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THE

UPPER CANADA MEDICAL JOURNAL,

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ORIGINAL COMMUNICATIONS.

ART. XLII.—*Pathological Histology, by* DR. GOTTLIEB GLUGE. *Translated from the German by* JOSEPH LEIDY, ESQ., M. D. *Philadelphia.*

FOURTH SECTION.

The Histological Metamorphoses of the Blood.

The blood, which contains all the elements from which the tissues are developed, may organize itself immediately into them. It is not even necessary that it should be exuded through the walls of the vessels to construct new tissues. Hunter asserted the possibility of the immediate conversion of blood into tissue, but latterly the fact has been almost entirely overlooked, and I believe I was the first to prove this transformation by microscopic observation.

Blood may experience a transformation into tissue as readily within as exterior to the vessels, occurring, in the first case, in a very trifling degree in stasis of the blood; in the second, in blood extravasated into the surrounding parenchyma, when the vessels are torn.

23. *Metamorphosis of blood within arteries, veins, and the heart.*

In the organization of blood corpuscles, within the vascular system, they associate in groups of ten or more, and then become enveloped with a grey albuminoid matter, soluble in acetic acid, which afterwards condenses, and thus constitutes a cell membrane.

The blood corpuscles at first retain their hematine, and may either preserve their original size or may undergo diminution. After the cell is formed the red color gradually disappears, and is then observed filled with numerous dark granules (nucleoli), which consist of fat, a proteine substance or pigment.

Sometimes, before the cell-wall is yet visible, a large clear spot appears in the centre of the groups, which is the nucleus of the future cell, and occasionally two such nuclei are formed. This metamorphosis of blood-corpuscles into inflammation globules and cells cannot always be traced or proved, because frequently when the examination is made, the red color has already disappeared from the mulberry-formed globules. However, be it as it may, the existence of these inflammation globules within a vessel is the only certain sign that a column of blood had stagnated during life. The length of time intervening between the commencement of stasis of the blood and the formation of the structures above described, according to my observations, is several days.

The explanation of the process can hardly be given with certainty. To form the globules, it appears as if from each constituent blood-corpuscle a portion of albumen and fibrine exuded, and another portion of these with fat remained.

The mode of transformation of the corpuscles into pigment granules is problematical. At first of a red color, they then become of a rust or yellowish color, and finally blackish, and are also diminished in size. They no longer give up their coloring matter to water or acetic acid, nor are they soluble in these; so that a chemical transformation has taken place in the proteine as well as in the former substance.

Besides this change in color, and diminution in size of the blood-corpuscles,* in which, for the most part, the hematine remains in an altered condition, the formation of masses of pigment granules have hematine, which has exuded from blood-corpuscles without a change in their form, is also observed.

A further metamorphosis of inflammation-globules, or of the cells, with many nucleoli, I have not observed in blood within the vessels.

In the organization of the fibrine within vessels, it coagulates into fibres, which at first branch in an arborescent manner and are smooth, and at a later period become rounded. According to my observations, these fibres are never preceded in their origin by cells. In other cases, by the separation of fat into globules, inflammation-corpuscles, or cells of the second form, are produced in the fibrine.

* I cannot participate in the opinion of *my honored friend* Dr. Lebert, that these colored corpuscles are never blood-corpuscles (as Kölliker concedes), but are newly formed from the hematine. I have too often and distinctly observed the transition forms. That perfectly preserved pale blood-corpuscles are observed with hematine globules in old blood-coagula is quite correct.

Sometimes the latter, before metamorphosis of the blood corpuscles has yet commenced, or is completed, form around them sheaths or canals, which are undistinguishable from the simplest capillaries. This fact has been observed by me only in the heart.

The organization of fibrine into fibres and cells is a matter of direct observation; from albumen the process appears never to occur primitively; so that fibrine approximates more the fibrous tissues yielding gelatine, than albumen does.

In cancerous degeneration and colloid cells are sometimes developed in coagulated blood within the blood vessels around pus corpuscles.

The above are the only histological metamorphoses of blood in the large bloodvessels.

Within the capillaries, in a similar manner, in stagnation of the blood, the blood-corpuscles become associated, and are converted into inflammation-globules; and if the stasis continues, the walls of the capillaries dissolve, and the liquor sanguinis, mixed with the inflammation-globules, extravasates into the parenchyma of the organ. This fact, however, is only inferred, and not directly proved.

A conversion of fibrine into fibres I have never yet observed within capillaries.

21. *Metamorphoses of blood exterior to blood-vessels.*

Much more numerous and manifold are the transformations of blood which has escaped into the surrounding parenchyma of lacerated vessels, and has not been resorbed, than occur in that within the vessels.

As in the latter case, blood-corpuscles also form red, and then uncolored inflammation corpuscles and cells; besides which, they frequently are developed into pigment cells, often filled with black granules, insoluble in mineral acids. The small corpuscles resulting from the transformation of the blood-corpuscles, however, do not always become enclosed in cells, but frequently remain accumulated in large irregular masses.

In the coagulated fibrine, cells originate by the two characteristic modes, and also fibres, areolar tissue, adipose tissue, and even osseous tissue. It is by the metamorphosis alone of this fibrine, that wounds heal per primam intentionem, and not by a new exudation.

Melanotic tumors, sarcoma, and osteoid, sometimes owe their origin to blood which has escaped from the vessels.

FIFTH SECTION.

Pyæmia.

Pyæmia consists in a commingling of pus with the cir-

culating blood. The pus is either the result of a transformation of a portion of the latter, or it obtains entrance into the circulation through veins accidentally opened.

The consequence of the admixture almost always, though not necessarily, is stasis in the capillaries and the conversion of the blood of these into pus, with the formation of abscesses; and in this manner the latter may originate in greater or lesser number in the liver, spleen, kidneys, lungs, brain, and more rarely in other organs, as beneath the skin, in the mucles, and in the joints.' This transformation of the blood into pus, is most frequently induced by the spontaneous conversion of coagulated blood into that material.

The definition above given of pyæmia is not the usual one, but I hope the following explanation will justify its adoption.

On examining cases which have died after extensive surgical operations, and more especially where suppurating wounds have existed, frequently abscesses are found in the lungs, liver, sometimes in the kidneys, spleen, other or internal or some external organ. This fact, long known, since the last century, has been the subject of numerous theoretical and experimental researches to determine its character. These investigations, which have always borne the impress of the times, and the ideas of the prevailing school, evidently are not only of scientific interest, but are of practical importance, as upon the exactness of our knowledge of the production of such abscesses, we can alone depend for precautionary measures to diminish the great mortality which still follows amputations.

The first idea which obtruded itself as an explanation was that the pus of a suppurating wound became absorbed, and was deposited in the organs above indicated, constituting the so-called metastatic abscesses. This view was supported by the usual diminution of suppuration in the wound, the absence of evident inflammatory symptoms in the organs which had become the seat of the metastatic abscesses in so short a period, and the presence of pus in the veins and lympatics, frequently themselves unin flamed.

But to this explanation, latterly, the objection has been advanced, that as pus consists of a liquid with solid corpuscles, which cannot be resorbed through capillary walls,

* "Perhaps the time is not far off when we shall return to the view of De Haen, who considered that, under certain circumstances, pus could form in the blood, as does urea in the physiological condition."—*Andral.*

the pus corpuscles in the circulation and abscesses could not have been derived from the suppurating wound.

Another idea became prevalent, that the abscesses were the result of local inflammations, and the pus within the veins was there formed through inflammation of these vessels (Dance). Some authors, but especially Blandin and Cruveilhier, adopted phlebitis as the cause of metastatic abscesses, and the latter even a "phlebite capillaire."

"It has been proved by strictly physical experiments," says Cruveilhier* "that pus circulating with the blood stagnates in various parts of the capillary system, everywhere inducing inflammation of the venous capillaries or circumscribed inflammations, which more or less rapidly run their course to the formation of abscesses."

Finally, Sédillot very correctly remarked that pyæmia is the result of commingling pus-corpuscles with the blood, which stagnating in the vascular extremities, destroy capillary circulation, and induce the formation of small foci of inflammation. It is not the consequence of an admixture of a putrid serous liquid with the blood, as supposed by Bérard, for this would rather operate in the production of gangrene.

That pus may be introduced through open veins immediately into the circulating blood and become intermingled with this, and induce metastatic abscesses, is at present not a subject of doubt. The occurrence of those rare cases in which such abscesses form without phlebitis, and the circumstance that usually a coagulum of blood incloses the pus within the veins, is variously explained by authors.† The coagulum, by most of the latter, is considered insufficient to prevent the entrance of pus into the circulation, and almost all agree that pus is separated from the inner surface of the veins; which idea, so generally prevalent, is the reason why the whole process of phlebitis as well as pyæmia, has been misunderstood, notwithstanding so many excellent anatomical researches. But in what follows, I hope to prove that pyæmia originates by transformation of the blood within the vessels, without necessary participation of their walls, and that this transformation may occur from preceding stasis of blood in the veins, even without the previous existence of abscesses.

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* Atlas, livr. xi., p. 8, pl. i.

† Sédillot views phlebitis in the ordinary cause of metastatic abscesses, but with others (Lepeau, Jobert, &c.) gives cases in which such were found without inflammation of the veins, and attempts to explain them by supposing the latter to have become eroded, which, however, has not been proved, and in the normal suppuration certainly is not so.

25. Conditions of Pyæmia.

1. The irritation of the inner membrane of veins by means of foreign bodies, according to my experiments, neither induce redness in nor deposit upon it, and the same is the case with the lining membrane of the arteries* Daily the veins are cut in bleeding, and nevertheless suppuration does not occur in them.

2. On the contrary, the more vascular external tunic of veins is frequently the seat of exudation, and less so of suppuration, as well from exterior irritants as from the influence of these in their immediate vicinity,—primitive phlebitis. The pus, which is formed under these circumstances, can penetrate only to the lining membrane of the veins, in which position it can induce secondary stagnation of the blood within the latter, as in the reverse case stagnation of the blood within a vein readily induces inflammation of its cellular tunic, because the venous nutrient vessels which open directly into the vein are impeded by the closure of the latter.

3. This phenomenon does not in itself determine pyæmia.

4. The introduction of substances into the veins which cannot pass through the capillaries, as, for instance, when mercury is injected into the jugular vein, induces the formation of minute abscesses in the lungs around each small globule of the metal, which, however, do not contain pus, as formerly believed, but inflammation-corpuscles.† In a similar mechanical manner pus-corpuscles operate in the capillaries, destroying the circulation, and causing the conversion of their blood into pus.

5. Injection of a small quantity of pus into the veins does not determine the formation of abscesses, but these are always produced when a considerable portion is introduced. Nor does the injection of liquor puris into veins produce metastatic abscesses; but the introduction, in this way, of a large quantity of pus-corpuscles always induces the formation of abscesses surrounded by ecchymoses, and accompanied by rapid destruction of the parenchyma.

6. The principal cause of pyæmia is coagulation of blood in the veins, which then undergoes conversion into pus, and is thus conveyed into the capillaries.‡

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* See Arteritis, Path. Anat. pt. 14, and Virchow's Archiv. Similar results were obtained by Meinel, and he has arrived at the same view as to the cause of pyæmia, for an account of which, see Wunderlich's Archiv, 1848,

† Pneumonia, Path. Anat. pt. vi.

‡ To the existence of two *forms* of phlebitis,—in the first of which the inflammation of the venous coats is primary and the coagulation the result; in the second, the latter is the essential, and the former secondary;—attention was first directed by Rokintansky. Only in the fact that I consider the pus found in the veins in the both cases to be directly formed from the blood, do I differ from the excellent Wiener anatomist

7. This coagulation of the blood is induced especially under the following conditions:—

a. Through inflammatory thickening of the external tunic of veins from contact with fibrinous exudation and pus.

b. Through pressure of tumors upon the veins.

c. Through the accidental entrance of pus into veins from without, as in the suppurating wounds of amputation, and after ulceration of the venous parietes.

d. Through contact of thin-walled vessels with exudation undergoing decomposition, as in the case of the inner surface of the inflamed uterus after child-birth. Inflammation-corpuscles are found upon the inner surface of the uterus after every delivery, particularly in the position which was occupied by the placenta. If this is not expelled or decomposed, stasis next occurs in the neighboring vessels, and this is the true source of the pus in the phlebitis of lying-in women. How, otherwise, could so large a quantity of pus in a few days transude into the veins through their thick walls?

e. Stasis of the blood in a large number of capillaries of an organ frequently determine coagulation in its arteries and veins, as in pneumonia. Other observers, instead of viewing this phenomenon as a natural consequence, have considered it a cause of the inflammation of the lungs. In the same manner nephritis may determine coagulation and the formation of pus in the veins of the lower extremities.

f. Even continued pressure upon a part in which the circulation is less favored, as in the foot, sometimes induces stagnation of the blood in veins of the whole extremity, sometimes giving rise in their vicinity to rapidly destructive abscesses, which appear to proceed from a conversion of the blood in the capillaries into pus.

g. The introduction of organic matter in a state of decomposition into the capillary system operates in producing coagulation of the blood in the veins. In this manner the poisonous material of dead bodies and the matter of glanders give rise to metastatic abscesses, at first in the interior part of the body, and subsequently in the external organs.

8. This coagulation of the blood, whose most important causes have now been indicated, likewise in itself does not determine pyæmia. If veins feel hard and become painful, the case is usually considered as one of phlebitis, but incorrectly, for a vein may be filled with firm coagula, and the limb be œdematous and painful without a trace of

existing inflammatory exudation, as I have observed in phlegmasia alba dolens.

9. If blood is coagulated in the veins, it may again become liquified, and the circulation be thus restored. This is not a cured phlebitis, but the coagula of blood have again become fluid, and the production of abscesses through exudation from the capillaries has been prevented.*

10. Or the stagnated blood undergoes transformation. It either forms inflammation-corpuscles, or its hematine undergoes conversion into pigment granules or cells, which, as before remarked, are the safest signs that coagulation of the blood in the vessels had occurred during life. The fibrine, under such circumstances, adheres firmly to the inner surface of the veins, and becomes converted into an irregular fibrous tissue, from which the vessels, with or without previous inflammation exudation into their external tunics, are tranformed into fibrous cords.

11. Or the coagulum is converted into pus.

12. I have already proved that inflammation-corpuscles and fibres may form in the blood itself; and it only remains to show the possibility of its conversion into pus.

13. It is a fact known to all who have made frequent autopsies, that in case of abscesses and suppuration generally, veins with their parietes entirely uninjured occur filled with pus, and that this latter may be found within blood coagula, even in the heart itself. In such an instance the introduction of pus from a suppurating surface cannot admit of a thought. Cases also occur in which a vein is visibly filled with mingled blood and pus, and yet its walls are unbroken, and an abscess is nowhere to be found.† Such an one I shall hereafter describe.

14. The pus is formed at the expense of the fibrine of the blood, and not directly from blood-corpuscles, which, however, undergoes solution. In the process the fibrine becomes soft, grayish in color, and in it appear minute nucleoli, often surrounded by a clearer substance distinctly defined, which are to constitute the future pus-corpuscles.

15. The coagulum is rarely transformed into pus without coming into immediate contact with pus introduced into the veins, as after amputation-wounds, or unless the venous

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* Such reliquefaction of coagulated blood in the capillaries is frequently observed in experiments on the web of the frog's foot, and also in man after venesection.

† In frogs, according to my observations and those of Weber, a remarkable quantity of lymph-corpuscles form in stagnated blood. It has already been mentioned that, although pus-corpuscles have no absolute distinctive characters, yet they are readily recognized, when they possess several nucleoli, from the smoother, indistinctly nucleolated lymph-corpuscles in which view I entirely correspond with Dr Lebert.

parietes are in contact with exudation and pus. In the case of arteries, the thickness of their parietes serves as a protection against the conversion of coagula into pus, and probably is the reason why this is so rarely found within them.

16. How pus in this case operates upon the blood is unknown, but the old maxim "pus produces pus," here finds its full application.

17. Even yet the morbid process of the production of pus may be local, for a portion of coagulum may close it off from the blood above, or below and above. Pyæmia may thus not occur, though this is rarely the case. Of this description Cruveilhier* mentions one of phlebitis of a superficial vein of the mammary gland, from which he had emptied the pus, which was reproduced for a fortnight, when it terminated without further consequences, with the closing up or obliteration of the vein.

18. But usually the plug of coagulum is useless, and the pus derived from the transformation of the fibrine passes into the circulation. Sometimes, according to the observations of Blandin, Sedillot and myself, the coagulum is entirely absent or is imperfect. In those organs in which foreign substances introduced into the circulation,† are usually deposited accumulations of pus form, surrounded by ecchymoses, which bear the impressions of a suddenly arrested circulation in the capillaries; in which, as in gangrane, when the latter occurs, the tissues quickly die and become mingled in fragments with the pus; hence the peculiar appearance of these metastatic abscesses, which are deep, of a dirty gray color, and surrounded by dark ecchymoses.

19. These abscesses I do not view merely as the result of the transmitted and accummulated pus, for pus-corpuscles can very well pass through certain capillaries; as, for instance, the large capillary vessels of the liver; but under the influence of the transforming fibrine, yet in a flocculent condition, stasis of the blood occurs, and a new formation of pus is the consequence.

20. Pus may directly enter a gaping vein by aspiration, in the same manner as air does. This is, however, rare; because, in amputations, usually the veins become closed before the suppuration is considerable. It is not the introduced pus which forms metastatic abscesses, for there is

*Livr. ii. pl. i.

†We may here be reminded of my experiments, and those of Thiernesse, of nourishing animals upon oil and injecting this into the veins; also to the researches of Cruveilhier.

nothing to indicate that the quantity is sufficiently large for such a purpose; but it is the stasis and transformation of the blood induced in the capillaries of the organs reached by the pus, which produce them.

21. The reception of the serum of pus by resorption into the blood—for we have no evidence that pus-corpuscles can pass through the parietes of capillaries without previous liquefaction—does not induce pyæmia. This is proved by the frequently observed disappearance of pus from serous cavities after inflammation in the lower animals, or after injections in the same. The undecomposed serum injected in a considerable quantity does not produce pyæmia, as has already been proved by Sèdillot.

22. Pyæmia then consists in the transformation of the blood into pus within the capillaries and veins. It is not pus-corpuscles which form metastatic abscesses; but, with fibrinous floculi, they give rise to stasis and transformation of the blood in the capillaries, and exudations from these, which result in the abscesses.

23. Analogous to this is the transformation of lymph into pus, which, in the so-called inflammation of the lymphatics, is certainly not separated from the walls of the latter.

For pyæmia to originate by absorption through lymphatics is not possible, because the pus-corpuscles cannot penetrate their parietes.

24. Suppuration in some position of the body usually precedes pyæmia, but this is not essential.

25. From what has been above stated, it can be understood why every injury of veins, inducing coagulation within, and suppuration in the vicinity of those vessels, is usually so dangerous.

26. The danger of pyæmia does not arise from the influence of any malignant property of normal pus upon the blood; for it is well known large accumulations remain a long time in cavities of the body, but from the mechanical impediments in the capillary circulation, to which it gives rise by inducing stasis, particularly when coagula imperfectly converted into pus are simultaneously carried along with the circulation. The mechanical operation alone of pus, however, is not sufficient in all cases of pyæmia to account for death. Such cases occur, on the contrary, in which the blood has lost its capability of coagulation, apparently the result of contact with pus in the act of decomposition, and no simultaneous production of pus is induced in other parts of the body.

26. *On the purulent dyscrasia.*

All surgeons are acquainted with the fact, that frequently,

without evident cause in various external and internal parts of the body, numerous abscesses gradually or simultaneously form. The name of purulent dyscrasy may be retained for such cases, as nothing indicates that the blood is converted into pus within the vessels; and we must, therefore, admit a general disposition to the formation of pus through exudation from the blood.

(*To be continued.*)

ART. XLIII.—*The Hip-joint—Considerations on its injuries and diseases, deduced from the Anatomy; by* S. J. STRATFORD, M.R.C.S., Eng., Toronto, *continued from No.* 3.

INFLAMMATION OF THE LIGAMENTS OF THE HIP-JOINT.

(*Continued.*)

In a preceding number of the *Journal*, we pointed out the anatomical nature of articular cartilage, and demonstrated that a knowledge of its structure and function was necessary to enable us to comprehend the phenomena of inflammation when it attacks this portion of the joint. We indicated that in inflammation of cartilage the destruction of the cell apparatus and the solution of its fibrous element, was that condition which has long been spoken of as ulceration of articular cartilage, and that the absence of nervous filaments sufficiently accounts for the little irritation in this complaint, while the nature and character of its inflammatory action has not been understood for the want of the minute anatomical knowledge necessary to enable us to comprehend it; but now that the microscope has exhibited the true condition of the part, the solution of this difficult point was readily obtained.

It must be clear, from the foregoing facts, that this disease of the cartilage which we have been describing, may at any moment, when it has amounted to any considerable extent, involve the structure of the synovial membrane from its proximity, the inflammatory action will extend to it, and when inflamed, each and every symptom and result of such disease will be speedily developed, such as the effusion of serum, or of coagulable lymph into the cavity of the hip-joint. This inflammatory action however may not be so acute as to produce any extreme results, while the disease may continue to extend in the structure of the cartilage, sometimes involving the whole cartilaginous covering of the femur, and largely implicating that which lines the cotyloid cavity. This is certainly the history of the progress of the

complaint long since pointed out by Sir B. Brodie as a distinct disease, and described by him as ulceration of the articular cartilages.

Again: the effusion of fluid blastema, which takes place from the conjested ampullæ of the cartilage, may be so extensive, that it may take on the changes to which this substance is liable as a result of inflammatory action, it may soften, and the pus corpuscle may be developed; this is certainly rare in inflammation of the cartilages, but nevertheless it does occur, and would seem most frequently to happen around the vascular apparatus, which connects the cartilage to the synovial membrane. When this morbid product has been softened and the pus corpuscle formed, its effects will commonly extend to the neighbouring tissues, the calcarious salts will be dissolved by the liquor puris, so also may the fibrous element of the cartilage, until by degrees we find a considerable cavity to result, and progressing, this abscess may extend to the cancellated structure of the bone, and by degrees find its way through the periosteum into the areolar tissue surrounding the bone, or burrowing down among the muscles, may obtain an exit through the skin; again, it may destroy the basement membrane of the synovial tissue, and escape into the cavity of the joint. When the disease has commenced on the articulating surface of the cartilage it will commonly induce disease of the several textures of the joint, which will in nowise differ from the changes already detailed, as the ultimate result of inflammation of the synovial membrane. The disease will be submitted to the same chances of recovery, or produce the same ultimate results, always ending either in deformity or death. It is a fact worthy of remark, that although we may with sufficient accuracy diagnose the primary symptoms that indicate inflammation of the separate tissues of the hip-joint, but as soon as matter has been developed in the joint all chances of distinction are finally lost, for all the structures become similarly effected, and all the symptoms are confounded in a general result.

In acute inflammation of the cartilage the changes progress with such rapidity that it speedily involves all the textures of the joint, and it can seldom be recognized as a distinct disease, while the state of chronic inflammation is continually presented to our view, and may be recognized with comparative ease.

The most usual period of the advent of chronic inflammation of the cartilage is after the age of puberty has

passed; it may occur in children, and will occasionally happen in old people. It may sometimes be traced to a blow, or injury, or may be developed by inordinate exercise, while it not unfrequently appears without any known or recognized cause. The disease may be confined to the hip-joint, or it may simultaneously appear in other joints at the same time. The first symptoms which mark the approach of this insidious disease is a slight degree of pain in the joint increased upon pressing the bones together, and more or less inability in the use of the joint; this may continue for months, and is unattended with any appearance of swelling or effusion within the joint; these are the chief symptomatic indications of chronic inflammation of the cartilage in its earliest stages, and with the absence of any sensible disease in any of the other structures of the joint, must alone guide our judgment. After a time, however, the pain greatly augments in severity, and motion vastly increases it, while the patient is continually roused from his sleep by spasmodic starting of the limb, pressure upon the trochanter, or the forcing the thigh-bone into its socket, causes great complaint. We not unfrequently find the lymphatic glands in the groin become tender and swelled; they may inflame and suppurate: this is doubtless dependent upon a low irritative inflammation which has followed the course of lymphatic vessels from the diseased joints, and may be dependent upon the absorption of the dissolved tissues within the joint. From the absolute necessity of perfect rest in the diseased joint, the hip has become less prominent, has considerably lost its usual convexity, while the muscles feel flaccid, hang loose and flabby; the same necessity also for the fixed position of the joint, causes a change in the position of the pelvis, and the sigmoid flexure of the spine is not of unusual occurrence. These symptoms having progressed for an indefinite period, the sudden advent of inflammation of the synovial membrane may be added; the acute pain and swelling of the joint, which so decidedly marks the appearance of this disease, may be present itself, and may rapidly go on to all those changes incident to acute disease of this structure —such as the effusion of serum, or the deposit of fibrine, or of blastema into the cavity of the joint; should matter now be formed in the joint, the progress and course of events will bear a strict analogy, with all the consequences previously detailed, as resulting from acute inflammation of the synovial membrane, such as, ulceration of the cartilages, caries of the bones, and destruction of the capsular and

round ligaments, while the disease will eventually end in dislocation of the coxo-femoral articulation, followed by anchylosis or death.

The treatment of this disease should be regulated by the principles indicated in the cure of chronic inflammation of the hip-joint, such as local bleeding and the employment of contra-irritation. The remarkable tardy progress of the malady would indicate in the earlier stages the inapplicability of active means; seatons, issues, or perpetual blisters will be found far the most useful, and also, from the chronic nature of the disease, will in all probability have to be continued with unremitting perseverance. Another means peculiarly applicable to this disease of the hip-joint is the employment of the splint to the diseased limb, so as to preserve the joint free from all possible motion, and so to allay the irritation of structure which friction and, pressure must necessarily keep up in the part; it is an indication of nature, and deserves to be strictly and patiently attended to. The employment of alterative medicines, and the strictest attention to general health, should not be overlooked. By such means we may occasionally accomplish a cure of the disease; but should inflammation of the synovial membrane make its appearance and be attended with the formation of matter in the joint, the general principles advocated in the treatment of that disease must be strictly adhered to—such as a free, and early opening for the exit of matter—and the prompt excision of the head of the femur; when destruction of the cartilages, ulceration and carries of the bones is clearly established.

Inflammation of the head and neck of the thigh-bone.

Inflammation of the spongy or cancellated structure of the head and neck of the thigh-bone may occur; as an acute and idiopathic disease, its attack may be comparatively sudden, and its progress extremely rapid. It will be attended with severe deep-seated pain in the region of the hip-joint, that will not be increased by motion of the parts one upon the other. The neck of the thigh-bone may appear tender, upon direct pressure. The constitution will be evidently greatly alarmed, as evinced by the violent inflammatory fever that accompanies its advent, a strong indication that severe mischief is going on in the part, and, with evidence that is afforded upon our examination of the hip-joint, will readily point to the seat of the complaint.

To comprehend the changes which occur in this complaint, the character of the structure requires due consideration, before we can appreciate the various

alterations which occur in it. The head and neck of the thigh bone consists of dense external plates, or laminæ of bone, superiorly covered with cartilage; between which numerous cancelli, or small hollows bounded with very thin plates of bone, and lined with an extremely vascular membrane, which communicates with the medullary canal; these cavities are filled with a peculiar adipose matter. The Haversian canals traverse the hard substance of the bone. These canals run for the most part in the direction of the laminæ and carry the blood-vessels which serve to nourish the bone and support the life of the part. The size of these canals vary from 1·200th to 1·2000th of an inch. The smaller carry but one capillary vessel, while several may be observed in the larger ones, and to these is added a quantity of adipose matter. Around these canals the bony matter is arranged in concentric circles, and these circles are marked by a series of stellated points, they are cavities or lacunæ of a particular form, and run in the course of the laminæ; they are so placed that one of their sides is turned towards the Haversian canal, and the other towards its fellow in the circle beyond it. They are of a lenticular or oval form; their long diameter is generally from 1·2400th to 1·1600th of an inch, while their thickness is about one sixth of their length. These canaliculi completely traverse the substance of the bone and communicate irregularly with one another—in this manner a perfect communication is kept up between the Haversian canals and the most external concentric laminæ of bone. The canaliculi which form this junction are infinitely small, being only from 1·1400th to 1·2000th, on even 1·60,000 part of an inch in diameter. The blood, in the normal state of the parts will penetrate the Haversian canals and cancelli; but it is obviously impossible for the red globules of the blood to penetrate the canaliculi,—consequently only the more fluid parts, containing the salts of the blood in solution, keep up a sort of circulation through the osseous substance. This apparatus presents a means, whereby the earthy matter of the bones may be deposited on each portion of the fibrous structure, of which the primary element of bone is composed. Here then we find a condition of parts, which permits a free circulation of healthy arterial blood into the centre of the most dense structure of bone; a condition of nutrition which certainly presents considerable peculiarity in its character, insomuch that the deposit of the inorganic materials of the blood required to give that hardness and durability to the bone has a facility of operation that could not

otherwise be obtained; for by means of this apparatus, the canaliculi carrying but a serous fluid with the carbonate and phosphate of lime and the other salts of the bone in solution, are conveyed to the part; the deposit of earthy matter is accomplished with great ease, and is continually under the influence of this circulatory apparatus. The fibrous element in which this earthy material is deposited is comparatively of low vitality, requiring but to be moistened to preserve its normal condition; the earthy matter of bone continually varies in amount, and this is the means by which these materials may be deposited, and enables them to be so constantly changed in health and in disease; presenting the ever varying amount of the earthy salts, so evident at different periods of life: thus in Mollities ossium the bony matter is found deficient, so that the bones are soft and easily bent, while in old persons it is superabundant in amount, and the bones have become abnormally brittle. From this condition of the part also, and the nature of the nutrative apparatus in bone, we can readily comprehend the peculiarity of its diseases; we can understand that should inflammatory action occur in this structure, that its unyielding character would in all probability cause it speedily to run into stasis—the collection of blastema in the Haversian canals and the other capillary vessels of bone might give rise to the formation of the pus corpuscles, but that the chief peculiarity would be the rapidity with which this stasis of the circulation is accomplished, and from the unyielding material with which it is surrounded, it rapidly causes the death of the part. This state of things also accounts for the intense pain and great constitutional irritation which is so rapidly developed; so that on the very first advent of acute inflammation of bone, this condition of stasis is speedily recognized by the intensity in the amount and duration of the cold shivering which is always a most prominent symptom.

The generality of long bones derive their capillary or nutrient vessels either from the periosteum or medullary cavity, but the neck of the thigh-bone is very peculiarly situated with respect to its circulation. This portion of the bone is in the first place surrounded by dense fibrous structure, a reflection of the capsular ligament; and this is again covered with synovial membrane, which embraces it as a glove covers a finger, while it is almost entirely lacking that periosteum which carries the blood-vessels of the outer lamina of bone; this complication makes the

whole extent of the neck of the thigh-bone more liable to be implicated in the complaints which originate in the various structures of the joint, or, should disease occur in the bone, as a matter of course, it will early implicate the adjacent tissues of the hip-joint, and soon involve all in indiscriminate disease. From the position of the neck of the thigh-bone, we find the vascular periosteum by which the hard lamina of the circumference of the shaft of the bone is nourished is absent, and the blood-vessels are necessarily derived from the nutrient apparatus of the sparsely nourished capsular ligament which surrounds it; hence in cases of death of this part of the bone, the impossibility of any attempt at repair. In the next place, the cancelli of the interior obtain their circulating material from the medullary canal,—this is doubtless greater in amount, and more fully supplied, than the Haversian canals; so also the more yielding and comparatively lax structure of the cancelli permits a greater amount of hyperæmic action, causes a far redder appearance in this part of the bone, and affords a much greater latitude for the deposit of blastema than can be expected to occur in the more dense structure of the shaft of the bone; so that we find that inflammation is more apt to cause the death of the bone in the latter than in the former structure; so also we find by experience that necrosis is much more common in the hard shaft of the bone than in the more loose and open texture of the articulating extremities—these however are not entirely exempt from such a result of inflammatory action, and as a consequence of chronic inflammation it will occasionally be found to occur. Thirdly, the head of the thigh-bone is supplied with blood-vessels which take their course along the ligamentum teres; these dip down into the structure of the bone, and supply a considerable portion of the cancelli of the superior part of it; doubtless they anastomose freely with the other portions of this circulating apparatus, or else the head of the bone would invariably suffer whenever dislocation occurs, as this ligamentum teres is always torn across.

The first step in inflammatory action is an increased supply of blood sent to the circulating apparatus of the bone—the capillary vessels in the Haversian canals.—The subsequent stages of inflammatory action are followed up; an increased amount of serous fluid is given out to the canaliculi and lacunæ, giving rise to solution of the earthy matter and its removal from the fibrous element, which also become swelled and morbidly softened; and this

is followed by the effusion of albumen and fibrine, and the deposit of blastema into the cancelli, so that this structure is completely filled, and the circulating apparatus compressed and blocked up. This condition occurs far more readily in the unyielding structure of the Haversian canals than in the free and open texture of the cancelli; but even here it readily occurs, causing a complete stasis of the circulation and producing the death of the bone. As soon as this condition has taken place, the dead bone takes on the character of a foreign body, and produces all the effects of such a substance on the surrounding parts. Should this condition be the result of acute inflammation of the head and neck of the thigh bone, the probability is that it speedily involves the whole bony structure; but if it should be partial and chronic in its action, a portion only of the bone may be destroyed. In the first instance the whole of the hip-joint would without doubt be rapidly involved in one general disease, but in the other variety, the structures of the joint might not be so quickly implicated, taking up its various actions but as a secondary result. The blastema deposited into the cancelli undergoes the same softening it would in other positions, and the pus corpuscles are formed in greater or less quantity, according to the amount of the deposit, but from the unyielding nature of the structure this is generally not very c-ious; but when the formation of pus does occur in this part, it is always attended with symptoms of extreme constitutional irritation, much greater than mark its occurrence in most other parts of the body. The cold shivering is commonly intense, and is followed with great inflammatory fever, hence we have a diagnostic symptom of great value in these cases. As I have before said, it seldom happens that acute inflammation of the bone has arrived at this stage, without the various textures of the joint participating in the disease. The circulating apparatus of the cartilage and of the synovial membrane have become implicated, and the successive stages of inflammation may rapidly follow each other, involving the whole joint in indiscriminate disease, suppuration and destruction, followed by ulceration and consequitive dislocation, which alone stops the progress of the complaint and gives nature a chance to set up a process of repair.

If the amount of dead bone should be but small, the matter formed among the cancelli, may find its way out by ulcerative absorption into the joint; or being located near the shaft of the thigh-bone, it may pass down among the

muscles, and arriving at the skin be evacuated through it, leaving sinuses behind it. The precise process by which this ulcerative absorption is arrived at in the living bone has been previously dwelt upon, it consists in the solution of the salts of the bone in the liquor puris or serum of the blood; the fibrous element itself may, when dead, be softened and dissolved, until it likewise is removed from its connection with the living system; so that by degrees we not only find a new passage formed for the pus, but also that the dead bone is isolated from the living structures; and if a probe is introduced into the sinuses, we may find the bone dead and rough, and perhaps discover that it is separated and moveable in the cavity which it has formed for itself; and, was it not for the peculiar position and connection of the head and neck of the thigh-bone, we might have hoped that the dead sequestrium might eventually be removed from the living structure, and the disease be cured by nature. The fallacy, however, of such a hope must be evident, from the isolated position of the bone, which must clearly show the little chance of a natural cure, and that this chance, if any at all, must entirely depend upon the position of the dead portion; for did the sequestrium approach the head of the bone, it is impossible that the various stages of this disease should progress without influencing the other structures of the joint and involving all in one common disease; but was it situated principally at the trochanteric extremity, we might be more likely to find a favorable termination to the complaint. This condition of the bone, dead from inflammatory action, must not be confounded with the result of the deposit of tubercular matter in the head and neck of the thigh-bone; to do so, would be to confound two perfectly different conditions and possibly to substitute the treatment of one, that can be but partially relieved, for another that may be cured by nature, and vastly assisted by art.

Should we be able to examine the diseased structure at this period of time, we should in all probability find one or more cavities containing portions of dead, perhaps detached bone, surrounded with pus, which may or may not have communicated with the cavity of the joint, or possibly with the external surface, by means of a fistulous opening. The cancellated structure of the bone surrounding the cavity appears natural, save that it is much redder and softer than usual; the cavity itself is lined with red vascular granulations; and should the pus corpuscles have been removed, and the blastema have been exhausted, a thin viscorous abnormal pus, consisting principally of a reddish or

brown-red fluid, will be evacuated. This is for the most part the serum of the blood coloured by hæmatine, holding in solution dissolved or broken down corpuscles, the various salts of the bone, and the dead fibrous elements of the same. This material is in fact the active agent in the ulcerative process now going on; so that this action, by the great and exhausting discharge which it produces, even should the disease not spread to the joint, may so debilitate the constitution, and destroy the health of the patient, as to demand our active interference for the removal of the sequestra.

The question which next presents itself is that when the dead bone is removed by ulceration or dissolution, can the cavity again be filled up, consolidated, and become normal bone? From analogy we are bound to expect that it may. When we see the long sequestrum of the shaft of the necrosed bone completely replaced, we apprehend that the process by which it will be accomplished is the same. In the regeneration of bone the pre-formation of cartilage is undoubted, an amorphose cyto-blastema, which is liquid at first, afterwards solid, is yielded by the neighbouring blood-vessels; in this cartilage cells are formed—the original proteine compound of the cyto-blastema is converted into chondrine—by degrees the cartilage corpuscles are enlarged in size and increased in numbers and collected together, take on a peculiar arrangement. From these groups of cells cavities are formed, the future medullary canals, the cancelli and the blood-vessels are developed. The fibrous texture of the intercellular tissue gradually undergoes a change; it becomes ossified by the deposition of the salts of the bone, which constitutes the future osseous lamina, while the organic bases have been converted into common gelatine, having lost the chemical characters of cartilage in the full development of the bone tissues.

From these facts we learn that the unassisted powers of nature are able to cure these diseases of bone; consequently, in all our attempts at relief, we must follow in the footsteps of nature and remove the dead sequestrum as soon as it is loose and completely separated from the living parts. In the first place, however, should we be able rightly to diagnose this disease in its earliest stages, when we find the patient complaining of very severe pain in the trochanter major and the head of the thigh-bone, this pain not being increased upon pressing the surfaces of the joint together, or on considerable motion, or on retraction of the thigh-bone out of the cotyloid cavity, instructing us that neither the synovial membrane, the ligamentous

structures, nor the cartilage were the seat of the disease; while the great inflammatory fever, which this disease always presents, indicating an intense amount of inflammatory action, which neither the cartilages or the ligaments of the joint commonly produce at their first outset. This condition of things clearly indicates the intense sympathetic influence with which the constitution views this affection of the bone; and, should we now make pressure behind the trochanter upon the neck of the diseased bone, the patient will in all probability complain of soreness of the part; if so, we may justly conclude that inflammation of the neck of the thigh-bone has occurred, and will demand a most active treatment to subdue it,—free general and topical bleeding, combined with active purgatives and antimonials, must be employed,—should these means fail and the advent of cold shivering indicate the positive formation of matter and the probable death of a part of the bony structures, we cease to use such active means; now the use of opiates to allay the pain is all that we can expect to accomplish in the present stage of the disease—keeping a sharp look out that the inflammatory action does not extend into the joint; and if it does, by immediately combatting it with the most approved means, we may hope to restrain its extent and the bainful amount of its influence.

Should we be so fortunate as to prevent the complaint from extending into the hip-joint and the further stages of the disease be in due time accomplished, the pus may find its way to the surface, and by means of a probe perhaps we may clearly distinguish the sequestrum, and be assured that it is loose. We must now direct our attention to its removal; this may be done by enlarging the opening in the soft parts either by following the course of the sinuses or making a direct opening into the part, when the dead bone may perhaps be removed with the forceps; or it may be necessary to enlarge the opening in the bone with a sharp chisel before we can get it away; at all events the removal of the dead bone is absolutely required and may be accomplished at almost any risks.

Should it have so happened that, notwithstanding all the means we have used, this diseased action has extended into the joint and matter have formed within the capsular ligament, our first object will be to evacuate the pus, and as soon as we shall have become convinced that there is no chance of saving the joint, our best plan will be to cut down and remove the head and neck of the thigh-bone.

This operation will at once remove the irritation that causes the continuance of the complaint by separating the diseased surfaces of the joint, and it will enable us to remove the sequestrum with facility; after which, by perfect rest and the application of proper support to the limb, in all probability, we may accomplish the formation of a false joint without any great amount of shortening or deformity, and at a great saving of time and irritation to the constitution of our patient.

(To be continued.)

BOOKS RECEIVED FOR REVIEW.

Functional and Sympathetic Affections of the Head.—A Paper read before the Society of Statistical Medicine of New York.—By JOHN W. CORSON, Esq., M.D., late Physician to the Brooklyn City Hospital, and Physician to the New York Dispensary.—Holmes, Gray & Co., corner of Centre and White Streets, New York, 1854.

A well written, and Scientific Paper. We may mention that Dr. Corson was formerly a Student of the Toronto School of Medicine, and bids fair to gain considerable reputation in the city of New York.

REVIEW.

PRINCIPLES OF PHYSIOLOGY, GENERAL AND COMPARATIVE.—By William B. Carpenter, M. D., F. R. S., *Examiner in Physiology and Comparative Anatomy in the University of London: Professor of Medical Jurisprudence in University College, &c., &c.*

(*Continued from No. 3*).

PRIMARY TISSUES OF ANIMALS, CONTINUED.

In the last portion of our review of Mr. Carpenter's beautiful and elaborate work, we ventured to disagree with him when he declares that "new cells originate in plastic or formative material without any direct intervention of pre-existing cells," and we ventured to affirm, that from the nuclei elaborated in the epithelial structures of the lymphatic glands we have an abundant source from whence, not only the cell formations contained within the blood, may have their origin; but we would even now add, that those cells elaborated in all the other structures of the animal frame, both in health and under disease, may proceed from the same source.

In the observations we offered in the previous number, we ventured to point out that the albumen prepared in the alimentary canal, and absorbed in the blood, was the pabulum from which the nucleated epithelium of the lymphatic glands obtained their formative material. In the egg of the chick we have a remarkable illustration of the fact, that in this instance a very large amount of this food is stored up for the use of the cell formations, that are speedily to be called into operation, in the production of the different animal structures of which the bird is composed. This material having been collected and elaborated in the processes of digestion in the human stomach, is absorbed into the blood, and passing into the current of the circulation, is by means of it applied to the perfect nourishment and development of the various cell formations, not only contained within the liquor sanguinis, but operating in other parts of the body. In the egg, before it enters the circulating fluid, nay, within the blood itself, and even when

effused through the blood-vessels during disease, this albumen still continues fluid, and only coagulates at a temperature of 158°; not so with fibrine, arrested comparatively but for a moment in any portion of the circulating system, it immediately begins to coagulate; while effused from the blood-vessels under disease, it rapidly becomes solid, and what is more, can never again enter the circulating system without being re-dissolved: on the contrary, when albumen is poured out into the meshes of the areolar tissue, it may again be readily taken up by the absorbents, and carried into the circulating system. Here plainly exists a marked difference between these two substances. To quote Mr. Carpenter's own words,* "It is evident from these facts, that some peculiar agency must exist within the vessels, by which the elaboration of fibrine from albumen is effected." This point is a great desideratum in physiology—the knowledge from whence the fibrine is derived, as well as the source from which the nuclei of the animal cell developements originate, have lately claimed great attention, and in the observations which we presumed to make in our last notice, it will be observed that we enunciated a fact, which in our humble opinion is perfectly sufficient to explain these points—points which at no distant period we hope to prove by experiments.

It is really curious that a physiologist of Mr. Carpenter's acumen and experience could advocate the possibility of "new cells originating in plastic or formative material without the direct intervention of cell nuclei." In vegetable cell developments the sporule may be easily wafte in the atmosphere, and falling into positions favourable for its re-development, may appear to grow without the visible influence of a nucleus, in such a case these merely escape observation from their minuteness; not so in the animal cell—such a condition could not precede their formation in the mass of the circulating blood, the pre-existence of a nucleus must absolutely exist. It cannot be disputed that a simple cell, exhibiting all the attributes of life "to be born, to grow, to arrive at maturity, to die, and to be decomposed into original elements from which it sprang," exists in this position, are abundantly present in the circulating current; and although it cannot always be shewn that these positively produce their like, still their growth and destruction amply testify to the existence of that condition we call life. It is clear that many animal cells, after they are produced,

*Principles of Human Physiology, Philadelphia, p. 100, 1850.

are applied to particular purposes, and by their growth and development fulfil the purposes for which they were intended; like the epidemic and epithelial cells, for example, their independent condition must plainly point to a nucleated origin, derived from a parentcell; and, although the uses for which they are individually intended are different, and the attributes and destinies various, still we maintain that position and local circumstances are sufficient to produce the variations in character and expression, such as we may constantly observe to happen in the wide ranges of animated existence.

It is, moreover, certain that if the attributes of life are possessed by the simple cell, and it is clear from the observation of these phenomena in their growth and development, that they must differ from the nature of the cell growth, advanced by Archerson, such cells are only artificially produced by a layer of albumen surrounding a globule of fat; such cells as Gluge has justly said are as different from the living products of "vital agency as a corpse is from a living body * * * * such artificial cells are always non-nucleated and undergo no kinds of transformation," and we might add, cannot produce their like. We then think it will be readily granted that the various corpuscles formed in the blood must have a nucleus for their origin, and we are infinitely indebted to Mr. Jones for his researches clearly show that the various corpuscles present in the blood are but the several stages of development of the same nucleus, and point to the fact that we are endeavouring to establish, that from the epithelial cells produced in the lymphatic glands originate the whole series of corpuscles that exists in the sanguineous fluid. These absorbent glandulæ placed either upon the lacteals on the mesentery, or upon lymphatics in other parts of the body, have the same general conformation, and are intended for similar purposes; this purpose has long been hid in inextricable mystery, but which the powers of the microscope are likely to unravel. The lacteals and lymphatic vessels, as single cylindrical canals; accumulate and become enlarged when they reach a gland; are here dilated into larger cavities or cells, forming convolutions, while they are enclosed in a strong fibrous structure, derived from the areolar tissue in their neighbourhood; within this structure, and among the convolutions, are many capillary blood-vessel, but these do not open into the dilated lymphatic cells, they merely ramify upon their coats and nourish the epithelial structure contained within them; as in other glands,

the exosmotic action of the capillary vessel supplies endosmotic material to the glandular structure, it is a curious fact that in no instance can we find that the circulating system in which the blood is contained has any direct communication with the structures it is intended to nourish, further than by transfusion through the coats of the blood-vessels; that in fact the whole circulating system of vessels, to all intents and purposes constitutes a shut-sac, is lined with a serous membrane, this is endowed with a basement membrane and epithelial cell formation. The epithelium lining the lymphatic vessel is minute, flat and scale-like, forming but a single layer upon the basement membrane, but as soon as it enters into the gland it is composed of many spherical nucleated cells, which are easily detected and may be constantly seen floating in chyle.* These form the nuclei of the blood-corpuscles; they are first nourished by the exosmotic matter furnished by the capillary blood-vessel in the gland, but as soon as liberated, their pabulum consists of the albumen absorbed by the lacteals, and appropriated by the endosmotic action of the nucleus, until it becomes developed into the white corpuscle of the blood. This act of appropriation is continued until the whole corpuscle arrives at full maturity—the contents of the cell now consist of a large *nucleus* and an elaborated product, the *fibrine;* and when the white corpuscle has terminated its full period of growth it opens, and sets free both the fibrine and the nucleus. By degrees the nucleus continues by endosmotic action to grow, and is developed into the celli-form nucleus, the red corpuscle of the blood.—These red corpuscles of the blood are believed to be the carriers of oxygen from the lungs to the tissues, and of carbonic acid from the tissues to the lungs, and that the generation of animal heat is mainly dependent upon the copious supply of oxygen, which it is their function to supply, so that, excepting this duty, they have little other direct concern in the functions of nutrition.

Having then indicated the normal development of some of the animal cell formations, let us consider the abnormal; the formation of the pus-corpuscles for example—here we think that a diseased condition of the cells which had previously existed in the blood may be seen; we find two varieties of pus-corpuscles described in *pus bonum et laudabile;* the one is evidently a metamorphosis of the red

*See Mr. Goodsire Anatomical and Pathological Researches, p. 46.

corpuscle of the blood, as shewn by Gluge—the *inflammation corpuscles*, consisting of the red corpuscle which has swelled by endosmosis, and has within it many minute globules of olein, while it has lost its hœmatine by exosmotic action. The true *pus-corpuscle* would appear to be the white corpuscle of the blood, submitted to a similar operation, granular matter, or corpuscles of olein, are certainly present and may clearly be seen; and, if we apply acetic acid to the dense cell wall, we shall discover one or more nuclei contained within this pus-corpuscle. The mode in which the blastema is deposited, from which pus is formed, is almost always by rupture of the capillary and effusion from its coats, or it may exist in the vessels themselves from stasis; at all events, the presence of the blood-corpuscles, both white and red, must clearly be proved. These corpuscles are surrounded by the fibrine and albumen present in the blood—as softening progresses the pus-corpuscles are developed. That these abnormal cells are produced from the normal formation is evident, insomuch that the development of pus ceases as soon as the blastema has become exhausted, and we would set it down as a fact that the pus cells can be formed only from the blood-corpuscles, and their nuclei effused from the blood; while it is also clear that the character of the ingredients effused from the capillary vessels with the corpuscles have considerable influence in the complete development of the pus-corpuscle. Should it happen that the material effused with the blood-corpuscle is not perfectly suitable to the proper growth and development of these cells, then we shall find but degraded and disintegrated cell formations to occur, perhaps mixed with cytoblasts, as in tubercular deposits; and this condition would seem mainly to depend upon a deficiency of fat. So, again, if these materials are too rich in fat, an excessive amount of nourishment is supplied to the same effused blood-corpuscles, so that they gain an enormous size, and take on irregular forms; this is dependent upon local circumstances; these same cells contain a very great number of largely developed nuclei; such are cancer cells, and the abundance of oil would in these cases appear to have considerable influence in this abnormal development. It has been said that these cancer cells may reproduce their like, from the nuclei contained within themselves; in the formation of the nucleated pus-corpuscle, it is certain that reproduction from the nucleus does not take place, nor is it probable that the nuclei of the cancer cell can produce their like. If we are correct in show-

ing that the nuclei were originally intended for a different purpose, the formation of the red corpuscle of the blood, but having experienced a change of their natural habitat, by an inordinal supply of nourishmem, which has produced their abnormal condition, it is not likely that they should subserve to another purpose, such as the re-generation of the cancer cell.

Still further to follow out this subject, did not time and space forbid, we should endeavour to show that the organs of secretion, in which are an abundance of animal cell, such as the epithelial and epidermic cell formations, constituting the coverings of the mucous membrane and of the skin, are also derived from a similar source—the nuclear formations in the blood. The great peculiarity of all these cells is that they contain nuclei; and when we reflect upon the various offices they perform, in which, as organs of excretion, they absorb within themselves the different materials to be removed from the blood, and by bursting pour out the contents into an excretory duct, so that it may be removed from the system—themselves dying and being disintegrated without a chance that the nucleus contained within them shall produce its like—we naturally ask ourselves what is the reason that all these cells contain one or more nuclei? In the epithelial scales these nuclei are most distinct, and are evidently shed with the parent structure, so that it is certain they are not intended for reproduction—whence, then, do these cells obtain their origin, if not by their own reproductive powers, it must be from the capillary blood-vessels, and that these cells are derived from the nuclear structures of the blood, which being deposited in the substance of basement membrane, instead of becoming the nucleated cell, the white corpuscles of the blood, in the new location it is developed into the epithelial or epidermic scale. If we cannot at present perfectly substantiate the fact that the epithelial scales are derived from the nucleus developed in the lymphatic glands, we think that we have said enough to prove that these cells are not reproduced from the nuclei developed within themselves—nay, their general histological progress forbids such a conclusion, but it shall be our duty to reconsider this matter at some future period.

While considering the history of the cell formations in the blood, we maintained that the fibrine of the blood was generated in the white corpuscle; that it was albumen submitted to the operation of cell life, from which it attained a low degree of vitality. It is clear that in the formation of

false membranes, all that exists is fibrine, vitallized, fibrillated fibrine, in which a certain number of capillary vessels exist to afford the fibrous element an amount of moisture, which it absorbs through the coats of the blood-vessels; this is all the nourishment, all the change that occurs in the various fibrous elements of the body during a long period of existence. These fibrous structures are comparatively inorganic, the beautiful basement membranes of the mucous and epidermic structure, form striking examples of their character; while in other instances we find the same material, endowed, apparently, with only physical properties binding together the various structures of the body. The tendons, the ligaments and the strong fibrous membranes, are examples of it; and the properties these structures exhibit, would appear to be entirely dependent upon the mode of their conformation—the way in which these fibres are woven together; thus we have some tense and unyielding, and others again endowed with considerable elasticity. and this appears to be the principal distinctive character between the white and yellow fibrous tissues.

The white fibrous tissues, under the microscope, present the aspect of flattened bands, with numerous longitudinal markings, these must be regarded as an aggregation of the fibrous element; when we attempt to tear them apart from each other, they have a peculiar tendency to fall into undulations, and are perfectly inelastic. The yellow fibrous tissues may be seen in the form of long, single elastic branching filaments with a dark decided border, individually much more distinct than the white, having a tendency to curl, and evidently possessing great elasticity. This structure is constantly present in all parts, requiring strength and elasticity, such as the ligamentum nuchæ, and the vocal cords.

The chemical composition of these two fibrous elements appears to present a considerable difference—the one may be entirely resolved by long boiling, into gelatin or glue, while the other appears to undergo scarcely any change by the same operation. According to Mulder gelatin consists of 13 carbon, 10 hydrogen, 2 nitrogen, and 5 oxygen. The yellow fibrous element is compound, according to Scherer, of 48 carbon, 38 hydrogen, 6 nitrogen, and 16 oxygen. In the living body these tissues are little susceptible of change; still however they require a certain amount of vascularity to preserve them in a moist condition, and to enable them to perform the functions required of them. If their blood-

vessels are destroyed, the fibrous structure dies, and has to be removed from the living body. In the tendons these vessels are very few, in the fibrous membranes and ligaments they are somewhat more numerous; but even here, they seldom admit, in a state of health, of the entrance of the red corpuscle of the blood.

A variety of the fibrous structure is the areolar tissue; it pervades most of the animal body; it is continuous with the fibrous membranes, and would appear to be this same structure greatly expanded by the continuous increase of the body, and afterwards to be distended with the fat cells. It possesses a certain amount of blood-vessels that traverse its structure and permits the escape of a fluid containing the chloride of sodium and albumen into this network of fibres; some are compound of the yellow or elastic kind, but the majority are of the white fibrous tissue. The fluid contained within the meshes of areolar tissue serves to lubricate and moisten the fibrous element, permitting freedom of motion in every direction. This fluid is continually collected by the transparent absorbent vessels carried through the lymphatic glands and poured into the veins, again forming part of the circulating system. In the course through the lymphatic glands, it affords pabulum for the further development of the epithelial structure, which, when passed into the blood-vessel, is eventually to constitute its corpuscular structures. It has been shown that the basement membrane which exists in the skin, in the mucous membranes, in the synovial and all serous membranes, is likewise formed from the fibrous elements; the white and yellow fibrous tissues may be distinguished in them—the latter being peculiarly abundant in the skin and in the lungs, where it is endowed with evident elasticity, while the mucous membranes yield gelatin abundantly upon boiling. This basement membrane is easily distinguished in some parts, especially in the tubuli uriniferi of the kidney; while in the skin it is with difficulty made out. In the serious and synovial membranes this structure is smooth and even, but in the mucus membranes and in the skin, it is vastly extended and uneven, covering the villi and lining the mucous follicles. Immediately under this structure, the basement membrane, we find a collection of areolar tissue; it is of varying thickness in the different tissues; in the skin and mucous membranes, it constitutes the chief thickness of their structures. The blood-vessels, nerves and lymphatics are largely distributed to the basement membrane, and to arrive at it permeate this variety

of areolar tissue; in the serous membranes the capillary blood-vessels that traverse this areolar structure, give out the material, which, transuding through their coats, passes the basement membrane to nourish the epithelial cells, and to supply, the fluid, which is given out into these cavities, as serum in the one instance, or of synovial fluid in the cavities of the joints. In the skin and mucous membranes, the distribution of these capillary vessels in immense loops are collected in the villi, or they line the mucous follicles; in both cases they serve to extend the amount of surface and increase the facility of secretion; all these folds of structure are covered with basement membrane, and layers of epithelial cell formations; while they are supplied by the vascular apparatus with the fluids necessary to their growth, and the perfection of their secretions—these secretions being clearly dependent upon the power of selection inherent in the peculiar variety of cells that conduce to its formation. The nerves are also largely distributed in this structure especially to the skin, endowing it with the necessary sensibility, while the absorbents, and especially the lacteals, are particularly numerous in the mucous membrane of the small intestines; a fact worthy of particular notice is, that in the skin both vascular and tactile palpilla may be found—a certain number of them containing vascular loops, while to others are distributed nerve tubules, ending in oval *corpusculum tactis*.

Another point of great importance, which should not be overlooked in the fibrous elements is, that the fibrous tissue has the peculiar power of combining with calcareous matter which appears to be incorporated in its structure; hence we find it consolidating and forming the shells of the *echinodermita*, while it is frequently found deposited in the fibrous texture of the periosteum, forming by successive layers additions to the surface of the bone. In the dura mater, and in the heart of man, we often find this structure abnormally calcified, while in the carnivora or ruminantia this bony deposit occurs as a natural and necessary formation.

Such also is the case in normal bone; the vessels of the Haversian canals are merely capillaries carrying blood; but the serous fluid of the canaliculi and lacunæ transuded from the blood-vessel, carries the calcareous matter of bone, which is deposited in its fibrous element.

(*To be continued.*)

EDITORIAL DEPARTMENT.

PROCEEDINGS OF THE CANADIAN INSTITUTE.

On Saturday evening, the 7th of January, the proceedings of the Canadian Institute were marked with a considerable amount of interest to the Medical Profession. After the business of the evening had been disposed of, the President, the Honorable Chief Justice Robinson, delivered the annual address to a numerous assembly of the members of the Institute, in which he congratulated them on the very large accessions to their numbers during the past year, and also upon the very prosperous condition of the finances; particularly calling their attention to the erection of a building, which should be commensurate with the growing importance of the Institute, and suitable for all the purposes of the improvement in Science and Literature, which it was the especial aim and intention of the Institute to foster and encourage.

After the President had concluded his very interesting address, Dr. Bovell was called upon to read a paper which he had promised to the members of the Canadian Institute, on the Functions of the Kidney. The Doctor showed that the functions of the kidney were of a two-fold character, and that each function had an apparatus peculiarly adapted to the duty it had to perform; that to the one belonged the secretion and removal of the watery parts of the blood from the system; while to the other was devoted the duty of excreting the effete and useless matter from the blood; that the one carried off the superabundance of the aqueous fluid, while the other purified the blood from the matter, which, if permitted to accumulate, would surely poison the whole system, and perhaps cause the death of the individual. The Doctor made many long extracts and quotations from Carpenter, Golding Bird, and many of the first Physiologists of the day, in which he endeavored to prove that the

opinions entertained by them were erroneous as to the true function of these different structures in the kidney, which were engaged in the operations above alluded to. To our knowledge, at one time, Dr. Bovell, after Bernard, stated that the circulation of blood in the kidney was directly the reverse to the received opinion of the present day. He declared that the emulgent vein carried the impure blood to the kidney, and that the renal artery returned it into the circulation, blood depuriated and freed from the matters intended to be excreted by the kidney;—but in the present address he appears to have considerably modified his ideas upon the subject. To enable his hearers to understand the circulation of blood in the kidney, subservient to the process of secretion and excretion, the Doctor had to explain the minute structure of the kidney; in doing so, he showed that it was a gland of the most elaborate character, and beautiful construction; that the blood was conveyed to the kidney by the renal artery, a vessel of very considerable size, which passed off from the aorta, almost at an acute angle, and entered the fissure of the kidney, where it divided into very many branches; that these branches were subdivided into smaller twigs, and that they eventually become minute capillaries; that the extremities of these capillaries were contorted, convoluted and folded upon themselves, so as to form a kind of ball of blood-vessels, which in anatomical language were called the Malpeghian tufts. That these vascular tufts were each enclosed in an ampullæ or pouch-like portion of the tubuli uriniferi; whether the delicate extremity of this tube was reflected over the tuft as a covering, so that the tuft might be said to be without the tube, at the same time that it completely surrounded it, or whether it actually penetrated the tubuli and was free in its expanded extremity, could not exactly be made out; suffice it to say, that the tuft was completely surrounded by the tubuli uriniferi. In this portion of the tubuli uriniferi, and surrounding the tuft, was located a very considerable development of epithelial cells; these were round or polygonal, and of considerable amount and thickness, immediately around the tuft; and, where the

neck of the tube became narrowed, a certain amount of ciliated epithelium were located in this situation, and when the tubuli uriniferi regained its natural size, layers of pavement epithelium covered its internal surface. It had long been maintained by Physiologists that this structure secreted the fluid parts of the blood, but it was the opinion of Dr. Bovell that they were mistaken, and that this beautiful apparatus was intended to excrete the solid matter of the urine, the urea, the creatine, and creatinine, &c.; that these matters were selected by the polygonal epithelial cells from the arterial blood contained in the convoluted capillaries of the tufts, and that they had the power of absorbing their matters into these structures from the blood-vessels by endosmotic action; that as soon as each individual cell had done its duty it opened and permitted its contents to flow out, and that those excretions were prevented from accumulating in the neck of the sac by the beautiful ciliated epithelium, whose constant and independent movement continually directed it down the course of the tube, until it was finally emptied into the expanded tubuli uriniferi, to be poured out of the system with the watery parts of the urine. Having shown that there was an afferent vessel going to the tuft, he also explained that there was an efferent vessel going from it, and that this efferent vessel was to all intents and purposes a capillary vein; that it joined the large plexus of veins that surrounded the blind extremities and bodies of the tubuli uriniferi. These portions of the tubuli uriniferi are of considerable size, of infinite tenuity, and are covered on the inside with a layer of most delicate pavement epithelium; around this delicate structure and to this part the large plexus of veins is freely distributed, and pours out the thin and watery parts of the blood by exosmotic action, which passes rapidly through the coats of the tubuli uriniferi by endosmosis, and descending the tubular portion of the kidney, meets with matter excreted by the tufts, and with it is poured out into the ureter, to be removed from the system. The ready secretion of the watery parts of the urine is readily affected by this apparatus, so that when the blood becomes

too full of water, a stasis or ramora occurs in the emulgent vein. Blood flows backwards from the vena cava, and distends the venous plexus which surrounds the tubuli uriniferi; it passes by these means into the tubuli uriniferi, and is often poured with great velocity out of the system. Dr. Bovell also maintained, that there was a direct route from the veins of the mesentery, through the portal system, to the vena cava, which was able to account for the speedy manner in which the urine was often excreted; and that there was a peculiar arrangement of muscular fibres in the structure of the vena cava, at the point from which the emulgent veins were given off, that facilitated the direction of the blood into the emulgent vein, and assisted in this peculiar ramora of the blood.

At the termination of Dr. Bovell's learned disquisition, which, for want of time, was scarcely more than epitome of the paper he had industriously collated, and which it is impossible for us to do full justice to in so short a space, Dr. Richardson asked Dr. Bovell how he accounted for the rapid excretion in the urine of the chloride of sodium after it had been injected into the mesenteric vein. As there was evidently not sufficient time left to enter into any arguments upon the subject, from the late hour of the evening, it was resolved to postpone the discussion of the subject until Thursday evening; when it was agreed that the Medical members of the Institute should meet, the paper should be again read, and its merits discussed. Such we believe was the case, but we were unfortunately not able to attend, and therefore cannot give the particulars of the meeting.

It was suggested by some of the members of the Institute, that it would be well to divide the meetings of the Institute into classes, and that one of these classes should constitute the chemical and medical department; that such individuals as belonged to, or took an interest in these sciences, should have separate meetings for the discussion of such subjects as belonged to their department; that the sittings should be continued through the summer, when the meetings would in all probability bring together the Medical

gentlemen of this city, and enable them to know each other; while, perhaps, the influence of science might serve to rub down some of those crude asperities of feeling that so unhappily exists among them,—we hail it as a step in the right direction, and should be delighted to see it accomplished.

With respect to Dr. Bovell's paper, we think it an improvement in the Physiological knowledge of the functions of the kidney, and believe that his ideas are correct, for the following reasons:—1st. That the size of the emulgent vein is out of proportion to that of the artery, and much larger than would be required to return the blood of that vessel, especially after a free elemination of water from its coats. 2nd. That the size of the emulgent vein clearly favors the occasional regurgitation of blood from the vena cava to the plexus in the kidney, which are situated around the tubuli uriniferi, and may rapidly pour the fluid parts of the blood into the tubuli without traversing the renal artery. 3rd. From the location of the kidnies, and the passage of the emulgent veins, almost at an acute angle from the vena cava, so that they are nearly horizontal, particularly favoring this ramora of the venous blood in the kidney. 4th. That the casts of the tubuli uriniferi that are shed in the urine have, for the most part, the bluff termination of the blind sac of these structures—and that we have never seen a cast of the bulbous extremity of these tubes. 5th. The pavement epithelium which lines these casts are intended only as a natural organic defence to the basement membrane, and are not designed as secretory organs—which has been assigned to them as a function. 6th. We have often seen abundance of the flat epithelium in the microscopic examinations of the urine, but never have observed the ciliated variety above mentioned; consequently do not think that they are shed under disease.

A fact that should be remembered is, that the left spermatic vein enters into the left emulgent vein, so also the veins from the capsula renalies, and sometimes even a lumber vein; this would at first sight appear to be an objection to the idea of a ramora of the blood in the emul-

gent veins, and it should be a point of observation, whether the left testicle is particularly subject to disease of the veins, when the left kidney is labouring under any complaint.

TO THE MEDICAL PROFESSION OF CANADA WEST.

The absolute necessity that exists for the incorporation of the Medical Profession of Canada West, has induced us to address a Letter to the Honorable J. Rolph, the President of Her Majesty's Executive Council in Canada, on the subject, in which we have endeavoured to set forth the reasons that should induce him to take this matter in hand,—make a Government question of it;—and endeavour to obtain that justice for the Medical Profession of this section of the Province which has been so long denied it.

A terrible example of the want of confidence of the Medical Profession, in the public generally, came to our knowledge a short time since; we will not mention the names, or the locality where it happened.—A wealthy mechanic, who had lived in the place some eight or ten months, had the misfortune to have his wife in a state of great danger, from a miscarriage; suddenly in the middle of a cold night, he was called upon to seek Medical assistance, he called at the house of six or eight Practitioners, and every one of them refused to go with him, because he was not known to them. A nurse had to officiate, and, fortunately, the woman did well. The shameful way in which the Medical Profession is constantly treated by a very large portion of the public, who omit to remunerate them for their services is, doubtless, the cause of this want of confidence. Then, again, we continually see the "Quack" preferred to the regular Practioner; a certain proof of a reciprocal want of confidence; it must be obvious to all, that this is a state of things, alike adverse to the good of the public, and detrimental to the interest of the Profession, and it loudly demands a speedy change.

[We shall publish the Letter and the Reply in our next.]

SELECTED MATTER.

CLINICAL LECTURE

ON THE PATHOLOGY AND TREATMENT OF THE DISEASES OF THE SCALP, POPULARLY KNOWN BY THE NAME OF RINGWORM, DELIVERED AT UNIVERSITY COLLEGE HOSPITAL. BY WILLIAM JENNER, M. D., F. R. C. P., PROFESSOR OF PATHOLOGICAL ANATOMY, UNIVERSITY COLLEGE; PHYSICIAN TO THE HOSPITAL FOR SICK CHILDREN, ETC.

Frequency of Scalp Diseases. Signification of the word "Ringworm." Definition of the Genus Tinea. General description of its Four Species: Tinea Favosa, Tinea Tonsurans, Tinea Decalvans, Tinea Sycosa. Characters of, and situations occupied by, the Parasitic Plants found connected with the Hairs in these Species. Synonyms. Etiological relation of the Parasite to the Disease. General principles of Treatment. Parasiticides. The use of Sulphurous Acid illustrated by its effects in the Tinea Decalvans. Aphthæ. Case of Tinea Favosa.

GENTLEMEN,—Such of you as have attended in the out-patient's room, are aware that diseases of the skin are among the most common of those we have there to treat: and of skin diseases, that those affecting the scalp come, perhaps, the most frequently under our notice. I have observed that students, and even young practitioners, are often extremely puzzled to diagnose these diseases of the scalp. This difficulty is partly due to the resemblance of some of them to each other, and partly to the fact, that, while some writers have given the same name to different things, others have given different names to the same thing.

Several of these scalp affections are popularly called "ringworm:" and you must have many times observed the anxiety with which the mother asks whether her child has the ringworm. The cause of her anxiety is, that she understands by the term she employs, a very obstinate and a very contagious disease.

To-day I propose to consider certain of those diseases of the scalp which bear a highly important pathological, etiological and therapeutical relation to each other, although they differ very greatly in their readily recognisable physical characters. I shall show you several cases of these diseases, and read you the notes of one case which left the hospital a short time since, and shall speak of their treatment as illustrated by two of these cases.

You are aware, that on the mucous membrane of the mouth, in one form of the disease termed aphthæ, microscopical parasitic plants are developed in enormous quantity: and that, in the stomach, not uncommon vegetable growths are sarcinæ Goodsirii and torulæ cerevisiæ.

It has been shown, that parasitic plants are also sometimes developed on the skin and its appendages: and in several scalp affections to which the popular name of ringworm has been especially applied (because they are obstinate and contagious diseases, having a tendency to spread in circles), these parasitic vegetables are found in or around the hairs.

What is popularly meant by ringworm was by some of the older writers on skin diseases expressed by the word tinea: but the technical name being found, as our knowledge advanced, to have no definite signification, gradually fell into disuse.

It has been recently proposed to employ this word tinea again, and to give to it a precise signification. Under the generic name tinea it is proposed to include* all diseases of the hairs produced, kept up, or attended, by the development of parasitic plants.

* "Bazin Recherches de la Nature et le Traitement des Teignes"

In this genus are included the following species:

Tinea favosa.
Tinea tonsurans.
Tinea decalvans.
Tinea sycosa.

It is to this genus tinea, and to these species of that genus, that I desire to-day especially to call your attention; and I am confident that if you remember the names of the species of tinea I have just repeated, if you learn what I am about to tell you of these species, and observe well the things I shall presently show you, the remaining and more common diseases of the scalp will be mastered in a very few hours spent in the out-patients' room.

I shall now, then, briefly enumerate the characters of each of these four species of the genus tinea.

Tinea Favosa.—The man Hyman Jacobs, who recently left Ward 4, was suffering on his admission from tinea favosa. Just call to mind the appearance of that man's scalp, trunk and extremities, and you will the more readily follow my general description, because in all points the eruption in his case was a type of the disease. This wax model, from the college museum, and these plates of Mr. Wilson, will also assist you in following me.

Tinea favosa most commonly affects the hairy scalp, but now and then it is found on other parts of the surface. It is characterised by thick, dry, yellow crusts, which, if small, are circular in outline and depressed in the centre, cup shaped. Passing through the centre of each of these crusts is a hair. Crusts of this kind were present on the trunk and extremities of the man Jacobs; some of the crusts were extremely small; the largest had a diameter of one-third of an inch. The larger of the circular crusts often appear as though made up of concentric rings, alternately yellow and brown in colour. They were so in the case just referred to.

If the crusts are very large, as they were on Jacobs' scalp, they have an irregular shape; but still they indicate their origin from distinct centres by the semicircular outline of the masses which project from their margin. These larger, irregularly-shaped crusts, are pitted on the surface, and from their fancied resemblance to the cut surface of a piece of honeycomb, the disease has received the name of favus.

The margin of the large crusts rises considerably above the level of the cutis; internally, they seem as though half buried in the substance of the cutis. Carefully detach the crusts from the cutis, and a distinct layer of epithelium is found below them: examine the surface of the smaller crusts, and you find a layer of epithelium cover them.

The hair, at an early period of the disease, can be pulled out from the centre of each little crust with great facility; subsequently it falls off from the diseased parts, and permanent baldness results. We have an example of this in the girl Lewis, whom you must have repeatedly seen in the out-patient's room.

The crusts, then, of tinea favosa are remarkable for their thickness, dryness, brittleness, and depressed centre. Tinea favosa is not a pustular disease, but it is said, by those who have seen much of it (it is a rare disease in London), to be often consecutive to eczema, impetigo, chronic lichen, and herpes circinatus; pustules are sometimes formed subsequently to the tinea favosa, in consequence of the inflammation excited by the crusts, and the injury inflicted on the scalp by scratching.

That tinea favosa is contagious, was placed beyond doubt by Remak. He found a crust removed from a patient suffering from this disease on to his own arm; after a few days, the crust and bandage came off, and there was no appearance of any effect having been produced. But, fourteen days after, he felt the part itch, and in a short time, a crust of tinea favosa formed on the spot. Tinea favosa is said to occur chiefly in the scrofulous, those mentally weak, and those in bad health. Jacobs was certainly neither scrofulous nor mentally weak, and his health was excellent.

Tinea Tonsurans is often mistaken for herpes circinatus of the scalp, with

which it is now and then conjoined. It is characterised by pallor, decolorization and brittleness of the hairs, and the presence of thin white powdery scales around the base of the hairs, and on the skin between them. The diseased hairs have been likened to "tow." "They are," Mr. Wilson says, "remarkable for their bent and twisted shape, and resemblance to the fibres of hemp in colour and apparent texture." Their brittleness is sometimes such, that every hair on the affected spot is broken off just above the surface of the skin. This appearance is well seen in the girl who is now going round the room for you to inspect; while the decolorization of the hair is equally well seen in the boy. Observe, that the diseased patches are circular in both children. It is only when torn by the nails of the patient, so as to be made to bleed, or when, from neglect, or the application of topical irritants, they inflame, that crusts are formed on the patches of tinea tonsurans.

In *Tinea Decalvans* the hair falls out rapidly from one or more circular spots leaving a smooth bald surface. There is no eruption of any kind—no crusts, no scales.

This little girl affords a good illustration of the disease. Observe, here is a small, circular, smooth, bald spot, here a larger one, while here is a very large, irregularly-shaped, bald surface; but note the outline of the latter, and you will see from its scalloped edges, the tendency of the disease to spread in circles manifested. The rapidity with which the hair comes off the head in this disease is often singularly great. The first bald patch on this girl's head was observed by her mother about six months since; but it is only lately that the disease has spread much, and now you see nearly half her scalp is uncovered by hair.

Tinea Sycosa is characterised by inflammation of the hair follicles. Sometimes the inflammation leads only to the effusion of serosity, and the exudation of lymph around and into the capsule of the hair. At other times, and more commonly, pus is formed, and then, when the pustule breaks, a brownish scab is formed on the surface. The usual seat of tinea sycosa is the chin, upper lip and sides of the cheek. I had a case lately under my care in which the pustules occupied the inner surface of the nares—that part from which the hairs spring that protect the orifice of the nose. Tinea sycosa rarely occurs on the scalp, and it does not spread circularly; so far as I know, the name of ringworm has never been applied to it. I mention it to you, although I have no example of it among my patients to show you, because of its relation to the species of tinea of which we have examples before us.

You will have remarked, then, from the characters of the species of tinea I have mentioned, that—

Tinea favosa is especially characterised by its crusts.

Tinea tonsurans is especially characterised by decolorization and brittleness of the hair.

Tinea decalvans is especially characterised by baldness, not preceded or accompanied by an eruption.

Tinea sycosa is especially characterised by inflammation, tenderness, hardness, and suppuration of the hair follicles.

I told you that these diseases are arranged together in one genus, because in all a parasitic plant is developed in connexion with the hairs. Now, the plant present is different for each species of tinea; and the situation occupied by the parasite is also different in each species of that genus.

In tinea favosa, the parasite is the *achorion Schönleinii*. This plant has mycelium, sporule-bearing branches and sporules. The sporules are round or oval, and their diameter varies, according to Gruby, from 0.003 mm. to 0.01 mm.

The vegetable growth is first perceptible between the layers of the epithelium, just at the orifice of the hair follicle; from this point it may spread downwards between the hair and its capsule, and upwards around and in the substance even of the hair.

Such of you as visited Ward 4 during the time Jacobs was in the hospital, had frequent opportunities of seeing the mycelium, the sporule-bearing

branches, and the sporules of the *anchorion Schönleinii*. You will recognise it in these very excellent drawings of Robin.

In tinea tonsurans, the parasite is the *trichophyton tonsurans*. This plant is composed of spores only; the spores, however, are occasionally somewhat elongated and arranged in a linear series. They are round or oval, and their diameter varies from 0.003 mm. to 0.01 mm.

The primary seat of the trichophyton tonsurans is the root of the hair; subsequently, it extends up into the substance of the hair, and even outwards, according to Bazin, on to the skin between the hairs. I have under the microscope some hairs removed from the head of one of these children. You will see in one specimen the spores in the hair follicle; and, in another, the hair split up with the spores among the fibres, as figured in this plate by Bazin, and in this more highly magnified drawing by Robin.

In tinea decalvans, the parasitic vegetable is the *microsporon Audouini*. This plant is formed of branched filaments, on which the spores are developed. The spores are very small—from 0.001 mm. to 0.005 mm. The seat of the growth is the outside of the hair; it forms a sort of sheath around the hair, from the surface of the skin upwards, from 1 mm. to 3 mm. Gruby first described this plant and its relation to tinea decalvans; and Robin says, he can confirm the accuracy of Gruby's description.

In tinea sycosa, the parasite is the *microsporon mentagrophytes*. It is also composed of filaments and spores; but the spores are larger, and the filaments broader, than those of microsporon Audouini.

The seat of the growth is the hair follicle between the hair and the capsule.

I have told you the names I would have you employ to signify the diseases I have described and demonstrated to you; but you ought also to know the names employed by the writers on skin diseases most popular in this country, to signify the same things.

Tinea favosa, then, is called porrigo favosa by Willan and Bateman; favus by Dr. A. T. Thompson, Simon, and many other writers.

Tinea tonsurans is called porrigo scutulata by Willan, Bateman, and Dr. A. T. Thomson; herpes tonsurans, by Cazenave; and trichinosis furfuracea by Mr. Wilson.

Tinea decalvans is called porrigo decalvans by Willan and Bateman; vitiligo of the hairy scalp by Cazenave.

Tinea sycosa is called mentagra by Willan and Bateman; sycosis by Mr. Wilson.

As to the etiological relation of the parasite to the disease, it appears, that the spores of the vegetable growth require for their development a peculiar soil. I say so, because all persons who mix with children suffering from tinea do not have the diseases. But if a soil highly favourable to their growth exists, then a spore having found its way on to that soil developes itself, forms other spores, and so the parasite spreads over the surface of the individual more or less rapidly, according to the more or less favourable nature of the soil.

You will observe, however, that the abnormity of the secretion necessary for the development of these spores is not appreciable by our senses, nor by the sensations of the patient, for Remak did not know, when he applied the favus crust to his own arm, that his skin was not in all respects healthy; nor was he aware, when he removed the crust, that the secretions of his hair-follicles differed from those of the most healthy individual; and it was not till a fortnight after, that he was conscious that his arm was diseased. This experiment of Remak, then, proves, that a secretion in which these parasites can grow may be formed by the hair-follicles, and the patient believe himself to be in perfect health, not only generally, but even so far as concerns his skin; and that it is only when the parasite has developed in its secretion, that what we call the disease begins; then it is that the growth of the hair is impeded, that it is altered in colour and in intimate structure, that ultimately the hair falls out, and the hair-forming apparatus is so far damaged by the foreign body, that it fails to construct even imperfect hairs, and baldness results.

It would appear, from the fact of a large number of children whose scalps are supposed to be healthy, suffering from tinea tonsurans, when placed in situations where the spores of microphyton tonsurans are floating in the atmosphere, that many persons, whose scalps are considered healthy, have in their hair-follicles a secretion suited to be the nidus of this plant.

The patient suffering from tinea comes under our care for the perceptible disease, and will be well contented if we can cure him of that: but it would be better if we could also destroy the susceptibility to the disease,—if we could bring the hair-follicles into a state in which they no longer secrete a nidus in which the plant can grow.

Strumous and weakly children, especially if dirty in their persons, are more frequently than others the subjects of tinea; therefore it has been inferred, that struma, debility and dirt favour the formation of the secretion in question. In the treatment of tinea, then, we strive to enforce personal cleanliness, to strengthen the patient and improve his general health, and *to destroy the parasite.* As to the first and second objects, they are to be effected by attention to hygienic rules, ablution, air, exercise and diet; tonic medicine and cod-liver oil especially are in some cases useful. But you may kill the parasite in all cases, and in many cases cure the disease, by topical applications alone. Agents, the effect of which is to destroy directly the parasite are called "parasiticides." Several agents having such an action have been brought before the profession. Some physicians use a solution of corrosive sublimate. Acetate of copper has been also employed; but these agents are not sufficiently powerful parasiticides for the small quantity of them that finds its way into the hair-follicles to kill the growths occupying that situation. Therefore Bazin, who is one of the great advocates of their employment, with the especial object in view of killing the parasite and not modifying the secretion, says, that it is essential for their efficient action that epilation be performed: that is, that the hairs be forcibly removed from the affected parts. He says, that only two or three hairs should be taken hold of by the pincers at the same moment; and that, if this rule be observed, and diseased hairs alone be operated on, the patient suffers no pain from what seems on paper a very terrible operation. From the details of two cases I am about to give, you will observe that it is highly probable that if sulphurous acid be employed as a parasiticide, epilation will be found to be altogether unnecessary to its complete action. This agent was first introduced to the notice of the medical officers of the hospital by Professor Graham, as a possible remedy for cholera, at the time that disease was said to have its origin in the presence of an entophyte in the intestinal canal. It was first employed by myself to check fermentation, and to destroy the torulæ cerevisiæ and sarcinæ Goodsirii.* When lecturing on this subject, some time since,† I expressed myself thus: "Considerable benefit may be anticipated from the employment of sulphurous acid in all diseases attended with the employment of parasitic plants. I would especially mention porrigo."

The case I am about to read to you, of Hyman Jacobs, proves, that, in regard of tinea (porrigo) favosa, these anticipations have been fully realised, while the case of the girl now in the room, and who is still under treatment, renders it highly probable that the beneficial effects of this parasiticide will be as manifest in tinea decalvans as they are in tinea favosa.‡

In some forms of thrush, too, I may mention that it acts most rapidly, on application of a solution of sulphite of soda (a drachm to an ounce of water) sufficing to remove the disease from the mucous membrane of the mouth in

* Several medical men have lately administered the hyposulphite of soda, instead of the sulphite; but the latter is the preferable salt, and for this reason, that when the hyposulphite is decomposed by the hydrochloric acid of the gastric juice, not only is sulphurous acid generated, but sulphur is precipitated,—a substance it is very undesirable to have in the stomach in some of these cases.

† *Medical Times and Gazette*, August, 1851.

‡ This case of tinea decalvans has continued to progress most favourably. No hair has fallen out since the first application of the acid, and hair well formed and of good colour is replacing the little down that scantily covered some of the patches; while on other patches which were absolutely smooth hairs are springing up.

twenty-four hours. The secretions of the mouth being acid, the salt is decomposed, and the sulphurous acid is set free; in this, as in all other cases, the sulphurous acid is the active agent in the destruction of the parasite.

Hyman Jacobs, aged 27 years, a Jew pedlar, a native of Amsterdam, and resident in London fifteen months, was admitted into the hospital on March 21, 1853.

He was, as most of you must remember, a man of cheerful disposition, dark complexion, rather short, muscular, moderately stout; in fact, he looked generally in robust health. His habits were those of his class; he slept in the low common lodging-houses, fared badly, rarely eating meat, and judging from his appearance, was not very cleanly in his person.

He affirmed, and I believed him, that he was temperate in regard of the use of alcoholic liquor. His general health, he said, had always been good.

The scalp affection was of nine years' duration at the time he came into the hospital. He had been in many hospitals, but had never derived any marked benefit from treatment. When Jacobs came under observation, his condition was as follows:

Cerebral, circulatory, respiratory and digestive functions healthy in all particulars.

The whole of the scalp, excepting the margin, was covered with the crusts of tinea favosa. The largest crusts were of a greyish yellow colour, of the consistence of dried putty or mortar, and brittle. Their thickness generally was considerable. Where thickest, the surface of the crust was below the level of the cutis; so that it looked, at the first glance, as if the latter had been partially destroyed by ulceration. The surface of these crusts was very irregular; it had a pitted, worm-eaten, or eroded appearance. At the edge of the large, irregularly-shaped crusts, were many small circular crusts, depressed in the centre. A hair passed through the centre of each of these small crusts. When the crusts were forcibly detached from the scalp by mechanical means, the exposed surface of the cutis was very red and raw.

The head itched much; and, though scratching gave considerable pain, it was evident, from the traces of blood on the surface, that he had been applying his nails to the part.

The odour of the head was very offensive, something like that emitted by mice, only, as one of you remarked at the time, sweeter and more nauseous. Scattered over the trunk and extremities were a very large number of circular tinea crusts. There were as many as forty on the back alone. The smallest of these appeared, when seen through a lens, to be constituted thus: in the centre was a hair, around and touching that a brownish-yellow crust, and around that again a dusky-red halo; the diameter of the whole not exceeding two-thirds of a line. On the back no crust was more than one-fourth of an inch in diameter; on the leg there was one-third of an inch in diameter. These crusts were circular, raised about a line above the level of the cutis, hard, dry, and appeared as though made up of concentric rings of pale, greyish-yellow and brown colours alternating. The surface of these crusts was readily detached, and then a cup-shaped cavity was exposed, filled with a brimstone-yellow powder. The base of the crust being removed, the surface of the cutis, from which it had been detached, was raw.

We saw, you may remember, the mycelium, sporule bearing branches, and sporules of the achorion Schönleinii, when portions of the crusts, or of the yellow powder, were placed under the microscope.

No treatment was adopted for some time after the man's admission. On April 6th his state was exactly the same as when he entered the hospital. 'Rags, wet with a solution of sulphurous acid, were now ordered to be kept constantly on the scalp; the head to be covered with an oil-silk cap.

On April 18th, large quantities of the crust had separated from the scalp, but those remained attached had entirely lost their yellow hue; they were of a *dirty-brown colour*. All itching of the scalp ceased shortly after the application of the sulphurous acid. No sulphurous acid had been applied to the crusts on the trunk and extremities, and they had still the characters they presented on the man's admission into the hospital.

A piece of lint, wet with sulphurous acid lotion, was applied to one of the largest crusts on the leg.

On the 22nd April a mere trace of the favus crust remained on the scalp: but the surface of the cutis was red, and there was an inflamed papula near the vertex. Thinking this condition might be partly due to the acid, which was a very strong solution, I ordered its use to be discontinued for twenty-four hours. The crust on the leg to which the sulphurous acid was applied on the 19th, had separated; the exposed surface was red, but not raw. *Two favus crusts which were seated in the vicinity of that to which the acid was applied on the 19th, were observed to be turning brown; subsequently they dropped off spontaneously.* The effect of the sulphurous acid gas on these two patches is of great interest, as illustrating the mode of action of the solution. The crusts on the scalp turned brown shortly after the acid was applied to them and before they separated from the cutis.

On the 29th April the lotion was discontinued, and zinc ointment applied to the scalp.

On May 2nd the head was free from crusts, but the scalp was still red, and several inflamed papulæ were seated on it.

On May 9th the skin of the scalp was here and there more natural in hue, and one or two papulæ had suppurated; the pus was healthy in appearance, and there was no trace of the parasitic plant to be detected by the microscope.

On the 18th the head continued free from favus; the scalp was much less red; the hair was growing. As the crusts on the trunk and extremities were still in the same state as on the patient's admission into the hospital, he was immersed about nine in the evening, for half an hour, in a full-sized tepid bath, containing sixteen ounces of saturated solution of sulphurous acid; no friction was employed. During the night all the crusts save three fell from the surface.

On the 20th he was again immersed in the acid bath, and the next day no trace of a crust was to be found on the trunk or extremities. My notes say: "No fresh crusts on head; a small pustule occasionally appears and dries up in two or three days, and then disappears entirely; the skin of the head generally is much paler and more healthy in aspect."

31st.—The scalp was still paler than at the previous report. There were only two small pustules on the scalp. By the microscope, no trace of the parasite could be detected. The skin generally appeared healthy; and, on June 2nd, Jacobs left the hospital at his own desire to return to Holland.

I cannot conclude without expressing my confident belief, that a very great advance was made in pathology when the vegetable nature of the diseases I have to-day referred to, as well as of some others, was demonstrated; and my equally confident belief, that the foundation for a very great advance in therapeutics was laid when Professor Graham introduced to notice the power of sulphurous acid to destroy vegetable life, and explained how it could be given internally without injury to the patient.

NOTE.—The solution of sulphurous acid I have used is made by passing a stream of the gas through water till the latter is saturated. Of this saturated solution, two ounces may be added to six ounces of water to make the lotion.—*London Lancet, December* 1853.

Analytical Examination of all the Cases Admitted, during Sixteen Years, at the Small-pox and Vaccination Hospital, London; with a view to Illustrate the Pathology of Small-pox, and the Protective Influence of Vaccination. By J. F. MARSON, Resident Surgeon to the Small-pox and Vaccination Hospital, London.

During the period comprised within this analysis, small-pox had been epidemic four times—in 1838, 1844, 1848, 1851; and rather more than half

of the patients admitted into the hospital had been previously vaccinated. The analysis referred principally to the following points:—

I. Natural small-pox.
II. Small-pox after small-pox.
  a. After natural small-pox
  b. After inoculation.
III. Small-pox after vaccination.
  a. Number of cicatrices.
  b. Character of cicatrices.
  c. Vaccinated, but without cicatrices.
IV. Febrile eruptive diseases mistaken for small-pox.

A remarkable difference was observed between the vaccinated and unvaccinated patients, and also between the vaccinated cases themselves; some patients having the small-pox in a mild form, wholly devoid of danger, whilst others had it in great severity, scarcely, if at all, lessened by the previous vaccination. The author thought that the causes of this remarkable difference might be sought for among the antecedents in respect to the vaccination of each individual admitted, with a view to explain the extreme mildness of some cases,—the danger, unmitigated course, and even death, of others. Small-pox, in the unprotected, remains as virulent as it ever was. Vaccination, when performed in infancy, affords almost complete security against the fatality of small-pox, up to the period of puberty; and the general experience of the Small-pox Hospital shows that small-pox did not usually occur after vaccination, until several years had elapsed. The most trustworthy evidence of the perfection of vaccination was to be obtained from the cicatrices.

The analytical series consisted of six tables. Observations on the results accompanied each table; and it appeared that 3,094 patients with small-pox reported themselves to have been vaccinated at some period of their lives 1,357 had one vaccine cicatrix; and of these, four and a quarter per cent died with a good cicatrix, and twelve per cent. with an indifferent cicatrix: mean, seven and a half per cent. and a fraction 588 had cicatrices, two and a half per cent. died with good cicatrices. Mean mortality, four per cent. and a fraction. 274 patients had three cicatrices. Average mortality, one and three quarters. 268 patients had four cicatrices; and there died with good cicatrices under one per cent.; with indifferent cicatrices, none, the average being only three-fourths of one per cent. The author described a good vaccine cicatrix as distinct, foveated, dotted, or indented, in some instances radiated, and having a well, or tolerably well, defined edge: an indifferent cicatrix as indistinct, smooth, without indentation, and with an irregular edge. The author's opportunities of examining the foreigners admitted with small-pox at the hospital, and comparing them with each other, and with the same class of persons in this country, had led him to the conclusion that vaccination was performed in the best manner generally by the Danes, Swedes, Norwegians, and Germans. Then came the Italians; and, from the few he had seen, the Spaniards; then the Scotch; then the Irish; and, lastly, the English and French. There must exist some grave and lamentable evils (more especially affecting the humbler classes) connected with the circumstances under which vaccination in country districts was performed. There could be no justifiable reason why the rural inhabitants of England and Wales should be less well vaccinated than the rural inhabitants of Denmark, Sweden, and Prussia. The mortality, severe as it was between the indifferently and well vaccinated, was not the only evil result of bad vaccination. Proportionate to the mortality was the severity of the disease; and, to those who escaped death, there was damaged health, disfigurement for life perhaps, and undeserved discredit was brought on vaccination. Great judgment and caution should be exercised in the selection of vaccine lymph. Lymph for use was in its best state on the seventh day of the progress of the vesicle, the day week from the vaccination.

The author's conclusions were—

1st. That natural small-pox destroyed about one-third of all whom it attacked.

2nd. That small-pox after small-pox was of comparatively rare occurrence; that a second attack of natural small-pox was rare, but not often fatal, and that protection seemed to be the law. That after inoculated small-pox, an attack of small-pox had more frequently led to fatal results; but there is reason to presume that the virus used for inoculation—like a great deal of the lymph used at the present day for vaccination—was often taken at too advanced a period of the disease, and thus did not afford the full measure of protection it was capable of affording if taken at a proper time.

3rd. That vaccination performed in infancy afforded almost complete protection against the fatality of small-pox, to the period of puberty; that a variety of circumstances conspired to make it almost impossible to ascertain exactly in what proportion to the vaccinated cases of small pox subsequently occurred, or might occur, if all persons lived to an advanced age.

4th. That, as a matter of safety, it would be well for all persons who were vaccinated in infancy to be revaccinated at puberty; this measure being more especially requisite for those who were either indifferently or doubtfully vaccinated in infancy, and still more necessary for those who, though vaccinated, had no cicatrix remaining. Finally, as a matter of precaution, it would be desirable that all persons should be re-vaccinated, on small-pox existing in the house where they were residing.

Mr. Streeter would suggest the necessity of attending to the health of the skin before vaccination was performed. He believed that the exhausted state of the skin in tropical climates was one cause of the imperfect vaccination in them. About thirty years ago, in the practice with which he was connected, out of more than a hundred children who had been vaccinated, not one half returned to show the arm and the effects of the operation. He had only seen one fatal case of small-pox after vaccination, on the fifth day. He alluded to one source of danger in cases of small pox—namely, a profuse flow of the catamenia, which occasionally occurred in the secondary fever.

Dr. Webster entirely concurred with the opinion stated, respecting the great fatality of small-pox among young people compared with those in more advanced life. For instance, during 1847, when upwards of 4,200 persons died by variola throughout England and Wales, more than three-fourths were under five years of age—the sexes being equally divided; while very few had passed their forty-fifth year. Again, the fact that death very rarely occurred in cases where the individual had been properly vaccinated in three or four places at the same time, was likewise most important, and showed, if the system was once properly imbued with true vaccine virus, little danger of the subsequent small-pox need be apprehended. In his (Dr. Webster's opinion, many of the deaths reported from variola, after cow-pox, occurred where the party never had been correctly vaccinated, especially throughout rural districts and country towns, where numbers remain unprotected, owing to the prejudices prevailing in ignorant minds against vaccination, who obstinately object to the operation, "as an impious attempt to arrest the will of the Almighty."

Dr. Chowne, having been a frequent visitor at the Small-pox Hospital, could corroborate many of the statements made in the paper. The fact mentioned in the paper, of the number of persons affected with small-pox after vaccination in the country, was most important. The failure of vaccination in country districts was most lamentable; but it was not the fault of the practitioners—it was the fault of the Boards of Guardians, of the Government, by whom no efficient arrangements for vaccination were made, and consequently thousands lost their lives.

Mr. Marson said that, much of his paper being tabular, it could not be heard before the Society. He wished, however, just briefly to allude to the number and quality of cicatrices. The difference observed was remarkable.

Thus, amongst the persons who had only been vaccinated in one place, and the cicatrix was imperfect, twenty per cent. took the small-pox; whereas, when there were four cicatrices, and these were good, the number who took small-pox after vaccination was only one per cent. The medical public had relied upon the circumstance of Jenner having at one time vaccinated in only one place: but he (Mr. Marson) knew that Jenner did not confine himself to one, for he had seen a patient whom Jenner had vaccinated in 1806, and the person had four cicatrices.—*Assoc. Med. Jour.—N. Y. Journal of Medicine, November*, 1853.

TRANSFUSION OF BLOOD.

In this memoir, Dr. Polli collects twenty-three cases in which the operation has been practised in the ordinary way, that is, with human blood. In five of these, death happened, either because the operation was too late, or because death was about to happen from some independent and inevitable cause; in all the rest, life was saved—in many, from the very jaws of death. In no one case did the operation give rise to any serious inconvenience.—The majority of the cases were those of parturient females, reduced to death's door by flooding; the rest, those of persons suffering from other kinds of hemorrhage, induced upon the hemorrhagic diathesis.

Dr. Polli also enumerates some cases in which the *blood of animals* was successfully substituted for that of man. Four of these are on the authority of M. Denis, who wrote his *Lettres sur la Transfusion* at Paris, in 1667.—Another is taken from an Italian work by Dr. Manfred of Lucca (*De Nova et Inaudita Medico-Chir. Operatione, &c.*, Romæ, 1668). Another, by MM. Tower and King, from the *Gaz. Medicale de Paris*, p. 65, 1848. The particulars of the last two experiments are not given, and we are only told that the blood of a lamb was employed in the one, and that of a calf in the other, and that the result was successful. The particulars of M. Denis's experiments are as follow:

Exp. 1.—M. Denis took ten ounces of blood from the arm of a strong and healthy butcher, aged forty-five, and injected through the same opening twenty ounces of the arterial blood of a lamb, after which the butcher, without any alteration in his manners and feelings, proceeded to kill and dress the animal which had furnished the blood, and then went to the public house to dispose of the gratuity which had been given him by the operator. The next day, according to his own account, he felt in better health than usual, and he underwent the same operation with the same results.

Exp. 2.—Nine ounces of the arterial blood of a lamb were injected into the arm of a youth, aged sixteen, who had suffered during two months from fever, and who, from this cause, and from having been bled twenty times, lay in a moribund state, when he immediately calmed and slept, and this rallying eventuated in complete recovery.

Exp. 3.—A madman of eight years' standing, whose madness showed itself in attacks of complete restlessness and wakefulness of eight or ten months' duration, was treated with transfusion in the fourth month of such an attack. Ten ounces of blood were abstracted, and six ounces of the arterial blood of a calf injected in their stead, with much relief to the symptoms. Afterwards a pound of the same blood was injected. The immediate result of the second transfusion was vomiting, purging, and sweating. These ended in a sound sleep, which brought about a favorable crisis, for from this time the patient continued to improve until he was quite well.

Exp. 4.—The patient in this experiment was lethargic, convulsed, and almost pulseless, in consequence of a violent and protracted attack of vomiting and purging. M. Denis injected eight ounces of blood (of what animal

is not stated when the convulsions ceased, the pulse arose, and consciousness returned, the bystanders were recognized and spoken to, and some food was taken. This state continued for twenty-four hours. The transfusion was then repeated, but the vomiting and purging returned, and the patient sunk eleven hours afterwards. Serious intussuception of the small intestines was found after death.

The conclusion to which Dr. Polli arrives is, that the operation of transfusion is simple, efficacious, and safe. He recommends it only in cases of excessive hemorrhage under ordinary circumstances, but in cases where there is a strong hemorrhagic diathesis, as likely to produce a beneficial change in the crasis of the blood. He recommends it also in cases of extreme inanition, where there is not time to introduce food in the ordinary way, or strength to digest that food. He *suggests* it as a possible means of inducing a beneficial change in the constitution of the blood in chlorosis, rachitis, and scorfula, and insanity; and he thinks that defibrinized aerated arterial blood might be a powerful means of resuscitation in cases of asphyxia and other kinds of apparent death.—*Half-Yearly Abstract*, vol. xvii.

We have performed this operation but once, and with only partial success.—Editor, *Philadelphia Medical and Surgical Journal, January*, 1854.

COMPOUND COMMINUTED FRACTURE OF HUMERUS, NEAR SHOULDER-JOINT, WITH WOUND OF BRACHIAL ARTERY; AMPUTATION AT SHOULDER-JOINT; RECOVERY.

Christopher Fricke, æt. 35, a healthy German, of temperate habits, was admitted on the 1st of July, with a comminuted fracture of the humerus, at its surgical neck, accompanied by severe bruising of the surrounding part, and occasioned, a few hours previous to his admission, by the falling of a building, at which he was employed at work. One of the fragments of the humerus had been forced through the integuments on the inside of the arm, near the axilla, lacerating the soft parts extensively, and wounding the brachial artery. The limb was much infiltrated with blood; its temperature was much lower than that of the opposite side, and no arterial pulsation could be detected below the seat of the injury. No hemorrhage. On the following day, reaction having taken place, a consultation was called upon to explore the extent of the injury, and, if possible, to endeavour to save the limb. A ligature was accordingly placed beneath the axillary artery, after the administration of ether; and the incision thus made was prolonged downwards, over the brachial artery, into the original wound. Several arterial points were secured, but the comminuted state of the bone, and the extensive infiltration of the blood amongst the injured parts, rendered the removal of the limb evidently advisable, and this was accordingly effected by means of antero-posterior flaps. Serious collapse followed, from which the patient rallied in a few hours under stimulants, and subsequently recovered without a serious symptom. He was able to leave his bed within three weeks from the operation, and was discharged, cured, on the 11th August.—*N. Y. Med. Times.*
