I am still unwilling to propose a counter-opening, because this operation might have unfortunate results, and because I hope the canal will dry up or fill by the addition of new bony layers. If this does not take place, if the suppuration continues, if it becomes more fetid, if the patient is unable to work, he will return to us, and then, recognizing the inability of nature to complete the cure, I shall make a large opening at the bottom of the accidental canal so as to prevent the stagnation of the pus.)

PART IV.

TRAUMATIC FEVER, PYÆMIA, AND SEPTICÆMIA.

LECTURE XXIX.

TRAUMATIC FEVER.

Gunshot wound of the right elbow—Resection followed promptly by death from traumatic fever—Considerations upon grave traumatic fever following compound fractures.

GENTLEMEN: We lost yesterday a patient who was struck at the battle of Montretout by a ball which passed through his right elbow, causing a comminuted fracture of the three bones forming the articulation. He was brought to the hospital the next day, and on the following morning, thirty-six hours after the accident and while the fever of the first period was still moderate, I resected the elbow. You remember that the bones were so shattered that I found it very difficult to remove all the fragments, since most of them were still adherent and had to be separated one by one from the muscular and aponeurotic fibres. I made a T-shaped incision, the vertical portion of which was on the outer side of the arm and forearm, and the horizontal portion posterior, passing above the olecranon. This incision is similar to that adopted by Roux,[1] but differs from it in this: that in the latter the vertical incision is on the inner side, while in the one which I used and which belongs to M. Nélaton, it is on the outer side. This enables the operator to reach the radius immediately and resect it, and then, having thereby opened the articulation freely, to isolate and remove, while avoiding the ulnar nerve, first the upper extremity of the ulna and then the lower extremity of the humerus. In this case the operation was not as regular as it would be under many other circumstances, for after having made the external incisions, I came upon a mass of splinters which I removed without knowing to which bone each belonged, and then I sawed off the end of each bone so as to substitute a regular and uniform surface for the irregular and jagged one due to the injury. You remember that I then brought the edges of the solution of continuity together with four points of metallic suture, rather with the view of giving them a good position and immobilizing them than in the hope of obtaining immediate union. Indeed the latter is very difficult to obtain, and

[1] Thore, Résection du Coude, Inaugural Thesis, 1843.

experience has taught us that immediate union after large operations almost always fails, and fails in the same way, that is, because if by chance it takes place in the outer or superficial layers it does not in the deeper ones, where the fetid pus accumulates and is retained more easily in consequence of the union of the edges of the wound and the formation of a cavity behind them. Now this retention of fetid pus behind a closed wound favors that absorption of putrid substances which is the starting point of infectious fevers. My intention then was not to seek an immediate union, which from the moment it became impossible would have offered only disadvantages, and the same principle guides me after amputations, as I have had and shall doubtless again have occasion to show you.

After putting in the sutures I placed the limb in a wire splint properly lined with cotton batting and oiled silk. You know that this splint is a recent improvement which we owe to those skilful manufacturers, Messrs. Robert & Colin. It has on the outer side a movable piece attached to the rest by straps and buckles, which can be removed and replaced at will. We removed it morning and evening to dress and clean the wound, which was done without communicating any movements to the limb and without causing any pain. The dressing was completed by means of a double compress soaked in a mixture of alcohol and water and renewed every morning and evening.

You remember what followed. The next day the pulse was 130; the skin hot; the thirst intense. The patient had no appetite; had not slept; complained of headache, and was very anxious about himself. The wound and the adjoining parts were very painful; the lower half of the arm and the entire forearm were considerably swollen. I removed the compress wet with alcohol and substituted poultices; prescribed a potion containing one and a half ounces of the syrup of the acetate of morphia to be taken by spoonfuls, and an opium pill at night.

The following day the conditions were the same. The abdomen became tympanitic. The wound yielded an abundant sero-sanguinolent discharge, and was covered with a grayish diphtheritic pulp.

The third day the fever still persisted; the pulse was 130; temperature in the axilla 104° (Fah.); tongue slightly dry; sub-delirium at times; increase of the local swelling. The sero-sanguinolent discharge had given place during the night to a hemorrhage, *en nappe*, which evidently came from the capillaries. As it was not possible to apply a ligature, the flow had been arrested by means of charpie wet with dilute perchloride of iron and a band which included the splint in its folds.

The fourth day still worse. Fresh hemorrhage during the night; the wound covered with pulp and sloughs; the swelling of the deep diffuse phlegmon in the arm and forearm had become enormous.

The following days the general and local conditions grew worse; the tongue became drier; the abdomen more and more tympanitic; the delirium continuous, and finally death took place at the beginning of the seventh day.

We had in this case, gentlemen, an exaggeration of the phenomena which we often observe in the first period of large wounds which, if the patients survive, suppurate and granulate before cicatrization. You remember that in gunshot wounds involving only the soft parts, I have applied the term *preparatory to suppuration* to this period which most of our authors have called *inflammatory*. It is true that when the bones are not involved the suppuration is always preceded by local phenomena of inflammation: slight swelling, heat, moderate pain; but ordinarily the general symptoms, especially the fever, are absent. On the other hand, when the skeleton, as well as the soft parts, is injured, this period preparatory to suppuration is almost always marked by general and febrile as well as local symptoms, so that it more than ever deserves the name of inflammatory period. I say almost always and not always, because the general symptoms are sometimes lacking, and that occurs in the fortunate cases in which the skeleton itself, the bones, and the synovial cavity, when a joint is involved, do not suppurate. I have had occasion to call your attention to cases of this kind, and as the result of observation of such I offer this formula: intense fever appears in the first period of compound fractures where suppuration is preparing in the bones themselves, and it is lacking when the bones are destined not to suppurate.

Have we now any special names to designate this group of local and general symptoms? If you often hear me ask this question of nomenclature it is because the words are associated with ideas and theoretical explanations with which we ought to be acquainted and from which we have even to choose when these ideas and those explanations lead to therapeutic or prophylactic measures. I have told you before that the term *hospital gangrene* has sometimes been applied to wounds in this condition, and also that I did not approve of it. Let us seek one that is more appropriate.

After Hunter's and Broussais's works on inflammation the denomination of *inflammatory period*, which I have just mentioned, was adopted. By this was meant that the suppuration depended upon a peculiar condition of the wound and of the entire organism called inflammation. When the fever was lacking, or was not very high, they said the inflammation was moderate; when the fever was very marked, it was explained by the intensity of the inflammation.

A little later, about 1840, surgeons began to express some doubts of the sufficiency of this explanation of the symptoms which precede and seem to prepare the way for suppuration. Without giving any reasons, they adopted new terms which seemed to indicate another, but still vague and indefinite, theory.

This is seen in an article published in 1848 by an English surgeon, Fenwick, in which the causes of death after amputation are discussed; deaths occurring during the first ten days instead of being charged to a too intense or malignant inflammation are attributed by this author, some to nervous complications, the others to gangrene of the stump. Fenwick has certainly included under this head of *nervous complication* those cases in which the patients were delirious, and under that

of gangrene those in which the wounds presented in a very marked degree the sloughs and pulp which you saw on our patient. Moreover, as Fenwick's statistics were taken from the records of different hospitals, and were of patients whom he himself had not treated, he had to take as the causes of death those assigned by the surgeons in charge, and they wrote the words *nervous complications* or *gangrene* according as their attention was attracted more by the delirium or by the sloughs. That meant that in their opinion death was due to a concomitant cerebral affection, or to gangrene, but they did not explain the intervention of this as a cause of death.

Since that time we have had other American and English statistics which still attributed the deaths of this first period of capital operations to one or the other of these two causes.

Still later, about 1850, and still without giving any positive explanation, the German surgeons, and Billroth in particular, made use of the term *traumatic fever*, and attributed to this fever that which in France we had first attributed to inflammation, and that which Fenwick and the English had afterwards attributed to nervous complications and to gangrene of the stump.

Then came the experiments of Otto Weber, those of Billroth himself,[1] and Panum's. These experiments consisted in the injection under the skin of different animals of sanious and putrid discharges coming from patients whose suppuration was of bad character, and then in watching the subsequent condition of the animal by means of the thermometer. It was found that in almost all cases the temperature rose several degrees, that some of the animals died, and the others recovered after having been sick for several days. The experimenters inferred that the passage of putrid substances into the blood can cause fever, and they explained by this passage the so-called traumatic fever, so that at last this term came to convey the idea of an infectious fever due to the absorption by the lymphatics and bloodvessels of the wound of the putrid materials found upon the surface of the latter.

Before the experiments of the German authors were made, I had worked out the same solution of the problem, and I said in the paper which I read in 1855 before the Société de Chirurgie that the fever which sets in during the early days of a large wound was due to an infection, that is, to the passage into the blood of putrid materials having their origin in the decomposition, by contact with the air, of the sanguinolent, serous, and sero-purulent liquids poured out during the first hours, before the complete establishment of suppuration, and absorbed by the vessels of this wound. I was led to this opinion by two series of experiments. The first were made upon human beings by applying the iodide of potassium to wounds with the view of studying their power of absorption. I found this power was very marked, and as, on the other hand, I often found putrid liquids during the preparatory period, I did not hesitate to infer that these liquids might be absorbed, and, passing into the economy, produce fever.[2]

[1] Billroth, Arch. Générales de Médecine, 1865, 6 series, tome vi.
[2] Gosselin, Mémories de la Société de Chirurgie, tome v. p. 147.

The others were made upon animals; the skin was incised, and sanguinolent and fetid pus, procured from fresh amputation wounds, was introduced below it and retained by three or four points of suture. I did not take the temperature, but I found that the animals (dogs) became ill and died promptly, while others inoculated in the same way with phlegmonous pus, that is, pus not coming from an acute osteitis, survived, and, indeed, were scarcely affected at all.

I admit then that the German experiments have been of service to this new theory, because they were more numerous, and more widely published than mine. But I may be allowed to repeat what I said in the Académie de Médecine,[1] that, so far as I am concerned, I did not wait for the results of foreign work before expressing my opinion upon this subject.

To-day, adopting the word *septicæmia* for all the febrile conditions which we are authorized to explain by the passage of putrid substance into the blood, we say that traumatic fever is a septicæmia, the traumatic septicæmia of the first few days, as distinguished from the purulent infection which occurs a little later.

Two questions arise here:—

Are all the symptoms observed during the first period of wounds which are destined to suppurate due to septicæmia?

What is the origin of the putrid poison the absorption of which gives rise to traumatic fever or primitive septicæmia?

1. We must distinguish three varieties among the symptoms of this initial period of wounds.

The first, which we find especially in the cases in which the solution of continuity involves only the soft parts, is that in which the symptoms remain local and are not accompanied by fever.

The second is that in which, while the local symptoms remain quite moderate and the surface of the wound especially does not become gangrenous, a certain amount of fever is nevertheless present. This is what I call *mild or benign traumatic fever;* it is seen in some cases of very extensive wounds interesting the soft parts alone, and in some of those in which the bones are involved and are destined to share in the acute suppuration, but without putridity.

The third is that in which, the bones being involved and about to become the seat of acute suppurative osteitis, the surface of the wound becomes gangrenous, a deep-seated, fetid, diffuse phlegmon is developed, and fever sets in and takes on a very serious form. To this I give the name *grave traumatic fever or essentially malignant primitive septicæmia.*

I do not wish to affirm that septicæmia really exists in the first variety; indeed I am inclined to think that it does not, and that the local symptoms should be attributed to a group of local anatomical conditions or modifications which are necessary to the establishment of the pyogenic membrane and the suppuration, a group to which we can give no other name than the one by which it is now known in

[1] Discussion sur l'Infection purulente. (Bull. de l'Acad. de Médecine, 23d March, 1871, vol. xxxi. p. 182.)

pathology, that of inflammation. I will say then that in such a case suppuration is preceded by a purely inflammatory period.

In the second variety where there is fever, but a mild one, I am more ready to admit a certain degree of septicæmia. It is true that local inflammation exists, but it is not sufficient, I think, to account for the fever, and when I see this coexisting with the presence of more or less putrid substances upon an absorbing surface, I am disposed to consider it due to absorption, and consequently to septicæmia.

As for the third variety, I do not hesitate a moment. The intense and dangerous fever coincides with extreme putridity of the wound; the symptoms observed accord with those furnished by experiments upon animals. The absorption seems no more doubtful to me than the septicæmia which is the consequence of it. It would remain to determine whether the gangrene of the soft parts, which would then have to be attributed to a bad character of the inflammation, precedes the septicæmia and is the cause of its gravity, or whether it is the intensity of the septicæmia which reacts upon the wound and leads to gangrene.

We here touch upon questions which can be answered only by hypotheses supported neither by experiments nor by analogy. For that reason I shall offer you no definitive solution, wishing simply to leave you with this impression that grave traumatic fever owes its gravity to the extreme malignity of the putrid poisons formed upon the surface of a wound in a certain number of cases where these wounds are complicated by the imminent appearance of acute suppurative osteitis.

2. I asked a second question: What is the origin of the supposed poison which gives rise to the septicæmia of traumatic fever?

The authors who first spoke of putrid absorption, and who prepared the doctrine of septicæmia, confined themselves on this point to generalities, saying that the poison was formed by the decomposition in the presence of air of the serosity and blood exuded from the surface of the wound during the first few days, and they spoke of the poison as if it might be formed, and with the same facility, on the surface of every wound.

Now, if my idea has been properly expressed, you must have understood that, if I admit the existence of inflammation during the first period of all wounds, I am far from admitting septicæmia in all, and that, if I admit it for some, I make a distinction between benign septicæmia or mild traumatic fever, which is never fatal, and grave septicæmia, which often causes death. You must also have understood that grave septicæmia is rarely seen in cases where the skeleton is not involved. We see it especially when there is fracture of a large bone at the bottom of a wound caused by a gunshot or by some bruising body, and when this bone is about to take on acute suppurative inflammation of all its constituent parts (periosteum, bony substance, medullary tissue, or marrow), or when a large articulation is widely opened and becomes the seat of acute suppurative synovitis. So that in my opinion the problem is restricted to this: What is then

the origin of the supposed poison in the cases of osteitis and traumatic synovitis, which, together with the coexisting wound, are to pass through acute suppuration?

A. As for the cases of osteitis, I have often explained to you the opinion which I first expressed in 1855,[1] that the medullary fat is probably the origin of the poison. When a bone takes on acute osteitis, the marrow shares in the inflammation, to which I am always obliged to concede a certain part in the evolution of the symptoms preceding the establishment of suppuration. This marrow becomes hyperæmic, infiltrated with blood which escapes from its congested vessels, and with plastic matter exuded by these same vessels; part of the fat and of the albuminoid substances which form the marrow escapes and mingles with the serosity, the clots, and the exudations. All this decomposes as the result both of the admixture and of an action of the air similar to that which produces putrefaction. I wish I could help you to see and touch this peculiar alteration of the fatty substance of the bone; but I cannot do so, for chemistry has not yet given a final opinion upon the subject. I have, however, read an article by M. Klose of Breslau,[2] in which he speaks of the special alteration of the fat of inflamed bones and of the putrid principles to which it gives rise. I admit that I have no positive demonstration to offer you, but how are we otherwise to account for the frequency, and above all, the gravity of septicæmia in those cases in which the bones suppurate? I know that fat is to be found in the soft parts, and that it would seem as if this fat ought to change in the same way as in the cases where the bones are involved. But the fat of the soft parts has not the same composition, that is, it is not combined with the same albuminoid or gelatinous substance, the presence of which perhaps renders the decomposition of the fat of the bones easier and more deleterious; moreover, I have told you that traumatic fever sometimes occurs also during the first period of wounds of the soft parts. It may be because their fat does not furnish such pernicious substances that this fever is rarer and more generally mild. But it is none the less allowable to explain it also by a certain degree of septicæmia, admitting that the organic poison supplied by the altered fat of the soft parts is a little different, or, if it is the same, that it is formed and absorbed in less quantity.

In 1855 I ventured another supposition, that, the poison being the same in the traumatic fever following lesion of the soft parts as in that following lesion of the bones, its greater gravity in the latter was the result of a more ready and more abundant absorption, due either to the fact that the solution of continuity of the bone increased the extent of the absorbing surface, or that perhaps the marrow itself possessed a very great power of absorption. I published the results of several experiments upon dogs, in which I trepanned the shaft of the femur, and injected through a syringe a preparation of iodine into the medullary canal, results which showed that the marrow possesses the power of absorption, although not to a greater degree than other parts of the organism.

[1] Gosselin, loc. cit.

[2] Klose, Gazette Médicale.

The results of recent experiments communicated by M. Demarquay to the Académie de Médecine in October, 1871,[1] are more favorable than mine were to the opinion that a rapid and easy absorption takes place within the medullary canal. These experiments consisted in the injection of fuchsine by means of an Anel syringe through a hole made between the condyles of a rabbit's femur.

B. As for the cases of synovitis, I shall first make a distinction between those in which the penetrating wound of the articulation is complicated by fracture, as in gunshot wounds, and those in which fracture does not coexist. Intense traumatic fever is rarely absent in the first case; but it can be explained, in part at least, by the acute suppuration of the fragments. It is not so intense nor so grave in the second, but it nevertheless exists, and is more marked than in ordinary wounds of the soft parts.

Whence comes the poison then? Probably from the altered fat of the synovia; but perhaps the extent of the absorbing surface must be considered, especially when a large articulation is involved. I may add that liquids are retained and stagnate easily within the cavity of an articulation, and that consequently when once formed the poison is brought into contact for a longer time, and more freely with the large absorbing surface.

Etiology, Prophylaxis.—We have discussed the pathogeny, the ultimate mechanism, that which is so difficult to grasp in all diseases, and I wish now, returning to the practical standpoint, to speak of the etiology, of the appreciable causes of traumatic fever. And yet I should tell you at once that I have very little to say. You know that the principal cause of this affection is a solution of continuity involving the soft parts and the bones. But all persons who receive wounds of this kind are not sure to have the fever, and among those who are attacked by it, some are but slightly affected, and others so severely that they die speedily. Do we know the reasons of these differences? Very slightly.

I can again tell you that traumatic fever is absent, or is moderate, in the rare cases in which the bones do not take part in the suppuration. We have had several examples of this, and I have discussed it sufficiently on other occasions. But I do not know what are the causes which favour this suppuration, and make it inevitable in most cases. However that may be, acute purulent osteo-myelitis having been set up, the causes which aggravate traumatic septicæmia are probably all those which may have deteriorated the constitution shortly before the wound was received, such as fatigue, privation, bad food, loss of sleep, forced marches, moral emotions, chagrin, all those circumstances, in a word, which affect the soldier, and give a special gravity to gunshot wounds of the large bones. I believe, however, that bad domiciliary conditions in the hospitals, and notably the hygiene of the wards, exert but little influence. After the battles about Paris, I so often saw grave traumatic fever make its appearance in large rooms, or in

[1] Demarquay, Recherches sur la Perméabilité des Os dans ses repports sur l'Ostéomyélité et l'Infection purulente. (Bull. de l'Acad. de Médecine, Octobre, 1871, tome xxxvi, p. 877.)

well-ventilated and not crowded military hospitals, that I cannot admit that bad atmospherical conditions have any influence in producing it, at least not so certainly as they have in purulent infection.

In addition to the nature of the wound, and all the individual conditions which I have enumerated, we can only invoke, to explain the intensity of the traumatic septicæmia, as we do for so many other diseases, an idiosyncrasy, that occult cause of which I have spoken so often, in consequence of which certain persons are more apt to supply, from the liquids of their organism altered by contact with the air, or by the consequences of a violent inflammatory process, the quantity and quality of septic poison necessary to compromise life.

From what has been said I wish to draw the conclusion that, in the present state of our knowledge, we possess no real prophylactic measures to be employed against grave traumatic fever.

The best plan, when a patient has received a compound fracture, is to do everything that may prevent suppuration of the bone. To obtain this result in gunshot fractures, we can do little beyond immobilizing the limb and the fragments, and taking the special precautions which are necessary during the removal of the patient from the field to a more or less distant place.

As for the constitutional conditions of which I have spoken, and which predispose to dangerous suppuration, it is plain that we can do nothing against them, and that no prophylactic measures could oppose their influence.

It is always well, especially in view of purulent infection, which, next to grave traumatic fever, threatens the patient most—it is well, I repeat, that he should be placed in as pure an atmosphere as possible which can be renewed easily and without chilling, and if possible, in a room which contains no other wounded patient. From what I have said, you may have comprehended that this precaution is not so necessary against traumatic fever as against purulent infection, but so long as isolation is a precious prophylactic measure against the latter, it will inevitably be used against the former. I have returned to this subject in order to leave this idea in your minds, that, if we are authorized in our statistics to attribute the mortality caused by purulent infection to bad atmospherical conditions, yet we must not attribute that caused by traumatic fever to the same cause, since it is due rather to individual than to external conditions.

There is, indeed, a prophylactic measure to be found in a mode of dressing which we should always bear in mind when we wish to prevent a suppuration, the consequences of which may be serious. I refer to the occlusive dressing, which I have often had occasion to mention, and which you have seen me use successfully. Its result may be either to suppress all suppuration or only that which is dangerous, suppuration of the bones, by favouring the union of the deep parts and allowing suppuration of the superficial parts alone. But, although this dressing succeeds perfectly when the wound is small and when it has been made by an ordinary instrument, it is of no use when the wound is so large and contused as it is when caused by a gunshot. Consequently you have never seen me use it in cases

of this kind, and I have shown you that when patients have occasionally escaped suppuration of the bone after gunshot wounds, this fortunate result could not be attributed to our method of dressing the wound, but was due simply to the idiosyncrasy of the patient, the immobilization of the limb, and abstention from irritating explorations.

Finally, do not be surprised that I do not speak of curative treatment; there is none that has much influence upon this dangerous affection. Derivation towards the alimentary canal by means of laxatives is always indicated, also alcoholic stimulation, and even sulphate of quinine and tannin as antiseptics. You have seen me employ these, but your observations and mine have shown that they were not very efficacious.

LECTURE XXX.

PURULENT INFECTION OR PYÆMIA.

Two cases of purulent infection or pyæmia, one following gunshot fracture of the thigh, the other, gunshot fracture of the leg—Anatomical characters and pathogeny of this disease.

GENTLEMEN: We have recently lost two of our patients who were suffering from gunshot wounds. One had had the femur, the other the tibia broken by a ball. In each case the fracture was near the middle of the bone and moderately comminuted. They suppurated; the patients, who were both young but much broken by exposure to cold, forced marches, and loss of sleep, had intense traumatic fever from the beginning, and, in one case on the ninth, in the other on the eleventh day, had an initial violent chill which lasted twenty or thirty minutes, and was followed by great acceleration of the pulse. The tongue became dry, the skin clayey, and then subicteric in color. The chill was repeated once or twice each day at irregular intervals, the strength grew less, slight delirium, diarrhœa, and abdominal tympanites set in. Meanwhile, the suppuration diminished, the pus became thinner, and had that fetid odor which you have heard me compare to that of a mouse. Finally, death took place on the twelfth day in one case, on the fifteenth in the other.

The autopsies were made, and I now show you some of the specimens taken from the bodies.

I. The principal lesions were found in the chest, abdomen, some of the joints, and the broken bones.

A. *In the chest*, each pleural cavity contained a notable quantity of serosity, together with soft false membranes lining the parietal pleura and the lungs, especially at the base and the lower lobes.

After having taken out the lungs and removed the false membranes, I examined the upper and middle lobes, without finding anything worth mention in them. Then, taking hold of the lower lobes, in which lesions are most frequently found in cases of this kind, I felt, in the tissue of the lung along the outline of the base and behind, several hard lumps about as large as peas, over some of which the surface of the lung was of a deeper colour than elsewhere, whilst over others the colour was yellowish. On cutting into these different points, we found different appearances. I here show you two of them, in which the surface of section is black, and from which I can scrape or squeeze a thick sticky liquid which is nothing but blood. But this blood does not flow away freely; after the scraping and squeezing there is still enough left to keep the colour dark and to give the pulmonary parenchyma a firmer consistency at these points than elsewhere.

Here are two other spots, in which you find the centre of the section yellow and the outer part of the same deeper colour as before. The yellow centres yield, when pressed and scraped, a small quantity of liquid which to the naked eye seems to be pus, and in which the microscope shows us purulent globules; but this pus does not flow away in sufficient quantity to leave a cavity behind. In addition to this rather scanty infiltrated liquid, there is a yellow substance, probably plastic matter, united very intimately with the parenchyma of the lung.

Lastly, I show you three other spots over which the surface itself of the lung was yellow. On cutting into them you see real pus flow, yellow and creamy like wholesome pus. After its escape there remains a cavity, here as large as a large pea, there as large as a hazel-nut, the inner surface of which is still lined with a rather adherent yellowish exudation. But the red and yellow centres have disappeared, and with them all that remained of the parenchyma.

You see there, gentlemen, the three stages of what are called metastatic abscesses of the lungs; the brown foci belong to the first, those that are gray in the centre and brown at the periphery to the second, and the purulent collections to the third. The anatomical characters during the first two stages differ from those of ordinary phlegmonous abscesses. In the first, for example, instead of a simple hyperæmia with infiltration of serosity, it seems that we have an ecchymosis, that is, a flow of blood from torn capillaries, and at the same time a thickening of this blood and an intimate union of its coagulum with the infiltrated portion of the parenchyma of the lung.

Dance[1] and Cruveilhier,[2] however, explained these brown foci in another way. They attributed them to small blood clots formed within the capillaries of the lungs in consequence of the development of a capillary phlebitis.

Virchow[3] and the German authors afterwards adopted this explana-

[1] Dance, Article Abces metastatiques, in the Dict. de Méd., in 30 vols. Paris, 1832.
[2] Cruveilhier, Article Phlébite in the Dict. de Médecine et Chirurgie pratiques, in 15 volumes.
[3] Virchow, Pathologie Cellulaire, Paris, 1868, 3d edition.