possibility be adduced, more definitive than the above, of the truth of the theory advanced in these observations. Here it is evident that the friability cannot be traceable to a "greater proportion of blood than of air," in that part of the lung submitted to examination, and which is esteemed by Andral as an essential to the existence of that property. But it is plainly demonstrated that the loss or diminution of that parenchymatous cohesion, through the means already mentioned and explained, whether resulting from undoubted morbid action, or mechanical gravitation, is, according to the present condition of our knowledge, a sufficiently explicit origin to which the increased friability of the lung can be traceable, in the circumstances already mentioned.

In conclusion, with regard to the imperfect and limited nature of these remarks, and their total insufficiency in even adverting to the intimate nature of that particular affection referred to, and which must be at once perceived and acknowledged, a great and almost overwhelming deficiency; the only observations that can be advanced in extenuation of such a defect, are, that even in the present brilliant æra of the development of medical knowledge, the most minute and elaborate disquisitions into the nature of disease, have utterly failed in discovering, or even understanding, the intimate and innate action, peculiar to that change, denominated *disease*, and which, as yet, baffles, and perchance for ever will foil, human research and human genius.

ART. XVIII.—*Observations on Empyema*. By GEORGE GREENE, M. D., Fellow of the College of Physicians, Medical Inspector of the House of Industry, and Lecturer on the Practice of Medicine in the Richmond Hospital School.

BEFORE we proceed to the operation of paracentesis thoracis in cases of empyema, the necessity of examining the lungs, in

order to ascertain whether these organs be affected with structural disease, or not, is justly insisted on by every practical writer on this subject.

The reasons for this rule are obvious; for, from observing the results of the operation in a given number of cases, we are immediately struck with the fact that it is chiefly in those cases where the pleuritic effusion is uncomplicated with a lesion of the lung, that the operation is followed by recovery, and that, on the other hand, the chances in favour of this termination diminish in proportion to the nature and amount of the visceral disease, with which the affection of the pleura is complicated.

It becomes therefore a matter of great moment in all cases where we contemplate this operation, to determine beforehand, the exact condition of the lungs, and take into consideration every source of error which may prevent us from arriving at a correct opinion in this essential particular.

The labours of modern pathologists, aided by the assistance to be derived from percussion and auscultation, in conjunction with the consideration of general symptoms, have succeeded in revealing to us the nature of almost every disease to which the respiratory organs are subject, and of suggesting methods of investigation for the recognition of these affections. The disease of empyema, in particular, or to speak more correctly, the morbid products of which the pleural cavity may become the seat, has received a large share of attention, and in the writings of almost every modern author on this subject, the signs and symptoms which lead to its detection are so fully discussed, as to render it unnecessary for me to advert to them here, particularly as in a late work* they have not only been amply considered, but rendered more useful for diagnosis by a variety of novel and interesting observations.

My object in this communication is to draw attention to some stethoscopic phenomena which may occasionally present

* On Diseases of the Chest, by Dr. Stokes, p. 487, et seq.

themselves, owing to the compressed condition of the lung ; and further, to make some remarks on the expectoration, which, from its character, both as to quantity and quality, may lead to the supposition that it depends on an abscess in the lung, or on a fistulous communication established between a bronchial tube, and the matter contained in the pleural cavity.

It is true that the latter supposition is not likely to arise by reason of the marked stethoscopic phenomena, which enable us to recognize with so much facility the occurrence of such a communication ; but the opinion which would refer the expectoration, when it is profuse and purulent, to an abscess in the lung, may be more readily adopted, and receive apparent support from other circumstances presently to be adverted to.

The result, however, of the cases about to be detailed will afford strong evidence that the expectoration may be independent of the lesions just mentioned, or of bronchitis, and that in such cases it will either disappear, or undergo important modifications, after the operation of paracentesis has been performed.

Before entering on an explanation as to the cause of this profuse and purulent expectoration, and of its changes after the operation, I shall proceed to detail the cases in which it occurred.

CASE I.—*Case of Pleuritis, with subsequent Empyema ; Paracentesis ; Recovery.*

Michael Byrne, a labourer, aged 20, was admitted under my care, into the Hardwicke Hospital, on the 23rd of February, 1838. After a severe wetting, received a few days before his admission, he was seized with a rigor, which was succeeded by pain and stitch in his right side, about the mammary region. This was followed by a hard and dry cough, with painful and difficult breathing, and fever. In this state he was admitted, four days after the commencement of his illness.

On examination, no rale was discovered in either lung, but

the two inferior thirds of the right gave a very dull sound, and neither the respiratory murmur, nor resonance of the voice could be detected in this situation. The right side of the chest was but feebly expanded in the process of respiration. The voice was œgophonic between the inferior angle of the right scapula and the spine.

The treatment consisted of free detraction of blood from the arm ; the application of cupping-glasses to the affected side, and the frequent exhibition of calomel and opium. In a few days his mouth became affected, after which the cough, pain, and other symptoms rapidly subsided. A slight friction sound was now heard a little above the inferior margin of the chest, on the right side, which gradually disappeared after the application of two blisters.

In sixteen days he found himself so much improved that he requested to be discharged from the hospital. At this time the fever had subsided, he had scarcely any cough, and the pain in his side had disappeared. His respiration, however, became hurried on the least exertion, dulness still existed in the situation already mentioned, and the respiratory murmur was not reestablished in the inferior third of the right lung. I did not consider, therefore, that the disease was altogether removed, but he refused to stay longer in the hospital.

On his return home, which was two miles from Dublin, he resumed his occupation, and incautiously exposed himself to cold and moisture. The cough and pain in the side now returned, the latter extending to the right shoulder ; he experienced occasional rigors, and finally his breathing became so laborious that he was obliged to give up his employment.

An expectoration of a purulent character, which gradually became profuse, now made its appearance, amounting, according to his own statement, to a pint and a half daily. He applied at the dispensary in the country for advice, but notwithstanding the means adopted, the right side of the chest became gradually enlarged, and the dyspnœa became so urgent that the ope-

ration of paracentesis was considered to be the only means calculated to give him relief.

Dr. Hutton was now requested to visit him, when he found him labouring under all the usual symptoms of empyema. The right side of the chest was smooth, and enlarged in all its dimensions, and the intercostal spaces were obliterated. The liver was displaced downwards, and the heart pulsated upwards and to the left of its normal position. Except immediately under the clavicles, percussion gave a dull sound over the whole of the right chest, even extending to the left margin of the sternum: over this side no resonance of the voice or respiratory murmur could be observed. The respiration was bronchial under the clavicles. He could not lie on his left side without much distress to his breathing.

About the sixth rib, and to the right of a line dropped perpendicularly from the nipple, a convex tumour, about the size of a small walnut, presented itself; it was not discoloured; it gave evidence of fluctuation; and an impulse was communicated to it by coughing. The expectoration was copious and purulent, but no sign of pulmonary abscess or fistulous communication with a bronchial tube could be discovered. The patient was much emaciated, and had copious night-sweats and other symptoms of hectic fever.

A consultation was now held with Mr. Adams and Dr. Mac Donnell, and it was agreed to perform paracentesis by puncturing the tumour: this was effected at the time, when a large quantity of well-formed pus flowed out, without air. By coughing or a forced expiration the flow of the matter was accelerated; a probe passed readily into the thoracic cavity. The quantity of matter taken off amounted to an imperial pint, and gave immediate relief to his breathing. *In three days after the expectoration had diminished in a remarkable manner; it had also lost its purulent, and assumed that of a mucous character.*

The matter continued to flow from the opening, and his

breathing became more and more relieved. In August, 1838, the wound closed, and remained so for a month, during which he stated that his general health greatly improved, and that he considered himself to be quite well.

I did not see this man again until the 29th of November, 1839, when he again requested Dr. Hutton to examine the wound, which had opened a month after it had closed, and continued to discharge a small quantity of matter daily. On examination, two fistulæ were found in the situation of the original tumour, from which he could produce a discharge of purulent matter by making a forced inspiration, and then contracting the area of the thorax, without allowing the air to escape through the air passages. The right side of the chest was half an inch smaller in circumference than the left; the ribs on the same side were depressed, and the spine was curved towards the right side. The respiration was inaudible over the inferior third of this side, and there was complete dulness. The respiratory murmur was not near so distinct in the right lung as in the left, where it was very loud, combined with a clear sound on percussion. He complained of weakness, from the discharge, but he appeared to be in tolerable health, and had no symptom of hectic. He shortly afterwards returned to the country, not wishing to remain in the hospital.

The second case I shall detail occurred in Dr. Crampton's ward, in the Hardwicke Hospital, and I am indebted to Dr. Russell (at that time his clinical clerk) for the following account of the case, which I shall abridge from the copious and accurate notes made by Dr. Russell during the time the patient remained under Dr. Crampton's care.

CASE II.—Case of Pleuro-Pneumony of the Right Side, followed by Empyema; Paracentesis; Recovery.

A porter, named Henry Rutledge, was admitted early in April, 1838, into the Hardwicke Hospital, for pain and stitch in the right side, accompanied by a dry and painful cough, severe inflammatory fever, and the other usual symptoms of pleuritis.

He was actively treated by venesection, repeated cupping over the affected side, and the exhibition of tartar emetic, followed by calomel and opium. Under this treatment, the urgent symptoms were quickly subdued; but having again exposed himself to cold, he suffered a relapse, for which he was again cupped, and put a second time under the influence of calomel and opium. From this second attack he also recovered, and went out of the hospital in tolerable health, six weeks after the date of his admission.

On the 9th of July, 1838, nine weeks after his leaving the hospital, he was again admitted under my care, into the Whitworth Chronic Hospital. He now suffered from extreme dyspnoea. The respiration was forty in a minute; he had a short cough, and expectorated daily upwards of a pint and a half of purulent matter; he could not lie on his left side, and suffered much from copious perspirations. The whole of the right side was perfectly dull on percussion, the dulness extending across the median line of the sternum. The heart was somewhat displaced towards the axilla, on the left side, and the liver was pushed downwards, but no sulcus was observed between it and the inferior margin of the chest. The right side of the chest was smooth, and measured in circumference two inches more than the left. The intercostal spaces were obliterated, and respiration was principally performed by the left side.

The respiratory murmur was inaudible throughout the right lung, except in its superior third, and about the scapular region posteriorly. The respiration was puerile in the left lung, which gave a loud sound on percussion. A large tumour presented itself under the great pectoral muscle, and extended upwards to the right axilla; no fluctuation could at first be detected in it; the integuments presented a blush of inflammation over the tumour, and the surface was œdematous.

The dyspnoea became so urgent the day after his admission, that it was evident he could only obtain relief by an operation. A consultation was immediately held on his case by the sur-

geons of the Richmond Hospital, when it was agreed to make an incision into the tumour, which was accordingly done by Dr. Hutton, when nearly two quarts of purulent matter escaped, with the most marked and immediate relief to his breathing. No air escaped with the matter. A probe was introduced into the wound, and passed into a large cavity ; a poultice was applied over the wound, which continued to discharge a considerable quantity of matter daily.

In two days after the operation the pulse had fallen to 80 ; the respiration was nearly natural in frequency ; *and the purulent expectoration had entirely ceased, and was replaced by one of a mucous character.* From this period his recovery went on rapidly ; purulent matter continued to flow from the wound until within a few days of his discharge, when it ceased entirely, and the wound closed. He left the hospital on the 13th of September, having lost the cough and all the symptoms of hectic.

Although this case terminated so favourably, I had strong suspicions, founded on the following observations, that the substance of the lung was not free from disease. On applying the stethoscope under the spinous process of the scapula, and towards the root of the lung, a loud gurgling sound was heard ; the resonance of the voice, also, was so loud and clear in this situation as to amount to imperfect pectoriloquy, while percussion yielded a very dull sound. All these phenomena were the more striking, as contrasted with the voice and respiration on the opposite side. These signs, combined with the profuse, purulent expectoration, led me to suspect that the pleuritic effusion might be complicated with some structural disease of the lung—probably, with a pneumonic abscess—but, for reasons to be mentioned in the sequel, I now consider that these phenomena were deceptive, and did not necessarily indicate the existence of a cavity.

The next case (for the particulars of which I am also indebted to Dr. Russell) occurred in Dr. Ferguson's ward, in the

Whitworth Hospital. I had frequent opportunities of examining this case, which presented the usual appearance of empyema in the chronic stage.

CASE III.—*Case of Pleuritis, with subsequent Empyema, Paracentesis performed; Recovery.*

Patrick M'Manus, a watchman, aged 30, of a tall and athletic make, was admitted into the Whitworth Hospital on the 2nd of April, 1837. Three days before, he was attacked with violent darting pain in the left side, extending from the nipple to the left shoulder. He had a frequent and suppressed cough, the respiration was quick and interrupted, 44; the pulse 118, small, but regular. His expression was rather pallid, or of a livid hue. The auscultatory signs were those of pleuritis, with effusion in the left side. General and local bleeding was immediately put in practice, and calomel and opium administered rapidly, till ptyalism was produced. At the end of three weeks some improvement had taken place, when he applied for his discharge. At this time the dyspnoea had not ceased, he had lividity of countenance, his pulse was 120, but not hard. As, however, the cough and pain in the chest had subsided, he wished to leave the hospital. On examination at this time, the lower third of the affected side was dull on percussion, and the respiration had not returned.

In the month of July this patient again returned with all the symptoms of empyema well marked. The left side of the chest was enlarged in all its dimensions; it was smooth, and the intercostal spaces were obliterated; the left shoulder was elevated; the heart pulsated to the right of the sternum; dulness existed over the whole of the left side, and extended across the sternum; the respiration and resonance of the voice could not be distinguished in this side; the respiration (except where the heart pulsated) was puerile in the right lung, and a loud sound was obtained on percussion; no evidence of fluctuation, metallic tinkling, or amphoric respiration was obtained; he lay constantly on the left side; he suffered much from perspirations, and ex-

pectorated daily upwards of a pint of purulent matter, with scarcely a trace of mucus in it.

A few days after admission, a tumour was observed under the lower edge of the left pectoral muscle, this gradually increased, became tender, and in a short time gave evidence of fluctuation. In a few days afterwards the integuments over its surface became tense and painful. A consultation was now held with Mr. Carmichael and Mr. Adams, and Drs. Hutton, O'Beirne, and Macdonnell, as to the necessity of an operation. It was determined to make an incision into the tumour, which was accordingly done by Dr. Hutton, when immediate exit was given to a large quantity of purulent matter, amounting to nearly eight pints; no air escaped from the wound. On passing a probe into the orifice it was found to communicate with the cavity of the pleura.

He bore the operation well, and on *the next day the expectoration had entirely ceased*; the cough and dyspnœa also disappeared. The wound continued to discharge purulent matter in considerable quantity, so that great debility ensued. On one occasion the wound had closed, and the expectoration began to be more copious and purulent; but when the wound was again opened the expectoration diminished and eventually ceased. He was now supported by animal food and wine, and put upon quinine mixture; under this treatment he continued to improve, and on the sixth of November was discharged from the hospital as he had an opportunity of going to the country. A month afterwards, this man had so much recovered his health as to be able to earn his livelihood as a stone cutter; the wound had altogether closed, without any recurrence of the dyspnœa or other symptoms. The heart pulsated nearly in its natural situation; the left side of the chest was contracted, and presented the alterations in shape so well known as the sequelæ of this affection.

The empyema in all of the foregoing cases appeared to be the result of uncomplicated pleuro-pneumony. In none of them

could the existence of tubercle in the lung be detected, a circumstance which will account for the favourable result of the operation. But in the case I am now about to detail, in addition to partial empyema of the right side, some of the physical signs, together with the general symptoms, indicated the existence of isolated tubercles, though not of a phthisical cavity in the left lung; an opinion which was proved to be correct by the *post mortem* investigation. This case is also important by demonstrating that the profuse expectoration did not depend either on a fistulous communication with the pleural sac, or on an abscess in the lung, and similarly to the other cases it diminished in a remarkable manner immediately after the operation of paracentesis was performed.

CASE IV.—*Case of Empyema of the right Side; Paracentesis performed with temporary Relief; Tubercular Development in both Lungs.*

In the month of October last, I saw at Kingstown, with Dr. Hutton, a gentleman who had suffered for some time from cough, pain in the right side, and difficult breathing; to these were added, loss of appetite, quick pulse, and nocturnal perspirations, together with an abundant and purulent expectoration.

On examination we found the two inferior thirds of the right side of the chest presenting a considerable enlargement. Over this portion the sound was dull, with absence of the respiratory murmur and voice; the respiration was audible under the right clavicle, but bronchial; the liver appeared to be much enlarged, and somewhat displaced downwards; over the left lung the sound was clearer, except under the clavicle towards the mammary region, where it was dull, with great resonance of the voice, accompanied by bronchial respiration. None of the phenomena indicative of fistulous communication with the pleural cavity were detected.

The surface on the right side was œdematous, and about the level of the seventh rib, two tumours presented themselves,

which were merely separate points where a large collection of matter, apparently under the pectoral muscle, was approaching to the surface. This tumour had been poulticed for some time, but as the matter was deep seated, and apparently productive of much distress and impediment to the breathing, we determined to insert a small caustic issue over the most prominent part of the swelling. In three days after this had been done, an evident fluctuation became perceptible in the anterior portion of the tumour. Dr. Hutton now made an incision into it, and immediately gave exit to a large quantity of purulent matter.

The discharge was followed by immediate relief to his breathing, and he could now lie on the left side—a position which he always avoided before the operation. No air escaped from the wound during the operation, and a probe could be passed through the incision into a large cavity. In two days after, the cough had much abated, and the *purulent expectoration entirely ceased*. The wound continued to discharge matter, but not in considerable quantity. The symptoms of hectic became less severe after the operation, and he expressed himself as much relieved from the evacuation of the collection.

These favourable symptoms continued for some time; but on his return to town, in November, the cough became again more frequent, but the expectoration was not copious, nor did it ever present the character it exhibited previous to the operation. In December he was attacked with an obstinate diarrhœa, under which he continued to labour until the middle of March, when he sunk, five months after the operation.

Post Mortem Appearances—Chest.—The sac containing the matter was formed by adhesion superiorly of the pleura pulmonalis to the costal pleura. The membrane was much thickened, and the cavity reached from the third to the tenth rib; its interior was occupied by about three ounces of purulent matter, which could be made to flow through the external wound, which continued open. Dr. Hutton and I searched

accurately for a communication between the sac and a bronchial tube, but none existed. The right lung was diminished by two-thirds of its bulk : hard tubercles were scattered throughout this lung, but no tubercular cavity whatever was found. The left lung was also studded with tubercles, and towards its apex they had begun to soften, so as to leave excavations about the size of a large pea. We were surprised to find in this side also a small sac, formed by adhesion of the pleura, similar to that in the right, but much lower down, and containing a small quantity of matter. We examined with equal care the parietes of this sac, but no communication with a bronchial tube existed.

Abdomen.—Small ulcers were found in the mucous membrane of the small intestines, near the ileo-cæcal valve : the mesenteric glands in the vicinity were enlarged. The liver was much enlarged, with hypertrophy of its yellow tissue.

From this examination, therefore, it is obvious that the expectoration did not proceed from an abscess in the lung, or from a fistulous communication, established between the seat of the collection and the bronchial tubes. Its sudden disappearance, also, after an external opening for the matter had been made, proves that it was not the result of bronchitis.

The last instance with which I am acquainted where phenomena, similar to those I have detailed, occurred, was brought under the notice of the Pathological Society by Dr. Graves, at the third meeting, 1838. He there exhibited a specimen of chronic pleuritis, with empyema. The matter had made its way externally ; but for some time previous to death, and consequent upon the bursting of the abscess, the secretion from the bronchial mucous membrane, which had been copious and purulent, rapidly diminished, and its fœtor disappeared.

Dr. Graves has since informed me that he remembers to have seen another instance of this phenomenon. It occurred in a case of chronic empyema, the result of pleuritis, in a young person who had been under the care of Mr. Rumley. When Dr. Graves first saw the case, the expectoration was abundant, puru-

lent, and foetid; but some time after, when paracentesis had been performed, it became suddenly diminished, and lost its peculiar foetor. The particulars of this very interesting case, I regret to say, I have not been able to procure in time for this publication; but Mr. Rumley informs me of a remarkable circumstance attending it, namely, that on one occasion, when the external wound became closed, the expectoration re-appeared—a phenomenon similar to that which occurred in the case of M'Manus, already detailed.

It will be observed in all these cases, that a very remarkable diminution of the expectoration, and an alteration in its character, immediately ensued, after a free external outlet was established for the matter lodged in the pleural cavity, and did not re-appear as long as it continued to flow freely to the exterior of the chest; and that, on the other hand, in two instances, when the escape of the matter was prevented by a temporary closure of the wound, the expectoration again made its appearance, possessed of its original puriform character. It is obvious, therefore, that some relation must exist between these two phenomena—that is, between the accumulation in the pleural sac and the appearance of a profuse expectoration; the latter diminishing in proportion to the quantity of matter discharged from the external wound, and again increasing whenever the external evacuation is from any cause impeded, and this in cases where, in one instance at least, it has been *proved* that no communication was established between the sac and the bronchial apparatus.

The first explanation I heard offered as to the nature and cause of this expectoration was suggested by Dr. Hutton, in a consultation held on one of the cases detailed. He observed that he had frequently seen the expectoration to subside and lose its character when an opening had been made for the collection, and had consequently come to the conclusion, that in many cases of empyema the expectoration was the result of an effort of nature to free the system of the purulent deposit,

through an external outlet, which in these instances was effected through the bronchial tubes. This explanation I consider, for reasons to be mentioned, as applicable to many cases where we have physical evidence against the supposition, that cavities exist in the lung, or that a fistulous communication has been established between the morbid collection seated in the pleural sac, and the bronchial tubes. Now, if it can be proved that this explanation of the cause of the expectoration is correct, it will be important, because many cases, will occur where, when the physical signs are obscure, we may be inclined to lay too much stress on this symptom, and ascribe this profuse and purulent expectoration to a pulmonary abscess, and consequently, be less inclined to recommend the operation of paracentesis.

That the expectoration, however, (in cases where the physical evidence is not sufficient to ascertain the existence of cavities, or is altogether opposed to that supposition,) may in many instances be regarded as a simple excretion from the bronchial mucous membrane, receives confirmation from observing that other portions of this structure serve as outlets, through which morbid collections are evacuated from the system. The subsidence or disappearance of morbid collections in the abdominal cavity is often effected by a critical discharge from the bowels, and the fact is familiar to every practitioner. But many instances of these critical discharges, more remarkable than that just mentioned, are on record. Thus the matter of empyema* has been discharged by evacuation from the bowels, and in other cases from the vagina and from the bladder.

The most remarkable instances, however, of this translation of purulent matter to the mucous surfaces, and those best authenticated by *post mortem* examinations, are detailed by Dr. Mouat† in the Report of the Regimental Hospital, Bangalore. An analytical table of thirteen cases is given of these purulent

* Townsend, art. Empyema, Cyclop. of Prac. Med.

† Med. Chirurg. Review, 1838.

discharges, by which it appears that in eleven pus was discharged by the bladder ; in ten by stool ; in four by expectoration ; and in one by vomiting. In the majority of these cases the purulent collection was seated in the liver, but in one it was found in the stomach.

The remarkable circumstance demonstrated in some of these cases (Nos. 3, 5, 6, 9, 10) by the post mortem investigation was, that although during life purulent matter was passed by the urine and by stool, yet no communication whatever could be traced between the hepatic abscess (which was the disease in five of them) and the intestinal canal, kidney, or bladder, or between the stomach, which was the seat of the purulent collection in a sixth, and the parts just mentioned. It is to be observed that the discharges by stool and urine were followed by relief to the hepatic affection, and the mucous membrane was not diseased in the bladder or intestine. Here then we have several well marked instances of pus evacuated from different outlets, as Dr. Mouat observes, by "absorption and subsequent excretion," but by what agency this is effected, whether by the absorbents, or through the vascular system, is as yet undetermined, the opinions of eminent physiologists being at variance at present on this interesting physiological question.

Other instances might be readily adduced of similar critical discharges, those mentioned, however, are sufficient to shew that they are often effected by some peculiar determination to various portions of the mucous membrane, and as it has been proved above, that no fistulous communication may exist between the purulent matter seated in the liver, stomach, or peritoneal cavity, and the portion of the mucous membrane through which it is evacuated, we are entitled to assume, by a parity of reasoning, that a similar disposition may occasionally prevail when matter is accumulated in the pleural sac, and be evacuated by excretion through the great emunctory presented by the bronchial mucous membrane.

If this supposition be correct, it will account for the remark-

able character of the expectoration in the cases I have detailed, and will, so far as the consideration of this symptom is concerned, disembarass our minds as to the cause which has produced it. For, unless other evidence of a very decided character is obtained, that the lung is diseased, the occurrence of a very copious and purulent expectoration may be referred to the operation of the pathological law above alluded to, and, consequently, should not prevent us from having recourse to the operation of paracentesis. Whether the matter of empyema is, in any instance, completely discharged from the system by this determination to the bronchial mucous membrane, I am unable from my own experience to determine, but in those cases where it has been vaguely stated, that the matter has been absorbed, it is probable, that the removal of the collection has, in part at least, been effected in the manner just explained.

I shall now shortly advert to another source of perplexity as to the state of the lung, in these cases of empyema attended with profuse expectoration. From the compressed state of the organ by the effused fluid, the phenomena of the voice, and of the respiration, will become exaggerated at the root of the lung, and in consequence of the great accumulation of puriform matter in the larger tubes, a loud gurgling rale will be produced. When, therefore, the stethoscope is placed over the root of the lung, many of the signs of a pulmonic cavity appear to exist, and the doubt which thus arises as to the integrity of the organ, is strengthened by observing the great quantity of purulent matter which is expectorated. These signs were observed in the case of Rutledge, and were at times so strongly marked, as closely to resemble those which are produced by abscess in the lung. Shortly after the operation, however, when, as has been already observed, the expectoration ceased, it was ascertained by applying the stethoscope to the same situation, that these signs underwent an important modification. The loud gurgling sound and extraordinary resonance of the voice gradually subsided, till at length all the physical signs which had given rise

to so much uncertainty as to the sound condition of the lung, completely disappeared.

From observing, therefore, these modifications in the physical signs, I was led to infer that they were produced in the manner just stated, viz., by compression of the pulmonary tissue around the greater bronchial tubes, more or less charged with a quantity of purulent matter, and that when, after the operation, the mucous membrane ceased to excrete this matter, and the lung was allowed to expand from the removal of the compressing cause, the auscultatory phenomena began to approximate to their natural character.

The existence, therefore, of these signs, accompanied as they may be by a copious purulent expectoration, are not to be held, in cases of empyema, as necessarily indicative of structural disease in the substance of the lung, if they are only observed in the vicinity of the root of this organ. That the altered condition of the parenchyma enveloping the tubes, is favourable to the propagation of these signs to some distance from the root, is evident from physical considerations, but a careful examination in such cases, will shew that they gradually diminish in intensity according as the instrument is carried from the root to the lesser divisions of the bronchial tubes. This fact, therefore, if clearly ascertained, will form our principal ground for diagnosis, it being evident that these phenomena, if heard above the clavicle, and not at the root of the lung, or if they gradually diminish in intensity from the former situation to the latter, will be more indicative of a cavity, and the same observation will hold true, if the phenomena are heard in any other situation remote from the root of the lung.

Other and important considerations must, however, be taken into account before we can pronounce positively as to the existence of a cavity in such cases, or if we are satisfied that such a lesion has occurred, as to its nature. As, however, I can at present add nothing to the valuable remarks of a late wri-

ter,* on the grounds for our diagnosis between phthisical and pneumonic cavities and dilated tubes, I will not pursue the subject further, my object being to draw attention to the fact, that the signs of a cavity may be simulated, at or near the root of the lungs, and from the causes above assigned.

With respect to the bearing which the result of these cases has on the question, whether an operation is advisable in cases of empyema, little can be added to what is already known. They were all instances of what has been termed "empyema of necessity," where the matter had penetrated the pleura some time previously to the collection presenting itself, in a defined form, under the integuments, and where the pointing externally did not correspond to the opening in the pleura. Such cases are known to end more favourably than others, partly, perhaps, from the gradual process adopted by nature, and the sinous nature of the opening, and partly because in these cases the empyema is generally partial. It is remarkable that the place of this pointing was nearly the same in all—viz., under the edge of the great pectoral muscle.

In the table given by Dr. Townsend, of the results of the operation in twenty-three cases, it is not stated whether the successful ones were those of the "empyema of necessity" or not: this, however, is an important circumstance to be stated, because in the great majority of those cases, if there be no developement of tubercle, recovery is likely to follow from the operation; a more important ground for forming an opinion for or against the propriety of operation should be founded on the calculation of the results in a large number of cases, where no thoracic abscess and pointing had occurred, and where, consequently, the pleura had been penetrated by the operator.

The result of the cases which I have detailed confirms the remark made by Begin†—that, of the two methods of evacu-

* On Diseases of the Chest, by Dr. Stokes, pp. 148, 389.

† Dict. de Med. et Chirurg., art. Empyème.

ation of the matter of empyema, that by thoracic abscess is always more advantageous than the route the collection sometimes takes by perforation through the bronchial tubes, inasmuch as, in the latter instance, there are often lesions of the pulmonary tissue superadded to the primary affection.

I shall now briefly enumerate the conclusions which a consideration of the foregoing facts and observations suggests.

1. That in cases of effusion into the pleural cavity a copious and purulent expectoration is a frequent accompaniment, depending, in some instances, on a fistulous communication established between the seat of the collection and a bronchial tube, and that when such a communication has taken place, it may be recognized by well-known and characteristic signs.

2. But that, in other instances, the expectoration may be equally copious and purulent, while all the physical signs of such a communication are absent, and where, consequently, the symptom in question cannot be referred to such a lesion.

3. That an expectoration of a similar character will also occur in some cases of empyema, uncomplicated with tubercular excavations or with abscesses, the result of pneumonia, as can be proved—first, from the absence of the physical signs indicative of these lesions; and, secondly, by a consideration of the following phenomena:

4. That remarkable changes take place in the expectoration as soon as a free external outlet is afforded for the matter: it will be then observed to have rapidly diminished in quantity, and to have changed from the puriform to the mucous character, and, in some instances, to have lost its fœtor.

5. That if the external opening becomes closed the expectoration will again become copious, and will re-assume its puriform character and fœtor.

6. That as these phenomena cannot be accounted for, on the supposition that the expectorated matter is the product of bronchitis, or that it is received into the bronchial tubes, by their communication with purulent deposits in the lung, or with the col-

lection in the pleural sac, an explanation must be sought for in some general law which establishes a reciprocity of morbid actions between serous and mucous surfaces.

7. That many examples of the force of this law are afforded in what have been termed "critical evacuations;" as, for instance, where morbid collections in the peritoneum have been suddenly transferred to the intestinal mucous surface, independently of the processes of adhesive inflammation and ulceration; and that there is no reason, *a priori*, why this law should not occasionally obtain between the respiratory, serous, and mucous membranes.

8. That a recollection of this law may be of practical importance, because in cases where the physical signs of cavities in the lung are obscure, we should not allow our opinion to be biassed in favour of these lesions, by taking the expectoration, however copious and purulent, into consideration, inasmuch as it may be the result of the general law just referred to, and if so, should not form a ground of objection to the operation of paracentesis.

9. That even when the physical signs of a cavity appear to be better marked, they may be still deceptive, owing, first, to the great accumulation of matter in the bronchial tubes; and, secondly, to the compressed condition of the lung around them, whereby the natural phenomena of the voice and respiration are so modified, that, when combined with the loud, gurgling rale in the tubes, they may be mistaken for the signs of a cavity.

10. That these fallacious signs will be found in greatest intensity at the root of the lung, and will disappear more or less quickly after the operation, in proportion to the power of expansion possessed by the lung, when the fluid in the pleura, which is the cause of the compression, is removed.

11. That one of the grounds for diagnosis, in such cases, is the proximity of the signs to the root of the lung: if they diminish in intensity from this situation, they will depend on the causes

just assigned ; if on the contrary, they are found at the apex of the lung, or any part distant from the root, they may either depend on cavities, or on an enlarged bronchial tube.

ART. XIX.—*Observations upon the Nature of Hooping Cough, and its successful Treatment by Mercury.* By JOHN JAMES MACGREGOR, M.D., Physician to the South-Eastern General Dispensary, &c.

THE following remarks respecting a disease peculiarly fatal to a most interesting class of our fellow-creatures, which the statistical tables of medicine throughout Great Britain fully attest, pretend to little more than that of bringing before the Profession the result of a new mode of treatment, practised by the writer at an extensive dispensary, where the opportunity of witnessing the various affections incidental to childhood were considerable.

Mr. Colles, in his admirable work on the venereal disease, declares that it has long been his opinion that “syphilis is the opprobrium of surgery.” In the same language, we would ask the physician, is not hooping cough at least one of the opprobria of medicine ?

It must be granted that at this present day, little or no light has been shed upon its nature, pathology, or treatment.

Its treatment is empirical and uncertain, its pathology obscure and insufficient, and clouds and darkness rest upon its essential cause. If this statement, that seems borne out by every day's experience, be true, is it to be wondered at, that the language of the physician to the anxious mother, when called upon to pronounce an opinion upon her drooping infant, should be, “ We can give no opinion ; the disease must run its course ; nothing can be done towards eradicating it ; every one knows, all we can do is to keep the bowels free, and give some simple expectorant with warm baths and a few leeches :” and this toge-