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

# CASES

ILLUSTRATING THE PATHOLOGY

OF THE

# PULMONARY DISEASE

FREQUENT AMONG

## RAZOR-GRINDERS, STONEWORKERS, COLLIERS, ETC.



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1. *Specimen of diseased lung from a case of grinder's asthma.*

The specimen has been in my possession for some years. It was taken from the body of a razor-grinder, who had long suffered from grinder's pulmonary disease, but had died from an intercurrent attack of acute pneumonia. The portion of lung shown is from the upper lobe, near the apex; it is consolidated, but some parts are harder than others, and it is intersected by a firm white band, apparently produced by the thickening of inter-lobular tissue. It is now of a dark bluish-grey colour, but is paler than when fresh. On examination of a thin slice under the microscope, a few small, apparently crystalline bodies, irregular in size and shape, were seen embedded in the tissue, which also contained numerous small, well-defined, black masses of various sizes, which gave the lung its peculiar dark colour. On the supposition that these latter might be at least partly due to the presence of oxydized iron, a very thin slice of the lung was taken and immersed for some time in hydrochloric acid; but on examination under the microscope it was found still to present appearances identical with those already described. In order to determine the nature of the apparently crystalline bodies, a small portion of the lung was carefully incinerated in a porcelain crucible; it left a bright red ash, which partially dissolved in boiling hydrochloric acid, leaving a small residue, that gravitated to the bottom of the vessel. On examination of this residue under the microscope, it was found to consist partly of an amorphous deposit, partly of small angular masses, which reflected light powerfully, and polarized light transmitted through them. A portion of this residue being, at the suggestion of my friend, Mr. Heisch, Lecturer on Chemistry at the Middlesex Hospital, exposed in a shallow platinum vessel to the fumes of hydrofluoric acid, was entirely dissipated, proving it to be silica. A comparative experiment was tried with a portion of ordinary lung (from a patient who had died in the Middlesex Hospital) which, when incinerated, left an ash not quite so red as that from the grinder's lung, and altogether soluble in boiling hydrochloric acid. The solution of the ash from both lungs gave faint indications of the existence of iron, about equal in both cases; but the absence of free particles of iron in the grinder's lung was determined by bringing every part of the specimen into proximity with a delicate magnetic needle without causing any sensible disturbance.

The disease from which the patient had suffered appears to have been chronic, or as Rokitansky terms it, interstitial pneumonia, and

its cause was doubtless the inhalation of finely pulverized grit given off from the revolving grindstone while the man was at work, and which, as we have seen, was found in the lung after death, in the form of small angular particles of silica.

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2. *Specimen of coal-miner's black lung.*

This specimen, like the former, has been in my possession for some time. It was obtained from the body of a collier who had worked in the shallow and ill-ventilated coal-mines near Wolverhampton, and was taken from the free margin of the upper lobe. The general colour of the mass is dark blue, almost black, but it was quite black when fresh, at which time a black juice could readily be expressed from its substance. The pleura is thickened, and the lung is traversed by some firm white bands, apparently formed by the thickening of inter-lobular tissue. The lung cuts toughly, and is very firm and solid, but not uniformly so, some ill-defined harder portions being felt in its substance when handled. Under the microscope, the lung was seen to be studded with small black deposits, apparently irregular both in shape and size, but the examination was not made until it had been for some time immersed in spirit. On boiling a small slice in strong hydrochloric acid, the black deposit was not affected. A portion of the lung, when incinerated, left a red ash closely resembling the ash left from burnt coal. When boiled in hydrochloric acid this ash was partially dissolved, leaving a white or greyish amorphous residue, which did not polarize light but evidently consisted of silica, for it was dissipated on being exposed to the fumes of hydrofluoric acid.

This case appears to have assimilated in its pathological characters to that of the razor-grinder. The lung was similarly consolidated and traversed by white bands. Whatever doubts may sometimes be entertained regarding the origin of the black deposit in the lungs of colliers, it appears quite certain that in this instance it arose mainly from the inhalation of finely pulverized coal, for on no other supposition can we explain the presence of the very large amount of amorphous silica obtained from the incinerated lung.

*Remarks.*—The result of the examination of these specimens of lung accords with the history of the symptoms from which the several classes of operatives exposed to inhale grit or other heavy dust are

practically found to suffer. The earlier symptoms are those of bronchial irritation, namely, slight dyspnœa, cough, and scanty expectoration coloured with the material inhaled. This ailment often proceeds so slowly and insidiously that the sufferer is scarcely aware of its existence until it becomes aggravated by some attack of catarrh and more or less disables him from working. Hence, overlooking the previous indisposition, the patient, for the most part, dates the commencement of his illness from the occurrence of a cold. In a great many instances, and especially those in which the dust inhaled is of a light description, the disease often remains bronchial throughout, and presents only the ordinary characters of chronic bronchitis, with or without emphysema. But in other cases, and especially in those in which a heavy dust, such as that given off in the processes of razor-grinding or china-scouring, has been inhaled, chronic pneumonia supervenes after a time, and frequently proves fatal, either in consequence of an intercurrent attack of acute pneumonia, or, after a long chronic course, with symptoms resembling those of very chronic phthisis. Dyspnœa is always a very marked feature of such cases, and is sometimes so extreme as to prevent active locomotion, even while the patient is still able to continue his occupation. The physical signs are also out of all proportion to the amount of disturbance of the general health, which, in constitutionally sound subjects, is much less than in those who are the subjects of pulmonary disease, arising from constitutional cachexia. Sometimes, even when the complaint appears to be far advanced, the discontinuance of exposure to the determining cause, viz., the inhalation of dust, is followed by a most marked improvement of health.

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Note.—Since the above cases were published I have had a patient under my care in the Middlesex Hospital, whose case well illustrates the clinical history and pathological character of this form of pulmonary disease.

W. J. F., æt. 38, formerly a French millstone maker, but latterly a stone-mason, was admitted an in-patient September 21st, 1865. He dated the commencement of his illness from a cold caught only eight weeks before his admission, although on careful enquiry I found that he had suffered for twenty years from morning cough, attended by

scanty white expectoration. His cough had usually been aggravated in winter; but he had never before been laid up with it.

On admission his skin was cool, pulse 78, small and compressible. His cough was troublesome, and he raised a very copious muco-purulent expectoration. The expansion of the chest in respiration was deficient; but it was equal on both sides. The percussion resonance was dull 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 at 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. The patient appeared to be going on well until the 8th of October, when he had a severe attack of diarrhœa, and the following day his pulse was quick and feeble, his features shrunken, and his skin cold. Towards the evening profuse hæmoptysis supervened, under which he sank.

*Autopsy.*—The apices of both lungs were dense, hard, and of a coal-black colour; the bronchial tubes in the consolidated parts were dilated and rigid. The remaining portions of both lungs were denser than normal, and in parts almost black, but for the most part crepitant. Scattered here and there in the crepitant portions of the lungs were small, well-defined, hard nodules, on section of a pale colour, which were evidently the products of chronic inflammatory exudation. In the lower lobe of the left lung there was one irregular cavity, about two inches in its longest diameter, containing a little dark bloody fluid. The bronchial glands were hard and black throughout and somewhat enlarged. Some slight recent pericarditis excepted, the other organs were all healthy.

Under the microscope the dense portions of black lung in the apices were seen to consist of elastic fibrous tissue, abundantly intermixed with granular exudation cells and black pigment, the latter being arranged partly in the form of small roundish nodules, partly in that of fine granules. Sections of the lungs, at the junction of the condensed and crepitant portions, showed thickening of the walls of the air-cells, with a deposit of black pigment in their substance.

Small portions of the dense black tissue 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, under the microscope, 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 hydrofluoric acid in a covered platinum vessel.

I have to acknowledge the kind assistance of my colleague, Mr. Heisch, in the chemical part of this investigation.

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