Hints on the pathology, diagnosis, prevention, and treatment of thoracic consumption / by J.C. Hall.

HINTS

ON THE PATHOLOGY, DIAGNOSIS, PREVENTION, AND TREATMENT OF

THORACIC CONSUMPTION.

BY

J. C. HALL, M.D.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH;
PHYSICIAN TO THE SHEFFIELD PUBLIC DISPENSARY;
LATE LECTURER ON THE PRACTICE OF MEDICINE AT THE SHEFFIELD MEDICAL INSTITUTION;
&c., &c., &c.

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PREFACE TO THE THIRD EDITION.

The First and Second Editions of this work consisted of a series of papers reprinted from the pages of the London *Medical Gazette*, at the suggestion of several professional friends and pupils, who wished to have in a united form, the articles devoted to a consideration of the pathology, diagnosis, prevention, and treatment of Consumption, which, under the title of "Bed-side Sketches," had been written for that Journal at the request of its Editor, Dr. A. Taylor.

From the kind manner in which the Work was received by the Profession and the Medical Press two large editions have been exhausted; in fact, more than two years have elapsed since the last edition was out of print.

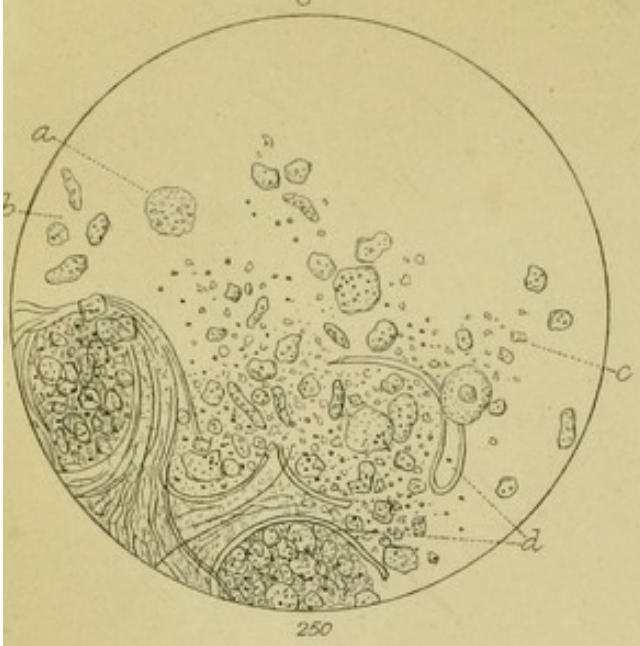
The present Edition contains many additions; and, without pretending to offer a complete treatise on the pathology, diagnosis, prevention, and treatment of thoracic Consumption, I wish to place, as briefly as possible, before the student and junior practitioner an epitome of what, in an experience of more than twenty years in fields for observation which do not fall to the lot of many to explore, has appeared of practical importance; and, at the same time, without the assumption of new views, or arrogating to myself any new method of treatment, to investigate the important question of the curability of thoracic Consumption, and to indicate what has appeared the best plan of bringing about a result so desirable.

The numerous cases of phthisis applying for relief at the large public institution to which I have the honour of being one of the physicians, have afforded extensive opportunities for investigating the nature of tubercle with the aid of the microscope, and of thus confirming many of the opinions of fellow labourers in these important researches; and I can only express the hope that Mr. Tuffin West's beautiful microscopic illustrations of tubercle will be of use in assisting the uneducated eye of any brother practitioner, who may not as yet have used the microscope in examining the expectoration in thoracic Consumption, in researches the practical importance of which it is impossible too highly to estimate.

Sheffield, October, 1856.

PLATE I.

Fig 1.

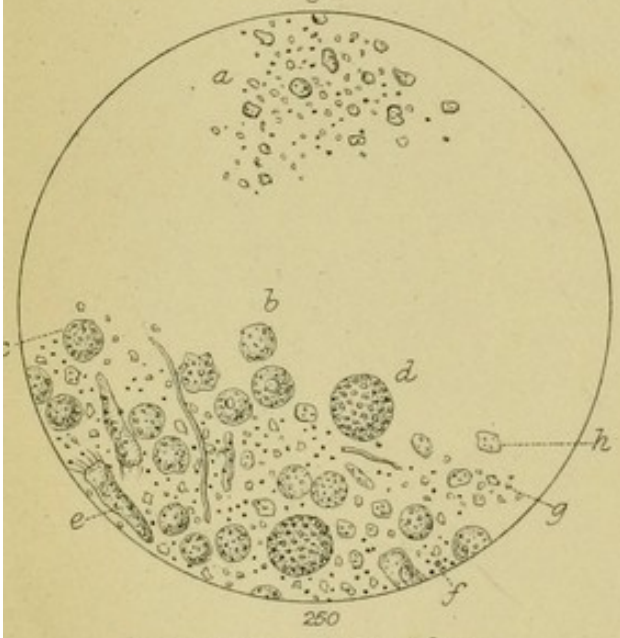


Yellow Tubercle.

Fig 2

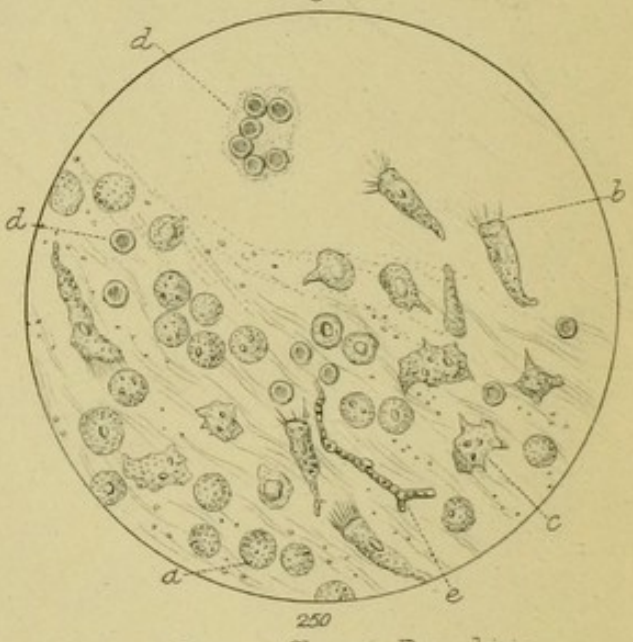
Gray Tubercle.

Fig 3.



Yellow Tubercle liquefying

Fig 4.



Sputa. Chronic Bronchitis.

Fig 5.

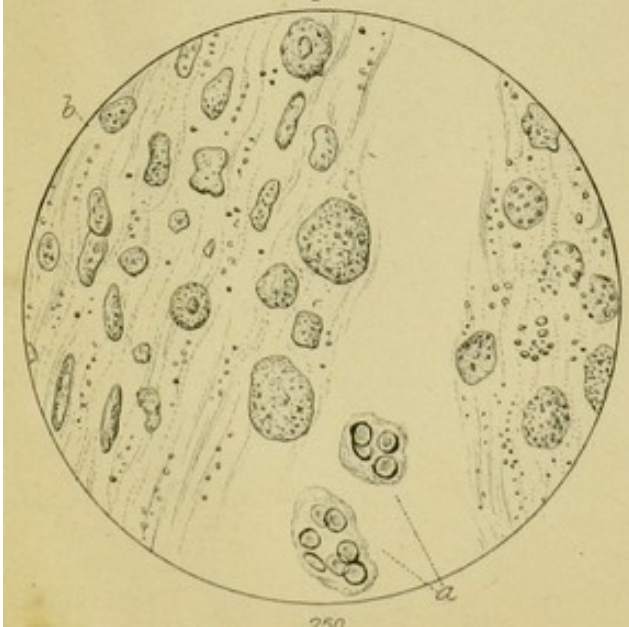


Fig 6

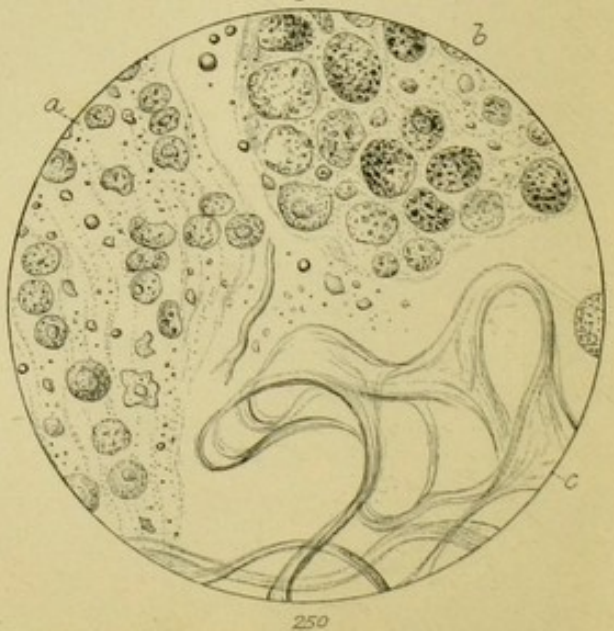
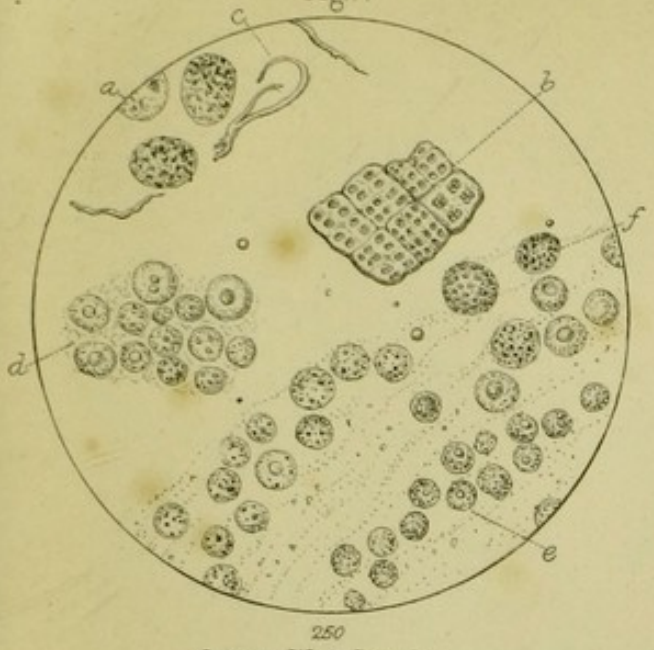


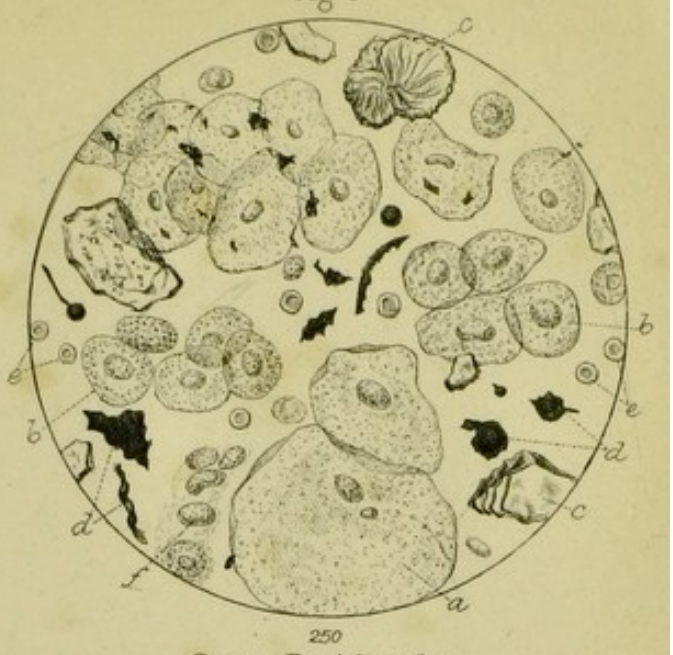
PLATE II.

Fig 7.



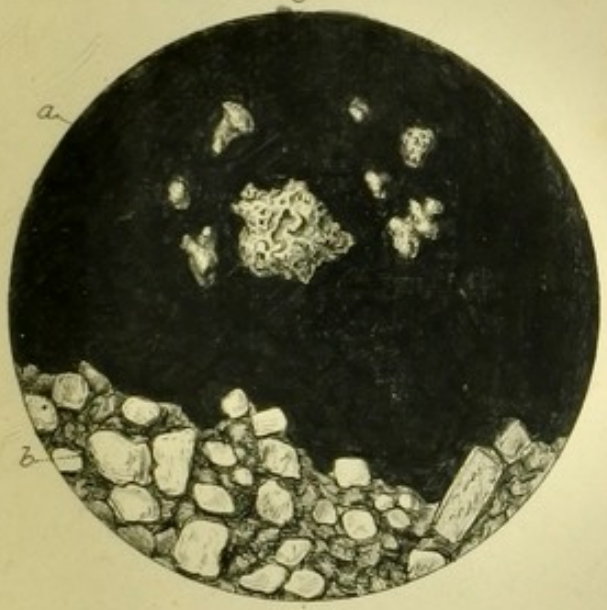
Sputa., Wet Grinder.

Fig 8.



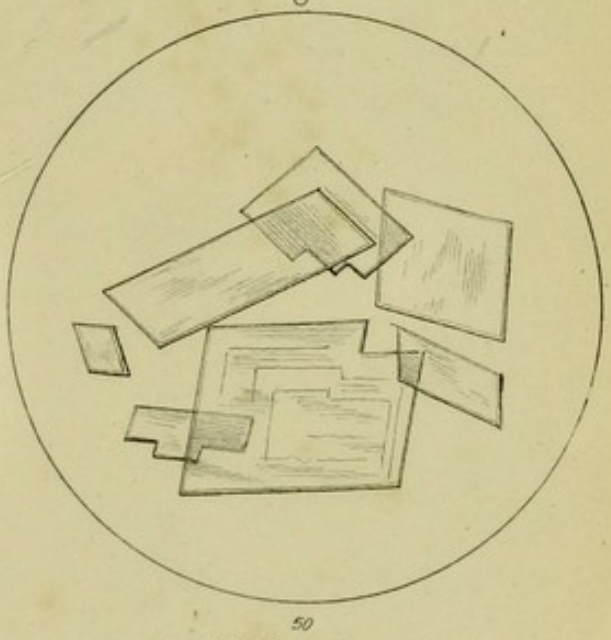
Sputa., Dry Grinder.

Fig 9.



Expectorated Chalk & Cretaceous matter from the lungs.

Fig 10.



Cholesterine.

Fig 11.

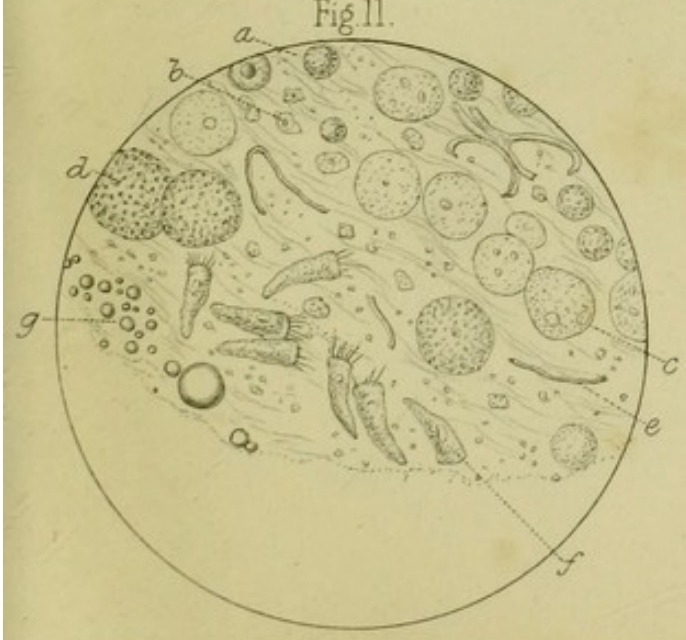
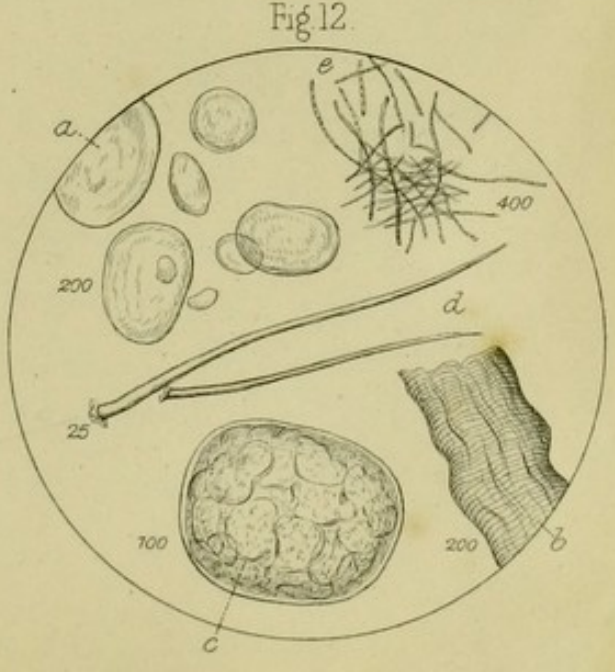


Fig 12.



CHAPTER I.

INTRODUCTION. CAN CONSUMPTION BE PREVENTED, ARRESTED, OR CURED? WHAT IS MEANT BY THE TERM THORACIC CONSUMPTION? STATISTICS OF PHTHISIS. PHTHISIS AND SCROFULA VARIETIES OF THE SAME DISEASE. THE TUBERCULOUS DIATHESIS. HEREDITARY PREDISPOSITION. THORACIC CONSUMPTION ARRESTED BY SCROFULOUS INFLAMMATION OF THE CERVICAL GLANDS.

Can consumption be prevented? Can consumption be arrested? Can consumption be cured? are questions of the most momentous import; for not only do they concern the members of the medical profession individually and collectively, but in their solution the fathers, mothers, sons, and daughters of this country are most deeply interested; for how few families can for many generations hope to claim exemption from the attacks of this ruthless destroyer, which, selecting but too often the fairest and most beautiful of our sisters, or the most promising and intellectual of our sons, quickly carries them to the dark silence of a premature grave. It will be seen from the following table, compiled from materials kindly supplied by the polite attention of the Registrar-general, that in London alone, in eleven years, no less than seventy-five thousand three hundred and eleven have perished from thoracic consumption.

If these inquiries be extended to England and Wales it will be found that of the whole population one person out of every

three hundred and ten dies annually from thoracic consumption. With a fact so awful before us it is certainly the duty of every practising physician and surgeon, and more especially of those holding appointments in public institutions, to inquire if thoracic consumption admit of cure, and, if so, will cod-liver oil—a remedy which has now for some years been extensively employed by the profession in its treatment—prevent the deposition of tubercle; and when tubercles are already deposited, what influence does it exert upon them? From the results of a long and very extensive exhibition of the oil in private and dispensary practice, and from what has been gleaned from the experience of others, there can be no hesitation in stating that much benefit has arisen from its employment, even in some of the worst and most advanced cases of phthisis; not that I would advise an implicit faith to be placed in this medicine alone for the treatment of the disease. The administration of cod-liver oil is only a part of that plan of treatment which requires to be most steadily persevered in, and which, in detailing certain cases, an endeavour will be made to explain. To restore the patient to that healthy condition of body from which there is a departure in the tuberculous diathesis; to render the tubercles already deposited harmless, to promote their expulsion, and to prevent a further deposition of the same kind of matter, is

TABLE I.

Deaths in London from Thoracic Consumption.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.
	7,099	6,731	6,890	7,010	6,556	6,317	6,137	7,027	6,935	7,502	7,107
Tabes Mesenterica.....	462	594	861	990	856	841	752	812	838	965	1,099
Scrofula.....	161	178	307	278	367	354	305	391	447	443	446

obviously the treatment which the disease requires, whatever may be the hindrances and difficulties that will most certainly frequently present themselves at the bed-side of the patient.

It will, however, be well in the first place to say a few words on the pathology of thoracic consumption; and also to endeavour to define clearly the signs denoting the arrival at those several stages of that long journey of hopes and fears by which it conducts its victims to the tomb; for it would manifestly be unfair to claim for any remedy powers which do not belong to it, or to swell the list of supposed cures by cod-liver oil after giving it in imaginary cases of phthisis. This leads naturally to the consideration of what is meant by the term thoracic consumption; what are the signs by which the disease may be detected at each period of its existence; and what has appeared the most appropriate treatment, not only for arresting the progress of the disease when tubercles are unquestionably present, but also for preventing their deposition, and this more particularly in children and young persons, in whom an hereditary taint is known to exist.

If we were to regard phthisis as confined to the lungs only, a manifest mistake would be committed. We have a peculiar state of the blood in which the requisite materials for the growth and support of the body are imperfectly supplied, and at the same time there is deposited from it in the lungs a morbid substance known as tubercle. The same condition exists in scrofula which may be considered as simply a variety of the same disease, the tuberculous matter in the latter being deposited in glandular and superficial structures instead of organs of such vital importance as the lungs. Thoracic consumption is, therefore, to be regarded only as an offspring of a peculiar constitutional diathesis, which may be inherited from the parents, or produced by exposure to influences adverse to

the growth and healthy development of the body. Without entering at length into the causes influencing the deposit of tubercles in the lungs at certain periods of life, it may be observed that the circumstances which deteriorate the materials of nutrition, and thus induce the deposition of cacoplastic and aplastic matter, may be either local or general. Of the local causes, Dr. Williams mentions "congestion and the lowest and most chronic forms of inflammation, as capable of producing cacoplastic deposits;" but even in such cases he inclines to the opinion that general causes have alone no inconsiderable share in such formations; meaning by general causes a "degraded state of the plasma of the blood."

In this peculiarity of constitution on which the existence of thoracic consumption depends—the tuberculous cachexia—there is found in the blood an increased liability to deposit,—an altered state of the red particles, and a great excess of fibrine. Now, from fibrine in a healthy state is developed the basis or plasma, whence the reparative process is derived. This plasma, in a healthy individual, has a capacity for life, and is capable of organization; but when the scrofulous diathesis exists this capacity is *lowered*, and the materials for nutrition become what Dr. Williams has happily termed "cacoplastic"—capable only of a very low degree of organization, or perhaps not organizable at all, as is seen in yellow tubercle, pus, and cheesy matters; and although fibrine may be found in superabundance in the blood of consumptive patients, the products are always aplastic or cacoplastic. The fibrine from such blood, when placed under the microscope, exhibits fewer finely defined fibres and regular nuclei than is natural,* more closely resembling coagulated albumen than the more animalized form

* Gulliver

of proteine. The red particles are deficient in quantity, and the fibrine is also more opaque and less elastic than in that which is derived from healthy blood, presenting numerous fat globules and a predominance of granular matter.

In that idiosyncracy of the constitution to which allusion has already been made—namely, the tuberculous diathesis, there is a certain constitutional bias which is liable to hereditary transmission. As a result of this constitutional taint there may occur local deposits of an organic material which is incapable of further development. It must be borne in mind that although scrofula is most undoubtedly handed down from father to child, from generation to generation, tuberculous material, in the process of procreation, does not actually pass from the body of the scrofulous parent into the germ of the future child, remaining there in a latent condition until circumstances adverse to health, exposure to the influence of which, by debilitating the vital functions, awaken the tendency to disease; we are not to consider that the blood of the child is poisoned before birth from the blood of the mother, as we constantly find to be the case in small-pox and in syphilis; but, as Professor Simon has clearly pointed out, in the scrofulous diathesis the disposition to form tubercles is transmitted, because the child has received from one or both the parents an imperfect model of development.

The various peculiarities of body which a child inherits from its parents admit of many illustrations; and the family of almost every one of our acquaintance will supply the materials. Nor shall we have to look long before we not only discover that there is a general likeness, but, that if the child be traced from the cradle to the grave, there will be found from childhood to puberty, from puberty to manhood and old age, a certain defined succession, the result of a peculiar hereditary law of

development, which affixes something peculiar and individual to each period of life. For example, the child becomes stout at the same age that his father did—his hair becomes gray, or his head bald, at the same age—and, in a word, by acquiring the same figure of body and peculiarities of constitution at the same time of life as his father, we have abundant proof that the parent is the pattern of formation for his child. In speaking, therefore, of scrofula as an hereditary disease, it is not asserted that the tuberculous material passes from parent to child—not that the child is born with tubercle already in its body—but that the disposition to form blood in a manner "which shall give tubercle as a collateral phenomenon, exists as a clause in the child's charter of life, and forms a part of its type of development;"* of this we may be convinced as certainly as of any exterior resemblance it may bear to the configuration and growth of the parents.

We conclude, then, that in the etiology of disease there is no fact better established than that a peculiarity of constitution in the parents gives rise to the tuberculous disease in their children, and that too in proportion to the degree in which the disease is developed in them. This is frequently seen in the offspring of scrofulous parents, the symptoms often being much more strongly marked in the younger than in the first born children. When the health of the parents undergoes a change during the increase of their family it sometimes happens as a consequence that the elder children are healthy and the younger ones the victims of thoracic consumption. This fact is of no little importance, particularly when considering the eligibility of an individual for life assurance. With regard to the question, Is the disease more readily transmitted by the father or the

* Simon.

mother? it must be confessed the problem is difficult to solve. Professor Nasi, of Bonn, is of opinion that the hereditary predisposition is more commonly derived from the mother. I am, however, inclined to think that the child may possess the constitution either of the father or the mother—a fact seen in almost every family; and it has certainly been remarked, with much truth, that the more nearly the offspring resembles the conformation of its father or its mother the more closely will its diseases be those of that parent. When both parents possess in a marked degree the tuberculous constitution, the chances of escape for the children become very much diminished: still we every now and then observe, even in families where there is a strongly marked predisposition to consumption, a generation escape. This arises evidently from the improved physical condition of that generation, and from an avoidance of those causes which are favourable to the propagation of tubercle—a fact worthy of attention, as calculated to induce a strict compliance with that plan of treatment which is necessary to maintain the body in a state of health. Sometimes a child is tuberculous at birth; but, so far as my own experience enables me to speak, instances of this kind are seldom seen, except when the mother is labouring under the disease in an advanced stage. These are facts well worthy the serious attention of all classes, for how much of pain, of sorrow, and of unspeakable misery would every year be avoided in this country by the interdiction of marriage between persons when both are labouring under this peculiar state of the system. It has been found amongst the female phthisical patients at the hospital, at Brompton, that about 36 per cent. report themselves as the offspring of consumptive parents; but it is by no means certain that of the remaining 64 per cent. a considerable number may not have laboured under tuberculous deposits, or that other parents,

escaping thoracic consumption in their own persons, may not have transmitted the predisposition from their own immediate predecessors to their children. The elaborate researches of Dr. Cotton go to prove *(a)* that males more frequently derive the disease from the father than the mother; *(b)* that girls more commonly do so from the mother; *(c)* that the influence of a double hereditary taint is especially fatal.

It must be added also that gout, cutaneous diseases, syphilis, when treated with long courses of mercury, spirit drinking, chronic dyspepsia—especially that form to which Dr. Todd has directed attention, under the title of "strumous dyspepsia"—everything which has a tendency to deteriorate the vital powers in the parents, may give rise to the tuberculous constitution in their children. Dyspepsia is undoubtedly one of the most prolific sources of cachexia in every form—an aphorism that will not be controverted; for a healthy condition of the digestive organs, and a proper performance of their functions, is essential to the due assimilation of food and a constant supply of healthy nourishment to the body.

With regard, then, to the question of the hereditary predisposition to the scrofulous diathesis, general observation and experience lead to the conclusion, that diseases are transmitted from the parents to their children with no less certainty than many physical characters not inconsistent with health. Phthisis may or may not be transmitted to the child of a diseased parent, and may be transmitted without being developed, because counteracting circumstances, more particularly such as relate to the protection and preservation of health, may have prevented a result which, in their absence, would in all probability have occurred. Hence it is, as we have already seen, one or more only of the several children of the same father and mother will exhibit the diseases of the parents. Again, the

other brothers and sisters, though to all appearance healthy, may on becoming parents have still the power of transmitting to their offspring the elements of disease. Thus we find a diseased parent in one generation having an apparently healthy offspring, and in the next generation an apparently healthy parent with a diseased offspring. This class of facts is, (as stated in the first report of the Hospital for Consumption, p. 18,) of the greatest importance in all inquiries like the present, since conclusions founded on the presence or absence of disease in the parents only afford too limited an idea of the influence of predisposition, for this becomes much more evident when the inquiry is extended to a preceding generation—to grandfather and grandmother, and to collateral relatives, uncles, aunts, brothers, and sisters. It is, doubtless, a remarkable fact that about one in every four of the consumptive patients at this hospital was born of a consumptive parent. Table 2 shows the number amongst 1,010 consumptive patients predisposed to the disease by its existence in the preceding generation.

TABLE II.

* Sex.	Cases of Thoracic Consumption.	Predisposed by Disease in Parent.	Per Cent.
Males.....	669	122	18·2
Females...	341	124	36·3
Total	1,010	246	24·4

A singular fact may be noticed in the above table—viz., that whilst only 18 per cent. of the males trace their origin to consumptive parents, 36 per cent. of the females state their parents to have been consumptive. It is, however, probable that girls, from many circumstances, know the history of their parents

* Medical Report of the Hospital for Consumption.

better than boys. The result of my own observations leads me to conclude that women are more liable than men to inherit consumption from their parents, but not in so great a proportion as the table above indicates. In dispensary practice I have repeatedly found that the patients of either sex are unable to give any account of their family history, the ages at which they lost their parents, or the causes of their death.

It may be added that those in whom scrofulous disease is most apt to appear are children with pale and pasty complexions, a dry harsh skin, large heads, badly formed chests, and prominent abdomens; with muscles soft and flabby, and a languid and feeble circulation. Others, more particularly in the middle and higher walks of life, have light or red hair, gray or blue eyes with large pupils and long silky eye-lashes, brilliant transparency of skin, and rosy cheeks, which on exposure to cold become purple or livid; the skin is thin and soon irritated, the feet and hands are liable to attacks of chilblains, and there is a peculiarly pearly lustre about the sclerotic. Such children are generally very clever—lively, ardent, and imaginative—they display a precocity of intellect which parents too often encourage by education and look on with fond delight, while they too often disregard the warnings of the experienced physician, who sees in all this but the types of a peculiarity of constitution which has rendered childless the once happy home of many a mother.

Scrofulous affections, frequently obstinate and difficult to cure, are met with in the melancholic or bilious temperament—in children with sluggish mental and bodily energies, with dark hair and complexion; but such cases are not so common as in those of the serous, or of the sanguine temperament.

Chronic lippitudo, chronic disease of the conjunctiva, continuing for weeks without inflammation or heat, with great

intolerance of light and a tendency to form little pustules near the edge of the cornea, *tumid and chapped upper lips, redness and swelling of the columna nasi* and lower parts of the nostrils, especially in winter, *certain diseases of the joints,** *caries of the vertebræ, moist eruptions behind the ears, chronic enlargement of the glands of the neck, ulceration of the nares*†, *tabes mesenterica, acute and chronic hydrocephalus, tubercular meningitis*, (many cases of *chronic peritonitis* at a later period of life are associated with a tuberculous affection of the lungs,)—are all signs of the scrofulous diathesis; all depending more or less on the same cause; arising the one in this patient, the other in another patient, in consequence of the particular influences to which the child may have been exposed.

The circumstances to which, acting separately or in combination, we most confidently ascribe the power of developing this diathesis, are insufficient nutriment, exposure to wet and cold, impurity of the atmosphere, the want of natural exercise, and mental disquietude; also, severe and long continued disease of the organs of digestion, insufficient excretion, fevers, excessive loss of blood or of the more animalized secretions, the cessation of growth, the termination of pregnancy, the sudden stoppage of habitual discharges (especially such as are purulent), and the amputation of a limb. To estimate the separate effect of each of these causes would be difficult, but their combined influence is unquestionable in favouring the development of tubercle; and we may conclude that they, for the most part, produce this effect by increasing the proportion of fibrine in the blood when there is a deficiency both of red particles and of vital power to

* Popularly called White Swelling: the knee and hip joints are frequently attacked.

† Slow and eating in its course—termed *Lupus*.

give to this fibrine a due amount of elaboration and the requisite capacity for the properties of life.

It is a singular fact that in scrofula, the close identity of which with thoracic consumption is undoubted, one form of disease has a tendency to keep the other in abeyance. Of this a remarkable instance occurred at the hospital for consumption, in a patient who was under the care of Dr. Cotton for nearly three years. The softening process was going on in the lungs at the time of his admission, and the case appeared hopeless, when the cervical glands began to discharge scrofulous matter, and an abscess formed in the tibia. From this period the pulmonary symptoms abated; the patient improved in health, and returned to his employment, which was that of a town traveller. A few months afterwards he again applied at the hospital, without the scrofulous symptoms, but apparently in the last stage of phthisis. After a short rest and proper care, his health again improved; he increased in weight; the scrofulous abscesses re-appeared, and he resumed his occupation. I have several times seen in both sexes this curious alternation of symptoms repeated. In one case a gland enlarged in the neck of a young girl aged nineteen, under my care, in the second stage of phthisis; after a few weeks, a considerable discharge of scrofulous pus took place — the progress of the disease was then arrested—she became fat, was enabled to resume her duties as a domestic servant, and when I last saw her, which was more than twelve months after the first discharge of the scrofulous abscess, the pulmonary disease had made no progress. I advised her to obtain, if possible, a situation in the south of England, and it is probable her life may be spared for some years. When I last examined her, there was still a slight discharge from the gland.

In reading over what has been already written on this sub-

ject in the passage of these sheets through the press, I would only add that our exact knowledge with regard to the tuberculous crasis is as yet but small. All we know is, that there is present a special dyscrasia intimately connected with causes which induce debility, and leading to the pouring out of materials which exhibit only the faintest traces of organization. We are not a little indebted to Rokitansky for the manner in which he has demonstrated that tubercle is a modification of fibrine, and also for pointing out how, "in consequence of the alteration of the nature of the fibrine, tubercle is continually deposited, even when the blood is very deficient in that constituent." He says, "all the fibrine that is formed is soon affected by the peculiar dyscrasia, and thrown out in the form of tubercle;" and additional evidence to the same effect is furnished by the fact that many depressing influences increase the quantity of fibrine, and also cause the deposition of tubercle. In the preceding pages an attempt has been made to show that even before that singular modification of the fibrine has taken place, which induces the excretion from it of tubercle, there is an abnormal state of the system easily distinguished by the experienced practitioner, indicative of the evil which is to come, and to the removal of which condition our best efforts are to be directed; for, be the time long or short before its actual development, there is in the system a proneness to disease, and in this consists the tuberculous diathesis.

CHAPTER II.

THE TUBERCULOUS CRASIS. TUBERCLE; WHY DEPOSITED IN THE LUNGS SO FREQUENTLY. INFLAMMATION, WHEN SET UP, CAUSES THE EXUDATION OF TUBERCLES WHICH RAPIDLY GO ON TO SOFTENING. RESEARCHES OF VOGEL, LEBERT, CARL WEDL, GLUGE, AND ROKITANSKY. NATURE OF TUBERCLE. DIFFICULTY OF ARRIVING AT A CORRECT HISTOLOGICAL DEFINITION. GRAY TUBERCLE. YELLOW TUBERCLE. MILIARY TUBERCLES. TUBERCULOUS INFILTRATION. SOFTENING. CAVERNS IN THE LUNGS. PULMONARY FIBRES IN THE SPUTA OF GREAT PRACTICAL IMPORTANCE: HOW RECOGNISED. REMARKS OF SCHRÖDER VAN DER KOLK. CONTENTS OF CAVERNS. PYOGENIC MEMBRANE. CURE OF THORACIC CONSUMPTION. CICATRICES IN THE LUNGS. CRETIFICATION. WAVY INSPIRATION. &c., &c.

Of the numerous patients applying for relief at the Sheffield Public Dispensary, in childhood and early youth, the mesenteric and cervical glands are most frequently the seat of strumous diseases. In patients a few years older tubercles are found, most frequently, in the lungs. As respects the choice of organs for scrofulous deposits the pathological statistics of the celebrated Rokitansky, collected during more than twenty years at the general hospital at Vienna, and consisting of thousands of instances, are remarkably interesting. From them it will be seen that the lymph-glands and lungs maintain a very great superiority in the number of cases over all other organs *affected singly*, and that the organs in which the

disposition to primary deposit* almost exclusively prevails, are such as may in the opinion of Mr. Simon, "be called with equal exclusiveness the organs of blood development, and in this generalization we possess a clue which it is impossible to over-estimate for arriving at a true interpretation of this fatal disease."

Tubercles, when they exist in the lungs, are deposited more commonly and thickly upon the posterior and superior portion of the upper lobes; indeed, that distinguished pathologist, Dr. Carswell, does not scruple to affirm that when they are found in any other portion of the lung they are of secondary occurrence. To this rule only one exception requires to be made—viz., an attack of inflammation in some other portion of the lung which may have occasioned the first deposit of tubercles in that part, (such a case I have examined this morning.) Not that inflammation is necessary to the formation of tubercles, but there is undoubtedly a most important connection existing between the occurrence of inflammation and the occurrence of tubercles: "*tubercles will cause inflammation*, and inflammation will determine the development of tubercles,"† "Tubercular matter is formed in two ways: first, by a gradual and uninflammatory separation from the blood; second, by inflammatory action, ending in a morbid scrofulous secretion."‡ When tubercles appear under the second condition, so far as I know, it is in cases where inflammation of the lungs, pleuro-pneumonia or bronchitis, has been disregarded. In such patients, if there be a tendency to the scrofulous diathesis,

* In the lymph glands it is more than probable that the tubercles are only an accumulation in the tube of the gland of their own morbidly coagulable or inspissated lymph.

† Dr. Watson's Practice of Physic, 2nd Ed., Vol. 1, p. 200.

‡ Fothergillian Prize Essay, by Dr. R. P. Cotton.

these diseases are apt to terminate in thoracic consumption. Of one thing, however, I am quite certain—viz., that although the production of tubercle may be quite independent of inflammation, and though inflammation in the great majority of cases is only secondary and excited by it, as a cause of irritation, still, when set up, it has a wonderful effect in hastening the exudation of tubercle, and that of a kind which goes on to softening with the most fatal rapidity.

That tubercles should be deposited so frequently in the lungs is not to be wondered at, when it is remembered that they are highly vascular, and that a very large quantity of blood is constantly passing through them; so that it seems hardly possible such organs should escape a participation in any disordered condition of this fluid. The softness and yielding nature of the pulmonary textures renders them more readily adapted for the permission of effusion than such structures as are of a more dense texture. The exposure of the lungs to external causes of disease—such as cold damp air, entering directly by the windpipe, or operating through the medium of the circulation; and, lastly, from their being the principal seat of the production of fibrine—fibrine being found in much larger quantity in arterial than in venous blood,—all these circumstances undoubtedly render the lungs a most frequent seat of tubercle.

Not only are tubercles deposited with singular uniformity in the upper and back portions of the upper lobes, but the left lung is more frequently attacked than the right. Thus it was shown by Louis, that in 38 cases in which phthisis had proceeded to the complete disorganization of the upper lobe of the lung, 28 were of the left, and 10 of the right. In eight cases in which the pleura was perforated by the extension of tuberculous disease, seven were on the left side. In four out of seven cases in which only one lung was affected, it was found to

be the left. In 100 cases of thoracic consumption which came under the care of Dr. Cotton during the first dawning of the disease, he found the seat of tubercle to be the apex of the left lung in 51 cases, and of the right in 27 ; in eight patients the deposition appeared alike in both apices, and in 14 the deposition was unequal. It would appear that the opportunities for investigating this disease which the Hospital for Consumption at Brompton has afforded go to confirm the conclusion to which Dr. Carswell had long ago arrived; for in 500 out-patients only four presented signs denoting the lower lobes to be the principal seat of tubercle. Thoracic consumption, therefore, presents a very striking contrast to pneumonia; for in 210 cases which came under the observation of Andral, it was twice as common on the right side as the left. The following table gives the seat of 868 cases of pneumonia, treated by M. Lombard, of Geneva.

TABLE III.

No. of Cases.	Right Lung alone.	Left Lung alone.	Both Lungs at once.
868	413	260	195

Now and then inflammation may commence in the superior lobes; but, when the upper portions of the lungs are involved, it is generally in cases where the disease has commenced below. There may be exceptions, but this is the rule.

Since the publication of the former editions of this work the microscope has thrown no little light on the true nature of tubercle, which may, in almost every instance, be regarded as an exudation of proteine material rapidly passing into the solid form, and never advancing beyond the lowest grade of development. In examining tubercles from the lungs, it has ever appeared to me that considerable difficulty must be experienced

in arriving at a correct histological definition; for no little risk is of necessity incurred of regarding half-destroyed tissues as new products, and hence one reason for the different opinions expressed by different writers on this subject. With regard to the seat of tubercle in the lungs, it may be stated that tuberculous matter is deposited primarily on the free surface of the lining membrane of the air-vesicles, the inter-vesicular passages, or the lobular bronchi. Dr. Clark, in his remarks made to the Pathological Society, on the preparations illustrative of the seat of tubercle, shows that the deposit of tubercles takes place primarily on the free surface of the lining membrane of the air-vesicles, the inter-vesicular passages, or the lobular bronchi—that it extends to the walls of the air-vesicles, the areolar tissue around the blood-vessels and bronchi; and between the lobules only at an advanced period of growth, when such retrogressive changes have set in as involve destruction of the structural elements of the lung; and that it does not occur *indifferently* at any point external to the blood-vessels.*

There are two principal varieties of tubercle known as *gray tubercle* and *yellow tubercle*, of which the admirable delineations of Mr. Tuffen West in the plate convey to the eye a correct representation. The tuberculous matter for the most part assumes a spherical form, its origin being in a blastema exuded from the adjoining capillaries, which, effused in a fluid condition, infiltrates the tissue. The elements of tubercle, according to Wedl, Vogel, Lebert, Gluge, Rokitansky, and as far as my own observations enable me to judge, may be described as—

* See the highly interesting papers of Dr. A. Clark, Trans. Pathological Society of London, Vol. vi. Dr. C. Handfield Jones contends, "Manual of Pathological Anatomy," p. 145, that "the seat of tubercle in the vast majority of cases *is on the exterior of the vessels*, but in their immediate neighbourhood."

(*a*) * Molecules, assembled in superimposed layers, some too minute to be measured.

(*b*) Flocculent masses, consisting of proteine bodies, only seen when the tubercle is carefully spread out.

(*c*) Rounded or oval nuclei, imbedded in a hyaline matrix, with scattered molecules.

(*d*) Flattened angular, granular corpuscles, rarely with a distinct nucleus, which become transparent on the addition of acetic acid.

(*e*) Cells, occasionally elongated, with distinct nuclei.

Gray tubercle is of uniform consistence, toughish or soft, compressible, and of a pearly gray colour; it is composed essentially of "a basis substance, which is solid and homogenous, and serves as the uniting medium of certain corpuscular elements;"† such as oily-looking granules, nuclei, and a few cells; the elements of the tissue in which it is deposited may also frequently be seen. I have never discovered any vessel in separate tubercles, although when several are aggregated together, in the interspaces some traces of those belonging to the tissue may be observed.

Yellow tubercle, which usually forms in larger masses than the gray, varies in colour, though generally of a whitish yellow hue. These tubercles are from the first opaque, of a cheesy consistence, containing a large abundance of fine proteine molecules, among which may be detected the elements of gray tubercle, shrivelled, indented, and wrinkled, and of a yellowish

* It is stated by Vogel that these granules do not all behave in the same way towards re-agents, the greater portion of the minute-coloured granules being unaltered in acids, alkalies, or ether. He looks upon them as modified proteine compounds. In addition to the delicate molecules in the soft yellow-coloured tubercle, a considerable quantity of large strongly-refractive globules may be observed, which resemble free fat, and are soluble in ether. A third kind of these granules are calcareous salts—*phosphate and carbonate of lime*—soluble occasionally with effervescence in acetic acid.

† Pathological Anatomy—Churchill, p. 141.

lustre. The relation of the two varieties of tubercle to each other is a point of considerable interest; and, Laennec without doubt was right when he taught that gray tubercle sooner or later is converted into yellow tubercle. This undergoes two metamorphoses of very great importance to the practising physician; *one is that of softening—the other that of cretification.* That yellow tubercle should be thus regarded as a secondary form of gray tubercle is generally correct, and also in strict accordance with the fatty metamorphoses of normal and newly-formed elements; but it has been suggested with some probability that the remains of the proteine compounds, which have not been used in the formation of the organic elementary parts, may at once undergo fatty degeneration; and, consequently, that it is not absolutely necessary that the yellow tubercle should have previously been of the gray kind.

Before proceeding to a more detailed consideration of these important processes, (softening and cretification,) it is necessary to remark that when once deposited the tubercles may continue for years in the same condition surrounded by perfectly healthy lung, remaining in what is technically termed a crude state. Much will depend on the extent of lung involved in the disease, much on the nature of the deposit itself, much on the state of health of the patient, the treatment adopted, and the influences to which he is exposed. In some constitutions, when the strumous diathesis exists in a very marked degree, and where the blood is as it were surcharged with an enormous quantity of aplastic material, the tubercles are from the first of a yellow colour, soft and friable, and quickly break down into a moist cheesy substance. In other cases, where the nutritive powers are not so lowered, the tubercles are at first of a gray colour; and here it is very interesting to note how the different kinds of tubercle, in their action, resemble the fibrine from

which it may be said they are derived. We see the gray resembling healthy fibrine in its tendency to contract and shrink up into an indurated mass; whilst the yellow tubercle, like the croupous fibrine of coagula and exudations, has a tendency to soften and become fluid. It should also be added, that when an apparent softening of the gray tubercle takes place, this does not depend on a change arising in its own substance, but in that of the yellow tubercle intermingled with it. For the most part the gray tubercle is first deposited; (sometimes the yellow in the miliary dispersed form); as the dyscrasia increases, yellow tubercle is mingled with the gray, and at last the exudation consists entirely of yellow tubercle.

With regard to *miliary tubercles*, of which the lungs are frequently the seat, the researches of Gluge and Dr. Wedl, of Vienna, are particularly interesting, as solving the question, Do these deposits take place in the parenchyma itself of the lungs, or to some extent merely in the interstitial connective tissue? Gluge, many years ago, pointed out that the ultimate pulmonary vesicles are involved in the tuberculous infiltration. This the reader has it in his power to decide. If a granular tubercle of this kind be carefully dissected with needles, the fibres of the pulmonary tissue will display their characteristic curves, corresponding to the peripheral borders of the air cells, and everywhere visible in the adventitious deposit; but in the denser portions, (so concealed as not to become visible until acted upon by an alkali,) Wedl describes the elements enclosed in and completely filling the air cells as flattened corpuscles, in which now and then a *nucleus* may be distinguished. But, he adds, "more frequently when the cells are ruptured nothing escapes from them but rounded or oval nuclei, often surrounded with a circlet of minute molecules." And yet no little caution requires to be exercised before deciding that these constituents

are altogether of new formation, for the internal lining of the air cells is constituted of an epithelium, having similar cells and nuclei. This objection has not escaped the distinguished pathologist just referred to, who remarks, "that although in the air cells infiltrated with tuberculous matter, the newly-formed elements cannot be certainly distinguished from the disintegrated epithelium, still it would be wrong to conclude that the elements contained in miliary tubercles of the lungs merely represent the disintegrated epithelium of the air cells."

When the miliary tubercles are of a yellowish colour, in the fine molecular interstitial substance in which the new elements are imbedded, numerous fat globules will be seen; and when the consistence is at the same time diminished, the substance of the tubercles will be more easily compressed between two glasses, and the pulmonary fibres, although still distinctly recognizable as such, will be seen to have lost to some extent their peculiar arching curves.*

Miliary tubercles may in some cases be seen in the lungs aggregated into considerable groups, softening down into a yellowish pulpy substance exhibiting numerous points of black pulmonary pigment. It is well to bear in mind that a large amount of pigment is found in the interstitial tissue of the air cells, subsequently enclosed in the tuberculous infiltration, and appearing in them as colouring matter.

In some bodies that I have examined, tubercle has not assumed the usual small characteristic form from which the name is derived, but, as pointed out in a former edition, appeared as a uniform mass, which had been regularly diffused over a considerable extent†—a whole lobe or more being con-

* Wedl.

† Second Edition, 1850, pp. 18 and 19.

verted into one tuberculous mass, "the tuberculous infiltration" of some authors. Dr. Handfield Jones has expressed the belief that "in a person whose blood is affected in a high degree by the tuberculous dyscrasia, inflammatory hyperœmia may result in the exudation of a material which corresponds closely with the tuberculous, but is less inclined to soften and break down." In some of the most rapidly fatal cases of thoracic consumption I have seen, this has taken place; many of the ordinary signs of phthisis have been absent; the patient dying without either cough or expectoration. Of this variety of thoracic consumption, the following case affords an instructive example:—Miss H——, fair and delicate in appearance, with light hair and blue eyes, whose mother had died of phthisis soon after giving birth to this her third child, complained about three months before my seeing her of being tired after the slightest exertion. She had rapidly lost flesh, although the appetite was still good, and she could take exercise in a carriage. *She had not had any cough, expectoration, or hæmoptysis.* There was an increase of the expiratory murmur at each apex, and the respiration was dry and tubular—voice bronchial. There was a falling in of the chest beneath each clavicle, and great want of mobility, particularly on the left side. The shortness of breath on the slightest exertion was painful to witness, and throughout there was hardly any cough, expectoration, night sweats, or diarrhœa. An examination of the body after death, I was informed, showed both lungs to be filled with a tuberculous deposit. Here we have an example of a case of tuberculosis in which the very foundation of organic life may be said to have been rapidly destroyed—the greatest emaciation possible being present, without the usual attendants of thoracic consumption, night sweats, cough, expectoration, and diarrhœa.

(*a*) SOFTENING is the most unfavourable metamorphosis of tubercle: it may proceed either from the centre or the periphery. It is the opinion of Rokitansky that the change generally commences at the centre of the tubercle; perhaps because there the growth is of the most ancient date. It appears to me that the more probable reason is the centre being furthest removed from the vivifying influence of the blood; and this opinion, long ago expressed,* has been recently confirmed by a foreign pathologist, who remarks that "it can scarcely be doubted that tubercle, like every new formation, requires a certain amount of nutritive material for its further growth, or even for its maintenance, which is afforded by the surrounding blood vessels. Now, if repeated exudations take place around the tubercle, and if the effused products, incapable of further development, degenerate immediately after they have been secreted, a peripheral softening of the tubercle would necessarily ensue. On the other hand, in the case of a tubercle of considerable bulk, of the size of a pea or more, it is easily conceivable that the nutritive matter afforded to it will no longer suffice for the maintenance of the whole tubercle in *statu quo*, and the parts most distant from the periphery—the central, namely—will undergo a retrograde metamorphosis and become softened."†

As the process of softening goes on, the solid parts of the yellow tubercle become broken up into a creamy purulent looking mass in which may be distinguished—

1. A fluid with a great number of granular points.

2. Traces of altered nuclei and cells, various sized drops of free oil, and the débris of the tissues.

* Second Edition, 1850, p. 20.

† Wedl.

This softening Rokitansky describes as the "spontaneous degeneration of yellow tubercle," and, as differing from the mere disintegration of the tubercle-mass under the influence of the surrounding effusion; for it commences even in the centre of large masses. Although tubercle has no vessels proper to it, remains of vessels and other elements of the structure invaded by the tubercle will be found in the softened mass.

When the tuberculous infiltration is extensive and several adjoining lobules are involved in the softening, a cavern is formed, the walls of which consist of tuberculous deposit infiltrated into the pulmonary tissue, and having in its interior broken up tuberculous matter and portions of dead pulmonary parenchyma. On the inner walls of this excavation may be noticed a dirty reddish-yellow looking thick fluid, consisting of granular matter, and organic remains *(principally nuclear corpuscles)*. In the less advanced stages, detached pulmonary fibres can be distinguished in the contents of the excavation in the lung, and they are at once recognized by the *peculiar way in which they are curved. In the sputa of patients labouring under thoracic consumption these fragments may be frequently seen, and become, in my opinion, a means of arriving at a correct diagnosis, because they afford proof of the loss of the pulmonary parenchyma.* For this important fact we are indebted to Schröder van der Kolk, who thinks they are more likely to be met with in the sputa, in the early stages, when very small excavations exist in a state of progressive development. It has been already described why they are not found in the larger cavities in the last stages of thoracic consumption. The careful examination of the sputa in phthisis by Dr. Andrew Clark, detailed by him in the sixth volume of the Transactions of the Pathological Society of London, may probably lead many physicians to alter their opinions with regard to the utility

of the microscope in determining the changes going on in the lungs.

If this fluid secretion be scraped away from the inner walls of the cavern, there will frequently be found lining it a membrane of considerable extent, to which Lebert has given the name of the "pyogenic layer." It is of a reddish colour with a velvet-like surface, presents an irregular fibrous structure, and has an intimate vascular connection with the subjacent pulmonary tissue. The perfect organization of this membrane is prevented by the subsequent tuberculous excrescences, and this circumstance is regarded by Lebert and Wedl as one reason why these caverns so rarely close. Lebert regards this membrane as a superficial, newly-formed connective tissue, and looks upon it as an attempt on the one hand of healing, by its protecting the ulcerated surface from the direct influence of the air, and on the other by its causing the cicatrization of the cavity. As the cicatrization goes on, the tissue of the adjacent portion of the lung is rendered more dense, and in the atrophied condition assumes a callous consistence. In this condition the air cells can no longer be distinguished, but in their place are found the remains of elastic fibres and pigment, indistinct nuclear bodies, and flocculent masses mixed with fat. Imbedded in the more condensed parts of the lung are small numbers of concentric colloid-corpuscles, and earthy concretions, usually regarded as cretified tuberculous masses. In addition to the amorphous calcareous salts, these concretions contain no little fat, in the form of globules and broken cholesterine plates, together with nuclear bodies imbedded in a lightish brown molecular substance.

The disposition of tubercle to break down varies in almost every case we may be called upon to treat. I have, as already stated, seen it apparently remain for years in its original crude

state. I almost every week see cases where it appears to break up nearly as soon as deposited; and as each tubercle, or series of tubercles, break up and soften, the space they once filled becomes the cavity of a small abscess, the contents of which will in time be evacuated, together with the destroyed tissue which the tubercle has invaded. If the same condition of the blood remain,—if the tuberculous dyscrasia increase,—if a low type of strumous inflammation be set up around the tubercles, the surrounding tissues become with great rapidity infiltrated with tuberculous exudations of the lowest kind; the infiltrated tissue is quickly destroyed, and in a very short space of time a large cavity is formed. But if from the first the scrofulous diathesis has been less marked, or the health of the patient become improved by timely and judicious treatment, fibrine is sometimes exuded in the fibroid callous, "which either surrounds and capsulates the tubercle, or forms a wall to and contracts the cavity if one has formed."* The surrounding tissues are often much puckered by the shrinking in of the fibrinous deposit. Some years ago I saw a gentleman in whose lung a vomica most undoubtedly existed; but it had, happily for him and for his family, existed singly. In time it was completely emptied; no additional deposit of tubercles took place, and he has now enjoyed, comparatively, a fair share of health for some years. In some bodies which I have examined after death, this state of things has been very beautifully exhibited. When the sides of these cavities come together a puckering takes place of the pleura on the surface of the lung; beneath this puckering is seen a collapsed vomica, the inner surface of which resembles cartilage. It unfortunately happens, however, in too many instances, that tuberculous matter continues to be effused; that inflammation being set up the tubercles become further dege-

* Dr. Jones.

nerated, and, breaking up, leave larger or smaller caverns. I have seen them not bigger than the end of the little finger, and others sufficiently capacious to contain a large amount of fluid. Sometimes, indeed, the whole upper part of the lung is excavated into one large cavern. I have before me the notes of the *post-mortem* examination of two bodies, opened, one on the 15th of June, the other on the 16th of June, 1856, in the presence of Mr. R. J. Pollock, of Bath-place, Kensington. In both we found very large cavities, more particularly in Mr. Kinner, aged 40, a carpenter. There was in this case a cavity in both lungs: the largest was on the right side. This large vomica appeared the result of the amalgamation of several smaller ones. It was of an irregular shape, and divided into compartments by bands which crossed it in various directions. There were also in both these cases a good many pervious bronchial tubes opening into the cavities, and appearing as though they had been divided just before entering the excavations. No blood vessels were found in these cavities, nor have I seen them in the great majority of the numerous subjects dying from phthisis that I had an opportunity of examining, for seven years, in the dead house of St. George's hospital, the hospitals on the continent, and for the last twenty years in private practice. This would appear to arise from the yielding nature of the coats of the vessels permitting their being pushed out of the way and flattened: some are thus rendered impervious by pressure from without, and others are possibly obliterated by accumulations in their interior. Now and then a considerable vessel does get laid open in the formation of a vomica. This happened to Miss B——, aged 17, (attended with Mr. G. Chapman, of East Retford,) and whose death was the result of hœmorrhage. I saw a young man, Mr. S——, aged 22, in consultation with Mr. Harrison, of

Sheffield, some years ago, in consequence of rather a copious exhalation of blood that suddenly came on during the night, and tinged the matters expectorated, and which evidently came from a large cavity in the upper portion of the left lung. The case is different with the bronchial tubes, which do not admit of easy compression; and in the blending together of the softened tuberculous bodies, by which these cavities are created, the air tubes included within this pulpy mass become stopped up by it, and when the whole breaks down, by the process already described, they are coughed up with the rest: their open mouths remain at the point where the tuberculous matter stopped, and when this also becomes soft channels are formed, through which it may get into the trachea.

In another case that I examined, that of a young lady aged 26, who had died from fever, and with whose previous history I was altogether unacquainted, I found near the apex of the left lung the remains of a cavity of considerable size, lined with a fibrous membrane; and in other parts of the lungs were tubercles in that condition, to which Rokitansky has given the name of *obsolescence*. A portion of this lung was seen by Mr. S. Lane.

Two cases of *post-mortem* examinations have been recorded by Dr. Turnbull, of Liverpool, which are highly interesting, as showing the process by which these excavations may be healed. The first is that of a patient who died from acute bronchitis. On opening the chest the right lung was found firmly adherent at the upper part. A cavity of more than ordinary size, large enough to contain an apple, was discovered, anteriorly, near the apex, having an irregular surface with projecting ridges, as if formed by the union of several smaller ones. It was lined with a greyish-white membrane, which was well organized, and evidently contracting. There were some deep red spots

and patches upon it, apparently indicating the occurrence of recent inflammation in the new structure. Below the large cavity there was another, the size of a walnut, lined with a white membrane free from any purulent secretion. At the apex of the left lung there was also a large cavity lined in the same way, and in both lungs were tubercles more or less advanced, of a dark colour, proving they had not recently been deposited. In the other case the left pleura was extensively adherent, and at the posterior part of the lung, four inches below the apex, there was a very distinct cicatrix running transversely an inch in length, and penetrating half an inch into the lung. This could only have been caused by the healing of a cavern of very considerable size. Deeper still there was a cavity, the size of a small walnut, lined with a thick and rather soft membrane, and filled with a thick secretion of a greyish-white colour, not unlike sebaceous matter. In front, the upper lobe was contracted and more dense than natural, and about an inch and a half below the apex there was a cavity smaller than the first, and lined completely with a firm, well-organized fibrous membrane. Dr. Turnbull thus concludes his description:—"The tissue of the lung, lower down, was firm and rather shrunk, and it contained two or three small cyst-like cells filled with a thin yellowish fluid. In their vicinity there were one or two very small cretaceous bodies, the sole remnants of absorbed tubercles; and, as the lungs were in other respects healthy, and the two cavities in process of contraction, or at least producing no injurious effect upon the health, there is no reason to doubt that so far as the lungs were concerned this individual might have lived to an advanced age. * * * An examination of the liver and stomach proved at once that she had not died from the pulmonary disease, but from cancer of the liver." p.p. 22, 23.

(*b*) *Cretification.* When tubercle, instead of softening and breaking down as already described, is not further developed, and wastes by the withdrawal of its nutritive material, it undoubtedly undergoes a highly favourable metamorphosis: it gradually becomes drier—the organic elements can no longer be recognised, and it becomes of a cartilaginous density; whilst calcareous salts are generated, in the tuberculous masses, the cretified tubercle very often remaining as a hard irregular mass, surrounded by indurated tissue. As a general rule no further change takes place, but in some instances the greater part of the deposit is either coughed up or removed by absorption.

Cure of Thoracic Consumption. With regard to the cure of pulmonary consumption Laennec remarks (Forbes' Translation, 2nd edition, p. 358,):—"From considering the *great number* of the phthisical and other subjects in whom cicatrices are found in the summit of the lungs, I think it more than probable that hardly any person is carried off by a first attack of phthisis." In the Archives Générales de Médicine, 1839, is a paper from the pen of M. Rogèe, on the curability of phthisis, in which the details are given of several cases which prove that the calcareous bodies which are found in the lungs are the result of the transformation of tubercle. Dr. Turnbull had a patient in the Liverpool infirmary who died of tubercular peritonitis. The abdomen contained "a very large quantity of matter like mortar, and the mesenteric glands exhibited almost every form of tuberculous disease, some being in the state of crude, cheesy tubercle, and others undergoing transformation." In this case the liver was found to be "fatty"—a fact tending, Dr. Turnbull thinks, to show that fatty degeneration of the liver, so often seen in persons who have died of *thoracic consumption*, cannot be a result of the function of

respiration being interfered with, but that it has some peculiar relation to tuberculous disease generally, and is more frequently found in pulmonary consumption, because, as we have already seen, the lungs are the organs in which tubercles most generally and in the greatest abundance exist. In a paper in the "Edinburgh Medical and Surgical Journal," for April 1854, my friend Dr. Bennett considers the existence of cicatrices which denote the spontaneous obliteration of a vomica as far from uncommon. Andral gives the histories of eight such cases, and Louis relates two or three. In one of the chapters of his interesting work headed "Examen de cette question: la guérison de la phthisie est-elle possible?" Laennec fully enters into the subject of the cure of consumption, not only by the cretaceous transformation of tuberculous matter, but also by the cicatrization of cavities. *Eight* or *ten* cases are related, and in three this celebrated stethoscopist was fully satisfied that he had traced the healing of cavities, where recoveries took place after all the worst symptoms had supervened. That consumption undergoes a cure in this way is admitted by all the members of our profession who have devoted any attention to the subject. The numerous cases of *post mortem* examinations now recorded, in which cicatrized cavities have been found in the lungs of individuals even when they have not been known to exist during life, explain to us how large and small vomica may be obliterated.* The labours of modern

* Dr. Williams states he found phthisical lesions in the lungs of half the adults he had examined after the age of 40. Professor Bennett found concretions and puckerings in 28 out of 73 bodies. Rogée states "that of 100 aged persons who died at the Salpêtrière, 51 had concretions and other traces of tuberculous disease of the lungs, and in five of the cases he found cicatrices of cavities which had healed." Dr. Bennett has recorded the case of a man who, at the age of 22, laboured under all the symptoms of a deep decline, but recovered and died at the age of 50 of an affection of the brain; the apices of both lungs contained cretaceous tubercles, and were puckered, and the cicatrix at the summit of the right lung was from a quarter to three-fourths of an inch in breadth and three inches in length.

pathologists have proved that thoracic consumption does in many instances continue far longer than at one time was thought possible, and that in some varieties of this disease the active duties of life may be carried on with a high degree of comfort and efficiency.

Formerly, in considering the way in which phthisis admitted of being cured, the only idea suggesting itself to the mind was that a cavern that had once been open had now closed, the accidental membrane which enclosed the cavity being contracted, and drawing with it the pulmonary substance, so as to produce external puckering, whilst within there was presented an imperfect cicatrix of fibrous material.

My own experience would, however, lead me to conclude with Dr. Theophilus Thompson, to whose labours we are not a little indebted, that this is not the general way in which thoracic consumption is arrested. Under favourable circumstances, he thinks, (and of the truth of this I am daily becoming more and more certain,) that tubercle does not unfrequently undergo a favourable metamorphosis, and its development ceasing, it may waste from the withdrawal of nutritive material. The organic elements are, as we have already noticed, then absorbed, leaving only calcareous salts combined with aggregated fat globules, pigment-masses, and plates of cholesterine. In this variety of phthisis there may be heard a delicate sound, usually persistent, and giving to the ear the idea that the air is entering the lung by a succession of waves rather than in a continuous stream. This, so far as I know, was first pointed out by Dr. T. Thompson, and described by him as "*wavy inspiration*"—a modification of the respiratory sound of great practical importance, as denoting, together with increased weight, a diminished amount of expectoration, and the coughing up of portions of calcareous matter,

a favourable termination, or at any rate an arresting of the disease, and the probability that the tubercles have undergone the calcareous metamorphosis. Such cases are happily far from uncommon.*

The faithful record of the above cases, occurring in the professional experience of other physicians as well as myself, in which at each of the different stages of thoracic consumption patients have most certainly been restored to at any rate a moderate share of health and of enjoyment, (and other cases of *arrested consumption* will be found narrated in succeeding chapters), imparts a lesson of no ordinary importance; since it is proved that cavities may be healed by cicatrization, by contraction with chalky or calcareous concretion, or by the formation of a thick tough fibro-cellular lining membrane, the cavity remaining persistent,—to despair for the future in any case of phthisis is certainly unwise. For our consumptive patients we have ground for hope, and hoping, it is our duty to resort to all the appliances within our reach—medical, hygienic, climatic —to bring about what some will call an *arrest*, what others will describe by the still more cheering title of *recovery*, but what, designate it as we may, will prove in numerous cases an invaluable boon.

* See the next chapter.

CHAPTER III.

ACUTE AND CHRONIC THORACIC CONSUMPTION. GRINDERS' DISEASE.

In considering, at the conclusion of the last chapter, the processes whereby consumption may be cured, allusion was made to the conversion of tubercle into calcareous matter. Dr. Watson remarks, in his 56th lecture, "Let me tell you while I think of it, that the expectoration of these chalk-like concretions, denoting as it usually does the existence of pulmonary consumption, *marks at the same time the chronic character of the case.* I am acquainted with a gentleman who, though delicate, enjoys a fair share of health, and who has for years been coughing up at intervals little branching fragments like bits of white coral, consisting principally of carbonate and phosphate of lime, and evidently moulded in the smaller bronchial tubes." There is a wonderful difference between these chronic cases and such as are acute: in the latter a rapid deposit of tuberculous matter may take place in both lungs at the same time; all the symptoms are unusually severe; the cough daily increases; the expectoration becomes more and more copious, and quickly goes through its various changes; the hectic fever is violent, and the night perspirations are copious. Next, diarrhœa sets in: there is rapid ema-

ciation, and in six weeks or two months the patient dies of what is popularly, and very correctly, styled a *galloping consumption.* In the Archives Générales de Médicine, vol. ii., p. 205, Andral relates four cases of this rapidly fatal form of consumption, three of which occurred in young persons, and terminated in from three to five weeks. This form of phthisis usually occurs in the young and in such as have the tuberculous cachexia strongly developed, often commencing after hooping cough, measles, or scarlet fever. I have generally observed that these diseases have only acted as excitants—that the children were previously feeble, and that they were the offspring of consumptive parents. If cases of this form of phthisis be regarded as simply inflammatory, as they too often are, by the careless or inexperienced, a fatal termination will frequently show the fallacy of the favourable prognosis they may have been deluded into pronouncing. Such mistakes can generally be avoided by a little careful inquiry, and by remembering that these attacks usually occur in the members of families of a strongly-denoted strumous constitution. The rapidity with which this form of phthisis proves fatal may be explained in two ways. It either occurs in persons with so highly tuberculous a state of the system as only to require the agency of some exciting cause to produce the exudation of tubercle, or in other cases, the rapid progress of the disease may be more apparent than real; for although remaining latent, tuberculous disease has previously existed in the lungs, making little progress until some circumstance or other has induced pulmonary congestion. From this time the disease becomes active, and, from the previous condition of the tubercles, soon runs its course.

Chronic thoracic consumption generally exists at a more advanced period of life—after the 40th year—the acute form

occurring most frequently in the young. This chronic form of phthisis, first described by Bayle and Laennec, may continue during the greater part of a man's life. Its early stages are little marked. It often occurs in merchants' clerks and others leading a sedentary life, and as such are often the subjects of dyspepsia, although they may have a slight cough and be languid, and little capable of exertion, the stomach is generally thought to be the offending organ, and this, in the opinion of the patients and their friends, becomes quite clear when they see the cough leaving them in the summer, and that a few weeks in the country or at the sea side quite renovates them, and that they return with good looks and a good appetite, having gained many pounds in weight. But with the winter the cough returns: again they become thin, languid, and totally incapable of much exertion; and though attending to business as usual, that which was once a pleasure now becomes irksome and fatiguing. The state of health varies a good deal; they are liable to acute catarrh, pleurisy, or pneumonia; take cold after the slightest exposure; and when an attack of acute catarrh comes on it is often severe, and is sometimes attended by fever and copious expectoration—symptoms which seem to threaten life. They recover, appearing to have a sort of chronic catarrh: the appetite is good, but what they eat is imperfectly assimilated; they are short-breathed, and cannot endure much of either mental or bodily exertion. If a patient labouring under this form of chronic phthisis be in the upper or middle walks of life, and not obliged to expose himself to the vicissitudes of temperature to which our fickle climate is obnoxious, he may live for years, delicate it is true; but the cough is little regarded—it almost goes away in the summer, and the dyspnœa has come on so slowly as hardly to be noticed. I have often been told by such patients that they

have always been short of breath since boyhood, and that they remember they could never run, and jump, or play at cricket like other lads. This form of thoracic consumption appears of long growth, and to be most generally present in the higher ranks of life, or in those in whom there is no very marked hereditary predisposition. It may occur in the merchant's office, and in those engaged in unhealthy occupations; but the evil day is put off, perhaps by living out of town, which secures a walk and fresh air night and morning, or by a few weeks spent now and then in the country, free from the cares and anxieties of business. An examination of the chest seldom leaves any doubt as to the nature of this affection: one or both of the clavicular regions will yield a dull sound on percussion, and, on taking a deep inspiration, the upper part of the chest is seen to move much less than in a healthy individual. On applying the stethoscope, the *expiratory murmur* will be found *considerably prolonged*, the voice more resonant than natural, and the sounds of the heart very distinct over the dull patches; (condensation having taken place in the lungs, from the deposition of tubercles, they have become better conductors of sound). Moist clicks will also be heard during the progress of the disease, and often over the greater portion of the apex of the lung, both before and behind, the wavy inspiration will be very apparent—the microscope also enables us to detect, not unfrequently, portions of the elastic tissue of the lungs in the expectoration. "Sometimes," says Sir James Clark, "in these chronic cases the tuberculous matter becomes softened and expectorated, leaving cavities at the summit of the lungs, some of which, having discharged their contents, are either in the process of cure or actually cicatrized."

That such a patient may exist for years, if his habits of life be regular and temperate, and if he avoid exposure to the night

air and to other causes having a tendency to produce inflammation of the lungs, we have the authority of the same distinguished physician for asserting; but then such a one is ever in the greatest danger—the grave is daily open before him, and a slight cold, an attack of bronchitis, or any febrile affection, which would have been of trifling moment in a healthy individual, cuts the slender thread of existence, and death, preceded by all the ordinary well-marked symptoms of consumption, quickly occurs. In some of the cures that have been reported as taking place in consequence of the administration of cod-liver oil, the patients are stated to have reached the age of 35, 36, and 40. Of the cases of cure detailed by Louis, one was aged 45, and another 50.

This chronic type of thoracic consumption is well deserving the attention of the profession: in its early stages it may be arrested, and this can only be accomplished by such an improvement of the general state of the health as shall remove or considerably mitigate the tuberculous diathesis. Diseased conditions of the digestive organs were mentioned as often present at the commencement of this chronic form of phthisis: and this irritation of the digestive functions, the result of a congested condition of the liver and abdominal vessels generally, demands the most serious attention of the physician.* The statistics of *thoracic consumption*, as an indication of the advantages of any particular line of treatment, require to be received with very

* "From a study of the symptoms, causes, morbid anatomy, and histology of phthisis pulmonalis, we are, therefore, led to the conclusion that it is a disease of the primary digestion, causing—1st, impoverishment of the blood; 2nd, local exudations into the lung, which present the characters of tuberculous exudations; and, 3rd, owing to the successive formation and softening of these, and the ulcerations which follow in the pulmonary or other tissues, the destructive results which distinguish it. Further observation shows that circumstances which remove the mal-assimilation of food, frequently check further tuberculous exudations, while those which previously existed become abortive, and that occasionally more extensive evacuations in the pulmonary tissue may, owing to like circumstances, heal up and cicatrize."—PROFESSOR BENNETT.

great caution: we have within the last few years seen so many vaunted remedies which have gone up like rockets fall to the ground as sticks, that we are bound to receive the results of the treatment of consumption by any particular remedy with the greatest possible caution; and, although there is evidence that the exhibition of cod-liver oil has been followed by the most marked advantage, we have yet to learn that cod-liver oil is a *specific in the cure of thoracic consumption*, any more than a thousand other remedies which have one day been spun to the most exalted position by the whirligig of fortune, the next, "as fickle fancy changes," to follow their predecessors in their fall; still it is certain that more advantages arise from the oil than from any other remedy with which we are as yet acquainted.

The following table, extracted from the report to which allusion has already been made, shows the ages in decimal periods of 2,679 males and 1,670 females, labouring under thoracic consumption, and the per centages of the sexes at each period of life:—

TABLE IV.

Ages.	Males.	Per cent.	Females.	Per cent.	Total.	Per cent.
0 to 5	9	0·33	12	0·71	21	0·48
5 to 15	125	4·66	112	6·67	237	5·43
15 to 25	695	25·94	574	34·19	1269	29·11
25 to 35	953	35·50	578	34·42	1531	35·13
35 to 45	570	21·27	271	16·14	841	19·29
45 to 55	251	9·37	110	6·55	361	8·28
55 to 65	68	2·53	21	1·25	80	2·04
65 to 75	8	0·29	1	·05	5	0·20
Total Males..	2,679	Total Females	1,679		4,358	

Below the age of puberty, tubercles appear to exist (see the tables prepared by Papavoine*) most frequently during the third,

* These tables are calculated on the examination of an immense number of bodies.

fourth, fifth, and sixth years. M. Andral* states, "tubercles are most prevalent from four to five; they appear in much greater quantities, and in a greater number of organs at once." After the age of puberty, the greatest number of deaths occur between the ages of twenty and thirty—the next in proportion between thirty and forty—the next between forty and fifty; the succeeding grade of mortality sometimes is found between fifteen and twenty, sometimes between fifty and sixty. All writers agree in stating that one half of the deaths from thoracic consumption occur between the twentieth and fortieth years, and that its maximum is reached at thirty; from this age the rate of mortality sensibly diminishes.

The following case well illustrates this chronic form of phthisis:—June, 1855. Mr. M——, aged 37, residing a few miles from Sheffield, requested my opinion in consequence of a cough that had troubled him for the last three months. He stated that his weight was now about 10st. 7lbs., and his height 5ft. 9in.; and that two years ago he weighed nearly 12 stones. His father and mother were both living: he was one of a family of six, all of whom were alive: had never heard of consumption in his father's or mother's family. Two years ago he had for a few days a cough—his expectoration was then tinged with blood for about a week, but this got better under the care of the usual attendant of his family. He was not married; had never had syphilis, or taken mercury that he was aware of. He has generally had a cough since the attack of hœmoptysis, more particularly in a morning when he first gets out of bed: this has increased of late, and he now coughs a good deal during the day. The expectoration at this time was gelatinous, and the microscope showed corpuscles differing in shape and in size. [It may be noticed here, that even when

* Andral's Anat. Path., Townsend and West's translation.

there is no tendency to thoracic consumption the microscope will often exhibit in the expectoration of those suffering from pulmonary congestion corpuscles of one uniform kind, having a reaction similar to pus globules; but when the pulmonary congestion arises from tubercle, even at a very early stage, according to my own observation, the corpuscles vary in form, and have *jagged margins*, only seen, as far as I know, in the sputa of those who are labouring under thoracic consumption.] He said he had once coughed up something that was hard and white, at which time there was also a little blood. He has always from a child suffered from dyspepsia. There was nothing peculiar in the gums—the pulse was 84; the bowels were regular and the urine deposited lithates. He complained of pain over the clavicular regions on both sides, where some little dullness on percussion could be detected. A wavy inspiration, extending over the whole of the front of the left apex, could be heard, and in one or two places a slight friction sound was apparent. A small blister was applied on the left side, under the clavicle, and he was ordered a few grains of rhubarb at night, and an ounce of the infusion of roses with two drops of hydrocyanic acid (Scheele's) three times a day. In a week or two he was much improved, and I directed him to take cod-liver oil (a teaspoonful three times a day), and to go to the sea-side. He gained weight, his cough nearly left him, his general health was better, and I did not see him again until the end of September. He then told me he had taken cold, that he had constant pain under the left collar bone, and had again noticed that his expectoration was streaked with blood; he complained of shortness of breath and said "it killed him to go up hill." A humid click was now very distinct over a small portion of the apex of the left lung. His cough was troublesome and the expectoration consisted of *free fat and other granules;*

disintegrating nucleated cells imbedded in a matrix, together with elastic tissue of the lungs: one or two pus globules were also present. He was ordered to rub his chest with an embrocation composed of two drachms of croton oil, two of liquor potassæ, and four of water: as the eruption this produced died away the application was repeated, and the chest kept more or less sore for two or three weeks. He increased the quantity of cod liver oil to a tablespoonful three times a day, and took eight grains of the compound ipecacuanha pill every night; he sponged the upper part of the chest night and morning with cold water and used a flesh brush: the diet consisted of milk, eggs, meat once a day, and a little bitter beer or porter: he wore a *respirator* and took exercise in the open air whenever the weather permitted. I saw this gentleman, now and then, till June, 1855: during the whole of this period he had gained rather than lost weight; he had occasionally slight attacks of hœmoptysis and at intervals a good deal of pain above the left nipple. He said he could take cod liver oil no longer, and a draught of the compound decoction of sarsaparilla, with two grains of the iodide of potassium, was substituted, and taken three times a day, the chest being well rubbed night and morning for a quarter of an hour with an embrocation consisting of *one ounce and a half of cod liver oil, two drachms of the oil of turpentine, and two of camphor;* (this endermic method of employing cod liver oil has appeared to me in numerous cases of the greatest advantage.) During the month of August he had pain in the left shoulder and, in the front of his chest on the same side; his expectoration for about ten days at this time was streaked with blood, and, from his description, for I did not see him, had evidently contained an abundance of chalky matter.

November, 1855. The moist click is now no longer present

on the left side, but there is still bronchophony, and at one point the wavy inspiration may still distinctly be heard. He weighs 11 stones, and can walk five or six miles without inconvenience; his cough has entirely left him. This is certainly a most encouraging case, as showing how thoracic consumption is arrested, and how, though to some extent an invalid, a man after such an attack may have a fair share of enjoyment and discharge efficiently the duties of his station. I know a gentleman, now retired from our profession, in whom after thoracic consumption had made considerable progress (and whose case appeared at one time altogether destitute of hope), the disease was arrested, and he has enjoyed for the last five or six years a tolerable degree of health. Being a man of great intelligence, and thoroughly understanding what is requisite to be done under the circumstances in which he is placed, I have no doubt that much of his comfort has arisen from taking care that the demands upon his lungs have not been greater than their diminished capacity would supply. In other words, he has so regulated the exercise he has taken, that the portion of healthy lung that remains has been equal to the duties it has had to perform.

From what I have seen of cases where an attack of tubercle has ended in excavation, I venture confidently to assert that although under treatment very great improvement does take place, there is, unquestionably, a limit beyond which, so far as my experience enables me to judge, recovery does not extend. By this I mean that a person who has once weighed, as in one of the cases just narrated, 12 stones, never does so again: he never gets back the flesh which he has lost. It is true that he may follow his usual calling, but to his convalescence there will be from time to time certain hindrances, and he never becomes again—at least I have never yet seen an instance—

either in muscle or in vital energy, quite equal to that standard of health which he had once attained. Dr. Pollock, in his clinical lectures, published in "The Lancet," has very well explained why this is so. In such a state of things, he says, there is "a diminished respiratory volume, and with it there is necessitated a diminution of the daily waste of the carbon in the system, which otherwise could not be got rid of, but must be thrown on other organs in excess or remain in the blood as a poison." And yet, many of these cases may, and do, go on for years: invalids it is true they are, but with good care and attention many of the enjoyments of life are within their reach.

Grinders' Disease. There is no necessary connection between this disease, which proves fatal to so many of the industrious artizans of Sheffield, and thoracic consumption. It is possible the two diseases may exist, as in the cases described by Sir A. Knight,* in the same individual, but the connection is purely accidental. Many years ago Mr. Thackrah pointed out the effects of arts, trades, and professions on life and longevity. Stone-masons, quarrymen, cotton-batters, miners, needle pointers, machine filers, and, in Sheffield, FORK GRINDERS, RAZOR GRINDERS, and TABLE-KNIFE GRINDERS, all suffer more or less from inhaling during their labours an atmosphere charged with irritating particles. The fork grinders suffer the most, being *dry grinders.* The mortality ranges next in degree amongst razor-back grinders and those who are partly dry and partly wet grinders, and is much lower amongst table-knife grinders and those who work on wet stones. It should also be added that in all these trades the mortality is greater amongst the workmen who are obliged to labour in the town, than amongst those carrying on the same trades in the villages around Sheffield. In all

* North of England Medical and Surgical Journal, Vol. I., p. 86.

these cases of chronic bronchial disease there is, in addition to the question of pulmonary irritation, the fact that many of these men are exposed to influences tending to induce the tuberculous cachexia: they pass many hours every day in a confined and deteriorated atmosphere, and the position in which they are obliged to work is unfavourable to the free action of the respiratory organs, and many of them are very intemperate. Much of the evil arising from the inhalation of metallic and gritty particles could be avoided by working in rooms where means are provided to prevent the inhalation of grit-dust, &c.; but, singular to relate, these men are so indifferent as frequently not to make use of the means at their disposal for rendering their calling at any rate less injurious. Dr. Alison states, "there is hardly an instance of a stone-mason in Edinburgh free from this affection of the lungs at the age of 50.* Dr. Forbes states,† "that an immense proportion of the miners in Cornwall are destroyed by chronic bronchitis." Wepfer‡ had observed, in his day, the destruction of the miners employed in cutting millstones from the mines of Waldschut, on the Rhine, where all the men are said to have become consumptive. The pernicious effects of the inhalation of silex in a minute state of division is described by Benoiston de Chateauneuf and M. Clozier;§ and many years ago Dr. Johnstone, of Worcester, described the injurious effects to the respiratory organs from the inhalation of metallic particles as exemplified in needle-pointing.‖

* Trans. Med. Chir. Soc., Edinburgh. Vol. 1.

† Trans. Provincial Med. Sur. Association. Vol. II.

‡ Observ. de capitis affect. § Le Blanc, Œuvres Chirurgicales. Vol. I., p. 585.

‖ Memoirs of the Medical Society of London.

The Sheffield *grinder's asthma*, or *grinder's rot*, (and the same remark applies to the various forms of disease induced by the inhalation of irritating particles of different kinds, as is seen also in stonemasons, quarrymen, the machine filers at Leeds, the miners, cotton-batters, &c., &c.,) may be described as mechanical bronchitis. The digestive functions are impaired, the fauces are dry, and the respiration is difficult; and to this state succeeds habitual cough. The disease is in fact chronic bronchitis, followed as a matter of course by dilatation of the tubes, and, at last, inflammatory destruction and excavation of the substance of the lung takes place.

What are the physical signs of the *grinder's disease?* Those of bronchitis and dilated bronchi in some cases; in others of emphysema, or of consolidation; and, lastly, of excavation; but, in many cases, the general symptoms are not in proportion to the extent of the disease in the lungs. A knowledge of the occupation of the patient will, however, always ensure, with ordinary care, a correct diagnosis.

The first essential in the treatment of these unfortunate cases is to induce, if possible, a change of occupation.

A chronic form of thoracic consumption is very common amongst bricklayers, and the poor Irish generally, in the metropolis and larger manufacturing towns. Exposed to every inclemency of the weather, scantily clothed and badly fed, one attack of catarrh, bronchitis, pleurisy, or inflammation of the lungs, is quickly succeeded by another, until, at length, the whole of the lungs having their pleura more or less adherent over their whole extent, presents a mass of disease partly tuberculous, and partly the result of inflammation. Sometimes a difference of opinion may arise as to the real nature of the apparent tuberculous infiltration, from the resemblance it bears to chronic pneumonic consolidation. Dr. Walshe regards them as

identical. It is possible, however, that in a person whose blood is affected to a great degree with the tuberculous dyscrasia, inflammatory hyperæmia may lead to the exudation of a material having a close resemblance to the tuberculous, but not so inclined to soften and break down.

CHAPTER IV.

PHYSICAL EXAMINATION OF THE LUNGS IN THORACIC CONSUMPTION. AUSCULTATION AND PERCUSSION. TABLE OF SOME OF THE MORE IMPORTANT DIAGNOSTIC SIGNS. MICROSCOPIC EXAMINATION OF THE SPUTA. SYMPTOMS OF THE DIFFERENT PERIODS OF THORACIC CONSUMPTION, &c., &c.

Before proceeding to consider in detail the different symptoms indicative of the several periods of thoracic consumption, a few brief hints on the best way of proceeding with the physical examination of the chest may not be out of place—hints the importance of which will be evident to the experienced practitioner, and not without utility, I trust, to the student. The necessity for some exact rules for the physical examination of the chest will be apparent to any physician who has observed the clumsy way in which young men frequently set about the auscultation of the pulmonary organs. The student will do well to take his first lesson, not from books, but from a healthy adult; and I venture here to repeat the advice which was given to me by the late Dr. Hope, whose pupil it was my good fortune to be for many years. "Never," said he, "commence by examining a diseased person: first learn the sounds natural to a healthy chest." If students would condescend to take this advice how greatly would their labours be lightened, and how much better stethoscopists would they become!

It is desirable that the person to be examined should be placed in a chair in a slightly inclined position, and if the room be warm and the patient a male, the clothes had better be removed to the waist, and the whole of the anterior part of the chest at once exposed to view. The wishes of a lady can always be consulted by throwing a shawl over her shoulders, so as to leave uncovered only the part it is necessary to examine at one time. From an inspection of the chest, we endeavour to ascertain both its *form* and *size*. The size of the chest is of less consequence when considered as a whole, than as consisting of two divisions, the relative proportions of these being the point of most importance. The *motions* of the chest are *general* and *partial*, the general motions consisting of elevation and expansion, the partial of a movement of the ribs in respect to each other. The examination of the chest should be practised *anteriorly*, *posteriorly*, *laterally*, *and from above downwards*. In health, and where there has never been any disease of the thorax, the form of the chest may be *regular* or *irregular*, and this being the case it is of no little importance to ascertain, when there is a variation from the usual form, whether such irregularity be congenital or the result of disease. Chests are of a more regular form before than after the age of thirty, and in such as follow pursuits requiring little muscular exertion. Having with the eye obtained a general knowledge of the form of the chest and its movements, and carefully compared the one side with the other, the hand is to be applied gently on the chest, so that the sense of feeling may assist that of the sight. If the hand be placed upon the chest of a healthy person, when speaking, a vibratile tremor will be felt, and this will be in a direct ratio to the peculiar quality of the voice; it will vary, also, with the shape of the chest, being more intense in tall than in short persons, and

much more marked in thin than in fat people; and, as a general rule, is much greater on the right than on the left side of the chest. The fremitus in health varies in intensity in different parts. Over the larynx and trachea it is most marked—stronger at the sternal than at the humeral halves of the intra-clavicular regions, faintly apparent on the right clavicle, and not distinguishable at the top of the sternum. In *disease* it may be either increased or diminished, and this will be most correctly ascertained by making a special comparison with the corresponding point of the opposite side. In doing so, the natural difference which exists between the two sides must not be forgotten. With regard to thoracic consumption, I may hint that the vocal vibration is rendered more intense by tuberculous infiltration, unless this be carried to a very remarkable extent. When this is the case, especially if the infiltrated parts be at some distance from the larger bronchi, the vibration will be deadened. When it is thought necessary to ascertain more accurately still the comparative bulk and volume of the two sides of the chest, recourse must be had to mensuration; and if this be done during inspiration and expiration, we learn, in health, the exact degree of expansion and retraction of which the chest is capable, and discover in disease the amount of deficiency of expansion on both sides, or of one side when compared with the other. There is, also, another way by which the expansibility of the lungs may be estimated—namely, measuring the cubic inches of air which can be expelled from the chest, after the fullest possible inspiration. The most correct investigations of this kind are those of Dr. Hutchinson, made with his spirometer. He endeavours to show that the bulk of air received by the lungs in health, increases in a certain ratio with the height of the individual. At the height of five feet the mean volume is 174 cubic inches, and for every inch of

stature from five to six feet, eight additional cubic inches of air at 60 degrees Fah. are given out on a forced expiration. This being set up as a general standard, it is said that a deficiency of 16 per hundred is suspicious, and that beyond this the deficiency is certainly morbid. I have given this plan a fair trial, and it appears to me that the proposed standard of height is in practice of questionable value, and that this instrument, notwithstanding its merits in noting the imperfect expansibility of the lungs, is not of so much practical utility as an ordinary tape.

The next step is to examine the chest by percussion, and the fingers may be applied either parallel to the ribs or at various angles with them. The index and median fingers, having their points placed on the same level and supported by the thumb, furnish the best instrument for striking with; or, the index finger alone may be used when very gentle percussion is required, and in children I always make use of it only; but, under any circumstances, the force used must not be great. No mention need here be made of those peculiar hammers, of home and foreign manufacture, of various shapes and sizes and material, the taking of which out of their cases with solemn mien is enough to terrify a timid patient, except to remark that it is very difficult to discover in them any advantages over the fingers to compensate for the loss the practitioner sustains when using them, in being deprived of the information furnished by the sensation of resistance and resilience in the parts percussed. In percussing a chest perfectly free from disease we are conscious of a motion arising from a slight yielding of its walls, accompanied with a sensation of elasticity. The sounds of the chest vary in different individuals and in different parts of the same chest. For example: the middle portion of the sternum, on the right side, is the most resonant, while the

sound will be found to be duller in the regions of the pectoral muscles and scapula. The resonance is clear in proportion to the thinness of the walls, and, in the old, the cartilages of the ribs, from the larger quantity of ossific matter which they contain, render the parts less elastic and diminish the resonance. This effect, however, is often counterbalanced by the diminished quantity of fat, and even of muscle, on the surface of the chest, and by the enlargement of the air-cells, also, the resonance is at times increased. In disease the following are the principal alterations of sound elicited by percussion, and the indications they furnish are most precise and valuable. On two or three of these variations, as resulting from the several stages of thoracic consumption, a few hints will not be out of place.

The statical changes in the percussion sound resulting from disease are :—

(*a*) Loss of clearness: this may be very slight, or pass by degrees into the most complete dullness. When this is the case the duration of the sound will be reduced in proportion and the sense of resistance increased.

(*b*) Sound more clear—duration longer—sense of resistance diminished.*

(*c*) Increase of clearness and duration, with increase of resistance.

(*d*) Alterations in the quality of the sounds.

1. The sound elicited on percussion is less clear whenever there is accumulated within the chest a new material of a greater density than lung and air, combined in their natural relationship—as in chronic consolidation or tuberculous infiltration of the parenchyma of the lung; likewise in effusion into the cavity, or thickening of the substance of the pleura.

* This occurs in pneumothorax, and, according to Dr. Stokes, extreme anæmia, by lessening the relative quantity of blood in the lung, may possibly increase the clearness of the percussion sound.

The sound is also less clear when there is an abundant muco-purulent secretion accumulated within the bronchial tubes, or when there is dilatation and thickening of the bronchi condensing the adjacent parenchyma. The thickening of the periosteum of the ribs in syphilitic persons (a point of no little clinical importance in our present inquiry, for when treated by long courses of mercury it is frequently followed by phthisis), will also deaden the sound.

2. Increase of clearness and duration of sound, with increased resistance also of the walls of the chest, occurs when there is a surplus of air in the subjacent parts, with considerable induration of tissue between the surface and the part containing that surplus.* This condition is frequently met with when there is a superficial cavity in the lung having a very thin, indurated, and adherent external wall.

3. *Alterations in the quality of the sound* are much more difficult to describe. These morbid varieties are known as the *wooden*, the *hollow*, and the *tympanitic*. The *wooden* sound is heard in all descriptions of consolidation, when there is present an abundance of indurated false membrane. The *hollow* type presents three varieties. 1st. The *tubular*. 2nd. The *amphoric;* and 3rd. The *cracked-pot*. (*a*) The *tubular* is exactly like that of the resonance produced by the mediate percussion of the windpipe: it can always be best heard by keeping the patient's mouth wide open; and, generally, with the most distinctness at the inner part of the infra-clavicular and upper mammary regions. It is heard when there is solidified lung (acute or chronic), pent up collections of matter, or solid products of any kind, lying between the larger bronchi and the costal surface. A similar resonance is furnished by small or

* See the interesting remarks of Dr. Walshe on this subject, p. 61.

medium-sized excavations in the lungs, and the same effect may be produced by dilatation of the bronchi. (*b*) The *amphoric* quality is only an exaggeration of the tubular. It may be well imitated by filliping the cheeks with the finger, when the mouth is shut and moderately inflated. The origin of this sound is, in the great majority of cases, a large cavity in the lung, situated near the surface and having hard and thin walls. (*c*) The *cracked-pot quality*, or *bruit de pot fêlé*. When this sound is heard in a case of thoracic consumption there is generally present in the lung a cavity of very large size, with anfractuous walls, *which has a free communication with the bronchial tubes*. It has been attributed to the collision of liquid and air, produced by striking the chest; but the cracked-pot sound may be heard over cavities when they are quite dry, and even in chests where the lungs are perfectly healthy; and Skoda, and Dr. Stokes, showed long ago, that it may be produced on percussing the chests of young children. To hear this sound it is necessary always to have the mouth of the patient open, for if, after this sound has been heard, the mouth and nose be closed it cannot be elicited, although probably an amphoric note will be given out on percussion. (*d*) With regard to the *tympanitic* variety *(drum sound)*, Dr. Graves has remarked, "the quality of the note over pneumonic consolidation sometimes temporarily becomes tympanitic."*

Since the above was in type, Professor Bennett has very kindly forwarded to me his recent elaborate investigations of the cause of the cracked pot sound, the careful perusal of which cannot fail to be highly interesting and instructive to every physician and surgeon into whose hands they may fall. He shows that it may be produced in cases of pleurisy, pneumonia, and even,

* See the remarks of Dr. Markham, "Monthly Journal, June, 1853;" and the paper by Winterich, Medizinischen Neuigkeiten, 5 Jahrgang.

as already stated, in the healthy chest; consequently, the existence of a cavity, as stated by Laennec, or of a mixture of air and fluid, as described by Piorry, is not essential. Dr. Bennett considers the conditions necessary to the production of this sound as regards the chest to be—1st, a certain amount of confined or tense air in the tissue of the lung; 2nd, the sudden compression of this air by a solid body in its neighbourhood; 3rd, communication of this air with the external atmosphere. With regard to this sound as diagnostic of thoracic consumption, he thinks that partial pneumonia can only be distinguished from limited tuberculous deposition by the general symptoms, on the one hand, and the absence of the signs indicative of a cavity, on the other; but, when in a case of phthisis the cracked-pot sound is heard, other signs of a cavity being present, Dr. Bennett agrees with other observers in concluding that it indicates such cavity to have a direct communication with the larger bronchi.

It has been said, with some degree of truth, that percussion is in fact a species of auscultation or listening; but we have now to consider what additional information may be gained from the application of the stethoscope in thoracic consumption, the object of pulmonary auscultation being the appreciation of the different sounds that can be heard on the external surface of the chest. Such sounds may be the result either of the respiratory play of the lungs themselves, or transmitted in a diversified form by these organs from others. In applying the stethoscope to the chest, which, if possible, should be uncovered, the following hints may prevent errors, and assist a correct diagnosis. (*a*) The position of the patient should be the same as advised for percussion, and the chair in which he is placed should have a high seat. (*b*) The stethoscope must be applied firmly, but not with too much force, to the chest;

for, if the pressure on the surface be either too light or too heavy, the character of the sounds transmitted will probably be altered. (*c*) The end of the stethoscope must be in actual contact with the skin at every part of its circumference. (*d*) The stethoscope should first be applied to the chest to discover three things: first, the natural respiration; secondly, the forced or exaggerated respiration; and, thirdly, the degree of vocal resonance. This knowledge is gained by permitting the patient during a minute or two to breathe in his accustomed manner; then ask him to take a deep inspiration, to sigh, or to cough. This deep inspiration enables us at once to ascertain the condition of the murmurs, and his answer to a question gives a correct notion of the vocal resonance. The sounds produced in the pharynx from the passage of the air must not be confounded with the true respiratory sounds, and the mistake may be avoided by asking the patient to open the mouth if shut, and *vice versâ*. If the sounds heard proceed from the lungs, the opening or closing of the mouth will cause no particular change; if from the pharynx, their character will be modified more or less. (*e*) Two sounds are heard on listening over the chest—the natural respiratory murmurs: one corresponding to the movement of *inspiration*, the other to that of *expiration*. The student will find no hints here as to what they resemble. I have never yet read any description of them in books that even approached accuracy, and it is indeed stupid to trouble ourselves with the notions of other men, when the truth may at once be learned from the living body itself. (*f*) Auscultation can never be considered complete until every part of the chest has been carefully examined. The examination should begin by placing the stethoscope just under the centre of the clavicle on the left side. Ascertain the amount of vocal resonance, and the nature of the murmurs

heard there; then go to the corresponding portion of the right side, making your comparison with what you have just heard on the other side. The stethoscope is thus to be applied, first on the left, and then on the right side, until the whole of the front of the chest has been explored. The posterior surface is then to be examined in the same way. (*g*) The sounds heard on listening to the lungs in health may in disease be increased, may be diminished, or may be altogether wanting. The natural sounds may be changed; first, in *duration* and *intensity;* second, in *quality;* third, in *position;* fourth, in *rhythm.* We may not only have changes in the natural sounds, but noises may be heard from alterations in the walls of the tubes as *ronchi*—in the contents of the tubes, as *rattles*—from excavations in the lungs which are accessible to the air, as *cavernous sounds*—from changes in the structure of the cells, as *dry crepitation and wheezing*, and from the motions of the two surfaces of the pleura upon each other, when impaired by disease.

My space will not, of course, permit a lengthened examination of the causes giving rise to the different sounds heard on applying the ear to the chest in health and in disease. I purpose, therefore, presently to give in a tabular form some of what have appeared to me in my own practice the most important diagnostic signs of thoracic consumption. Before doing so, however, one or two of these require especial attention. But here let me hint to others that of which I am convinced most fully, after more than twenty years of active practice, that there is no rule which has not its exceptions, no one sound, or combination of sounds, invariably pathognomonic of any particular pathological condition of the lungs, and, conversely, no pathological state of these organs invariably productive of the same stethoscopic signs.

First. With regard to the sounds of the heart, and murmurs,

transmitted through the lungs, as evidence of thoracic consumption, it may be stated, that if the sounds of the heart (the heart itself and the great vessels being free from disease, and the walls of the chest sound) be more distinctly audible under the *right* than under the *left* clavicle, and, if the excess be sufficient to leave no room for doubt in our mind, after two or three examinations, the incident, conjoined with the situation at which the sounds are heard, affords strong evidence of the existence of tuberculous deposit. In a majority of patients other symptoms of phthisis will be present also; but, in many cases of incipient, deep-seated tuberculous deposit, this sign is of practical importance. It may here be stated that Dr. Latham mentions that a soft, blowing, systolic murmur, limited to the pulmonary artery, is a frequent concomitant of tubercles in the lungs; and, that Dr. Stokes has described a sharp blowing murmur as sometimes heard in the subclavian artery, where the apex of the lung is consolidated by tubercle, which he ascribes to falling in of the infra-clavicular region, to consolidation of the lung, and, to sympathetic irritation. The murmur described by Dr. Latham has been met with also by Dr. Walshe unassociated with the subclavian murmur. The murmur pointed out by Dr. Stokes, as an evidence of tubercle, I am inclined to think seldom exists without some disease of the aortic orifice, and that the nature of the consolidation giving rise to its transmission need not, of necessity, be tuberculous.

Second. *Jerking respiration.* "When," says Dr. Walshe, "the movement of inspiration instead of being accompanied by a murmur continuous from the outset to the close (which may be represented thus * * * * * *) is divided into several unequal parts, (thus * * * | * * | * * * | * * * &c.,) the respiration may be considered jerking." This jerking respiration may be either *general* or *partial;*—general, when it is heard all over one or

both lungs—partial when limited to a small portion of one lung. The first variety occurs in spinal irritation, hysteria, spasmodic affections of the air passages, and, in the early stages of pleurisy, &c.; the partial, most generally, in tuberculous infiltrations of the lung, and in cases where there is pleuritic adhesion.

Third. *Prolonged expiratory murmur.* The altered ratio of inspiration, to expiration, is most important as a diagnostic sign in the early stages of phthisis. In a healthy condition of the lung the *inspiratory murmur* is, to the *expiratory murmur* (when it is audible at all), as *three* is to *one.* In cases of emphysema, however, this ratio may be converted in point of intensity and duration as *one* is to *four:* I mean as 1 (length of inspiration) is to 4 (length of expiration); and it is more or less prolonged in various consolidated conditions of the lungs, more especially when arising from a deposit of tubercle, though not to the same extent as in emphysema. Prolonged expiratory murmur is a sign of no slight significance as indicating the presence of thoracic consumption. A prolonged expiratory murmur, slight in degree, when heard only on the right side, must not be considered conclusive; but it is far more significant when confined to the apex of the left lung. Again, the more circumscribed the space over which it is heard, the more certain may we conclude that it is the result of tubercle. It is quite impossible that this sound can be heard day after day, for weeks together, (symptoms of pneumonia, bronchitis, or emphysema being absent), without the existence of some permanent obstacle to the free exit of the air from the lung, and in a large proportion of cases I have found tubercle the cause of the obstruction. The existence of some permanent obstruction appears satisfactorily to account for this phenomenon; for, in health, with few exceptions, the expiratory murmur is always sonorous. But, when the outward passage of the air is ren-

dered more difficult, and becomes slower, than in the normal condition of the lung, the evident result naturally appears to be a proportional intensification and prolongation of the accompanying sound. Of 2,000 cases at the Hospital for Consumption, the prolonged expiratory murmur proved the most significant physical sign in 288. For my own part, I regard it as one of the most important diagnostic signs of incipient consumption. Hardly a week passes without my seeing, either at the Sheffield Dispensary or in private practice, several patients (generally young people of both sexes, from the age of 15 to 21,) who only complain of feeling tired after the slightest exertion, and of being out of breath on walking fast or running up stairs. In a great majority of these cases, even before there is cough (except perhaps in a morning), hæmoptysis, or any one of the symptoms usually described as rendering it probable that tubercles have been deposited, on applying the stethoscope under one or both clavicles, the prolonged expiratory murmur (somewhat roughened) may be heard; and both myself and our present house-surgeon, Mr. R. M. Smith, have had occasion frequently to remark that, although in such patients the prolonged expiratory murmur was the only symptom in addition to general debility denoting a departure from a healthy condition of the lung that could be detected,—still, after a time, this has been succeeded by dullness under the clavicles on percussion, hurried breathing, a quick pulse, hæmoptysis, bronchophony, night sweats, emaciation, phthisical expectoration, &c., &c.; fully demonstrative of the truth of the prognosis expressed on first seeing the patient, that the prolonged expiratory murmur was a result of the deposit of tubercle in that portion of the lung over which it was heard. And, important as it confessedly is to detect the earliest approach of this disease, I am inclined to think that *we have in the prolonged expiratory*

murmur (accompanied as it generally is with some degree of roughness) one of the first warnings of incipient thoracic consumption.

Bronchophony. The conditions under which bronchophony is heard may be described as consolidated or compressed lung, surrounding the pervious bronchi—(that is, airless parenchyma surrounding the tube.) Whenever, therefore, the substance of the lung is much condensed in the vicinity of the bronchial tubes, without obliteration or very great compression of their calibre, bronchophony will in all probability be present. The pathological conditions in which it usually exists are hepatization, and induration from the deposit of tubercle. In its maximum degree, and marked by the metallic and sniffling quality described by Dr. Walshe,* bronchophony is heard coexistent with tubular blowing inspiration in parts corresponding to the hepatized lung. In its more simple forms we hear it in tuberculous and plastic consolidations; and, when existing as it frequently does beneath the clavicles (particularly if on one side only), it tends, other signs being present, strongly to confirm the probability of phthisis. According to the views of Skoda, this sound is produced by the occurrence of what is called *consonance*;† but, it appears to me, his explanation is not so satisfactory as that given by Dr. Barlow and others,

* "Increased resonance presents itself in the forms of exaggerated resonance and bronchophony, which are little more than degrees of each other. In quality bronchophony may be metallic, sniffling, or partake of the tremulous and bleating tone especially characterizing ægophony: commencing and ceasing abruptly, it sometimes fines off with an echoing character."—WALSHE.

† Skoda, in the fourth edition of his work on Auscultation, p.p. 91 and 104, remarks that the laryngo-tracheal murmurs and those of both main bronchi *consonate* in the air contained within the bronchi permeating the consolidated parenchyma, and thus produce the phenomenon of bronchial respiration, when intense and of high pitch; whereas weak bronchial respiration of low pitch comes directly, *without consonance*, from the lower part of the trachea, the main bronchus, or one of those of second order. It is, however, doubtful that consonance could occur in an apparatus of branching tubes like the bronchi.

who think that in a perfectly healthy condition of the lungs and air passages, the vibrations of the vocal chords, upon which the voice depends, are propagated downwards, along the trachea and large bronchi—these vibrations being communicated both to the walls of the trachea and large bronchi, and to the column of air contained within them. But the bronchi become divided into innumerable branches and twigs, which again are surrounded by the spongy lung, so that not only are the vocal vibrations broken and obstructed by being thus diverted into innumerable directions, or in other words their power of consonating destroyed, but they are also muffled, and as it were smothered by the heterogeneous substance which surrounds them, and which, also, prevents any sounds that may be excited in them being propagated to the surface of the chest.* But when, in the place of the natural spongy lung and the minute ramifications of the bronchi, a large tube is surrounded by extensive consolidation, the vibrations excited both in the walls of the tube, and the air within it, will be propagated at once to the surface of the chest.

Pectoriloquy.† In regard of mechanism, pectoriloquy is either simple bronchophony in an intense form, or bronchophony echoed by the walls of a cavity.‡ A tuberculous excavation of a moderate size, of a regular rounded shape, and having a smooth internal lining and dense walls, if situated near to the surface of the chest and freely communicating with one or more bronchial tubes (especially when there is adhesion of its periphery to the walls of the chest), will, when empty,

* Auscultation of the Voice. p. 157.

† Chest speaking; from *pectus*, and *loquor*.

‡ Dr. Walshe retains pectoriloquy as a variety of common bronchophony under the title of *pectoriloquos*.

give rise to the most perfect pectoriloquy. It must, however, be recollected that we may have the most perfect pectoriloquy in a patient one day, and the next, find it very imperfect, or that it has even entirely disappeared, owing to changes that have taken place in the interior of the cavern or of the bronchi leading to it. It is best heard in an excavation of a moderate size and of a regularly rounded shape, for, when very large or very small, the sound of the voice is often indistinct. It is also more distinct according as the voice is shrill, and therefore, in women and children, the caution of Laennec, not to mistake "natural bronchophony for pectoriloquy," is important.* This distinguished writer also pointed out that this phenomenon was impaired by a very small diameter of the communicating bronchi, and that a want of communication between the cavern and the bronchi prevented its development altogether, or temporarily, just as the obstruction itself was permanent or dependent on some accidental cause—such for example as an accumulation of secretion in their interior. Pectoriloquy also becomes indistinct when the excavation communicates by a number of fistulous openings with the bronchi; and, when a communication becomes established between the excavation and the pleura, or, should its contents be poured into the subcutaneous cellular membrane, it can no longer be heard. As a proof of a tuberculous cavity in the substance of the lung, we have many

* Various circumstances have a tendency to modify the natural vocal resonance. It is marked in proportion to the graveness of the voice, and, as regards *intensity*, more marked in males and adults than in females and in children, and, possibly, from the thickening and hardening of the bronchi, more marked in old age than in middle life. The size and thinness of the chest exert a considerable influence. It is stronger in front than behind, the interscapular region excepted. It ought to be of the same intensity on both sides of the body, except below the clavicles and in the spaces between the spines of the scapulæ and median line, in which regions it is much more strongly marked on the right side. The vocal resonance varies so much in different individuals that the only safe plan, in drawing an inference from it as to the condition of the lungs, is carefully to compare the sound on one side with the other. *Vocal resonance, however, varies so much that it is little worthy of clinical confidence.*

other signs more to be depended on than pectoriloquy: Even Laennec was obliged to admit "imperfect" and "doubtful" pectoriloquy; its essential character, as described by him, being complete transmission of the voice through the stethoscope.

Metallic tinkling is frequently heard when there is a large excavation in the substance of the lung. The student will obtain a good idea of it by the following experiment. If he blow into an empty decanter, a low-pitched, buzzing, amphoric echo will be heard;—it may be even metallic and ringing in its quality, but it cannot acquire the tinkling pitch;—such pitch being altogether impossible, unless fluid be present. If, however, a small quantity of water be put into the bottle, and drops of water then permitted to fall slowly on the surface of the fluid, the ear applied to the side of the bottle, will have conveyed to it the most exact imitation of the metallic tinkle. This is just what takes place within the chest, when a patient with a large tuberculous cavity changes his position from the recumbent to the sitting posture—drops of fluid are thrown from the top of the cavity into the liquid contents on its floor, and metallic tinkling is the result. Fournet has endeavoured to show that the sound produced is an amphoric echo, if the drops fall in quick succession, and metallic tinkling when they fall more slowly. It is at any rate true that if the experiment with the decanter just mentioned be varied, by letting the drops of water fall rapidly, the sharp metallic tinkle is changed into a low, confused amphoric echo.

Dry crackling rhonchus is frequently heard just before the breaking up of tubercle. When once established it generally continues as a persistent condition, until succeeded by the humid form: sometimes it may pass away for a day or two and then return. It is composed of sharp, dry crackling sounds, numbering probably three or four to each inspiration, with which

it is, in the great majority of cases, exclusively co-existent; though in some rare instances it may be more obvious during the act of expiration. According to M. Fournet, it passes into humid crackling, in a majority of the cases of acute phthisis, in from eight to twenty days; and, in the more chronic forms of the disease, in from twenty days to two or three months.

Humid crackling is heard during the incipient softening of tubercle. This rhonchus is composed of a series of clicking crepitations which are heard during both the respiratory movements. Its mechanism is but little understood; but it may possibly arise in the middle of softening tubercle at the period when they have just commenced to communicate with the minute bronchi; at least one of our most distinguished pathologists thinks this explanation far from improbable.

Cavernous or gurgling rhonchus. The usual cause of bubbling is, as a matter of course, the passage of the air in and out of an excavation in the lung. These humid bubbles are of large size and have a singular hollow metallic character. The sound will of course vary according to the relative position of the fluid contents of the vomica and the bronchi communicating with it. I saw a lady a few weeks ago, at Matlock Bank, in whom, between my first and second visit, at an interval of ten days, the cavernous rhonchus had altogether ceased. This is not a very unfrequent occurrence: the following conditions will give rise to it. (*a*) The total evacuation of the contents of the cavern. When this takes place cavernous respiration will be heard. (*b*) A diminution of the contents of the cavity sufficient to bring the fluid below the level of the bronchial openings into it. (*c*) Want of air in the cavity, the entire space being filled with fluid. (*d*) Blocking up of the communicating bronchi by inspissated muco-purulent secretion, &c. The cavernous rhonchus may sometimes be heard at a distance

from the patient's chest, and if the cavity is superficial even the liquid may be distinguished by placing the hand over the spot.

In the annexed table I have grouped together some of what have appeared to me the most important physical signs in the diagnosis of thoracic consumption. The assistance derived from a microscopic examination of the sputa will be considered in a separate section; and, other symptoms will be discussed more at length when considering the several stages of the disease.* Still, I would remark that in the earliest threatenings of phthisis there are many physical signs and constitutional symptoms, not always of certain import, as diagnostic of incipient tuberculization; and a beginner, at all events, cannot be too cautious in hazarding a hasty opinion as to the state of the lungs. May not errors in diagnosis serve also to swell the list of imaginary cures of phthisis? for, whilst I am ready to admit that even in the advanced stages of the disease it often is arrested, and that recoveries from other stages are far from uncommon, the extensive field for observation which I enjoy leads me to fear that there may be in our day a tendency to attribute the cure of supposed incipient phthisis to treatment, when tubercles have never existed in the lungs: and we shall at any rate do well to be quite certain that the organic lesions which result from phthisis have occurred, before asserting in any cases that they have been removed.

* The diminished influence on the frequency of the heart's action, induced by change of posture, in thoracic consumption, is a sign of some importance: if, for example, in the first stage of the disease the pulse be 80 when sitting and the patient rise from his chair, in the standing position, it will not be more than 84 instead of being accelerated about 15 or 20 beats as in health.

TABLE V.

DIAGNOSIS OF THORACIC CONSUMPTION.

Physical Signs.	Prognosis.	Exceptions.
1. Prolonged expiratory murmur, no cough; general debility,	1. Tubercle.	1. Inconclusive when slight, aud heard on the right side only. It must not be forgotten that what may appear in one man, as compared with another, *prolonged expiratory murmur*, may be in him a perfectly healthy condition; a lengthened expiratory sound at the right apex of many females, is a perfectly normal condition. In robust health there is often a difference in the amount of respiratory murmur between the left lung and the right.
2. Cough; general debility, prolonged expiratory murmur, heard only at the left apex,	2. Almost to a certainty tubercle, the more limited the space over which it is heard the more conclusive.	2 and 3. The presence of bronchitis, emphysema, or pneumonia.
3. Prolonged expiratory murmur, heard on both sides, when continued for some weeks, with cough, expectoration and general debility,	3. That there is some permanent obstruction to the free exit of air, the obstacle being, in the great majority of cases I have seen, tubercle.	
4. A dry continuous cough, which, commencing without coryza, in process of time is accompanied by a gelatinous transparent expectoration resembling a solution of isinglass, and not stringy; generally observed in a morning when dressing; pains in the chest, debility, and even a very slight loss of weight, before the age of five and twenty, and prolonged expiratory murmur,	4. Tubercle.	4. The steady loss of weight before the age of thirty is always an unfavourable symptom: the exceptions are secondary syphilis, and spermatorrhœa.
5. The addition of hæmoptysis, however slight,	5. Renders the deposit of tubercle still more certain.	5. Aneurism, or mitral disease.
6. In addition to the above symptoms, weakness, hoarseness or permanent loss of voice,	Thoracic consumption;	6. Syphilis.
7. Cough—slight dullness on percussion, heard over one apex; respiration harsh, jerking, irregular, over the left apex or behind the right apex,		7. Infiltration of the apex of the lung with encephaloid cancer.*
8. If on taking a deep inspiration with the same combination of physical signs, a few clicks of dry crackling rhonchus are heard,		8. Some flattening under one clavicle; imperfect movements of the walls of the chest, some dullness and harsh respiration, in the absence of the general symptoms of thoracic consumption, ought not to lead us to pronounce with certainty that the first period of tuberculization had commenced, unless there be signs of phthisis at the other apex also; for, such symptoms might be the result of chronic pneumonia, or of thick induration-matter in the pleura.
9. As these clicks become more and more moist, with flocculent expectoration,	9. Still more certain.	

* Such a case has been recorded by Dr. Walshe; in his case, however, there was no hæmoptysis.

Microscopic examination of the Sputa. We now approach a part of our inquiry of no little interest and importance—the assistance we may gain with the microscope from an examination of the expectoration in thoracic consumption as a means of diagnosis. On this question the most contrary opinions have been expressed. Dr. Cotton, for example, in his work on Consumption, says his "own experience would lead him to place but little reliance upon its results." Mr. Rainey terminated nis valuable paper on the "Minute structure of the Lungs" with the remark that "the expectoration in the phthisical most probably is not to be distinguished from that in ordinary bronchitis;" and that "it is only during the breaking up of a tubercle that matter truly tuberculous will be expectorated: and this, I believe, can only be recognized with certainty by no other character than its containing fragments of the membrane of the air-cells." Dr. William Addison, in his work on "Healthy and Diseased Structure," published about five years ago, concludes that such inquiry is useless, "mucus and pus being only varieties of the excretion natural to all mucous or granulation fabrics;" and, only two years ago, Dr. Theophilus Thompson, in his clinical lectures on pulmonary consumption, expresses a very discouraging opinion as respects the prospect of deriving any practical advantage from this application of the microscope. In his first Lettsomian lecture delivered last year, however, he states, "I have been induced to change that opinion;" and he admits that he can now show "that, with careful attention, the microscope will afford definite and conclusive information regarding the disease in its progress, and open views of peculiar interest respecting its origin;" and, Dr. Bennett has recently published a very interesting case, to which I shall have occasion presently to refer, in which disintegrated lung-tissue was detected in the expectoration of a patient by the microscope

before any auscultatory sounds were audible. For our knowledge of the microscopic appearances of the sputa in phthisis we are not a little indebted to the labours of Schröder Van der Kolk, Dr. Black, and especially to the valuable papers of Dr. Andrew Clark, and my friend and namesake, Dr. C. Radclyffe Hall, of Torquay. I have personally examined the sputa in more than one hundred cases of phthisis, and in many labouring under the Sheffield grinder's disease, that have been under my own care, and shall simply content myself with describing what I have seen. Before doing so it may be remarked that considerable difference of opinion has arisen as to the minute anatomy of the lungs; an authority so great as Mr. George Rainey considering the presence of an epithelium in the air-cells of the human lung is by no means proved. In certain parts of the lungs, as for example the lining membrane of the bronchial tubes, he has no doubt as to the existence of an epithelium, but its existence in the air-cells he regards as anything but certain. He says, "whilst on the one hand the mere circumstance of a *pavement epithelium* having been described by several anatomists in the air-cells of the human lung furnishes an amount of evidence of its existence which, if unanimously confirmed by all future observers, would be regarded as conclusive; so, on the other hand, the fact of its existence being *denied by anatomists who entertain no doubt whatever of the presence of epithelium in the smallest bronchial tubes, may fairly be adduced as negative evidence of its non-existence.*" Dr. Thomas Williams, in the article, "Organs of Respiration," in the Cyclopædia of Anatomy and Physiology, observes, "that the nuclei and granules of the epithelium of the air-cells are less declared than those of any other description of epithelium," and he proposes to distinguish it by the term *hyaline epithelium.*" Mr. Rainey thinks that the corpuscles described so

precisely by Kölliker were some of the imperfectly developed epithelial cells from the smallest bronchial tubes, which had been detached in the process of manipulating and got by accident into the air-cells; and that in the air-cells of man certain appearances have been mistaken for epithelium, which does not exist. On the other hand, the celebrated Kölliker describes in the air-cells a *fibrous membrane*, and an *epithelium;* the former being manifestly the much attenuated mucous membrane and fibrous tunic of the bronchi, entirely deprived of the smooth muscles, and consisting of a homogeneous matrix of connective tissue, together with *elastic fibres* and numerous vessels. His description of the epithelium I shall quote entire, as having a most important bearing on the question at issue. He says:—

"The epithelium of the air-cells is of the common tesselated kind, without cilia, and composed of polygonal, pale granular cells, *in morbid states containing fat*, 0·005–0·007‴ in diameter, and 0.003–0·004‴ in thickness, resting immediately upon the fibrous membrane of the air-cells. *A regular detachment of this epithelium is not to be supposed any more than with that of the trachea and bronchi, whilst it is indubitable that, by chance or in diseases of the air-passages, its isolated elements may become mixed with the bronchial mucus.* In man, these cells are detached with remarkable readiness, and then lie free in the air-cells and finest ramifications of the bronchiæ; although in almost every lung, at all events in some of the alveolæ, they may still be seen in situ; and in animals recently killed the observation of their disposition presents no difficulty whatever. Vol ii., p. 174."

There are certain particulars with regard to the anatomy of the lungs we shall do well to remember. The lungs are two large compound racemose glands, in which may be distinguished (*a*) a special serous coat,—*the pleura;* (*b*) the *secreting parenchyma*, composed of the ramifications of the two bronchi, with their terminations, the air-cells, and numerous vessels and nerves; (*c*) an *interstitial tissue*, interposed between those parts and uniting them into larger and smaller *lobules*. This anatomical peculiarity of the lungs invites attention as leading to a

correct knowledge of the structure of these important organs. Each lobule has an artery, nerve, and lymphatic vessel, and is composed of inter-cellular passages and air-vesicles; the inter-cellular passages have a cribriform appearance from the openings of the cells, which communicate with each other, but not with the cells of contiguous lobules. A bronchus consists of 1, a mucous membrane; 2, a longitudinal layer of elastic tissue; 3, a layer of cartilaginous flakes; 4, circular muscular fibres; 5, areolar tissue. On entering a lobule the bronchial tube drops the cartilaginous flakes, and in the inter-cellular passages the muscular fibres are no longer present, but the elastic tissue is continued to form the circumference of the cells. I have in my possession a tolerably successful injection of a portion of lung in which tubercles have been deposited, and which enables us to determine the situation of the deposit as described at page 22, and we learn how, the tuberculous matter being poured into the interior of the air-cells, the septa of contiguous cells are compressed, the vessels gradually obliterated, and the supply of blood cut off.

As it is possible that many practitioners and students, into whose hands this work may fall, have not had many opportunities as yet of becoming familiar with the microscopic appearances of the sputa in thoracic consumption, I shall endeavour briefly to explain how such investigations may be facilitated and mistakes prevented; and here I would be understood as addressing myself to those only who are novices in investigations and manipulations of this nature. To an adept observations of this kind are of course useless. With regard to the microscope used, I may say that my own investigations have been made with an *inch*, and with a *quarter inch* object glasses, made by Mr. Ross; with a *fifth* made by Smith and Beck, and an *eighth* by Powell and Lealand. Of

foreign microscopes the best I have seen are those manufactured by Oberhäuser, and Nachet, of Paris. They may be obtained at a moderate cost, and are amply sufficient for every purpose the medical student can require. The hospital microscope of Powell and Lealand, and the educational, and students' microscope of Smith and Beck, are rather more costly, but possess many advantages.

To form a correct opinion of the nature of the sputa submitted to us for examination requires no little time and study. It obliges a thorough knowledge of the appearances of the secretion natural to the mucous and salivary glands, the epithelium of the mouth, of the fauces, and the pharynx, and the results of the varied morbid processes which may take place in the several parts. Portions of fungous vegetations, which are so frequently present at the back of the mouth and in the matter secreted by the tonsils, are very often seen in the expectoration, mingled with the remains of the food that has been taken; such as muscular fibre, starch, oil globules, various vegetable and animal substances, &c. It must not, therefore, hastily be concluded that every thing we see in the sputa, under the microscope, comes from the air tubes. And, again, in examining the expectoration in certain trades—such, for example, as the grinders of Sheffield, various small particles of stone and of steel may be readily detected. The appearances vary a good deal, however, in these men, with the time of the day at which the expectoration has been coughed up, and whether or not they have been working within a short period at the wheel. Pus, blood-corpuscles, claws of Echinococci, and portions of hydatids, are sometimes present, and in the more advanced stages of pneumonia numerous large cells containing oil globules will be seen, together with many finely-granular cells, not very unlike pus globules, but which, on the addition

of acetic acid, do not exhibit the presence of central bodies. Sometimes the sputa contain small fragments of pulmonary tissue, frequently distinct and well defined, but which are easily overlooked without a good deal of care. The small white calcareous masses which are not unfrequently present in the sputa in cases of arrested thoracic consumption, and of which Mr. Tuffen West has given a good illustration in the plate, as well as of some crystals of cholesterine, are best examined by mounting them as opaque objects, on a black ground, and looking at them through an inch object glass. Sometimes in the cheesy matter found so largely in tuberculous masses we may not be able to detect crystals of cholesterine; it is better then to place a little bit of the mass on a slide, and to add a small quantity of alcohol. As this evaporates, crystals of cholesterine gradually form, and may then be easily examined under the microscope. They are very beautifully seen by polarized light. If the calcareous masses to which reference has just been made be placed in a watch glass, and tested with a little acetic acid, they will dissolve with effervescence, demonstrating the presence of a carbonate. If to one part of the acetic-acid solution an excess of ammonia be added, a precipitate of phosphate of lime takes place, and a little of a solution of oxalate of ammonia added to the other portion will detect the presence of lime,

To examine the expectoration under the microscope, all that is required is to place it on a glass slide, and cover it with a bit of thin glass. Certain parts that look different from the rest must be separately submitted to examination: any particular portion can be removed from the rest with a pair of forceps; a sharp pair of scissors will also often be required. Sometimes it is advantageous to throw the expectorated matters on water, and then to stir them well with a glass rod. Various particles

are thus separated from the tenacious mass, and can be examined when the deposit has subsided. It will be seen at once that a knowledge of the various extraneous matters likely to be found in the sputa is of the highest practical importance, and the accurate representation of some of them in the plate, with the description which will be found at the end of the work, will, I trust, contribute to the education of the eye of the student in these highly important investigations.

There are certain appearances in the expectoration, even without the use of the microscope, that may assist in forming a correct diagnosis in diseases of the chest. When a patient has severe pain in one side and coughs often, expectorating only a salivary-looking fluid, we suppose him to be labouring under pleurisy. A glairy fluid, not unlike the white of an egg, is indicative of bronchitis. If the expectoration be rust-coloured, resembling gum-water tinged with blood, we feel almost certain this arises from pneumonia; and the sudden expectoration of a large quantity of fætid pus generally is the result of matter which had accumulated in the cavity of the pleura finding its way into the bronchial tubes. Purulent expectoration may be present both in bronchitis and in thoracic consumption; and the latter, as in the case recorded at page 27, may run its course without expectoration, or go on to a very advanced stage before it commences. The expectoration is also often suspended under the favourable results which arise from the successful employment of appropriate remedies.

Sometimes the expectoration contains a little dark-coloured matter, which in a large manufacturing town like Sheffield is thought by many to owe its origin entirely to the carbonaceous matter floating in the atmosphere; but on the addition of nitric acid the colour fades, and we must, therefore, conclude that some of this dark colour is derived from the pigment cells

where it is known to increase under even very slight attacks of bronchial irritation. Since the observations of Mr. Brett, published in the "Transactions of the British Association for the Advancement of Science," it has been ascertained that the proportion of salts in the expectoration appears to be in an inverse ratio to the degree of inflammation present: the proportion of saline matter in the solids expectorated being about 20 to 30 per cent. in catarrh; 15 to 20 in the more opaque mucus of chronic bronchitis; and under 10 per cent. in the puriform sputa of the last stages of thoracic consumption.

There is a variety of expectoration which, without any qualification of which I am aware, may be regarded as conclusive of the existence of thoracic consumption. When spat into a glass containing water it appears in globular masses, like little balls of cotton. Some may be seen floating on the surface, sustained by the bubbles of air which are entangled in the surrounding mucus; others are suspended at different depths, and some have fallen to the bottom of the vessel. The patients from whom such expectoration is obtained will be found in an advanced stage of the disease, and a clicking rhonchus or the cavernous gurgling will generally be heard under one or both clavicles.

The first kind of expectoration observed in thoracic consumption is frothy, and is characteristic of irritation. So far as my own experience goes it does not enable us to arrive at any correct conclusion as to the existence of tubercle when placed under the microscope; and many of the appearances may arise from other causes. After a longer or shorter period as the disease may be impending or established, the expectoration becomes gelatinous, rather transparent, and resembles a solution of isinglass. This expectoration is generally brought up in a morning in the dressing room, and scarcely noticed by the

patient. It consists of a transparent and very tenacious semi-fibrillated matrix, in which we may see imbedded oily matter, molecules, granules, and corpuscles. This kind of expectoration may often be seen in various forms of pulmonary congestion. The investigations I have made in numerous cases of phthisis enable me to conclude with certainty that we have, in looking at this kind of expectoration, a diagnostic guide of very great practical importance; for where there is no special tuberculous tendency the corpuscles are of one uniform kind, but when the deposit of tubercle has taken place or is impending the corpuscles are of various forms and sizes. Some are ovoidal, some spherical, and resist the action of acetic acid; others are abruptly defined, obscurely granular or nebulous, requiring the application of re-agents to render their nuclei apparent. Others, again, are compressed and elongated; another set may be seen of a spherical form, which are filled with granules of fat or pigment, and these are often in process of disintegration; and, lastly, corpuscles may be seen with depressions, from which nuclei have been extruded. The first kind of corpuscles, Dr. A. Clark considers to consist of very young epithelial cells and extruded nuclei; the other varieties are unquestionably diseased epithelial cells, in various stages of degeneration. The jagged outlines of the corpuscles (to which allusion is made in the case described pp. 46 and 47), is a point of great interest to the practitioner, and almost certainly diagnostic of phthisis. Dr. C. Radclyffe Hall* has drawn attention to the appearance in the sputa, of *enveloped*

* In impending tuberculization of the lungs the glairy expectoration, according to the researches of this gentleman, contains single plates of small flakes of flat epithelium from the air vesicles fattily degenerating, and bronchial columnar epithelium in a state of fatty degeneration. As the disease advances, he has observed in addition, "blood globules more or less shrivelled and faded, enveloped in a filmy cell; a few large many-nucleated cells, granules, casts of air-vesicles, and of the ultimate bronchi, in which are plainly visible epithelial cells in various stages of fatty degeneration."

blood corpuscles, at the commencement of thoracic consumption. In a great majority of the cases in which I have examined the sputa this microscopic hæmoptysis has been evident, even when to the naked eye there was no trace of blood, and the opinion of this physician, that this appearance is seldom absent in cases of the disease in which the more obvious expectoration of blood is wanting, is strictly in accordance with what I have observed.

The next kind of expectoration is met with at a more advanced stage of thoracic consumption. A highly characteristic example is given (Plate 1, figure 6) of this flocculent sputa, in which will be seen a large piece of the curled elastic tissue surrounding the pulmonary vesicles. The expectoration was obtained from Sarah Ann Chambers, aged 18, admitted during the month of October, 1856, under my care, at the Sheffield Public Dispensary, with signs of softening at the apex of one lung. It is at the period of the formation of these excavations in the lung that I most frequently observe the elastic tissue forming the areolæ of the air-vesicles, partially obscured by masses of molecular matter in which tubercle-corpuscles may be seen, and it then becomes an important aid to the formation of a correct diagnosis. I may observe that the elastic tissue shown in the plate is exactly a quarter of the actual size of one of the pieces in the preparation put up by me, from which Mr. Tuffen West's drawing was made. The pus globules, shrivelled cells, disintegrated nucleated cells, &c., &c., found in the sputa of this patient, will be described at the end. I have never yet met with a case in which I discovered, with the microscope, the elastic tissue of the lungs in the absence of all other symptoms indicative of thoracic consumption. Such a case, however, has occurred, in which that accomplished physician, Dr. Bennett, after a careful examination with the

stethoscope, could not detect any physical sign of consumption. The case was seen with W. T. Iliff, jun., Esq., of Kennington. Professor Bennett says, "the chest was well formed; careful percussion and auscultation elicited positively nothing; the percussion note was normal and equal on both sides; the respiratory murmurs were normal, and there was no increase of vocal resonance." There was cough and muco-purulent expectoration. This patient, a lady aged 23, had an impression she was in the habit of spitting up fragments of her lungs. Some of them were examined by Dr. Bennett, Mr. Queckett, Mr. Rainy, and Dr. Beale, all of whom agreed as to the fact of the expectorated matter containing portions of human lung. After a time the physical signs of the disease became more clear, and on examination after death extensive tuberculous disease of both lungs, with cavities in their apices, was found. This case has fully impressed Professor Bennett with the importance of a microscopic examination of the sputa whenever the symptoms and a suspicion of thoracic consumption exist, without any clear evidence derivable from auscultation being present; and when such signs are present as lead to the conclusion that a cavity is just forming microscopic appearances of the sputa, such as are shown on the sixth figure of the first plate, afford, I am certain, no little evidence confirmatory of our opinion.

At a more advanced period of the disease, when there is a large cavity, the sputa is little more than pus, mucus, large granulous cells, and sometimes portions of opaque tubercle, and confervoid vegetations.

Microscopic appearance of the Sputa in the Sheffield Grinders. Figure 7, Plate 2, gives a correct representation of what is observed in the wet grinders. The example there given has been drawn from two slides; one containing the sputa of a *table-blade grinder* who, after having suffered for some time

from the disease peculiar to this class of workmen, gave up for a time his employment. The disease at the time, in this man, may be said to have been in some degree arrested. The **sarcina* was discovered in the same expectoration: it was coughed up in my presence, and at once put up in a glass cell and forwarded to Mr. Tuffen West. I wish to be particular on this point, because so far as I know sarcina has not been observed before in the expectoration; at any rate, I do not remember to have seen it described.

The sputum at the top of the circle *a* and *c* was from a file grinder—the file grinders work on wet stones; (*c*) is a portion of elastic fibre, and (*a*) cells containing pigment. Frequent allusion has already been made to *wet* and to *dry* grinding, the latter being by far the most destructive. For the information of those who are not conversant with the trades carried on in Sheffield I may say that certain articles are ground on wet stones, and other articles on dry stones. Of the different kinds of grinding that of forks is the most fearfully destructive to the workmen employed, being always performed on a dry stone. Forks are made in two ways: they are forged, and they are cast. When forged they are beaten with a hammer into the required shape; when cast, the heated metal is poured into a mould. They are in the next place ground on a *dry* stone, and hence the fatal nature of the trade of a fork-grinder, which of all the grinding trades carried on in Sheffield is, as before observed, by far the most pernicious. Figure 8, Plate 2, gives a faithful representation of the sputa of a workman suffering from the *fork-grinders' disease*, aged 32. It contains epithe-

* The Sarcina Ventriculi was discovered by Goodsir, in 1842, in some matters vomited by a patient. It has been found in the urine by Heller, Dr. Mackay, Dr. Johnson, and Dr. Beale; in the fæces by Drs. Bennett and Hasse, by Dr. Jenner in the fluid of the ventricles of the brain, and by Virchow in an abscess of the lung. M. Robin has arranged it under the genus Merismopædia, and has given it the name of Merismopædia ventriculi.

lium from the mouth—epithelium from the fauces, pus, blood-corpuscles, together with particles of grit and metal, which will be found fully explained in the description of the plates at the end.

Symptoms of Thoracic Consumption. Each period of this distressing complaint is marked by certain symptoms; these symptoms are both general and physical, and in giving an epitomized and rapid sketch of the course of *thoracic consumption*, an endeavour will be made to trace the connection between the external symptoms, local, and general, and the lesions which are at the same time occurring in the lung.

(*a*) *Period preceding the deposit of Tubercle.* Before tubercle is deposited in the lungs the bodily powers appear to decline. Without being positively ill, there is a sense of fatigue after the slightest exertion, and a degree of inability to pursue the accustomed avocations. The idea of consumption never enters into the minds of the patients or their friends: the complexion is often pale, or sallow; the features are sharpened, and the expression of the countenance, though not devoid of animation, is that of care; the movements of the body are hurried, and there appears a desire, almost instinctive, to conceal the presence of disease. The sleep is restless, and often attended by night sweats; there is a tendency to diarrhæa. The digestive organs are more or less impaired, and we have various proofs of the mal-assimilation of the food, and that too at a period of life when nutrition is directed to building up the tissues of the body. At this period, as pointed out in Table 5, there is loss of weight, in some cases so slight as hardly to be noticed, in others so great as to be perceptible to the patient and his friends. Loss of weight is always an unfavourable symptom. The peculiar transparent appearance at the edge of the gums, thought by some physicians to be useful as a sign of

threatened consumption, or of the early stages of the disease, is certainly present in many cases; in others I have seen it altogether wanting, and the conclusion to which my own investigations have induced me to come is that this sign is of questionable importance. This preliminary period is of very uncertain duration: with judicious treatment it frequently passes away in a few weeks, and under careful medical superintendence, rather than treatment, may not return.

The opinion expressed by Dr. Andrew Clark, that the originating elements of thoracic consumption, in early life, are first apparent in the mesenteric glands, where a disturbed function, short of that condition which induces obvious scrofula, occasions an imperfect performance of their part in the elaboration of healthy blood, is probably correct. The peculiar action which appears associated with the development of this disease may, in individuals prone to the tuberculous diathesis, manifest itself in other organs at the period when their increase is the greatest. There is a time when the growth of the brain is peculiarly rapid, in which patients fall victims to tuberculous meningitis, who at another period of life would probably have died from thoracic consumption. Dr. T. Thompson has observed, "that the phenomena observable in such subjects are consistent with the evidences of hasty abortive growth, as characterizing tuberculous meningitis: precocity, terminated by hydrocephalus, is in such instances common. It is among such that we find individuals pale and prematurely wise, exhaling like the early dew before the morning sun." p. 23. The interchangeable relation between insanity and consumption is worthy attentive consideration, for it not unfrequently happens that when the symptoms of threatened chest affection subside, some eccentricity of mind manifests itself, and the patient becomes insane. Dr. E. Smith

is of opinion that the essential characteristic of the pre-tuberculous stage is the lessened *inspiratory action*, which, although it may exist alone, will soon induce consequent changes.*

6. *Period the First.* By this I mean the period after tubercle has been deposited in the lung. The patient now complains of shortness of breath, particularly when walking up a hill or running up stairs, and of a sense of tightness across the chest. Fleeting pains are also experienced under the clavicles, between the shoulders, or at the epigastrium; and on arising from bed in the morning the patient coughs once or twice. In a few weeks he coughs also on retiring to rest, and next he does so during the day. There is seldom any expectoration, and if there be it is so slight, and the cough is so trifling, that no uneasiness is created. By degrees this cough increases, more especially in a morning. There is a tickling sensation in the posterior fauces from which the expectoration appears to come; this expectoration is now more abundant; it is frothy, resembling the saliva, and indicative of irritation: for some time the expectoration is most abundant in a morning, but by degrees the cough is accompanied by the same kind of sputa during the day, which becomes like a solution of isinglass, and exhibits the microscopic appearances already described. There is frequently slight hæmoptysis, or the expectoration is streaked with blood.† The pulse is accelerated, particularly after dinner and in the evening, but a change from the sitting to the stand-

* The Lancet, Nov. 8, 1856.

† Streaky hæmoptysis is often present in chronic bronchitis and in inflammatory and congestive attacks of the mucous membrane about the fauces. Hæmoptysis may be present in acute bronchitis also: the patients are generally plethoric, when such is the case. It is also sometimes vicarious of certain natural secretions. It occurs in females whose uterine functions are irregular, and now and then alternates with the bleeding of hæmorrhoids.

ing posture does not on an average increase it more than four or five beats in a minute—a sign, in my opinion, of much diagnostic importance. A desire to creep to the fire is experienced, and an unpleasant chill, followed by some degree of febrile heat, is felt: the sleep is no longer sound and refreshing, and is often altogether prevented by the cough. On looking at the patient his face presents a true index of his condition. To the experienced practitioner, consumption is no "silent cheater of the eye," for the tuberculous cachexia is visibly impressed on the features. The face is pallid; the colour comes and goes. After very slight exertion, the countenance is singularly expressive of languor; the skin is often dry; the elastic feel peculiar to health is wanting; the muscles lose their firmness; a degree of emaciation becomes evident, and the shoulders appear more forward than natural.

Sometimes on an amendment of the general state of the health, depending often on change of air, increased warmth of the weather, (for the duration of consumption depends much upon the period of the year at which the first invasion of tubercle takes place,) or on other causes, all the above symptoms may diminish in severity. This is often the case in the spring; and, in the summer they nearly disappear, and the patient and his family become convinced that there is no cause for further apprehension. These hopes are often fallacious: with the cold weather comes an attack of catarrh, and then the symptoms already described recur with increased severity.

Languor, *debility*, *hæmoptysis*, *dyspnœa*, *slight hectic fever*, *night sweats*, *cough*, *diarrhœa*, and *loss of weight* may be said to constitute the *general signs* of the first period of consumption. What are the physical signs at this period of the disease? We must keep in mind that if death should take place at this time, from any other cause, a greater or less quantity of tubercles

would be found in the lung. Many of these would appear of a grayish colour and semi-transparent; others would be of a pale yellow colour and opaque, as represented in the plate. I am inclined to think with Dr. C. Radclyffe Hall, that even during life we may form a tolerably correct guess at the kind of tubercle deposited from the symptoms which may be present. When the disease is chronic, non-febrile, attended with considerable retraction of the chest, with gradual emaciation and little pain, the tubercles are probably gray. When consumption is more acute and febrile, with hardly any retraction of the chest, more difficulty of breathing and frequent pain, we may be almost certain that yellow tubercles predominate. Of course, many circumstances will have a tendency to qualify such a general opinion. The principal complication leading to great distress of breathing, is a congested and inactive state of the liver. When the liver fails properly to discharge its functions, a few tubercles will cause far more distress and difficulty of breathing than a much more extensive deposit when this organ acts properly. On examining the chest, the supra or infra-clavicular depression will probably be apparent; any depression, especially when observed on one side only, is always a symptom calculated to excite alarm; and the examination with the stethoscope which follows, too often confirms the fears which the first glance of the eye has communicated to the mind. Percussion will generally detect a want of resonance under the clavicle, more particularly if you ask the patient to take a deep inspiration, and to hold his breath: the unsound lung being less distended with air than the other, as a matter of course, will exhibit more or less (comparative) dulness. This want of resonance is one of the earliest symptoms of consumption. (In a patient under the care of Dr. Cotton, labouring under sub-acute bronchitis, the infra-clavi-

cular region emitted a dull sound from an accumulation of mucus in the bronchial tubes.) At this stage of the disease, the diagnostic importance of the prolonged expiratory murmur has already been alluded to, both in the table of the signs of consumption and also when treating of the physical examination of the lungs. The prolonged expiratory murmur appears to be caused either by the deposition of tubercle presenting a mechanical obstruction to the free passage of the air from the lungs, or, from a want of contractility in the pulmonary tissue; the capacity for inspiration being at the same time diminished by the imperfect expansion and decreased capacity of the lung. Prolongation of the expiratory murmur and weak jerking bronchial respiration will be the leading evidences of the deposit of tubercle afforded by the application of the stethoscope. When, on applying the stethoscope over the apex of the lung, the respiration is found to be remarkably feeble, the instrument should be placed a little lower down the chest; by degrees the sound becomes louder, and as we approach the centre, or a little below the centre, of the lung, the respiration is heard of the natural intensity. It is true that feeble respiration may be, and often is, a healthy peculiarity; but, when so, it is the same on both sides: we may, therefore, conclude that an evident difference in the force of the respiratory murmur in several parts of the chest is presumptive evidence of the existence of tubercle, more especially when the respiratory sound, weak at the apex, is heard increasing in degree towards the middle of the lung. In the very early stages a sound is present (most audible posteriorly, in the supra-spinous regions,) which is only heard during the act of inspiration, and which has been called *pulmonary crumpling*. This sound is difficult to describe; but when heard it conveys to the ear the idea of the lung expanding under difficulty.

Urine. At this period of the disease the urine presents nothing requiring especial notice. As a rule it contains an excess of uric acid, and sometimes a minute quantity of sugar; a fact of some importance when the tendency of diabetes to end in consumption is remembered: and it will sometimes be, passingly, in a trifling degree albuminous.

If there be * bulging of the infra-clavicular region, with increased or diminished resonance, or retraction of the same region, with imperfect resonanance,—if increased vocal fremitus,—if percussion yield a dull sound over the apex of one lung,—if there be an increase of the expiratory murmur,—if the breathing be feeble or rough,—if these signs be attended with undue resonance of the voice, a click, a catch, or any kind of unnatural noise, when the patient respires, coughs, or talks, —if these sounds are always present, and especially if heard at the upper part of one lung only, we may safely attribute them to the presence of tubercle.

Hæmoptysis is another symptom always to be regarded as indicative of consumption, for should it occur in a person who has not received any injury to the chest, without disease of the heart, or a disordered state of the uterine functions, in the great majority of cases, tubercles will be found in the lungs: although hæmorrhage most undoubtedly might, by diminishing the vital powers, render an individual in a condition favourable for the development of tubercles: still we are bound to consider

* The bulging of the chest over that part of the lung which has been invaded by tubercle in the first period of consumption was pointed out some years ago by Dr. Chambers. It is no uncommon circumstance to find this part of the chest more resonant than the healthy side; possibly from an enlargement of the pulmonary cells amounting to emphysema. Every physician who has seen much of consumption will, I am certain, agree with me that on the first invasion, in some cases, the respiratory sound is actually loudest on the diseased side; and also, that in other cases, at the tuberculous apex, the respiratory murmur may be very feeble at one point and morbidly loud at another.

pulmonary hæmorrhage the *result* and not the *cause* of the presence of tuberculous matter in the lungs. Cases of amenorrhæa and accidents to the thorax being excluded, Louis did not meet with one case out of 1200 of hæmoptysis, except in such as were labouring under thoracic consumption. The reports of the Hospital at Brompton show how frequently it exists, more particularly in the first period of the disease, and that to an extent which very clearly proves its value as a highly characteristic symptom of this stage of phthisis. My own experience has convinced me that, with the exception of cancer of the lung, aortic-aneurism, and diseases of the heart, there are very few cases in which considerable hæmorrhage takes place from the lungs without the existence of tubercles, which may, and often do remain latent for years, even after the occurrence of copious hæmoptysis. I have two gentlemen at present occasionally under my care, to whose cases I shall presently refer, in both of whom hæmoptysis to the extent of considerably more than a pint occurred, in one case three, in the other five years ago. It is of practical importance to keep in mind that hæmoptysis when slight is often rather beneficial than otherwise, and that it ought not to be arrested, as it too often is, by acetate of lead and other astringents. The best way for combating the more formidable attacks of hæmoptysis will be discussed when considering the treatment of consumption. The popular error that all bleeding from the lungs must result from having "*broken a blood-vessel*" has led to serious mistakes: and it appears to me far more probable that hæmoptysis is generally caused by compression or obliteration of the pulmonary veins by the deposit of tubercle, and that the blood which is thus interrupted in its natural channels exudes into the contiguous bronchi. Although great alarm is generally evinced and sudden death apprehended when the bleeding is considerable, such

very rarely happens, and so far as the cases I have seen enable me to form an opinion, I am inclined to say that after copious hæmoptysis the course of the disease is often very slow.

Loss of voice is ever an alarming symptom. The mucous membrane of the larynx ulcerates, and this scrofulous ulceration only takes place when the lungs are filled with tubercles. I knew a medical gentleman in whom this was well marked, although the disease in the lungs did not appear to have advanced beyond the first stage; the symptoms often come on, however, at a later period. In 180 bodies examined by Louis after death from various chronic diseases, he only found one with ulceration of the larynx; but in those who had been carried off by thoracic consumption, *one* in *five* had ulceration of either the larynx or epiglottis, and nearly *one* in *three* had ulceration of the windpipe. If the secondary effects of syphilis be excepted, ulceration of the larynx is almost peculiar to thoracic consumption. Louis also remarked that ulceration of the epiglottis was often latent, and afforded no appreciable token of its existence. The symptoms I have noticed are, a pricking and burning sensation at the superior portion of the thyroid cartilage, with rejection of liquids through the nose: the tonsils and pharynx present no visible alteration. Slight pain, and some peculiarity in the voice, attend the first invasion of the larynx; permanent loss of voice, and deeper pain, denote the more advanced mischief in the interior of the larynx. I am not aware of any sign which proves the trachea to be ulcerated.

Intellectual activity. About, or perhaps a little before the first period of consumption, we frequently see individuals, destined in the end to fall victims to it, distinguished for intellectual activity, ready memory, and quick perceptions. They appear constantly at work and do not often complain of ex-

haustion after even extreme intellectual exertion. Such young men engage with the greatest energy in the ambitious pursuits of life. I well remember a young friend, just called to the bar, working day and night in the preparation of some treatise he thought of importance to his professional success. He disregarded my repeated warnings—said such work was good for him, and never even dreamed of danger until he was one day suddenly seized at his chambers with hæmoptysis. This was followed by not to be mistaken symptoms of consumption, of which he ultimately died.

(*c*) *Period the Second.* By this is meant the period at which tuberculous softening takes place. This is marked by the increasing severity of all the symptoms already enumerated. The cough is frequent, permitting little rest to the patient night or day. The cold chills experienced in an evening are still more frequently complained of: the succeeding feverish heats are more constant, and the perspirations more regular and copious. The respiration is hurried, even when the patient is sleeping: the languor and sense of fatigue is greater day after day, aud the loss of flesh more apparent. The slightest exertion causes much distress; the muscles are flabby; the face, which is pale in the morning, as the day advances is tinted with a crimson flush, and pains in the side and in the chest are frequently complained of. The finger nails may now be frequently observed incurvated; the fingers themselves are, also, in some cases enlarged at their extremities, and assume that peculiarity of form which has been designated "clubbed." There is at this period, also, more or less of suffering from dyspepsia. This is sometimes only functional, but not unfrequently, depends upon some organic change in the stomach itself. The peculiarity of the *expectoration* at this period of consumption as appearing to the naked eye, and when viewed under the

microscope, has already been fully described. *Diarrhœa* is frequently a most troublesome complication. At this stage, however, there is no little diversity in the general symptoms, and in the sufferings of the afflicted. Some hardly complain of anything; others appear to suffer most acutely.

An examination of the chest will easily detect the great amount of disease in the lungs: the upper portions of it are less and less freely raised, and this evidence of disease is often more evident on one side than the other. On applying the stethoscope the dry crackling ronchus already described is found to have become *moist*, and a series of clicking crepitations are heard during both the respiratory movements; and we may, such physical signs being present, announce with tolerable certainty that softening has begun.

(*d*) *Period the Third*, at which cavities exist in the lungs. Violent perspirations, almost daily attacks of diarrhæa, increasing emaciation and debility, distressing cough, an apthous and fissured condition of the tongue; painful dyspnœa; aggravated by the slightest exertion, œdema of the feet and ankles; the shoulders raised and brought forward; the clavicles prominent, having a deep hollow between them and the upper ribs; the flat, instead of the rounded chest of health; the dragging upwards of the thorax on attempting to take a deep inspiration; the loss of bodily power; slight wanderings of the mind, and some decay of mental energy; cavernous or gurgling ronchus, &c. &c., all with solemn and not to be mistaken certainty tell us of the arrival of the last period of this too fatal disease, and that death is inevitable. The physical signs have already been fully described, and I have wished to give here only a mere outline of the symptoms indicative of the several periods of consumption, as they are usually met with. It is singular how patients indulge in hope, in many cases even to the last, and it

is no uncommon thing to hear plans formed for the succeeding summer, or perhaps for future years, within a few days—possibly within a few hours of death.

In childhood the symptoms of consumption differ somewhat from those of the disease in adults. The cough is of a different character from that which is present at a more advanced age; it sometimes occurs in paroxysms, almost like hooping-cough, and is rarely attended by expectoration till the disease has made considerable progress; frequently this latter symptom is wanting, from the sputa being swallowed; hæmoptysis is of rare occurrence, and the hectic fever less marked than in the adult. And yet there is little difficulty in detecting the disease if we observe the tuberculous aspect of the child, and mark the rapid pulse, the hurried breathing, the frequent cough, the daily increasing emaciation, the tumid abdomen, and the unnatural condition of the evacuations. The deranged functions of the abdominal viscera have led to the general opinion that in children the mesenteric glands are the chief seat of the disease; but, in reality, tubercles even in childhood are more frequently found in the bronchial glands and lungs. In fifty careful *post-mortem* examinations of the bodies of children made by Papavoine to determine the relative frequency of tubercles in the different organs of children, the result was what is described in the annexed table.

TABLE VI.

	Times.		Times.
Bronchial glands	49	Pleura	17
Lungs	35	Liver	14
Cervical glands	26	Small Intestines	12
Mesenteric glands	25	Brain	5
Spleen	20	Membranes of the Brain	3

CHAPTER V.

TREATMENT OF THORACIC CONSUMPTION.

This part of our subject, in accordance with the plan proposed at the commencement, will be divided into two parts. We proceed therefore to consider, *firstly*, the prevention of the development of the tuberculous diathesis, and *secondly*, the treatment of thoracic consumption.

(*a*) *Prevention of the tuberculous diathesis.* "The causes of tuberculous disease," says Sir James Clark, "like those of most diseases, are referable to two distinct heads—the remote, and the exciting; or those which induce the constitutional predisposition, and those which determine the local deposition of tuberculous matter after such predisposition is established." The one class of causes operates by modifying the whole system; the other, by determining, in a system so modified, the particular morbid action of which tuberculous matter is the product.

Taking this axiom for our guide, we proceed to consider what are the causes detrimental to health which are to be avoided in order to prevent the establishment of the tuberculous cachexia, since daily experience fully proves that the ravages arising from consumption are to be arrested rather by seeking to remove

everything which may tend to promote the constitutional predisposition, than to find in any medicine a fancied "*specific*" for the disease when its fatal seeds are sown. This will open a wide and very interesting field for inquiry—a field the extent of which will of necessity compel a very brief sketch of each of the topics which may suggest themselves.

If a perfectly healthy infant be kept in a close and badly ventilated room,—if no attention be paid to diet or to cleanliness,—the external lymphatic glands, more especially those of the neck, will be seen to enlarge; the hue of health will be exchanged for a pallor which gradually creeps over the countenance; the muscles become soft, the abdomen enlarged, and in a very few months the tuberculous constitution may be established,—and this, too, in a child whose parents are perfectly healthy, and whose brothers and sisters have never exhibited any symptom of this disease. If what has just been stated be true of a child born without any hereditary predisposition, what must inevitably be the fate of another born of unhealthy parents, or of parents who may have the tuberculous constitution, when exposed to these adverse circumstances? If we diminish the proper quantity of food taken by a healthy man tuberculous disease may not be a result, although such would probably be the case in childhood or in youth. Having taken this general view of the subject, it will be interesting to consider more in detail some of the influences tending to develop a disease which every year carries off so many thousands of our countrymen, and the fatal fruits of which, from seeds already sown, will be ripened in generations yet unborn.

Impure air. Few subjects are of greater importance than a correct knowledge of the changes produced on the animal economy by the air which we respire. It may be truly said that there is not a single function of the body independent of

respiration; for, neither in the living nor the dead animal organism can changes take place without an interchange of gases. If we shut out the supply of atmospheric air in a living body development ceases, and if we exclude its action in a dead one decay is instantly arrested; and, neither can a new cell be formed, nor an old one destroyed, without its all important influences. So long as animal life continues the function of respiration goes on; sleeping or waking, by night and by day, the lungs are ever performing their important task of inhaling the pure and expelling the effete air. If we take the average respirations at sixteen in each minute, the gases essential to the continuance of our lives will be changed nine hundred and sixty times in a single hour, and no less than twenty-three thousand and forty times every twenty-four hours; and during each year of our lives, the respirations number 8,409,600, by which our lungs have been inflated and exhausted, inhaling oxygen and exhaling carbonic acid with each effort.* And yet, how few are aware of the condition of the dwellings of the poor in the back courts of London and our larger manufacturing towns. How many roll along in their carriages through the magnificent streets of the metropolis without knowing that the air is tainted, and pregnant with the causes which give rise, amongst others, to the disease we are now considering, and of which in London alone thousands annually perish! These causes of death though often unknown to the rich and noble nevertheless exist. Rooms never cleaned—walls never purified with a whitewash brush, and floors the nature of which is hid by accumulated layers of dirt. Such abodes are seldom visited by the sunbeams; for

* See a very interesting article on the Chemistry of Respiration, in the British and Foreign Med. Chi. Rev.

although the Almighty said, "let there be light," man's cupidity has so contrived the back streets and blind lanes of our larger towns, that the sun and the pure air can never reach them. These homes of the poor, surrounded by heaps of decomposing animal and vegetable remains, are often without drainage, or drained only on the cesspool system; still in such places families consisting of ten, or twelve, or more human beings are huddled into one unventilated room, in which all the domestic duties must be performed. Men, women, and children herd together—eat, drink, sleep, wash, dress, and undress before each other. It is in such places that all ideas of virtue, decency, and morality are broken down; that crime is created, brought forth, nurtured, or concealed: here the babe enters the world without God's blessing, and the old man leaves it without a hope. The districts thus unhealthy are well known to all who have paid any attention to the sanitary question;* the effects are known also. It is known as certainly as the large red cross on the door and over it the words "Lord have mercy upon us," in the days of the plague, denoted that house to be visited by the pestilence, that in all densely-populated districts, where the streets are dirty, narrow, and badly drained, the houses ill-constructed and without the means for cleanliness or decency, there will most assuredly be found a squalid, wretched, and *scrofulous population.* The system, also, which even yet prevails to a considerable extent, of burying the dead in church yards situate in the centre of large towns, is highly prejudicial to health, and the vapours which arise from these tolerated nuisances must be ranked amongst the most prolific of those causes which increase the bills of mortality and seriously affect

* "Leaves from the Case Book of a Practising Physician," by J. C. Hall, M.D. *The Lancet*, 1849.

the health of towns,* by polluting the atmosphere, and thus changing that which was intended, by the purification of the blood, to give additional health, and strength, and vigour, to our bodies, into a poison, making the very air we breathe a source of lingering diseases and premature decay. In ages long since fled Moses imposed upon the Jews sanitary laws. Among Grecian sages, Aristotle and Plato taught the absolute necessity of a sanitary police; whilst the Ediles saw that the streets of Rome were kept clean, and her sewers in a proper condition. In our laws relating to health we are yet in a state of barbarism, and many are the useful lessons we might glean from the system of the ancients.

Some medical writers, of no little authority, have gone so far as to assert that impure air and want of light are the only real causes of scrofula; and although other adverse influences may doubtless have a tendency to promote the mischief, impure air and want of light are often, at any rate, essential to its establishment. In a very sensible essay,† M. Baudelocque contends that, even if a child be fed on a sufficient quantity of good and nutritious food, if living in a house so placed that the sun's rays do not reach it, or the fresh air cannot be supplied in sufficient quantities, the strumous diathesis will in all probability be induced. "If," says he, "the house is small, dark, low, and badly aired, scrofulous disease will inevitably supervene;" and it is very certain in this country, in abodes such as we have just been examining, in the confined districts inhabited by the poorer classes of our larger manufacturing towns, even when a sufficient supply of food is given, such

* A Series of Letters "On the Causes which increase the Bills of Mortality and seriously affect the Health of Towns," by J. C. Hall, M.D. *The Times*, 1846 and 1852.

† Mémoire sur les Scrofules, Revue Médicale, 1832, Vol. I., P. 10.

nutriment cannot be properly assimilated in the absence of light and pure air. We may, therefore, safely conclude that the daily respiration of the tainted air of the ill-ventilated narrow dark streets and alleys of towns, of many manufactories, workhouses, and workshops—nor must the too often badly-ventilated school-room and sleeping apartments of the pupils of schools be omitted—has a tendency to excite the latent disease into a more active condition, where there is a strong hereditary predisposition, or even to create such a disposition in the most healthy, if circumstances so prejudicial to health be prolonged.

The same adverse causes which tend to produce consumption in man, occasion the deposit of tubercles in animals. The late Mr. Youatt told me that many of the animals under his care at the gardens of the Zoological Society had died from phthisis. In the Archives de Médicine, Vol. XXV., M. Reynaud has published a very interesting account of the diseases of the monkeys in the Jardin des Plantes. In fourteen of these creatures, tubercles were found in the lungs after death; and in some other cases, the lungs appeared filled with tuberculous matter. I have often induced scrofula in rabbits by want of light and by bad food; and, MM. Andral and Dupuy, have even observed it in the fœtus of the rabbit and the sheep. It is said that, after a certain period of confinement in the cow-houses of that city, all the milch cows in Paris become affected with tuberculous diseases. Aristotle discovered tubercles in the pig, the ox, and the ass.*

Unwholesome food.—Food unfitted for the supply of the wants of the growing body is undoubtedly another very frequent cause of this disease. If the most healthy child at birth be suckled by a woman whose milk is either deficient in

* Historia Animalium, Lib. VII., Cap. 21.

quantity, or not sufficiently good in quality, to nourish the infant imbibing it, the result will, in all probability, be the establishment of that degraded condition of the blood which gives rise to the formation of tubercle. Not only is the coarse food, almost devoid of nourishment, given to the children of the poor a cause of scrofula, but the stimulating diet too often seen in the nurseries of the wealthy has a tendency towards the same result; and although the disease may not at first exhibit exactly the same type, the end will be the same in both. It is absolutely necessary to the growth and health of the body that both the quantity and kind of food should be adapted to the age of the child, and to the requirements of the economy.

Clothing, Exercise, Cleanliness.—The same remarks will apply to clothing, to exercise, and to cleanliness. The clothes should be adapted to the season, and care taken so to cover the body that the circulation may be properly carried on. The dress of young females is generally far too scanty during the day; and in the evening, how often is the young girl of eighteen, when thinly clad, obliged to remain for many hours exposed to all the health-destroying effects of a heated ball-room; and, when the excitement is over, relaxed and exhausted, she is taken into the cutting currents and cold frosty atmosphere of a winter's night! Is it not wonderful that any escape such baneful influences? And although I often hear many complaints from which this class of patients suffer attributed by their good mammas to the delicate constitution inherent in the sex, I am induced to consider the powers of resistance possessed by the fairer part of the creation perfectly wonderful. Let any man be so clad, so tight-laced, so suffocated, so exposed, and how long would he be enabled to boast of either mental or bodily vigour?

With regard to the skin, unless the greatest attention be

paid to cleanliness a state of body incompatible with health will result. The skin absorbs oxygen, and throws off carbonic acid gas and water—a function similar to that performed by the lungs. It should, therefore, be kept in mind by the practitioner that in all patients, more especially in those in whom a tendency to thoracic consumption is suspected, that an healthy condition of the skin must at all times be maintained. Hence the advantage of an occasional warm bath, the daily sponging with cold water, and the use of the flesh-brush, by which means the skin is deprived of all matters which obstruct free absorption and exhalation. Of the evils of tight-lacing and the encasing the body in stays, so much has been written, and so well, that no additional remarks are required to point out to the youngest student their inevitable results; and yet, this system of tight-lacing, by which the functions of respiration are so much interfered with, because the action of the muscles thereby is crippled and the free expansion of the chest rendered impossible, still forms an idol—a fashionable god to whom thousands bow the knee, and perish. It may be endured for a few hours at night, amid the glitter of lamps, the strains of music, and the excitement of the dance; but all this time the motions of the ribs are restricted, perfect respiration is impossible, the blood is only partially vitalized, and the functions of nutrition. as a matter of course, imperfectly discharged. But mark even yet another result; the internal sensation of respiration not being gratified, and as each inspiration becomes less full, the wants of the body force, as a compensation, increased frequency: the respiration is hurried, and a tendency to inflammatory action is set up. The heart participates in the mischief, and we have a quickened pulse and palpitation. In the morning comes a feeling of debility: the tightly-laced stays cannot be borne; the muscles of the

back, no longer sustained by the accustomed pressure, give way; the spinal column bends; a wonder is expressed why Miss Martha, once so remarkably upright, has now round shoulders, and the wonder is soon exchanged for the most just and fearful anxiety when lateral curvature of the spine becomes so evident that it cannot be mistaken; and then, and not till then, the medical attendant of the family is consulted; but the mischief is done.

In childhood, and during the growth of the body, the exercise should be sufficient to bring into play, and thus fully to ensure the vigour of all the muscles. This is promoted by the active sports of boys. But how different the lot of unhappy girls, who, after spending many hours in school, reading, writing, or working, are permitted perhaps one hour for taking a walk! This exercise consists in walking arm in arm with solemn mien, or with books in their hands, reading, along the road, and is altogether insufficient for the exercise of the muscles specially engaged, and many others are left altogether inactive. What has been said of dress, as regards the head and chest, applies also to the legs and feet, during these solemn funeral-procession-like-walks; and the thin shoes and spider-web stockings, of necessity, cause the capillary circulation through the extremities to become languid, and the wearer to suffer all the debilitating influences of cold.

Education.—Nor can I refrain from adding a word or two of caution against the forced and too early over-cultivation of the intellectual faculties. It never was intended that a boy of ten should be taught German, and French, and Latin, and at least the Greek alphabet; to say nothing of the other "*sciences*—writing, arithmetic, and the use of the globes." Some parents will tell you, "that it does seem a good many things for a boy to learn, but their son is particularly strong, and can bear

it very well; because he *will* learn, and there is no keeping a book from him." Such a boy is the one of all others I would most anxiously guard against this cramming system. Ours is a high-pressure age, and never was it more urgently the duty of the physician to caution parents against allowing an amount of food to be given to the brain which it is quite impossible it can bear. How often have a fond father and mother, proud of the acquirements of their darling boy, boasted of his talents to their friends, and if the medical adviser has ventured a caution, how quickly have they replied, "*it does not at all hurt him!*" This is very wrong every way. In the first place, even if the brain do not become softened, and the once quick boy converted into an idiot, by this over-culture, he will be no further advanced in his studies at twenty, than another boy who has been more judiciously educated. What has been said of the over-straining of the mental powers in childhood may be repeated even with regard to a later period of life; for how many young men are yearly offered up as victims on the altar of ambition; how many, when too late, have

"View'd their own feather on the fatal dart."

What does this excess of study prove, but that sedentary habits are indulged in; and weakened digestive powers, constipated bowels, mal-assimilation of food, tuberculous lungs, &c. &c., are the results? More than this: the brain, like any other organ, becomes exhausted by over-exertion; the nervous system is weakened, and these functions being defective, not only does the mind decay, but all the organs of the body share in its debility; because all of them receive a diminished and vitiated supply of nervous stimulus, a proper share of which is highly requisite to their health. This mental depression, the result of a taxing of the dawning powers of the youthful mind beyond what they are able to bear, is a chief cause of consumption;

parents will do well to regard this caution, and every physician will join in reprobating this injurious system. The over-taxing of the mental powers ought to be avoided in even the most robust children: how much more so in those in whom there is a strong hereditary tendency to the tuberculous constitution! In all boys and girls of delicate frame, the period for study should be considerably reduced, and that for exercise out of doors much increased. The school-room should be large, and well-ventilated. The same remark applies to the sleeping apartment; each child should have a separate bed, and the number in each room not be so large as to taint the atmosphere, and render it unfit for the purposes of respiration.

Allusion has already been made to the hereditary transmission of tuberculous diseases, and to the misery that must inevitably result from a union between two young people both labouring under the constitutional taint. This is a subject of much delicacy—one on which the physician is seldom consulted; but it is nevertheless one highly important, and one worthy the most serious consideration of every rational being.

It would be well for parents to remember that the happiness of their children will depend upon themselves, and that the diseases of the fathers pass to the third and fourth generation. Dyspepsia in all its forms requires at all times attention, and the importance of this class of diseases will become still more apparent when we consider that the evils of a long-continued disordered state of the digestive organs end not with the life of the individual; they are entailed on the unfortunate children, and step by step the disease degenerates as it descends, until the dyspepsia or gout of the father becomes scrofula or thoracic consumption in the son. How many parents labour to hand over wealth, and estates, and titles, to their children! how few to adopt a more healthy and rational mode of living, in

order that property may be accompanied with that without which it is altogether valueless—health!

As the tuberculous constitution may be formed even before birth, the young mother will do well to remember—and it is the duty of the physician faithfully to teach and to tell her—that it will depend in a great degree upon herself whether the child within her be robust or not. Stimulants of all kinds should be avoided, and exercise taken daily in the open air. It is hardly necessary to add that the ball-room, public assemblies, the theatre, and every thing which may tend violently to excite the mind, is injurious, and consequently to be shunned; and when the mother remembers that the life of another is closely interwoven with her own, she must feel that improper management of herself during the period of pregnancy may be destructive of the future welfare of the child.

If the mother has the strumous diathesis, or if consumption has occurred in her family, it will be well at once, both for her own sake and for that of her child, that a young and healthy wet nurse be provided; because experience teaches that the children of the most delicate parents often grow up with constitutions more nearly allied to their wet nurse than their mothers. The diet of the nurse should be plain and nutritious, with a moderate supply of ale or porter at dinner, and milk at bed time. The large allowance of malt liquor so frequently given is highly improper, and to bring a nurse from the country to the house of a gentleman, and to give her a highly-seasoned and stimulating diet, as too often is the case, will most certaily be injurious to her and to her foster child. Exercise in the open air is essential both to her health and that of the infant; and a bath two or three times a week preserves cleanliness and greatly invigorates the health. The same remarks will apply to a mother nursing her own child,

who, often from a desire to produce a plentiful supply of rich milk drinks a larger quantity of porter, and takes more food than usual, and thereby effectually defeats the object she has in view. As the earliest food should resemble the milk of the mother as nearly as possible, the analysis given by Pereira of the different kinds of milk is highly interesting.

TABLE VII.

CONSTITUENTS.	COW.	ASS.	WOMAN.	GOAT.	EWE.
Caseine	4.48	1.82	1.52	4.02	4.50
Butter	3.13	0.11	3.35	3.32	4.20
Sugar of Milk	4.77	6.08	6.50	5.28	5.00
Various Salts	0.60	0.34	0.45	0.58	0.68
Water	87.02	91.65	87 98	86.80	85.82
Total	100.00	100.00	100.00	100.00	100.00
Solid Substances	12.98	8.35	12.02	13.20	14.38

This analysis proves that woman's milk is the poorest, but that it contains the largest quantity of saccharine matter. Asses' milk comes next, and in selecting a substitute, that which more nearly approaches the natural food of the child should have the preference. To cow's milk a large proportion of sugar and water must be added, and a less amount of each to goat's milk. Any of the milks so prepared will, for the most part, agree very well with the child, and ought to form the staple food for many months. There is, however, this important difference between feeding and nursing, that whilst a child will thrive upon its mother's milk for nearly a year, it is necessary when feeding now and then to change the food, or the child will most certainly suffer from disordered bowels. The milk should be used, and especially in warm weather, as soon as it is drawn from the cow, and immediately after the sugar and water has been added: only as much as is required

should be mixed at one time, for it is much better to prepare it fresh than to run any risk of giving it when sour.

Although farinaceous articles must compose the principal part of the diet, as the infant grows older chicken broth or beef tea, or sago well boiled in weak beef tea, with the addition of a little milk, or an egg, may occasionally be given for dinner, and such will naturally constitute the proper diet of the child, until supplied with teeth to masticate solid food. At all times early hours, simplicity of diet, regularity of living, and exercise in the open air, are essential to the healthy condition of the young.

Dress. The dress should be so contrived as to afford warmth and permit the free exercise of the muscles of the body, and the night clothes should be lighter and looser than those worn during the day. The most scrupulous attention must be paid to cleanliness, the whole body must be well washed night and morning, and the linen frequently changed. When five or six years old, and from this period until puberty the clothes must still be so made as to prevent restraint, and there must be no exposure of the neck, arms, or legs. If mothers could be induced to believe that the only way to assist in forming a truly fine figure, is to remove the pressure of stays, shoulder-straps, and every possible restraint, we should have to remark fewer of those ridiculous attempts to mould the rounded form of a boy or girl into what fashion pleases to call a very good shape, but which is in reality only a very miserable imitation of a man or a woman, altogether deficient in the grace of the one and the ease of the other.

Medicine. The less medicine given to a child the better. The habitual use of medicine once so common in the nursery is a very great evil, and nature will bring up children much better in her own way without, rather than with, the assistance

of the domestic medicine chest. If a child be really ill the usual medical attendant of the family should at once be consulted, for it is at an early age that we must, when there is a predisposition to the scrofulous constitution, endeavour to guard against disease.

Exercise in the open air, cleanliness, daily ablution, cold affusion to the head, than which nothing tends more powerfully to prevent congestion, and plain nutritious food, supply a rational method for managing the young, and imparting excellent health and a robust frame, even to children, apparently doomed to become the victims of consumption. Such simple rules, however, are generally neglected: parents and nurses, and friends, are so apt to consider consumption an "exaggerated cold on the chest," that its prevention is thought to consist in precautions against "taking cold," instead of adopting a plan which is calculated to give health and vigour to the body.

When the age of puberty has arrived the peculiar functions of the female will require attention, and in boys the state of the nervous system must be examined, and if need be, an end put to practices which are much too common, and which have a marked influence in developing the tuberculous constitution.

Resumé. It would appear, then, that of the means best calculated for the prevention of consumption, experience suggests a constant supply of pure air, a nourishing but not too stimulating diet, and daily exercise, &c. Walking a moderate distance every day is highly beneficial, when it does not embarrass the respiration; but when this is the case, or when the breathing is soon hurried, exercise must be taken on horseback or in a carriage: yatching, or a row in a boat, when it does not produce sickness, may sometimes be substituted with advantage. When the chest is contracted, the exercise must

be so regulated as to favour a *gradual* expansion of the lungs. With a view of obviating the tendency to a contracted chest, boys are often urged to join in athletic games far beyond their strength; and in lads thought to be predisposed to consumption, boating, cricket, foot-ball, and other similar games, ought to be indulged in, with no little caution. The clothing, both for boys and girls, should be warm, and where a uniform system of under-clothing is employed, the outer garments may be sufficiently light to avoid over-fatigue and oppression from wearing them. When a girl complains of irritation about the upper part of the trachea, it will be desirable to cover the throat with a thin layer of flannel or woollen gauze. The flannel worn in the day time should be laid aside on retiring to bed, and the night dress ought to be made of calico. The patient should sleep on a mattrass, and the bed-clothes must be exposed every day to the air. If the feet are cold, when in bed, woollen socks may be worn. Of the evils of undue pressure, or constraint, mention has already been made. The apices of the lungs are first attacked, and whatever causes increased activity in those parts promotes this disease, and it would be difficult to devise means more effectual than the compression of the lower lobes by stays or tight waist-bands. The most rigid temperance must be maintained, and every vicious indulgence avoided, as well as every possible cause which may be productive of mental and bodily exhaustion. In those more especially prone to the tuberculous constitution, occupations known to be prejudicial to health must not be engaged in. These are really considerations of national importance, for I am fully satisfied that a very large proportion of those who die of consumption from the ages of sixteen to thirty, might be saved by the timely adoption of these simple measures.

Bathing. It is always desirable at any rate to sponge the

body every day with cold water, and immediately to dry it with a rough cloth; care being taken, however, that only a small portion of the body is exposed at one time. With regard to bathing, and especially sea-bathing, I am of opinion that, occasionally, it is highly injurious. When, compared with the venous, the arterial circulation is defective, as evidenced by a cold skin and feeble pulse, cold bathing is never safe. Under such circumstances there is not sufficient power in the left ventricle to force the blood again to the surface, and internal congestion, most likely of the lungs, often ensues. But, when the lungs are sound, the pulse full, and all signs of venous congestion absent, as well as a perfectly healthy condition of the heart, cold bathing either in the sea, in some inland river, or in a bath at home, two or three times a week during the summer months, is doubtless beneficial. Under no circumstances ought a person go into the water when fatigued, or when feeling cold. In bathing in the sea it is foolish to jump suddenly into the water: it is far better to step from the machine with the feet foremost into the sea, and after immersing the whole body and head, to return immediately.

Change of Climate. A question will often arise as to the propriety or otherwise of removal to another climate when a suspicion of threatened consumption is created in the minds of patients or their friends. A patient when threatened with consumption in this country should reside in a house as far removed as possible from the centre of large towns; it should have a southern aspect and the apartments be spacious and lofty. The winter can be passed by the consumptive in England in-doors, in an artificial climate, without danger, if due regard be paid to ventilation. The air, which should be constantly changed, may be heated to a fixed temperature of about 64° Fah. Dr. Arnott's scientific system of ventilation

forms a very good substitute for the naturally soft air of countries favoured with a milder climate than our own. Before considering the propriety of a removal to another country it may be stated that the warmest winter residences in England will be found on her southern and south-western shores.

On the south coast the most desirable residences are *Undercliffe*, in the Isle of Wight, and *Hastings*, and *Brighton*, on the coast of Sussex. Undercliffe is one of the most sheltered and warmest of these places, and it has the advantage of being a good summer residence also. The town of *Ventnor* contains about 2,600 inhabitants, and can now supply that accommodation to invalids which Sir James Clark so much regretted the want of when his great work, "On Climate," first appeared. This town is entirely screened from the northern and to a great extent from the eastern winds; while on the south is spread the broad expanse of the British Channel. Ventnor, from its peculiar situation and from standing on a chalky soil, possesses a climate at once mild, dry, bracing, and equable; and hence the great benefit which many derive from a residence during the winter in this delighiful spot.

Hastings is situated at the base of a range of steep hills, by which it is protected from the north and north-east winds. For the winter and early months of spring the coast of Sussex does not afford a milder or more sheltered residence.

Brighton is inferior to Ventnor or Hastings as a residence when there is much irritation of the bronchial membrane. During the autumnal months, however, it supplies many advantages to such invalids as are of a relaxed habit of body. Various towns on the coast of Devonshire have long been held in repute as residences for those labouring under pulmonary diseases. The principal of these are *Torquay*, *Dawlish*, *Sidmouth*, and *Exmouth*.

Torquay. As a winter residence, I decidedly give the preference to Torquay. Here the patient can command the advantages of a considerable tract of sheltered country; and, let the wind blow from whatever quarter it may, some part or other may be selected for a ride or walk that will be quite free from its effects. Its site also, on the southern declivity of a range of lofty hills composed for the most part of calcareous rocks, renders it comparatively dry. The surrounding country is beautiful and picturesque in the highest degree, and the accommodation for all grades of society is excellent.

Foreign Climates. It is only in the earliest stage, or rather in the stage preceding the deposit of tubercle, that much advantage is to be derived from leaving the shores of the country. In the selection of a climate for any particular patient due regard must be had to the *dry* or *moist* character of the accompanying bronchitis. In the former case, Madeira, Teneriffe, the Azores, Rome, Pisa,—in the latter, Egypt, Cadiz, Algiers, Genoa, or Nice, may be selected.* When there is a strongly marked predisposition to the tuberculous constitution a removal to a warmer climate for three or four years, about the age of puberty, may be and often is a means of arresting its development. But, when the disease is more advanced, and more particularly when softening has commenced or cavities have formed, on no consideration ought such a one to be sent away. It is often imagined that such islands as Madeira are free from consumption; but no greater mistake can be made, for consumption and scrofula are frequent there. Whilst, therefore, we may be certain that change of air and scene is in the earlier periods of the disease an important element in the plan of treatment, when it is advanced we may be equally cer-

* Dr. Archibald Smith speaks highly of the inland localities of Peru, particularly of Canta, as a residence in phthisis.

tain that to seek a foreign shore will in all probability hasten rather than retard a fatal result. How often has change of climate been tried in the advanced stages of consumption, and how often has it failed: how often has some unfortunate mother, after enduring a sea voyage, a long uncomfortable journey, and all the many inconveniences of travelling on the continent, finding her strength declining day by day and the disease rapidly increasing, when worn out by suffering and fatigue, sighed to return, and has just lived long enough to reach her home, bless her children, and then die! I have for many years thought there is much cruelty in sending a patient in an advanced stage of consumption to a distant country—far better is it to remain at home, surrounded by the comforts of an English fire-side and enjoying the society of relatives and friends, than to wander to other climes on an imaginary pilgrimage of health, in all probability, after encountering many miseries, to expire amongst strangers and to be buried on a foreign shore.

(*b*) *Treatment of Consumption.* Hitherto we have only considered how the deposition of tubercles in the lungs might best be prevented. It remains to inquire how consumption can be arrested in its course when incipient or limited in degree, and how the pillow of the sufferer may best be soothed when the disease has made such progress as to preclude all hope of preventing, sooner or later, a fatal termination. In the present chapter a general outline of the principles of treatment will be given: in the next it is proposed to examine the efficiency of some of the specific agents which are employed, and also the treatment of the various complications that arise in the course of the disease.

As consumption is a disease depending on a deranged condition, involving the system generally, local remedies are alto-

gether insufficient, and the object of treatment must be directed to change as much as possible the constitutional peculiarity. In treating consumption it is essential to remember that under judicious measures the disease frequently stops short in its progress and exhibits no further tendency to run a fatal course. Bearing in mind the disordered condition of the blood and the causes producing it, as well as the presence of tubercles and their effects and changes, our treatment must be directed to the restoration of that healthy condition of body from which there is a departure in the tuberculous diathesis, and when tubercles are already deposited, to promote their removal or quiescence, and at the same time so to improve the general tone of the system as to prevent a further deposit of the same kind of matter. The treatment of the last stages of the disease must of necessity be but palliative.

During the first period of consumption, or after tubercles are deposited in the lungs, the general hygienic principles of treatment, already mentioned as appropriate to the preliminary stage, must still be continued. When to rapid growth with a phthisical physiognomy succeed loss of strength, shortness of breath, a difficulty in making a thorough expiration, cough, pains in the chest, and the peculiar expectoration already noticed, means should be taken to obviate congestion. A few grains of gray powder and rhubarb may be taken at night, followed by an aperient the next day; dry cupping should be resorted to under each clavicle; after which counter-irritation in some form or other must be applied to the chest. In my own practice I place much reliance on counter-irritation, and in many cases I have seen permanent relief obtained from it. Counter-irritants operate not only as revulsives, which diminish the congestions and irritations of internal organs, but also, by inducing a free circulation on the surface, they promote the

purification of the blood by perspiratory secretion, and materially assist the lungs in the process of decarbonization.* A singular case is related by Dr. Abercrombie, in which the course of consumption was arrested by cerebral disease. I was consulted a few years ago by the friends of a gentleman aged 33, who was labouring under consumption and in whose lung a cavity of some size existed. Shortly afterwards he was attacked with mania, and the disease of the lungs remained stationary, and he eventually died, two years after this, of the cerebral disease. I saw a case, also, at St. George's Hospital, in which a scrofulous affection of the elbow-joint induced Mr. G. G. Babington to remove the arm: the patient rapidly sank and died from acute phthisis. I remember hearing Sir B. C. Brodie, during the time I was his pupil, say, "that after amputating a leg for scrofulous disease of the ankle-joint, symptoms of consumption, not previously noticed, set in and the patient died in a short time." At this period of the disease when a young patient is affected with a strumous ulcer I am inclined to think any attempt to heal it, except such a result can be effected by a general improvement of the health, a very questionable proceeding. If it be thought requisite to heal some very unsightly strumous ulceration of the skin, it will be necessary to establish, by a seton or issue, some compensating discharge on the surface of the chest. The *iodide of iron*, in such cases, is a valuable internal remedy. Unless the discharge is very great, should fistula in ano exist, I am certain an operation for its cure in the great majority of cases should never be resorted to. During the first period of the disease, in the absence of hæmoptysis and symptoms of pulmonary congestion,

* "I look on issues and setons as one of the most important means in the prevention, if not in the treatment, of phthisis: I consider their advantage very great."—Dr. Greaves, Clinical Medicine, p. 292.

various preparations of iron are frequently productive of great benefit. It often happens that a young lady or gentleman is brought to your house by some friend anxious about a slight cough, which the patient ridicules and characterizes as "not of the slightest possible consequence." A complaint is made of feeling languid, and every night there is profuse perspiration; and these night sweats it is very necessary at once to check. The pulse is little excited; there is no dulness on percussion, but the expiratory murmur is generally prolonged, and there is little difference in the pulse between the standing and sitting posture. The face is often pallid and the feet and hands cold. For such I often prescribe some preparation of iron.

℞ Ferri Sulphatis, gr.x;
Acidi Sulphurici diluti, ʒi;
Tr. Hyosciami, ʒii;
Infusi Cort. Aurantii, ℥viiss.;
Misce, capiat cochlearea duo ampla ter indies.

Or the following, which is much more agreeable, may be substituted.

℞ Ferri Potass. Tart ℈ii;
Extract Glycyrrhizæ, ʒii;
Syr. Aurantii, ʒii;
Aquæ Rosæ, ℥viiss.;
Acidi Hydrocyanici (*Scheele's*), gtt.xii;
Misce, capiat, ℥i, ter indies.

Or,

℞ Ferri Sulphatis, ʒi;
Magn. Sulphatis, ʒiv;
Acidi Sulph. Aromat. ʒi;
Tr. Hyosciami, ʒiii;
Æther Chloric, ʒii;
Inf. Quassiæ, ℥xiss.; Misce, capiat, ℥i, ter indies.

In some cases advantage is derived from taking this pill with each dose of the mixture.

℞ Ext. Conii, gr.iii; Pulv. Ipecac. gr.¼; misce, ft. pil.

The bowels will best be regulated by taking, occasionally, at bed-time

℞ Ext. Aloes (*aquosi*), gr.i; Ext. Taraxaci, gr.viii;
Pulv. Ipecac. gr.½; misce, ft. pil. ii.

The *liquor potassæ* combined with some sedative and a light bitter is often useful, although I have no faith in the notion, with which it was first given, that it dissolves protein and forms a liquid soap with the oil, (thus promoting the removal, solution, or disintegration of cacoplastic deposits), because it is altogether impossible to administer caustic alkalies in sufficient quantity to exert this solvent power through the blood. Naptha, so highly lauded as useful in dissolving the fatty particles of tubercle, has not in my practice appeared to exert any special influence on the tuberculous deposit. Although I have been unable to collect facts which prove that the preparations of iodine have the power of promoting the absorption of tubercles, the application of a strong solution of iodine under the clavicles and the internal administration of the *iodide of potassium*, or the *syrup of the iodide of iron*, are often useful; so is also a combination of the *extract of conium* with the *compound decoction of sarsaparilla.* When there is great irritability, the action of the heart may be checked by the exhibition of *digitalis* and *hydrocyanic* acid; and in the absence of active irritation in the lungs or bronchi much benefit will arise from the addition of iron. Cod liver oil should be given, especially when there is an evident tendency to emaciation, and it is best administered in this form of draught three times a day.

℞ Ol. Morrhuæ, ʒ i; Acidi Nitrici diluti, gtt.v;
Acidi Hydrochlorici diluti, gtt.v;
Inf. Cort. Aurantii Co., ʒ xi; Misce.

If the bowels are at all irritable a few drops of Battley's solution of opium may be added. Inhaling the vapour of warm water impregnated with emollient herbs or opium relieves the dryness of the throat and palliates the cough. Cod liver oil may be, in almost every case, advantageously introduced into the system by friction, especially when the stomach refuses to tolerate it.

So employed in children also, its effects are frequently highly beneficial; and, in adults, a table-spoonful of the following embrocation, rubbed upon the back and chest night and morning, may be used both as a substitute and a supplement to the internal administration of this medicine.

℞ Ol. Morrhuæ, ℥ ii; Camphoræ, ʒ iv;
Ol. Terebinthinæ, ʒ ii; Misce.

Cod liver oil is a remedy well adapted for anæmia and the various forms of scrofulous diseases; and when an hereditary taint of the blood is known to exist I would most strongly urge the necessity of introducing, as early as possible, oleaginous medicines into the system. The inunction of the bodies of strumous children with oily substances is a plan of treatment often, I repeat, attended with the happiest results.

When the *night-perspirations* are very troublesome (and the copious perspirations of the consumptive patient during sleep are often a most distressing symptom) they may be controlled by taking as little of fluids as possible in the evening, by using light bed-clothes, and by sponging the chest with a weak decoction of oak-bark, or with tepid vinegar and water; and they may sometimes be abated by sleeping in a night-gown that has been dipped in sea water, or a solution of salt and water, and dried. The medicine I have found by far the most useful in checking night perspirations is the oxide of zinc, taken at bed-time, with the extract of conium. The perspirations are not nearly so profuse or difficult to restrain when a little food is given during the night: a glass of calves' feet jelly, or blanc-mange, with a rusk is generally enjoyed, and the advantage of this plan, as evidenced by the perspirations becoming less profuse, is often very remarkable.

Diarrhœa is another trying complication of phthisis. When arising as it often does at this stage from irritating matters in

the bowels, a dose of rhubarb and magnesia, or of castor oil and tincture of opium, will often arrest it. In other cases when it exists without evidence of inflammatory action, depending as it probably does on a relaxed state of the intestinal exhalants, it will require treating with sulphate of copper, acetate of lead, nitrate of silver, the chalk mixture, opium, and especially with full doses of the *nitrate of bismuth*. When the large bowel is ulcerated all remedies generally prove useless. Sometimes enemata consisting of a solution of the nitrate of silver have appeared useful. In such a state of things the nitrate of silver may be given in doses of one grain in the form of a pill, or the sulphate of zinc in two grain doses, or, the third of a grain of the sulphate of copper and quarter of a grain of opium; and at times, even in this hopeless condition I have seen temporary relief afforded. The patient will often, also, obtain rest from the injection of about two drachms of starch gruel with twenty drops of the tincture of opium. If the diarrhœa be associated with either intestinal ulceration or with appearances indicating considerable irritation of the mucous membrane, the diet must be plain and unstimulating; as a rule it should be as dry as possible. The thirst is best quenched by allowing small bits of ice to dissolve in the mouth. If there be evidence of sub-acute inflammatory action, the abdomen should be rubbed with stimulating embrocations, or blisters, mustard sinapisms, or a few leeches may sometimes be applied over any spot that appears particularly tender; and warm poultices always afford considerable relief. At all stages of the disease the distressing *cough* is one of the most difficult symptoms the physician is called upon to relieve. Opium in some form or other will often be required: it allays the cough and procures sleep—sleep, which is the most effectual and natural means of affording repose to the respiratory organs. I am inclined, however, to place the greatest reliance

on the inhalation of chloroform. Mixed with spirits of wine—(chloroform 1 part, spirits of wine 3 parts)—placed on a handkerchief and used with caution, under the superintendence of a medical practitioner, it affords at every period of consumption very great relief. I have frequently put a few drops of chloroform upon a handkerchief and held it before the face, and in a minute or two have seen a patient pass from a condition of the greatest suffering to one of tranquility and ease. *It may be mixed with four parts of eau de Cologne, as suggested by Mr. Spencer Wells, and of this half a teaspoonful may be thrown upon a handkerchief and inhaled with perfect safety and with a sensation of relief altogether luxurious.* I have at present a lady under my care in an advanced state of consumption who has employed this remedy for the last four months, at all times with certain and immediate relief. The inhalation of camphorated spirits, also, alleviates the cough and difficulty of breathing. Sometimes a severe cough, after resisting many of the ordinary modes of treatment, is much mitigated by the application of two leeches above the sternal notch. Should nausea and vomiting be complained of, creasote, prussic acid in iced water, effervescing draughts, and Seltzer-water are appropriate remedies. When there is much acidity, liquor potassæ, lime-water, blisters, and mustard poultices are generally useful; and tenderness over the epigastrium may demand the application of three or four leeches, care being taken to control the bleeding if such a necessity should arise. In a young lady I attended many years ago, and whose case was described at the time in the London Medical Gazette,* constant nausea and vomiting with pain and tenderness over the epigastrium added much to her distress for a considerable period before death. Here the mucous membrane

* Bed-side Sketches, by J. C. Hall, M.D.

of the stomach was thin and softened, and nothing afforded permanent relief. Her distress was most mitigated by the application of a blister and the administration of effervescing draughts with hydrocyanic acid and a few drops of the liquor opii.

The hepatic congestion so often present during the pre-tuberculous and earlier periods of consumption may be advantageously treated by the various preparations of taraxacum. I prefer an infusion made by putting the fresh leaves and roots of the plant into cold water and permitting them to remain a few hours. The same end may be accomplished in other cases by a course of chalybeates with saline aperients. The waters of Kesselbrunnen and of Ems have been recommended by Dr. Theophilus Thompson, and where there is a tendency to hæmoptysis he gives a preference to the Saratoga Congress Spring of America; but such waters being beyond the reach of the great majority of our patients, as a substitute, two grains of sulphate of iron, a drachm of sulphate of soda, a scruple of the bi-carbonate of soda, and ten grains of dinner salt may be dissolved in a pint of warm water and half of it taken before breakfast every morning.

With regard to the selection of a residence during the summer and winter months, it will not be necessary here to add to the observations already made. When exercise is taken in the open air it will be prudent at all times to wear a *respirator*. The treatment of the last two periods of consumption, softening and excavation, are of necessity the same. Our object must be to endeavour to allay irritation, to support the strength, to increase the weight of the body, to sooth the cough, to procure rest, and to set up counter-irritation. This is what we attempt to do; but in actual practice it is found that each case requires a different plan of treatment, and that so many complications

arise and so many collateral symptoms present themselves, that hardly any two cases run exactly the same course. Thus, when softening occurs, evidenced by humid crepitation, &c., (the sputa exhibiting probably under the microscope some of the elastic tissue forming the areolæ of the air-vesicles,) exposure to heat or cold ought to be guarded against, and the treatment must be directed to the strengthening of the system as much as possible; counter-irritation should be employed to the chest and cod liver oil exhibited. When the last stage is established the treatment of course can only be palliative. If the expectoration be excessive, in addition to cod liver oil I have found much benefit from the various preparations of tar and especially from creasote. A table-spoonful of the following mixture may be taken three times a day.

℞ Creasote, gtt.vi; Morphiæ Acetatis, gr.i;
Acidi Acetici, gtt.xii; Pulv. Acaciæ, ʒ ii;
Aquæ dist, ℥ vi; Misce.

It must not be forgotten that cases frequently occur in which a cavity of considerable size empties itself and ultimately becomes nearly obliterated. "*That such cases*," says Dr. Walshe, "*really occur is indubitable. It has been the vanity of late years to deny this absolutely, because a scientific (or pseudo-scientific?) explanation of the fact cannot be found; but I am not one of those who refuse to accept the evidence of my senses because I am unable to comprehend what they teach me.*" What has already been written when speaking of the symptoms that arise during the first period will have anticipated the remarks which might here be made with reference to night-sweats, cough, diarrhœa, sickness, &c., &c., &c.

Diet. The diet must be nutritious without being too stimulating: a little meat or an egg may be allowed for breakfast, with cocoa or bread and milk; for dinner, white fish, meat,

bread, porter, or light bitter beer; for supper, milk and bread, and calves' feet jelly, or the jelly made from Carragheen and Iceland mosses may be substituted. It is quite impossible, however, to lay down rules with regard to diet which are applicable to each particular case.* The medical attendant must, of course, regulate the diet according to individual peculiarities, remembering, however, that as much animal food may be taken with advantage as can be digested without local or systematic disturbance. In all cases *Gum Arabic*, an important aliment of respiration, should be taken in considerable quantity as an article of food. Milk from the country is better than that procured in towns, where both cows and asses, from the way in which they are treated, are often themselves the subjects of tuberculous diseases. Of the necessity for some little food during the night I have already spoken. As a rule I object to wine or spirits: there are cases however—women, for example, with a cold skin and livid lips—where a little hot brandy and water, or brandy in hot arrowroot gruel, imparts warmth to the surface and relieves the difficulty of breathing. It has been thought by some pathologists† that the notion that brandy supplies pure aliment for respiration may explain the fact that habitual spirit drinkers sometimes suffer less and live longer with cavities in their lungs than sober persons.

* Dr. Latham has very properly divided phthisis into the *mixed* and *unmixed;* and this division is of practical importance; for our treatment both with regard to diet and the remedies administered must be so regulated as to give every support to the system; but at the same time care must be taken not to set up an inflammatory action in the pulmonary tissue around the tubercles. It is therefore quite impossible to say, with some authors, animal food and porter is the best diet for patients labouring under thoracic consumption; or, with others, give nothing but asses' milk, rice, bread, and potatoes Both may be right, and both may be wrong. Every case of this disease presents in itself a study for the physician and will demand at his hands the most careful attention; and it will be for him so to regulate the treatment as to avoid either an increase of the local mischief by an over-stimulating diet, or a further degeneration of the system by reducing the general strength.

† Dr. Walshe.

The Sheffield Grinders' disease, which is in the first instance simply bronchitis, arising from the irritation produced by the presence of fine particles of stone and metal in the tubes, will require to be treated on general principles. The removal, for a time, from the wheel, and a residence in the country, at least during the early stages of the disease, is an essential step to be taken, and the man should resolve in future to work only in a room where the revolving fan, properly adjusted, carries off the greater portion of the irritating particles from the surrounding atmosphere. In a grinder advanced in years, and in whom the disease has made considerable progress, when in addition to dilatation of the bronchi, the surrounding portion of the lung is not only condensed by pressure, but very often also locally consolidated by chronic pneumonia, it often happens that an acute attack of bronchitis supervenes on the chronic disease. Such a case requires to be treated with the greatest possible caution; the patient, under such circumstances, broken down in constitution, does not die from the inflammation, but from the large accumulation of muco-purulent secretion thrown out by a congested surface: this copious secretion, which the patient has not sufficient strength to throw off, is the cause of death, the brain and tissues becoming poisoned by venous blood. Strong stimulating embrocations are here required to the chest, and doses of sesquicarbonate of ammonia and chloric æther should be given at short intervals.

With regard to the treatment of the chronic form of bronchitis so common amongst the Grinders of Sheffield, much will depend on the peculiar complications each case presents. The addition of a dilated state of the tubes to chronic inflammation of their mucous-membrane, adds much to the difficulties of treating a patient so affected with success. In the great majority of such patients that I have seen, both in private

and dispensary practice, the sputa have been very abundant, solid, opaque, and, for the most part, purulent. The face is bloated, the lips are blue, the countenance is generally livid, such symptoms arising from the altered state of the mucous-membrane preventing the proper aeration of the blood. When the disease has existed for some time it is not uncommon to find enlargement and thickening of the right ventricle. Blisters applied to different parts of the chest and repeated dry cupping are useful in many cases. In the chronic forms, counter-irritation, especially with the turpentine and strong acetic acid liniment, should always be employed; the expectorant medicines to be selected must depend upon the condition of the discharge from the bronchial tubes. When the expectoration is considerable balsam of copaiba and naptha are medicines of considerable value; and the inhalation of the vapour of *tar* or *creasote*, or of chlorine much diluted, has unquestionably a tendency to reduce the irritability of the mucous-membrane, and to lessen the quantity of its secretion.

CHAPTER VI.

TREATMENT OF THE INCIDENTAL SYMPTOMS OF CONSUMPTION. HÆMOPTYSIS. COUGH. BRONCHITIS. PNEUMONIA. PLEURISY. TUBERCULOUS MENINGITIS. DIARRHŒA. NIGHT PERSPIRATIONS. IRRITABLE STOMACH. DYSPNŒA. INFLAMMATORY AND ULCERATIVE CHANGES IN THE LARYNX. CERTAIN REMEDIES EMPLOYED IN THE TREATMENT OF CONSUMPTION. IRON. TAR. COUNTER-IRRITATION. INHALATIONS. COD LIVER OIL; ITS MODE OF ADMINISTRATION, EFFECTS ON THE SYSTEM, &C. CONCLUSION.

Hæmoptysis. It has already been remarked that hæmoptysis is rather to be regarded as an unfavourable symptom than as one calling for active medical interference. When, however, the bleeding is excessive, and of an active character, it may be necessary to cup over the chest, or even in some rare instances to bleed the patient from the arm, *but bleeding ought never to be resorted to without the most urgent necessity.* When the hæmoptysis is passive, direct astringents are required: one of the most powerful is the acetate of lead. I have, in several very urgent cases, found gallic acid very efficacious: it is quite as useful as tannin, and does not exert the same dessicating effect on the tissues. M. Aran describes three cases in which he employed *veratrine* with happy effect. In a great majority of cases turpentine is one of the best remedies that can be employed. Great caution should be exercised in applying cold

to the chest, or congestion, pneumonia, and a speedily fatal result may arise from it. The following is the case referred to at page 92 :—

"I was consulted, October, 1852, by Mr. R. A., aged 34: he had lost two brothers from phthisis: I had attended his eldest brother, who died of that disease only a few months previously. When I first saw Mr. A., he complained of some difficulty of breathing on going up a hill, or a ladder; but it was in consequence of slight hæmoptysis that he now requested my attendance. Two months from this period he sent for me about seven o'clock in the morning, having coughed up nearly a pint of blood when he was dressing. This hæmoptysis continued for many days in considerable quantity; and it was weeks before it entirely ceased. There was dulness under both clavicles, and at one time signs of softening under the left. Various remedies were employed to arrest the hæmorrhage, the most effective being gallic acid. After a time he took a teaspoonful of cod liver oil three times a day, in a little infusion of orange peel, with the addition of five drops of the dilute nitric acid, and 1-12th of a grain of morphia. Counter-irritation was applied to the chest. He gradually gained a little strength; and the chest, on being examined, showed that the disease was arrested. He went that winter to reside at Torquay, and has spent every subsequent winter there. I examined him a few weeks ago (nearly four years after signs of softening were present, and evident not only to myself, but to Dr. Lennard and to Dr. Elam, who saw this gentleman with me): he had been attending to his business all the last summer, and was fat and well nourished. The vocal resonance was marked under both clavicles; there was a little dulness on percussion, imperfect expansion of the chest, and some flatness on the left side, and harsh respiration; on urging him to take as deep an inspiration as he could, a peculiar creaking sound was heard."

This case is to me of considerable interest, as showing the arrest of consumption under circumstances the most unfavourable. It is not a little singular that I saw near Sheffield, about two years ago, a similar case in many respects, in a gentleman, Mr. P., of about the same age, and who followed the same calling, viz., that of a builder. He was attacked with sudden and violent hæmorrhage from the lungs, which continued for some time. The case differed in this respect. I could never detect any signs of softening, and no very near relation had died of consumption. The recovery was equally satisfactory, and there has been no return. Gallic acid, here, arrested the hæmorrhage after the acetate of lead had been given with no apparent effect.

Cough. "Cannot something be done to relieve my cough, and get me a little rest?" is one of the most common requests a consumptive patient makes to his medical attendant. If the patient be particularly irritable, three drops of the tincture of aconite may be given in a draught consisting of the spermaceti mixture. Anodynes, such as hyoscyamus, conium, and Indian-hemp, are useful; and nothing more so, in many cases, than the following draught every six hours:—

℞ Acidi Hydrocyanici (*Scheele's*), gtt.ii;
Aquæ Anisi, ℥iss; Misce.

This troublesome cough is frequently soothed by the aniseed, and so great an authority as the late Dr. Prout has advised that three drachms of the aniseed should be bruised, and a pint of water added, at a temperature of 120°; this is to stand until cold, and taken at pleasure, either alone, or as a vehicle for other medicines. Of course it is very desirable to give but little opium; still, in the great majority of cases, some form of it will be both useful and necessary. The linctus suggested by Dr. Theophilus Thompson is particularly agreeable; it consists of half an ounce of conserve of roses, half an ounce of lemon juice, and half an ounce of syrup of poppies, a teaspoonful to be taken occasionally; or 1-16th of a grain of morphia may be mixed with a teaspoonful of syrup of tolu, and five drops of the dilute nitric acid, and taken in a wine glass of water, every four or six hours. Of the advantages of inhaling chloroform, mention has been made, and other substances will be considered when speaking of inhalation. When a patient tells me he cannot get any sleep in consequence of his cough, I make it a rule to obtain rest for him, giving as little opium as possible, but still sufficient to command repose; if sleep be not obtained hectic generally sets in, and, indeed, without rest, no good can arise from either cod liver oil or any other remedy.

Capillary Bronchitis. Pneumonia. Pleurisy. Tuberculous Meningitis. With the advance of the disease the liability to attacks of capillary bronchitis increases, and this is the case more particularly after softening has taken place. Bronchial inflammation is ever injurious, and when set up in the vicinity of the tuberculous deposit it encourages degeneration, and is often followed by an additional effusion of cacoplastic matter. It should be met by prompt, but by no means too active measures; dry cupping, followed by a blister to the chest, is generally sufficient to relieve the patient; but when the attack is more severe, and attended with fever, increased cough, and difficulty of breathing, salines, with small doses of antimony, will be required; the diet, as a matter of course, being less stimulating than usual till the attack has subsided. The same plan of treatment will be required should an attack of *pneumonia* occur. In the last stage of consumption, pneumonia is sometimes present; when this is the case, as active measures always do harm, the treatment must be as little depressing as possible.

Secondary Pleurisy must be treated with due regard to its severity and the period of the disease at which it occurs. Pains in the chest generally may be relieved by some stimulating embrocation, or a mustard poultice; a friction murmur heard over the apex of the lung, even if accompanied with cough and a good deal of pain, usually subsides if a blister be applied over the part where the pain is most severe. The pleuritic effusion present in the last stage of consumption I have found best relieved by this embrocation :—

℞ Ext. Opii (*Aquosi*), ʒ ii; Ext. Belladonnæ, ʒ iii;
Camphoræ, ʒ iii; Ol. Terebinth, ʒ ss.;
Ol. Olivæ, ʒ iss.; Misce.

The strength must at the same time be supported by food and stimulants.

Tuberculous Meningitis may be treated by cold to the head, leeches, purgatives, and, when there is a tendency to coma or low delirium, blisters should be placed on the nape of the neck, and mustard sinapisms to the feet and calves of the legs, care being taken that the strength is supported. I have never yet seen a case of tuberculous meningitis in an adult that did not prove fatal.

Diarrhœa. The nitrate of bismuth is one of our most valuable remedies: the following draught may be administered every four hours:—

℞ Bismuthi Nitratis, gr.vi; Pulv. Trag. Co., gr.x;
Pulv. Ipecac. Co., gr.iii; Aquæ, ℥iss.; Misce.

Dr. Theophilus Thompson first pointed out the advantages of this remedy in the thirty-first volume of the Medico-Chirurgical Transactions, and from the numerous cases in which I have prescribed it, I feel that I am justified in saying there is no one remedy with which I am acquainted nearly so valuable in checking the diarrhœa of consumption. In some cases, a draught composed of the *decoct. hæmatoxyli* and *aqua calcis* (by the way not a very chemical combination), used a good deal at the hospital at Brompton, is unquestionably useful. Other methods of treatment have already been indicated.

Night Perspirations. A good diet, cod liver oil, and tonics, usually arrest the excessive perspirations. The following are some of the remedies I have found most useful:—

℞ Acidi Gallici, gr.iv; Morph. Acet., gr.1-12th;
Spir. Vin. Rect., gtt.iv; Syr. Tolutani, ℥ss.;
Aquæ, ℥i; Misce, ft. haust. h. s.

Or,

℞ Zinci Oxidi, gr.iv; Ext. Conii, gr.iv; ft. pil., ii; h. s.

Or,

℞ Acidi Gallici, gr.iii; Morph. Hydrochl, gr.$\frac{1}{8}$;
Syr. Rhead, ℥i; Aquæ, ℥i; Misce, ft. haust. h. s.

In some of the worst cases of night sweats a mixture containing *tannin*, *nitric acid*, and *lupulin*, is often advantageous: but it not unfrequently happens, that after resisting every other remedy, they are relieved by the night pill of the oxide of zinc, and the extract of conium.

Irritable Stomach. Nausea and vomiting I often see relieved by the draught, I think first suggested by Dr. Risdon Bennett, consisting of ten grains of the nitrate of bismuth, a drop or two of hydrocyanic acid, and a little gum, in green mint water. When this fails creasote is an appropriate remedy. General directions for the treatment of this distressing complication will be found at p. 123.

Thoracic Pains, often of a reflex character, and obviously of nervous origin, may be treated with the anodyne liniment described at p. 132 : a plaster of opium or belladonna applied over the seat of pain is almost always useful

Dyspnœa, if the result of a considerable accumulation of tubercle in the lungs, is best relieved by small blisters; if arising from secondary inflammation it must be treated on general principles (always remembering that the consumptive never bear active measures), and if from exhaustion, stimulants will be required; chloric æther is one of the best medicines that can be employed for this purpose.

Inflammatory and Ulcerative Changes in the Larynx. Leeches, blisters, and counter-irritation, are the best means for arresting these affections. Equal parts of croton oil, and oil of turpentine, may be mixed together, and two or three drops rubbed cautiously over the part for half a minute at a time. Much relief, and now and then a temporary improvement in the voice, arises from stimulating the internal surface of the larynx with a solution of nitrate of silver (Argent. Nit, ℥i; Aquæ Dist., ℥i). Dr. Quain has found that this solution acts

almost like a charm when applied with a probang to the top of the larynx and vocal chords. Dr. Ebert employs inhalation of the nitrate of silver in substance, considering it difficult, when using the solution, to reach the interior of the larynx. He mixes three grains of the nitrate of silver with one drachm of powdered sugar, and places the powder in a steel pen firmly fixed in a quill, open at both ends; this is put into the mouth so that the end of the steel pen shall be on the root of the tongue; then the lips are closed round the quill as the patient inspires forcibly. He says that after a few trials the patient soon learns to manage it very well; a little cough and irritation follow, but no uneasiness.

Clergymen, schoolmasters, and public speakers often suffer from attacks of follicular laryngitis, which produces hoarseness, and when neglected, complete loss of voice. There is often cough, which is increased by exposure to cold, and the labours of the church, and if the uvula be relaxed the cough is often so troublesome on lying down as to render sleep impossible. The usual expectorant medicines so often given do more harm than good. On depressing the tongue the fauces, uvula, top of the pharynx, and epiglottis will be seen more or less red and congested, and this follicular laryngitis is sometimes attended with a spitting of blood, which must not be mistaken as coming from the lungs. The application of the nitrate of silver, counter-irritation, tonics, and cessation for a few weeks from speaking in public, for any length of time, continuously, is all that is required to remove what often proves, when neglected, a very troublesome affection.

Preparations of iron. The *potassio-tartrate* of iron is much better than the old Ferrum Tartarizatum: being a double salt of a bibasic vegetable acid, it is said to be more readily assimilated than any other form of iron, and its influence in anæmia

is consequently very rapid. The *Liquor Ferri Peracetatis*, strongly recommended by Dr. Neligan, is unquestionably a very valuable preparation.

Of the various preparations of Tar, *Creasote*, *Tar water*, *Petroleum*, or *Barbadoes* tar, and *Pyroxylic* spirit are the most useful. When the expectoration is very profuse, they often diminish it considerably, and allay the cough. I give the preference to the creasote and the petroleum.

Counter-irritation should be employed when the system is as quiet as possible. Small blisters are always useful. They may be applied at intervals under the clavicles about the size of a half crown. I think the cantharadine blistering tissue prepared by Mr. Thomas Brown, particularly appropriate for this purpose. Of the various embrocations, experience has fully proved to me that the three following forms are the most generally useful; they can be varied in strength according to circumstances:—

℞ Ol. Crotonis, ʒ ii; Liq. Potassæ, ʒ ii; Aquæ, ʒ iv; Misce.

Or,

℞ Iodinii, ℥ i; Potass Iodidi, ℥ i; Spir. Vini Rect., ℥ ii; Solve.

This preparation may be applied under each clavicle for about half a minute at a time, by a piece of sponge fixed to the end of a stick. Sometimes I order half a drachm, or a drachm of croton oil to be added to seven drachms of soap liniment, and a little of this to be rubbed on the chest every night until a papular eruption is produced; the embrocation may then be left off until the eruption begins to fade, and in this way counter-irritation can be kept up as long as we please, and this, too, with so little inconvenience to the patients, that, sensible of the relief they receive, they frequently request it may not be discontinued. I have not used the tartar emetic ointment for many years.

Inhalations are of use as palliatives in the treatment of consumption, for they sometimes allay cough and induce sleep. Dr. Snow is of opinion that opium, morphia, extract of stramonium, and the gum resins are best inhaled with the aid of heat; iodine, camphor, and creasote with the vapour of warm water; and ammonia, chlorine, and hydrocyanic acid, at the ordinary temperature. The vapour of warm water alone has often been productive of much relief in my own practice, and the addition of a few hops, in other cases, to boiling water has produced a soothing effect. I have never been able to trace any specific curative effect from the vapour of iodine. The inhalation of the vapour of hydrocyanic acid, as recommended by the physicians at the Brompton Hospital, now and then affords relief. When the expectoration is profuse the vapour of tar is especially useful: perhaps creasote, sufficiently diluted with the vapour of water, is the most useful in relieving cough and lessening the quantity of the secretion both in consumption and chronic bronchitis. When the expectoration is profuse, attended with remarkable fœtor of the breath, nothing is more efficient for the removal of a symptom so offensive to both patients and their friends as chlorine. The best way to inhale it is to pour hot water upon chloride of lime, placed in a basin over which an earthenware funnel must be inverted. Chlorine has been much used for the purposes of inhalation, in Paris, both for consumption and chronic bronchitis. I consider all these remedies, however, inferior to the vapour of chloroform (used as described at p. 123) for the purpose of allaying the cough so troublesome and distressing in the last days of patients labouring under consumption.

Cod Liver Oil. Were additional testimony wanting of the value of this medicine in the treatment of consumption, it has just been supplied by Dr. C. J. Williams, in the third edition

of his classical work on "The Principles of Medicine." He remarks, "*that the further experience of several thousands of cases induces me to repeat the opinion formerly expressed, that the pure fresh oil from the liver of the cod is more beneficial in the treatment of consumption than any other agent medical, dietetic, or regiminal that has yet been employed.*" I am certain, from what I have seen for years of the benefits produced by the oil in my own practice, that no greater boon has been conferred in our day on thousands of our countrymen than its introduction to the notice of the profession by Professor Bennett, of Edinburgh.

The oil I always prescribe is the pale oil; this is the real oil as obtained from the liver of the codfish. It is rich in biliary matters, as well as in iodine and other inorganic principles, and above all it is destitute of those products of putrefaction found in the dark oils. I have given a fair trial to the oil sold in this country as "Dr. de Jongh's Light Brown Cod Liver Oil," but have been unable to discover any advantages it possesses over the pale oil, and I am convinced that the opinion expressed by Dr. de Jongh, that the brown oil is much more efficacious than the pale, rests on no sufficient foundation. With regard to the administration of cod liver oil, it is essential not to give too much at the first; if this be done nausea is produced and the end we have in view is defeated. I always advise a small teaspoonful two or three times a day, to begin with, and I never in any case exceed a table-spoonful three times a day. It may be taken in the bitter infusion already mentioned, with a few drops of nitric acid; in water, coffee, orange wine, raspberry vinegar, or in any aromatic water; in the infusion of calumba, cusparia, hop, quassia, cascarilla, or chyrayta. Some patients take it well in milk: I have a lady at present under my care who swallows it the best in cream. Others prefer it without any

addition; and the power of the stomach in digesting the oil is improved by taking a little salt before and after swallowing it. When it cannot be taken in any other way it may be formed into an emulsion with the liquor potassæ; or a table-spoonful of the following mixture may be taken three times a day.

℞ Creasote gtt.viii; Pulv. Trag. Co., ʒ ii;
Ol. Morrhuæ, ℥ ii; Aquæ Cinnam, ℥ vi; Misce.

Many physicians object to its administration during an attack of hæmoptysis, but much depends upon the nature of the symptoms: if the hæmoptysis be active, a remedy which increases the fulness of the pulse had, doubtless, better be omitted; but when the spitting of blood is passive, means which have a tendency to enrich the blood will certainly tend to arrest the bleeding. In practice, when the hæmoptysis has been passive, I have never seen any reason to regret continuing the oil during its occurrence.

The oil, for reasons pointed out some years ago in the London Medical Gazette,* I prefer administered about one hour after a meal. The increase of weight I find in no proportion to the amount of the dose: in more than fifty cases the best effects and the largest increase of weight have followed the dose of a teaspoonful three times a day. One young lady gained ten pounds in weight in less than two months from friction over the back and chest with the oil night and morning, she being unable to retain it on her stomach even in doses of half a teaspoonful. When the weight is not increased the oil seldom does much good. It would be out of place to speculate at length on the exact way in which cod liver oil produces a beneficial effect on the system in consumption. The researches of Simon have shown, in one case of phthisis, in which the oil had

* On the Use of the Pancreatic Juice. By J. C. Hall, M.D., *Medical Gazette*, April 13th, 1849.

been given, the fibrine was reduced below the normal proportion, and the albumen (which amounted to nearly 13 per cent.) and other principles of the blood increased very considerably. It is probable that cod liver oil proves beneficial as a nutriment to all the textures. Not only is fat deposited in the adipose tissues, but the muscular powers are often most wonderfully increased by it, and the bloom of health which is seen upon the cheeks after its administration proves that a change has been effected in the circulating fluid, and that the vessels now contain healthy and nutritious blood. Some of these changes are shown by the examinations which were made by Mr. Dugald Campbell for Dr. T. Thompson, in seven cases of phthisis, according to the method of Andral and Gavarret, the results of which are given in the "Proceedings of the Royal Society," for 1854:—

		Red Corpuscles.		Fibrin.
First stage, before the use of cod liver oil	Female	129·26	...	4·52
	Male	116·53	...	13·57
First stage, after the use of cod liver oil	Female	136·47	...	5·00
	Male	141·53	...	4·70
Third stage, after the use of cod liver oil	Male	138·74	...	2·23

These analyses prove that cod liver oil increases the solids of the blood more especially in that portion which is estimated as blood globules, and that the fibrine is diminished. Dr. Hughes Bennett has remarked* that in scrofulous diseases there is a want of fat, and that the albumen derived from the food in digestion is liable to be precipitated in an unorganizable condition (as tubercle, &c.) from the want of it. Dr. C. J. Williams says that the chief salutary action of cod liver oil is, not that it supplies fat where it is wanting, but that it supplies fat of a better kind, more fluid, more divisible, less prone to change, and more capable of being absorbed into, and of pervading the struc-

* Bennett on the Oleum Jecoris Aselli, p. 57; also on the Structural Relation of Oil and Albumen in the Animal Economy, read before the Royal Society of Edinburgh.

tures of the body: thus affording a fine molecular base in the chyle, and therein a material for a better plasma, and being conveyed into the blood, and distributed through capillaries and around deposits, by dissolving the crystalline and irregularly-concreted fat scattered through them, it renders them more amenable to the process of reparation and absorption.*

The following extracts, kindly furnished me from the Journal of a Barrister, are very interesting as showing the effects of cod liver oil in increasing the weight:—

"September, 1846. I was attacked by pleurisy and did not touch cod liver oil again till November, when, being in a very reduced state, and weighing about 10st. 4lb., Dr. Hall advised me to resume it. At this time my cough was violent. I had profuse night sweats, and my expectoration, which was considerable, was frequently tinged with blood. I began the oil (which was foreign, *Dantsic*) by taking a dessert-spoonful twice a day; then I increased to a table spoonful in the morning two hours before rising, and one the last thing before going to bed. This I continued from the 2nd of November, 1848, to about the middle of January, 1849. My weight during this time was as follows:—

AT BRIGHTON.	st.	lbs.	AT HASTINGS.	st.	lbs.
November 11th, 1848.....	10	6	December 21st, 1848.....	11	1½
December 6th, „	11	0	January 22nd. 1849	11	6½

My diet during this time consisted of a pint of warm milk in the morning, about an hour after the cod liver oil; for breakfast I had tea, bread and butter, and bacon, with two or more large raw apples; for dinner I had mutton, roast or boiled fowl, some roast beef, and potatoes and turnips; light puddings, tapioca, arrow-root, sago, &c., with roasted apples; and for supper I had a bowl of arrow-root, with a toast; I drank toast-water and weak tea. For about three months and a half following the last mentioned period, I only took a table spoonful of cod liver oil in the morning. My weight was:—13th Feb., 11st. 10lb., at Hastings; 17th May, 11st. 8lb., at London. I then left off the use of cod liver oil almost altogether, or I took it in small quantities, varying from a dessert to a tea spoonful. My weight was:—4th July, 11st. 2lb.; 17th, 11st. 2lb.; 16th Aug,, 10st. 9lb.; 27th, 10st. 8lb.; 29th Sept., 10st. 6lb.; 24th Oct., 10st. 9lb.; 23rd Nov., 10st. 4lb.; 17th Dec., 10st. 6lb.; 30th Jan., 10st. 6½lb.; 23rd Feb., 10st. 5lb. Highest weight attained, 11st. 10lb., 13th Feb., 1849; lowest weight, 10st. 5lb., 23rd Feb., 1850. I ought to have added that I derived much benefit from my physician's prescription of repeated counter-irritation, by a small blister under each clavicle, and this I have applied very frequently up to this time, with great advantage. Hastings, Feb. 1850. H. R."

* Principles of Medicine, p. 404, and On Cod Liver Oil in Phthisis. London Journal of Medicine.

From the position in which I am and have been placed for some years past, the most extensive opportunities have been afforded me of giving cod liver oil, in numerous cases of consumption, and in almost every possible modification of age, sex, and rank, and I am fully satisfied that in many cases it has arrested the disease when there was little reason for hoping that any treatment would be of use, and that I know many who are alive at this moment who would not have been so but for the employment of this remedy. Its effects in consumption are most marked. It nourishes the body, increases its weight, relieves the cough, reduces the expectoration, checks perspirations, and prevents the additional deposit of tubercle.

Of the effects of other oils I have had little experience. I have given glycerine in a few cases, but I have no reason for thinking it particularly efficacious.

Conclusion. Thus have I very briefly endeavoured to give the results of my own experience during the last twenty years in the treatment of consumption, believing as I do that it is the duty of every physician and surgeon faithfully to record the facts which he observes, and to place them before his professional brethren. Thus might be gathered from every part of this and other countries a number of valuable facts from which important conclusions could be drawn.

With regard to the treatment of consumption, the experience of physicians in our large provincial towns confirms that now expressed by their brethren in the metropolis; that although when Laennec and Louis calculated the average duration of life in consumptive patients at two years, they were probably right, in our day, improvements in treatment will extend that average to four years. And are we not also justified in expressing our confidence that patient research, scientific method,

and careful observation will enable our profession, which has banished the plague from this country—destroyed the virulence of small pox—materially lessened the prevalence of typhus fever, of dysentery, of ague, and done so much to remove the dangers incident to child-birth, and to mitigate the sufferings of the mother, even yet to discover, in the appliances of our art, means for still more effectually diminishing the mortality of consumption?

FINIS.

Printed by Harrison and Pawson, High-street, Sheffield.

DESCRIPTION OF THE PLATES.

PLATE I.

FIG. 1. *Yellow Tubercle.*

a Tubercle corpuscles. *b* Simple tubercle cells. *c* Granular matter in quantity. *d* Curled elastic tissue.

FIG. 2. *Gray Tubercle,*

a Elastic tissue of the air-cells. *b* Tubercle elements. *c* Compound tubercle cells, and epithelium in a state of fatty degeneration.

FIG. 3. *Yellow Tubercle Liquified.*

a Fluid of a creamy consistence from the centre of crude yellow tubercle. Small tubercle corpuscles, granules, and oil in a state of minute division. *b* Pus-like fluid from yellow tubercle completely liquified. *c* Pus-cells. *d* Granule cells. *e* Columnar epithelium. *f* Oil molecules. *g* Free granules. *h* A few single tubercle corpuscles.

FIG. 4. *Sputa from Chronic Bronchitis.*

a Pus and mucus: *b* Bronchial columnar epithelium. *c* Shrivelled and abortive cells. *d* Blood corpuscles, some of these appear to have a delicate envelope. *e* Leptomitus (a minute fungus).

FIG. 5. *Gelatinous Sputa, Consumption.*

a Enveloped blood-corpuscles. *b* Cells with a few granules, molecular matter, and oil.

FIG. 6. *Flocculent Sputa, Consumption,*

a Pus and mucus, shrivelled cells. with irregular edges, granular matter, and oil. *b* Group of cells, with pigment; probably from one of the bronchial glands. *c* Curled elastic fibre.

All the figures on this Plate are enlarged 250 diameters.

PLATE II.

FIG. 7. *Sputa. Sheffield Grinders'* (*Wet*), (Table Blade and File Grinders.)
a Cells containing pigment. *b* Sarcina ventriculi. *c* Curled elastic fibre. *d*, *e*, *f*, Pus and mucus cells, some very transparent, showing a distinct nucleus, and in one instance two nuclei are represented, others (*f*) with pigment. (250 diameters.)

FIG. 8. *Sputa. Sheffield Grinders'* (*Dry*). (Fork Grinder.)
a Epithelium from the mouth. *b* Epithelium from the fauces. *c* Silicious particles. *d* Metallic particles. *e* Blood Corpuscles. *f* Pus and mucus cells. (250 diameters.)

FIG. 9. *a Expectorated Chalk*, (*natural size.*)
b Cretaceous matter removed from pulmonary tubercle. This is much magnified and has a somewhat crystalline earthy appearance.

FIG. 10. *Cholesterine.* (50 diameters.)

FIG. 11. *Sputa from a Cavity at an advanced period of Consumption.*
a Pus and mucus cells. *b* Tubercle corpuscles. *c* Large, and very dimly granular hyaline cells; probably mucus from the pharynx. *d* Large cells, coarsely granular throughout. *e* Curled elastic tissue, in minute fragments. *f* Conoidal ciliated epithelium from bronchi, very abundant in patches. *g* Entangled air bubbles, highly characteristic of sputa brought up from a distance; much granular matter. (250 diameters.)

FIG. 12. *Substances Foreign to the Expectoration, but brought up along with it.*
a Starch granules, altered by heat and moisture, from bread. (200 diameters.) *b* Striped muscular fibre from meat, (200 diameters.) *c* Cell from the potatoe, with remains of the membranes of the contained starch granules, as left after boiling. (100 diameters.) *d* Leptothrix buccalis (minute fungous vegetation). (400 diameters.) *e* Hairs from wheat grain, not uncommon in the coarser kinds of bread. (25 diameters.)

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