the saccharine fermentation, could be carried on apart from any living body.

The subject of respiration was fully considered. With respect to animal heat, the author advocated the views of Black, Crawford, and Lavoisier. He had always "considered it very absurd to object to this theory that the reduction of the capacity of the carbonic acid and water as compared with the oxygen, carbon, and hydrogen, was insufficient to account for the heat developed in respiration; and therefore to propose theories of animal heat being produced by nervous influence, &c., when precisely the same objection existed to the theory of combustion, which should surely rather have been considered to strengthen the analogy between the phenomena than to lead to their divorce."

The discussion, which followed the reading of this paper, had reference chiefly to the changes wrought on the blood by the function of respiration, the properties of hæmotosine, the formation of carbonic acid in the capillaries, and its passage through the delicate membrane of the air-cells; but as these questions were not advanced by the author, it may be sufficient to state that Dr. Favell objected to the opinion that digestion was a purely chemical process, inasmuch as pepsin, an organic product which no chemist could make, was a necessary element.

ON THE DIAGNOSIS OF INCIPIENT TUBERCULIZATION OF THE LUNGS.

By W. H. RANKING, M.D., Cantab., Physician to the Suffolk General Hospital, Bury St. Edmunds.

(Concluded from p. 76.)

There are two other circumstances which are deserving of notice as regards the diagnosis of tubercles, namely, the degree of resonance of the voice, and of transmission of the cardiac sounds.

Upon the subject of the natural resonance of the voice, writers are much at variance. As the degree of this resonance, however, becomes an important diagnostic sign of tubercles in the lungs, it is right to determine with as much precision as possible, the limits of its healthy and morbid conditions. The resonance of the voice is somewhat modified by the degree of obesity of the thoracic parietes, being, *cæteris paribus*, greater in thin than in fat persons. The natural intonation of the voice also assists in its modification; but in this particular also, strange to say, diametrically opposite opinions are entertained by different writers. Fournet maintains that the resonance of the voice is greatest when its tones are grave. Williams, and others, with more reason, affirm that the resonance is most distinct in persons with a high treble voice.

The normal resonance of the voice is somewhat more marked in front than behind; it is most intense at the root of the lungs. In a healthy person the vocal resonance should amount to little more than an indistinct buzzing; the more articulate the sounds, the further is the removal from a healthy condition. It

may be stated in a general way that the resonance is equal on both sides. Stokes, however, states that it is stronger on the right side than on the left, an opinion which is also maintained by Sir James Clarke.

The distance to which the cardiac sounds are transmitted has also been made available in the diagnosis of incipient phthisis. The heart's action in the healthy condition of the lung is more perceptible under the left clavicle than under the right, since the conductivity of the lungs being the same, the distance is greater on the right side. Consolidation may, however, induce a change in this respect, and the heart's action may become more distinct on the right than on the left side. Such an occurrence, or even equal transmission of the sounds on both sides, may become a sign of morbid solidity in that the farthest removed from the heart.

With this statement of the qualities of the physical signs afforded by healthy respiration, I shall proceed to consider those modifications in their character, which constitute the basis of our diagnosis of incipient pulmonary tubercle. I cannot do better than adopt the phraseology of Fournet in stating, that the respiratory sounds are modified in a triplex manner, in "*intensity and duration*," in "*quality*," and by the "*substitution*" of sounds foreign to a state of health. The alterations of the first kind are first observed in the expiratory sound; which, from being nearly inaudible, acquires an appreciable character, by the increase of its intensity and duration, in proportion to that of the sound of inspiration. The ratio between the two portions of the respiratory act may be disturbed in a two-fold manner, and in various degrees. Thus the expiratory sound may be increased and prolonged, the inspiratory murmur remaining unaltered, or the former condition may co-exist with a decrease of the latter. The first of these conditions marks the very earliest commencement of phthisis, the sound of expiration being simply rendered audible by the consolidation of the lung; the second condition shows a more abundant deposit of tubercle.

The next modification of the respiration in incipient phthisis is observed in the "*quality*," of the murmurs. Independently of the changes in duration and intensity, the murmurs lose the soft breezy intonation which characterises their healthy condition, and assume various degrees of coarseness and roughness. In the higher forms of this alteration the vesicular respiration is replaced by sounds similar to those produced in the larger bronchi, and bronchial respiration is established. This phenomenon, occurring in conjunction with a dull stroke sound beneath the clavicles, affords the strongest evidence of tubercular consolidation. A further extension of the disease causes the bronchial respiration to degenerate into the cavernous.

The alterations of the respiratory sounds in incipient phthisis, by substitution, are two, one which has long been known to auscultators—the existence of a crepitating rle; the other is a sign which is perfectly new and rests entirely on the authority of Fournet. He calls it the "*bruit de froissement pulmonaire*," or sound of pulmonary crumpling.

The first of these sounds—the crepitating rhonchus—has long been noticed in the very earliest commencement of phthisis and derives the greatest importance from the fact established by Fournet, that it is absolutely confined to that disease, and to the earliest

period. This sound first appears as a dry rhonchus, but, as the disease advances, becomes converted into the moist crepitating rhonchus of authors, and eventually degenerates into the mucous and gurgling rhonchi. I have frequently verified the correctness of the French writer's observations on this rhonchus—that it is exactly confined to the apex of the lungs, and seldom extends below the second rib. It has also occurred to me to witness what I do not find mentioned elsewhere, that the sound is occasionally produced in such intensity as to be audible at several feet distance from the patient. The sound, as I have noticed it, is confined to the murmur of inspiration, and seldom consists of more than four or five bubbles. I would not be understood to subscribe implicitly to the limitation of the rhonchus to cases of tubercular deposit; I believe, on the contrary, that it occurs in a modified form under other states of the lungs. Its explanation appears to me to be, that it is produced by the unequal and difficult expansion of dilated air-cells, and therefore I should expect to find it in a more developed, and, therefore, somewhat different form in general vesicular emphysema.

The pulmonary crumpling sound was quite unknown to auscultators, until it was noticed by Fournet; the present description of it, therefore, must be entirely drawn from that author's writings.* The impression left by this sound upon the ear is, according to him, different from all other sounds hitherto described. It resembles the crumpling or crushing of a fine tissue against a hard body, and may present different forms and degrees from the "new-leather creak," to the sound produced by blowing gently upon fine paper. It is heard only at a certain epoch of the disease. This epoch includes the last half of the first stage, and the commencement of the second. Sometimes it appears before the respiration assumes the bronchial character, but in general the two phenomena make their appearance at the same time. It co-exists with other signs of the first period of the disease, as with the dry crackling rhonchus lately described, with bronchial respiration, with increased and prolonged expiration, and lastly, with dulness on percussion and distinct bronchophony. Its situation is at the top of the lungs only, usually below the clavicle. Fournet further remarks that he observed this sign in one-eighth of the cases of phthisis which he examined with minute carefulness, and generally in the acute form.

Without wishing to deny the accuracy of such an observer as Fournet, I cannot but agree with the writer in the *British and Foreign Medical Review*, No. 18, that the author has converted into a new sign, one which has long been recognised as depending upon friction of opposed and inflamed serous surfaces. This opinion is supported by the fact that the sound in question is observed chiefly in those cases in which inflammatory symptoms run high, and in which, as a matter of course, partial pleuritis might be expected. It is to be remarked also, that Fournet affirms the sound to be limited to an early stage of the disease, which is precisely the case with the true friction sound, that being destroyed by adhesion of the pleural surfaces.

In further corroboration of the identity of the two phenomena, it may be mentioned that Fournet admits the occasional existence of symptoms of pleuritic

inflammation in the situation corresponding with the "crumpling" sound. His words are these, "Some phthisical patients are sensible of a feeling of restraint, of uneasiness, sometimes even of pricking pain, in the points where the 'pulmonary crumpling' sound is heard."* In another place, one patient is said to have complained of an *inward rubbing* at the site in which the sound was produced.

The above is a condensed account of the physical signs of the incipient stage of phthisis, but as with the exception of the crepitating rhonchus, and that only upon the authority of Fournet, none are absolutely confined to that disease, but may appear in other pulmonary lesions, it will be necessary to enquire what those lesions are, and to draw a differential diagnosis between them.

And first of the prolonged expiration. It has been stated that the advance of the expiratory murmur in intensity and duration from two to ten, or more, is a sign of the infiltration of tubercles. But the expiratory murmur is prolonged also under two other conditions of the respiration. These are puerile respiration, and pulmonary emphysema. The distinction between them is thus established.

In puerile respiration the expiratory murmur is increased, it is true; but the inspiration is augmented in an equal proportion. If the former has risen to four, the latter will be found at twenty. In phthisis, on the contrary, the extension of the expiration is accompanied by diminution in the *duration* of inspiration, its *intensity* being at the same time increased. Dulness on percussion, also, often accompanies the prolonged expiration which depends upon tubercular consolidation. In puerile respiration, on the contrary, the stroke sound, if not clearer than usual, is at least normal. The diagnosis will likewise be assisted by the discovery of a cause for the puerile respiration. Suppose, for instance, it be doubtful whether the exaggerated murmur of expiration in the apex of one lung be indicative of tubercular infiltration, or simply of puerile breathing; if evidences exist of pneumonic engorgement of the lower portions of the same lung, such evidences would go far towards attributing the morbid sound in the apex to the latter cause.

The liability of confounding tubercular deposit in its very commencement, before any dulness on percussion exists, with an emphysematous condition of the upper portion of the lung, is greater than in the foregoing case, since in both these affections there is not only increase of expiration, but diminution of the inspiratory murmur. In emphysema, however, there is greater disturbance of the ratio between the two murmurs than in tubercle. In the former the inspiration may be diminished in any degree, from its normal state to occasionally complete extinction. In phthisis, so great a disproportion never occurs, but before the inspiratory murmur is much diminished, it undergoes the changes in quality before mentioned. In emphysema, moreover, the expiration at its close frequently merges into one or other of the dry rhonchi. No distinction of importance can be derived either from percussion, or auscultation of the voice, at the period in which mistake is liable to occur, since no changes are induced in those respects till the tubercular deposition has become considerable.

* Op. cit. p. 95.

* Op. Cit. p. 94.

It is necessary, likewise, in studying the expiratory murmur to be aware that it is closely imitated by the sounds produced in the mouth. I was frequently at first misled by this circumstance. The error is rectified by closing the unemployed ear.

The morbid phenomena afforded by the voice in incipient phthisis are not of the same value as those of the respiratory sounds; and for the reason that they are not perceived until the deposit exists in notable quantity, and therefore cannot be made available at a period in which their usefulness would be the greatest. The change produced in the transmission of the voice, from an indistinct murmuring sound to a more or less distinct articulation is, however, very conclusive of tubercular infiltration when it does occur. But it is often absent altogether, generally so, at first, and frequently even at a later period, if their exist at the same time with the tubercles a number of dilated air-cells; we may say, therefore, that however valuable bronchophony may be when present, its absence is not conclusive of the non-existence of tubercles. The same may be said of the transmission of the heart's sounds, and the subclavian whizzing; they are valuable as auxiliary signs, but individually are not worthy of confidence.

The last mode of investigation which remains to be noticed is percussion, and however valuable it may be in pulmonary diseases in general, its value in the earliest period of phthisis is small. While the tubercles are only sparingly disseminated, which is the condition we are anxious to be able to recognize, no material change of the stroke sound exists, since a very considerable consolidation is necessary to render the dulness appreciable. When this dulness, however, does exist, the results afforded by it are much to be relied on, although we may generally in such case be assured that an earlier and more remediable period of the disease has been overlooked. It may be mentioned with regard to percussion, as in the case of bronchophony, that the existence of a certain number of dilated air-cells will negative the results to be expected from consolidation.

To recapitulate the diagnostic signs and symptoms of incipient phthisis. If, in a person exhibiting the scrofulous diathesis, catarrhs should, at a period between puberty and 35 years of age, become frequent and increasingly obstinate, there are grounds for the suspicion of impending tubercular disease.

The probability of the actual presence of tubercles is highly increased, if in addition to this, hæmoptysis should occur, more especially if it be not copious, but frequently recurring. An accumulation of evidence is afforded by the persistence of cough, increase in the frequency of the pulse, and slight emaciation. Should auscultation under these circumstances exhibit the signs of prolonged expiration in one or both subclavicular regions, the inspiratory murmur at the same time becoming diminished in duration, and acquiring an increase of intensity; if both murmurs should assume a coarseness of tone, followed by the crepitation before mentioned; if the voice has a bronchophonic resonance; if the respiratory movements at the summit of the thorax become confined in their extent with falling in of the infra-clavicular spaces, and with or without dulness on percussion, a mass of signs is accumulated which leaves no room for hesitation in

deciding that tubercles are present. Many circumstances may concur to modify the succession of events, and to complicate the diagnosis; and it must be admitted that no study connected with auscultation is invested with such difficulty, and requires such close attention, as the detection of tubercles in their earliest stage. But let us hope, that in the difficulty of the subject, all will see but an inducement to extra diligence in its study; and it may, I think, be confidently asserted, that before many years have elapsed, we shall be able, by its earlier recognition, to deprive this most deadly of all maladies of half its terrors. It is folly to run over the pharmacopœia, exhibiting now iodine, now naphtha; lauding at one time depletion and emetics, at another, beef steaks and stimulants. It is something worse than folly to write books to gull the public into the belief that one or other of these schemes is successful. There is but one way of diminishing the fatality of the disease, and this is by a patient investigation of its initiatory pathology, and a closer attention than is generally paid to the physical signs of incipient tubercle. When we shall have arrived at a positive and general acquaintance with these signs, then shall we, perhaps, be able in reality to accomplish what has been the boast of licensed and unlicensed quacks of all ages—the cure of consumption.

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ON THE TREATMENT OF PUERPERAL CONVULSIONS

TO THE EDITOR OF THE PROVINCIAL MEDICAL AND SURGICAL JOURNAL.

SIR,

Several communications on the treatment of puerperal convulsions have recently appeared in the pages of the *Provincial Medical and Surgical Journal*.

The perusal of the letter of Dr. North Arnold, in a late number, induces me to send you the following particulars of two cases, which have occurred to me in practice, within the last twelve or fourteen months.

From these cases it will appear that the treatment of puerperal convulsions, and of what disease may not the same be said, requires to be modified according to the peculiar circumstances of each case. That while in one case copious depletion, to the extent of 50 ounces or more, may be imperatively demanded, another case may be brought to a successful issue, by the employment of more moderate means.

But while admitting this, I do not agree with Dr. North Arnold, when he says "general bleeding, as our first remedy, is not indicated by a review of the causes; neither are we justified in making it our anchor." On the contrary, the impression on my mind, from the experience I have had, and from all I know of that of others, is, that in the treatment of puerperal convulsions, more than of any other disease, it may emphatically be said, "to spare the lancet is to lose the patient."

Entertaining these views, I should hesitate much ere I called in question the propriety of large abstractions of blood in cases of this description; and especially where this practice had been adopted at the instance of one, like Mr. Druitt, the soundness of whose judgment, and general professional attainments, will not, I think, be disputed.