

**Second series of cases illustrating the pathology of the pulmonary disease frequent among razor-grinders, stoneworkers, colliers, etc. / by Edward Headlam Greenhow.**

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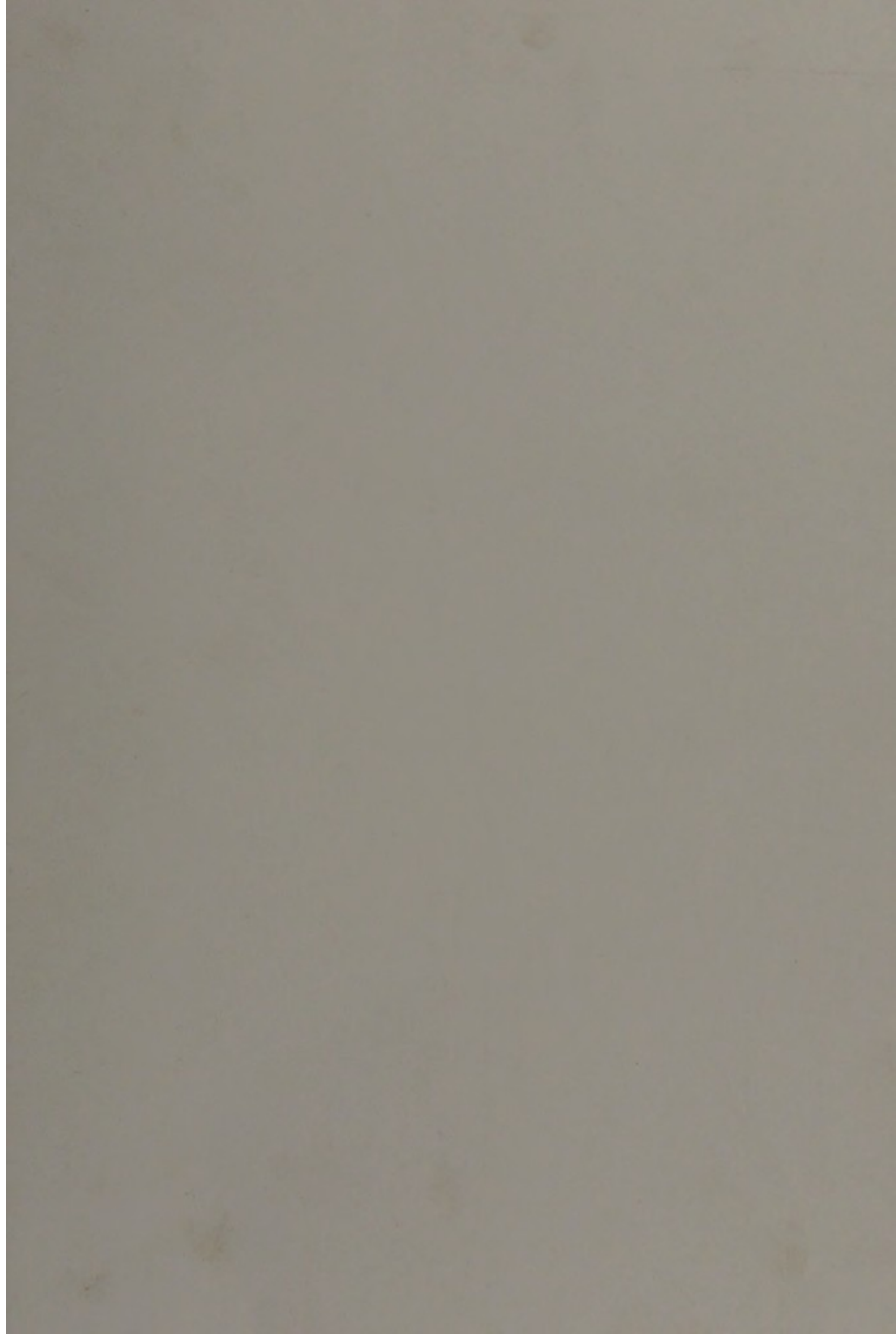
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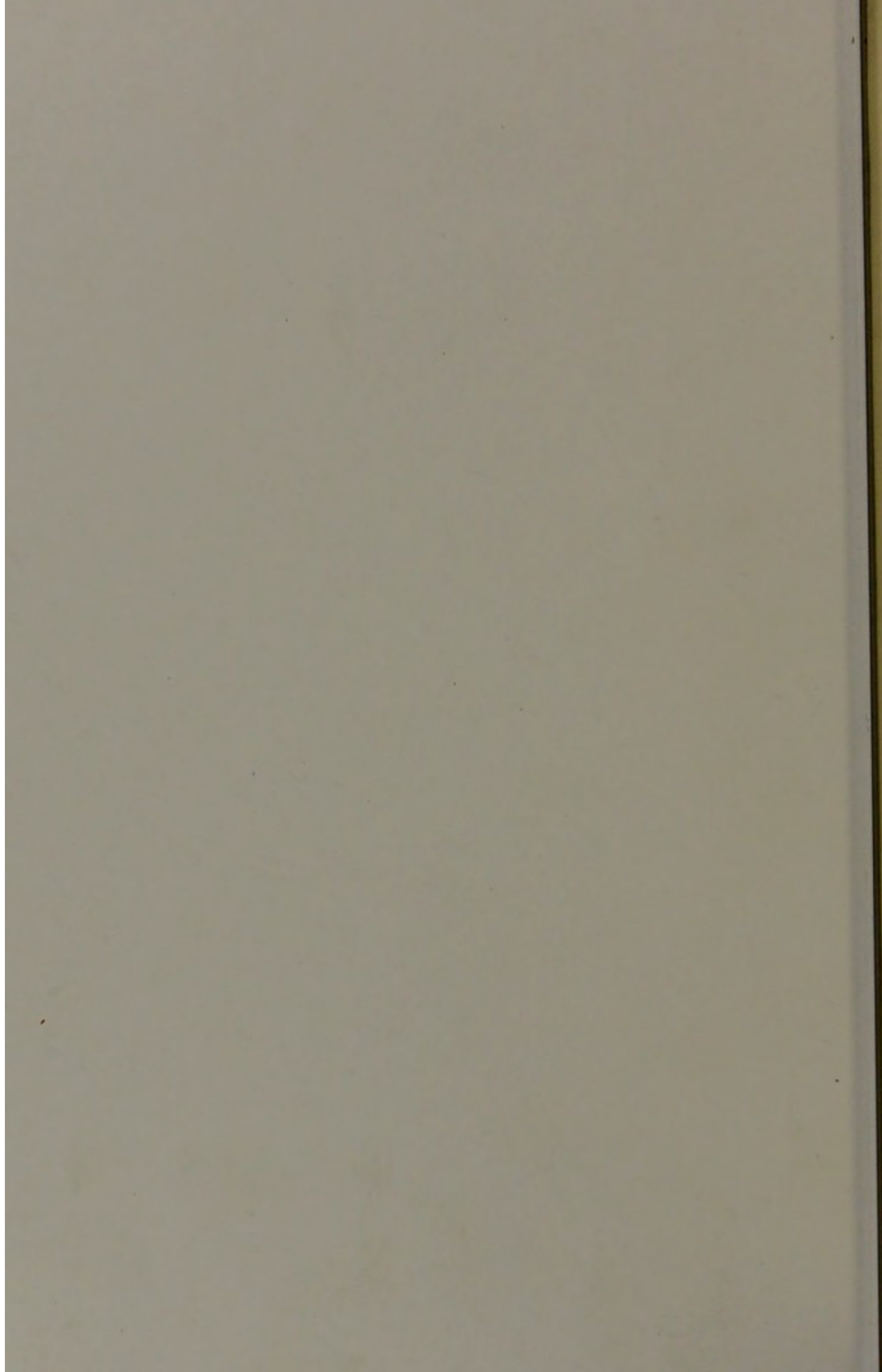
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SECOND SERIES OF CASES

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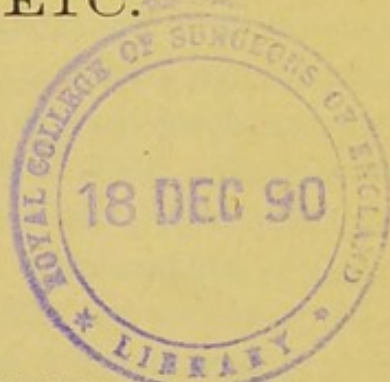
ILLUSTRATING THE PATHOLOGY

OF THE

# PULMONARY DISEASE

FREQUENT AMONG

RAZOR-GRINDERS, STONEWORKERS,  
COLLIERS, ETC.



BY

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1865-66.

SECOND SERIES OF CASES

ILLUSTRATING THE TECHNOLOGY

PULMONARY DISEASE

PRELIMINARY

BY DR. J. M. W. W. W. W. W.

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1. *Case of stone-worker's pulmonary disease.*

W. J. F., æt. 38, formerly a French mill-stone maker, but for the last eight years a stone-mason, was admitted into the Middlesex Hospital under my care, September the 21st, 1865.

He had for twenty years been subject to morning cough, attended by scanty white expectoration, but he stated that he had never suffered from dyspnœa. His cough had generally been worse in the winter season, but he had never been laid up with it until now. Eight weeks before his admission, a chill, from unusual exposure at night, had been followed by shivering and catarrh, and since that time his cough had been much aggravated; the expectoration had become very copious and muco-purulent, and he had lost flesh rapidly. On admission, his skin was cool; pulse 78, small and compressible. The expansion of the chest in respiration was deficient, but it was equal on both sides. The percussion resonance was deficient over the upper and anterior part of the thorax; also over the whole left side of the thorax posteriorly, especially in the supra-scapular region, and likewise in a less degree over the right side. The vocal fremitus was increased in the sub-clavicular and supra-scapular regions on both sides, and there was bronchophony above the left nipple. The respiration was dry and harsh, and the sound of expiration much prolonged over the whole chest. There was coarse crepitation over a limited space near the left nipple, and also occasionally on deep breathing in the left supra-scapular region. The heart-sounds were normal. A few days after his admission the expectoration contained a few streaks of blood, but his appetite continued good, his skin cool, though moist, and his pulse quiet. On the 8th of October he had a severe attack of diarrhœa, and the following day his pulse was quick and feeble, his features shrunk, and his skin cold. Towards evening profuse hæmoptysis supervened, under which he sank.

*Post-mortem examination.*—The lungs, especially the posterior parts, were externally much darker than usual, and studded with dark pigment-patches. The anterior borders of both lungs were emphysematous. The left lung, from a little below the apex to the base, was firmly adherent by its posterior surface; otherwise the lungs were free from adhesions. The apices of both lungs were puckered and presented several cicatrix-like folds, around which were emphysematous bullæ. The posterior part of the upper lobe of the left lung, for two-



thirds of its depth downwards from the apex, was converted into an extremely dense and hard solid tissue of an almost coal-black colour, and of gristly consistence, but giving a slight sense of grittiness on being cut through. The freshly-cut surface was remarkably smooth, and presented a somewhat mottled appearance, the black hue being diversified by irregularly-arranged lines of an iron-grey colour. The bronchial tubes in this part of the lung were dilated and thickened. The remaining portion of the upper lobe was also nearly black and very dense, but crepitant. The lower lobe was likewise very dark on section; it contained a deep-seated irregular cavity about two inches in long diameter, the walls of which were shreddy and black. A small quantity of dark bloody fluid was found in the cavity. The posterior part of the lobe was non-crepitant, tough, and nearly black, but less hard and dense than the upper lobe. A portion of the posterior part of the upper lobe of the right lung was converted into a dense black tissue similar to that already described in the left lung, but of smaller extent. The rest of the lung was congested, and very dark from deposit of pigment, but crepitant. Scattered here and there, in the crepitant portions of both lungs, were a few small solid nodules, varying from the size of a split pea to that of a small bean, and found on section to be of a pale colour and firm consistence. The trachea and large bronchi were somewhat dilated, and filled with mucus intermixed with bright red blood. The mucous membrane of the larger bronchial tubes was slightly injected. The bronchial glands were somewhat enlarged, very hard, and of a deep black colour throughout. The lungs together weighed three pounds ten ounces. There was slight recent pericarditis; the pericardium contained about an ounce of turbid serum, and a few very small flocculi of lymph. The heart was otherwise quite healthy, as were likewise the intestines, kidneys, and other abdominal organs.

On microscopic examination of a portion of the dense hard tissue from the upper part of the lungs, it was seen to consist of elastic fibrous tissue, abundantly intermixed with granular exudation cells, and with black pigment, the latter being in some places arranged in well-defined roundish masses, and in others in the form of fine granules. Sections of the lungs, at the junction of the solid and crepitant portions, showed thickening of the walls of the air-cells, with a deposit of black pigment in their substance. The small, solid, pale-coloured nodules in the crepitant portions of the lungs had the character



of chronic inflammatory exudations; they consisted of nucleated cells and nuclei, granular matter, and cells containing oil-globules, interspersed with a little fibrous material and black pigment.

Portions about the size of a small horse-bean, taken from the apices of both lungs, having been thoroughly incinerated in a porcelain vessel, left a considerable amount of white ash. On boiling this ash in strong hydrochloric acid the greater part was dissolved, leaving a heavy residue of a greyish-white colour, which, on being thrown into a glass of water, fell rapidly to the bottom. Under the microscope, this residue was found to consist of very minute angular-looking particles, which did not polarize light, but which were dissipated on being exposed to the fumes of hydro-fluoric acid, thus proving them to be silica. A portion of consolidated lung taken from the body of a man who had died of chronic pulmonary disease, having been treated in the same manner, left a much smaller proportion of ash which was entirely dissolved in boiling hydrochloric acid. In order to place beyond question that the insoluble residue was in fact mill-stone dust, I obtained some fine dust of French burr, through the kindness of Dr. Peacock, who first drew attention to the prevalence of pulmonary disease among the mill-stone-makers of the Metropolis, and demonstrated the presence of grit in their lungs. (*Pathological Transactions*, vol. xii., p. 36.) This dust being placed under the microscope with polarized light showed no signs of polarization, and a portion of it having been ground down in a mortar, and afterwards treated with hydrochloric acid, so as to reduce it to a similar condition with that of the residue from the lung, was found under the microscope to be apparently in all respects identical with that deposit.

*Remarks.*—The pulmonary disease in this case had evidently been caused merely by the mechanical irritation, excited by the inhalation of gritty particles to which the patient had been exposed by his occupation. The coincidence of a cool skin and a quiet pulse, with wheezy asthmatic cough, and copious muco-purulent expectoration would indeed have rendered the diagnosis of the case from one of tubercular phthisis comparatively easy, even without a knowledge of the nature of the patient's employment. The sequence of events in the case exactly corresponded with the history of many similar cases which have come under my observation. Such patients often suffer for many months or years from chronic cough or expectoration, without being disabled from



work until the supervention of some acute catarrhal attack, to which persons in this condition are peculiarly liable. This, as we have seen, was the case in the present instance, notwithstanding the extensive changes which the lungs had undergone, and I have frequently seen potters, needle-pointers, flax-hacklers, chaff-cutters, and other artisans, who had contracted pulmonary disease from the inhalation of various kinds of dust incident to their occupations, still able to continue their labour, when, judging by the physical signs, the disease appeared to have been even more advanced than it was in the case under consideration. Disregarding the cough, expectoration and dyspnoea, to which they have long been used, persons, in these circumstances, most frequently date the commencement of their illness from the catarrhal attack which only aggravated it, and this, in fact, was done by the patient in the present case. He persisted at first that he had been in good health until his last illness, although the disease in his lungs was obviously of much older date, and it was only by close inquiry that the fact was elicited of his having suffered for many years from habitual cough.

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## 2. *Specimen of collier's lung.*

I am indebted to Dr. G. H. Philipson, of Newcastle-upon-Tyne, for the specimen exhibited to the Society. It was taken from the body of a pitman, æt. 30, who died four hours after his admission into the Newcastle Infirmary, for severe injuries occasioned by a fall of stone from the roof of the mine in which he was working. The man had been employed as a collier for twenty years.

At the *post-mortem* examination, the pleuræ on both sides were found to be firmly adherent, and the lungs remarkably exsanguine and doughy. There was no consolidation, nor any trace of tubercle, and the bronchial glands were of ordinary size, and not discoloured. The portion of lung sent to me appears to have been taken from the free margin of the upper lobe, and is very dark, being speckled and streaked with black. With the assistance of my friend, Dr. Cayley, I have made a careful microscopical examination of sections taken from various parts of the specimen. In some of these we found air-cells perfectly normal in appearance; whilst in others several cells had coalesced, as though from rupture of the intervening walls. In the walls of many of the cells



were deposits of amorphous black pigment, in some places taking a granular form, in others accumulated into black masses which had a tendency to arrange themselves in a longitudinal direction, but with occasional branching and frequent interruptions. In some parts these black seams appeared to sweep round the individual air-cells; in one section a longitudinal mass of black pigment ran across the field, giving off branches and suggesting that a vessel was both plugged up and surrounded by black pigment. The lung had been preserved in glycerine, in which also the sections were immersed for microscopical examination, and numerous small granules of black pigment apparently identical in nature with that seen in the pulmonary tissue were floating freely about the field of every section examined. (*See Plate, Figs. 1 and 2.*) The smaller bronchial tubes contained some red viscid mucus, which, under the microscope, was seen to consist of fibrillæ, blood-corpuscles, and irregular cells, mixed with some small masses of amorphous granular pigment, identical in appearance with that seen in the lung-tissue.

Assisted, as on former occasions, by my colleague, Mr. Heisch, I incinerated a portion of the lung, about the size of a hazel-nut, in a porcelain crucible. It left a dark reddish-coloured ash, much more abundant than that which remained from the incineration of a piece of normal lung of the same bulk. This ash, on being boiled in strong hydrochloric and nitric acids, was partially dissolved, but left a white residue that rapidly fell to the bottom of the vessel, and which, under the microscope, was seen to consist mainly of amorphous deposit, mixed, however, with a few minute crystals which polarized light. On exposure to the fumes of hydrofluoric acid, in a covered platinum vessel, both the amorphous and crystalline deposits were entirely dissipated, proving them to be silica.

Feeling assured that the presence of the silica was due to inhalation of dust from the coal measures, I presumed that it would probably be associated with alumina. In order to determine this point the acid liquor, left by the subsidence of the silica, was first treated with pure solution of potash—ascertained by careful preparatory testing to be perfectly free from any trace of alumina—and by this process red oxide of iron was thrown down. The iron having been filtered out, the filtrate was neutralized with hydrochloric acid, and treated with ammonia, when alumina, in a flocculent form, was abundantly deposited.



*Remarks.*—This case is the more interesting because the man did not die from disease of the lungs, but from the effects of an accident whilst continuing his labour as a pitman, and apparently in tolerable health. The disease was, in fact, only in an early stage, and yet the examination shows that a considerable quantity of foreign matter was lodged in the stroma of the lungs. In former communications to the Society on kindred cases, I have described the usually slow and insidious course of the pulmonary disease excited by mechanical irritants, and of this a further illustration appears to be afforded by the present case.

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### 3. *Specimen of potter's lung.*

This specimen, forwarded to me by Mr. W. D. Spanton, House-Surgeon to the North Staffordshire Infirmary, was taken from the body of a man *æt.* 35, who had been a potter all his life, and had latterly worked as a Parian-ware maker. The portion of lung sent, evidently consists of the upper and middle lobes, and part of the lower lobe of the right lung. The surface of the upper lobe is covered with old false membrane, and is generally of a very dark colour, the pigment being arranged in minute dots, or in small circular patches; but near the lower border the surface is uniformly black. On being cut through, this lobe was found to contain two larger, and several smaller, irregular, ragged cavities; the pulmonary tissue surrounding these cavities was solidified, and on section presented an aggregation of hard, perfectly black nodules from the size of hemp-seed downwards. Near the apex of the lung these nodules were intermixed with yellowish granular matter resembling tubercle. The greater part of the middle lobe was also solidified, but much less dark in colour, and the section was granular, and for the most part of a yellow colour, intermixed with some dark pigment. The upper part of the lower lobe resembled the middle lobe; but the lower portion was crepitant, and on section studded with patches of dark pigment, between which the pulmonary tissue was pale. The borders of the lung were emphysematous.

With the same kind assistance, which I have acknowledged in the previous case, the specimen was carefully examined microscopically and chemically. Sections under the microscope showed a deposit in the air-cells of opaque yellow granular matter, mixed with irregular



nuclei. The cell-walls contained a deposit of black pigment, which was, in some places, arranged round the cells in what appeared to be the thickened cell-walls. The yellow deposit, within the air-cells, appeared to be here and there detached from the cell-walls, leaving a visible interval. In some of the sections the field was traversed by what looked like semi-transparent fibrous bands of the breadth of four or five cell-walls, and containing pigment-deposits. The boundary between these fibrous bands, and the surrounding granular deposit, was in every instance well-defined (*See Plate, Figs. 3 and 4.*).

A small portion of the upper lobe of the lung, having been thoroughly incinerated, left a somewhat abundant greyish-coloured ash, which, on being boiled for some time in hydrochloric and nitric acids, was partially dissolved, leaving a white amorphous residue which did not polarize light, but was entirely dissipated by the fumes of hydrofluoric acid. The acid liquor, left by the subsidence of the silica, having been carefully tested in the manner described in the previous case, was found to contain a smaller quantity of iron, but a larger quantity of alumina, than was obtained from the collier's lung.

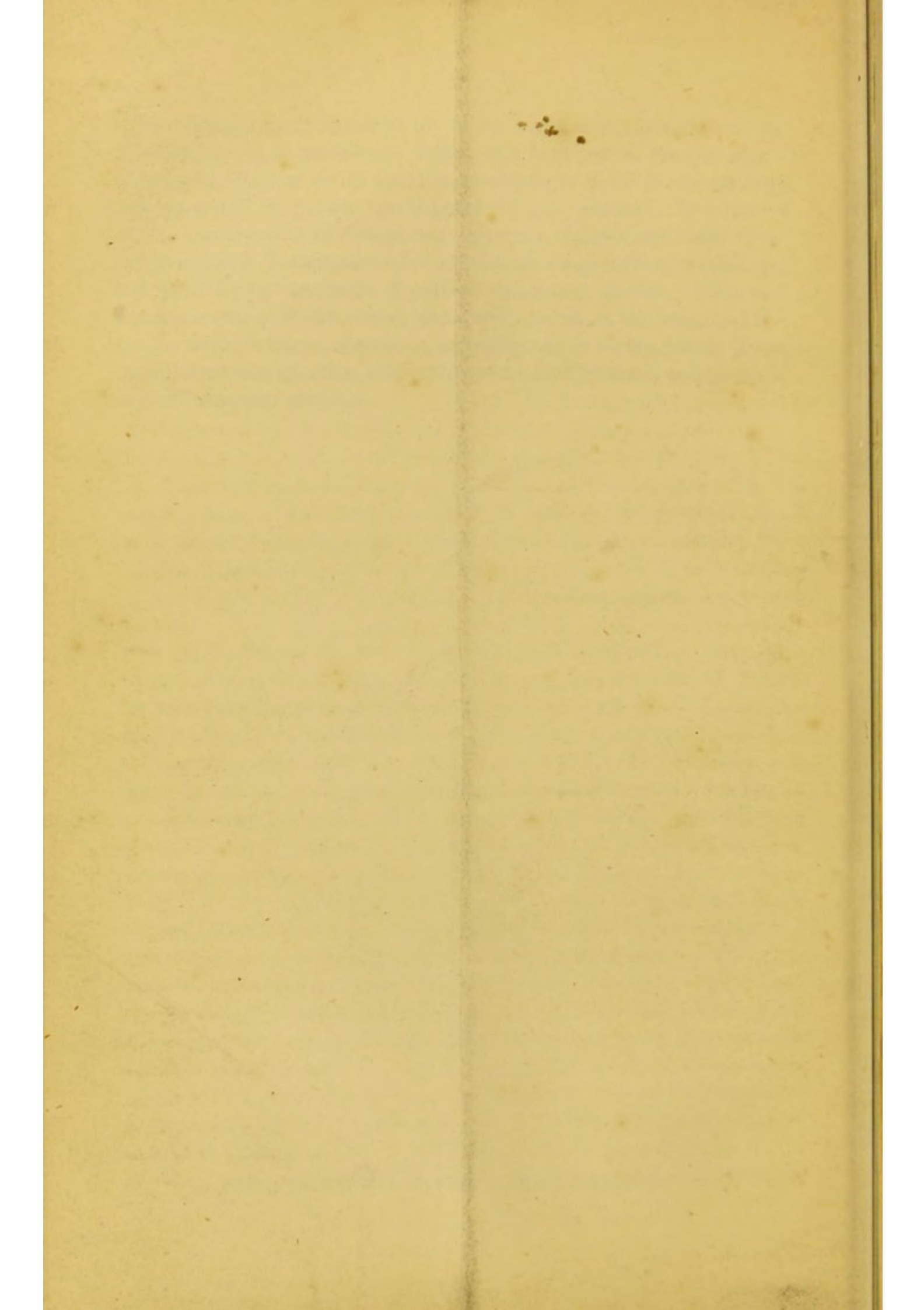
*Remarks.*—The great liability of potters to pulmonary disease has long been known, and was mentioned by Sir Charles Hastings, among others, in his work on *Bronchitis*, published upwards of forty years ago. Moreover, in the autumn of 1860, I myself spent a week in the pottery districts of Staffordshire for the purpose of investigating the nature and causes, of the disease, popularly known as potters' asthma, or consumption, and the results of that inquiry, published in the third Report of the Medical Officer to the Privy Council, showed that the disease closely resembled that to which colliers, razor-grinders, and other operatives exposed to inhale dust, are found to be subject. In that paper I mentioned that the pottery operatives, who principally suffer from this disease, were the china-scourers, the flat-pressers, and the hollow-ware pressers, but that other persons employed in potteries were not altogether exempt. I stated that the immediate cause of the disease was the inhalation of the fine dry dust given off in the process of china-scouring, or raised from the floor of the hot potter's workshops by the pattering to and fro of the boys employed in carrying the green ware to the drying stove. I need scarcely say that this dust consists chiefly of silica and alumina, which form the main constituents of the clay used in the manufacture of china and earthenware.



The disease itself appeared to me to begin as a chronic bronchial affection, to which pneumonia might, at a later period, become super-added, and I had no doubt that the development of tubercular phthisis was promoted in persons predisposed to that disease. The results of the examination of the present specimen fully accord with these opinions which I expressed after examining many potters' workshops, and many living specimens of potters' pulmonary disease. Silica and alumina were, as we have seen, abundantly found in the lung, and the disease was of a mixed character, partaking partly of the nature of the chronic bronchial affection, excited by mechanical irritants, and partly of that of tubercular phthisis.











### DESCRIPTION OF PLATE.

The plate is taken from drawings made by Mr. F. H. Watts of the Middlesex Hospital.

- Fig. 1. shews the deposit of amorphous black pigment, in granules and masses of various sizes, in the parenchyma of the colliers' lung. One of the longitudinal bodies, supposed to be vessels choked up with deposit, is seen crossing the field.
- Fig. 2. shews a more highly-magnified section of the same lung.
- Fig. 3. shews the manner in which black pigment is deposited in the potters' lung.
- Fig. 4. shews an air-cell in the potters' lung filled with opaque yellow granular matter, the surrounding walls containing numerous deposits of black pigment.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

