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CONTRIBUTIONS

TOWARDS THE

PATHOLOGY OF GRINDERS' DISEASE OF THE LUNGS.

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No. I.

Diseases of a purely endemic character, or such as affect only a certain class of men, have generally failed to receive that attention and study which must be admitted to be their due, when it is considered that their characteristics are generally of a more prominent order, and that they more especially exemplify in their history the influence of mechanical agents on vitality. There is much to be learned from what is rare and peculiar. We often, in such cases, meet with circumstances whose existence all previous experience would not lead us even to surmise, which throw a light on what has before been mysterious, and present a link towards the completion of a deficient chain of evidence. Medical science does not yet teem with such a mass of facts—it is not yet so profuse in its wealth—but that all that we meet with should be carefully observed and faithfully recorded. Its philosophy, if such a term can be used, is anything but inductive; its evidence anything but positive. We can see the end, but not “from the beginning.” We can trace no such relation between cause and effect as in other sciences. If we do find out a cause, its operation is clouded and mysterious; if we observe the effect, we often look in vain for the cause.

One reason of the neglect of local diseases will be found in the fact, that in any given number of men there are only a certain quantity who pay such attention to disease as is requisite for its proper study; and even among these few, there are still fewer who feel themselves called upon to make their neighbours as wise as themselves; so that by this means the chance of a disease of an endemic character being fully understood is far less than when a disease obtains universally.

Of the various diseases which affect the artisans of this country, there is none that present such prominent features of interest as the disease of the lungs peculiar to grinders—and this, whether we regard the very marked character of the pathological results, or the baneful influence it has on human life. There are two kinds of grinding, wet and dry; the former is a comparatively innocuous employment; it is the latter which entails on the workmen such an amount of misery and disease. The injurious effects arise from the inhalation of small particles of stone and metal, which are given off during the act of grinding; and of the dust of crocus and emery, used in polishing the articles. The latter is regarded by the workmen as the most distressing. It will not be the object of this and succeeding papers so much to treat of the circum-

stances attending this peculiar branch of trade, or to regard the subject in a hygienic point of view, as to enter on the yet untrodden field of the pathology of the disease. The following details of the destructive influences of this occupation will, however, be not an inapt prelude:—

In an article on “Grinders’ Asthma,” by Dr. (now Sir Arnold J.) Knight, in the “North of England Medical and Surgical Journal” for August, 1830, it is stated that fork-grinders “die from twenty-eight to thirty-two years of age; razor-grinders, from forty to forty-five; and tableknife-grinders, who work on wet stones, from forty to fifty.” Also, “that the result of some inquiries made in 1822 showed that, out of 2,500 grinders, there were not 35 who had arrived at the age of fifty, and perhaps not 60 who had reached the age of forty-five; and out of more than 80 fork-grinders, exclusive of boys, it was reported that there was not a single individual thirty-six years old.”

Dr. G. C. Holland, in a recent valuable work,* observes that, “in 1,000 deaths of persons above twenty years of age, the proportion between twenty and twenty-nine years in England and Wales is annually 160; in Sheffield, 184; but among the fork-grinders the proportion is the appalling number 475; so that, between these two periods, 3 in the trade die to 1 in the kingdom generally. Between the ages of thirty and thirty-nine a still greater disparity presents itself. In the kingdom, 136 only in the 1,000 die annually between these two periods; in Sheffield, 164, but in the fork-grinding branch 410; so that, between twenty and forty years of age, in this trade, 885 perish out of the 1,000; while in the kingdom at large, only 296. Another step in the analysis, and we perceive that, between forty and forty-nine, in the kingdom, 126 die; in this town, 155; and in this branch, 115; which completes the 1,000. They are killed off.”

The last sentence is as graphic as it is true. Such is, indeed, a vivid outline, the filling up of which would be a dark portraiture. The “wheels,” as they are termed, where the process is carried on, externally present no faint type of the disease and decay within; indeed, their grim and sombre aspect, with shattered windows, would call to the mind of the classic reader the soliloquy of Lydus before the door of Bacchis.

aperite propere januam hanc Orci, obsecro!

quippe cui nemo advenit

Nisi quem spes reliquere omnes.*

All that ingenuity could do for the amelioration of these evils has been done. The inhalation of the dust, both metallic and stony, has been in some measure prevented by various contrivances. However, the benefit that might accrue from the use of these instruments is lost, from the want of generosity of the masters on the one hand, and the extreme

* Vital Statistics of Sheffield, p. 198. † Plautus, Bacchides.

carelessness of the workmen on the other. In many cases the masters will not be at the expense of these apparatus, and where, from their kindness, such is furnished, the use of it is often neglected. The men seem utterly reckless; they live in the midst of disease and death; one by one of their companions is cut down, but they each seem to think that, in the enjoyment of present health, they will be an exception to the rule, and escape the virulence of the disease.

Such being the character of the disease, and the local interest which one would suppose it should excite, it is somewhat remarkable that its nature has never been properly studied. Many details and collateral circumstances connected with the disease have at different times been laid before the public, but until the last few months no account has been given of its pathology. On turning to the article "Diseases of Artizans," in the "Cyclopædia of Practical Medicine," which *was to have been* a national work, the subject is mentioned in a very desultory manner; and it is not even alluded to in the "Report of the Sanitary Condition of the Laboring Population of Great Britain." The blame, of course, rests with the profession in this town. It behoves us to mention a paper on the "Pathology of Grinders' Phthisis," in Dr. Cormack's "Edinburgh Monthly Journal" for June, 1843, by Dr. Holland. This gentleman has paid great attention to the disease, has collated much evidence as to the condition of grinders in general, and by his kindness and professional skill has earned for himself the lasting gratitude of this class of artizans. There are, however, in the case which is about to be adduced several features of the disease which are not mentioned by him, and, indeed, we may gather from the general tone of his remarks that his post-mortem examinations have not been very extended. The following case may be regarded as presenting in a very marked manner the pathological nature of the disease; the patient only coming under our care about two months before his death, the history of his case does not exemplify the general symptoms of the disease. They are, however, such as are generally observed in chronic bronchitis, extending to dilatation of the air tubes and emphysema of the air cells. Several years before the men are obliged to cease from work, they are frequently attacked with dyspnoea and cough, with expectoration of black sputa. One man, at present under treatment, states that he has not been well for seven years past, and yet has continued at his work. In another case the patient did not enjoy good health for six years. There are frequent attacks of laryngitis of a chronic nature, and more or less severe in character, attended with considerable hoarseness; pains in the side, indicating chronic pleuritis, are also experienced, but seldom attended to. Indeed, there is no doubt that in a seeming state of health, and while at work, these men undergo much pain and inconvenience.

Thomas Stacey, aged fifty six, a razor-grinder by trade, of temperate habits; short spare man, though now emaciated by disease, always a spare man, light hair, without tendency to grey, and grey eyes. Been a grinder for forty years; began at thirteen years of age, but been on the parish for three years. Always had good health until Midsummer, 1842, when he had a bad cough, and spitting, with great difficulty in breathing, and pain at the chest. Was very ill for

several weeks, and ever since has had a cough. Was attacked with same symptoms again at Christmas, and has become worse and worse since that time. When he was at his work used to spit up a deal of black sputa, and had sometimes flying pains in the side.

June 27. Body much emaciated; complains of being very weak, can scarcely get up stairs; no pain either in the chest or elsewhere; great dyspnoea, and oppression in breathing; slight hoarseness, but no pain or uneasiness in the larynx; very bad cough, worst during the night, not attended with expectoration; pulse 96, and full; appetite bad; bowels regular; no sweats.

Physical Signs.—The chest well expanded; the left side rather flatter than the right; no motion of the ribs on full inspiration; the whole chest seemed moved together. *Percussion*: clear over the whole chest, both anterior and posterior, with the exception of over the clavicles; more sonorous than natural in the anterior part; the sound was clear over the region of the heart. *Auscultation*: the sound on respiration clear and distinct over the whole of the right side. Bronchial in the two upper thirds of the lung, somewhat vesicular, but indistinct at the inferior third. At the external superior angle a dry crepitant rale. Posteriorly bronchial respiration at the upper part, more natural at the lower; left side presented the same signs.

Heart.—No impulse; sounds very indistinct, heard in the immediate region of the heart, and towards the right side, but not at the upper part of the left side; no morbid sound.

The treatment pursued was simply palliative, with nourishing diet. He daily grew weaker until the 17th of August, when he died.

After-death Appearances.

The body was examined eight hours after death. It was much emaciated. The chest was large and expanded, seemed inordinately large for the size of the man; the left side flatter than the right; on opening it there was a rush of foul air. The lungs slightly collapsed. Right lung: the color of the external surface was violet, interspersed with black spots of different sizes, presenting a mottled appearance; on passing the hand over the surface, there was perceived over the whole body of the lung numerous hard substances, circumscribed, and varying from the size of a pea to that of a hazel-nut. The pleurae were adherent at the lateral region of the middle lobe, but especially at the apex of the lung, where they could not be separated without leaving a portion of the lung adherent to the ribs. The costal pleura was marked by many dark patches, apparently corresponding with those on the lung. The apex of the lung was converted into a hard substance of the size of a large orange. On dividing the lung, numerous black, hard bodies were found scattered throughout its structure, varying in size from a pin's head to a walnut, but the largest was at the apex, which was entirely composed of one dense mass of black firm substance, exactly resembling Indian-rubber. It was homogeneous, except at the surface; caused the same sensation on cutting it as does Indian-rubber, and each movement of the knife left horizontal parallel lines. At the surface it was greyish and calcareous, and contained one mass of white firm substance, resembling a piece of carious bone, only that the small prominences were rounded instead of being spiculated.

It was about the size of a small hazel-nut. At the extreme apex of the lung was an encysted tumor, the size of a marble, filled with a clear liquid. The other and smaller tumors in the lung, which at the surface corresponded with the black marks before mentioned, were of different degrees of consistence, varying from that of Indian-rubber to a hard, gritty substance; such as were softer were quite black, those that were hard were interspersed with grey particles. The generality of these deposits were round or oval, and circumscribed, while others were indefinite in shape and disposition; these latter invariably were of a greyish color. In the centre of the lung, or below the large hard mass, was an irregular cavity, somewhat of a triangular shape, capable of holding three or four ounces of fluid. It contained half an ounce of a thick chocolate colored fluid, which seemed to be the debris of the lung. Several large bronchial tubes opened into this cavity, but these were stopped up, and had no communication with the great divisions of the bronchus. The interior of the cavity presented a very irregular appearance, and was not lined by a membrane. The texture of the lung around it was very firm.

The lung where it was not thus diseased was emphysematous, especially at the margin. The left lung presented the same appearance, both externally and internally, as the right, with the exception that there was no cavity. The apex was converted into a similar hard mass, and quite as large as the one on the right lung. The pleura at this part were also inseparable.

Mucous membrane of the trachea was thickened, and that of the bronchial tubes very red. The tubes were much dilated. At the bifurcation of the trachea the bronchial glands were enlarged; one was as large as a walnut, and several as large as a horse-bean. They were converted into a black, calcareous mass, divided by fibrinous intersections. Two or three of the smaller ones were composed of a firm metallic-like shell, the inner part of which was like a black paste, and might be scooped out.

The heart was small and flaccid. The valves were not thickened. The abdominal viscera quite natural.

REMARKS.

The first thing that strikes the attention in the consideration of this case is the age of the patient. He was fifty six, the oldest razor-grinder in the trade. This branch of the trade is not so destructive as fork grinding, or needle grinding, which will partly explain the advanced age of the patient. In the history of the case it is stated that he never ailed anything until twelve months ago, and this was corroborated by the testimony of his friends after his death. Then how are we to explain this vast mass of disease? It could not have arisen and spread itself to such an extent in so short a time; moreover, he had not been exposed to the injurious influences of his trade, having been on the parish for three years. We have here an instance of the power of vital tissue to withstand, or rather accommodate itself to, the existence of extraneous mechanical agents. There is little doubt but that this diseased structure had been in process of formation for years, causing some trifling disturbance in the respiratory function, but not so extensive as to excite the attention of the patient; the system being in the meantime sustained by good diet. But so soon as he was reduced to want, then diseased action, before

dormant, is called into active exertion, the system sympathises with the morbid structure, and the result is more or less speedily fatal. The deposits in the lungs and bronchial glands may be divided into four classes—the white calcareous piece; the grey structure, seemingly a mixture of calcareous and metallic particles; the glands, composed of a metallic shell with a pulverised interior; and the Indian-rubber production. Some portions of these products are at present in the hands of a very able chemist, and we hope, in a future communication, to be able to state their composition. We are not aware that this Indian-rubber appearance has been before mentioned, or indeed anything that would correspond to it.

Mr. Porter, one of the surgeons to the Sheffield Public Dispensary, who was present at the above examination, informs me that he observed the same structure in a case which came under his own observation; but it is not alluded to either in the report which he gives of the case in a former number of the Provincial Journal, nor in a report of the same case by Dr. Holland in the "Edin. Monthly Jour." Of course it may have existed and not have been especially remarked. It seems, in all probability, to be a fibrinous structure with the small particles of emery dust intermingled. On the day after the examination it had become softer and rather of a purple hue; it also had the appearance of a fine powder mixed with a firm glutinous substance. Below this deposit was found the large cavity, which in its aspect, with the exception of color, had the closest analogy to an ulcerated tubercular cavity. It will be an interesting study to observe, and, if possible, determine, the relative stages of these formations. From what we know of tubercular phthisis, we should be apt to regard the cavity as the ulcerative stage of the black mass. Another circumstance to be noticed is the fact of the greater part of the disease being at the apex of the lung. This, although it does not go to show any identity between phthisis and grinders' disease, yet is interesting as showing that in the deposit of morbid matter there is the same principle at work—some peculiar local cause in operation. Dr. Carswell entertains the opinion, that the reason of the greater extent of tuberculous deposit at the apex of the lung in phthisis is owing to the inferior degree of motion of the upper lobes as compared with the lower, and thus the chance of tuberculous matter being expelled is diminished. If the tuberculous matter was deposited loose in the air cells, we could understand the *modus operandi* of this cause, but not otherwise. This hypothesis, with regard to tuberculous deposit, will have a juster application in this case. It is evident that the dust which is inhaled will be expelled more easily from those parts where the motion is of a more extensive nature than where that motion is limited. From a consideration of the nature of this disease—viz., a large portion of the lung filled with extraneous matter, we should, *a priori*, expect to find dilated air tubes and emphysema of the air cells. Dr. Holland lays great stress on this as one of the most decided of the pathological results. But it cannot be viewed as in the least degree pathognomonic. It may happen in any disease of the lungs, where any part is prevented by deposition or other cause from expanding on the ingress of air. His mode of explaining this morbid state is, in our humble

opinion, if not erroneous, at least very defective. He ascribes it solely to the cough, and observes, "The violent and full expirations occasioned by coughing are, of course, immediately followed by inspirations correspondingly ample, by which the air is introduced in large quantities into the lungs. When ten times the amount of air, not only in individual acts, but in a given time, enters the lungs, these organs are expanded in a correspondingly increased proportion. The air tubes and cells are under the necessity of doing ten times the amount of functional duty; and it is a law of the animal system, that the development or enlargement of an organic apparatus is according to the exercise of it. We know of no exception, nor can we imagine one." This is certainly a law of universal operation, but it must have a sound and proper application. It is one thing for organic structure to develop from increased action, but an increment of space is another thing. This law refers *only* to structure, and in its operation only to the development of structure. It is true that the bronchial tube does dilate from increased action, but not from increased action of the tube; indeed, the air tube becomes more than usually a passive agent. The air tubes are dilated from the increased quantity of air that is brought into the lungs, also into particular parts of the lungs. But before even this can operate, other conditions are required. There are two classes of tissues in the structure of the air tubes—the muscular and non-muscular. It is the inflammation of these that is the primary cause of the dilatation. In the case of the non-muscular, from continued irritation, there is a loss of elasticity, and the tube is exposed to the distending influence of the air; and in the instance of the muscular there is a loss of tonicity of the part, followed by innervation and paralysis similar to that of the intestine in ileus. We thus can account for the difficulty of expectoration, the contractile power being gone, also the dyspnoea—one very important adjunct in expiration being lost.

What, then, is this disease?—is it phthisis? Dr. Holland treats of the disease under the name of phthisis; but the cases he enumerates, and the pathological results which he details, lead to no such conclusion. If we are to understand by phthisis the literal meaning of the word—wasting away or decay—the term may not be objected to; but if we are to understand by that term tubercular disease, the question may be answered in a decided negative. No doubt grinders' disease may be conjoined with phthisis, and in a strumous habit the irritation in the bronchial membrane from the dust will easily call into play the morbid principles of that peculiar diathesis. In a case which terminated fatally the other day (August 21), and which we had hoped to have introduced on the present occasion, but that an examination was denied, there was every symptom of tubercular disease, but there was a prominently strumous habit. In another case, chronic laryngitis with tubercular disease was present, and where the patient had worked forty years as a penblade-grinder—one of the worst branches of the trade. But such cases are the exception rather than the rule.

The consistence of many of the morbid deposits resembles that of tubercle, but the proof that it is not tubercle will be found in the absence of all such con-

stitutional symptoms as are observed in the history of phthisis. There is a gradual decay of the system, but no irritability, no fever, or sweats, or any symptom indicating extensive sympathetic action. Where there is strumous diathesis, we have observed that the disease has commenced earlier in life, and been more rapid in its progress. Indeed, it is natural to suppose that the disease will take its aspect from the nature of the constitution; and that on such will depend, as in the case of the operation of other external agents in causing disease of the lungs, whether tubercle or disease of the air tubes is to be the exponent of morbid action.

Another and very interesting question that presents itself, with regard to these morbid deposits, is as to the mode of their formation. Are they simply inhaled, and there remain, or are they deposited from the blood? The late Mr. Thackrah, in his observations on a statement made by Diemerbroeck, that he found heaps of sand in the lungs of masons after death, inclines to the supposition that they were calcareous deposits, and were not inhaled. But tracing, as we can, by a decided connection, the daily inhalation of a foreign body into the lungs during life, and the existence of a similar body after death, surely it is more easy to suppose that the substance found after death is the same that was introduced during life, especially when the contrary supposition is attended with so many difficulties. The same view will apply to the question under consideration. In the daily occupation of grinders, there is the expectoration of black, gritty sputa, composed of the metallic and other particles inhaled. If the whole is not expelled, it must either remain in the state in which it entered, or must be dissolved and absorbed into the blood. The latter we cannot conceive. Nevertheless, it must be allowed that we are placed in a dilemma with regard to the bronchial glands. The gritty particles could not enter them by inhalation, and must have been deposited. The subject is evidently beset with some difficulties, and will require further study and opportunities of investigation.

We may state, in conclusion, that we have at present ten or twelve cases of this interesting disease under treatment; and although there is much difficulty in obtaining post-mortem examinations, we hope to be able to lay several of the cases at a future time before the readers of this Journal.

CASES OF DIABETES.

By CHARLES F. FAVELL, M.D.,

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(Continued from page 479.)

CASE II.—William Parke, aged fifteen, was admitted into the infirmary December 5th, 1842. He has been employed, for the last three or four years, as a farmer's servant; has worked a good deal in the fields, and consequently been exposed to the inclemencies of the weather. Until about four months ago he always enjoyed good health, and was able to get through his daily work with ease and comfort. His health then began to fail, but he is unable to give any accurate account of the commencement of his illness. His appetite for liquids and solids became