

constitution," as it is called, has been exhausted), the malarial microbe, like the Giant Antæus, born of Neptune and of the Earth, expires, if its strength be not renewed by a return to the water and to the soil. Malaria, therefore, thrives in the open country, while zymotic diseases spread chiefly in cities.

Another frequent rule is that the receptivity of the body, its power of natural selection is destroyed or diminished by the agency of the germ, a first attack preventing a second. Not only is this not true of intermittent fever or malaria, but it may be doubted if natural selection plays a very important rôle in the etiology of its epidemics, unless the fact of a periodicity in all diseases appearing before an outbreak of malaria be cited in proof of this.

Why malaria spares the colored races which are so especially prone to attacks of infectious and contagious diseases, is a question which awaits further inquiry.⁶

In 1849, Professor J. K. Mitchell, of Philadelphia, in a paper "on the cryptogamous origin of malarious and epidemic fevers," suggested a direction for the study of the etiology similar to that intended in this paper. His theory was admitted to be in harmony with the fact, but was never sustained by actual demonstration.

In 1866, it will be remembered that Dr. J. N. Salisbury declared that he had discovered the origin of malaria in the minute spores of certain species of palmellæ, which he found in great numbers in the saliva of those suffering from intermittent fever, and also in or upon marsh mud recently dried.

Others have followed in the same track without greater success. The spores or ovules of various cryptogamous organisms have been suspected. In all cases, however, it could be shown that these minute plants thrive abundantly in non-malarious regions, and indeed wherever light and moisture were present. These plants cannot therefore furnish the germ, or essential factor, for which search is to be made.

What of the contagion vivum? Prof. Marchiafava and Dr. Celli claim to have discovered in the interior of the red corpuscles of the blood, in those suffering from malarial fever, minute organisms having amœboid movements, and which can be distinctly stained. These they term *pla-modes* of malaria. They are capable of transformation, by a process of fission, into granules not possessing motion. As infection progresses these bodies multiply, and are accompanied by an accumulation of pigment. The exhibition of quinine causes them to disappear or deprives them of all motion. They diminish as infection ceases. The intravenous injection of malarial blood will cause them to appear and multiply in the blood of the recipient. They are regarded as of a parasitic nature, and as belonging to the simplest class of protozoa. "As yet their pure culture outside of the body has not been effected, nor their natural source discovered." (*Bos. Med. and Surg. Jour.*)

The effect has been made in this paper, while covering the ground of what is believed to be known with regard to the malarial infection, to draw as near as possible to the borders of its "boggy Syrtis," and by the aid of the germ theory to throw light into the fog and mists which now shroud it from view.

⁶ That an acquired melanosis of malarial origin, or that the protection against insect bites afforded by a dark skin, should be accepted as a sufficient explanation of the exemption of the colored races from malaria, seems to the writer to be not consistent with the facts, and not sustained by authority.

It may not be too much to claim, in conclusion—*First*, that water is almost certain to prove to be its habitat, and the vehicle by which this microbe enters the human organism; *Second*, that by new methods of investigation its life-history may be studied; and *Third*, these two points being gained, that it is possible to attack the free germ, or prevent its admission to the body and thus the disease may be checked.

In the future undoubtedly new devices will be employed for the prevention of epidemic diseases. Thus far the only effectual method has been that introduced by Jenner and vaccination, namely, the exhaustion of the "epidemic constitution" in the human being. In most of the zymoses this factor is first in importance. But to prevent the development of epidemic virulence in the free microbe is probably in certain diseases of equal, if not of greater, necessity. In malaria, for example, may not this parasite be found and destroyed in its dormant, chrysalid, or nascent, state? May it not be sought and studied in water better than in the animal fluids? And, if this be admitted, there seems no clear and sufficient reason why our other senses, smell, taste, perhaps touch, aided by chemistry, it may be, or possibly electricity or mechanical means, should not, in this simple element, help us in accomplishing that which, in the case of bacteria and bacilli, is only possible to the organ of sight assisted by the microscope.

ABDOMINAL CELLULITIS.¹

BY JULIAN A. MEAD, M.D., OF WATERTOWN.

THE term abdominal cellulitis does not appear in the index of any medical work that I have consulted; and its analogue, pelvic cellulitis, is fast yielding to the influence of the modern analytical tendency, which divides and sub-divides each subject until the broad and distinguishing characteristics of the whole are overshadowed by the peculiarities of the part.

Without the least desire to call in question the great gain that this classification has conferred upon our profession, it has seemed to me that something perhaps may be learned by imitating the microscopist, who, by occasionally substituting the lower power for the high, obtains a more comprehensive, if less minute, idea of the nature of the pathological condition under examination.

The abdominal cavity contains a large amount of what is known as cellular or areolar tissue. It surrounds and supports the various organs, and is distributed so universally throughout the abdominal cavity, that it is necessarily concerned in most inflammations, and is the seat of the chief changes that result.

The areolar tissue consists of loosely-interlaced bundles of two forms of fibrous tissue, the white and yellow, with flattened connective-tissue corpuscles adherent to them, together with a great quantity of capillary vessels, nerves, and lymphatics, and, in most places, fat.

According to Gray, the chief use of the cellular tissue is to bind parts together; while, by the laxity of the fibres and the permeability of its areolæ, it allows them to move on each other, and affords a ready exit for inflammatory and other effused fluids.

This tissue, when inflamed, whether in the abdomen

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or elsewhere, undergoes important changes. The essential changes that take place in inflammation have been satisfactorily demonstrated; the difference in the symptoms depends largely on the seat and intensity of the inflammation, and their variability is not a valid argument against the unity of the process.

The credit of the modern explanation of inflammation belongs to Cohnheim; it matters not whether or no we admit that a proliferation of the fixed corpuscles takes place, as is held by Virchow, Von Becklinhamen, and Stricher; the only satisfactory explanation of the phenomenon of inflammation is that afforded by Cohnheim's theory. As observed and stated by Cohnheim, the changes in an inflamed tissue are as follows: The vessels, in the order of artery, capillary and vein, at once begin to increase in size, the velocity of the blood, at first quickened, gradually diminishes, and the white corpuscles range themselves along the walls of the veins, where they move slowly along, tumbling over each other until they become stationary. On the outer contour of the walls of a vessel, usually a vein, in which the marginal layers of white corpuscles are well developed, is seen a small projection, which enlarges in length and breadth, and becomes a rounded, colorless lump. This again enlarges, puts out new pointed projections, and gradually withdraws itself from the wall of the vessel until it is attached to it only by a long, narrow stem. Finally this attachment is broken, and we see a colorless, contractile body, with one long and several shorter processes, with one or several nuclei, in fact, a white corpuscle. The white corpuscle in this way passes out of the vessel and becomes a foreign body. The number of corpuscles that pass through a vein in a certain time depends upon the intensity of the inflammation; when, however, the inflammation is fairly acute, six to eight hours suffice to completely surround the veins and capillaries. Red corpuscles also pass through the walls of the veins and capillaries, but neither white nor red pass through the walls of the arteries. The liquor sanguinis soon follows, and the surrounding tissue is soon drenched with it.

The cardinal symptoms of inflammation, heat, pain, redness, and swelling are readily understood and explained, if we bear in mind the above-mentioned minute changes that take place in the vessels. The swelling, heat, and redness are the direct result of the effused corpuscles and liquor sanguinis. The pain is caused by injury to, or pressure of the nerves. The fifth symptom, impairment of function, is accounted for by the size of the exudation, and the lack of the usual nourishment.

Such an inflammation of the cellular tissue cannot occur without causing injury, the extent of which is proportional to the nature of the cause of the inflammation, and the degree to which its harmful influence is felt.

Inflammation ends in resolution, production, or destruction. By resolution is meant complete absorption of the exudation, and restoration of the integrity of the affected part. This process begins as soon as the walls of the bloodvessels are restored to their normal condition. If the inflammation is mild, and the injury of the bloodvessels trivial, the cellular tissue is quickly relieved of the exudation, which is taken up, partly by the lymph-vessels and partly by the bloodvessels. Should the inflammation be more intense and cause considerable exudation, and a slight destruction of the tissue, the process of resolution is more complicated;

the fluid part of the exudation and the cells are absorbed as before, but the solid part of the exudation must become softened and liquefied before the lymph and blood-vessels can take it away. This dead tissue, removed by the vessels, is, if not large in amount, replaced by a new and similar growth. Sometimes, indeed, the amount of this regenerative growth exceeds the original loss, and causes a hyperplasia of the diseased tissue.

Inflammation ends in production when the process is more intense than that which results in resolution, but not sufficiently intense to induce the formation of pus, and also when the circulation in the bloodvessel is not materially impaired. According to Ziegler, the cells that form this new productive tissue, granulation or cicatricial, are the same white corpuscles that have passed out of the vessels.

The essential part of the formation of this new tissue is the existence of new bloodvessels, without which the tissue would not be produced or sufficiently nourished. Unfortunately, all inflammations do not run the favorable course above described. Instead of resolution and production, there may be destruction. This happens when the nutrition of the inflamed tissue is cut off by the stoppage of the vessels on which the tissue depends for its support. The more abundant and more cellular the exudation, the more likely is the inflammation to end in destruction. Billroth says, as the inflammation progresses, the entire inflamed part is finally changed to pus, that is, to fluid tissue, consisting of cells with some serous intercellular fluid, which is mixed with shreds of dead tissue. The tissue surrounding the purulent collection is filled with cells, and is very vascular; anatomically, it closely resembles a granulating surface lining the whole cavity.

If the exudation softens and becomes liquid rapidly, it forms an acute abscess; if slowly, a cold abscess. The course of inflammation has been described somewhat in detail, because it will assist to a more intelligent understanding of the nature of the inflammatory process that takes place in the cellular tissue of the abdominal cavity. This pathological change is practically the same, whether the seat of the disease be near the cæcum or kidney, in the abdominal wall, or in the fascia behind the peritoneum. Its course and its results may be, and undoubtedly are influenced by the surroundings, but the inflammation goes steadily on to resolution, production, or destruction, with the formation of pus.

As in diseases of the kidney it is not uncommon to find one type complicated by another, and the most important symptoms obscured by the prominence of the complication, so we shall find that an inflammatory process of the cellular tissue does not in every case run a typical course. The symptoms will show that complications exist which, while they do not change the nature of the disease, modify its course and influence its manifestations.

It is generally admitted that an abscess which originates in the abdominal wall, in the sub-peritoneal cellular tissue or in the region of the loins, and is totally unconnected with disease of bone, or with ulceration of the bowels or with child-birth, is not a very common occurrence.

Dr. Gurdon Buck says that suppuration may take place in the iliac fossa behind its fascia, unconnected with caries of the lumbar vertebrae or pelvis or morbid lesion of the cæcum or colon. The same writer describes the true postfascial abscess originating in the

iliac fossa from idiopathic inflammation of the cellular tissue, as follows: It represents itself in a chronic, more rarely in an acute, form, and locates itself in either the right or left iliac region. It is most frequent in adult age. The tumor which it forms rises up from the hollow of the ilium, pushing before it the fascia and outer half of Poupart's ligament so that the crest of the ilium and the anterior superior spinous process can no longer be grasped between the thumb and finger. The outer half of Poupart's ligament, is rendered tense and unyielding, and a deep seated induration may extend two or three fingers' breadth below it. The precise limits of the swelling can only be appreciated by the touch and by percussion over its abdominal portion; upon the surface, the eye perceives only a fulness or a diffuse swelling of those parts.

Of seven cases, in only one was fluctuation unequivocal. In all except one the thigh was retracted and attempts to straighten it caused pain.

The phlegmonous character of the swelling, its anatomical relation to the iliac fossa and Poupart's ligament, the absence of disease of the lumbar vertebræ and the co-existing retraction of the thigh, these points being clearly made out, are sufficient to warrant the conclusion that suppuration has taken place in the fossa behind the fascia.

Oppolzer divided the inflammatory process in the region of the cæcum into perityphlitis and paratyphlitis, the former being limited to the peritoneal envelop of the cæcum and appendix vermiformis, and the latter to the post-peritoneal and post-cæcal connective tissue. This is a refinement in diagnosis that is not warranted by actual experience. A preponderance of certain symptoms, namely, the pressure symptom in the right lower extremity; the flexed thigh; formication, numbness, pain, and sometimes paresis of the right leg; dysuria, and retraction of the testicle, and pressure upon the iliac vein inducing thrombosis, show that the tissue behind the cæcum has become affected, but these symptoms do not limit the disease to this locality. In a majority of cases the peritoneal covering of the cæcum and the vermiform appendix participates in the inflammation. An English writer says that there is reason to believe that this malady is often passed over unrecognized, and is of more frequent occurrence than is supposed. This is said to be the case in children, in whom cases of iliac abscess around the cæcum are liable to be mistaken for hip-joint disease, though with perhaps scarcely sufficient reason.

This disease is generally secondary to some affection of the cæcum, but also arises from perinephritic and psoas abscess, vertebral caries, septicæmia, and external injuries such as blows, kicks, or severe compression.

In the admirable "Letters to a Young Physician," by Dr. James Jackson, mention is made of a painful tumor near the cæcum. Dr. Jackson located the pain and tumor on a horizontal line connecting the two anterior superior spinous processes of the ilium at the point where this line intersects the right margin of the rectus muscle on the right side. This tumor is felt on deep percussion. Sometimes it is superficial. Marked tenderness on pressure exists within a circumscribed space over the tumor. According to Virchow, the tumor may be as large as a man's fist, but as a rule it is much smaller. Dr. Jackson frankly admits his inability to form an opinion as to the precise seat and

nature of this affection. It is clear, however, that he described what is known as perityphlitis, that is an inflammation of the connective tissue around and behind the cæcum; the accuracy of his localization and description is borne out by modern research.

The nature of this affection has been described in the beginning of this paper, and an intelligent explanation given of the swelling, pain and nervous symptoms. The gradual disappearance of the tumor in one case, and the formation of an abscess in another, was accounted for. The same treatment, namely, rest, poultices, opium, and an early opening of the abscess, that has been found beneficial in inflammations in other localities, is indicated here for the same reason. Opium and incision of the abscess should be resorted to early, on account of the danger of rupture into the peritoneal cavity. The value of opening these abscesses is shown by contrasting the sixty-seven cases, mostly treated without incision, with a mortality of forty-seven and a half per cent., reported by Bull, of New York, in 1872, with the one hundred cases treated by operation, with a mortality of only fifteen per cent., reported by Noyes, of Providence, in 1883.

Another favorite seat for abdominal cellulitis is the loose connective tissue around and behind the kidneys. This affection has received the name, from its location, perinephritis. The inflammatory process generally begins in the connective tissue behind the kidney. Perinephritis, like perityphlitis, is generally secondary, but it may be primary.

In the earlier stage the cellular tissue behind the kidney is suggested; later, as a result of the exudation of the white corpuscles and liquor sanguinis, it becomes solid and firm. This congestion causes from the first pain and tenderness. When exudation has taken place, a hard tumor appears in the lumbar region which, if the inflammatory process continues, becomes soft and fluctuating in the middle, and generally more distinct and superficial.

The inflammatory process may stop short of the formation of pus, and the swelling may gradually disappear. The inflammation is then said to have terminated in resolution. Trousseau in his Clinical Medicine mentions several cases that resulted in this way. If the inflammation goes on to suppuration the tumor should be explored, and the pus, when demonstrated, should be at once removed. An early incision is desirable, as it may anticipate an unfavorable burrowing or pointing of the abscess.

Local inflammation of the cellular tissue may occur in the abdominal walls unconnected with disease within the cavity, and may terminate in suppuration. Such abscesses are generally the result of an injury, and are usually found near the umbilicus. The absence of urgent symptoms referable to the abdomen will distinguish these abscesses from the peritoneal abscess. An effort on the part of the patient that makes the recti muscles tense, such as raising the trunk or forced expiration, will protrude the superficial and obscure the deeper tumor. These abscesses require but little treatment, and the prognosis is generally good. In case they are connected with and dependent upon some intestinal trouble, the progress and treatment depends on the extent and nature of the intestinal disease. Dr. Howell, of England, reported a case of a man with a small, hard tumor, about the size of a hen's egg, lying over Poupart's ligament, about midway between the external and

internal abdominal rings. After two days the tumor began to soften, and an incision was made and four ounces of pus were discharged. On the following morning two worms were found in the poultice. Fæces passed by the wound for three weeks. The man recovered within two months. After confinement it is not uncommon to find an extra-peritoneal abscess in the inguinal region. To quote Dr. Coale, its most frequent seat is where the aponeurotic covering of the deep abdominal muscles going to the thigh passes into the fascia transversalis and Pourpart's ligament. Examination by the rectum and vagina rarely affords any information. In course of time the abscess extends upwards towards the inguinal region, where its presence soon becomes manifest. Here, as in other cases of abscess, an incision should be made as soon as its situation is obtained, and the pus removed.

The foregoing are some of the favorite seats of abdominal cellulitis. The experience of the members of this Society will prove that the list has not been exhausted. Perhaps some of those tumors of the abdomen whose character is obscure, and which do not belong to the so-called phantom tumors, nor to that class that disappear after a good cathartic, may be examples of inflammation of the cellular tissue of the abdominal cavity. It is certain *a priori* that a tumor may appear wherever there is cellular tissue, and an exciting cause for inflammation, and that, while the physician, somewhat in doubt as to the nature of the swelling, postpones aspirating, it may by the process known as resolution, gradually disappear. Such a tumor, when the result of chronic inflammation, might simulate a malignant growth, and suggest a prognosis entirely unwarranted by the nature of the case and its subsequent course. If the pathological condition is recognized, and the changes in the inflamed tissue understood, the prognosis becomes more certain, and the treatment more effective. Should the tumor tend to resolution, general treatment, together with morphia to relieve pain, and poultices to assist the resolution, will suffice. But when pus is suspected or actually demonstrated, an effort should be made at once to remove it, either by aspiration or incision.

The object sought in the preparation of this paper has been to call attention to the frequency of abdominal cellulitis; in short, the unity of its course in different parts of the abdomen; to suggest the possibility of mistaking for other diseases; to explain the nature of the disease, and to point out the necessity of an early evacuation of the pus.

— A correspondent of the *Medical Brief* states that Mr. Savory, President of the Royal College of Surgeons, was recently going round his wards at St. Bartholomew's Hospital, when he came to a case of hernia just operated upon. Turning to one of the students following him, he asked: "You have passed, have you not?" An affirmative answer was returned. "What is a good thing after an operation for hernia?" "A dose of opium." "How much would you give?" "Ten grains." "How would you give it?" "The liquid extract." "How much of it would you require to give you ten grains of opium?" "Half a drachm." "They will not be long before they require an extra coroner in the district where you settle down," was his comment.

BACKWARD DISLOCATION OF THE FINGERS UPON THE METACARPUS.¹

BY E. O. OTIS, M.D., OF BOSTON.

Two cases of backward dislocation of the index finger upon the metacarpal bone give me the text of my subject. One refused to allow a proper attempt at reduction on account of the pain, was unwilling to take ether, and can be speedily dismissed.

The other, a student, was practising jumping for an athletic tournament, and fell upon his hand, with fingers extended. He and his companions noticed at once the deformity, and tried to pull the finger into place. Failing in this, he appeared with his friends at my office. I attempted, by the "Crosby Method" — to be described later, and which was first brought to my notice several years ago by Dr. William Ingalls — to reduce it. Not succeeding, I gave him ether and renewed my attempts, but unsuccessfully. I then rested a while, long enough to have made a Levis's apparatus, which, when applied, gives one an artificially lengthened finger by which greater force can be used in extension. Then, again administering ether, I made a careful and prolonged attempt to reduce the luxation. Several times I thought this was accomplished, but the joint, being left to itself, the dislocation always recurred. Finally, I desisted, and allowed the boy to come out of ether. I then told him that the only thing to be done was an operation; an incision of some ligament or ligaments, having a very vague idea myself of exactly what was to be done. His home being not far distant, I advised him to see his parents and family physician and explain to them what I desired to do, and obtain their consent. He went home, and I did not see him again for some weeks. His finger then did not seem to be in place, nor had it regained its original freedom of motion, although he told me his family physician had performed some sort of an operation. This is the last I saw of him, and the ultimate result I do not know. The case, however, left a very vivid impression upon my mind of the possible difficulties in the reduction of a dislocated finger, quite different from that one would obtain from Keetley's single sentence upon the subject: "Dislocation of fingers," he says, "are not common, and may be reduced by extension."

Since, as Billroth says in discussing dislocations, "Everything depends on correct anatomical knowledge," I shall first consider the *Anatomy of the Metacarpo-phalangeal* joint, next the *pathology* of the injury, and finally, the *treatment*, based upon the previous considerations. I shall, moreover, refer often to dislocations of the thumb in considering those of the fingers, for the two injuries are anatomically and pathologically in many respects quite alike. I shall make frequent reference to Jalaguier's recent and admirable article on the subject in the *Archives Générales de Médecine* for February, 1886.

The metacarpo-phalangeal joint is an enarthrodial one (Tillaux), characterized by the reception of a head into a cavity, the cavity being much smaller than the head which it contains. The size of the cavity, however, is much increased by the anterior or glenoid (Cruveilhier) ligament. This ligament is thick, dense and fibro-cartilaginous in texture; placed on the palmar surface of the joint, inseparably connected with

¹ Read at the meeting of the Boston Society for Medical Observation, May 3d, 1886.