

passed fat in his evacuations: and I can well imagine that in this case there was disease of the suprarenal capsules. He has somewhat the appearance of a bronzed pancreatic disease complexion, the bronzed skin being modified somewhat as jaundice is modified which supervenes upon disease of the pancreas, as seen in drawings of jaundice in pancreatic disease.

A case has been reported by Mr. George May in the number of the ASSOCIATION MEDICAL JOURNAL for September 20th, under the head, "Brown Colour of Skin, with Normal State of the Suprarenal Capsules," in the Annual Report of the Reading Pathological Society, which confirms the view I have taken of the case; namely, that there are many brown skins without disease of the suprarenal capsules; yet I fully agree with Dr. Addison in believing that disease of the whole or part of the suprarenal capsules will cause a corresponding tint in the colour of the skin; and a slight amount of disease may take place in these bodies without much effect upon the skin.

I think that the difficulty of diagnosis in these cases will be readily overcome if we attend to the history of these cases. In looking over the full history of those cases which I have seen, I find that the patients have suffered from much mental anxiety, and that the first appearance of discoloration of the skin has been observed to come on afterwards; then come on the obstinate and prolonged gastric symptoms; and, from examinations that have been made of the mucous membranes after death, it is quite evident that they participate in the disease to an equal amount at least as the skin. (See Dr. Hodgkin's account of the mucous membranes in Dr. Bright's case, reported by Addison, and other cases.)

I will now briefly state my theory of the disease.

I look upon the blood-forming process as that over which the nervous system has the greatest possible amount of influence; and that it is derangement of that influence, caused by mental anxiety, which is the first cause of those cases of bronzed skin where anormal or heterologous deposit is not found in the suprarenal capsules, but simply a degeneration of these bodies from their normal structure. From this disorder of nervous influence, the change in the blood-forming process and the change in the suprarenal organs themselves take place nearly simultaneously, the former perhaps preceding. Altered blood is thrown upon the system generally, and effects changes in the skin which are evidenced by the bronzed colour, and in the mucous membranes of the stomach and intestines, the effect of which is seen in derangement of their actions, and of course in the functions depending upon the capillary actions of all organs. This view is, I think, confirmed by the anatomy of the suprarenal capsules, which displays to us that they are enormously supplied by nerves; and by the great importance of the blood-forming process, which appears to me the essential point of union between the vital and material parts of our system; for, however well all the other functions of the body may go on, whether nutritive or depurative, should the blood-forming process be in error, the powers of the constitution must very soon fail, from error in the formation of the blood, upon which the nutrition of every part of the body depends. Again, error in the blood-forming process is disastrous to a greater extent than error in any other process; as, should any other process be wrong in its action, this might in some degree, if not entirely, be corrected by a healthy blood-forming process; but should the blood-forming process be in error, the poisoned blood is at once thrown into the circulation, without any possibility of its being corrected until it shall have passed through the circulating vessels, and have arrived at some of the depurating organs. And, moreover, however active the depurating organs might be, the defect in the blood-forming process is continually supplying impure blood, or blood of an unhealthy character.

## Original Communications.

### ON THE CAUSE OF PROLONGED EXPIRATORY MURMUR, AND ITS VALUE AS A SYMPTOM IN THE EARLY DIAGNOSIS OF TUBERCLE IN THE LUNG.

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I HAVE often asked my friends the question, Do the bronchial tubes contract or expand during inspiration? The answer has generally been, "Expand, of course". I propose to consider this physiological question, respecting which I am at a loss where to seek for information; but it is evident that on its just determination much of our right or wrong reading of the stethoscopic sounds of respiration will depend. As I have not met with any satisfactory explanation of the change that takes place in the duration of the expiratory murmur as soon as tubercle begins to be deposited in the lungs, I have ventured to offer one, which, if correct, may prove useful to others; if it be incorrect, perhaps some of our associates will take the trouble to supply a better.

I find among my notes for clinical lecture one which may serve as introductory to the subject of the early diagnosis of phthisis. It runs as follows:—"In the whole course of my experience, since the curious fact was first pointed out to me by Dr. Corfe, of the Middlesex Hospital, in 1833, I have never met with an instance where the finger nails were hypertrophied, dome-shaped, and adun-culated, in which tubercle was not present in the lungs. Tubercle may, and often does, exist in the pulmonary tissue, without being accompanied by the above change in the form of the nail, but the altered appearance in the nails never fails to indicate pulmonary tubercle. This is the more remarkable, as the peculiar form assumed by the nails in consumption does not attend tubercular deposit in any other organ or organs, so long as the lungs remain unaffected. The value of this symptom, therefore, is very great, if it induce us never when it is present, to relinquish the examination of the chest, until we have discovered the seat of the tubercular deposit. It is also occasionally valuable in cases of chronic catarrh or old pleuropneumonia, as pointing out the supervention of phthisis where it would be difficult to distinguish it by auscultation alone."

Such was my note. But I may observe that, important as the indication of the existence of tuberculosis of the lung, afforded by this peculiar change in the form and size of the finger nails, undoubtedly is, especially as it is often well marked in a very early stage of phthisis, the part affected will often escape the search of the tyro, and even of the practised stethoscopist; for when tubercle is equally diffused over a large space, and is still only in its first stage, percussion and voice-sounds are comparatively valueless, and in such a case the only truly reliable symptom is the change which the duration of the expiratory murmur has undergone in reference to that of inspiration.

But if we do not know why the expiratory murmur is shorter than that of inspiration in health, and have consequently no knowledge why a deposit of tubercle should produce a more prolonged expiratory murmur, then is it not possible to rely with absolute faith on that single symptom as invariably to be depended upon. Besides this, so long as we are ignorant of its cause, it does not present to the imagination that vivid picture of the pathological condition of the portion of lung under examination by the stethoscope which every sound symptomatic of disease should present. I conceive that it is due to this want of clear conception of the cause of the variation of the length of the breath-sounds, that the full value it deserves is not generally given to this symptom as one whose presence or absence is always conclusive of the existence or non-existence of

pulmonary tubercle. Many years ago, when assisting at the vivisection of a stunned rabbit, in which the trachea and larger bronchi were fully exposed, I was surprised to observe their muscular fibres contract, diminishing the diameter of their tubes, at each movement of inspiration. It is not the general belief that the tubes are contracted during inspiration, and expanded in expiration; but if we consider the anatomical structure of the lungs and the physical effects which the whole apparatus of respiration is intended to produce, it will be obvious that, had the bronchial tubes been made to contract during expiration, and expand during inspiration, as they are generally imagined to do, this would have defeated the object of bestowing on them any contractility or power of elastic expansion.

The intention to be fulfilled by expansion of the chest through raising the ribs and depressing the diaphragm, is to cause the air to rush into the cells of the lungs: now, if the tubes all expanded at the same time as the thorax, say, for the sake of argument, to the same extent to which the capacity of the chest had been increased by its expansion, it is obvious that no air whatever would penetrate into the cells, as all that was drawn into the chest would be required to fill the tubes. Or, if the parietes expanded much, and the tubes comparatively little, the real vacuum in the air-cells would be only the difference between the increased capacity of the chest, and the increased space occupied within it by the expanded tubes. But on the other hand, if instead of expanding, the tubes contract at the moment that the chest expands, thus occupying a less space in its interior just when its capacity is greatest, it is obvious that a much increased vacuum will be formed, and that it will take place in the air cells where alone it is required; and thus, whatever air enters the chest goes directly to its destination, instead of lingering in the tubes.

Taking this view, the operation of expiration as well as of inspiration, will be more intelligible, for it will be seen that if the tubes expand at the same moment that the chest contracts, the air cells will be submitted to direct pressure between the expanding tubes and the contracting thoracic parietes; and while the air that has ceased to be serviceable to the animal economy is thus more effectually expelled from them, the way is at the same time more widely opened for its exit.

It will be seen from the above, that inspiration is principally due to *muscular action* in the thoracic muscles, the diaphragm and the circular fibres of the bronchial tubes, whereas expiration depends more on cartilaginous *elasticity*, bringing down the ribs and expanding the tubes.

If additional argument be wanting for the belief that the lungs must in themselves possess considerable power of inspiration and expiration, while within the unopened chest, independent of the expansion and contraction of the thoracic parietes, we would point to the apparently very small amount of abdominal respiration in a case of fractured rib, bandaged *secundum artem*, and to certain states of syncope, etc., that will suggest themselves to each of us, in which respiration is maintained without any apparent thoracic or diaphragmatic motion.

It appears, then, that contraction and expansion of the bronchial tubes is the only satisfactory mode of accounting for the well established fact, that the sound made by the inhaled breath rushing through the tubes towards the air-cells is considerably more protracted than that made by the same air returning in expiration; for there does not appear sufficient difference in the forces exerted in drawing in and expelling the breath, to account for the difference of time occupied in its entrance and its exit, if the calibre of the tube remained the same.

No sooner, however, do we admit that the air-tubes contract during inspiration, and expand during expiration, than the full value of a slight prolongation of the expiratory murmur becomes apparent as a consequence, and therefore as a certain symptom, of the deposit of tubercle in the parenchyma of the lung: for what

change should we *a priori* infer to have taken place in the condition of the bronchi, if we found the expiratory murmur becoming as long, or nearly so, as that of inspiration, but that something had occurred to impede their elastic expansion, and that the tubes remained nearly of the same calibre in expiration as during inspiration? Now the part in which the earliest deposit of tubercle is found in the structure of the lung is known to be the cellular tissue immediately surrounding the minute bronchi; and the natural effect of this would be to impair their elastic expansibility, and cause the difference of calibre of the tube in its utmost degree of contraction and expansion to be less than in health, and consequently the duration of the murmur of expiration to approach that of inspiration. I do not know that it is ever so protracted as to equal the latter sound; nor should we expect that the deposit of tubercle, although plainly calculated to interfere with the elasticity of the bronchi, should do away with the contractile power of their muscular fibres.

What gives peculiar value to prolonged expiratory murmur as a reliable symptom of phthisis is, that so far as I know, there is no other condition of the lung capable of producing it; cancer of the lung is the only disease that appears to me likely to do so, but whether it does or not, I have had no opportunity lately of ascertaining.

The importance of possessing any symptom on which we can implicitly rely, independently of concomitant evidence, cannot be too highly appreciated in this disease, because it enables us to begin and follow up earnestly a course of treatment at a stage of the malady so early as almost to insure success; and a firm conviction that this symptom is truly diagnostic has this farther advantage, that, by the concentration of our attention upon it the ear soon becomes educated to a much finer discrimination of the presence or non-existence of tubercle than at first could have been thought possible, and in some cases a diagnosis may be made from this alone with a degree of certainty, that a stethoscopist without faith in it could hardly venture to found on the aggregate of all the other evidence derivable from auscultation and percussion.

But it is not only in their bearing on the early discovery of tubercle in the lungs that the above considerations will be found interesting; for there are nervous affections of respiration, in which it is important to consider the action of the bronchial tubes, such for example as the anomalous sounds heard in some curious forms of hysterical spasm of the chest and throat, but more especially in spasmodic asthma, in which it is often most painful to the ear to listen to the effects of continued muscular contraction of the tubes during expiration.

To the consideration of these very interesting subjects, and that of the early treatment of phthisis, I hope soon to return in a future paper.

#### PRACTICAL OBSERVATIONS ON INFLAMMATION OF THE SCLEROTIC.

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I AM doubtful how far the following observations on a very common disease possess sufficient originality, or are of sufficient practical importance, to merit the attention of the profession. I am also unwilling to make any remarks which may appear to invite a further nosological subdivision of ophthalmic diseases than is already recognised. I am rather inclined to agree with those who consider there are more minute distinctions made in the study of this class of complaints than are necessary, at least for practical purposes. Nevertheless, a somewhat extended experience has led me to the conclusion, that in considering inflammation of the sclerotic, ophthalmologists have not paid sufficient attention to the constitutional varieties which this disease presents.

The term "rheumatic ophthalmia," which is used by