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THE

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OF

Medical, Surgical and Physical Science.

ORIGINAL COMMUNICATIONS.

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

SECOND SECTION.

THE ELEMENTS OF THE TISSUES COMBINED IN PERFECT OR IMPERFECT TISSUES, AND ARRANGED ACCORDING TO THE PROCESSES OF DISEASE.

8. *The tissues and elements of the tissues in an imperfect condition of development: cytoblastema, nucleoli, nuclei and cells.*

FIRST CLASS.

Proteine predominating.

1. Amorphous or finely granular substance.

This is without a trace of organization; even the ordinary arborescence presented by coagulated fibrine. It is found only in scirrhus, and is that material deposited among the fibres which gives the tissues its characteristic hardness.

2. Nucleus-like bodies in an amorphous, or finely granular dry substance.

To this case belong tubercle and typhoid matter. From neither are fibres or vessels ever developed. Once deposited, they operate as foreign bodies in the position they occupy.

3. Nuclei in a liquid albuminous blastema.

To this category belong the corpuscles of medullary cancer, of pus, and those found in catarrh, of mucus membranes, of grandular ducts, especially of the kidneys, of the gastric glands, of the glands of Brunner, and of the duodenum.

4. Jelly, or an amorphous gelatinoid matter, in which, at a later period, cells, fat-globules, and isolated smooth fibres may appear, as in colloid.

5. Cells with a rarer accompaniment of others prolonged to fibres.

The cells are either simple or endogenous. The latter frequently occur in larger quantity in medullary cancer, sometimes in scirrhus, in tumors of the mucous membranes, and occasionally in catarrhal affections.

The cell-structures frequently approximate, in their form and their chemical relation, to those of the organs, within or in the vicinity of which they are developed. Thus, in epithelial tumors with, or without ulceration, the cells are like those of the normal epithelium;* and, in the same manner the cells of medullary cancer of the liver frequently are quite like the hepatic cells.

SECOND CLASS.

Carbon predominating.

1. Pigment,—The black pigment of most pathological products exists in the form of free granules, or within cells, which are sometimes elongated in a fusiform manner.—Generally, it consists either of carbon, and is therefore insoluble in mineral acids, as in melanotic tumors, in the lungs, skin, glands, etc., or of sulphuret of iron, soluble in the latter acids—as upon the intestial mucous membrane frequently occurring in typhus.

The crystallized transformations of hematine into hematoidine found in the blood which has been a long time stagnated, either within or external to blood-vessels, and more especially in that effused after rupture of the graafian vesicle, were first accurately investigated by Virchow.

According to the latter, the hematoidine appears in the form of spherical bodies, granules, and oblique rhombic prisms, or perfect rhombs; is yellowish red, red, or ruby-red, and is insoluble in water, alcohol, ether acetic acid and weak mineral acids. In hydrate of potassa it becomes spongy, and then crumbles into granules which gradually dissolve. In concentrated mineral acids—as for instance, sulphuric acid—the crystals lose their sharp contour, and break down into granules, which become brownish-red, then green blue, rose-red, and finally, dirty yellow. According to my own researches, the crystals of hematoidine, of which the chemical composition is yet unknown, although its origin is undoubtedly from hematine, sometimes exhibits a very variable relation with the same reagents. Thus, in one case, I observed the rhombic crystals break up into red granules with a considerable development of air-bubbles,

* To speak of epithelial cancer is as unnecessary as to adopt an hepatic cell-cancer.

which probably indicate a combination of the coloring matter with carbonate of lime. Hematine, or the red-colouring matter of the blood, however, does not only undergo gradual conversion into granules and crystals of hematoidine but also into black pigment, usually found in the form of granules, and very rarely in that of crystals. This tranformation occurs either by the gradual solution of the walls of blood corpuscles, leaving only red or black granules, which may associate in masses and become enveloped in a cell membrane, thus constituting red or black pigment cells; or masses of blood-corpuscles fuse together and undergo similar changes to those just mentioned, and notwithstanding the blood-corpuscles appear to remain unaltered in composition, their coloring matter is no longer soluble in acetic acid. In this manner groups of blood corpusles may become enveloped in a newly-formed cell. In a third case the blood-corpuscles may remain unchanged in their form, and the colouring matter transude and become converted into the forms of hemotoidine.*

But although we conclude that hematine may be transformed into black pigment cells, from the simultaneous presence of these with such as are red, and are gradually undergoing the change of color, yet I am far from considering it proved that most melanotic tumours originate from effused blood, and directly from hematine, for I have frequently examined large tumors of the kind mentioned without detecting any indication from which a previous transformation of the blood could be inferred.

That red and black pigment cells originate in the manner stated, may be concluded from the fact that in the same specimen all stages may be observed from the formation of granules to the fully-developed cells; but that previously existing cells may become infiltrated with pigment granules† I do not deny, although I consider such a mode of origin rare in pathological structures.

2. Free Liquid Fat—Oleine in large or small drops, frequently occurs within the investing cells of the ducts and terminal follicles of glands, as in stearosis of the liver and kidneys. The deposit is most frequently in the hepatic cells; the cells of the tubuli uriniferi being more disposed to be

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* Dr. Lebert has communicated to me a new form of hematoidine crystals. It consists of long needles, frequently arranged with great regularity.

† I think it highly improbable under any circumstances, that a solid granule, even of the utmost minuteness visible with the highest powers of the microscope, can endosmose through a cell-membrane. I know of no instance on record in which it has been actually observed, and in some incidental experiments on the life of the organic cell, I found the finest particles of carmine, estimated to be 1-6000 of an inch, would not endosmose through any of the vegetable or animal cells with which the substance was brought into contact.—*Trans.*

detached by the penetrating fat. Further, newly-formed cells frequently become infilterated with the latter substance.

Fat also occurs in the form of granules of uniform size, from the $\frac{1}{899}$ to the $\frac{1}{699}$ of millimetre, consisting of oleine, associated with proteine, or the solid fats, as in exudations.

In the crystalline condition, margarine occurs rarely in the form of acicular crystals mingled with other substances. More frequently cholesterine is found either alone—as in cholesteatomatous tumors, or associated with other deposits. In the former case it has a pearly lustrous appearance, and is crystallized in rhombohedral tables; or, in combination with other fats, it is contained within cells.

9. *Transition Forms to Perfect Tissues.*

1. Fusiform fibres constructed upon nuclei, and nuclear fibres produced by elongation of the latter. These constitute the characteristic form in soft polypi of mucous membranes, and that modification of the same in which cysts filled with serum are developed simultaneously within tumors composed of them—as in cystosarcoma and fibrous tumours. Further, they also compose those hardened flesh-like tumors of the skin, the so-called sarcomata. Again, they form firm masses, consisting of nuclei and nuclear fibres, as in some varieties of fibrous tumors of the uterus.

2. Branched flat fibres, not fasciculated, with numerous hollow or solid nuclei, accompanied rarely with sparse cells, and deposited in an albuminous, amorphous, or granular substance, as in albuminous sarcoma.

10. *Perfect Tissues.*

1. Areolar and adipose tissues are frequent pathological formations. The former, with fat cells, is the most common metamorphosis of plastic matter when deposited in excess. It is formed from exuded fibrine, the result of inflammation or the ordinary course of nutrition, and it is to be remarked, in the former case, its fibres originate according to the four modes previously indicated—*i. e.*, by cleavage and coagulation, by deposit around nuclei, by elongation of nuclei, and from cells.

Examples of areolar or fibrous tissue, developed as a result of inflammation, are presented by the pseudo-membranes, and others produced in the course of physiological nutrition, are the adipose tumors or lipomata.

2. Tendinous tissues—at least so far as it resembles such in external appearance and in the arrangements of its fibres, is very frequently developed in the so-called fibrous

tumors. Very often the latter presents a distinct fibrous structure to the naked eye, and yet neither by the microscope nor through the finest sections can isolated fibres be separated or demonstrated. This condition is particularly the case when the fibres do not originate from cells, but by splitting or cleavage of plastic coagulated matter, as is frequent in fibrous and fibrinous polypi, in the tumors of the uterus which have been produced from coagula of blood, and in old fibrious exudations. The contour of the fibres in these cases often is indicated only by shaded lines.

3. Striated muscular tissue rarely originates independently of the muscular system, but lately has been observed by Rokitansky [*] in a tumor of the testicle. On the contrary, its production is frequent in hypertrophy of the muscles. The mode of development of this variety of muscular fibre is unknown. Unstriated or smooth muscular tissue frequently originates anew upon that of the stomach. The fibres of this variety are formed by the deposit of layers around a nucleus which subsequently disappears.

4. Nerve tissues in the form of cylindrical fibres I have observed in pseudo-membranes and in the rare cases of reproduction of cephalic substance after loss from hemorrhagic softening. The mode of development in both cases is unknown.

5. Mucous tissue. The pus-producing membrane and granulations alone belong to this category. It originates from cells

6. Blood and blood vessels. In pathological structures the blood-corpuscles form earlier than the blood-vessels, are grouped in isolated points, and in size resemble those of the embryo, as in pseudo-membranes and in enchondroma. The new blood-corpuscles are at first pale, and their nucleus is frequently distinct, but disappears at a later period. The formation of blood vessels is as difficult to trace as in the normal development, but I am acquainted with three modes in which it occurs, viz.:—

1. By prolongation of pre-existing vessels—a process which is more frequent than is generally supposed.
2. By the production of channels, the sides of which, at a later period, become defined by vascular parieties.
3. By development from cells. This I consider to be the rarest mode, having myself observed it but once.†

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* Wiener Zeitschrift, 1849. (Virchow has since imparted an instance of the production of striated muscular tissue in a tumor of ovary, and referring to the observation of Rokitansky, makes the philosophical remark, that it is not to be overlooked that the occurrence of muscular tissue in both cases in a generation gland—once in the testicle, the second time in the ovary—confirms our knowledge that in these parts also pathological reproductions are most energetic.—*Trans.*)

† Kölliker states he has observed the origin of vessels in the batrachian larva in these cases by processes from the vena caudalis from stellate cells, and by the productions of channels.

The new vessels, wherever formed, at first are longitudinally extended, and possess few anastomoses, but in time lose this character by the production of lateral branches, which at the commencement, appear as cæcal processes.

The mode of origin of lymphatic vessels I have not observed, but, according to Schrœder van der Kulk, they occur in fully-developed pseudo-membranes.

7. Hair and teeth, besides occurring in the ovary, are also produced in sebaceous tumors. I never saw the hair growing from follicles, nor the root inclosed by a sheath; but on the contrary, other observers state they have seen the roots of the hair of sebaceous tumors surrounded by a sheath.

8. Glands, like those of the skin, I have never seen myself, but Krause and Lebert state that they have observed such in sebaceous tumours of the skin.

9. Serous tissue, or, in other words, a vascular areolar tissue covered by an epithelium, occurs frequently in cysts; but, nevertheless, not all the latter are lined by an epithelium.

10 Cartilage.—In the production of this tissue an amorphous blastema is the basis in which appear nucleolated nuclei, separated by light interspaces; and later, upon the simple or compound nuclei, rises the cell-wall.

In this case endogenous cell-production is frequent. The vessels of cartilage are developed after the origin of the blood corpuscles.

The cartilage may be permanent, as in enchondroma, or it may ossify, as exemplified in the healing of fractures and in osseous tumors.

11. Osseous tissue is always preceded by cartilage in its development. Ordinarily, in its production, a network is formed frequently quite similiar to that of normal bone; then the nuclei of the cartilage-cells become converted into osseous corpuscles, by the deposit of calcarious matter, and finally the cell-membrane fuses with the intervening substance, and both become pervaded by the calcareous matter. The radiating tubuli of the corpuscles appear to be the remains of the unossified intra and intercellular-substance. Frequently, in the course of the conversion of cartilage into bone the process ceases, constituting tumors, which I have described under the name of jelly-osteophte—the osteoid of Müller. The bone canals (Haversian)—or rather the medullary canals—are developed partly from becoming calcified and partly from branched areolar channels of the cartilage, and never from cells. The formation of vessels is by no means essential to the ossification

of cartilage. The dental tissue is frequently developed in encysted tumors—as in the ovary; and the structure is quite like that, physiological or normal.

12.[1] Calcification.—No tissue of the body, except the hair, nails, and epidermis, is free from liability to calcification. It occurs in the non-vascular as well as in the vascular tissues. Thus are calcified the non-vascular inter-articular cartilages, the crystalline, the lens, epithelial cells of the mouth (tarter), cells of glandular ducts, fibrous and serous tissues, and even the muscular fibres and nerve tissues, though rarely, and much more rarely the grandular tissues. More frequent is calcification in pathological structures, as pseudo-membrane and tubercles, but very rarely in the cells of cancerous tumors. Calcification is effected chiefly by carbonate and phospate of lime.

(To be continued.)

ART. XXXVII.—*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 the last Journal.*

INFLAMMATION OF THE LIGAMENTS OF THE HIP-JOINT.

(Continued.)

In the last *Journal* we pointed out many of the symptoms of ligamentous inflammation; we especially indicated the character of nutrition in the structure, and pointed out the fact that the development of pus was impossible from the nature of the part; that softening and distention of the tissue was the most frequent consequence of inflammatory action.

In inflammation of the ligamentous structure of the hip-joint, inflammatory fever often runs very high, the tongue is thickly furred, the pulse full and bounding, while a profuse morbid perspiration often breaks out that greatly exhausts the patient's strength, without alleviating his suffering or mitigating his pain. His thirst is great, and his urine often deposits a copious sediment of lithic acid, showing that in many cases of this disease of the hip-joint the irritation of the fibrous texture is mainly dependent upon the accumulation of this material, or the protinous compounds from which it is formed, in the blood.

It has lately become evident, from the great improvements in animal chemistry and the use of the microscope, that from the peculiar condition of the blood is derived the great variety of diathisis which the human constitution presents in an abnormal condition. That several of the morbid states appear to specially influence certain characters of tissues, and that the fibrous tissue is the

[1] The description of inorganic deposits—concrements, belong to the manuals of a pathological chemistry and anatomy, and therefore, I shall in this place mention but one form.

especial seat of gout and rheumatism. Dr. Garrod has succeeded in demonstrating the presence of urate of soda in the blood of patients labouring under these complaints. He has collected the blood from a gouty patient, evaporated it to dryness over a water-bath, and then reduced the mass to a dry powder. This was digested in water at the temperature of 100° for an hour. Having dissolved out the urate of soda, and having evaporated the solution to a small bulk, he added a little strong acetic acid, acetate of soda was formed, and crystals of uric acid deposited after a few hours; at the same time that he demonstrated that urate of soda existed in the blood of gouty patients, he showed that urea was remarkably deficient in the urine, and that this was especially observable immediately before a paroxyism of the disease, facts that clearly indicate that this peculiar inflammatory action of the fibrous structure is mainly dependant upon, or greatly influenced by this morbid product in the blood. The universal distribution of the urate of soda throughout the whole mass of the blood may, in some degree, account for the intense constitutional irritation attending some varieties of inflammatory action of the fibrous tissues, and may serve to explain how every case of inflammation that attacks the various tissues of the body will be influenced by the different conditions, and varying peculiarities of the vascular fluid.

Without doubt, inflammation of the structure of the ligaments may occur without the necessity of gout or rheumatism being present in the constitution, but should such peculiarity happen to exist, it makes the disease both more severe in its character and more lengthened in its duration. The severity, however, is rather dependent upon the pain and constitutional irritation than upon the organic changes which happen to the part, for individuals may have oft repeated returns of inflammation, without complete destruction of the hip-joint. Inflammatory action may arise from a strain or other injury, and is constantly more or less attendant upon dislocation of the joints, and in old persons the disease may remain for years the pertinacious adherent of the injured structure. The result of this condition is that the fibrous structure of the ligament remains considerably swelled, softened and greatly thickened from the increased amount of serous fluid in which it is, as it were, constantly macerated, while the naturally transparent vessels continue to be filled and distended with red blood, marking a continuous hyperœmic condition of these vessels in which the neighbouring tissues participate; hence we often have seen effusion into the cavity of the hip-joint and constantly find that the blood vessels of the areola structure surrounding the joint, are conjested and the tissue itself hypertrophied and largely filled with fat.

Instead of remaining confined to the fibrous structure of the hip-joint, the inflammatory action may have spread to its serous tissue; and having influenced this in the diseased action, all the symptoms of synovial inflammation will be developed and added to those which indicate the affection of the fibrous tissues. There will be found more or less effusion into the cavity of the joint, the character of the pain will be changed, now acute and easily increased by pressure on the trochanter major. The areola tissue external to the capsular ligament may participate in a similar excitement, and effusion of serum into its meshes may be the result, that will give a swelled and enlarged appearance to the whole hip. On the occurrence of this serous effusion, the diseased vessels of the part may have been relieved from their state of conjestion, especially if proper means have been employed to assist the efforts of nature and a cure be now obtained; such is constantly the case in the disease called synovial rheumatism, and to our mind the extent of this disease alone constitutes the difference between gout and rheumatism. It would appear that the constitutional cause was similar in both complaints, but that in gout increased action is alone present in the fibrous tissues, while in acute rheumatism it has spread to the synovial membrane.

Should the amount of inflammatory action in the fibrous tissues be more intense, the effusion of albumen and fibrine may occur in the fibrous structure, this is generally but small in quantity, for the unyielding tenseness of its fibres would seem not very readily to permit it to take on the changes, to which this morbid blastema is constantly liable, but as the impulse is soon spread to the synovial structure within the joint, this effusion often occurs there to a considerable amount, and may likewise happen in the areola tissue without the capsular ligament. When the fibrine or blastema which has been effused into the cavity of the hip-joint, has failed to become organized, it softens, and pus corpuscles are in time developed, until matter is largely formed within the joint. The disease will now be found to implicate all the textures of the joint, and will follow in its onward course all the steps, and be liable to all the changes, which has already been pointed to, in disease of the synovial membrane, until, in all probability, consecutive dislocation, or death is the result.

As a consequence also of the effusion of coagulable lymph into the areola tissue, without the capsular ligament, we have the formation of pus without the joint; it may occur in numerous distinct abscesses, which after a time become general; it may burrow down among the muscles, and pointing may be evacuated before the matter in the distended cavity of the joint has forced its way through the capsular ligament. This formation of matter without the joint may even occasionally occur without a simultaneous result happening within; as such, it has been recognized as abscess of the areola tissue of the hip-joint. When this condition is readily understood, proper management will generally cure the disease, without the destruction of the joint.

In the treatment of acute inflammation of the ligaments of the hip-joint, we have particularly to consider, if the cause has a constitutional or a traumatic origin. If the complaint is evidently connected with and forms a feature of rheumatic disease, the peculiar constitutional treatment will be required. If the fever is intense, the pulse quick, full and bounding, the tongue furred, and the whole system morbidly excited, while the patient, is of a strong plethoric constitution, the free employment of blood-letting will be necessary, followed by the exhibition of colchicum and the application of warm fomentations to the diseased hip. The plan I have adopted with considerable success is, after the free abstraction of blood and use of active purgatives, to combine the sulphate and carbonate of magnesia with the vinegar of colchicum in some spearmint water, into a mixture, a dose of which is to be repeated every three or four hours, according to its effect upon the bowels. I also give alterative doses of calomel and opium night and morning; these means will generally remove the intense pain, and by their action upon the kidnies and liver will commonly remove the poison from the system and cure the complaint within the joint. The free employment of citric acid has been of late strongly recommended in this disease, with a view to change the protinous compounds within the blood, and enable the process of nature more readily to remove the poison from the constitution.

When acute inflammation of the ligaments of the hip-joint is dependent upon an injury, such as a strain or violent twist, applied to the unyielding ligaments considerable constitutional excitement, and great pain may be produced, these symptoms are, however, often several days in being fully developed, it being a mark of ligamentous inflammation that it is slow of progress. In such a case, general blood-letting may be demanded; but the employment of cupping or the application of leeches, repeated according to the severity and persistence of the inflammatory action, will be found peculiarly advantageous. These means, assisted with warm fomentations to the part, and followed by repeated doses of tartarized antimony and epsom salts, so as to nauseate the stomach and fully purge the bowels, these will generally remove the disease. Among other means, however, the most scrupulous attention must be given to keep the part in a state of perfect rest, being particular not to adventure too much motion for a time, even after the part seems perfectly restored to health. But if it should happen, notwithstanding these means, that the disease is determined to increase and spread to the other structures of the joint, causing effusion of serum, or the deposit of fibrine within or without the joint, so that pus shall be formed, and this being developed to a sufficient extent, a free exit should be secured for it as soon as it is plainly diagnosed to exist. From this period forward, without doubt, this inflammatory disease, now established in the hip-joint, will follow all the stages, will be liable to all the changes, and experience all the chances of recovery, which we have already explained may happen to the same part affected with inflammation of the synovial membrane; and now that all the structures of the joint are implicated in the disease, the treatment must strictly correspond with that proposed in extreme cases resulting from inflammation of the serous membrane, which has already been fully detailed, and which, therefore, it will be unnecessary for me again to repeat.

In chronic cases, however, this disease of the ligaments of the hip-joint not unfrequently endures with amazing pertinacity; in such cases, however, the inflammatory action has never advanced beyond the congested state of the vessels of the part, and some degree of effusion of serum. The fibrinous texture in these cases has become swelled and softened by the increased amount of serous fluid constantly surrounding it; and when the poison of gout has existed in the constitution, by the deposit of the urate of soda between the fibres of the ligament, it has often become greatly thickened and enlarged; this always produces stiffness and immobility of the limb, and is constantly attended with a dull heavy pain, particularly increased upon changes of the atmosphere. When this disease has continued for a very long time, especially in aged patients, when the pain and stiffness of the ligaments has rendered motion intensely painful or almost impracticable, then shall we often see a wasting of the head and neck of the thigh bone, dependent upon interstitial absorption of the bone. In such a case the extremities begin gradually to shorten, the patient has long limped upon progression; when he attempts to walk the toes turn outward, but still the sole of the foot comes flat upon the ground; the lumber vertebra acquire considerable mobility, corresponding in some degree with the immobility of the hip-joint; the buttock of the affected side is much less prominent than its fellow, while admeasurement of the limb shows actual shortening. This condition is very liable to be confounded with fracture of the neck of the thigh bone, especially after a patient has met with an accident in this region; doubtless this is the disease which has been truly described as chronic rheumatic arthritis of the hip-joint.

The treatment of chronic inflammation of the ligaments of hip-joint should consist principally in the employment of the counter-irritants applied to the neighbourhood of the part; blisters made perpetual by the use of the savine cerate; stimulating liniments, or the ointment of tartarized antimony, have been used with advantage; the application of warm, stimulating plasters, and splints, so as to retain the part in a state of perpetual rest; cupping, moxas, and the actual cautery, have been recommended to be used in obstinate cases. In many cases of this disease in which the urate of soda has been largely deposited in the structure of the ligaments, the internal use of benzoic acid has been found of great advantage; this medicine acting upon the protinous compounds in the blood, has prevented the formation of uric acid, by converting it into the hippuric acid, this being far more soluble and passing out of the system more readily with the urine, has tended to prevent the formation of this urate of soda and its deposit in the ligaments, and has even been said to favour its removal, after it has been largely deposited in the ligaments of the joint.

Inflammation of the Cartilages of the Hip Joint.

The consideration of the true nature of the structure of the articular cartilages will alone explain the phenomena of inflammatory action when it implicates these structures, and it presents us with a very apt illustration that inflammation of every structure in the body is, in its first stages, but a direct lesion of its nutrative functions—that is to say, the embarrassed circulation, the first step in inflammatory process—impedes or otherwise deranges the condition necessary to those changes which alone constitutes a proof of the vitality of the part.

The articular cartilages are formed of a fibrous structure, largely supplied with cells; these cells are developed in the meshes of the fibrous tissue from a very early period of its existence; and this organization is for the most part retained in the structure to the most extended term of its existence. The cellular structure of the cartilage does not appear to be directly nourished through the medium of blood-vessels; the finer portion of the blood passing by transudation around the fibrous element is absorbed by the cell wall, so as to fill this structure and nourish its growth; the fluid absorbed, consequently, must be of the most attenuated character; and we find, to furnish this material, that the cartilaginous structure is every where surrounded with large ampullæ or varicose dilatations of blood-vessels; these supply due nourishment to the cellular structure without the necessary intervention of capillary vessels, as takes place in other parts of the body. That a similar condition of cell formation is also present in the early stages of the formation of bone, has been fully proved; it would seem to me that this formative process had been arrested in cartilage covering the extremities of bone; and that the condition of cartilage is maintained by the function of the parts; the universally intermitting pressure to which this structure is submitted, preventing the elaboration and deposit of the calcareous salts in the fibrous tissue; hence a limb maintained in perfect rest for a very long period of time may become anchylosed, while cartilage will invariably be found at the extremities of fractured bones, submitted to the intermitting movement, which causes a false joint to be produced. A point of great importance to be remarked is the absence of nervous filaments in the structure from which cartilage is formed; hence diseases of this part may progress to a very considerable extent and for a very considerable period without much pain being complained of by the patient, a fact which is very remarkable, as long as the disease is confined to this structure.

Such being the mode in which cartilage is formed and nourished, let us consider the first result of inflammatory action or the flow of an increased amount of blood to the vascular apparatus which supplies the cellular structure of the cartilage. The first stage, then, of inflammatory action is a local hypœmia, a delitation of the ampullæ and a relaxation of their coats, with an especial increase in the amount of the red corpuscles of the blood; these, with all the other component materials, are increased in quantity while the walls of the capillaries are distended to their utmost. The result of this congestion of the ampullæ is a greatly increased supply of the natural secretion, the nutritive material of the cells, so much so, that the fibrous element is greatly swelled and softened, while the cartilage cells themselves, surrounded by this excess of serous fluid, are greatly distended by endosmodic action, until they increase so that they burst and are destroyed, and their nuclei are liberated. During the last efforts of the cartilaginous structure to form bone, these cartilage cells were arranged in strait rows, extending from the last formed bone towards the free circumference of the cartilage; hence we find that in these cases, that as cell after cell suffers from this destructive influence, many are hereby destroyed; those which remain are enlarged, and their nuclei escape, the cavity filled with serous fluid now left in the cartilaginous structure; into these cavities so formed, the distended ampullæ or loops of blood vessels in connection with the bone, or lying between the cartilage and the basement membrane of the synovial tissue, are pressed; these vessels now distended with red blood, fill the cavities so formed in the cartilaginous structure; so that when on dissection we separate these several structures, numerous nipple-like projections are observed upon the vascular apparatus, and minute cavities on the diseased cartilage will be found to correspond with them; to so great a length is the process sometimes carried, as we shall presently see, that the naturally firm connection between these several parts seems almost severed. As this state of things progresses, it will frequently happen that the basement membrane, and even the epithelial cells of the serous membrane, may be submitted to a similar action, a slow dissolution in the serous fluid may take place; the consequence is, that the nutritive vessels of the cartilage and also of the serous membrane, are left on the surface of the denuded cartilage, completely free within the joint; this is the structure that has been described by Mr. Keys as a new formation of vessels, which had been produced for the purpose of causing ulceration of the cartilage. It is clear that this collection of blood vessels is the result, not the cause, of the ulceration. This vascular structure, which was first described by Mr. Goodsir, being now unsupported by the fibrous element on either surface, and hanging free in the joint, will after a time cease to perform its function of carrying red blood, and as soon as this function has ceased, will die. These vessels themselves will be dissolved in the serous fluid now free in the joint, and by degrees their dissolution and destruction will be complete, so that they will be entirely removed from the part, leaving the surface of the cartilage bare. At this period the surface of the cartilage will present the appearance of elongated fibres, dependent upon the destruction and removal of the cartilage cells, vascular apparatus and synovial membrane, leaving the fibrous element floating in the joint; if this condition of things increase, the fibrous element of the cartilage will be dissected up, as it were, by the destruction and removal of the cartilage cells, so that the fibrous element may be left as large bands or fibres floating in the cavity of the joint. Although this state or condition of the part cannot be distinguished by the eye, upon a section under the microscope it is plainly visible. and to the feeling of the hand will seem soft like velvet. Under these circumstances we often find the nuclei of the cartilage cells to abound in the part, being entangled in these fibrous elements, and now wanting due support and proper nourishment, the nuclei are not properly developed into cartilage cells, but they may enlarge, and we may find them filled with fat globules, as pointed out by Dr. Redfern.

It will frequently happen before the synovial membrane and the vascular apparatus of the part is destroyed, that the cartilage cells have been largely submitted to distention rupture and destruction, that a cessation may take place in the diseased action, so that the joint by degrees regains its power of motion; the compression of the surfaces now experienced by these parts consolidates the fibrous structure, by pressing them closely together; when we come to examine the part, it will appear that more or less of the cartilage has been removed, and the indentation and destruction of its substance will sometimes apparently amount almost to complete removal, leaving the surface of the bone to a considerable extent denuded of this structure. We shall, however, in these cases find that the surface of the injured cartilage, or what remains of it, is still covered with synovial membrane, similar to that which lines the other portions of the joint, and which in point of fact has never been destroyed by the ulcerative action; the effect of which is plainly visible through it, has progressed below this structure, but it is now clearly consolidated and united to the surface of the cartilage or what remains of it. When this disease has progressed to a considerable extent, it not unfrequently happens that the cartilage cells which remain after this destruction of its substance will take on a calcareous deposit composed of phosphate of lime. The perfect rest to which the joint has been submitted has in all probability permitted this deposit to form, which, had motion continued, would not have happened any more than in ordinary cartilage, but having occurred, and motion being again by slow degrees established, the fibrous element will be consolidated, and with the phosphate of lime, will take on a vitreous character, giving to the remains of the cartilage a firmness and consistence equal to porcelain.

In some cases this disease in the cartilage will progress in the vascular apparatus upon both its surfaces, the ampullæ next the bone and those connecting it with the synovial membrane will be implicated in the disease, and this may proceed so as completely to isolate the cartilage from the bone, and before it is completely dissolved, to set it free as a foreign body in the cavity of the joint; should this happen, it will assuredly be sufficient cause to bring on general inflammatory action of all the structures of the joint, that will in all probability, progress to the most fatal results.

(To be Continued.)

ART. XXXVIII.—*On Phlegalgia Oris, by* WILLIAM KERR, *Surgeon, Corresponding Member of the Medical and Physical Society of Calcutta, and of the Medico-Chirurgical Society of Glasgow,* Galt, C. W.

The disease which forms the subject of this paper has not, as far as I know, been described by any author. From its most prominent symptom I take the liberty of naming it phlegalgia oris, or burning pain of the mouth.

On looking into the mouth chaps are observed on the tongue, its edges are raw and tender and papulæ are seen on the gums as well as on the tongue. The principal seat of the disease is the edges of the tongue adjoining the under teeth.

The diseased appearances, however, are slight, and give no idea of the sufferings of the patient, who complains of a constant sensation of burning or scalding, interrupted only by sleep, varying in intensity from day to day, but continuing without cessation perhaps for years. During sleep the tongue generally becomes parched, and so dry and painful that on awaking the patient can scarcely move it. While awake dryness gives place to an increased secretion of saliva. Anything having a pungent taste, such as salt, pepper, or alcoholic liquids, taken into the mouth aggravates the pain. The patient always prefers soft food, as even potatoes communicate the sensation of containing sand. To relieve the scalding, a little milk or cream is often taken into the mouth, and for the same purpose the patient is frequently observed sucking in cool air between the lips. Breathing a really cold air, however, aggravates the pain, so that on going out of doors when the day is cold, the patient is glad to cover the mouth with a handkerchief. As may be expected from this fact, the complaint is generally worse in winter than in summer. Sometimes the pain stretches to the back of the head, and more frequently up the side of the face, like toothache.

I have met with the combination of symptoms constituting phlegalgia oris, only in females. It generally commences during pregnancy or lactation, but sometimes arises without being connected with either of these.

The digestion is often impaired, and the patient is never actually robust, though her general appearance may not indicate any deviation from health.

For several years after I became acquainted with phlegalgia oris, I was in the habit of directing my patients to take wine, porter, or some alcoholic liquid; and prevented local smarting, by instructing them to coat the tongue with thick mucilage of gum senigal just before using them. I also often succeeded by giving bitters, the object of the treatment being to communicate greater vigour. Many years ago, however, a case occurred which baffled my most earnest exertions to cure it, and convinced me that these remedies, though capable of removing recent or slight affections, were altogether incapable of curing protracted or severe ones. The case was that of a lady, who after the birth of one of her children, was afflicted with phlegalgia oris. The ordinary medical attendant having failed to give relief, several medical gentlemen were consulted. At the end of several years, no benefit having been obtained, she repaired to Edinburgh to obtain the opinion of an eminent operator, at that time residing there. A consultation having been held, an assurance was given that her complaint arose from a concretion lodged somewhere about the root of the tongue. To remove this an operation was performed, but a concretion could not be found, and she returned home deeply mortified with the result, and with her impressions of the candour of the profession considerably lessened.

About fifteen years from the commencement of the disease, I was consulted, being somewhere about the twelfth medical man who had seen her, and, like all my predecessors, I failed to cure. Ten or fifteen years afterwards she died of another disease, the sensation of scalding remaining to the last. Mercury, arsenic, iron, opium, belladonna, borax, the local application of nitrate of silver, and several other medicines were tried at different times, but without benefit.

No case equalling the one now shortly sketched, in duration or severity occurred to me till last January, when I was consulted by an elderly female for phlegalgia, which had commenced about twenty years previously, and which often, especially in cold weather, was productive of considerable suffering. Several medicines had been tried both in Scotland and Canada, but without benefit. In this case I resolved to make a trial of extract of hyoscyamus and camphor, and accordingly instructed her to take two and a-half grains of each twice a day. The result was most gratifying. Before a week was ended she was quite well, but to increase the security, the medicines were continued for two weeks in the whole; she then had taken seventy grains of hyoscyamus and the same of camphor. I am happy that she has not had the slightest return of phlegalgia, though a good deal exposed to weather of every kind.

I have since met with several recent and not severe cases, which yielded much more readily and speedily to hyoscyamus and camphor, than they would have done, I am satisfied from previous experience, to the remedies I was formerly in the habit of employing. An investigation is still necessary to determine, whether the cure depends upon one or both of the medicines I employed; but having succeeded in a most obstinate and protracted case, a parallel to which may not occur for many years, I consider myself warranted in laying this paper before the medical profession. Debility being more or less connected with the disease, it is possible that cases may occur requiring stimulants besides, or if debility be kept up by some cause in the system, that this cause must be removed before hyoscyamus and camphor can act beneficially.

Phlegalgia oris having its seat in the mucous membrane, more extended observation may perhaps detect it in the stomach or alimentary canal. In the first very protracted case, years after the commencement of the affection of the mouth, the patient fell and struck her side with considerable force, against the end of a piece of wood. For a long period afterwards chords of false membranes, evidently from the interior of the colon, were voided from time to time afterwards, in dysenteric attacks. The same patient informed me, that little pieces of gelatinous exudation occasionally peeled from the edges of the root of the tongue.

A few months ago I was consulted by a middle-aged female, the mother of seven children, who immediately after a miscarriage, at the beginning of the year, had an invasion of the symptoms of phlegalgia oris, the sensation of scalding aggravated by pungent substances extending down the gullet into the stomach. Acidity was often present, and attacks of dysphagia, squemishness and vomiting were not unfrequent; the bowels were constipated; she slept ill and had an unhealthy aspect. This case was deeply interesting on account of phlegalgia affecting the mouth, the gullet and the stomach. A rapid improvement followed the administration of hyoscyamus and camphor, and by the end of a month she was quite well.

While residing in Scotland I was consulted by a gentleman who complained of what I at first supposed to be chronic diarrhœa; but discovered it to be frequent discharges of mucus followed by healthy evacuations. Experience had taught him that constipating medicines were injurious. He had previously consulted a very eminent practitioner, who failed to cure him, and my prescriptions failed likewise This year an elderly lady with precisely the same symptoms requested my advice, and I am glad to say that hyoscyamus and camphor produced a cure without difficulty. There were no symptoms of phlegalgia in the intestinal canal.

I suspect that the general voice of the profession is, that the treatment of dysentery is unsatisfactory, and the conclusion seems to be that opium of itself, or along with laxatives, is inadequate. In hyoscyamus and camphor we evidently possess medicines capable of healing papula and chops in the mucous membrane, and the question seems will they likewise heal the ulcers which form in the mucous membrane in dysentery? The effect of their use, certainly of their prolonged use, is aperient, not constipating. Of late, in several cases, I have tried them along with opium, a laxative being given from time to time on the occurrence of febrile symptoms, and the success has been such that I am determined to continue my trials on the return of the dysenteric season. Will the same medicines be useful in cholera? In a disease which runs its course so rapidly, we may expect to do good wherever we find a medicine capable of speedily, not slowly, checking the progress of dysentery.

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.* 1.)

PRIMARY TISSUES OF PLANTS.

In the first number of the *Journal*, Oct. 1853, we pointed out that the vegetable cell-wall was in most instances composed of two layers of very different composition and properties. The inner, which appeared to be first formed, was called the *primordial utricle*, extremely thin and delicate, but most essential to the structure of the cell, and appeared to be an azotised compound, in all probability, of an albuminous nature; while the second appeared to be generated on the external surface of the primordial utricle, and to surround it; being composed of cellulose, a substance identical with starch; this might consist of one or many layers.

In the interior of the vegetable cell we find a granular matter, which is usually coloured; it is called the *endochrome;* it is this, with the albuminous coveiing or primordial utricle, which constitutes the true cells; in it are exhibited the phenomena which indicate the vitality of the cell, and the existence of a continual movement of the floating granules may be seen, carried along in a stream in the fluid contents of the cell. This motion appears to be confined to a viscid layer, which seems in close connection with the primordial utricle. In the aquatic plants among the *characeæ nayadaceæ* and *hydro-charidaceæ* we may observe this movement most easily; in some the current is so strong as to carry along with it granular masses of starch, chlorophyll and albuminous matters. Several distinct currents may exist in the same cell, and these may be observed to have a point of departure and return—a mass of granular matter attached to the cell-wall, termed a *nucleus* appears to be the centre of the vital activity of the cell. This movement would appear to exist in every vegetable cell, at a certain stage of its development, and its cessation would seem to indicate the arrest or termination of the formative powers of the cell.

Besides the evident circulation above mentioned in vegetable cells, we may sometimes observe another phenomenon, the rapid changes of form which they sometimes assume; this may even produce obvious motion, sometimes dependent upon internal causes, sometimes produced by external excitement. In the *oscillatoriæ* we may observe elongated cells in a state of continual vibration; these are remarkable as possessing no cell-wall, so that the power of movement must reside in the primordial utricle, and endrochrome.

Of the multiplication of cells, one thing is certain, tha each individual owes its origin, in some way or other, to a pre-existing cell; the method adopted seems to vary in different cells, but of one, there is no doubt, that the endrochrome of the parent cell is the starting point of its successor, while the outer cell-wall is comparatively passive. The most usual method of increase in the cells of plants is by sub-division into two halves. Take the *hæmatococcus binalis* as an example; these cells are of globular shape, and, when the process of sub-division commences, they become oval, a constriction appears to take place around them, and by degrees the endrochrome separates into two halves, is eventually divided, each portion of the original primordial utricle obtains an envelope of its own, but it is still included within the external cell-wall of the parent cell. Into this last a thick secretion occurs, which often considerably divides the two young cells, and places them at a distance from each other; the same process again takes place, with like results, in the divided cells, and other cells are continually formed. In the *confervæ* the first step is the division of the endrochrome, and the inflection of the primordial utricle around it, a division of the parent cell takes place by a kind of hour glass contraction, these two surfaces of the utricle are enveloped in a double layer of cell membrane; this appears not to be confined to the contiguous surfaces of the sub-divided cells, but to proceed from the whole surface of the primordial utricle.—In the lower *algæ* this process tends to the formation of a prolonged filiment or flattened leaf-like expansion, dependent on the mode of the division of the cells during the process of sub-division, the influence of the nucleus is not very evident, when it is present, it is divided with the endrochrome, and half is appropriated to each cell.

Another mode of increase is apparent in some cells; for example, in the *conferva glomerata*, a certain portion of the primordial utricle appears to grow on the surface, it projects, carries before it the outer cell-wall, forms a protuberance often of considerable extent, before separation begins to take place in the parent cell; this, however, gradually proceeds by the folding of the primordial utricle, until the endrochrome of the young cell is completely separated from its parent. This process is called *budding*, in distinction from *sub-division*, and may, as in the *characeæ*, form a circular row of buds, each of which may develope a whorl of branches. This process is observable among ferment cells, which under favorable circumstances shoot forth with buds at several points. In this process the nuclei do not appear to take any very prominent part, as new formations sometimes appear from cells apparently destitute of them, and when present do not seem to be included in their structure.

Another variety in the multiplication of cells would appear to depend upon the separation of the endrochrome into numerous parts, each of which acquires a cell-wall, and at once forms a brood of new cells, generated in the interior of the parent; the original cell-wall bursting, sets them all free. In the *achlya proliferæ*, it appears that on the detached tubiform cell, a circulation of granular particles may first be distinguished, then a collection of distinct masses; each of these appear to acquire an individual cell-wall, then they begin to move within the parent cell, and when quite mature burst the cell-wall, and go forth to form new and independent plants.

In some instances we find that new cells may be generated in a *proto-plasma*, or mixture of starchy and albuminous fluids elaborated by cell agency, in which the germs have been formed and set free, although they escape observation, from their minuteness; this fact has been brought forward as a proof of spontaneous generation. So also has the sudden appearance of the *protococcus navalis* in alpine regions, which often suddenly reddens large tracks of country. Doubtless the nature and rapidity of cell growth, directed, as it clearly is, by laws impressed upon its own individual character, may be greatly influenced by external agencies; for example, some kinds of fungi have been known to grow in one night from a mere point to the size of a large gourd, and, upon calculation, have developed cells at the rate of four thousand million per hour.— Again: the form of cells are often evidently influenced by their position, the rounded form in most varieties is retained, but when aggregated together, the sides of the vesicles on being pressed together become flattened in every shape and variety; should the preponderance be equal in all directions, the form assumed will be a rhomboidal dodecahedron, a twelve-sided solid, with equal faces, so that each surface is connected at all these points with neighbouring cells, without leaving an interstice between. In some cases, again, these cells appear held together by intercellular substances, a kind of mucous layer that intervenes between them, and is, in all probability, a material elaborated by the primordial utricle, receiving its nourishment through the cell-wall. In some instances we find that distinct fibres line the internal surface of the cell-wall, of a spiral form and an elastic character, or the lining of cell-wall may be of a ligneous or sclerogenous character, which may be deposited in numerous concentric layers; this is sometimes so thick as to fill the cell and to compress, and almost obliterate the primordial utricle; in other instances this matter would appear irregularly deposited over the surface of the cell-wall, as in the gritty matter of the pear; at all events, in the primordial utricle would appear to exist the active agency which shapes these various developments.

The *woody fibres* of plants, which in all the higher forms of the vegetable kingdom constitute its most firm and durable character, giving support and protection to the softer and more delicate structures, is evidently composed of cells, which become elongated at both ends, assume a fusiform or spindle shape, and has elaborated within it ligneous matter, which gives it great firmness and tenacity; even in the more delicate structures of herbaceous plants, these cells perform an important function; bound up in bundles and fasciculi, they constitute the skeleton of the leaves, and the firmness of the stems. It is said that these elongated cells, in their early condition contain and conduct fluids with great facility, and in the *coniferous tribes* are the sole channel for the ascent of the sap, the stems and branches being destitute of vessels in their mature condition: when in this tribe these are filled with ligneous deposit, we may observe a peculiar set of markings, apparently a deficiency of this lining deposit; being a circular or lenticular boundary, surrounding a globular body; this may sometimes be detached, while its shape indicates the variety of the plant.

The *spiral vessels* of plants are also formed from cells, containing circular fibres, developed in their interior, these winding from end to end, remain distinct from the cell-wall; in some plants they become hollow, and appear to contain air, and to be connected with the leaf-stalk, through which they are distributed to the leaves. Bearing a near analogy to these is the *tubular tissue* of plants, formed from cells laid end to end, whose partitions becoming obliterated, then form a continuous duct for the conveyance of fluids. In many ducts the original markings of these cells are sufficiently obvious, but in others their history can only be learned by studying their development; in some cases a partial deposit apparently occurs upon their surface, giving them the appearance of *dotted ducts*. Upon the longitudinal section of some plants we find all these forms of ducts bound up in the same bundle, and occasionally their orifices are to be distinguished by the naked eye. It is certainly curious to note the great resemblance there exists between the spiral vessels of plants and the tracheal system of insects, in whose case spiral formed vessels ramify by minute divisions through their whole bodies, conducting air to all parts, while the similarity to the trachea of *vertebrata* is also worthy of notice.

It is a general feature in the ducts of plants that they run in strait lines, parallel with each other, from the roots to the leaves; their office being for the most part to carry fluids in a direct course from one to the other; still there are in *lactiferous plants* a system of anastomosing vessels not unlike the capillaries in animals; these from a network by the coalescence of cells, and the development of vessels; they are often made particularly distinct by secondary deposits. The *intercellular spaces* of plants are large and fully communicating passages, that intervene between the large cells in the loose structure of plants, as in the leaves, when they contain air, while in other situations they appear to afford the means of circulation to an elaborated juice, not unlike the lactiferous contents of the branching vessels.

OF THE PRIMARY TISSUES OF ANIMALS.

Having demonstrated that the various tissues of plants are the production of cell growth, so the microscope teaches that the primary tissues of animals are alike dependent upon a similar formation; the more complex structures of animals, however, renders this fact more indistinct, but if we trace the development of the animal cell, we shall find that it is essentially the same element of animal, as we found it is to be of vegetable life. The albuminous character of the animal cell-wall agrees with the primordial utricle of plants, receiving its pabulum from without; while the external cell-wall of plants appears to have the power of generating the necessary nutriment for its cell. It is in the character of development, and the powers of selection, in which the greatest diversity appears to exist between these different cells. Among the animal cells we find they have the power of selecting from the same materials perfectly different products, a clear indication of a guiding agency controlling the common forces of matter.

In the multiplication of animal cells we may witness the two principal modes of development which continually present themselves in plants. In one case the new cell is formed from a nucleus of the parent cell; the nucleus appears to assume a more important office than in the cells of plants; in this case, the cell undergoes a sub-division, each portion of the nucleus contracting around itself a portion of the contents of the parent cell, before any division of the cavity becomes apparent—such is the *cartilage cell.* Again, the nucleus may break up into several fragments, each portion becoming a nucleus and ultimately developed into new cells, without the sub-division indicated in the previous mode; these having arrived at maturity, each successive crop of young cells is liberated with the rest of the contents of the cell draw from the blood, this in fact forms the process of secretion from the follicles of glands. In the first variety the cells are intended for a permanent destination, to build up the body; in the second, they are intended but for a transitory purpose, and are required to be removed from the system.

In the vegetable world we have found cells developed in a proto-plasma elaborated by cell life, without doubt, from invisible nuclei; so in animals, says Carpenter, "have we now to consider those in which new cells originate in plastic or formative material, without any direct intervention of pre-existing cells." In this variety of cell-growth Mr. Carpenter, without doubt, has reference to the blood corpuscles; to say that these are formed without any direct intervention of nuclei, is, I think, a positive mistake. If it is remembered that the result of the process of digestion is to present to the lymphatic vessels a material of which one of its principal constituents is albumen. This material having been absorbed, is carried by the lymphatic vessels to the lymphatic glands. These glands are made up of convoluted knots of absorbent vessels, the single cylindrical canals, which are now dilated into larger cavities, or cells; these cavities are lined with epithelium; in the lymphatic vessels, these epithelium are flat and scale-like, forming single layers on the basement-membrane, but in the gland itself, we find them composed of numerous layers of spherical nucleated cells, of which the superficial are easily detached, and, without doubt, form the granular nuclei which are to be developed into the white corpuscle of the blood. The granular nuclei grow by the absorption of plasma from the blood, which principally consists of albumen derived from the food; by degrees these increase until the white corpuscle of the blood is perfectly formed. The albumen, absorbed within the white corpuscle, helps to nourish and develope its nucleus, until this has arrived at maturity. The white corpuscle then opens and liberates the red globule of the blood, which now maintains an independent existence, and becomes the carrier of oxygen and the developer of animal heat. Along with the red globule of the blood was elaborated in the white corpuscle the most important material of the animal frame, this is the *fibrine* of the blood. The red globule of the blood itself is also largely composed of fibrine; and when in the course of nature this has fulfilled its function, and becomes broken up, and disintegrated, will add its modicum of fibrine to the circulating system. Thus we have presumed to differ from Mr. Carpenter in the origin of the blood corpuscles, and intend at some future period to demonstrate the facts we have now enunciated--viz. that the granular nucleus, derived from the lymphatic gland, is the origin of the white corpuscle of the blood; that the nucleus of the white corpuscle is developed into the red globule, while the main fabricator of the fibrine is the white corpuscle of the blood; for these reasons we venture to declare that the protoplasma of these cells is not fibrine, but it is the albumen of the blood; and this albumen becomes vitalized by cell development and turned into fibrine, hence fibrine is the only structure of the animal frame which presents a vital action, and can act without the immediate intervention of cells.

(*To be continued.*)

BOOKS RECEIVED FOR REVIEW.

A treatise on the Anatomy, Physiology and Diseases of the Human Ear.—By JAMES RYAN, M.D., Professor of Surgery in Geneva Medical College: Professor of Institutes of Medicine and Medical Jurisprudence in the Philadelphia College of Medicine: President of the Medica Chirurgical College of Philadelphia: Corresponding Member of the New York Medical and Surgical Society: Member of the American Medical Association, and of the Convention for the Revision of the United States Pharmacopœia, &c., &c., Philadelphia, 1851: 124 pages.

A succinct and scientific little work, that shall receive due notice.

EDITORIAL DEPARTMENT.

PROVINCIAL LUNATIC ASYLUM.

Having observed an advertisement inserted in the *Daily Colonist* newspaper of this city, requesting applications for the appointment of medical superintendent to the Provincial Lunatic Asylum; and being desirous of giving the notice all the publicity our subscription list will permit, we copy the advertisement.

GOVERNMENT NOTICE.

NOTICE.—The situation of Medical Superintendent of the Provincial Lunatic Asylum at Toronto having become vacant, applications for the said situation, accompanied by testimonials, will be received by the Government of Canada until February next.

The salary attached £500 currency per annum, with a residence in the Asylum. Applications must be addressed to the Honorable the Provincial Secretary, Quebec.

P. J. O. CHAUVEAU,
Provincial Secretary.

PROVINCIAL SECRETARY'S OFFICE,
Quebec, Nov. 4, 1853.

It appears to us that a more extended notice of so important an appointment as that of medical superintendent of the Provincial Lunatic Asylum should have been given by Government; at all events, it is sincerely to be hoped that a most liberal and enlightened policy will be adopted in this matter, and that a severe scrutiny will be made into the abilities and qualifications of the person who may be entrusted with the onerous duties of this appointment, such as will fully satisfy the public that judgment and humanity will be exercised in the management of the poor unfortunate beings committed to his charge.

Without a doubt the previous political history, and the present dreadful condition of the foundation, of the building, would deter many eligible persons from undertaking the management of the insane in this institution. With regard to the first point, we hope that the Government have seen the folly of political appointments; and with respect to the second, an absolute necessity exists, that a proper system of drainage be undertaken, (which by some is said to be impossible) before any person can do justice to his charge. Only fancy a collection of muck many feet deep proceeding from the scullery and washhouse drains, accumulating under the noble building, which has cost the Province so much money, without a possibility of escape. In this mass of putrid and decomposing matter, we find fomites amply sufficient to account for the low form of remittent fever that is constantly showing itself among the inmates of the institution, and which, with an occasional exercerbation of dysentery or cholera, carries off many of the patients. This poison produces very marked effects, for the patients commonly very soon sink, after they have been attacked with the disease; while the same complaint will not unfrequently show itself among the keepers and other servants residing in the building. There is no doubt but that a remedy must be found for this deplorable condition of things, by the adoption of a proper system of drainage, and a better mode of ventilation; for if the cause of the poison which has been accumulating under the building ever since it was inhabited is allowed to remain, a superintendent possessed of almost miraculous powers would surely be foiled in his best endeavours to cure the mental disease, while the animal frame was oppressed with a deadly poison, continually imbibed from such a hot-bed of disease and death. We propose at an early period, to return to the consideration of the terrible condition of this Lunatic Asylum building, and some other circumstances connected with the institution.

DEGRADATION OF THE MEDICAL PROFESSION.

A circumstance of the most disgraceful character has just happened in the village of Enniskillen, C. W., and as it forcibly demonstrates the disadvantages under which the medical profession of this Province labour, we shall relate the facts. It appears that two rival practitioners in medicine have been exercising their calling in the village and neighbourhood of Enniskillen; the one has received a license from the Medical Board of the Province, and the other has "a license to kill" issued by the voice of the Canadian public, and has for some considerable time followed, or rather we should have said, degraded the noble art and science of medicine, without any other legal authority. A spirit of rivalry between these gentlemen has ripened into bitter and vindictive feelings. It so happened that the quack, (we beg pardon) the individual licensed by the people, found himself going to the wall; so to improve his position, and make his claims upon the country good, he induced a newly passed *licentiate* to join him in his business. It seems this unholy union was regarded with no pleasant feelings by the opponent; nevertheless it was sanctioned by the *public voice*, and he had to abide by it. Some few days since a person was buried in the grave-yard, and on the next day it appeared evident that the body had been removed, for the grave was left but partly covered, and as though it was intended the theft should be disclosed. So heinous an offence against public morals was immediately taken in hand by judge Lynch, and a strict search was made for the corpse. The first house and premises examined were those occupied by the licensed practitioner, who was most anxious to disabuse the public that he should ever have been guilty of the *dreadful crime* of dissection: not the slightest vestige however of such professional zeal or industry could be found on the premises. The next point was of course to search the residence of the gentleman practising under "the license to kill." Such an individual could of course enjoy the confidence of the public without requiring any knowledge of the human frame, and certainly would not be guilty of desecrating the grave for such a purpose; it was evidently contrary to reason and common sense, to imagine that the body could be there; but nevertheless led to the place, a search was commenced, and low and behold, the missing body was found hid in a dung-hill. The popular fury was at once aroused, warrants were sought against the people's practitioner and his partner, but as they were not issued with sufficient speed by the magistrates, the mob took the matter into their own hands; they set to work and demolished the man's house and all his furniture; and having laid hold of the partner, violently assaulted him, so that he narrowly escaped with his life. We understand that warrants have been issued against all the parties concerned, who have been bound over to appear at the court of assizes to be held at Cobourg in a short time.

We maintain that this transaction is another proof of the increasing degradation of the medical profession in this Province, and a striking proof that the public must become the sufferers by such deterioration. The want of an act of incorporation is here clearly demonstrated, for had the profession the power to improve the standard of medical education in this Province, by requiring a higher grade of professional study and acquirements, and by encouraging a more elevated tone of conventional politeness, we should have science assume its true position, and not stooping to beleague with quackery and humbug, for the spoliation of the public, and the degradation of the profession.

We herewith present to our readers the Tariff of Medical Fees agreed to at a public meeting, and the names of the gentlemen who have promised to adopt the scale as a standard of their charges for medical attendance, visits, operations, &c. It may be observed, that a very considerable latitude is permitted in the amount of the fees, ranging as they do between the columns marked maximum and minimum. To our friends in the country it may be offered as a data (but with very considerable margin, we fear) to regulate their charges. The tariff would certainly serve in some degree as a guide in the settlement of a medical man's bill, when it should happen to be in dispute, and in this respect might really be very useful. It must, however, be remembered that this scale of fees has been adopted by Gentlemen of the medical profession in this city, some of whose standing for science and professional skill would naturally deserve the highest reward; and as *such* they can assume a position in this matter, in which all the profession could not venture to follow them. If it is understood that this matter of the fees shall remain an open question for all who please to adopt it, then we are sure that the whole profession will be indebted to those gentlemen for setting so good an example, and thus vindicating to the public the rights and emoluments of the profession; but if it is intended to brand any person as unprofessional who does not readily and uncompromisingly adopt the tariff as their rate of charges, then we say that those Gentlemen will be most completely mistaken; for it is perfectly certain that, in very many cases, the scale of fees here set forth could not be universally carried out, and that especially in the country parts.

MEDICAL TARIFF, &c.

	MAXIMUM.			MINIMUM.		
	£	s.	d.	£	s.	d.
For a Medical Opinion	1	5	0	0	10	0
Visit in the day time (from 7 a.m. to 9 p.m.)	0	5	0	0	5	0
If not the regular Medical Attendant	0	10	0	0	5	0
Night Visits (from 9 p.m. to 7 a.m.)	1	5	0	0	10	0
Visits into the Country, 5s. per mile in addition to regular fees, reckoned from the Market-place, Toronto.						
Consultation Visits—first three	1	0	0	0	10	0
Do. do. for a continuance	0	10	0	0	5	0
Letter of advice or certificate	2	10	0	1	5	0
For detention at a case, in addition to fee, per hour	0	10	0	0	5	0
SURGICAL OPERATIONS.						
Capital Operations — such as Lithotomy, Amputation of Extremities, Removal of Tumors, Artificial Pupil, &c.	20	0	0	10	0	0
Minor Operations—such as the Removal of Tonsils, Amputation of Fingers, Cutting for Fistulas, &c.	5	0	0	2	10	0
In addition to the above, the subsequent attendance to be charged.						
Introduction of Catheter, Probang, &c.—first introduction	1	5	0	0	10	0
Every subsequent introduction	0	10	0	0	5	0
Setting of Fractures, &c.	5	0	0	1	5	0
Reduction of Dislocations, &c.	5	0	0	1	5	0
Bleeding, Vaccination, Tooth Drawing, Opening Abscess, &c., in addition to regular fee	1	5	0	0	5	0
Dressing a Simple Wound, Cupping, Seatons and Issues, &c.	0	10	0	0	5	0

MIDWIFERY CASES.	MAXIMUM. £	s.	d.	MINIMUM. £	s.	d.
Attendance in all ordinary cases..........	5	0	0	1	5	0
Subsequent attendance to be charged as ordinary visits.						
Instrumental Delivery, Turning, Hæmorrhage, &c.	10	0	0	2	10	0
On journey into the country to perform the same, 5s. per mile in addition, &c.						

At a public meeting of the Medical Practitioners of Toronto, held at the General Hospital, on the 25th day of October 1853, it was unanimously agreed to adhere to the above scale of fees.

JOHN KING,
JAMES GRANT,
WALTER TELFER,
GEORGE HERRICK,
FRANCIS BADGELEY,
CORNELIUS S. PHILBRICK,
NORMAN BETHUNE,
FRANCIS PRIMROSE,
C. WIDMER,
W. R. BEAUMONT,
EDWARD M. HODDER,
WILLIAM HALLOWELL,
JAMES BOVELL,
JOHN T. SMALL.

As a matter of curiosity, while we are on the subject of medical fees, we may present to our readers the scale adopted by the medical profession in San Francisco, California; it is taken from the *Gazette de Paris*, and, as the *Medical Journal* of New Orleans suggests, "the medical faculty of the Eldorado must be looking up."

For consultation and visit....................	$32 00
For each visit	12 00
For one consultation.........................	16 00
For an extraordinary visit, and detention over one hour	32 00
For a night's consultation...................	100 00
For a consultation out of town, per mile	10 00
For medical legal opinion (written)	150 00
For a declaration of opinion before a Judge	200 00
For an accouchement.........................	3000 00
For a mortuary certificate	100 00
For the operation of lithotomy...............	1000 00
For introducing a catheter	32 00
For dilating a stricture of the urethra	500 00
For exploring anus or bladder	100 00
For amputating finger.......................	100 00
For trepanning	4000 00

SELECTED MATTER.

A COURSE OF LECTURES ON ORGANIC CHEMISTRY.

Delivered in the Laboratory of the Royal Institution of Great Britain, by Dr. A. W. Hofmann, F.R.S., Professor at the Royal College of Chemistry.

Lecture III.

Gentlemen:

Having in my last lecture fully described to you the process used in estimating the carbon and the hydrogen, I have now, in order to complete this sketch of organic analysis, to show you how we determine the nitrogen. I have already stated that nitrogen, unlike carbon and hydrogen, is in some cases estimated in the free state as nitrogen gas, the volume of which has to be accurately measured. This determination by volume was, in fact, the only one practised in the earlier stages of organic analysis. It was not until ten years ago that another process was introduced, which, had it been applicable in all cases, would have superseded the former method altogether. This process is founded upon the same principle as that which I pointed out in the determination of carbon and hydrogen; instead of estimating the nitrogen in the free state, this element is converted into a compound of salient properties, easily collected, and estimated by the balance; that is to say, the nitrogen is weighed in the form of ammonia. This new process, for which we are indebted to Messrs. Will and Varrentrap, may be used in the majority of cases; there are only one or two classes of nitrogen-compounds which still require the determination of that element by volume. On account of its practical importance (being, in fact, by far the most frequently employed) we will consider the ammonia-process first, although it is the more recent one.

When organic substances containing nitrogen are heated with the hydrates of the fixed alkalies, for example of potassa or soda, the whole of the nitrogen assumes the form of ammonia, at the expense both of their own hydrogen and of that contained in the water of hydration of the alkali. The oxygen, both of the substance and of the water, combines with the carbon, converting it into carbonic acid. Sometimes ammonia and carbonic acid are the sole products generated in this process. Take, as an illustration, urea, the composition of which is represented by the formula

$$C_2 \ H_4 \ N_2 \ O_2$$

It is obvious that the hydrogen contained in this substance is not sufficient to convert the whole of the nitrogen into ammonia. There are required for this purpose two additional hydrogen equivalents which are supplied by the water of the alkali with which we heat the urea: but we thus obtain also two additional equivalents of oxygen, which, together with the oxygen contained in urea, are sufficient to convert the whole of its carbon into carbonic acid.

1 atom of urea	C_2	H_4	N_2	O_2		
2 atoms of water		H_2		O_2	=	2HO
	C_2	H_6	N_2	O_4		
2 atoms of ammonia		H_6	N_2		=	$2NH_3$
2 atoms of carbonic acid ...	C_2			O_4	=	$2CO_2$

But, before proceeding any further, allow me to show to you by experiment the disengagement of ammonia from a nitrogenous substance by the action of an alkali. Let us take urea, the very compound which I have quoted. For this purpose, a few crystals of this substance are rubbed together with soda-lime (a mixture of caustic soda and lime). I might have employed soda alone, but we prefer the addition of lime, which diminishes the fusibility of the pure alkali, and moderates, to a certain extent, the powerful energy with which the pure alkali corrodes the glass vessel used in the operation. The mixture is now introduced into a Florence flask, provided with a delivery-tube. As soon as heat is applied, torrents of ammonia are disengaged, which is readily recognized by its characteristic properties, viz., by imparting a brown colour to turmeric paper, by restoring the blue colour of reddened litmus, and by producing dense clouds of chloride of ammonium on coming in contact with hydrochloric acid vapour.

The decomposition of urea by the action of a hydrated alkali may be taken as a type of what happens in the case of other nitrogenous substances of a more complex composition. If substances are very poor in oxygen, or very rich in hydrogen, it may occur that only a portion of the carbon is oxidised, while another portion combines with hydrogen, and is evolved, together with the ammonia, in the form of several of the varieties of hydrocarbons.

Of this behaviour of the great majority of azotised organic compounds, Messrs. Varrentrapp and Wills have availed themselves in order to determine the amount of nitrogen. For this purpose a weighed quantity of the compound is mixed with soda-lime, and carefully introduced into a combustion-tube, into which is then fitted a small glass apparatus, containing hydrochloric acid for the absorption of the ammonia generated. The form of this apparatus recalls that of Liebig's potash-bulbs. It is, in fact, the potash-bulb, only slightly modified for the occasion. The combustion-tube is now placed in a furnace perfectly similar to that used for carbon determinations, and gradually heated either by gas or charcoal.

The combustion being completed, the point of the tube is broken off, and a current of air sucked through it in order to collect the ammonia-vapour which may still linger in it. The whole of the nitrogen of the compound under examination is now present in these bulbs, in the form of ammonia combined with the hydrochloric acid.

But how is the amount of this ammonia determined? At the first glance it might appear that the simplest plan would consist in ascertaining the increase by weight of the hydrochloric acid bulbs after the termination of the combustion, a mode of proceeding perfectly analogous to that which is followed in determining the carbon. This method, however, is inadmissible in the present case. A considerable quantity of carbonnetted hydrogen passing constantly through the apparatus during the combustion, a portion both of the hydrochloric acid and of the water is carried off in the process. On the other hand, many of the hydrocarbons produced, although they are in the state of vapour at the temperature of their formation, become liquid and even solid at the common temperature: they float upon the surface of the hydrochloric acid, and, of course, increase the weight of the apparatus. Hence, it is obvious, that its change of weight is due to a variety of causes: we must therefore adopt another plan instead of simply weighing.

The amount of ammonia in the hydrochloric acid may be determined by two processes, which I will briefly describe to you. In both it is necessary to pour out the liquid from the bulbs; and hence the necessity for their shape to differ slightly from that of the ordinary potash apparatus. We may now precipitate the ammonia from the liquid by means of bichloride of platinum, which, as you know, forms a beautiful yellow crystalline compound with the chloride of ammonium; this salt is collected with the usual precautions, and weighed; from its weight and the known composition of the salt we calculate the percentage of nitrogen. A shorter mode of proceeding consists in using a standard solution of hydrochloric acid for the neutralization of the ammonia, i. e., a solution, the concentration of which has been accurately determined by experiment. We have, moreover, prepared a standard solution of soda, and carefully ascertained how much of the latter is necessary to neutralize a given volume of the former. Suppose we employ a cubic inch of the standard acid for the absorption of the ammonia, and we know that 100 measures of our standard alkali are necessary to neutralize this cubic inch before combustion,—suppose we find that after the combustion, i. e., when the acid has absorbed the ammonia, that the acid thus partially neutralized requires for saturation only 50 measures, it is evident that we have all the data for calculating the amount of ammonia, and from this the amount of nitrogen in the original substance.

The estimation of nitrogen in the form of ammonia is, as you see, very easy and expeditious; and, whenever this method is applicable in the analysis of an azotised body, it is invariably employed in preference to any other. There is, however, a number of compounds containing the nitrogen in the form of an oxide, as nitrous, or hyponitric, or even nitric acid, which cannot be analysed by the ammonia-process, inasmuch as only part of their nitrogen is convertible into ammonia by fusion with soda-lime. Again, a series of nitrogenous carbon-compounds, which are very analogous to ammonia, (the compounds known by the name of alkaloids,) yield their nitrogen with considerable difficulty in this manner. In analysing substances of this kind, we have to adopt another plan; many methods have been devised for this purpose, which all consist in collecting the nitrogen as such, and measuring its volume. I confine myself to showing you the one which has been first used by Dumas, and which, with the exception of the ammonia-process, is perhaps more frequently employed than any other.

If nitrogenous substances are burned with black oxide of copper, carbon and hydrogen, as we have seen, are oxidised, but their nitrogen escapes uncombined. Small quantities only unite occasionally with oxygen, forming binoxide of nitrogen, or nitrous acid; these compounds, however, may be readily destroyed again by placing a layer of bright copper turnings in the anterior part of the combustion-tube. The copper, at a high temperature, unites with the oxygen, and releases the small quantity of nitrogen which may have combined with it. In order to measure correctly the volume of nitrogen generated during the combustion of an azotised body, it is, as you at once perceive, absolutely necessary to expel in the first instance every trace of atmospheric air from the apparatus in which such a determination is to be made. For this purpose, immediately after the mixture of oxide of copper with the weighed amount of substance to be analysed, and the copper turnings are introduced into the tube, a stream of carbonic acid is passed through it, until the whole of the air is swept out and replaced by carbonic acid; this carbonic acid is often liberated by heating bicarbonate of soda which has been placed in the posterior portion of the tube, but more frequently a large two-necked bottle is employed, in which the carbonic acid is disengaged from carbonate of lime and hydrochloric acid. As soon as we have ascertained that the gas which issues from the delivery-tube in front is entirely free from atmospheric air, we may commence the operation.

But let me first show to you how this absence of atmospheric air is ascertained experimentally. For this purpose a long cylinder is filled over mercury with the gas issuing from the delivery-tub, and then immersed in a solution of potassa. If the gas is perfectly absorbed, we conclude that every trace of atmospheric air has been expelled from the apparatus. A graduated jar is now half filled with mercury, and half with a concentrated solution of potassa; it is then covered with a ground glass plate, and inverted over mercury, in order to collect the gases generated during the combustion, which is performed exactly as if it were intended to estimate the carbon. The whole of the carbonic acid is absorbed by the potassa; the volume of gas affected by this liquid consists of nitrogen. The combustion being terminated, we have now only to sweep out the nitrogen which still lingers in the tube. This may be again accomplished by a current of carbonic acid. The volume of nitrogen which is thus obtained is left for some time in contact with the alkali, in order that every trace of carbonic acid may be absorbed; it is then transferred into a tall glass cylinder filled with water, and accurately measured, by rendering the liquid inside and outside perfectly level. The barometer and thermometer having been simultaneously observed, it now remains only to correct the volume for temperature and pressure, in order to deduce from it the weight of the nitrogen and its per centage in the compound analysed.

This short sketch of organic analysis has, I hope, familiarised you with the more important processes for determining the composition of organic substances which are used in the laboratory. I must now invite you to follow me for a moment to the writing desk, at which the chemist calculates the results of his experiments. Let us open his note-book, and inspect the actual numbers obtained in the analysis of two or three substances.

You will be surprised to see by how simple a series of calculations he converts the immediate results of analysis into per centage numbers, and lastly into formulæ. The combustion of benzoic acid has furnished the following data, which the diagram exhibits to you in exactly the form in which they are noted in his laboratory memorandum-book:—

Weight of benzoic acid burned—5 grains.

	grains.
Weight of potash bulbs after combustion	732·57
" " before "	720.00
Carbonic acid produced	12.57
Chloride of calcium tube, after combustion	232·25
" " before "	230·00
Water produced................................	2·25

The composition both of water and carbonic acid are very accurately known. The combining number of carbonic acid = 22 contains 6 of carbon. The combining number of water = 9 contains 1 of hydrogen.

The following proportions give us the amount of carbon and of hydrogen in 5 grains of benzoic acid:—

Grains of Carbon.

$$22 : 6 = 12{\cdot}57 : x ; x = \frac{6 \times 12{\cdot}57}{22} = 3{\cdot}43$$

Grains of Hydrogen.

$$9 : 1 = 2{\cdot}25 : x ; x = \frac{1 \times 2{\cdot}25}{9} = 0.25$$

But it is more convenient to know the quantities of carbon and hydrogen in 100 parts of the substance. These we obtain by multiplying the above numbers by 100, and dividing by 5, for we have the proportions:—

Per Cent. Carb.

$$5 : 3{\cdot}43 = 100 : y ; y = \frac{3{\cdot}43 \times 100}{5} = 68{\cdot}6$$

Per Cent. Hyd.

$$5 : 0{\cdot}25 = 100 : y ; y = \frac{0{\cdot}25 \times 100}{5} = 5$$

The percentage of oxygen is equal to 100 minus the percentages o carbon and hydrogen $100 - (68{\cdot}6 + 5) = 26{\cdot}4$.

In a similar manner, the combustion of the volatile alkaloid aniline h furnished the following results:—

Weight of aniline burnt...........................	3·5	grains.
" carbonic acid produced	9·91	"
" water	2·39	"

From these data, the following numbers are deduced in exactly the sa manner as before:—

9.91 grains of carbonic acid correspond to 2·702 grains of carbon = 77 per cent. of carbon.

2·39 grains of water correspond to 0·265 grains of hydrogen = 7·75 p cent. of hydrogen.

Aniline is a nitrogenous substance; it is evident that, by deducting fr 100 the joint percentage of carbon and hydrogen, we obtain a number re senting the nitrogen and oxygen, i. e., aniline contains 100 — (77·2 + 7·

= 15.27 per cent. of nitrogen and oxygen. Aniline is one of those substances which are decomposed with great difficulty by soda-lime; hence the nitrogen had to be determined by volume.

The combustion of 10·5 grains of this compound furnished a volume of gas = 5·07 cubic inches, at the normal pressure of 30 inches, (more accurately 29·92.) and the normal temperature, i. e., at the freezing point of water. According to the latest researches of Regnault, 100 cubic inches of nitrogen, at the temperature and pressure I have stated, weigh 31·66 (or, more accurately, 31·6602 grains); hence the weight of 5·07 cubic inches is given by the proportion—

$$100 : 31{\cdot}66 = 5{\cdot}07 : x ; x = \frac{31{\cdot}66 \times 5{\cdot}07}{100} = 1{\cdot}605$$

and the percentage of nitrogen in aniline by

$$10{\cdot}5 : 1{\cdot}605 = 100 : y ; y = \frac{1{\cdot}605 \times 100}{10.5} = 15{\cdot}28$$

From this result, it is evident that aniline cannot contain any oxygen, since the percentage of nitrogen is almost exactly the complement of the joint percentage of the carbon and hydrogen, which, as we have seen, was 77·2 × 7·54 = 84·74.

For reasons, which will be obvious to you immediately, I quote, as a last example, the analysis of a substance containing carbon and hydrogen only. I select Mr. Faraday's bicarbide of hydrogen, the substance which is now more generally known by the name *benzol*.

3·2 grains of benzol, when burnt, gave
10·82 grains of carbonic acid = 2·95 grains of carbon.
2·25 " water = 0·25 " hydrogen.

The corresponding percentages are—

Carbon ...... 92·18 Hydrogen ...... 7·81

Analysis has thus led us to the composition in 100 parts of benzoic acid, of aniline, and of benzol—

	Benzoic Acid.	Aniline.	Benzol.
Carbon	68·6	77·20	92·18
Hydrogen	5·0	7·57	7.81
Oxygen	26·4	......	......
Nitrogen	......	15·28	......
	100.0	100·05	99·99

Let us now consider how these percentage numbers may be translated into formulæ representing the atomic constitution of the substances in question. In the first place, in order to find the relative proportions of carbon, hydrogen, and oxigen atoms in benzoic acid, we have to recollect the atomic weight of these three elements, which are respectively 6, 1, and 8. It is obvious that the number of carbon atoms is given by the proportion

$$6 : 1 = 68{\cdot}6 : x ; x = \frac{1 \times 68{\cdot}6}{6} = 11{\cdot}43$$

In a similar manner we obtain for hydrogen

$$1 : 1 = 5 : y ; y = \frac{1 \times 5}{1} \quad 5{\cdot}$$

And for oxygen

$$8 : 1 = 26{\cdot}4 \quad z ; z = \frac{1 \times 26{\cdot}4}{8} = 3{\cdot}3$$

or, in other words, we find the relative proportions of the carbon, hydrogen, and oxygen atoms in a compound, by dividing the percentages furnished in analysis by the respective atomic numbers. If the results of analysis were absolutely correct, the quotients in question would represent the exact atomic relations of the elements.

Accordingly, benzoic acid would consist of

11·43 atoms of Carbon,
5·00 " Hydrogen, and
3·3 " Oxygen.

Or, in round numbers, of

114 atoms of Carbon,
50 " Hydrogen,
33 " Oxygen.

It is obvious that the ratio of these numbers is very complicated. We know by experience that the composition of organic compounds, although generally less simple than that of mineral bodies, nevertheless but rarely exhibits relations of such intricacy. We recollect, moreover, that the results of analysis, so far from being exact, are always affected by errors unavoidable in the most careful experiments; we therefore endeavour to reduce these numbers to a more simple relation.

The number of oxygen atoms being evidently smallest in benzoic acid, we will seek how many carbon atoms and how many hydrogen atoms this compound contains for each atom of oxygen. For this purpose we divide the above numbers by 33, and we now obtain

Number of Carbon atoms .... $\frac{114}{33} = 3{\cdot}45$

" Hydrogen atoms.................. $\frac{50}{33} = 1{\cdot}5$

" Oxygen atoms.................... $\frac{33}{33} = 1$

These quotients are as near as possible as 3·5 : 1·5 : 1; or, in entire numbers, as 7 : 3 : 2; i.e., in benzoic acid we have for every 7 atoms of carbon, 3 atoms of hydrogen, and 2 atoms of oxygen, and the formula

$$C_7\ H_3\ O_2$$

accordingly would be the simplest atomic expression for benzoic acid. Let us now see how near the theoretical percentages of carbon, hydrogen, and oxygen, calculated from this formula, agree with those obtained by combustion.

7 atoms of carbon	=	7	×	6	=	42
3 " hydrogen	=	3	×	1	=	3
2 " oxygen	=	2	×	8	=	16
1 atom of benzoic acid					=	61

$$61 : 42 = 100 : x;\ x = \frac{42 \times 100}{61} = 68{\cdot}85 \text{ p. c. carbon}$$

$$61 : 3 = 100 : y;\ y = \frac{3 \times 100}{61} = 4{\cdot}91 \text{ " hydrogen}$$

$$61 : 16 = 100 : z;\ z = \frac{16 \times 100}{61} = 26{\cdot}22 \text{ " oxygen}$$

Composition of Benzoic Acid.

	Theory.	Experiment.
Carbon	68·85	68·6
Hydrogen	4·91	5·0
Oxygen	26·24	26·4
	100·00	100·00

You observe that the experimental and theoretical numbers closely agree; the experimental number for carbon is somewhat lower, that of hydrogen somewhat higher than the numbers deduced from theory; but I have pointed out to you that the ordinary mode of combustion generally involves a slight deficiency of carbon, whilst it furnishes a small excess of hydrogen.

I have explained to you at some length the derivation of the atomic expression from the mere percentage result of an analysis; because, without a perfect acquaintance with this proceeding, it is impossible to obtain a clear conception of the meaning of a chemical formula.

A few minutes will now suffice similarly to translate the other two analyses which I have quoted, namely, those of aniline and benzol.

By dividing the percentages of carbon, hydrogen, and nitrogen by the respective atomic weights, we obtain the following quotients:

$$\text{Carbon} \quad \frac{77{\cdot}20}{6} = 12{\cdot}86 \quad \text{or} \quad 1286$$

$$\text{Hydrogen} \quad \frac{7{\cdot}57}{1} = 7{\cdot}57 \quad \text{or} \quad 757$$

$$\text{Nitrogen} \quad \frac{15{\cdot}28}{14} = 1{\cdot}08 \quad \text{or} \quad 108$$

And if we calculate for 1 atom of nitrogen, (the element of which the smallest number of atoms is present) by dividing the three quotients by 108, we arrive at

$$\text{Carbon} \quad \frac{1286}{108} = 11{\cdot}90$$

$$\text{Hydrogen} \quad \frac{754}{108} = 7{\cdot}00$$

$$\text{Nitrogen} \quad \frac{108}{108} = 7{\cdot}00$$

from which the simplest atomic expression for aniline,

$$C_{12} \; H_7 \; N,$$

is at once evident; the theoretical percentages of this substance, when compared with those obtained by analysis, are as follows:

Composition of Aniline.

		Theory.	Experiment.
12 atoms of carbon	72	77·42	77·20
7 " hydrogen	7	7·53	7·57
1 " nitrogen	14	15·05	15·28
	93	100·00	100·05

The percentage lastly of benzol was:—

Carbon .... 92·18
Hydrogen .... 7·81

The ratio of the carbon and hydrogen atoms is given in the quotients:

$$\text{Carbon} \quad \frac{92{\cdot}18}{6} = 15{\cdot}36$$

$$\text{Hydrogen} \quad \frac{7{\cdot}81}{1} = 7{\cdot}81$$

Without further calculation we see at once that these numbers are closely as 2:1, and that the simplest atomic expression or ratio for this substance is the formula

$$C_2 \; H,$$

whence the original name of bicarburet (bicarbide) of hydrogen, proposed by Mr. Faraday. The theoretical numbers of this formula, however, sufficiently agree with the results of combustion, as will be seen from the following comparison:—

Composition of Benzol.

		Theory.	Experiment
2 atoms of carbon	12	92·31	92·18
1 atom of hydrogen	1	7·69	7·81
	13	100·00	99.99

The formulæ which I have developed to you are the simplest atomic expressions in entire numbers which can be framed for the substances in question; they are not, however, always those which are generally adopted. A variety of considerations frequently induces chemists to assume multiples of these formulæ as more appropriately representing the constitution of these bodies. In the next lecture I intend to bring before you some of these considerations, and to show you their influence upon the notation of organic substances.

ON BRIGHT'S DISEASE OF THE KIDNEY.

By Dr. George Johnson.

[We present to our readers in this paper the views of this eminent writer; for, though professing to be a review of several foreign works, it is, in reality, an interesting and short monograph on this subject, by Dr. Johnson. First, of the morbid change of the kidney:]

The following is the order of phenomena as interpreted by Reinhardt and Frerichs: an engorgement of the renal blood vessels, an effusion of inflammatory product, a more or less complete and general metamorphosis of these products into fat, and finally atrophy and wasting of the kidney. The small contracted granular kidneys have once been fat; the large, pale, fat kidneys are in continual progress towards atrophy and contraction.

[In answer to this definition of Bright's disease, Dr. Johnson remarks:]

The first observation which we have to make, with reference to this systematized description of renal disease, is, that there is no proof whatever that hyperæmia or over-fulness of the blood-vessels, is either a cause or an antecedent of those exudations into the uriniferous tubes, which constitute an essential feature of the inflammatory forms of renal disease. We refer now to the rapid formation of epithelium within the convoluted tubes, and to the occasional replacement of the normal epithelium by puriform cells. These changes in the tubes, it is true, are accompanied by engorgement of the blood-vessels, and the phenomena occur almost, if not quite, simultaneously; but, in the order of causation, the changes in the secreting cells stand first. The circulation is impeded in consequence of morbid changes primarily affecting the secreting cells, and retarding their functions. Engorgement of blood-vessels implies, not an increased afflux of blood, or a more rapid circulation, but a retarded and impeded circulation, the impediment being shown by the frequent occurrence of hemorrhage from the Malpighian capillaries in the early stages of acute renal disease, and by tortuosity of the arteries, with great hypertrophy of their muscular coats, after long-continued morbid changes affecting the secreting cells.

The theory of the *oneness* of Bright's disease has apparently had its influence in leading our authors to overlook the importance of distinguishing the various kinds of exudation into the tubes, which occur during the inflammatory forms or stages of the disease. If these varieties of morbid products were appreciable only after the death of the patient, their distinction would have little practical value; a moderate amount of clinical observation, however, will show, first, that the precise nature of the pathological changes which are occurring in the kidney, may, with few exceptions, be as readily detected by a microscopical and chemical examination of the urine during life, as by the most searching *post mortem* inspection of the kidneys; and secondly, that the various kinds of products observed in the urine have a widely different significance when viewed in relation to prognosis. With reference to this point, it is of the first importance to ascertain, in any case of recent albuminuria, whether the urine is clear and free from sediment, or whether it deposits morbid materials, and what is the nature of these materials,—whether there are any forms of tube-casts, and what is their appearance,—are they composed of blood or of pure fibrin? or do they entangle organic cells of any kind, and what is the nature of these cells? have they the character of renal gland-cells; and do they contain oil, or are they free from that material; or, lastly, do they more nearly resemble pus-corpuscles?

[The microscopical examination of the urine, during the patient's lifetime, is of the greatest importance in investigating the disease. In the inflammatory stages, in a large proportion of cases, renal gland-cells are entangled in the fibrinous materials of the casts; and in other instances the casts are transparent and homogenous, apparently being composed of pure fibrine, larger, and without entangled epithelial cells. The latter ones have been formed in those tubes which possess *no* epithelial lining: the former and smaller have been formed in those tubes which possess the epithelial lining complete.]

The Stage of Fatty Degeneration.—In considering the subject of fatty degeneration of the kidney, it is very important to bear in mind that the morbid condition occurs in two distinct forms. The large *granular fat kidney*, which is represented in the third figure of Dr. Bright's third plate, is, in a large proportion of cases, a secondary condition, which has been preceded for a longer or shorter period by an inflammatory state of the organ. We have observed the approach of this form of the disease under the following circumstances:

1. An acute attack of general dropsy, with high-coloured, albuminous, and bloody urine, and an abundant desquamation of epithelium, is followed, after a period of three or four weeks, by an appearance of oil in some of the cells; and as the disease makes progress, the total amount of epithelium in the urine diminishes, while the proportion of the cells which contain oil is increased, until at length nearly all the cells are more or less distended with oil, many of the cells, as well as scattered oil-globules, being entangled in small transparent wax-like casts. After death the kidneys are found enlarged, the cortical substance pale, and having scattered through it the characteristic yellow granulations, which very much resemble the minute atheromatous spots which are often seen in the arteries. These granulations are found, on microscropical examination, to be composed of convoluted tubes distended with oil, which is partly free and partly contained in cells. In other tubes the epithelium appears opaque, but contains no oil, and the central canal is free from deposit, while in others again there is an accumulation of epithelium, or a fibrinous effusion, or both combined.

2. In other cases the approach of fatty degeneration is different. The disease is chronic from the commencement; the urine is highly albuminous but frequently of the natural colour, and either free from sediment, or it deposits a light cloud, which contains some of the small transparent waxy casts before mentioned. After a period, which may vary from a few weeks to many months, these casts entangle oil partly in the form of scattered globules, and partly contained in cells. The oily casts and cells continue until the fatal termination, and after death the kidneys present essentially the same appearances as in the cases last mentioned.

The second form of fatty degeneration of the kidney differs in many important particulars from the preceding. The kidney is enlarged, but the cortical substance wants the granulations which are characteristic of the first-mentioned form, and it has instead a mottled appearance. On a microscopical examination all the tubes of the cortical substance are found to contain an excessive quantity of oil, which is, for the most part, contained within the epithelial cells. This condition of the kidney is sometimes found both in the human subject and in the lower animals—in cats and in dogs—unconnected with albuminuria, or with other functional symptoms of renal disease; while in other cases of dropsy, with albumen and oil in the urine, this mottled form of fatty degeneration has been the only anatomical change observable in the kidneys after death. It will be seen, therefore, that the two forms of fatty degeneration differ in these important particulars: 1st, that in the granular form of disease the fatty degeneration is partial, while in the mottled form it is general, throughout the tubes of the cortical substance; 2nd, that in the granular form of disease, albuminuria, and what may be considered an inflammatory stage, precede, sometimes for a considerable period, the signs of fatty degeneration, while in the second form a great degree of fatty degeneration may exist unassociated with an albuminous condition of the urine.

The stage of Atrophy.—We come now to the consideration of that condition of the kidney, the most remarkable outward feature of which is a diminution of size and weight. The atrophy effects primarily the cortical substance, the surface of the kidney usually becomes uneven and coarsely granular, and its vascularity is much diminished. The first and second figures in Dr. Bright's third plate are probably familiar to most of our readers.

We have already stated that Reinhardt and Frerichs agree in considering that these small granular kidneys have passed through the stage of fatty degeneration, and that atrophy of the gland is only a later stage of the same morbid process as that of which inflammatory effusion and fatty degeneration constitute the first and second stages. In this opinion Eisenmann and Mazonn also concur, although they differ from Reinhardt and Frerichs in respect to some points of less importance. Now, with reference to this question, we dissent entirely from the opinions of these pathologists. True it is that a careful and extended series of observations upon morbid urine and kidneys had led us to form a judgment upon the point in question before we had any knowledge of the opinions referred to, but we trust that we were not, on that account, less open to conviction by any evidence which might be adduced to prove the transition from fatty degeneration of the kidney to that contracted condition of the organ with which every pathologist is familiar. But as we have met with no such evidence in the course of our own study of morbid phenomena, so we find none in the writings to which we have access. None of our authors attempt to prove the transition in question by clinical observation of the urine, but their opinion appears to be based upon what they consider the morbid change in the kidneys, as determined by *post-mortem* examination.

Our limits will permit us to indicate only some of the principal facts, which tend to prove, as we think incontestably, that the large granular fat kidney and the small contracted kidney are the result of two morbid processes as essentially diverse as is consistent with the fact of the two diseases affecting the same tissues.

The most characteristic feature of that form of the disease which leads to atrophy of the kidney is a disentegration of the epithelial cells, which appear in the urine in the form of granular casts of the tubes. In consequence of this washing away of disintegrated epithelium from the tubes, the basement membrane is left denuded, and subsequently the tubes, having lost their epithelial lining, either waste away entirely, or, as we believe, they may continue to secrete a serous liquid, and so become dilated into cysts. In consequence of the atrophy of the tubes, the meshes of the matrix, in which the tubes are packed, become narrowed, and the fibres appear relatively thicker. Frerichs describes a development of new fibrous tissue as an occasional occurrence, and Mazonn considers it to be a constant and a characteristic condition. As Frerichs doubts the very existence of the normal fibrous matrix, his evidence upon this point is of little value to those who believe in the existence of such a tissue. Mazonn recognizes the normal intertubular tissue, and believes that he can distinguish this from the newly formed fibres which are the product of disease.

A very few of the tubes may usually be found to contain oily matter, and this occurs more frequently in the denuded tubes than in those which still retain their epithelial lining. The thickening, and finally the obliteration, of the Malpighian capillaries, and the hypertrophy of the arterial coats, occur in this as in all forms of chronic renal disease.

The points of contrast between the fat granular kidney and the contracted granular kidney are chiefly in respect of the tubes, with their epithelial lining. In the contracted kidney the disintegrated epithelium is swept away in the form of granular casts, and the tubes thus left denuded either waste or grow into cysts. In the fat kidney the epithelium for the most part retains its position, and undergoes fatty degeneration, the tubes neither become denuded nor waste as in the contracted kidneys, nor do they, except in very rare instances, grow into cysts. The combination, in the same subject, of the characters of the fat and the contracted kidney, are so rare as to prove that, while the two forms of disease are not absolutely incompatible they are by no means allied: indeed, their relation is rather one of antagonism, since, in the one case, the epithelium is disintegrated and swept away, while in the other it remains, and undergoes fatty transformation.

That the fat kidney has no tendency to pass into the contracted one, is shown by the *post-mortem* examination of cases which have been for a long time under observation. Not long since we examined the kidney of a man who had been nearly four years ill. He first had dropsy in the autumn of 1848: the urine was highly albuminous, and contained only casts and cells in November 1849, the same in January 1850, and again in December 1851; after that we have no note of the urine. He died in March of the present year (1852). One kidney had been destroyed by a calculus in the ureter, and the other was more than double the natural size and weight, and had all the characters of a granular fat kidney, but not a trace of denuded or atrophied tubes. In another case, which had been nine months under observation, the urine, from first to last, contained oily casts and cells. The kidneys were much enlarged, and presented all the characters of fatty degeneration, but not a trace of the process which leads to atrophy.

But the essential difference between the two forms of disease may be proved by evidence of another kind, which may appear more conclusive to some of our readers who, perhaps, have less confidence than ourselves in the results of microscopical observation. The chronic desquamative disease which causes the disintegration and destruction of the epithelium, and finally extreme wasting of the kidney, is in many cases one of the most insidious of maladies, and it may proceed to the extent of destroying a large portion of the epithelium of the kidney without the occurrence of dropsy or any other formidable symptom; when perhaps, suddenly, in consequence of some accidental cause, the most urgent symptoms of suppressed secretion arise, the patient soon dies, and the kidneys are found wasted, and many of their tubes denuded and atrophied. We have before us the notes of four such cases; one patient was suddenly seized with peritonitis, and died in a few hours, a second died with apopletic symptoms, a third with delirium and epilepsy, and a fourth with obstinate vomiting, consequent upon suppression of urine. The first two patients were supposed to be in good health until the period of their sudden seizure. In the last case alone had there been any dropsical symptoms, and these were only very slight and transient. In all the cases the kidneys were in an advanced stage of that chronic form of disease which is characterized by denuded and atrophied tubes. In contrast with these cases, which are by no means rare, we place the fact, that, according to our experience, the *granular form* of fat kidney *never* destroys life without the previous occurrence of dropsy, which is usually one of the most prominent and distressing symptoms. Again, we have very rarely met with a case of inflammatory disease of the kidney—such as Reinhardt and Frerichs agree in referring to the first stage of Bright's disease—unaccompanied with dropsy in some degree, and for a variable period. Now, according to the opinion of these pathologists, the kidneys of the four patients whose cases we have briefly mentioned must have passed through an inflammatory stage, and a stage of fatty degeneration, before they finally arrive at the stage of atrophy; yet, in three of the cases there had been no dropsy whatsoever, and in the fourth case a slight and transient oedema of the ankles—such as might occur in any debilitated subject—had formed the only dropsical symptom. This supposition is so improbable that we should hesitate to admit the doctrine which is based upon it, even without that we consider the conclusive evidence of the minute structural changes in the kidneys. We therefore feel bound to dissent from the doctrine of the oneness of Bright's disease, as propounded bo Reinhardt and Frerichs. The apparent simplicity of the doctrine is not in accordance with nature, and it therefore tends to cause confusion. While we recognise an inflammatory form of the disease, we must, for the purpose of diagnosis and prognosis, distinguish between the various kinds of effused products, which are chiefly, besides serum and blood, epithelium, pus, and pure unorganized fibrin. We must distinguish the granular form of fat kidney, which may be a consequence of a previous inflammatory stage, from the mottled form of the disease, which is analogous to ordinary fatty degeneration of the liver, and not a consequence of inflammation. Finally, we must recognise the fact, that the small contracted kidney, although an occasional consequence of an acute inflammatory attack, is more commonly the result of a disease which is chronic from the commencement, and never, as we believe, a consequence or a later stage of either of the forms of fatty degeneration.—*Brit. and For. Medico-Chirurgical Review. Jan. 1853, p. 57.*

ON THE NATURE AND TREATMENT OF DIABETES MELLITUS, OR GLUCOSURIA.

By M. Bouchardat.

[The following abstract upon this subject is taken from the review of an article in the memoirs of the French Academy, 1852.]

By the plan which M. Bouchardat now recommends to our notice, in its full detail, he declares that he can cure the majority of cases of diabetes—his test of cure being not only present removal of the sugar from the urine, but the ability of the patient to employ feculent ailment, without its reproduction. He, however, requires the intelligent co-operation of his patient, and, above all, the frequent testing of the urine, by the patient himself, as a means of ascertaining progress and guarding against relapse. The means chiefly to be relied upon are those of hygienic character; and at all events the power of these should be exclusively ascertained at first, before resorting to any medical agents.

1. *Diet*—As long as the urine exhibits sugar, all feculent and saccharine ailments must be entirely excluded; but the patient need not be confined to what is called an exclusively flesh diet, although this, when not repugnant to him, is the best. Every description of meat, dressed with the usual sauces and seasonings (to the exclusion of flour, however) may be employed: and for those who can get over the prejudice against it, the flesh of *carnivorous* animals, M. Bouchardat says, is best. By proper management (and what cannot a French cook do?) that of the cat or fox becomes a highly relished viand. Several poor patients, who otherwise would have been unable to procure flesh diet, have resorted to this means with advantage. Fish, in all its numerous varieties, forms a valuable resource for both rich and poor, and may be eaten with an abundance of oil and a moderate quantity of vinegar. Eggs, again, so susceptible of various modes of preparation, are excellent; and although milk is forbidden, good fresh cream and all kinds of cheese are allowed. Except in extreme cases, green vegetables and salads, although they contain some sugar, starch or gum, may be taken in moderate quantities; but abundance of oil, or the yolk of eggs, should be conjoined. For such patients who cannot well overcome their liking for bread and other feculents, M. Bouchardat has, during the last ten years, had prepared a bread of flour containing 70 per cent of gluten.

As the prohibited feculent and saccharine bodies belong to that respiratory group of alimentary substances, we have to choose others from the same group; and those best calculated to supply their places are fatty bodies and alcoholic drinks. Among the latter Bordeaux wine occupies a prominent place, as much as from one to two *litres* (from two to four pints), being admissible *per diem*, which at ten per cent, of alcohol, would supply about 150 *grammes* ($2\frac{3}{4}$ oz.) of this substance in the 24 hours. Fatty bodies must not be given too exclusively lest they excite disgust, but mingled with other aliments, from 150 to 200 *grammes* being required in addition to the alcohol. Beer is objectionable from containing dextrine. Coffee, drunk without milk or sugar, and to which a little rum, cream or brandy may be added, is a good drink. To relieve thirst, Seltzer, Spa, Vichy, or soda water may be taken; but acid drinks, so keenly desired by the patients, are very objectionable The patient should always eat and drink in moderate quantities, slowly masticating his food. This practice tends to the relief of the attendant dyspepsia, and to assist the distended stomach to return to its normal dimensions. A flannel bandage applied around the epigastrium contributes to the same end.

2. *Clothing*—As chills operate very injuriously on these patients, warm flannel clothing forms a valuable protective agent, and beneficially excites the languishing functions of the skin. Indeed some medicinal agents are of no avail unless aided by complete flannel clothing which maintains diaphoresis. General frictions are very useful, and a moist warmth of the feet should be maintained.

3. *Exercise.*—To recommend this indiscriminately would be injudicious, for many patients are too feeble to undertake it. But when their strength has become somewhat recruited by regimen, walking, gymnastics, agricultural labor, &c., much expedite the cure, and are found, as recovery is approaching, to enable the feculent aliments to become utilized by the system.

4. *Pharmaceutical Agents.*—M. Bouchardat entertains a high opinion of the utility of *carbonate of ammonia* (from 5 to 15 *grammes*—77 to 230 in the 24 hours), providing flannel clothing be worn. Other *alkalies* suffice for slighter cases, when the urine contains uric acid as well as glucose. Employed consentaneously with out-of-door exercise, they seem to exert great influence in preventing the reappearance of sugar in the urine, when feculent aliments are resumed. *Opiates*, if given alone, are mere palliatives; but when conjoined with other remedies, and in moderate doses, so as to act on the skin, they are very valuable. M. Bouchardat sometimes prescribes Dover's powder, but prefers the old theriaca before all other preparations, without defending the absurd complexity of its composition.

In severe cases of glucosuria, then, diet, exercise, and flannel clothing constitute the basis of treatment, carbonate of ammonia and opiates best aid their action. Other remedies have their occasional uses, such as iron, tonics, chloride of sodium, and antiscorbutic plants. M. Bouchardat often employs emetics at the commencement, and endeavours to modify the disturbed functions of the liver by aperients, of which ox-gall with rhubarb is the best.

Circumstances influencing the effects of Treatment.—Foremost among the *favourable* indications in a case is the *rapid return of the urine to a normal state*, which may take place in from 24 to 48 hours after the feculents have been excluded. The *recent date of the affection* is another highly favourable circumstance; and because it is so, M. Bouchardat urges testing the urine whenever the slightest suspicion can be held, and for the detection of relapses, which are frequent and insidious. Other favourable circumstances are the retention of considerable *embonpoint*, the easy circumstances of the patient, and his being in possession of great perseverance.

The *unfavourable* circumstances are the reverse of the above; but negligence is still worse than poverty, as the poor man has some resources. The treatment of the case is usually ill managed in *hospitals*, owing to the vitiated air, the absence of exercise, the sameness of diet, and the insufficiency of the surveillance. The existence of a great *appetite* is a common and not unfavourable circumstance, requiring only moderation in its gratification, at meals not too far separated. *Want of appetite* is a far more unfavourable sign, which should be actively combated. M. Bouchardat has found small doses of rhubarb, and exercise in the open air, of advantage. *Obstinate constipation*, resisting the most varied purgatives, is a bad complication, indicating disease of long duration, which has produced important modifications in the condition of the alimentary canal. Fatty substances, combined with matters which leave residue, as spinach and gluten-bread with bran, are here indicated. *Cold and damp air* is unfavourable to diabetic patients; but M. Bouchardat has had patients from Algeria, and has not derived advantage from sending others to Italy. M. Bouchardat agrees with Dr.

Prout in considering the appearance of *albumen* in the urine, which is often met with, as an unfavourable occurrence. The prognosis of saccharine albuminuria is not so serious as is that of simple chronic albuminuria. The frequency of the occurrence of *phthisis* in cases of glucosuria is familiarly known. In all the autopsies the author has made, when the patient has not been cut off by an intercurrent affection, tubercles have been found in the lungs; and he feels convinced that many cases of phthisis have had their origin in a glucosuria that has been overlooked, and which might have been easily removed. In severe and old cases of glucosuria, *vision* is always found more or less enfeebled; but in most cases, when not of old date, as the condition of the patient has improved under appropriate regimen, this amaurosis has subsided. When indeed this is not the case, the prognosis of the glucosuria is serious: and it will often be found complicated with albuminuria. *Impotence*, more or less decided, is another effect of glucosuria; but in young subjects the generative functions resume their power when the original disease is rationally treated. Glucosuria may occur at any *age*, from infancy to senility; M. Bouchardat having met with most cases between the age of forty and fifty. He met with none between eighteen and twenty-five. Old age does not constitute an obstacle to cure; but so difficult is it to watch over children, that the author is not aware of a sustained cure prior to fifteen years of age. He has met with more male than female patients.—*Brit. and For. Medico-Chirurgical Review, Jan.* 1853, *p.* 141.

CASE OF ANEURISM BY COMPRESSION.

Under the care of Edward Cock, Esq.

[From a very important case of popliteal aneurism treated by compression, the following points would appear to have been established:]

1. That the main-trunk, supplying an aneurism sac, may be steadily compressed for more than three months without the obliteration of the vessel being obtained.

2. That the aperture establishing communication between the still patent artery and the sac (the latter being partly filled up by the fibrinous layers) may during the same period, remain open, in spite of compression exerted on the arterial trunk and sac.

3. That the current of blood so admitted has sufficient force to make the aneurismal tumour pulsate continuously.

4. That the sac, notwithstanding the impulse communicated to it by the artery, goes on diminishing in size, and becoming harder.

5. That all the pain and uneasiness connected with the aneurismal tumour may cease, although the pulsation do continue.

6. That the tendency for a twelvemonth is rather toward the decrease than the increase of the tumour.

7. That great disturbance of the sac and vessel producing inflammation and congestion, may so change the relation of parts, and so far favour fibrinous deposits and general adhesions, as to require compression on the main trunk but a short time for the complete obliteration of the latter, and the consolidation of the sac.

[In a second case, however, of the same disease, the features offered a striking contrast. The patient was a carpenter 75 years of age, tall and robust, and had always been of temperate habits. Three months before admission his leg and thigh had pained him for a few days, and a month afterwards, he found a small lump, the size of a plum, in the popliteal space. During the next two months the tumour had got gradually larger, so as to seriously impede walking.]

On admission, the patient's state was the following:—There is a strong pulsating tumour, partly in the right popliteal space, and partly lower down towards the gastrocneminus muscle. The swelling begins above, in the popliteal space, opposite to the upper border of the patella, and ends below, on a level with the tubercle of the tibia. The tumor is round, and about the size of a turkey's egg: it pulsates strongly, and presents, on auscultation, a strong bruit. The chest, on careful exploration, does not yield any evidence of thoracic aneurism. The tumour feels yielding and elastic, and the hand placed upon it receives a sensation as if the vessel were dilated more towards the inner than the outer side.

Mr. Cock, after considering all the symptoms of the case, and giving due regard to the constitution, health, temper, &c., of the patient, resolved to give compression a fair trial, and used a clamp lately modified by Mr. Bigg, to which the latter has given the name of "Bigg's Aneurismal Compressor." The instrument may be described as follows:—

Semicircle of steel, with anterior and posterior moveable arms, the anterior containing the screw and pad to the rest of the artery, the posterior holding the hinged cushion or splint, on which the limb is placed. When the instrument is applied, the pad is screwed down so as to *gently* compress the artery. The center screw is then turned to direct the pad inwards, and fix the artery between it and the bone. The lower screw placed beneath the cushion raises the outer edge of the splint, and prevents the instrument moving in the slightest degree. The advantage of this instrument seemed to us to consist principally in giving the pad a direction inwards towards the bone, and in completely securing the limb by a good broad splint, which may, by a screw placed beneath it, be brought in closer contact with the thigh.

Mr. Cock expressed himself greatly pleased with the manner in which this clamp acted all through the case.

The compression was begun Nov. 24th, and regularly continued to Dec. 10th, making just sixteen days. The pulsation ceased five days before the apparatus was completely let off: but it was thought advisable to continue the pressure, so as to ensure the due establishment of the collateral circulation. The tumour was on the day of the patient's discharge (Dec. 22, 1852, thirty-seven days after admission) just half its original bulk, and presenting a great degree of hardness. The pressure was kept up with great regularity and patience, during the whole of the above-mentioned period; the weight at the groin being substituted for the clamps when the latter were getting too irksome. The patient slept very little for a whole week; he was anxious to keep up the pressure in the most exact manner; and he was fully rewarded for his close adherence to Mr. Cock's directions, by the speedy solidification of the sac and the obliteration of the artery.

When the apparatus had been completely removed, the leg was tightly and evenly secured by a roller; and when the patient first attempted to walk he felt the leg rather weak, but all pain in the limb had quite disappeared. He finally left the hospital Dec. 22, 1852, with the tumour quite solid, and the complete obliteration of the artery.

This is certainly a most satisfactory result of compression in the treatment of aneurism, and likely to make a lasting impression on all those surgeons who saw the case.

The operation of tying the main artery and compressing it for the cure of aneurism are, in fact, identically the same in principle. Some surgeons, as Mr. Syme, prefer the old method. We must say, however, that the compression, as used in Dublin and London, seems equally successful, if not more so. It may be sometimes more tedious, but certainly more safe. In both operations the current of blood in the sac is not prevented entirely. The ligature may stop the current in the main artery, but not in the collateral circulation. Therefore in both cases the blood, in fact, is only *impeded* in the tumour—the previous momentum is checked, and the blood passing slowly, lines the parts with fibrinous deposits; and if it be suddenly stopped in the main artery by a ligature, the sac rapidly becomes solidified by coagulum. Eventually, however, both processes are more or less identical.—*Lancet, Jan.* 8, 1853, *p.* 31.

ON THE SEAT OF THE SUGAR FORMATION IN THE ANIMAL BODY.

By Dr. J. Moleschott.

As it is well known Bernard (competes Rendus XXXI. p. 572, 573) has shown the existence of sugar in the liver, not only of all vertebrata, but also in that of the gasteropoda, acephala and decapods. Frerich's (article "Verdauung" in R. Wagner's Handwörterb d'Pysiol, p. 821) has confirmed these observations for the liver of man and many animals; Vander Brock (Nederlansch Lancet, p. 103, 110) for that of dogs and rabbits; Bamnert (Erdmann's Journal, liv. p. 359) for that of the fox, the dog, the cat and the sheep; and Kunde and Lehmann (Kunde, DeHepatis, ranarum exstirpatione, Diss. Beroli , 1850, p. 11) for that of frogs.

I selecte twelve frogs for my investigations, and notwithstanding the smallness of their livers, so much sugar appeared that it was easily shown by Trommer's test. Bernard and Lehmann regard this sugar of the liver as grape sugar.

The question arises, is this sugar of the liver derived from the blood or is it formed by the liver proper? Bernard advocates the latter view, since he has thus obtained the sugar wholly independent of the food, with the carnivora and herbivora, with animals famished during hibernation and with the fœtus in utero. Frerichs, Vander Brock and Baumert have repeated these observations and confirmed them.

Still more important is the result obtained by Bernard (loc. cip.) and Lehmanh (Erdmann's Journal, LIII. p. 214, 215,) that the portal blood of the dog and horse contain little or no sugar, while the blood of the hepatic vein contains, like no other vein in the body, this substance in considerable quantity.

To these data I would add a fact of some import. If the sugar is not found in the liver but is only strained off, as it were, by this last from the blood, then the blood of those animals whose liver had been removed would be found surcharged with sugar, exactly as the blood is filled with urea in animals whose kidneys have been removed. But with frogs, some of which had been without the liver for fourteen days, others for three weeks, I found no sugar in the blood, flesh, gastric juice, urine, nor finally in the water in which twenty-six of these animals thus mutilated had passed two days.

From all these facts it appears to me indubitable that the sugar contained in the liver is formed by the liver itself.—*Muller's Archiv*, 1853, *March*, *p.* 86.

PROSECUTION OF MEDICAL MEN.

Within the past year several suits have been commenced and carried through against medical men for malpractice. Among those in this vicinity we may mention the trials of Dr. Hammond, of Nashua, and Dr. Sargent, of Rochester in this State, and more recently that of Dr. Kittredge, of Andover, Massachusetts. In the first case, Dr. Hammond was acquitted, not more in consequence of the ability of his counsel than the honesty and independence of the surgeon called to testify for the plaintiff. In Dr. Sargent's case we are informed that the verdict was given for the plaintiff in the face of the most explicit testimony from medical men. The same was true in Dr. Kittredge's trial, in which, as we understand it, after an injury to the arm in which there was rupture of the brachial artery, the attending surgeon was brought in guilty for causing the arm to slough off by tight bandaging. The community should be made to understand that by encouraging such prosecutions they are endangering their own safety, and surgeons will be compelled in self-defence to require beforehand a bond that they shall not be prosecuted, whatever may be the result of the treatment. From several recent trials we feel warranted in saying that the chances are altogether better for the acquittal of an ignorant, uneducated pretender to medical knowledge, who is really guilty, than for that of an intelligent, well-educated surgeon to whom no fault can justly be charged.—*New Hampshire Journal of Medicine.*