 4	Huel Norris.
Huel Owles	23,712	543 8 0	889 4 0	5½	9	345 16 0	12,000	300 0 0	450 0 0	6	9	150 0 0	495 16 0	Huel Owles.
Huel Pollard	1,300	32 10 0	43 6 8	6	8	10 16 8	1,200	30 0 0	40 0 0	6	8	10 0 0	20 16 8	Huel Pollard.
Huel Reeth	17,680	442 0 0	589 6 8	6	8	147 6 8	5,600	140 0 0	186 13 4	6	8	46 13 4	194 0 0	Huel Reeth.
Huel Sithney and Carnmeal	4,131	120 9 9	137 14 0	7	8	17 4 3	4,705	117 12 6	117 12 6	6	6	- - -	17 4 3	Huel Sithney and Carnmeal.
Huel Unity Consols	4,476	111 18 0	149 4 0	6	8	37 6 0	1,300	32 10 0	43 6 8	6	8	10 16 8	48 2 8	Huel Unity Consols.
Kelly Bertha	4,728	118 4 0	157 12 0	6	8	39 8 0	8,100	202 10 0	270 0 0	6	8	67 10 0	106 18 0	Kelly Bray.
Lady Bray	5,932	148 6 0	197 14 8	6	8	49 8 8	13,440	336 0 0	448 0 0	6	8	112 0 0	161 8 8	Lady Bertha.
Lelant Consols	2,472	61 16 0	82 8 0	6	8	20 12 0	2,246	56 3 0	74 17 4	6	8	18 14 4	39 6 4	Lelant Consols.
Levant	24,000	600 0 0	900 0 0	6	9	300 0 0	15,680	392 0 0	588 0 0	6	9	196 0 0	496 0 0	Levant.
Marke Valley	12,884	322 2 0	375 15 8	6	7	53 13 8	11,647	291 3 6	339 14 1	6	7	48 10 7	102 4 3	Marke Valley.
Mulberry Hill	288	7 4 0	9 12 0	6	8	2 8 0	5,000	125 0 0	166 13 4	6	8	41 13 4	44 1 4	Mulberry Hill.
New Huel Vaddon	2,016	50 8 0	75 12 0	6	9	25 4 0	967	24 3 6	36 5 3	6	9	12 1 9	37 5 9	New Huel Vaddon.
New Tamar	1,800	45 0 0	45 0 0	6	6	- -	3,360	84 0 0	84 0 0	6	6	—	—	New Tamar.
New Treleigh	4,500	112 10 0	150 0 0	6	8	37 10 0	3,000	75 0 0	100 0 0	6	8	25 0 0	62 10 0	New Treleigh.
North Downs	11,109	277 14 6	370 6 0	6	8	92 11 6	6,100	152 10 0	203 6 8	6	8	50 16 8	143 8 2	North Downs.
North Frances	2,952	73 16 0	98 8 0	6	8	24 12 0	2,250	56 5 3	75 0 0	6	8	18 15 0	43 7 0	North Frances.
North Huel Basset	10,110	252 15 0	379 2 6	6	9	126 7 6	5,705	142 12 6	213 18 9	6	9	71 6 3	197 13 9	North Huel Basset.
North Huel Robert	8,486	212 3 0	282 17 4	6	8	70 14 4	13,456	336 8 0	448 10 8	6	8	112 2 8	182 17 0	North Huel Robert.
North Levant	4,200	113 15 0	140 0 0	6½	8	26 5 0	3,360	84 0 0	112 0 0	6	8	28 0 0	54 5 0	North Levant.
North Phœnix	2,886	72 3 0	96 4 0	6	8	24 1 0	2,800	70 0 0	93 6 8	6	8	23 6 8	47 7 8	North Phœnix.
North Roskear	12,700	291 0 10	476 5 0	5½	9	185 4 2	17,500	437 10 0	656 5 0	6	9	218 15 0	403 19 2	North Roskear.
North Wrey	656	16 8 0	21 17 4	6	8	5 9 4	100	2 10 0	3 6 8	6	8	0 16 8	6 6 0	North Wrey.

[illegible]	[illegible]	115	4	172	16	0	6	9	57	12	0	6,765	169	2	6	253	13	9	6	9	84	11	3	142	3	3	Okel Tor.
Pednandrea United	18,816	470	8	0	627	4	0	6	8	156	16	0	11,900	297	10	0	347	1	8	6	7	49	11	8	206	7	8	Pednandrea United.
Par Consols	51,086	1,277	3	0	1,702	17	4	6	8	425	14	4	63,445	1,586	2	3	2,114	16	8	6	8	528	14	2	954	8	6	Par Consols.
Pendeen Consols	7,295	182	7	6	273	11	3	6	9	91	3	9	4,511	112	15	6	169	3	3	6	9	56	7	9	147	11	6	Pendeen Consols.
Penhalls	9,408	235	4	0	313	12	0	6	8	78	8	0	5,300	132	10	0	176	13	4	6	8	44	3	4	122	11	4	Penhalls.
Polberro	12,440	311	0	0	466	10	0	6	9	155	10	0	5,300	132	10	0	176	13	4	6	8	44	3	4	199	13	4	Polberro.
Prosper United, &c.	96,000	2,300	0	0	2,800	0	0	5¾	7	500	0	0	27,600	632	10	0	690	0	0	5½	6	57	10	0	557	10	0	Prosper United, &c.
Providence	14,352	358	16	0	478	8	0	6	8	119	12	0	12,000	300	0	0	400	0	0	6	8	100	0	0	219	12	0	Providence.
Redmoor	4,140	103	10	0	138	0	0	6	8	34	10	0	6,000	150	0	0	200	0	0	6	8	50	0	0	84	10	0	Redmoor.
Rosewall and Ransom	11,600	290	0	0	386	13	4	6	8	96	13	4	6,000	150	0	0	200	0	0	6	8	50	0	0	146	13	4	Rosewall and Ransom.
St. Day United	27,552	688	16	0	918	8	0	6	8	229	12	0	18,000	450	0	0	600	0	0	6	8	150	0	0	379	12	0	St. Day United.
St. Ives Consols	20,000	500	0	0	833	6	8	6	10	333	6	8	10,000	250	0	0	375	0	0	6	9	125	0	0	458	6	8	St. Ives Consols.
St. Just United	14,400	360	0	0	540	0	0	6	9	180	0	0	6,000	150	0	0	225	0	0	6	9	75	0	0	255	0	0	St. Just United.
South Caradon	39,317	982	18	6	1,146	14	11	6	7	163	16	5	31,360	784	0	0	784	0	0	6	6	-	-	-	163	16	5	South Caradon.
South Caradon Huel Hooper	1,050	26	5	0	35	0	0	6	8	8	15	0	1,000	25	0	0	33	6	8	6	8	8	6	8	17	1	8	South Caradon Huel Hooper
South Creuver	5,244	131	2	0	163	17	6	6	7½	32	15	6	2,000	50	0	0	62	10	0	6	7½	12	10	0	45	5	6	South Creuver.
South Crinnis	7,123	178	1	6	237	8	8	6	8	59	7	2	6,712	167	16	0	223	14	8	6	8	55	18	8	115	5	10	South Crinnis.
South Crofty	5,000	125	0	0	166	13	4	6	8	41	13	4	4,550	113	15	0	151	13	4	6	8	37	18	4	79	11	8	South Crofty.
South Dolcoath	1,890	47	5	0	70	17	6	6	9	23	12	6	2,034	50	17	0	76	5	6	6	9	25	8	6	49	1	0	South Dolcoath.
South Exmouth	6,000	162	10	0	250	0	0	6½	10	87	10	0	3,000	75	0	0	100	0	0	6	8	25	0	0	112	10	0	South Exmouth.
South Frances	18,334	458	7	0	687	10	6	6	9	229	3	6	13,202	330	1	0	495	1	6	6	9	165	0	6	394	4	0	South Frances.
South Herodsfoot	1,045	26	2	6	34	16	8	6	8	8	14	2	1,717	42	18	6	50	1	7	6	7	7	3	1	15	17	3	South Herodsfoot.
South Huel Seton	3,840	96	0	0	128	0	0	6	8	32	0	0	2,000	50	0	0	66	13	4	6	8	16	13	4	48	13	4	South Huel Seton.
South Huel Tolgus	18,780	410	16	3	626	0	0	5¼	8	215	3	9	9,640	241	0	0	321	6	8	6	8	80	6	8	295	10	5	South Huel Tolgus.
South Phœnix	3,120	78	0	0	91	0	0	6	7	13	0	0	1,796	44	18	0	59	17	4	6	8	14	19	4	27	19	4	South Phœnix.
South Tresavean	1,568	39	4	0	52	5	4	6	8	13	1	4	1,244	31	2	0	41	9	4	6	8	10	7	4	23	8	8	South Tresavean.
Spearn Moor	6,000	162	10	0	200	0	0	6½	8	37	10	0	6,720	168	0	0	224	0	0	6	8	56	0	0	93	10	0	Spearn Moor.
Tamar Silverhead	9,096	227	8	0	303	4	0	6	8	75	16	0	11,884	297	2	0	396	2	8	6	8	99	0	8	174	16	8	Tamar Silverhead.
Turcroft	18,720	468	0	0	624	0	0	6	8	156	0	0	24,000	600	0	0	800	0	0	6	8	200	0	0	356	0	0	Turcroft.
Tolcarne	8,160	178	10	0	272	0	0	5¼	8	93	10	0	5,500	137	10	0	183	6	8	6	8	45	16	8	139	6	8	Tolcarne.
Trelyon Consols	7,050	176	5	0	264	7	6	6	9	88	2	6	6,880	172	0	0	258	0	0	6	9	86	0	0	174	2	6	Trelyon Consols.
Tresavean and Tretharrup	2,952	73	16	0	98	8	0	6	8	24	12	0	3,000	75	0	0	100	0	0	6	8	25	0	0	49	12	0	Tresavean and Tretharrup.
Treweatha	3,314	82	17	0	110	9	4	6	8	27	12	4	298	7	9	0	9	18	8	6	8	2	9	8	30	2	0	Treweatha.
Treworlis	4,320	108	0	0	126	0	0	6	7	18	0	0	2,688	67	4	0	89	12	0	6	8	22	8	0	40	8	0	Treworlis.
Trumpet United	2,085	52	2	6	69	10	0	6	8	17	7	6	2,716	67	18	0	90	10	8	6	8	22	12	8	40	0	2	Trumpet United.
Tywarnhaile	16,392	409	16	0	546	8	0	6	8	136	12	0	11,000	275	0	0	366	13	4	6	8	91	13	4	228	5	4	Tywarnhaile.

(*continued*)

Return of the Amount of Candles and Gunpowder consumed in One Year in Mines—*continued.*

Name of Mine.	CANDLES. Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound. Cost.	Sold.	Profit on Candles.	GUNPOWDER. Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound. Cost.	Sold.	Profit on Powder.	Total Profit on Candles and Powder.	Name of Mine.
	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	£ s. d.	
Wendron Consols	15,069	376 13 6	565 0 3	6	9	188 6 9	10,732	268 6 0	357 14 8	6	8	89 8 8	277 15 5	Wendron Consols.
West Alfred Consols	1,908	47 14 0	55 13 0	6	7	7 19 0	1,303	32 11 6	32 11 6	6	6	- - -	7 19 0	West Alfred Consols.
West Beam	6,240	156 0 0	208 0 0	6	8	52 0 0	5,500	137 10 0	183 6 8	6	8	45 16 8	97 16 8	West Beam.
West Caradon	27,132	678 6 0	904 8 0	6	8	226 2 0	22,992	574 16 0	766 8 0	6	8	191 12 0	417 14 0	West Caradon.
West Condurrow	3,350	83 15 0	111 13 4	6	8	27 18 4	1,963	49 1 6	65 8 8	6	8	16 7 2	44 5 6	West Condurrow.
West Fowey Consols	16,056	401 8 0	535 4 0	6	8	133 16 0	23,791	594 15 6	793 0 8	6	8	198 5 2	332 1 2	West Fowey Consols.
West Great Work	1,340	33 10 0	44 13 4	6	8	11 3 4	950	23 15 0	31 13 4	6	8	7 18 4	19 1 8	West Great Work.
West Huel Tolgus	3,120	68 5 0	104 0 0	5½	8	35 15 0	2,060	51 10 0	68 13 4	6	8	17 3 4	52 18 4	West Huel Tolgus.
West Par, &c.	3,600	105 0 0	120 0 0	7	8	15 0 0	6,720	168 0 0	196 0 0	6	7	28 0 0	43 0 0	West Par, &c.
West Sharp Tor	2,528	63 4 0	84 5 4	6	8	21 1 4	2,206	55 3 0	82 14 6	6	9	27 11 6	48 12 10	West Sharp Tor.
West Rosedown	2,363	59 1 6	68 18 5	6	7	9 16 11	2,995	74 17 6	87 7 1	6	7	12 9 7	22 6 6	West Rosedown.
West Wheal Basset	24,276	606 18 0	910 7 0	6	9	303 9 0	18,500	462 10 0	693 15 0	6	9	231 5 0	534 14 0	West Wheal Basset.
West Wheal Trevelyan	4,594	114 17 0	172 5 6	6	9	57 8 6	771	19 5 6	28 18 3	6	9	9 12 9	67 1 3	West Wheal Trevelyan.
Wheal Agar	6,967	174 3 6	232 4 8	6	8	58 1 2	9,057	226 8 6	264 3 3	6	7	37 14 9	95 15 11	Wheal Agar.
Wheal Anna	7,269	181 14 6	242 6 0	6	8	60 11 6	3,005	75 2 6	100 3 4	6	8	25 0 10	85 12 4	Wheal Anna.
Wheal Grenville	8,267	206 13 6	275 11 4	6	8	68 17 10	5,261	131 10 6	153 8 11	6	7	21 18 5	90 16 3	Wheal Grenville.
Wheal Grylls	12,765	319 2 6	425 10 0	6	8	106 7 6	2,400	60 0 0	80 0 0	6	8	20 0 0	126 7 6	Wheal Grylls.
Wheal Hearle	5,040	126 0 0	168 0 0	6	8	42 0 0	2,076	51 18 0	69 4 0	6	8	17 6 0	59 6 0	Wheal Hearle.
Wheal Tremayne	13,268	331 14 0	497 11 0	6	9	165 17 0	12,715	317 17 6	370 17 1	6	7	52 19 7	218 16 7	Wheal Tremayne.
Total	1,669,055	41,094 8 4½	56,122 19 6⅔	—	—	15,028 11 2½	1,215,455	30,295 15 0	40,149 0 10	—	—	9,853 5 10	24,881 17 0½	Total.

RETURN of the AMOUNT of CANDLES and GUNPOWDER consumed in One Year in Mines.

Name of Mine.	CANDLES. Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound. Cost.	Price per Pound. Sold.	Profit on Candles.	GUNPOWDER. Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound. Cost.	Price per Pound. Sold.	Profit on Powder.	Total Profit on Candles and Powder.	Name of Mine.
	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	lbs.	£ s. d.	£ s. d.	d.	d.	£ s. d.	£ s. d.	
Allenheads	94,716	2,367 18 0	2,367 18 0	6	6	—	52,858	1,321 9 0	1,321 9 0	6	6	—	—	Allenheads.
Allergill	500	12 10 0	12 10 0	6	6	—	700	17 10 0	17 10 0	6	6	—	—	Allergill.
Alston Moor	40,560	1,140 15 0	1,140 15 0	6¼	6¾	—	36,000	900 0 0	1,050 0 0	6	7	150 0 0	150 0 0	Alston Moor.
Appletreewick	2,200	55 0 0	55 0 0	6	6	—	2,688	67 4 0	67 4 0	6	6	—	—	Appletreewick.
Beldihill	637	15 18 6	18 11 7	6	7	2 13 1	1,035	27 7 6	31 18 9	6	7	4 11 3	7 4 4	Beldihill.
Beldon	1,164	29 2 0	38 16 0	6	8	9 14 0	2,000	50 0 0	66 13 4	6	8	16 13 4	26 7 4	Beldon.
Bentyfield, &c.	14,664	397 3 0	397 3 0	6½	6½	—	19,400	545 12 6	545 12 6	6¾	6¾	—	—	Bentyfield, &c.
Bolton Parks	720	18 4 6	18 4 6	6	6	—	216	5 8 0	6 15 0	6	7½	1 7 0	1 7 0	Bolton Parks.
Brownley Hill	5,760	144 0 0	144 0 0	6	6	—	4,500	112 10 0	112 10 0	6	6	—	—	Brownley Hill.
Buckden Gaole	780	19 10 0	26 0 0	6	8	6 10 0	112	2 16 0	3 14 8	6	8	0 18 8	7 8 8	Buckden Gaole.
Birchy Bank	456	12 7 0	12 7 0	6½	6½	—	312	8 2 6	8 2 6	6¼	6¼	—	—	Birchy Bank.
Calvert	852	23 1 6	23 1 6	6½	6½	—	112	2 11 4	2 11 4	5½	5½	—	—	Calvert.
Cashwell	1,944	48 12 0	56 14 0	6	7	8 2 0	1,456	37 18 4	37 18 4	6¼	6¼	—	8 2 0	Cashwell.
Coalcleugh	21,504	537 12 0	537 12 0	6	6	—	14,250	356 5 0	356 5 0	6	6	—	—	Coalcleugh.
Coniston	20,155	503 17 6	587 17 1	6	7	83 19 7	34,672	866 16 0	1,011 5 4	6	7	144 9 4	228 8 11	Coniston.
Coniston Out Moor	180	4 13 9	4 13 9	6¼	6¼	—	200	5 12 6	5 12 6	6¾	6¾	—	—	Coniston Out Moor.
Cononley	4,118	94 7 5	94 7 5	5½	5½	—	3,920	89 16 8	89 16 8	5½	5½	—	—	Cononley.
Craven Moor	2,762	69 1 0	80 11 2	6	7	11 10 2	2,302	57 11 0	67 2 10	6	7	9 11 10	21 2 0	Craven Moor.
Derwent	22,070	551 15 0	735 15 4	6	8	183 18 4	21,164	529 2 0	705 9 4	6	8	176 7 4	360 5 8	Derwent.
Do. Deborah's Level	13,631	340 15 6	454 7 4	6	8	113 11 10	13,861	346 10 6	462 0 8	6	8	115 10 2	229 2 0	Do. Deborah's Level.
Dosey	144	3 12 0	4 4 0	6	7	0 12 0	104	2 14 2	2 14 2	6¼	6¼	—	0 12 0	Dosey.
Dougang	2,160	49 10 0	49 10 0	5½	5½	—	1,500	37 10 0	50 0 0	6	8	12 10 0	12 10 0	Dougang.
Dowpot Syke	216	5 8 0	5 8 0	6	6	—	208	5 8 4	5 8 4	6¼	6¼	—	—	Dowpot Syke.
Driggith	1,300	32 10 0	48 15 0	6	9	16 5 0	1,446	36 3 0	54 4 6	6	9	18 1 6	34 6 6	Driggith.
East Allendale	37,200	813 15 0	813 15 0	5¼	5¼	—	19,000	415 12 6	415 12 6	5¼	5¼	—	—	East Allendale.
Ellerton Moor	1,468	36 14 0	48 18 8	6	8	12 4 8	200	5 0 0	6 13 4	6	8	1 13 4	13 18 0	Ellerton Moor.

(continued.)

Return of the Amount of Candles and Gunpowder consumed in One Year in Mines—*continued.*

Name of Mine.	CANDLES.						GUNPOWDER.					Total Profit on Candles and Powder.	Name of Mine.
	Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Candles.	Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Powder.		
	lbs.	£ s. d.	£ s. d.	d. Cost.	d. Sold.	£ s. d.	lbs.	£ s. d.	£ s. d.	d. Cost.	d. Sold.	£ s. d.	£ s. d.	
Fallowfield	7,000	175 0 0	175 0 0	6	6	—	5,000	125 0 0	125 0 0	6	6	—	—	Fallowfield.
Fell End and Gutters	648	16 4 0	21 12 0	6	8	5 8 0	225	5 12 6	5 12 6	6	6	—	5 8 0	Fell End and Gutters.
Forest Moor	507	12 13 6	12 13 6	6	6	—	437	10 18 6	14 11 4	6	8	3 12 10	3 12 10	Forest Moor.
Gallegill Syke	1,440	36 0 0	36 0 0	6	6	—	900	22 10 0	22 10 0	6	6	—	—	Gallegill Syke.
Goldscope, &c.	4,138	103 9 0	155 3 6	6	9	51 14 6	5,376	134 8 0	179 4 0	6	8	44 16 0	96 10 6	Goldscope, &c.
Grassington	8,124	186 3 6	183 3 6	5½	5½	—	6,748	154 12 10	154 12 10	5½	5½	—	—	Grassington.
Greenbourne	504	12 12 0	16 16 0	6	8	4 4 0	480	12 0 0	16 0 0	6	8	4 0 0	8 4 0	Greenbourne.
Greenside	15,771	394 5 6	459 19 9	6	7	65 14 3	24,080	602 0 0	602 0 0	6	6	—	65 14 3	Greenside.
Guttergill	624	15 12 0	18 4 0	6	7	2 12 0	520	13 10 10	13 10 10	6¼	6¼	—	2 12 0	Guttergill.
Harehope Gill	2,080	52 0 0	52 0 0	6	6	—	—	—	—	—	—	—	—	Harehope Gill.
Harwood	1,040	26 0 0	34 13 4	6	8	8 13 4	472	11 16 0	11 16 0	6	6	—	8 13 4	Harwood.
Hebden Moor	4,753	118 16 6	138 12 7	6	7	19 16 1	6,760	169 0 0	204 4 2	6	7¼	35 4 2	55 0 3	Hebden Moor.
Hollyfield	228	6 3 6	6 3 6	6½	6½	—	156	4 1 3	4 1 3	6¼	6¼	—	—	Hollyfield.
Hudgett Burne	1,872	46 16 0	54 12 0	6	7	7 16 0	350	9 9 7	9 9 7	6½	6½	—	7 16 0	Hudgett Burne.
Keldheads	8,838	239 8 11	239 8 11	6½	6½	—	4,100	111 0 10	111 0 10	6½	6½	—	—	Keldheads.
Keswick	3,336	83 8 0	97 6 0	6	7	13 18 0	3,900	97 10 0	130 0 0	6	8	32 10 0	46 8 0	Keswick.
Lady Vein	384	9 12 0	11 4 0	6	7	1 12 0	312	8 2 6	8 2 6	6¼	6¼	—	1 12 0	Lady Vein.
Langdon	888	22 4 0	22 4 0	6	6	—	150	3 15 0	4 7 6	6	7	0 12 6	0 12 6	Langdon.
Little Eggleshope	8,760	246 7 6	246 7 6	6¾	6¾	—	4,750	118 15 0	138 10 10	6	7	19 15 10	19 15 10	Little Eggleshope.
London Lead Co.'s Mines	113,376	3,188 14 0	3,188 14 0	6¾	6¾	—	92,950	2,323 15 0	2,711 0 10	6	7	387 5 10	387 5 10	London Lead Co.'s Mines.
Moor End	270	7 0 7½	7 0 7½	6¼	6¼	—	600	16 17 6	16 17 6	6¾	6¾	—	—	Moor End.
Nether Hearth	624	15 12 0	15 12 0	6	6	—	175	4 7 6	5 2 1	6	7	0 14 7	0 14 7	Nether Hearth.
Newbiggin	1,680	42 0 0	49 0 0	6	7	7 0 0	392	10 12 4	10 12 4	6	6½	—	7 0 0	Newbiggin.
Old Providence	1,026	26 14 4½	26 14 4½	6¼	6¼	—	1,950	54 16 1½	54 16 1½	6¾	6¾	—	—	Old Providence.
Old Gang	17,294	432 7 0	576 9 4	6	8	144 2 4	5,943	148 11 6	148 11 6	6	6	—	144 2 4	Old Gang.
Rodderup Fell	12,000	300 0 0	300 0 0	6	6	—	5,600	140 0 0	140 0 0	6	6	—	—	Rodderup Fell.
Roughten Gill	4,800	120 0 0	180 0 0	6	9	60 0 0	2,000	50 0 0	75 0 0	6	9	25 0 0	85 0 0	Roughten Gill.
Silver Rake	272	7 1 8	7 1 8	6¼	6¼	—	360	10 2 6	10 2 6	6¾	6¾	—	—	Silver Rake.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	130	3 7 8½	3 7 8½	6½	6½	—	0 18 0	Sloggy Burn.
Stone Croft and Grey Side	7,080	191 15 0	191 15 0	6½	6½	—	4,600	115 0 0	153 6 8	6	8	38 6 8	38 6 8	Stone Croft and Grey Side.
Stoney Groves	864	21 12 0	21 12 0	6	6	—	500	12 10 0	16 13 4	6	8	4 3 4	4 3 4	Stoney Groves.
Summerlodge	326	8 16 7	8 16 7	6½	6½	—	16	0 8 0	0 8 0	6	6	—	—	Summerlodge.
Sunside	5,268	131 14 0	131 14 0	6	6	—	1,250	31 5 0	41 13 4	6	8	10 8 4	10 8 4	Sunside.
Sunnyside	1,040	26 0 0	26 0 0	6	6	—	1,000	25 0 0	25 0 0	6	6	—	—	Sunnyside.
Surrender	9,404	235 2 0	313 9 4	6	8	78 7 4	3,360	84 0 0	112 0 0	6	8	28 0 0	106 7 4	Surrender.
Thornton Moor	108	2 9 0	2 9 0	5½	5½	—	25	0 12 6	0 18 9	6	9	0 6 3	0 6 3	Thornton Moor.
Tynehead	792	19 16 0	23 2 0	6	7	3 6 0	476	10 18 2	10 18 2	5½	5½	—	3 6 0	Tynehead.
West Burton	—	—	—	—	—	—	800	20 0 0	23 6 8	6	7	3 6 8	3 6 8	West Burton.
Whitaside	696	18 17 0	18 17 0	6½	6½	—	278	6 19 0	6 19 0	6	6	—	—	Whitaside.
Winder and Yeathouse	10,992	274 16 0	412 4 0	6	9	137 8 0	18,700	448 0 5	701 5 0	5¾	9	253 4 7	390 12 7	Winter and Yeathouse.
Wire Gill	10,944	307 16 0	307 16 0	6¾	6¾	—	10,400	260 0 0	303 6 8	6	7	43 6 8	43 6 8	Wire Gill.
Yorkshire	504	12 12 0	12 12 0	6	6	—	300	7 10 0	10 0 0	6	8	2 10 0	2 10 0	Yorkshire.
Total	562,372	14,526 11 10	15,588 2 4	—	—	1,061 10 6	450,797	11,251 6 11	12,840 4 11	—	—	1,588 18 0	2,650 8 6	

NORTH WALES.

Billuis	1,440	33 0 0	36 0 0	5½	6	3 0 0	1,000	22 18 4	33 6 8	5½	8	10 8 4	13 8 4	Billuis.
Bryngwiog	8,400	192 10 0	280 0 0	5½	8	87 10 0	4,728	108 7 0	157 12 0	5½	8	49 5 0	136 15 0	Bryngwiog.
Bwlch Consols	2,630	65 15 0	76 14 2	6	7	10 19 2	4,761	119 0 6	158 14 0	6	8	39 13 6	50 12 8	Bwlch Consols.
Bwlch Styllen	590	14 15 0	17 4 2	6	7	2 9 2	550	13 15 0	18 6 8	6	8	4 11 8	7 0 10	Bwlch Styllen.
Coed Mawr Pool	2,400	70 0 0	80 0 0	7	8	10 0 0	784	19 12 0	26 2 8	6	8	6 10 8	16 10 8	Coed Mawr Pool.
Cwm Erfin	9,828	245 14 0	368 11 0	6	9	122 17 0	14,100	352 10 0	470 0 0	6	8	117 10 0	240 7 0	Cwm Erfin.
Cwm Ystwith	11,700	292 10 0	341 5 0	6	7	48 15 0	11,800	295 0 0	393 6 8	6	8	98 6 8	147 1 8	Cwm Ystwith.
East Darren	9,660	241 10 0	362 5 0	6	9	120 15 0	13,100	327 10 0	436 13 4	6	8	109 3 4	229 18 4	East Darren.
East Hafod	78	1 19 0	2 12 0	6	8	0 13 0	140	3 10 0	4 13 4	6	8	1 3 4	1 16 4	East Hafod.
Gognian	5,340	133 10 0	200 5 0	6	9	66 15 0	1,900	47 10 0	63 6 8	6	8	15 16 8	82 11 8	Gognian.
Gelli Eirin	1,060	26 10 0	35 6 8	6	8	8 16 8	1,680	42 0 0	56 0 0	6	8	14 0 0	22 16 8	Gelli Eirin.
Lisburne	29,232	730 16 0	1,096 4 0	6	9	365 8 0	38,000	950 0 0	1,266 13 4	6	8	316 13 4	682 1 4	Lisburne.
Llwynmalas	1,450	36 5 0	36 5 0	6	6	—	2,400	60 0 0	60 0 0	6	6	—	—	Llwynmalas.
Long Rake	6,720	154 0 0	168 0 0	5½	6	14 0 0	3,000	68 15 0	100 0 0	5½	8	31 5 0	45 5 0	Long Rake.
Maes-y-safn	20,136	503 8 0	671 4 0	6	8	167 16 0	9,300	232 10 0	310 0 0	6	8	77 10 0	245 6 0	Maes-y-safn.
Minera	39,060	976 10 0	976 10 0	6	6	—	30,177	754 8 6	754 8 6	6	6	—	—	Minera.
Mona	13,203	330 1 6	770 3 6	6	1/2	440 2 0	6,435	160 17 6	482 12 6	6	1/6	321 15 0	761 17 0	Mona.
Park	5,964	149 2 0	173 19 0	6	7	24 17 0	1,064	24 7 8	31 0 8	5½	7	6 13 0	31 10 0	Park.
Parys	27,054	676 7 0	901 16 0	6	8	225 9 0	18,404	460 2 0	613 9 0	6	8	153 7 0	378 16 0	Parys.

(continued)

Return of the Amount of Candles and Gunpowder consumed in One Year in Mines—*continued.*

Name of Mine.	CANDLES.						GUNPOWDER.						Total Profit on Candles and Powder.	Name of Mine.
	Quantity of Candles.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Candles.	Quantity of Powder.	Total Cost.	Amount sold for.	Price per Pound.		Profit on Powder.		
	lbs.	£ s. d.	£ s. d.	Cost. d.	Sold. d	£ s. d.	lbs.	£ s. d.	£ s. d.	Cost. d.	Sold. d.	£ s. d.	£ s. d.	
Pentre Lygan	960	22 0 0	24 0 0	5½	6	2 0 0	900	20 12 6	30 0 0	5½	8	9 7 6	11 7 6	Pentre Lygan.
Rheidol	78	1 19 0	2 12 0	6	8	0 13 0	140	3 10 0	4 13 4	6	8	1 3 4	1 16 4	Rheidol.
Rhosesmawr	5,259	131 9 6	153 7 9	6	7	21 18 3	1,016	25 8 0	33 17 4	6	8	8 9 4	30 7 7	Rhosesmawr.
Talargoch	24,192	554 8 0	705 12 0	5½	7	151 4 0	13,440	280 0 0	448 0 0	5	8	168 0 0	319 4 0	Talargoch.
Westminster	7,992	183 3 0	266 8 0	5½	8	83 5 0	5,500	137 10 0	183 6 8	6	8	45 16 8	129 1 8	Westminster.
Total	234,426	5,767 2 0	7,746 4 3	—	—	1,979 2 3	184,319	4,529 14 0	6,136 3 4	--	—	1,606 9 4	3,585 11 7	
IRONSTONE MINES (NORTH OF ENGLAND).														
Cleator	5,866	109 19 9	109 19 9	5½	5½	—	17,200	358 6 8	358 6 8	5	5	—	—	Cleator.
Eston	—	—	—	—	—	—	132,518	3,312 19 0	3,312 19 0	6	6	—	—	Eston.
Groove Rake	2,652	66 6 0	66 6 0	6	6	—	5,525	138 2 6	138 2 6	6	6	—	—	Groove Rake.
Heights	2,184	54 12 0	54 12 0	6	6	—	4,550	113 15 0	113 15 0	6	6	—	—	Heights.
Lindale Cote and Eure	3,366	84 3 0	98 3 6	6	7	14 0 6	1,344	33 12 0	44 16 0	6	8	11 4 0	25 4 6	Lindale Cote and Eure.
Normanby	—	—	—	—	—	—	53,760	1,344 0 0	1,344 0 0	6	6	—	—	Normanby.
Parks	25,946	648 13 0	648 13 0	6	6	—	2,688	67 4 0	67 4 0	6	6	—	—	Parks.
Parkside	33,687	842 3 6	1,122 18 0	6	8	280 14 6	99,035	2,475 17 6	3,713 16 3	6	9	1,237 18 9	1,518 13 3	Parkside.
Red Vein	4,680	117 0 0	117 0 0	6	6	—	4,277	106 18 6	106 18 6	6	6	—	—	Red Vein.
Roanhead	7,500	187 10 0	250 0 0	6	8	62 10 0	—	—	—	—	—	--	62 10 0	Roanhead.
Rowantree	4,602	115 1 0	115 1 0	6	6	—	9,587	239 13 6	239 13 6	6	6	—	—	Rowantree.
Skelton	—	—	—	—	—	—	39,760	994 0 0	994 0 0	6	6	—	—	Skelton.
Slit Pasture	1,404	35 2 0	35 2 0	6	6	—	2,925	73 2 6	73 2 6	6	6	—	—	Slit Pasture.
Stotsfield Burnhead	312	7 16 0	7 16 0	6	6	—	650	16 5 0	16 5 0	6	6	—	—	Stotsfield Burnhead.
Upleatham	—	—	—	—	—	—	95,000	2,375 0 0	2,375 0 0	6	6	—	—	Upleatham.
West Pasture	390	9 15 0	9 15 0	6	6	—	325	8 2 6	8 2 6	6	6	—	—	West Pasture.
West Slit	1,248	31 4 0	31 4 0	6	6	—	2,600	65 0 0	65 0 0	6	6	—	—	West Slit.
Wood End and Gutterby	12,000	300 0 0	300 0 0	6	6	—	56,000	1,516 13 4	1,516 13 4	6½	6½	—	—	Wood End and Gutterby.
Total	105,837	2,609 5 3	2,966 10 3	—	—	357 5 0	527,744	13,238 12 0	14,487 14 9	—	—	1,249 2 9	1,606 7 9	Total.

XII.

BAL OR PAY BILLS.

Showing Earnings of Men, and the Deductions.

Tincroft Mine, Tribute Pay.

For February Ores, 1850.

Paid the 4th day of May 1850.

———— & Co. (2 men.)

21-cwts.	cwts.	qrs.		£	s.	d.
3	10	0	at 4*l.* 12*s.* per ton.			
£ 2	8		9 decrease. Real Amount:			
£13	11	0	at 13*s.* 4*d.* in the £	9	0	8

Sundry Deductions.

	£	s.	d.	£	s.	d.
To Subsist	4	0	0			
„ Materials	1	0	0			
„ Smiths' cost	0	12	9			
„ Drawing	0	3	3			
„ Dividing	0	1	9			
„ Dressing	0	19	1			
„ Crushing						
„ Assaying	0	6	0			
„ Debt	1	12	1			
„ Spale						
„ Barrow						
„ Doctor and Club	0	3	0			
„ Clay and Barber	0	1	3			
				8	19	2
Balance				£ 0	1	6

No. 36.

Dolcoath Mine, Tutwork Pay.

For November 1863.

Paid 26th December 1863.

———— & Prs. (6 men.)

	£	s.	d.	£	s.	d.
Tinstuff 198 tons 9 cwt. 6 qrs.				59	10	8
Deduct charge last month				18	0	0
				£ 41	10	8
Assisting timberman				1	4	3
				£ 42	14	11
Box and drawing	3	16	11			
Smiths' cost	4	11	1			
Candles and materials	6	1	2			
Powder	4	15	2			
				19	4	4
				£ 23	10	7
Doctor				0	3	0
				£ 23	7	7
Club 4*s.* 6*d.* and Barber 1*s.* 6*d.*				0	6	0
				£ 23	1	7
Subsist						
				£		

No. .

Dolcoath, Tribute Pay.

18th June 1842.

———— (4 men.)

	£	s.	d.	£	s.	d.
Amount 7*l.* 18*s.* at 12*s.* 6*d.*				4	18	9
Balance ending January	0	16	2			
Mixing and dividing	0	1	2			
Grinding	0	3	6			
Box and drawing	0	15	4			
Smiths' cost	0	8	9			
Candles and materials	1	14	5			
Powder	0	15	2			
				4	14	6
Subsist				7	6	6
Doctor				0	3	0
				12	4	0
				£ 7	5	3
Debt, Club						
				£		

No. .

Dolcoath Mine, Tutwork Pay.

For November 1863.

Paid 26th December 1863.

———— & Prs. (6 men.)

	£	s.	d.	£	s.	d.
Driving 26 fathoms at 14*s.*				19	16	8
Tinstuff 25 tons 4 cwt. at 7*s.*				8	16	4
				£ 28	13	0
Box and drawing	0	16	4			
Smiths' cost	1	11	11			
Candles and materials	2	6	0			
Powder	2	0	0			
				6	14	3
				£ 21	18	9
Doctor				0	3	0
				£ 21	15	9
Club (4*s.* 6*d.*) and Barber (1*s.* 6*d.*)				0	6	0
				£ 21	9	9
Subsist						

No. .

Dolcoath Mine, Tribute Pay.

28th November 1863.

———— & Prs. (4 men.)

	£	s.	d.	£	s.	d.
Amount, Tin				3	11	8
Tut				0	12	3
				£ 4	3	11
Mixing and dividing						
Grinding	0	2	3			
Box and drawing	0	13	11			
Smiths' cost	0	8	6			
Candles and materials	0	19	5			
Powder	0	8	6			
				2	12	7
Doctor				0	2	0
				2	14	7
				£ 1	9	4
Subsist				1	0	0
				£ 0	9	4
Club						

West Stray Park Mine.

Pay for October 1852.

Paid the 20th November 1852.

———— & Partners. (2 men.)

			£	s.	d.
0 6 2	Copper Ore, at 4*l.* 1*s.* 6*d.*				
	1*l.* 5*s.* 3*d.*, at 13/4		0	16	10
Tin, 5 at			0	3	4
			1	0	2

Materials.	Amount. £	s.	d.
15 Candles, 8*d.* per lb.	0	10	0
8 Powder	0	5	4
2 Fuse	0	1	0
Hilts			
Shovels			
Cans			
Padlocks			
Barrows			
Axes			
Paper			
Tubs			
Lanterns			
Duck			
Clay			
Smith cost	0	6	7
Drawing	0	1	0
Weighing, mixing, and dividing			
Sample			
Subsist			
Doctor and Club			
Barber			
Clearing stuff	0	5	0
	1	8	11
In Debt	£ 0	8	9

COOKS KITCHEN MINE.

Pay for August 1863.
Paid the 19th September 1863.

——————— & Partners. (6 men.)

	£	s.	d.
1. 18. 1. 11. at 60 - 115. 0. 10. at 11s. 6d. -	66	3	0
Less Retg. Charges - - - -	14	13	3
	51	9	9

Materials.	Amount. £	s.	d.
Candles per lb. - - -	2	15	6
Powder do. - - -	1	3	4
Fuse - - - -			
Hilts - - - -			
Shovels - - -	0	11	2
Cans - - - - -			
Clay - - - - -			
Smith cost - - - -	1	0	5
Drawing - - - -	2	12	9
Weighing, mixing, and dividing -			
Tramming - - - -			
Sample - - - -	0	9	0
Subsist - - - -	16	14	0
Doctor and Club - - -	0	8	0
Barber and Box - - - -	0	4	0
	25	18	2
	£ 25	11	7
Debt - -	1	18	0
	£ 23	13	7

Fo. 137.

WHEAL BASSET, TRIBUTE PAY.

For October 1863.
And paid 27th November 1863.

——————— & Partners. (2 men.)

	£	s.	d.
By 20 18 6 at 7s. 6d. - - - - -	7	16	11

	£	s.	d.
To Overcharged on Tribute - -	0	3	4
„ 18 lbs. Candles - - -	0	12	0
„ Powder - - - -			
„ Fuse, Hilts, Clay 6d. - -	0	0	6
„ Cans, Shovels, Spales - -			
„ Dressing - - - -	0	12	0
„ Mixing and Samples - -	0	7	4
„ Smith cost - - -	0	3	6
„ Drawing - - - -	0	12	0
„ Subsist - - - -			
	2	10	8
	5	6	3
Doctor, Club, and Barber - -	0	2	6
Balance - -	£ 5	3	9

No. 33.

CARN BREA MINES, TUTWORK PAY.

For May 1863.
Paid the 3d day of July 1863.

——————— & Co. (4 men.)

	£	s.	d.
Fms. ft. ins.			
1 0 7 at 12l. per fathom - - -	13	3	4
1 0 0 at 13l. „ - - -	13	0	0
Assisting Shaftmen - - - -	1	15	0
	27	18	4

Sundry Deductions.

	£	s.	d.
To Candles - - - -	1	19	4
„ Powder - - - -	1	13	4
„ Safety fuze - - -	0	6	0
„ Sundries - - - -	0	1	0
„ Smith cost - - -	1	5	5
„ Drawing - - - -	0	6	3
„ Tramming - - -			
„ Doctor and Club - - -	0	6	0
	5	17	4
	£ 22	1	0
Barber's Deductions - -	0	3	0
	£ 21	18	0

WHEAL BULLER, TUTWORK PAY.

For April 1861.
Paid 24th May 1861.

——————— and Partners. (2 men.)

	£	s.	d.
Breaking up tin rocks, &c., 1 m. - - -	7	7	0

	£	s.	d.
To 10 lbs. Candles - - -	0	6	8
„ 10 lbs. Powder - - -	0	6	8
„ Fuse 1s., Hilts , Clay 6d. -	0	1	6
„ Cans , Shovels , Paper -			
„ Slings , Barrels , Nails -			
„ Smith Cost - - -	0	7	0
„ ing - - -			
„ Doctor and Club - - -	0	3	3
„ Debt - - - -			
	1	4	10
	£ 6	2	2
Barber (6d.) Subsist (2l.) - -	2	0	6
Balance - - -	£ 4	1	8

WHEAL BULLER, TUTWORK PAY.

For March 1861.
Paid 19th April 1861.

——————— and Partners. (Man and boy.)

	£	s.	d.
Breaking up rocks in the bottom of the 60 -	5	10	0

	£	s.	d.
To 12 lbs. Candles - - -	0	8	0
„ lbs. Powder - - -			
„ Fuse 1s., Hilts , Clay 6d. -	0	1	6
„ Cans , Shovels , Paper -	3	1	6
„ Slings , Barrels , Nails -			
„ Smith cost - - -	0	6	6
„ ing - - -			
„ Doctor and Club - -	0	2	0
„ Debt - - - -			
	0	18	0
	£ 4	12	0
Barber (3d.) Subsist (1l. 10s.) - -	1	10	3
Balance - - -	£ 3	1	9

WHEAL BULLER, TUTWORK PAY.

For September 1861.
Paid 18th October 1861.

——————— and Partners. (Man and boy.)

	£	s.	d
Breaking up rocks at the 70 fathom level - -	5	14	0

	£	s.	d.
To 13 lbs. Candles - - -	0	8	8
„ lbs. Powder - - -			
„ Fuse 2s, Hilts , Clay 6d. -	0	2	6
„ Cans , Shovels , Paper -			
„ Slings , Barrels , Nails -			
„ Smith cost - - -	0	3	11
„ ing - - -			
„ Doctor and Club - -	0	2	0
„ Debt - - - -			
	0	17	1
	£ 34	16	11
Barber (3d.) Subsist (1l. 10s.) -	1	10	3
Balance - -	£ 3	6	8

WHEAL SETON, TUTWORK PAY.

For August 1859.
Paid 30th September 1859.

——————— & Partners. (4 men.)

	£	s.	d.
Driving 0 2 7 at 12l. - - - -	5	3	4
Stems about railroads, &c. - - -	10	0	0
	£	15	3	4

	£	s.	d.
To 33 lbs. candles - - -	0	19	3
„ 35 lbs. powder - - -	1	0	5
„ Fuze (6s.), hilts (8d.), and shovels -	0	6	8
„ Cans, slings, and dags - -			
„ Clay - - - -	0	0	10
„ Drawing - - - -	0	6	0
„ Smith cost - - - -	0	7	4
	3	0	6
Doctor and Club - £	0	6	0
	12	2	10
	0	6	0
Balance - - - - £	11	16	10

NEW WHEAL SETON, TUTWORK PAY.
For September 1863.
Paid 7th November 1863.
——— & Partners. (9 men.)

	£	s.	d.
Cutting flat per bargain	30	0	0
Stems	1	2	6
Putting in penthouse, &c.	13	0	0
Watching	2	0	0
£	46	2	6
72 lbs. candles at 8d.	2	8	0
53 lbs. powder ,,	1	15	4
12 pick hilts	0	3	0
Shovel hilts	0	0	4
Shovels			
13 Fuze	0	8	8
30 Cans widges	1	0	0
Sundries	0	4	10
10 lbs. cast steel at 1s.	0	10	0
Smith cost	0	10	4
Drawing and landing			
	7	0	6
£	39	2	0
Doctor	0	4	6
Club	0	9	0
	0	13	6
£	38	8	6

No. 13.
WEST BASSET, TUTWORK PAY.
For June 1853.
Paid 13th day of August 1853.
——— & Co. (4 men.)

fms. ft. ins.	£	s.	d.
1 2 2 at 7l. 10s. per fathom	10	4	2
To Candles	0	17	0
,, Powder	1	2	0
,, Safety fuze	0	3	0
,, Sundries	0	0	6
,, Tramming			
,, Smith cost	1	5	6
,, Drawing	0	4	1
Doctor and Club	0	4	0
	3	16	1
£	6	8	1
Barber's deduction	0	1	0
£	6	7	1
Deducting for	0	1	6
£	6	5	7

CONDURROW, TRIBUTE PAY.
For June and July 1856.
——— & partners. (3 men.)

	£	s.	d.
Amount 8l. 0s. 2d. at 13s.	5	4	1
Subsist	2	18	0
Materials, Smith Cost, Drawing, Mixing and dividing, Crushing and sample	1	16	10
Doctor and Club	0	3	6
	4	18	4
Spales			
£	0	5	9

CONDURROW, TRIBUTE PAY.
For April and May 1858.
——— (4 men.)

	£	s.	d.
Amount 24l 10s. 10d. at 12s.	14	14	6
Subsist	7	15	6
Materials, Smith Cost, Drawing, Mixing and dividing, Crushing and sample	4	2	0
Doctor and Club	0	6	0
	12	3	6
Spales			
£	2	11	0

WHEAL BULLER, TUTWORK PAY.
For May 1861.
Paid 21st June 1861.
——— (man and 2 boys.)

	£	s.	d.
Breaking up tinstuff at the 70 fathom level, 1 m.	8	8	0
To 18 lbs. candles	0	12	0
,, 20 lbs. powder	0	13	4
,, Fuse, 3s. hilts, clay, 6d.	0	3	6
,, Cans 1s., Shovels, Paper,	0	1	0
,, Slings, Barrels, Nails,			
,, Smith cost	0	8	0
,, ing			
,, Doctor and Club	0	2	0
,, Debt			
	1	19	10
£	6	8	2
Barber (3d.) Subsist (2l.)	2	0	3
Balance	£ 4	7	11

No. 23.
CARN BREA MINES, TRIBUTE PAY.
For March Ores, 1863.
Paid the 1st day of May 1863.
——— & Co. (2 men.)

21-cwts. cwts. qrs.	£	s.	d.
11 12 3 at 4l. 8s. per ton			
£ 51 1 5. Decrease 4l. 2s. 9d. Real Amount : £ 48 18 8 at 12s. in the £	29	7	2

Sundry Deductions.

	£	s.	d.
To Debt	1	19	10
,, Candles	0	16	8
,, Powder	0	13	4
,, Safety Fuze	0	1	0
,, Sundries	0	1	11
,, Smith's cost	0	9	8
,, Tramming			
,, Drawing	1	3	2
,, Dressing, &c.	4	7	0
,, Samplea	0	2	0
,, Turning and dividing	0	11	7
,, Weighing	0	5	9
,, Doctor and Club	0	3	0
,, Subsist	9	0	0
	19	14	11
£	9	12	3
Barber's Deduction	0	1	6
£	9	10	9

NORTH ROSKEAR PAY.
For October 1863.
——— (8 men.)

Fms. ft. ins.	£	s.	d.
: : at £			
Raising Tinstuff : 1,650 sacks at 50s	41	5	0
Subsist and dressing	13	7	9
Materials, &c	0	4	10
Doctor	0	8	0
Club	13	19	9
£	27	5	3
Barber	0	2	0
£	27	3	3

No. 12.
NORTH WHEAL CROFTY, TUTWOK PAY.
9th November 1861.
——— & Pr. (2 men.)

	£	s.	d.
Driving 1 5 4 at 3l.	5	13	4
Clearing stuff	0	5	0
£	5	18	4
Box and drawing			
Smith's cost	0	1	1
Candles and materials	1	1	7
Powder			
	1	2	8
£	4	15	8
Doctor	0	1	0
£	4	14	8
Club (1s.) and Barber (6d.)	0	1	6
£	4	13	2
Subsist	4	0	0
£	0	13	2

PAR CONSOLS MINE.

March 5th, 1864.

Pay for January Month.

——— & Co. (12 men.)

	£	s.	d.
Sinking a winze under the 100 fathoms level, west of Puckey's shaft on Puckey's lode, 2fm. 2ft. 6in. at 8*l.* 10*s.*	20	10	10
Do. driving east to hole to the rise from the 110 fathoms level, 1fm. at 9*l.*	9	0	0
Do. driving the 110 fathoms level east, 3ft. 6in. at 9*l.* 10*s.*	5	10	10
Watching the engine per month	1	0	0
	£36	1	8

	£	s.	d.	£	s.	d.
Deduct Cash	9	0	0			
Smiths' Costs	0	7	10			
Club	0	9	0			
Doctor	0	4	6			
Spale						
90lbs. candles at 8*d.*	3	0	0			
100lbs. powder at 8*d.*	3	6	8			
Pick Hilt	0	0	3			
Shovel, Shovel Hilts	0	5	9			
Barrow						
Barrel						
Brooms						
Powder Can						
Paper		1	0			
Hoop Iron						
Slings	0	1	0			
Axe	0	2	6			
lbs. Nails						
Rope	0	5	2			
Safety Rod feet						
Sump Rope 16 coils at 1*s.* 2*d.*	0	18	8			
				18	2	4
				£	17	19	4
Subsist				9	0	0
				£	26	19	4

PAR CONSOLS MINE.

March 5, 1864.

November. Ores.

——— & Co. (4 men.)

Tons	Cwts.	Qrs.		per Ton.	Amount.	Increase.
6	2	1	at	5*l.* 2*s.*	31*l.* 2*s.* 11*d.*	1*l.* 19*s.* 9*d.*
						£ s. d.
Real Amount 33*l.* 2*s.* 8*d.* at 12*s.* from 20*s.*						19 17 7

	£	s.	d.	£	s.	d.
Cash	5	0	0			
Smiths' Costs	0	6	2			
Dressing Cost	1	2	1			
Club 3*s.*, Doctor 2*s.* 3*d.*	0	5	3			
Spale						
17lbs. Candles at 8*d.*	0	11	4			
8lbs. Powder at 8*d.*	0	5	4			
Hilt	0	0	3			
Shovels						
Shovel Hilts						
5lbs. Hoop Iron	0	1	3			
Barrow						
Barrel	0	1	0			
Sieve and Handles						
Riddle and Handles						
lbs. Tallow						
Copper Nails						
Brooms						
Washing Tub						
Powder Cans						
Paper						
Kibble and Ropes						
3 Coils Sump Rod	0	3	6			
Slings						
Carriage						
Railing	0	11	5			
lbs. Nails						
Oil						
Feet Safety Rod						
Tar						
Grinding, Drawing, Dividing, Assaying at 6*s.* 8*d.* per Ton	2	0	9			
				10	8	4
				£	9	9	3
Subsist						
				£			

W.B. LEAD MINES.—ALLENDALE.

ALLENHEADS MINE.

Reckoning with 4 Pts. for the half year ending 31st December 1862.

Charge.

	£	s.	d.	£	s.	d.
Candles, 19 doz. lbs. at 6*s.* 2*d.*	5	17	2			
Gunpowder, 125 lbs. at 5½*d.*	2	17	4			
Drawing, 10¼ shifts at 3*s.* 2*d.*	1	12	5			
Laborage, brakeing, &c., per account	1	11	7			
Smith work and stores, per account	1	4	4			
Washing and crushing: 16¾ bings at 4*s.* 7*d.*; 10½ do 1*s.* 11*d.*	4	17	7			
				18	0	5
Cash advanced, as per other side	56	0	0			
Arrears deducted, do.	1	12	4			
Centage, do.	4	2	4			
				61	14	8
Amount due				57	9	3
				£137	4	4

Fathoms, Ore, Days, &c.

First Quarter.

	£	s.	d.
Fathoms, 6⅛ at 280*s.*			86 6 8
Contracts			
Ore raised, bings cwts.			
Days			

Second Quarter.

	£	s.	d.	£	s.	d.
Fathoms, 3⅜ at 44*s.*	8	1	4			
Contracts						
Ore raised, 27 bings 5 cwts. at 31*s.*	42	16	4			
Days						
				50	17	8
Arrears						
				£137	4	4

NOTICE.—This statement is issued subject to correction, and if the parties interested observe any inaccuracy therein they must give intimation of the same at Allenheads Office, between the hours of 9 a.m. and 5 p.m., on any week-day on or before Saturday, the 23d May 1862.

The balance due according to this statement will be paid on the next half-yearly pay day at Allenheads Office, when and where one of the partnership (of if an individual himself) is requested to present this statement.

4 Pts. Allenheads Mine.

Name of Partner.	Cash advanced. First Quarter.	Cash advanced. Second Quarter.	Previous Arrears deducted.	Centage.	Total.	Arrears due this Half Year.	Previous Arrears.	Total Arrears.
	£	£	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
———	6	8	0 14 1	1 0 7	15 14 8	—	—	—
———	6	8	0 14 2	1 0 7	15 14 9	—	—	—
———	6	8	0 4 1	1 0 7	15 4 8	—	—	—
———	6	8	———	1 0 7	15 0 7	—	—	—
	24	32	1 12 4	4 2 4	61 14 8	—	—	—

W.B. LEAD MINES.—WEARDALE.

Burtree Pasture Mine.

Reckoning with ——— 6 Pts. for the Half-year ending 31st December 1862.

Charge.

	£ s. d.	£ s. d.
Candles, 28½ doz. lbs. at 6s. 2d.	8 15 9	
Gunpowder, 325 lbs. at 5½d.	7 9 0	
Drawing, 28½ shifts, at 4s. 6d.	6 8 3	
Laborage, brakeing, &c., 28½ „ at 3s.	4 5 6	
Smith work and stores, per account	7 3 7	
Washing and crushing — 7⅜ bings at 11s. 4d.	6 18 4	
7⅜ do. 7s. 2d.		
		41 0 5
Cash advanced, as per other side		84 0 0
Arrears deducted, do.		
Centage, do.		
Amount due		
		£125 0 5

Fathoms, Ore, Days, &c.

First Quarter.

	£ s. d.
Fathoms, 3⅛ at 200s.	31 13 4
Contracts	
Ore raised, bings cwts.	
Days	

Second Quarter.

	£ s. d.	£ s. d.
Fathoms, 5 at 200s.	50 0 0	
Contracts		
Ore raised, 15 bings cwts. at 30s	22 10 0	
		72 10 0
Days		
Arrears		20 17 1
		£125 0 5

Notice.—This statement is issued subject to correction, and if the parties interested observe any inaccuracy therein, they must give intimation of the same at Newhouse Office, between the hours of 9 a.m. and 5 p.m., on any week-day on or before Saturday, the 23d day of May 1862.

The balance due according to this statement will be paid on the next half-yearly pay day at Newhouse Office, when and where one of the partnership (or if an individual himself) is requested to present this statement.

——— 6 Pts., Burtree Pasture Mine.

Name of Partner.	Cash advanced. First Quarter.	Cash advanced. First Quarter.	Previous Arrears deducted.	Centage.	Total.	Arrears due this Half-year.	Previous Arrears.	Total Arrears.
	£	£	£ s. d.	£ s. d.	£	£ s. d.	£ s. d.	£ s. d.
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
—— - -	6	8	—	—	14	3 9 6	—	3 9 6
	36	48	—	—	84	20 17 1	—	20 17 1

Lead Company's Due Papers in year ending October 1863.

	£ s. d.	£ s. d.
Earnings of A. B. and 3 partners		258 2 4
7 qr. barrels gunpowder at 14s. 6d.	5 1 6	
31 doz. lb. candles at 6s. 10d.	10 11 10	
Tools	0 3 7	
Drawing 256½ shifts, at 4s.	51 6 8	
Cash, labourers	3 15 0	
Balance due to each partner:		
£ s. d. Cash, A. B.	45 2 0	
16 13 11 „ C. D.	28 12 0	
18 3 11 „ E. F.	28 12 0	
16 13 11 „ G. H.	28 12 0	
School, A. B.	0 7 0	
£52 18 9 Funds, C. D. and G. H.	3 0 0	
		205 3 7
Due		£ 52 18

	£ s. d.	£ s. d.
Earnings of I. K. and 3 partners		168 7 0
14 qr. barrels gunpowder at 14s. 6d.	10 3 0	
24 doz. lb. candles at 6s. 10d.	8 4 0	
Tools	1 7 4	
Drawing 66 shifts at 4s.	13 4 0	
Cash, labourers	3 8 0	
Balance due to each partner:		
£ s. d. Cash, I. K.	26 2 2	
5 11 1 „ L. M.	27 4 1	
5 11 1 „ N. O.	27 9 1	
3 6 1 „ P. Q.	29 14 1	
Rent, L. M.	0 5 0	
£21 6 3		147 0 9
Due		£ 21 6 3

Guttergill Mine, 2d Feb. 1864.

	£ s. d.
2 Pts., cutting cross to south, 7 fms. at 37s. 6d.	13 2 6
Do. raising ore, 6 bings 0 cwts., at 50s.	15 0 0
Do. do. 9 bings 5 „ at 60s.	28 17 6
Do. master's work, repairing drift, 8 days, at 3s.	1 4 0
	£58 4 0

	£ s. d.	£ s. d.
Candles, 11 doz. lbs. at 6s. 6d.	3 11 6	
Gunpowder, 2 casks at 13s. 6d.	1 7 0	
Drawing, 10 shifts, 4 wag., at 3s.	1 11 6	
Washing, 15 bings 5 cwt. at 7s. 6d.	5 17 2¼	
C. Little, blacksmith	0 6 6	
Lent money	35 9 6	
		48 3 2¼
Due		£10 0 9¾

XIII.

CORONERS' INQUESTS AND ACCIDENTS.

With Report by A. H. Wylie, Esq.

Summary of Accidents referred to in subjoined report.

No.	Date.	Mine.	Name.	Cause.
1	March 4	Dolcoath	Thomas Kessel	Falling down the shaft 13 fathoms through stepping back to avoid fall of earth.
2	„ 24	West Fowey Consols.	James Sampson	Explosion while tamping.
3	April 15	Trevenen	Thomas Wedlake	Falling away of ground.
4	„ 18	Tolvadden	Charles Vincent	Falling through a trap door.
5	„ 21	St. Just United	Emanuel Trembath	Falling from the ladder.
6	„ 21	Botallack	Nine individuals	Breaking of the skip chain.
7	May 13	Buller and Basset United.	Frederick Uren George Teague.	"Blowing out" of boiler.

My Lord, London, 1st June 1863.

In compliance with your lordship's instructions I prefix a list of accidents in mines, to which my attention was directed during my recent visit to Cornwall, and which I brought before the Mines Commission at Tavistock on the 27th ultimo.

With the single exception of No. 7, the accident at Buller and Basset United Mine, my knowledge of these various accidents has been derived from the reports of Mr. Twite, and the shorthand writer's reports of the proceedings of the several inquests.

All these reports I now beg to hand to your Lordship. A very attentive perusal of them has given me an impression that in none of these cases has the inquiry before the coroner been so thorough and so complete as the interests of the unfortunate individuals themselves, the security and protection of persons working in mines, and the public interests, required; for in each case it seems to have been limited to ascertain whether death was occasioned by accident, with little or no regard to the nature of the accident.

The very accidents were most suggestive in themselves, leading to inquiries absolutely necessary to the interests of miners, and security of life among a hard working and deserving portion of Her Majesty's subjects, and might have been made conducive to high objects of humanity. Thus, the falling away of earth, explosions while tamping, falling through trap doors left open, and the examination of chains, boilers, &c., are matters of life and death; and though death may not always follow, injuries more or less grave may frequently happen, but pass without any injury whatever.

In the case marked No. 2, the evidence could scarcely be termed direct, proceeding as it did from a witness working in a level different from that in which the accident occurred, though the evidence of at least one person might have been obtained who actually witnessed the accident. In this case, as in the two succeeding cases, Nos. 4 and 5, the mode of tamping adopted, the superintendence and regulations, the sufficiency and safety of trap doors through which one and perhaps two of the parties alluded to fell, might have elicited important information, and possibly have led to greater and more practical precautions for the future.

No. 6. Accident at the Botollack Mine.—This accident happened on the 21st of April last, and from the large loss of life, and the special cause of the accident, has evoked more than the usual interest; and I think that throughout Cornwall generally, and especially in the mining districts, it was believed that the Government would cause a special inquiry to be instituted, inasmuch as only under such an authorised enquiry could all the facts and circumstances connected with this accident be elicited, its importance cannot be overrated, the destruction of life was large, and the question of the modes of descent into and ascent from mines was therein raised.

As your lordship has obtained the services of an officer of the Board of Trade to institute this inquiry, I may now curtail the observations which I thought it to be my duty to submit to the Commission with reference to this accident. It occurred at that part of the mine which is known by the name of the Boscawen diagonal shaft, and was caused by the breaking of one of the links of the chain by which the skip was in the act of being brought up to the surface, in which skip nine persons were then ascending. The chain broke when the gig or skip was about 100 fathoms from the bottom, and instantaneously, in less time than is taken to write the fact, the skip was dashed to the 190 level, and the nine persons destroyed.

At the 190 level, stout timbers are laid across the shaft, allowing only a clear height of 2 feet 9 inches; and one of the witnesses thought that some of these persons must have struck their heads against these timbers, and so came to their death.

Connected with the skip was certain machinery specially alluded to in Mr. Twite's report, by which, in case of need, a break handle could be disengaged from a loop, and set free powerful clippers to seize the rails, and so prevent the skip from descending further after the rails were so seized. And it appears to have been the impression of the witnesses that the persons in the skip, or he especially who was sitting nearest to the break, lost his presence of mind, and failed to set the clippers in action; and the coroner seems to have entertained the same opinion, and thought "that if any blame is to be imputed to any one, it is to the poor fellows who lost their lives." Whether this were so or no it is now impossible to decide; the circumstances connected with the accident have perished with the poor fellows to whom the blame is imputed.

The skip was a large iron carriage capable of holding eight men conveniently, and it was hauled up to the surface by a single link iron chain. It was invented and arranged by one of the engineers attached to the mine, and it was stated that it had often been tested and always found to answer; and it was further stated that the iron of which the chain was made was of good quality, "of the best charcoal iron," was made specially for the purpose, and had been in use for thirteen months. But here the inquiry seems to have stopped at the very point where I ventured to suggest to your Lordship it should now be reopened, to examine as to the particular efficiency of the machine and machinery itself, and into the character and condition of the chain; if during the time of its working it had ever been examined, and if so, how often; if it had ever broken before, and if any crack or sign of any previous fracture was apparent. Mr. Rowe, one of the witnesses, ascribes the defect in the broken link to the fact that other links came riding over it, and so "compressed the iron." This fact would surely have been apparent on occasional examinations of the chain, if such had taken place, and it verifies the saying that the strength of a chain is equal to that of its weakest link

I may add that at present the skip or gig is not in use. Probably the late disastrous accident may have suggested the propriety of considering the possibility of improving its machinery; but in the meantime the miners either ascend by ladders, or, as I understood, by walking up the inclined plane; either of which are tedious processes, occupying nearly an hour, and so severely tasking the energies of the men, and adding to their bodily fatigue, that it was stated that they did not now accomplish two thirds of the work which they did when they had the relief of the skip as a means of ascent.

No. 7. Accident at the Buller and Basset United Mine.—This mine is situated close to the hamlet of Four Lanes, in the parish of Wendron. The accident occurred on Wednesday, 13th May, and resulted in the death of Frederick Uren, aged 33 years, a married man, leaving a widow and three young children; and in the death of George Teague, a single man, aged twenty. Both of these men were miners working at Buller and Basset United Mine.

The cause was a "blowing out" of one of the boilers, and the verdict at the coroner's inquest was equivalent to "Accidental death," similar to the verdict in each of the above-mentioned cases.

In this special case, happening to be in the locality at the time of the accident, I attended the inquest, and visited the boiler house where the accident occurred.

In many mines a changing house is appropriated for the use of the miners, enabling them to dry and change their clothes. In this mine no such special provision existed, and the men for this purpose availed themselves of the boiler house. On Wednesday, 13th May, at two o'clock p.m., the hour of relief, some nine men were thus engaged in the boiler house, when suddenly and without any warning the casing of one of the boilers appeared to be lifted up, and the brickwork in front of the bottom flue underneath the fire was rent asunder, and volumes of steam issued forth. Four or five of the men who happened to be on a platform connected by a door with the engine house, rushed through this door, and escaped into the open air uninjured.

Two men, named James Oliver and James Hore, effected their escape also, but much scalded. Frederick Wren and George Teague appear to have been on the top of the second boiler when the other boiler "blew out," and leapt down for the purpose of making their escape through an opening into the coal yard; but in so doing they must have been enveloped in the boiling steam. They, however,

gained the coal yard, where their cries brought their comrades to their assistance. They were soon conveyed to their respective homes, and there Frederick Wren "passed away' at 11 o'clock the same evening, and George Teague on the following evening. These facts were stated by two miners of the name of Bosanco, father and son, working at the same mine, and in the boiler house at the time of the explosion. Captain Bice, the mining agent, attributed the accident to the weakness of the boiler, of which he had no idea, as it had been repaired about two months ago; and no blame seemed to be imputed to the engine man, who was a careful experienced person, and there was no reason to suppose that the "feed" had run down. He was of opinion that the steam must have escaped through an aperture or rent in the lower part of the boiler, but no opportunity had yet occurred to raise the boiler from its bed for the purpose of examination. He considered that it was a purely accidental circumstance, and that no blame was to be attached to any one.

In accordance with the evidence the jury returned a verdict of accidental death, to which verdict the foreman, unable to sign his name, affixed his mark.

When the inquest was concluded, it was mentioned that the boiler had been put up nine years ago, and that when put up it was an old one, and that the repairs which were said to have taken place about two months ago were in consequence of a similar "blow out," but fortunately on that occasion no lives were lost. When this accident was communicated to your Lordship, you desired me to convey to Captain Bice your desire that the boiler should be examined by some competent person. I conveyed this desire on the part of your Lordship to Captain Bice, who most courteously consented to give every facility for such examination, and to afford any information in his power.

With this object in view, and through the kind permission of the Admiralty, Mr. John Yale, of the Devonport dockyard, proceeded to Camborne on the 28th May, and, in company with Mr. C. Twite, visited the mine and examined the boiler. His report, of which I enclose the original, was to the following effect:

"28th May 1863, Buller and Basset United.

"I find by examining the boiler internally there is a "great collection of mud at the bottom, which has been "the means of keeping the water from the boiler and "causing decay to take place much quicker than it would "otherwise. And on examination of the boiler externally "I find the bottom very much decayed from end to end, "and in places not more than $\frac{1}{16}$" thick, and by the in- "formation of the engine keeper he saw this some months "ago, and put a few patches on.

"My opinion is that if a practical boiler-maker had sur- "veyed the boiler at the time when it was found defective, "he would have recommended it to have been taken out, "and a new bottom put in, and the flue examined and "repaired.

"(Signed) JOHN YALE,
"Foreman of Boiler Department,
"H. M.'s Dockyard, Devonport."

Mr. Charles Twite, of Camborne, who was present at the above examination, reports as follows:—

"It appeared from the agent's and engine driver's state- "ments that the boiler was repaired in the bottom so "recently as March last, when a portion of the brickwall "on which it rested was removed, and some patches put "on.

"The water supplied to the boiler is remarkably pure, so "the collection of mud is more culpable. I brought some "of it away, and shall send it to Dr. Smith."

I have thus, at some length, detailed this painful and interesting case, to which it is not my province to add many natural observations; I therefore content myself with placing its facts before your lordship, believing that they are well entitled to receive the earnest consideration of a Commission which seeks the amelioration and protection of a numerous body, industrious and intelligent, and with which no one, I think, can associate without becoming deeply interested.

Submitting this Report to the Commission on Mines,
I have the honor to remain
Your lordship's obedient servant,
A. H. WYLIE.

To the Right Hon.
Lord Kinnaird, K. T.
&c. &c. &c.
Chairman Mines Commission.

FATAL ACCIDENT AT DOLCOATH MINE, CAMBOURNE.

A fatal accident occurred at the above mine on Wednesday morning, 4th March, to a miner named Thomas Kessel, aged 25, of Bolennow, in the parish of Camborne, under circumstances as detailed in the evidence at the inquest.

The Inquest.

An inquest was held yesterday, 5th March, at noon, touching the death of the said Thomas Kessel, at the "Village Inn," Bolennon, before Wm. Hichens, Esq., county coroner. The jury consisted of the following persons, viz., Mr. Henry Treglown (foreman), Messrs. George Berriaman, William Skewis, William Stoneman, William Bawdere, John Skewis, Richard Williams, James Skewis, Charles Davey, George Noble, Hugh Phillipps, and Samuel Phillipps, who, after being sworn, proceeded to the residence of the deceased to view the body.

The Coroner, on their return to the inn, asked if there were any witnesses, and being answered in the affirmative—

Nicholas Date, after being sworn, deposed:—I am a miner, living in the parish of Camborne. I work at Dolcoath Mine. I knew the deceased Thomas Kessel; he was also a miner, and worked in the same mine. We were comrades. We were at work in that part of the mine called "Wheal Harriett." The accident happened on Wednesday morning. We were in company with another comrade called Samuel Jewell. Deceased was filling the kibbles, and sending the tin and stuff to grass, and I was tramming the stuff to him. The kibble deceased had last filled was being drawn to the surface, when the chain broke, and the kibble fell down through the shaft on the north part. The chain was a usual whim chain. We were all employed about it to get it in order, when a scale of ground fell out of the side of the shaft where we were working. Deceased stepped back, and fell away in the North Gunnis of the shaft, a depth of about 13 fathoms.

I went down after him, and was the first person who came to him; I found him in the bottom of the level 4 fathoms under the 220. Deceased was lying on his right side, face downwards. I took him up; he was then alive, but did not speak, and was apparently senseless, and died in about 5 minutes after. Witness was of opinion that as they pulled the chain they brought away the ground with it, and they were engaged in hauling the chain for the purpose of clearing it. I did not observe its being loose before. Jewell, the other comrade, went down with me to the deceased, and found his head much injured.

In answer to an inquiry from the Coroner, witness again said the chain appeared to be a good one and of the proper size.

(*The Foreman.*) Are you requested if a chain break, to fetch it at once on such occasions?

(*Witness.*) Yes.

(*A Juryman.*) That is the rule in all mines.

The Coroner thought from the evidence that this was a clear case of accident, and the jury being unanimously of that opinion a verdict of "Accidental death" was immediately returned.

DEATH FROM EXPLOSION OF GUNPOWDER IN TAMPING.

In the evening of Tuesday, the 24th of March 1863, an inquest was held by Edmund Gilbert Hamley, Esq., a coroner of the county of Cornwall, at the "Foundry Inn," St. Blazey, touching the death of James Sampson, a miner, aged 22 years, who was killed the previous day whilst working underground in West Fowey Consols Mine, in the parish and near the town of St. Blazey.

At the same time that Sampson received the injuries which proved fatal to him, his comrade, Richard Jasper, also received serious injuries, which at first it was feared would prove fatal to him, and afterwards it was supposed that, though his life might be spared, his sight would be lost; but it is satisfactory to learn that both his life and eyesight will be preserved.

The following inhabitants of St. Blazey were sworn on the jury:—

Henry Meager,
William Rescorla,
Richard Saunders,
Henry Thomas,
John Jenkins,
Henry Sweet,
Edward Martin,
Sydney Magor,
Edward Martin,
Edward Isaac,
William Werry,
Thomas Arthur.

The jury having seen the body of the deceased at his late residence near the Foundry Inn, the following evidence was taken.

WILLIAM HUGO sworn.

(*Coroner.*) What is your name?

(*Witness.*) William Hugo.

What are you?—A miner.

Where do you work?—At West Fowey.

Just tell the jury all you know about this case. Where were you working; what part of the mine?—I was working at the 120 fathom level.

When was it; what day?—Yesterday.

Where was Sampson?—Down at the bottom of the shaft, at the 130, 10 fathoms below me.

Well, what took place?—I received information from Richard Dower, his comrade, that something had happened; that a hole had gone off.

Did you go down?—Yes.

When you came down what did you find?—They were in the dark. Jasper was sitting down at one end of the shaft, in the north-east corner of the shaft, and Sampson was lying down in the south-east corner on his back. That's all.

Was he dead?—No.

What did you do?—I sent him up to grass at once.

He was got to grass as soon as possible, was he?—Yes.

Did you remain down in the 120, or did you come up?—I came up to grass with word to the captains. When I saw him up he was alive in the gig. He was sitting in the gig. He died in about five minutes after he came up.

Had you seen him before the hole went off?—In the morning, about four hours before the accident.

Where is his comrade Dower?

(*Policeman* 81, *Julius Bone.*) He is underground at his work.

(*Coroner.*) We can't do anything without Dower.

(*Some Jurors.*) Dower ought to have been here.

(*Coroner to witness Hugo.*) You don't know anything else about it?

(*Witness.*) No.

The man was not sensible after?—Not after he came to grass.

How do you know that he himself tamped the hole?—His comrade said so.

What caused it to go off?—He was tamping a second laying.

(*A Juror.*) They were putting a second laying and tamping it.

(*Coroner.*) Who was there besides Sampson and Dower?

(*Witness.*) The other man Jasper.

(*A Juror.*) Jasper is injured very much indeed.

(*Another Juror.*) There are several men here who have seen Jasper; what did he say?

(*Witness.*) He said that Sampson was tamping the hole.

(*A Juror.*) Dower saw the explosion, and then he ran to this man here for a light.

(*Coroner.*) How long had Sampson been working in the mine?

(*Jurors.*) For years. He had been an underground man for years. It appears that he was sensible as he was coming up the shaft, and he touched Jasper, and said, "Oh, I did'nt mean to do it." He was sensible, but he could not give any account how it happened.

(*Coroner to Witness.*) How near were the other men to him when it went off?

(*A Juror.*) Dower was at the 120, looking down the shaft when the accident happened. They had been all three putting in this hole.

(*A Juror.*) They were tamping the hole, and the tamping-powder caught fire. There must have been some loose powder about the hole.

(*Coroner to witness.*) You are sure that the man was tamping himself?

(*Witness.*) Yes, sir.

(*A Juror.*) The wages man was down with him. But they would not put a wages man to tamp the hole; it must have been the deceased himself who tamped the hole.

(*Coroner.*) It appears to me to have been a sheer accident. There does not appear to have been any blame. I will adjourn the inquest for the other man (Dower), if you think proper, gentlemen; but I do not think anything can come of it.

(*Several Jurors.*) It was pure accident. You could get no further information from any one.

The jury then immediately returned the following verdict: "Accidentally killed by the explosion of gunpowder in West Fowey Consols Mine."

The Coroner recorded the verdict, and handed to the policeman a certificate for burial.

DEATH FROM THE FALLING OF GROUND.

At noon on Wednesday the 15th April 1863, an inquest was held at the house of Richard Eade, the "Star Inn," at Trewennack, in the parish of Wendron, and about a mile and a half from Helston on the turnpike road to Falmouth.

The inquest was held by William Hichens, Esq., county coroner, resident at St. Ives; and it was concerning the death of Thomas Wedlake, a single man, aged 24 years, who died in the afternoon of Monday the 13th of April, in consequence of injury received by him while working that afternoon in Trevenen (or Trevening) Tin Mine, also in the parish of Wendron, and about a mile (or less) northward of Trewennack.

The following were sworn on the jury:—

Bennett Winn, foreman,
Walter Pearce,
William Williams,
Peter Gill,
Daniel Treloar,
William Pascoe the elder,
William Pascoe the younger.
William Chapman,
Nicholas Curnow,
John Morris,
John Bawden,
William Treloar.

The coroner and jury proceeded from the inn to the house of Mrs. Philippa Moyses, at Lower Trewannack, to view the body of the deceased. It was at this house that he had lodged with his brother John Wedlake and two other comrades; all four of whom had recently come down into this neighbourhood from the county of Devon.

After the jury had seen the body they and the coroner returned to the "Star Inn," and heard the following evidence:—

JOHN WEDLAKE, brother of the deceased, deposed as follows:

(*Coroner.*) Where do you reside?

(*Witness.*) Down at Mrs. Moyses'. My native home is Ashton, near Exeter, just under Haldon.

What is your calling?—A miner.

Thomas Wedlake was your brother, was he?—Yes, sir.

What was his age?—24 the 2d of January last.

He was a miner?—Yes, sir.

And lived at Ashton until he came into this neighbourhood?—No; we had been living at Tavistock for two years since we left home. We have no fixed residence now; but I call it my home where my father and mother live.

How long had your brother been in this neighbourhood?—'Tis three weeks last Friday since we came to Helston.

You came down together?—Yes, sir.

To seek for work?—Yes, sir.

Did you get employ here?—Up here at Trevenen Mine.

That is in Wendron, I think?—I believe so, sir.

(*Some Jurors.*) Yes, sir.

(*Coroner.*) Did you work together as comrades?

(*Witness.*) Yes.

Any other persons?—Yes, that young man there (*meaning Thomas Cox, afterwards examined*), and another young man; four of us.

Your two other partners, what were they called?—Thomas Cox and Thomas Lukey.

What part of the mine did you work in?—The 170 fathom level.

Were you down at your labour? What day was it?—Monday, sir.

What time of the day?—Between one and two, the middle of the day, when we went down.

Any others besides yourself and your brother?—The other two young men; we all four was there.

What were you doing? What happened?—We was working as usual, breaking ground, all four of us.

Near each other?—Me and my brother was near each other; the other two were at the other end of the stope, about four or five fathoms off, I suppose.

All in the same level?—Yes.

Just tell what happened?—I was working away as usual;

I did not see what happened before I was down on the stage; the ground came away and knocked down the stage, and I went down, and he went down. We fell about 10 feet before we came down on the *trade*. I did not see any ground falling away before.

Did the ground appear at all weak, or likely to fall?—No, it did not appear likely to fall; it was just as it seemed when we worked along there before.

It knocked out the stage?—It knocked out the stage pieces we were standing on, and we falled away.

You fell away with the stage; what distance?—About 10 feet, I should say; not more.

Did a great quantity of stuff come away?—A brave quantity of stuff, about 20 or 30 barrows, or it may be more. My brother was buried up over his legs—up to about his middle nearly.

Were you buried at all?—No, I was not buried at all.

What position was your brother in?—He was standing, with his body leaning forward, and was buried up to here (*pointing to his own waist*).

He fell away standing, and was buried in that way?—Yes.

The upper part of him was not at lla covered?—No, nothing at all on him upwards above here (*again pointing to his waist, just above the hips*).

He was able to speak, as he stood, I suppose?—Yes.

What did you do?—Why pulled away the trade and got him out as quick as I could. I called my comrades, and they come as quick as they could; they was not far; and we got him out as quick as we could. It might be 10 minutes, perhaps.

What injury did he seem to have sustained?—He didn't complain of nothing more than across his back before we got him out, but after we had taken him out he thought whether his legs was broke or not.

Was he able to walk?—Yes; or he couldn't walk by himself; he walked, with assistance, out as far as the plat at the end of the level.

Was he taken up in the kibble?—Taken up in the skip.

You accompanied him up, I suppose?—I came up just before him.

You were there to receive him as he came up?—Yes.

What became of him after that?—When he came up he was taken out of the ship, and carried over to the account-house.

Was a medical man called in?—Just after he was carried into the account-house the medical man came.

Who was the doctor?—Doctor Roskruge of Helston. He spoke to the doctor after the doctor came.

He is the mine doctor, I suppose?—Yes, sir.

How soon was the doctor in attendance?—He was there in about 10 minutes after my brother was up in the account-house.

Did he live to be examined?—The doctor went in and looked at him. I was not inside. I was there at the door, and heard the doctor speak to him.

How soon did he die after that?—In about five minutes after the doctor came.

You were not present when the doctor examined him?—No, I was not in when the doctor went in first. I was at the door of the account-house just afterwards. The doctor asked him where he felt most pain, and he said across the back. I was at the door of the account-house, and was no sooner there than I was told to go out.

You don't know whether he stripped to be examined, do you?—No, he was not stripped. (*The other witness in attendance made an observation confirmatory.*)

I suppose that's all you know?—Yes.

THOMAS COX was then sworn and examined.

(*Coroner.*) Are you a native of this neighbourhood?

(*Witness.*) No, sir; I am one of Christow, an adjoining parish to Ashton, near Exeter.

You are a Devonshire person then?—Yes.

And came into this county to seek for work?—Yes, sir; we all came here together, four of us. I accompanied these two. The other man is called Thomas Lukey.

You procured employment at Trevenen Mine, as he has stated?—Yes, sir; all four together.

You have heard what the last witness stated as to the manner this poor fellow came to his death?—Yes.

Is it all true, as far as you know?—Yes, sir.

The Coroner to the Jury:—Gentlemen, you have heard the evidence of these two witnesses as to the manner in which the deceased came to his death. It seems to be a clear case of accident, without any possible blame to be imputed to any body; and I suppose that is your opinion?

(*Jurors.*) Yes.

(*Coroner.*) And that will be your verdict?

(*Jurors.*) Yes.

(*Coroner.*) And so you say all—"Accidental death."

(*Jurors.*) Yes, sir.

Verdict of "Accidental death" was then duly recorded and the coroner's return was signed by the twelve jurors; as many as four out of the twelve, however, being unable to write their names, and making crosses in place thereof.

[It was not stated at the inquest, but the reporter heard subsequently from an apparently respectable elder'y man in the Inn, that this was the fourth or fifth fatal accident which had happened in Trevenen Mine, and that the mine was supposed to be insufficiently timbered.]

Camborne, Cornwall,
25th April 1863.

Sir,

A fatal accident having occurred at Tolvadden Mine, by which a lad named Charles Vincent was killed by falling away in the shaft, I visited the mine yesterday, according to Lord Kinnaird's instructions, and examined the shaft in which the accident occurred, and have now the honor of reporting upon the same.

I am, Sir,
Your obedient servant,

A. H. Wylie, Esq. CHAS. TWITE.

Tolvadden mine is a copper mine in the Marazion district, about three miles east of Penzance, under the management of Captains A. Bennett and F. Gundry.

The shaft in which the accident occurred is the engine shaft, and is used as an engine and winding shaft.

The part of the shaft which is used for winding in is most closely and securely cased off, both from the engine shaft and from the level which passes behind the shaft. The engine part is 6 feet long by 5 feet wide, and inclines at an angle of 22° from the vertical. The ladders run in long lengths down the shaft, but the men can step out every 10 fathoms upon a floor fitting closely all through the shaft. In this respect I never saw a better landing place. But all the pit work is sent down through the engine shaft, through a series of trap doors at every landing place. These doors are all opened every Saturday afternoon, as on this day any part of the pitwork which requires changing is attended to. On ordinary occasions the men entering the shaft from the level, which runs behind, step on this trap door and take the ladders, but when this door is raised the men step on a plank about a foot wide, on which the door rests.

It appears that on Saturday the deceased lad and his father were working at the 50 fathom level, when the lad went to go to the 40 to get a pick which had been left there, and that on entering the shaft, not thinking of the open trap door, he stepped in in the usual manner, and fell through to the 80 fathom level, and was killed.

The inquest was held on Monday the 20th instant, and resulted in a verdict of "Accidental death" being recorded

(Signed) C. TWITE.

Camborne, Cornwall,
23rd April 1863.

Sir,

I have visited to-day, by Lord Kinnaird's direction, the St. Just United Mines, situated in the parish of St. Just, and examined the state of the shaft in which Emanuel Trembath was found killed on Saturday last, the 18th instant. I inclose my report upon the same, as well as the short-hand writer's notice of the inquest.

I have the honor to be, Sir,
Your obedient servant,

A. H. Wylie, Esq. CHAS. TWITE.

St. Just United Mines are large tin mines, only recently set to work, after laying idle for some years.

The shaft where this man was killed is called Red Dippa Whim Shaft, and is used as a drawing and footway shaft. The drawing is by single skip. The ladder way is not cased off from the drawing shaft, there being only single boards placed across at a distance of 6 ft. apart.

I suggested to the agents the desirability] of having a more perfect casing, which was admitted, and attention promised to be given to it.

The ladders were long, from 9 to 15 fathoms long, and with staves 12 inches apart.

(Signed) C. TWITE.

FALLING FROM A LADDER.

In the afternoon of Tuesday, the 21st of April 1863, an inquest was held by William Hichens, Esquire, county coroner, at the house of William Williams, the "Commercial Inn," St. Just, in Penwith, concerning the death of Emmanuel Trembath, aged 23 years, who was killed on Saturday, the 18th of April, in St. Just United Mines, in the parish of St. Just, in Penwith. The deceased lived at New Downs, near St. Just, Church Town, and has left a widow and two children.

The following were sworn on the jury:—

Reverend George Hadow, vicar of St. Just,
Mr. John Bennetts,
Mr. John Wallis,

Mr. William Williams,
Mr. John Letham,
Mr. James Bennetts,
Mr. John Williams,
Mr. Nathan White,
Mr. William Trehair,
Mr. Thomas Hall,
Mr. Joseph Rowe,
Mr. James Akermann.

The jury, having been sworn, proceeded with the coroner to view the body of the deceased at his late residence; and after their return to the "Commercial Inn," the following evidence was taken:—

JOHN THOMAS sworn.

(*Coroner.*) You are a miner?
(*Witness.*) Yes, sir.
Living at St. Just?—Yes, sir.
Where do you work?—At St. Just United Mines.
Were you at the mine on Saturday last?—Yes, sir.
Did you know Emmanuel Trembath, the deceased?—Yes, sir.
Was he a miner, too?—Yes, sir.
And worked at the same mine?—Yes, sir.
Was he at the mine on Saturday last?—Yes, sir.
Did you see him at any part of the day?—No, sir, not that I recollect.
How do you happen to know that he was there?—I know he works at the 50 fathom level of the Redippa shaft.
Did you hear him working, as you thought?—Yes, sir.
About what time was that?—About, as near as possible I can recollect, about half-past two; and that was the last.
(*Mr. Hadow.*) How far did you work from him?
(*Witness.*) We worked below him; but at that time we were above; we were coming up when we heard him.
(*Coroner.*) Where do you say you worked?
(*Witness.*) I worked at the 70 fathom level.
(*Mr. Hadow.*) What do you mean when you say you heard him?
(*Witness.*) I heard him emptying a barrow of stuff.
(*Coroner.*) What you heard was his emptying a barrow of stuff?
(*Witness.*) Yes, sir.
You say you did not see him alive; did you see him dead that day?—Yes, I saw him dead; I saw him brought to surface that same day.
About what time?—I can't tell exactly; but I should think—well between three and four; I can't say to half an hour.
Is that all youknow about it?—Yes, sir.

RICHARD BLUETT sworn.

(*Coroner.*) Are you a miner?
(*Witness.*) No, sir.
What then?—A kibble filler.
At St. Just United Mines?—Yes, sir.
What part of the mine?—At Redippa.
At what level?—The 70.
(*A Juror.*) At all levels?
(*Witness.*) I was down at the 70 that day.
(*Coroner.*) On Saturday last you were down at the 70 fathom level?
(*Witness.*) Yes.
(*Mr. Hadow.*) Then you were below him?
(*Witness.*) Yes.
(*Coroner.*) What do you know about this deceased?
(*Witness.*) I came up from the 70 up to the 50, when I came up from my work. I was leaving work; and I saw a man lying across the manhole at the 50. I put my head up and came against him; he was lying across the manhole so that I could not go up.
You found a person lying across the manhole; but you did not know who it was at the time?—No, sir.
What did you do?—I did not move it. I went over a pile of stuff, and went up in another direction.
(*Mr. Hadow.*) You thought it was a dead man, I suppose?
(*Witness.*) Yes, I see'd he was dead, sir.
(*Coroner.*) Did you go to grass?
(*Witness.*) Yes, sir.
And told of it, I suppose?—Yes, sir.
You knew the man was dead?—Yes, sir.
But you took it to be—whom?—I thought it was Tom Williams.
You did not go down again, I suppose?—No, sir.
Did you see the man when brought up?—Yes, sir.
You remained on the mine?—Yes, sir.
You then knew it to be Emmanuel Trembath, I suppose?—Yes, sir.
Did you assist to take him home, or anything?—No, sir.
And that's all you know about it?—Yes, sir.
What became of the man afterwards?—I saw him carried away towards his own home. I went home with him.
(*Mr. Hadow.*) Was he lying at the bottom of the ladder.
(*Witness.*) Yes.
Close to it?—Yes.
And the ladder ascends close above?—Yes, his head was close to it.
What kind of ladder is it?—A good ladder.
No bad rounds in it?—No, sir.
(*A Juror.*) How many manholes have you above that?
(*Witness.*) There ought to be a manhole about every five fathoms.
(*The witness John Thomas.*) There are seven manholes above the 50, at different stages, at different distances. Manholes are stages to catch a man if he should fall away, and they are also places for men to rest going up or down.
(*A Juror.*) Is there a trap hatch?
(*Witness.*) There is one swing hatch just above where he fell from.
How far is it from the one that stopped him to the one above?—Not above 2½ fathoms. I think he fell through one, and went down to the other. He never went through but one.
(*The witness Bluett.*) I found a boot about 10 fathoms above the manhole where he was found, and his hat about three fathoms above the deceased's body.
(*To the Coroner.*) I don't know how far he must have fallen if he had fallen from his work.
(*A Juror.*) He had left his work and was going up, and he fell back to his own level.
(*Another Juror.*) It is supposed he must have fallen as he was going up. The man is known to have been subject to giddiness.
(*The Coroner.*) This seems to be a case in which you must find a verdict that he was found dead. There appears to be no evidence as to how he came by his death; though probably he must have fallen from the ladder as he was going up from his work.

Verdict:—"Found dead."

DEATHS FROM SCALDING IN A BOILER-HOUSE.

On Friday, the 15th of May 1863, an inquest was held by William Hichens, Esq., coroner, at the house of John Reed, the "Victoria Inn" in the parish of Wendron, concerning the death of Frederick Uren, aged 33 years. The deceased, a married man, with wife and three children, was a miner, and worked at Buller and Basset United Mines, about 2½ miles from the town of Redruth. About two o'clock in the afternoon of Wednesday, the 13th of May, he and eight other miners were in the boiler house, changing their clothes, when one of two boilers "blew out," and the water and steam rushing out through the bottom flue of the boiler, scalded four of the men, Frederick Uren, aged 33, George Teague 19, James Oliver 18, and James Hore, 20; Uren and Teague being so severely injured that they died in consequence,—Uren on Wednesday night, and Teague on Thursday evening. Uren's residence was at a place called Crigworthgan, about a quarter of a mile from the Victoria Inn, on the Redruth Road, and closely adjoining Buller and Basset United Mines; the Victoria Inn being in the village of Four Lanes. Teague lived and died at Tregagorran, in the parish of Illogan, and about a mile from the village of Pool.

The following were sworn on the jury:—
Thomas Prisk Jenkin, foreman,
Henry Kistle,
John Rogers,
William Medlyn,
Henry Reed,
John Wynn Gilbert,
Edward Richards,
John Allen,
John Crocker,
Thomas Hender Opie,
John Frederick Opie,
John Treloar.

The jury, after being sworn, went to see the body of the deceased, in the upper room of a very neat, clean, and well furnished cottage.

On their return to the inquest room, the following evidence was taken.

JOHN BOSANKO, an elderly man.

(*Coroner.*) Are you a miner?
(*Witness.*) Yes, sir.
What parish do you live in?—In Wendron.
What mine do you work in?—The same mine; Buller and Basset United.
Is that in the parish of Illogan?—No; 'tis in the parish of Wendron.
Were you at the mine on the day of the accident?—Yes, sir.

When was it; yesterday, or the day before?—The day before, Wednesday.

About what time of day?—About 2 o'clock in the afternoon.

Where were you at the time?—In the boiler-house along with them.

The engine boiler-house?—Yes, in the engine boiler-house.

Who were there besides?—Uriah, my son, was there.

The deceased, Frederick Uren, was there you say?—Yes, sir.

And what was the other man called who is dead?

(*Mr. Bice, an agent of the mine.*) George Teague.

(*Coroner to witness.*) And your son?

(*Witness.*) My son Uriah Bosanko, and others, were present at the time.

Were they all changing their clothes, or only these two?—We was all in the act of changing at the time of relief.

You were all going to leave work?—We had come up from underground, and they was going underground. We were taking off our underground clothes, and they were about to put on underground clothes.

You and your son, and some others, had come up, from underground?—Yes, sir.

What happened while there?—The boiler burst while we were changing.

While you were changing the boiler burst?—Yes.

What intimation had you got of it at first?—No intimation in the least.

You heard an explosion, I suppose, first?—Yes, sir; we heard an explosion, and saw it also. It came out just nigh where we were standing; and we, being very nigh the door, made our escape into the engine-house.

You heard an explosion, you say?—Yes, sir; it came out under first.

And you, being very near the door, made your escape through, you say?—Yes.

Did you all escape?—Yes, sir.

You said you saw something of it; what did you see?—I saw it burst out from just under the fire door, and it went out against the wall of the coal shed.

(*Mr. Bice.*) It would be more proper to say it forced its way just through the bottom flue of the boiler.

(*Coroner.*) You saw fire?

(*Witness.*) No; water and steam forced its way through, and come out against the wall of the coal shed.

You made your escape immediately, and saw nothing more of it?—As quick as possible we could; a quarter of a moment, or as soon as we could open the door. Four of us was standing on the platform washing at the present time.

You saw nothing more of it then afterwards?—No. The steam followed us into the engine-house. We quickly made our escape from being burnt alive, and that was all.

The steam followed you into the engine-house, into which you made your escape, I suppose?—Yes.

Were you all in the same place; or were those in a more dangerous place than you?—To all appearance we was in the most dangerous place.

Why?—We was nighest where it burst.

Where were those two men who have died?—Those two men were on the other boiler that did not burst; and they, hearing the explosion, and thinking to make their escape, jumped down to the fire-doors, where it had bursted out, among the steam and water.

They were on the top of the other boiler, I think you said?—Yes; from the top of the other boiler.

And then they jumped down before the fire-place of the boiler that burst?—Not exactly; they made their escape through the window.

How many boilers were there?—Two.

And they were on the boiler that did not burst?—They jumped over *thicky* that didn't burst, and steam and water was coming out about them from the other boiler that burst, and they made their escape through the window; they climbed up through the window that they throw out ashes through. The window is about five feet high.

(*Mr. Brice to witness.*) Did those two men who were killed make their escape through the window?

(*Witness.*) Yes.

(*Uriah Bosanko.*) One made his escape through the window, and the other through the door of the coal-shed. I think that's of it, from the account they gave me.

(*Coroner to witness.*) Did you see anything of them after the accident?

(*Witness.*) Yes, sir.

Where?—Out in the coal yard. We ran out of the engine-house, and heard them crying. We went round to the gate of the coal shed, and we saw Frederick Uren crawling on his hands and knees, and the others was standing up.

Did you see what state he was in?—Yes.

He was able to talk, we hear?—Yes, he was able to talk.

Did he give you any history of it at all?—He didn't give any history, or say anything what occurred; but he begged us to open the yard gate, which was locked; but we couldn't until we got the key.

He said nothing about the occurrence?—I don't know that he mentioned anything about it.

(*Uriah Bosanko.*) I asked him what was the matter, and he said he was burnt very bad.

(*Coroner to witness.*) Did you see that he was burnt very bad?

(*Witness.*) Yes; very bad about the head and arms, and every part we could see.

He appeared to be seriously burnt; scalded?—Seriously scalded everywhere we could see. He had his clothes on.

Every part that was exposed, you say?—Yes; it appears he was scalded everywhere that was exposed to the steam.

What was done with him? He was let out of the yard, of course; did you do anything more to him?—No; he was taken up by these here men, my son and who else?

(*Uriah Bosanko.*) I can't say.

(*Witness.*) He was carried into the account house, and very quickly after that he was carried by James Vincent or two men to his own dwelling.

(*Coroner.*) Where he died, I suppose?

(*Witness.*) Yes.

Were you present when he died?—I was in the house, but I didn't see him pass. My son did; he was sitting by him.

How soon after the accident?—About 11 o'clock at night; about eight hours after.

URIAH BOSANKO sworn.

(*Coroner.*) You are a son of the last witness?

(*Witness.*) Yes, sir.

And live in Wendron too?—Yes, sir.

With your father?—Yes, sir.

And you are a miner too?—Yes, sir.

And work with your father?—No, sir.

You work in the same mine?—Yes, sir.

You work in Buller and Basset United Mines?—Yes.

And you were there on Wednesday last?—Yes, sir.

And in the boiler house with your father, as he has stated?—Yes, sir.

And were present at the explosion?—Yes, sir.

You have heard the evidence your father has given; is it all true as to the manner this poor fellow was injured?—Yes.

Just give us the names of those persons you think were there. You said the parties present were, the two deceased, Frederick Wren and George Teague, and ———?—Myself and my father, John Oliver, William Oliver, and James Oliver (brothers), John Hand, and James Hore.

Were any beside these two injured?—Yes; James Oliver was injured, and James Hore.

They were also scalded?—Yes, sir.

The others escaped unhurt; is that so?—Yes, I believe so.

(*The Coroner, addressing Mr. Bice.*) Now then, Captain Bice, we will have your evidence. We want to have the best information you can give us as to the cause of accident.

(*Captain Bice.*) I think Bosanko's evidence is as near the truth as I can state.

But we want to have some scientific knowledge about it?—I don't know that I can give any scientific account, I can merely state—

The coroner, however, desired him to be sworn.

SAMUEL BICE sworn.

(*Coroner.*) You are a mine agent?

(*Witness.*) Yes, sir.

Where?—At Buller and Basset United Mines.

The principal manager?—No; the sub-agent. Captain Pascoe, is the managing agent. (Capt. Pascoe was not present.)

You have been a mine agent a considerable time?—Yes.

Many years?—Several years.

And employed there any length of time?—'Tis about 18 months since I came to that mine.

Were you at the mine on Wednesday last?—I was in the account house at the time of the bursting of the boiler.

And you went out at once, I suppose?—Yes.

You heard the explosion, I suppose?—No; I did not hear the explosion. I think it can hardly be called an explosion; it was rather a blowing out of the boiler.

(*John Bosanko.*) Yes, that's the thing.

(*Witness.*) The boiler blew out,—the bottom part of the flue: the steam escaped through the flue.

(*Coroner.*) You heard of it before you went out?

(*Witness.*) Yes, I heard of it, and I went out immediately?

You heard of it from some person you met at the door—From one of the men who had been in the boiler-house.

Just give us your description how it was. What did you

find?—I found when I came into the boiler-house that the brick-work was lifted and thrown aside.

Which boiler do you mean? Do you call it by any particular name?—We call it the south boiler. The bricks had been lifted up, but not with very great violence. They had been lifted up and thrown aside; the brick-work had been thrown aside; and the front of the bottom flue, underneath the boiler, underneath the fire-place, was forced out.

What caused that?—The escape of the steam.

What part of the boiler was it?—About the middle of the boiler. We have not examined the boiler yet; we cannot do so until it cools.

Are you not enabled to state the cause of the accident?—The case is blown out; but we have not been able to ascertain the extent of the damage. That will be done in the course of a few days; probably on Monday. I rather think, judging from what we can see, that a part of the case is blown out near the centre of the boiler.

(*John Bosanko.*) Very possibly it may be so.

(*Witness.*) I think so, as far as we can judge.

(*Coroner.*) About the centre of the boiler?

(*Witness.*) About the centre, at the bottom part.

Was blown away?—It may be a rent or an aperture, we cannot say which at present.

It is either rented or separated, or blown out?—Either rented or separated, or blown out.

To what do you attribute it?—To weakness of the boiler

Were you conscious that the boiler was weak?—Not at all. We thought it was perfectly strong at the time. We believed it to be in good order. We repaired it about two months ago. One of the witnesses, Uriah, was engaged in repairing it.

About the person in charge. Is there any suspicion that the water was allowed to go too low?—No; he is a very good engine-man.

(*Coroner.*) You have no idea that the feed was allowed to go too low, or any thing of that sort?

(*Uriah Bosanko.*) The feed was right enough.

(*Witness.*) The engine-man is a very safe man.

(*Coroner.*) There is not the slightest suspicion that the water was allowed to go too low?

(*Witness.*) No, not the slightest, so far as I can judge. There is every care taken in the working, as far as I know.

I ask you, on the oath you have taken, do you believe it was an accidental occurrence, and without any blame attributable to anybody whatever?—Perfectly so.

The *Coroner* read his note of Caaptain Bice's evidence; and the *Witness*, at its close, repeated that it was his decided belief that the occurrence was purely accidental, and without blame attributable to any one. He further stated that the men were not doing wrong in being where they were at the time of the accident. He believed if they had laid down on the boiler, and not have attempted to escape, they would not have been so much injured.

(*Coroner.*) It seems to be a dangerous place to go to?

(*Witness.*) We have no other place at present, but probably we shall make arrangements for some other place. That is the place to which the men were accustomed to go to change.

The *Coroner*, addressing the Jury:—The question is for you, gentlemen, having heard the evidence of the two Bosankos, and Captain Bice's statement here. He attributes it to weakness of the boiler; but he says, at the same time, that the boiler was believed to be in perfect order, that it was repaired two months ago, and that he had no reason to fancy that the boiler was not in a proper state, and that the feed was not allowed to go so low as to cause the accident. I think, therefore, you may safely say it was a case of accident. I don't see myself that there is anything else to suspect in the matter.

The jury immediately returned a verdict of "Accidental death."

In answer to a question, *Captain Bice* said the boiler was put in about nine years ago. We cannot say how long it had been working before that. It was an old one when brought here; or, rather, it was one that had been in use before. The engine-man told me just now that the boiler was perfectly sound above, and in every part except the bottom part of it.

In reply to another question, *Captain Bice* said the necessity for repair two months ago was from a blow out, similar in character, but not so strong. At that time only the engine-man was present. When it was repaired, it was tried with water in various ways until it was believed to be perfectly safe.

The Coroner recorded the verdict: "Accidental death by scalding from the blowing-out of an engine."

The Coroner then proceeded to the "Plume of Feathers Inn," at Pool, (whither the witnesses John and Uriah Bosanko had previously been despatched from Four Lanes), to hold an inquest concerning the death of George Teague, aged 19 years, who died at Tregagarran, in the parish of Illogan, on Thursday night.

The following were sworn on the jury:—

George Treglown, foreman,
Benjamin Hocken,
John Mayne,
William Scoble,
William Williams,
William Carne,
James Rogers,
William Phillips
Isaac Nicholls,
John Kitts,
Peter Blamey,
Jeremiah Curnow.

The jury, after having been sworn, went to see the body of the deceased.

On their reutrn to the inquest room, the Coroner, addressing the jury, said I have had the witnesses brought from the other inquest. I propose to read over the evidence given by them, and to ask them if it is true as regards this other man.

JOHN BASONKO was then sworn.

(*Coroner.*) You have been already examined to-day as to the cause of death of Frederick Uren?

(*Witness.*) Yes, sir.

I propose to read over your deposition, and to ask you the question whether it is alike true as to the death of this poor fellow.

The *Coroner* ,then read John Bosanko's deposition in the case of Frederick Wren, and said, I would now ask you the question, Do these circumstances apply to the death of Teague?—Yes.

Exactly the same?—Yes, exactly the same.

He was there at the same time, and his death was caused by the very same circumstances?—Yes.

I will ask you another question, as we have not the agent here. Do you attribute any blame to any body?—Not in the least.

Was the feed right, do you think?—It was tried a few minutes before. The engine-man had looked at the cock a few minutes before, and it was all right then.

What do you attribute the accident to?—To weakness of the boiler.

Had the boiler been repaired?—It was repaired about two months since, and we expected we were safer than we were in past times. We thought it was put in perfect order. We believed that the agents intended it should be put in perfect order.

You believe that the agents intended it should be put in perfect order?—Certainly we did.

URIAH BOSANKO was then sworn.

The *Coroner* read over his deposition, and asked him if it was true as regarded the man Teague as well as Uren?

(*Witness.*) Yes, sir.

The evidence which applied to Wren applies also to this poor fellow?—Yes, sir.

The death was from the same cause?—Yes.

WILLIAM OLIVER sworn.

(*Coroner.*) Your name is William Oliver?

(*Witness.*) Yes, sir.

Where do you live?—In the parish of Wendren, near the mine.

Were you with the deceased, George Teague, when he died?—Yes.

When did he die?—Last night at half-past 7.

Were you at his house when he came home?—I came home with him.

What were his injuries?—He was much burnt about the face and other parts.

Did you hear him give any account of the occurrence?—No.

Was he not able to do so?—The man seemed very weak.

And he did not give any account?—No.

The Coroner next read the evidence given by Captain Bice at the previous inquest, and the jury immediately returned a verdict of "Accidental death."

(*A Juror to the witness John Bosanko.*) Have you always been accustomed to change on the boiler?

(*Bosanko.*) Yes.

(*The Coroner.*) And now, after this accident, it appears they are about to alter that system.

(*The Foreman.*) I think it is a practice that ought not to be allowed.

(*Another Juror.*) It is what ought never to be allowed in the world for men to change on the boiler.

(*Another Juror.*) There ought to be a changing-house provided.

(*The Foreman to Bosanko.*) Is it likely they will have changing-house now?

(*The Coroner.*) I believe they are going to see to it after this accident.

Report by Capt. Tyler, R.E.

Fatal Accident at Bottallack Mine.

Chale, Isle of Wight,
16th June 1863.

My Lord,

I visited the Botallack Mine, St. Just, Cornwall, on the 6th instant, in compliance with the request contained in your lordship's note of the 1st instant, for the purpose of making inquiry respecting the accident which occurred at that mine on the 18th of April last, and I have now the honour to report for your lordship's information the result of my inquiry.

An inclined shaft, following the course of the copper ore, and called the Boscawen diagonal shaft, has been sunk in the "Crown's" portion of this mine, to avoid the excessive cost of horizontal excavations from the vertical shaft (which increased in length as the workings descended), and to provide a more perfect means of ventilation at the different levels. A tramway is laid through the shaft to a depth of upwards of 200 fathoms below the level of the sea, and for a length of 363 fathoms, measured from the surface of the ground to the point at which it strikes the 190 fathom level. It falls throughout its length on a slope of 5 feet per fathom, or 1 in 1·2, and contains nine curves of greater or lesser radius. The rails are of the  section, and are laid upon longitudinal sleepers $7\frac{1}{2}'' \times 2\frac{1}{2}''$, connected by transoms 6 feet apart from centre to centre. Wrought-iron bolts are used to secure the rails to the sleepers, but are inserted for the most part on the outside of the rails only. It would be better, especially on the curves, if a certain number were inserted on the inside also. The tramway in the interior of the shaft is in good order, but a little re-adjustment is required between the engine house and the entrance to it. A number of additional rollers, which are already, I believe, prepared for fixing, are wanted on different parts of the tramway; and above all a gangway, if only for facilitating inspection, cleaning, and maintenance. At present the ascent and descent are attended with considerable difficulty, in consequence of the irregular character of the excavation, and the slimy condition of the rock, the rails, and the sleepers.

The incline is worked by a stationary engine on the surface, and the trucks are drawn up one at a time by means of a single-linked chain, which is wound round a cage outside of the engine-house. The dimensions of the chain varied when it was new, as follows, according to the distance from the engine-house. The uppermost links were made $\frac{5}{8}''$ in the diameter of their section for 100 fathoms, the second portion $\frac{9}{16}''$ for 100 fathoms more, and the third portion $\frac{1}{2}''$ for the remaining length. The chain was constructed specially for working the incline, and appears to be of good quality. Its original breaking weight may be estimated at 15, $12\frac{1}{2}$, and 10 tons * for the different sections respectively, but its thickness is now reduced, in parts, by as much as $\frac{1}{16}''$ from the friction of the links against each other on the cage; and it has been, during the 13 months for which it has been in use, subjected to a constant succession of jerks, which must have been very detrimental to it. The coils over-ride one another and fall off alternately as the chain is wound up, and the sudden and irregular strains which are thus created have tested it more severely than a constant strain only, from its own weight and that of the truck or waggon to be raised, would do.

The tramway waggon in which minerals are brought to the surface weighs about 8 cwt., and carries a load of about 16 cwt., making a total of 1 ton 4 cwt. The truck for the conveyance of the miners is said to weigh 14 cwt., and the men who were in it on the day of the accident, an (excessive number), would probably have weighed 1,326 lbs., making a total of 2,894 lbs., or nearly 1 ton 6 cwt. The weight of the chain to the length of 363 fathoms would be 7652 lbs.,† and the total maximum weight thus to be raised would be nearly $5\frac{1}{2}$ tons. There would thus be a direct maximum strain upon the $\frac{5}{8}''$ chain (on the incline) of nearly $3\frac{1}{2}$ tons, or, including friction, of nearly 4 tons at the commencement of the lift, and upon the $\frac{9}{16}''$ chain when it failed, of rather more than $2\frac{1}{2}$ tons, or say 3 tons, including friction, and allowing for a paucity in some places of rollers, as against $13\frac{1}{2}$ tons, which was its *ultimate* strength, and $2\frac{1}{2}$ tons which ought to have been its *working* strain, when it was new.

An ordinary break acting by blocks upon the wheels would have been useless for arresting the progress of the truck, on so steep an incline; and an ingenious substitute for it has been constructed from the designs of Mr. John Rowe, one of the agents of the mine. Four iron clutches, one on each side of each rail, are placed near the upper end of it, and are worked by a lever handle at the side. A steel spiral spring at the lower end of the floor of the truck, causes the break to fly on when the chain is loose, and thus renders it partially self-acting. When the chain is tightened, and the truck begins to ascend, the spring is compressed, the clutches are withdrawn from the rails, and the break handle falls back, by the action of a short lever and loop attached to the drawbar. At the side of the truck, and near the lever-handle, there is also a catch-spring, provided with a notch, which holds the main spring back, and the clutches off the rails, whenever the lever is placed in it. The object of the catch-spring is to afford a means of keeping the clutches from gripping the rails while the truck is descending without any one in it to hold the lever back; and it is expected that the miner who has charge of the break-handle during the ascent, will keep the lever in his hand; will prevent it from falling back into the notch of the catch-spring when it is inclined to do so (as is sometimes the case in going round the curves) and will be ready (without trusting to the action of the main spring) to apply the break by hand instantly when it is required.

The chain had given way on a previous occasion while a mineral waggon was being drawn up, but had not before failed with the miners' truck. The break-apparatus had not therefore been tested under that contingency, but it had otherwise worked very successfully up to the period of the accident, so much so, indeed, that the miners had acquired undue confidence in the working of the incline, and been led to indulge in tricks and experiments which occasioned much risk to their lives,—such as allowing the truck to run down and then stopping it suddenly, requesting the engine man to lower them at extra speed, jumping into the truck while it was going at speed, and overloading it to a serious extent. As many as 12 miners are stated to have ridden up in it at one time instead of 7, which is the greatest number it ought to convey, in order to save the trouble and delay of making a second trip.

About 3 o'clock on the afternoon of the 18th April, 8 men and a boy got into the truck at the 165 fathom level, for the purpose of ascending to the surface. The man who took charge of the break for the occasion, Thomas Wall, was on his feet, leaning back against the front end of the truck; and the boy, Richard Nankervis, sat on the back of it, with his feet dangling over the end; but the remainder were sitting in it in the usual manner. Thomas and Henry Nankervis, two brothers of Richard Nankervis, were present when they started, and the latter, Henry, cautioned one of its occupants, John Eddy, to hold his brother Richard round the waist, while the former, Thomas, remonstrated with Thomas Wall, the acting breaksman, as to his position with respect to the break-handle. He observed to him that "he had not got fair play for the break," and on receiving the reply, "all right namesake," said again "Take care, you have not got room for the break, "Richard's (his son's) shoulder is too near the break "handle." Thomas Wall said again "all right," and they started towards the surface, with the break-handle out of the notch in the catch-spring.

The truck had proceeded about 70 fathoms from the 165 fathom level when the chain gave way. It ran back at once past the 165 fathom level to the bottom of the shaft, which was then a little beyond the 190 fathom level, with great rapidity. It was seen to pass; and the lifeless bodies of those who had been riding in it were all found shortly afterwards near some timber beams which had been laid across the rails, and 2 ft. 9in. above them, at that level. The greater number of the men appear to have met their deaths by the violence with which they struck against these beams.

What happened in the truck after it left the 165 fathom level on its ascent can of course only be conjectured. There is no one now alive to tell precisely why it was that the break did not act or was not applied to prevent it from running back when the chain failed. The weight of the long portion of chain that remained attached to it might well, however, have prevented the spring from causing the clutches to grip the rails, and the break from thus acting of its own accord; and the conversation that passed between Thomas Nankervis and Thomas Wall before the men started for the surface would lead to the apprehension that Wall may not have been well prepared to apply the break

* The *working* strains should not in such a case exceed one sixth of the *ultimate* strains or *breaking* weight, and would thus be $2\frac{1}{2}$ tons for the $\frac{5}{8}''$ chain, 2 tons for the $\frac{9}{16}''$ chain, and $1\frac{1}{2}$ tons for the $\frac{1}{2}''$ chain.

† The weight of the whole chain, 400 fathoms long, would of course be greater namely, —

fms.	lbs.	lbs.
100	× 26½	= 2,650
100	× 21½	= 2,150
207	× 17½	= 3,500
Total		8,300

by hand at the critical moment. The break-handle may possibly have slipped into, or it may have been placed in, the spring-catch after the men started; and if so, Wall would hardly have been able to release it with sufficient rapidity. It was found to be out of the notch of the catch after the accident; but it would probably have been jerked out of it, in any case, by the very violent blow which the truck received when it came into collision with the timbers near the 190 fathom level.

Portions of the truck, which is very strongly constructed, were slightly bent by this blow; and the spring did not act upon the break, when I inspected the truck, as well as it is represented to have done before the accident; but the apparatus still worked perfectly, and with immediate effect, when the break was applied by hand. I tested it near the 165 fathom level, to ascertain whether this was the case, with some portions of the chain in it, equal in weight, as nearly as I could judge, to the nine individuals who then lost their lives.

In order, as far as possible, to prevent an accident of this description from again occurring, it appears to be desirable that the following precautions should be adopted:—

In the first place a wire rope, to be wound regularly round a suitable drum, should be substituted for the chain which has hitherto been coiled so unsatisfactorily upon the existing cage.

2. It would not be difficult to provide at the 190 fathom level, a tramway on a rising gradient, on which any vehicle that breaks away on the incline may reduce its speed before being brought to a stand.

3. The catch-spring should be removed from the side of the truck, to prevent the possibility of the break-handle being caught in the notch with which it is provided, when it may be wanted for immediate use. The break-handle would then require to be held back by hand as the truck descended the incline; and a breaksman would be wanted to accompany the truck in going down as well as in coming up the incline.

4. A second break of the same description might be added to the present truck, in order that a double means of security might be afforded.

5. A regular breaksman should be employed to accompany the truck up and down on every journey that it makes, who should act under strict regulations, and should be responsible for the control of the break-handle, and for not allowing undue speed, or over crowding, or any irregularities in the working of the incline.

The last precaution is, I think, peculiarly important. Miners, and other men who necessarily incur more than ordinary risk, are liable to become exceedingly reckless, and require to be kept under constant control. It is not safe to entrust to these men, at hap-hazard, the working of a break such as that now referred to. The breaksman's own life, as well as the lives of others, depend upon an act being instantaneously performed, which may not be required for years, or which may be required, on the failure of the chain or rope, at any moment. Thomas Wall is stated to have been a steady as well as an experienced man; but there can be no doubt that this accident would not have occurred if he had exercised full care in the working of the break-handle that he was temporarily in charge of; and the constant employment of a responsible breaksman is obviously the means by which proper attention to this very important duty can best be secured.

I have the honour to be,
Your Lordship's obedient servant,
H. W. Tyler,
Capt. Royal Engineers.

The Right Honourable
Lord Kinnaird, K.T.,
&c. &c. &c.

Sir, Camborne, Cornwall, 22d April 1863.

In obedience with the instructions received from the Right Hon. Lord Kinnaird, I have visited Botallack Mine, at St. Just, and inquired into the circumstances attending the fatal accident which occurred on Saturday last, the 18th instant. I also attended the inquest held upon the bodies, yesterday the 21st instant, the short-hand writer's notes of the evidence given being appended, and beg leave now to submit my report upon the same.

I have the honor to be, Sir,
Your obedient servant,
Chas. Twite.

A. H. Wylie, Esq.

Botallack Mine is situated in the parish of St. Just, about 8 miles west of Penzance. It is one of the oldest as well as one of the largest mines in Cornwall, employing about 350 men and boys underground, and 200 men, boys, and girls on the surface. The ores raised are tin and copper. The mine is divided into 200 shares, and is under the management of S. H. James, Esquire, Captains Henry and John Boyns, and Captain John Rowe, resident engineer.

The underground operations are carried on at three distinct parts of the mine, viz., Crown's part, Huel Hazard, and Huel Cock.

It was in the Crown's part that the accident occurred.

The Crown's part is situated on the coast, and is worked to a depth of 200 fathoms, and the levels are driven upwards of 200 fathoms in length under the bed of the sea.

This part of the mine has returned vast quantities of copper ore, and is still a very valuable portion of the property.

It was worked from Pearce's Shaft, which is situated upon a ledge of rock about 30 fathoms above low water, and 40 fathoms below the top of the cliff. This shaft is sunk down, and the levels driven from it. But as the copper ore was dipping away at a considerable angle from this shaft, at every succeeding level in depth the length to be driven before meeting with the ore became greater and greater; and as the rock through which these levels had to be driven was very hard, the expense of working became very great; and as the men were a long way from the shaft without any other opening to surface, the ventilation became very defective.

To remedy these evils, a new shaft was sunk from an adjoining ledge of rock, which has followed the course of the ore, and so obviated the driving of such long levels, and has restored the ventilation to a proper state.

This shaft is called the *Boscawen Shaft* and also the *Inclined Shaft*. It is carried down to the 196 fathom level, and is still being sunk deeper. It makes an angle of 32½° with the horizontal; but as the common way in Cornwall is to measure from the vertical, the angle in this case is 57½°, or, in the language of the miners, it *dips* or *underlays* 5 feet per fathom (the sine of the angle giving the amount of dip). It is carried through greenstone rock, and is 363 fathoms in length to where it cuts the 196 fathom level. The size of the shaft varies, the smallest being about 5 feet by 6.

While the angle of inclination remains the same, viz. 32°, the angle of direction varies, there being nine changes. The greatest amount of variation is at the 80 fathom level, where it amounts to 22½°.

The shaft is laid with a single line of railway on longitudinal sleepers of red pine, 7½ inches by 2½, with cross pieces every 5 feet; the width between the rails, which are T rails, being 2 feet 7½ inches. At those parts of the shaft where a change in the angle of direction occurs, angle rolls are placed; four of these are placed at the 80. I append a plan of those at the 33 fathom level.

The ore is raised in an iron waggon weighing 8 cwt., and will hold about 16 cwt. of stuff. It is drawn to surface by a single linked iron chain, varying in size, it being $\frac{1}{16}$ths of an inch diameter for 100 fathoms in length, weighing 26½ lbs. per fathoms, then $\frac{9}{16}$ths for 100 fathoms, and weighing 21½ lbs., while the remainder 200 fathoms was $\frac{8}{16}$ths, and weighs 17½ lbs. per fathom. The chain was made expressly for this purpose, invoiced of best charcoal iron, and warranted to bear a strain of 4½ tons.

The whim engine is a single-acting condensing engine; the chain is wound upon itself on the winding cage.

It has been the habit, since this shaft has been in use, for the men to ride up and down to and from their work, in a special carriage provided and used for this purpose. This carriage, or gig as it is called, is made of iron, 6 feet 10 inches long, 2 feet 5 inches wide, and 20 inches deep. It is furnished with 4 seats, and would hold 8 men. It is provided with a safety catch, which is intended to be self-acting while the gig is *ascending* the shaft, and is formed and worked as follows:—Under the gig and attached to the bottom is a very strong and powerful steel spiral spring, to which is attached an iron rod moveable in a groove, with a loop at the other end, to which the chain is attached which draws the gig. This iron rod will move backwards and forwards, according to the difference between the tension of the chain and the elasticity of the spring. Connected with the iron rod, by a system of levers and link work, are two sets of eccentric cams, consisting of two each, which, projecting downwards from the bottom of the gig, are on a level with the hollow part of the rails on which the wheels of the gig run, and so arranged that while the chain is tight the iron rod is moved forward, and the cams kept clear from the rails; but when the chain slackens, either by surging or breaking, the spring acts, draws the rod backwards, and causes the cams to grip the rails, and to hold the gig immoveable. This power of the springs and cams has been tested on several occasions, and found to answer.

It will be readily seen that the "gig" in *descending* would often be acted upon by the spring, especially as it is allowed to run down by its own weight, and so frequently stopped. To obviate this a second part of the catch, called the "break," was introduced. By the side of the gig, by the back seat, was an upright handle, which was in fact the long arm of a straight lever. Attached to the short arm was a moveable rod running along the bottom of gig, and attached to the end of the spiral spring. By means of this contrivance the spring could be permanently held in a state of tension, and its action upon the safety catch be prevented, the handle of the lever moving in a rack, and under the control of the person sitting by it.

It appears that it is the custom for this break to be always applied to the spring, even when the men are ascending, and for the man riding next to the handle to hold it in his hand, so as to be ready to release it in case of emergency.

The men are accustomed to assemble at the 160 fathom level, and to ride from these. The rails were not laid below the 190, although the shaft is somewhat deeper. At this part some stout timbers are laid across the shaft, allowing only a clear height of 2 feet 9 inches.

On Saturday last, the men were coming up as usual, when one of the links of the chain opened, causing of course a severance. This occurred when the gig was about 100 fathoms from the bottom. The gig descended at a great velocity, dragging with it the broken chain. The spring could not exert its power, as the break was on it. The breaksman had not the presence of mind to take it off, and the gig, in running under the timbers at the 190 at so great a velocity, dashed each man successively against them, and killed every one upon the spot.

The inquest was held at the account-house of the mine, adjourned to that place from an adjoining inn, on Tuesday the 21st instant. The adventurers were represented by Messrs. Davis and Borlase, solicitors of Penzance, and they had secured the services of Messrs. Brerton engineer, to the Cornwall Railway, Sherriff from the railway engineering office, and Mathews, town surveyor of Penzance. The friends of the deceased were not represented.

From the shorthand writer's notes, you will see that the inquiry was directed to the working of the safety apparatus of the gig; and after an inquiry lasting an hour and a half a verdict of "Accidental death" was recorded. The question of the quality of the chain, and its breaking strain, was not gone into. The agents reported the chain as being capable of bearing a strain of 4½ tons. This was high, even for a new chain; and as the chain has broken on several occasions, and has never been through the fire since its breakage, it quality must have deteriorated. The use of chains in drawing in shafts with a regular underlay is far from satisfactory. Wire ropes are cheaper and much safer.

Accident in Botallack Mine.

Nine lives lost.

On Tuesday, the 21st of April 1863, an inquest was held at Botallack, in the parish of Saint Just, in Penwith, by William Hichens, Esq., of Saint Ives, a county coroner, concerning the deaths of nine persons, men and lads, in the Boscawen diagonal shaft of Botallack Mine, in the afternoon of Saturday, the 18th of April. The men and lads were ascending from their work in a tram-waggon attached to a chain, and drawn by steam-power at the surface; and when approaching the upper part of the shaft, the chain, a single-link one, broke, and the breaks beneath the waggon failing to clip the rails, the waggon descended with a rapidity estimated as equal to 100 miles an hour, and all its occupants were instantaneously killed.

The names of the deceased were:—

John Chapple, senior	aged	50
John Chapple, junior	„	20
Michael Nicholas	„	41
Thomas Wall	„	50
Richard Wall	„	20
Peter Eddy	„	16
John Eddy	„	16
Thomas Nankervis	„	17
Richard Williams Nankervis	„	10

They lived in the village of Botallack and its neighbourhood; and Chapple, senior, Nicholas, and Thomas Wall have left widows with large families.

The inquest was opened at half-past 11 o'clock, at the house of James Bolitho, the Queen's Arms Inn, in the village of Botallack; and the following were sworn on the jury:—

Rev. George Hadow, vicar of St. Just, foreman,
Mr. John Bennett,
„ James Akermann,
„ George Chenhalls,
„ John Letham,
„ John Wallis,
„ James Bennetts,
„ William Hodge Saundry,
„ Nathan White,
„ William Williams,
„ James Bolitho,
„ William Trehair.

After having been sworn, the jury and the coroner proceeded to view the bodies of the deceased at their several residences; and having performed this duty, at twenty minutes to 2 o'clock the sitting was resumed in the large room of the account-house on the mine.

Mr. Rowland Davies and Mr. Walter Borlase, solicitors of Penzance, attended professionally on behalf of the adventurers.

The jurors answered to their names, and in reply to a question from the coroner, said they had all seen all the bodies of the deceased.

Mr. *Rowland Davies*, addressing the coroner, said: I ask permission, Mr. Coroner, to attend on behalf of the mine, but more for the purpose of giving information than with any other object in view.

The *Coroner* replied: There can be no objection. I always consider mine an open court; and although I do not allow interruptions from professional men, I shall be glad to receive all information possible.

The *Coroner* then, addressing the jury, said: This sad case of accident you are all aware of. The object of the present inquiry is to ascertain, in the first place, how the parties came to their death; and in the next place, if any blame attaches to any persons whatever. If you should think there is blame in any quarter, it will be your duty to sift the case to the bottom, to ascertain where the blame lies, or whether there may have been such neligence on the part of some persons connected with the mine as possibly to have been the cause of death. If so, you will say as much, and the parties will have to answer elsewhere for their offence. I hope, however, that that will not turn out to be the case; I believe there is no reason to expect it. Any reports you may have heard you are bound to dismiss from your minds, except so far as they may be used as means for ascertaining the true facts of the case. If such rumours lead you to inquire more closely into the facts, so much the better. But you must not allow them to operate on your minds either for or against any parties supposed to be implicated. We will now proceed to hear evidence.

Thomas Nankervis, sworn.

(*Coroner.*) Your name is Thomas Nankervis?
(*Witness.*) Yes, sir.
You are a miner?—Yes, sir.
What parish do you live in?—Saint Just.
You work in Botallack Mine?—Yes, sir.
And that is in Saint Just, I believe?—Yes, sir.
Were you at your labour there on Saturday last?—Yes, sir.
At what part of the mine? Any particular level?—At the 160 level.
Did you see any of these parties, Thomas Wall, Richard Wall, John Chapple, the elder, John Chapple, the younger, Michael Nicholas, Peter Eddy, John Eddy, Thomas Nankervis, and Richard William Nankervis?—Yes, sir.
They were all at the mine?—Yes, sir.
At the 160 fathom level?—Yes, sir.
Did they leave to go up before you?—Yes, sir.
Leaving you there?—Yes, sir.
All of them?—Yes, all of them.
For the purpose of going up to the surface?—Yes, sir.
Having left their work for the day, I suppose?—Yes, sir.
At what particular part did they leave you?—They got into the tram at the 160.
You saw them get into the tram?—Yes, sir.
Was your brother one of the deceased parties?—Yes, sir.
You put your brother on the waggon?—Yes, sir.
What is your brother's name?—Richard Williams Nankervis.
You saw the tram start?—Yes.
Did you see anything more of them?—No, sir; nothing more till I saw them all dead.
Where did you see them all dead?—At the 190.
Did you see them pass you, or any thing of that sort?—I saw a fire, as if a chain was passing by.

But you did not see any object?—No, sir.

But saw fire, as of a chain?—Yes.

You saw fire as if proceeding from the velocity of a chain?—Aye, I suppose so.

You heard a rush; what was it like?—Just a rush, that's all; as if a waggon was going by with great swiftness.

Did you go down to them, and then saw them at the 190?—Yes.

What led you to go down to them?—I felt it my duty to do so; I thought they was all killed.

When you heard the rush and saw the fire, you thought it was a tram-waggon passed you?—Yes, sir.

And you went down from the 160 to the 190?—Yes, sir.

What did you see? did you see any one in particular?—I found my brother.

Where did you find him?—About three or four fathoms above the 190.

The rest, where were they?—One at the 190; John Eddy.

Where did you find any of the rest?—John Chapple was by the side of the waggon, two or three fathoms farther down. John Chapple and his son were both by the waggon, one on each side.

Let me see; you came upon your brother first, and then found John Eddy, and then Chapple and his son; that's four?—And Peter Eddy was in the waggon, with his head hanging over; and the four others, Michael Nicholas, Thomas Wall, Richard Wall, and Thomas Nankervis were just below, within three feet of the others.

They were about three feet below?—Three feet below the waggon.

Were they all dead?—Yes, sir.

Was the waggon smashed at all?—No, except one seat thrown out.

And is that all you know about it?—Yes, sir.

(*Coroner, after receiving a suggestion from Mr. Rowland Davies.*) Did you have any conversation with the breaksman before they started?

(*Witness.*) No; not I had'nt.

Did you hear any conversation between the breaksman and any other person?—Yes, sir. My brother Henry spoke to the breaksman, and said to Richard Wall, "Richard, take care, your shoulder is too near the break."

He said that Richard was too near the break?—Yes, sir.

(*Mr. Hadow, the foreman of the jury.*) Was Richard Wall the breaksman on that occasion?

(*Witness.*) No; Thomas Wall.

(*Coroner.*) The breaksman at that time was Thomas Wall?

(*Witness.*) Yes, sir.

And what did Thomas Wall say?—Thomas said, "It's all right."

The breaksman said to your brother, "It's all right"?—Yes.

Did they alter their position in any way in consequence of what was said?—No, sir.

He said it was all right, and they sat as they were sitting?—Yes, sir.

(*Mr. Hadow.*) Do I understand that the 160 was the place from whence the carriages always started?

(*Witness.*) Yes, sir.

That was the regular place of starting?—Yes, sir.

Is there a regular landing place there?—Yes.

(*Coroner.*) Have you been in the habit of using the break.

(*Witness.*) Yes, many times.

Does it operate quickly?—Yes, very quick.

Have you frequently had the management of the break?—Yes, sir.

Coming up and down?—Yes.

(*Mr. Hadow.*) Have you ever had to use it?

(*Witness.*) Yes, sir.

(*Mr. Akermann.*) This Wall was a very steady, experienced man, was he not?

(*Witness.*) Yes.

(*Another Juror.*) What age was your brother?

(*Witness.*) About 17.

I mean Henry; not the one the one that was killed?—About 17.

(*A Juror.*) Can you tell us if Wall was in the habit of putting his hand on the break before he got in?

(*Witness.*) When he got in; not before.

(*Mr. Akermann.*) Not before; they couln't do it?

(*Witness.*) No.

(*Coroner.*) The break is very easily managed, is it not?

(*Witness.*) Yes, sir.

You have worked it often yourself?—Yes.

(*Mr. Akermann.*) You would not be afraid to go in again after this accident?

(*Witness.*) No.

(*Coroner.*) When you have been working it, have you ever found it miss?

(*Answer inaudible.*)

(*Mr. Hadow.*) Is it usual, when you are coming up, to lock up the break?

(*Witness.*) No; we always keep it out of the loop.

Perfectly free to act?—Yes, sir.

Was it free to act on this occasion?—If it was out of the loop.

It would be free to act by itself?—If it had been there, it could not move.

You call it a loop, do you, or a rack?—A loop.

(*Coroner.*) It is kept so that the breaksman may have the more ready opportunity of using it?

(*Witness.*) Yes, sir.

(*Mr. Hadow.*) Is it a clear line of way between the 160 and the 190?

(*Witness.*) Yes, clear all the way.

No impediment of any kind?—No, sir.

Could you as easily ride between down from the 160 to the 190 as you could from the top to the 160?—Yes, just the same.

(*Coroner.*) You say the way was quite clear from the 160 to the 190?

(*Witness.*) Yes.

(*Mr. Hadow.*) So that a person going on need not take the trouble to stoop at all?

(*Witness.*) No.

(*Coroner.*) So that a person might ride without risk?

(*Witness.*) Yes.

(*Mr. Hadow.*) Are there any places where you have to stoop?

(*Witness.*) You need not trouble to do so, if you sit down.

Can you at all account how some of those persons have been so cut about the head?—They must have struck their heads against some timber below the 190—just below—new.

(*Coroner, for Mr. Rowland Davies.*) Have you occasionally jumped into the waggon when it has been going at speed?

(*Witness.*) My brother did once, in my presence. My brother had some stuff to take up from the 130. The skip was going on to the 160; she was going very fast; she said "She shan't go," and he jumped into her as she was going down the shaft, and brought her up.

(*Mr. Hadow.*) You could not do that going up?

(*Witness.*) No; she would right herself going up?.

(*Coroner.*) This only shows the reckless manner in which miners act very often.

(*Mr. Rowland Davies.*) It shows too that the break will act readily.

(*Coroner.*) Yes; he says it will act with great ease.

Captain JOHN ROWE sworn.

(*Coroner.*) You are a mine agent?

(*Witness.*) Yes, sir.

Employed at Botallack Mine?—Yes.

You are special engineer connected with the mine?—Yes, sir.

Of course you know the machinery on which these men were riding?—Yes. I am the inventor of the machine.

Just describe the machine; what it is; what it is used for; what is its object?—The object was to stop the carriage in case of the chain breaking. It is a machine for drawing up the men.

Can you describe the shaft in such a way as I can take it down?—The shaft is 463 fathoms long from the entry.

(*Mr. James, the purser, to the jury.*) Would you like to see a plan of the shaft?

Mr. Hadow, the foreman, assented.

[A large plan of the shaft was then produced by Mr. James, and placed before the Coroner and Jury; and also a smaller was produced, and to some extent explained by Mr. S. H. James, junior.]

(*Witness.*) It is 363 fathoms long from the entrance of the shaft to the 190 level.

(*Mr. Hadow.*) The shaft is not perfectly straight, is it?

(*Witness.*) No; there is a considerable angle at one part.

(*Coroner.*) What is the incline?

(*Witness.*) 32½ degrees from horizontal.

(*Mr. Hadow.*) Are there any very sharp angles?

(*Witness.*) No. We have made them easy; the sharpest is 22½ degress.

Where do you suppose the chain broke?—They went back about 100 fathoms.

(*Witness to a Juror.*) There are about 20 angle rolls in the shaft.

(*Mr. Hadow.*) What are the dimensions of the shaft?

(*Witness.*) The shaft is 5 feet wide by 6 high, on the average. The breadth of the tramway is 2 feet 7½ inches. The waggons are drawn by a chain.

2 feet 7½ inches would give a foot each side clear—? Yes.

So that a man putting out his arm could hardly at some places reach the side of the shaft?—No.

(*Coroner.*) Is the chain from the surface?

(*Witness.*) Yes.

And is there a whinn?—Yes.

(*Mr. Rowland Davies.*) And the chain passes over rollers?

(*Witness.*) Over rollers all the way to the bottom of the shaft; and wherever there is an angle there are side rollers, so that the chain never touches the ground; it runs on rollers all the way.

(*Coroner.*) It runs on rollers all the way?

(*Witness.*) From the engine to the bottom of the mine.

What do you say about the angles?—There are side rollers at the angles, so that the chain never touches anywhere, side or bottom.

Do you know anything about the chain itself?—I have seen the chain; there is a portion of it here. I know the chain itself. We have been working the chain about 13 months; it was then made for the purpose quite new.

(*Mr. Akermann.*) It was not warranted or tested in any way?

(*Witness.*) It was warranted, but not tested.

(*Another juror.*) You would not have a tested chain

(*Witness.*) No.

(*Mr. Hadow.*) What is the weight per fathom?

(*Witness.*) There are three sizes.

(*Coroner.*) Was it new when you took it into use?

(*Witness.*) Quite new from the manufacturer.

(*Mr. Rowland Davies.*) Made expressly for the purpose?

(*Witness.*) Yes.

(*Mr. Hadow.*) You say there are three sizes of chain in this shaft?

(*Witness.*) Yes. The first size connected with the drum is five-eighths of an inch chain; that is from close to the engine down 100 fathoms in length. The second 100 fathoms attached to the former is nine-sixteenths of an inch. The third part, 200 fathoms, is half inch, extending down the whole extent of the tram.

(*Mr. Rowland Davies.*) 400 fathoms in all?

(*Witness.*) Yes.

(*Coroner.*) Why that difference in size?

(*Witness.*) The first piece of chain has to pull up the whole length; this five-eighths chains has to pull up all the chain below besides the weight of the carriage.

(*Mr. Rowland Davies.*) Of what kind of iron is the chain?

(*Witness.*) The chain is made of the best charcoal iron of best quality. It is warranted.

(*Mr. Hadow.*) Have you examined it since it was broken?

(*Witness, producing a link of the nine-sixteenths chain.*) I have examined it myself. The defect is here, where other links of the chain came riding over it and compressed the iron. My opinion is, that from surging of the chain two or three links pressed on this one; it is quite evident that it has had a very sudden sweep. I think the quality of the iron is good.

(*Mr. Akermann.*) In government works they test the iron, I believe?

(*Witness.*) Yes; but I should not like to have it for our place.

(*Coroner.*) Do you see any defect in the iron itself?

(*Witness.*) I do not. My opinion is that the links rode over four or five on one another, and then the carriage went down.

Your opinion is that two or three links went up and got entangled?—No; they went up, three or four, rounded on one another, and then there was a slip.

(*Mr. Hadow.*) It is more likely to do that when it comes up empty than when full?

(*Witness.*) Yes.

(*Coroner.*) Will you just describe to the jury the nature of the drag; that which is supposed to have given way?

(*Witness.*) Several gentlemen have been down to look at it to-day. But we have not the carriage up to-day that carried the men. We could explain it better then.

Just describe it?—We have a chain attached to a long loop,—a sliding loop at the bottom of the carriage connected with a pin, so that the spring cannot be drawn up further than to a certain extent. The spring is about two inches; it is a cast-steel coil, a spiral spring. That is attached to the bottom of the waggon, and is connected with grips at the side of the carriage, which nip each rail. My decided opinion is, that the weight of chain attached to the carriage did not prevent the grips from closing on the rails, but that the men in the waggon, after the chain broke, had not the presence of mind to use the break, or had not kept the break handle out of the loop so as to be ready for immediate use.

(*Mr. Hadow.*) This spring must be very strong?

(*Witness.*) There is about two inches spring at one end, and a two-feet lever at the other, making 12 to 1. It takes the strength of any man to pull it back, and if you let it go, it will go as quick as the trigger of a gun.

(*Mr. Akermann.*) Could the weight of the broken chain have had any effect in preventing the action of the break?

(*Witness.*) No.

[A diagram of the machinery being produced the witness attempted to explain its details by reference to various parts of the diagram. He said, "We have here at the side a catch in order to keep the grips open, and if that catch had been kept back the grips would have clipped the rails immediately the chain broke, I never knew it miss once. There are two pairs of grips for each rail; they are two inches in diameter.

(*Mr. Hadow.*) Can you tell me what pressure or weight is necessary to bring the handle to?

(*Witness.*) 'Tis as much as I can do for my life.

Would you not say that the weight of chain left on the carriage was sufficient to keep it up?—No; I don't think the chain had any effect on it for an instant. But I think the first snap is sufficient to surge it.

(*Coroner.*) When the chain parted what happened, do you suppose, to prevent the machinery operating?

(*Witness.*) I cannot tell; but I think they had the lever into the catch, and when they tried to reach it they could not, and got paralyzed.

(*Mr. Hadow.*) Nankervis declares it was loose when they started.

(*Witness.*) We generally put it so, because we may sometimes meet with a surge of chain on the cage.

It would almost fall of itself into the loop?—Yes; it has with me several times; and then all they have to do is to close their thumb on this place.

Suppose the chain broke up at the 130 fathom from surface, would not the sudden jerk press the carriage onward so quick as to keep the remaining chain at full tension?—We have tried it several times and punished the carriage in every way to see what might be done to condemn the machinery; we have tried it with slack chain, we have tried it with reversed engine, and in every way, and the machinery has always acted; we never found it fail.

Your opinion is that the break-handle must have been in the loop, and that the men had not the presence of mind to disengage it?—Yes. They could have done it if they had had their recollection about them.

It is quite certain, I suppose, that the clippers were not used?—Captain Boyns and myself yesterday examined the rails, and we saw that the grips had not been used. If they had been used we must have seen it.

Did you notice that this (pointing to a part of the diagram) was quite free?—Yes.

If it had been in the loop it would have remained in the loop?—No. The shock of the collision was sure to knock everything out.

(*Coroner.*) You don't think the chain prevented their using the break?

(*Witness.*) No. We put double provision, that if one should not operate the handle should.

(*Mr. Hadow.*) What was the weight of the chain?

(*Witness.*) About 31 or 32 cwt.; about 1½ ton.

(*Coroner.*) Don't you think that operated on the break at all?

(*Witness.*) No, not at all.

(*Mr. Hadow.*) Then, if that be true, you can clip the rails ascending?

(*Witness.*) No, we can't stop it going up. We cannot stop it both ways. We don't want to stop her going up.

This weight of 1½ ton would effect tension to some extent in going up?

[Witness made some explanations by means of the diagram.]

[Witness also, by reference to the diagram, explained means for counteracting the possibility of recurrence of such an accident.]

(*Mr. Akermann.*) How long, should you think, after the chain snapped, these men were going to the bottom?

(*Witness.*) About half or three quarters of a minute.

Do you suppose that if they had been self-possessed they could have stopped it?—Yes.

(*Mr. Hadow.*) Would you be content to be let loose and run down half-way?

(*Witness.*) I don't know as to half-way, because one of the angles is very great, 80 degrees. But I should have no hesitation in getting into a carriage and your cutting the chain and sending it down at any rate you like. We had ten men in the carriage the other day running from the 80 to the 90, and they ran away and did not know they had run away. When they thought she had run off they stopped her. We have never known an instance of the drag failing.

(*Mr. Hadow.*) It is very important to have the men's confidence.

(*Witness.*) My opinion is that if you had the men up, and examined them, they would give their opinion in favour of it.

(*Coroner.*) What was the weight of the men and carriage?

(*Witness.*) About 22 cwt., carriages and men altogether.

What would be the velocity of their descent at an incline of 32½?—I cannot tell; I have not calculated.

(*Mr. Brereton, superintending engineer of the West Cornwall Railway.*) About 100 miles an hour.

(*Mr. Hadow.*) The chain would not go 20 miles an hour?

(*Witness.*) It would not go at all; it would stop when the carriage stopped.

(*Coroner.*) Then your opinion is that these poor men lost their lives from want of presence of mind to use the break?

(*Witness.*) Yes, that is my opinion; I mean the handle of the break.

(*Mr. Rowland Davies.*) You think they allowed the candle to be caught in coming up or at starting?

(*Witness.*) Yes, either at starting or in coming up.

(*Coroner.*) Then you think the accident resulted from their not using it?

(*Witness.*) Yes.

(*Mr. Hadow.*) Were they killed by being thrown out of the carriage?

(*Witness.*) Two were, I believe; perhaps they made an effort to get out. It appears that two were out before they came to the bottom of the shaft. The rest were killed at the bottom by passing under the piece of wood.

(*Coroner to Jury.*) I suppose you have had sufficient explanation of the machinery?

(*Mr. Hadow.*) Yes; we don't want any more.

(*Witness.*) My opinion is that there was neglect to keep the handle of the break out of the catch. The break would have been self-acting if kept out of the catch. It was in consequence of their neglecting to keep it out of the catch that the accident happened. If they had managed it properly it would have been effective.

JAMES EDDY sworn.

(*Coroner.*) What is your name?

(*Witness.*) James Eddy.

You are a miner, I suppose?—Yes, sir.

Living at St. Just?—Yes, sir.

Working at Botallack Mine?—Yes, sir.

Were you there on Saturday last?—Yes. I was not underground; I was at the engine house. It was at the higher part of the mine, where the accident happened.

(*Mr. Rowland Davies.*) Did you put in the work in this shaft under the direction of Captain Rowe?

(*Witness.*) Yes.

And you have since had it in your special charge?—Yes.

(*Coroner.*) You are a timber man at the mine, are you?

(*Witness.*) I pass for a timber man.

(*Coroner to Mr. Rowland Davies.*) What do you call this shaft?

(*Mr. Rowland Davies.*) The Boscawen diagonal shaft.

(*Coroner.*) It is an inclined shaft, is it not?

(*Mr. Rowland Davies.*) Yes, sir. We call it the Boscawen diagonal shaft.

(*Coroner to witness.*) Have you had charge of it any considerable time?

(*Witness*) Ever since it was put to work. I know it well.

Do you know the nature of the machinery working in it?—I know about that machinery, and know how to work it, and when it is working well.

(*Mr. Rowland Davies to Coroner.*) He tried the carriage and break with Captain Rowe before it was worked.

(*Coroner to witness.*) You know how the break apparatus acts.

(*Witness.*) Yes; I have looked into it sufficiently to know it well; it is a thing I have studied a great deal.

Is the break self-acting when fixed in its proper place?—Yes, sir. The handle of the break is attached to the side of the carriage, and the lever is put into a loop; but when they were going up the handle should have been loose so as to fly backwards and forwards. If the handle had been loose the grips would have self-acted, and would have prevented the carriages going down. I never knew it fail. I believe if the handle of the break had been loose, my son would have been alive at this present moment. I was coming up last Thursday evening, and I was paying attention to it; I did not put my hand upon it; I took it from the loop, and as soon as there was the least bit of surge of the chain, and a little slack fall on the gig, the catch would immediately act on the tramway instantly and quietly.

(*Mr. Rowland Davies.*) You have used it constantly?

(*Witness.*) Yes, and tried it in every possible way. I have gone into it and I tried it by myself, and I never found it fail with me, nor no one else that I know of. The man who sits in charge of the handle ought to have his hand upon it.

(*Mr. Rowland Davies to Coroner.*) You have it down that this witness had his son killed?

(*Coroner.*) Yes.

(*Witness.*) I never felt more dread when I was there, and had my hand on the lever, than if I was home in my bed. I always would rather have hold of the handle myself, for I thought I could do better for myself than others could do for me. Wall, when his turn was to go in the gig, had so much interest in the machine that he would take the lever in his hand. He was well experienced in it, and knew what he was doing.

(*Mr. Hadow.*) You don't believe that the weight of chain below was any impediment to the man's acting?

(*Witness.*) Not if the man's hand had been on the handle.

(*To the Coroner.*) I am satisfied that if I had been in the gig, or if the handle had been left to go where it would out of the loop, my son would be alive still.

You attribute the death of these men to want of presence of mind to take this lever out?—I attribute it to the lever being in the loop.

And that was neglect on their part?—I believe I have lost the life of my son from that lever being in the loop instead of out, free

(*Mr. Rowland Davies to the Coroner and Mr. Hadow.*) The great point is that if it had been left free, it would have self-acted.

(*Mr. Hadow.*) Is it generally the custom of the men coming up to put the handle into the loop?

(*Witness.*) No. The first man who gets in. I say to him, "Take the handle out." When I am there, I keep my thumb on the spring, and can feel the least movement.

Then these men must have lost their presence of mind?—I think, as the chain broke, they lost their recollection, and did not know what they were about.

(*The Coroner.*) Have you any other evidence? It strikes me the case is very clear?

(*Mr. James.*) We have many other witnesses.

(*Mr. Rowland Davies to the Coroner.*) We are quite in your hands, sir. We have Mr. Twite, Mr. Brereton, Mr. Shirreff. If you think it necessary to call further evidence, we are prepared to do so.

(*The Coroner.*) The fact is that the evidence of those gentlemen would be more appropriate to the future conduct of the machinery; and any opinion they might give as to its improved working in any way would no doubt be useful. But the question for us to-day is, how did these poor fellows come to their death? If you are satisfied that it was accidental death, and that no fault is to be attributed to any party, you will say so, and there will be an end of the matter. I don't profess to understand the machinery; but you have heard it explained, and understand it much better than I do. If you are satisfied there was no neglect, no negligence or blame to be imputed to any body, there would be an end of the inquiry.

(*Mr. Hadow.*) I am satisfied.

(*The Coroner.*) It seems that those who understand the machinery are satisfied that there must have been something wrong in the management of the handle; and that if the handle had been left loose, the machinery would have acted of itself. Either the handle, if free, was not attended to by these poor fellows, or it was in the loop, and they had not the presence of mind to set it clear when the accident happened. But in any case it was an accident. If there is any blame to be imputed to any one, it is to the poor fellows who lost their lives. Are you all satisfied it was an accident? Or do you wish to have any further evidence?

(*A Juror.*) I have heard two men say they always considered it quite safe.

(*The Coroner.*) We cannot account for the death in any way. It is mere speculation to go into the question how the thing happened. The engineers tell you that if the handle had been loose, the clippers would have caught the tram, and prevented the waggon going down. According to their account, it could not have happened otherwise. If the handle had been loose the grips would have laid hold of the tram, and the carriage would have been stopped.

(*Mr. Hadow.*) Would the jury wish to retire?

Some jurors intimated a wish for private consultation; and consequently all persons but the jurors and coroner withdrew. After a few minutes consultation, the public were readmitted, and the foreman said:

We have found a verdict of "Accidental Death"; and we recommend that a subscription be opened in behalf of the widows and orphans, and that the adventurers be requested to head the subscription list. I shall then be happy to see what we can do in the parish. (*To Mr. James:*) Perhaps you will take the trouble to let some of the adventurers know.

(*Mr. James.*) Some of the adventurers have come here for the purpose to-day. There is one thing you have not inquired into, which perhaps may be mentioned now, the quality of the iron in the chain.

(*Mr. Hadow.*) We have rather taken that for granted from what Captain Rowe stated.

(*The Coroner.*) I don't think we need inquire further into that. The chain is sworn to have been in good condition.

(*Mr. James.*) I should like to have stated that the chain was not working to one-fifth part of its estimated working power; and I believe all the engineers here will agree in that.

(*Mr. Rowland Davies.*) It is right I should state that directly the adventurers heard of this accident, they resolved to avail themselves of what engineering talent was within their reach. We got Mr. Brereton, a very distinguished engineer, Mr. Twite, Mr. Shirreff, and Mr. John Mathews, the town surveyor, to come over and look into things, and see if the accident resulted from defective machinery, or from any cause to which the adventurers could be said to have contributed in any way. We took that step in order that the subject might be thoroughly ventilated and that justice might be done. It has so happened that it has not been necessary to call those gentlemen. But it is right that it should be known what steps the adventurers took in the matter to clear up any difficulties, and to devise better means for the future.

(*Mr. Hadow.*) Perhaps Captain John Rowe may be able to guard against any mistake in future as to the handle, so as to secure the handle being kept out, free.

(*Mr. Akermann.*) We may presume, I suppose, that those gentlemen are satisfied with the safety of the apparatus?

(*Mr. Rowland Davies.*) Yes. Mr. Twite has come down to test it; and as regards the brake and everything else, the gentlemen would have spoken to being thoroughly satisfied.

(*Mr. Hadow.*) I examined the carriage carefully, and I believe I understand its principle. It is very important that confidence should be felt in the machinery.

(*Mr. Rowland Davies.*) There seems to be thorough satisfaction in the minds of all persons who have examined or used it. Fathers and brothers of some of the deceased are as much satisfied as any other persons with the invention.

[At the close of the inquest a subscription was opened by the adventurers for relief of widows and other surviving relatives of the unfortunate deceased.]

XIV.

Account of some Experiments instituted by the Commission, under the Superintendence of Dr. Angus Smith, with the view of testing the Applicability of Gun Cotton to Mining Operations.

From the reports herewith sent of the experiments in blasting with gun cotton, it appears that for blasting hard ground the holes should be charged with three fourths of the depth of gunpowder of the strength used in the Cornish mines. The cotton rope used was one eighth of an inch less diameter than the hole, which by tamping would probably be pressed down to fill the hole, by which six inches inserted would be pressed down to five inches; this would also be the case in the use of powder, so that the relative proportion remains the same, namely, as three to four.

We cannot report on the comparative safety of the cotton rope and gunpowder, nor on the effect on the miners' health; Dr. Angus Smith will attend to this. We must, however, observe that the cotton rope is very convenient for use in all the positions a hole can be bored in, in some cases dispensing with the use of cartridges required when gunpowder is used.

We have not been informed of the cost of the cotton rope, and cannot therefore report on the comparative economy of that article and gunpowder.

Reginald T. Grylls, Condurrow Mine.
John Daw, Carnbrea Mines.
Chas. Thomas, Dolcoath Mine.
John Tonkin, Do.
Josiah Thomas, Do.
Richard Pearce, Miners' Association of Cornwall and Devon.

Charlestown United Mines,
June 10th, 1864.

My Lord,

I beg most respectfully to tender you my opinion on gun cotton for blasting in mines, after carefully considering its merits, &c., on witnessing the experiments tried at Dolcoath mine on the 20th day of May 1864, as sent you in tabular notes arranged and made by those whose names are appended thereto.

I beg first to state that, as far as all the experiments already made, all danger from premature explosion of the gun cotton by compression in tamping is entirely removed. This, at one period in the history of gun cotton, rendered it highly dangerous for blasting purposes in Cornish mines, and on that account was, perhaps prematurely, condemned and set aside.

The proportionate power of gun cotton to the ordinary blasting powder does not, from the experiments made, show but a small per-centage, from 15 to 20, in favour of gun cotton, as no hole blasted with gun cotton (although charged with quite three-quarters of the bulk of ordinary powder) did not show any greater result, or remove more rock, than powder would have done.

The gases produced after each explosion appeared to be more transparent, and not in such quantity as the ordinary powder would have generated.

My opinion, if my bases are correct with regard to gun cotton when damp, is rendered useless, and believing it has a great tendency to absorb the least moisture, and then taking the reported low temperature at which it ignites, and the danger of miners drying the damp cotton, that even if used in mines it should be put in air-tight cases or cartridges, or otherwise serious accidents would result in its general adoption and use in mines.

In respect to its being more portable and compact than the ordinary powder, and therefore not easily wasted, I do not attach much importance to this, as the quantity of powder wasted in mines is exceedingly small, and it has not yet come under my notice that any accident has occurred to the miner through the agency of blasting powder, only in the premature explosion of the holes in tamping.

In respect to the gases or smoke generated in using the ordinary blasting powder in well ventilated mines, but little inconvenience is experienced, and if it could be impressed upon the minds of the miners to use smaller charges of the ordinary powder than is now used we should have less smoke, as in all accidents from blasting that I have myself witnessed the men have had quantity of powder blown into their faces, arms, &c., showing clearly that only a portion of the powder had exploded, and satisfying me that less powder would rend the rock.

I may be allowed here to add that in my opinion the miners would use the same excess of gun cotton in order to place beyond a doubt in their minds the result of the blast.

In concluding my report I think that further trial should be made of gun cotton for blasting purposes, and that it should be placed in the hands of some of the miners to use, and let their several opinions be taken on the subject; and it would also enable the agents and managers of mines to arrive at more definite opinions as to the desirability and propriety of adopting gun cotton as an agent for our blasting purposes in Cornish mines.

I beg to remain
Your Lordship's obedient and humble servant,
Richard H. Williams.

To the Right Hon.
Lord Kinnaird,
Chairman of the Royal Mines Commission.

(*Continued on p.* 466.)

Tabular View of the Experiments in Blasting with Gun Cotton in Wolcoath Mine.

No.	Description.	Depth of Hole.	Estimated Charge of Powder.	Cotton Rope used.	Proportion of Cotton to that of Powder.	Effect produced.	Observations by the Undersigned.	Weight of Powder.	Weigh of Cotton.	Observations by Thos. Prentice & Co.
		Inches.	Inches.	Inches.				lbs.	lbs.	
	May 20.									
1	278 end	17	8	6	¾	Quite satisfactory	In the eastern end of the 278 fathom level. Depth of hole, 17 inches; diameter, 1⅜ in. Estimated charge of gunpowder required, 8 in. Gun cotton rope used, 6 in. by 1¼ in. Result quite satisfactory; the whole burden removed.	0·365	0·083	Overcharged as evidenced by report from explosion.
2	Do. Recharged	21	8 –	3 6	⅜ ¾	No effect Burden removed.	Also in the 278 eastern end. Depth of hole, 21 in.; diameter, 1⅜ in. Estimated charge of powder, 8 in. Gun cotton rope used, 3 in. by 1 in. No part of the rock was moved; a part of the tamping was blown out. The tamping which remained was bored out, and the hole recharged with cotton rope 6 in. by 1¼ in., when the whole burden was removed.	0·365	0·055	Proportion reduced to nearly ½, rope 1¼ diam. in this case.
3	266 end Recharged	14	6 5	3	½	No effect to purpose Burden removed with powder.	In the eastern end of the 266 fathom level. Depth of hole, 14 in.; diameter, 1½ in. Estimated charge of powder, 6 in. Cotton rope used, 3 in. by 1⅜ in., which was unsuccessful, a small fragment of the rock only having been shaken off at the collar of the hole, the burden being left as strong as before. The hole was recharged with 5 inches of powder, which resulted in removing all the burden.	0·29	0·041	= ½ not sufficient; rope 1⅜ diam.
4	Stope	24	10	6	¾	Satisfactory	In a stope in the bottom of 210 fathom level. Depth of hole, 2 ft.; diam. 1¼ in. Estimated charge of powder required, 10 in. Cotton rope used, 6 in. by 1¼ in. Result quite satisfactory; all the burden removed.	0·482	0·083	= ⅛.

Reginald T. Grylls, Condurrow Mine.
John Daw, Carnbrea Mines.
R. H. Williams, Charlestown United Mines.
Chas. Thomas, Dolcoath Mine.
John Tonkin, Do.
Josiah Thomas, Do.
Richd. Pearce, Miners' Association of Cornwall and Devonshire.

	May 23.									
1	Stope	25	12	6	½	No effect	Stopes at 220 fathoms level. Depth of hole, 25 in.; diameter, 1⅜ in. Estimated charge of powder, 12 in. Cotton rope used, 6 in. by 1¼ in. No part of the rock broken, part of the tamping having been forced out. This hole was recharged with cotton rope. 13 in. by 1¼ in., when the burden was removed tolerably well.	0·578	0·083	= ¼. Recharged with much more, as ground was shaken, and miner said hole was stronger than he expected.
	Recharged			13	full length	Burden removed.				
2	Stope	24	10	5	½	Ground slightly shaken	220 stopes. Depth of hole, 2 ft.; diameter, 1⅜ in. Estimated charge of powder, 10 in. Cotton rope used, 5 in. by 1¼ in. The ground was slightly shaken, giving some cracks.	0·482	0·07	Just over ¼. Undercharged.
3	Stope	24	12	9	¾	No effect	220 stopes. Depth of hole, 2 ft.; diameter, 1¼ in. Estimated charge of powder, 12 in. Cotton rope used, 9 in. by 1⅛ in., which produced no effect. This hole was recharged with 10 in. powder, which shook the whole of the burden, so as to be removed with miners' picks.	0·578	0·124	Fired same time as above; could not possibly work, as the other failed.
	Recharged		10			Blast effective with powder.				
4	220 End	20	8	6	¾	Burden removed	In the end of the 220 fathom level, west. Depth of hole, 2 in.; diameter, 1⅜ in. Estimated charge of powder, 8 in. Cotton rope used, 6 in. by 1¼ in. The whole burden removed.	0·365	0·083	——
5	212 End	20	10	6	¾	No effect	In the end of the 212 fathom level, west. Depth of hole, 20 in.; diameter, 1⅜ in. Estimated charge of powder, 10 in. Cotton rope used, 6 in. by 1¼ in., with no effect whatever. Same hole recharged with 10 in. of powder, which removed all the burden.	0·482	0·083	The rock was split, and the miner said a little more would have fully thrown out, and so made more effective than powder.
	Recharged		10			Burden removed with powder.				
6	Stope	32	15	12	¾	Burden removed	Stopes in the 200 fathom level. Depth of hole, 2 ft. 8 in.; diameter, 1⅜ in. Estimated charge of powder, 15 in. Cotton rope used, 12 in. by 1¼ in. All of the burden removed.	0·723	0·167	——
7	Stope	30	16	12	¾	Burden removed	Stopes in the 200 fathom level. Depth of hole, 2 ft. 6 in.; diameter, 1¼ in. Estimated charge of powder, 16 in. Cotton rope used, 12 in. by 1⅜ in. All the burden removed.	0·77	0·167	——
8	Stope	30	14	12	⅞	Burden removed	- - - - - - -	0·675	0·167	——
9	200 End	14	7	6	½	Effect moderate	In the end of the 200 fathom level, west. Depth of hole, 14 in. Estimated charge of powder, 7 in. Cotton rope used, 6 in. Effect moderate.	0·337	0·083	Because of the pugs or hollows in the rock.
10	200 End	15	7	6	½	Burden removed	Also in the end of the 200. Depth of hole, 15 in. Estimated charge of powder, 7 in. Cotton rope used, 6 in. All the burden removed.	0·337	0·083	——

JOHN BAWDEN, Mine Agent, Dolcoath Mine.
RICHARD PEARCE, Miners' Association.

THOMAS PRENTICE.

Royal Institution,
Truro, June 2, 1864.

My Lord,

It seems that as a blasting material the cotton does very well, and if it could be rendered at a cheap rate it would probably be more economical and better adapted for general blasting purposes than ordinary blasting powder.

The smoke which it produces is infinitely less than that from ordinary powder, and appears to be comparatively harmless.

I was engaged for two days in conducting some experiments immediately after the several blasts for Dr. Angus Smith, and suffered no inconvenience whatever from breathing the smoke.

There is one important point to be considered, viz., that it is extremely dangerous in the hands of men who are ignorant of its properties. Miners who are accustomed to handle powder carefully (more or less) seem to treat the gun cotton with indifference. They imagine that because it looks like a piece of rope that it would be equally harmless.

One of the miners at Dolcoath had his hand burnt rather badly by the ignition of the gun cotton in a way he little expected. The charge of cotton which he had given him was too large, and instead of using a knife to cut it, he chopped a piece off with an axe; the cotton ignited in his hand. His comrade, with a little more caution, tried the same experiment by chopping it on a piece of *wood*, and it ignited in the same way.

I am, my Lord,
Your Lordship's most obedient servant,
RICHARD PEARCE.

Rt. Hon. Lord Kinnaird.

Stowmarket, June 14th, 1864.

My Lord,

We have just received from Captain Ch. Thomas a tabular statement of the shots fired at Dolcoath; and for showing more clearly the comparative weight of powder and cotton, we have added a further column. As we wrote to Captain Thomas our figures show these results, taking the holes as bored for powder: where we use one fifth part by weight (of cotton) the result is always good; when one sixth, sometimes good, but not certain. But to test its comparative effect, holes should be bored expressly and at varying distances in order to see at what resistance it will work. The saving in cost by using gun cotton is not to be found in firing single holes, but in continued working it will be found that less holes, *i.e.* a less number of holes, will do the same work. The cost of powder and cotton being equal in removing a given number of fathoms, from its greater range cotton will cost less labor in boring.

Dr. Angus Smith will doubtless in his report mention that in firing with the cotton the smell of the fuze became very perceptible. (We used the ordinary Cornish fuse.) This smell is completely covered by powder smoke, but became quite disagreeable in the absence of dense smoke from cotton.

Captain Thomas has offered to put some cotton on trial in one level for a month, in order to test its cost. This we propose to arrange with him.

We are, my Lord,
Your obedient servants,
THOS. PRENTICE & Co.

To the Rt. Hon.
Lord Kinnaird.