

Fibrin was rapidly digested, proving the presence of a proteolytic ferment, presumably trypsin; active starch and fat-splitting ferments were also found, the fat-splitting ferment being especially active.

The report of this case is, perhaps, mainly interesting from the way in which it illustrates the striking features of the group of cases to which it belongs. The analysis of the fluid proves without doubt its origin from the pancreas, while the anatomical conditions found at operation were consistent only with the assumption that the boundaries of the cyst consisted of the walls of the lesser sac of peritoneum. The extreme dilatation and displacement of the stomach is also a feature of note.

ART. VI.—*Pyorrhœa Alveolaris*.^{*} By VICTOR GREER BEST,
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THIS is a suppurative condition of the gum, which varies in extent from slight ulceration of the mucous membrane of the small groove between the summit of the gum and the teeth, to complete destruction of the bony alveoli and dental periosteum.

My reasons for selecting pyorrhœa alveolaris as the subject of my thesis are the fact that many important diseases, both medical and surgical, are the outcome of it, because its seriousness is liable to be overlooked, and because its progress can be checked, and the condition permanently cured since the introduction of the vaccine treatment.

Pyorrhœa alveolaris is one of the commonest causes of ill-health, not only in the lower classes, but also in those who hold a higher position in life.

The disease, though present in an individual, may not excite sufficiently obvious signs to convince him that he is suffering from a most serious condition, in fact the great majority of those who are the subjects of the disease are not aware of its dangers until one of its more serious complications ensues. It is this absence of subjective signs which accounts

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for the numbers of people who are invalided as the result of it. The disease starts insidiously, and its course is slow, but once established it is extremely persistent, and requires careful treatment to bring about a complete cure.

Apart from the remote complications which are liable to occur in the course of the disease, there is a less serious local one which invariably follows sooner or later in neglected cases—namely, loosening and falling out of the teeth.

The only symptoms which a patient may complain of are a loss of energy or a feeling of tiredness, and a persistent indisposition to do his every-day work. He may suggest that he has an unpleasant taste in his mouth, that his tongue is furred, especially in the mornings on rising.

Commonly there are symptoms of gastric trouble—for example, loss of appetite, indigestion, and flatulence. A chronic irritable throat is also very common.

Pain is not a characteristic symptom, but is sometimes present, in which case it usually affects a number of teeth.

These patients invariably have a foul breath, which rarely escapes notice. Their teeth are generally seen to be decayed, and coated with tartar between the teeth and the gum. The gums may be tender and often bleed easily on washing them. In the early stages they are red, slightly swollen, and thickened at their margins, but show no signs of suppuration. This occurs later, and pockets of pus are formed between the gums and the teeth, thus denuding the teeth of their periosteum and causing them to become loose and ultimately to drop out. On making pressure over these pockets, pus can be seen welling up at the junction of the teeth with the gum. The mode of infection is as follows :—

The mouths of every one are normally inhabited by myriads of bacteria. These are particularly numerous around the necks of the teeth. In this position there exists a potential space formed by the dental periosteum and the mucous membrane of the gum becoming continuous at a slightly deeper level than the surface of the gum. In this space food may lodge and decompose, forming a suitable nidus for the growth of bacteria. These under normal circum-

stances are perfectly harmless, but in the case of an individual whose vitality is lowered to such a degree that his tissue-resisting power to bacterial invasion is too weak to withstand the attack, the events which will follow after injury by hard food, the use of a tooth brush or other cause, will be multiplication of the bacteria and subsequent inflammation and suppuration around the injured part.

Many different varieties of organisms have been isolated from the discharge in pyorrhœa alveolaris, such as staphylococci, diplococci, streptococci, and various forms of bacilli, spirilla and yeasts, but to no one organism has the cause as yet been definitely assigned. The results of bacteriological experiments have, however, shown that streptococci and gram-negative cocci of the *Micrococcus catarrhalis* type are most commonly found. Both of these are pathognomonic of pyorrhœa.

The following are the more important diseases which have been observed to occur in those suffering from pyorrhœa alveolaris :—

Simple and pernicious anæmia, various forms of arthritis and osteitis, gastric and duodenal ulceration, appendicitis, acute endocarditis and acute nephritis.

Besides these many other pathological conditions may be produced, such as—septic laryngitis, tracheitis, chronic gastritis, enteritis, and sapræmic symptoms.

Nothing need be said about simple anæmia, as it is constantly present in every condition of long-continued toxic absorption. But pernicious anæmia seems to have a special relationship to pyorrhœa alveolaris, and, therefore, deserves closer consideration here.

Hunter has carefully observed many cases of pernicious anæmia with a view to discovering the true cause of the disease. The results of his observations have convinced him that the disease is of an infective nature, that it is the result of a special infection of the digestive tract, especially of the stomach, that the chief source of the infection is oral sepsis arising in connection with long-continued cario-necrotic conditions of the teeth.

In the vomit of patients with pernicious anæmia it has been found that the streptococcus is the organism which usually predominates. It is to this infection of the gastro-intestinal tract that the gastric and intestinal symptoms in pernicious anæmia are due. They are the local manifestations of the infection, while the excessive destruction of blood taking place in the portal area is the result of the action of its poisons absorbed into the blood.

The stomach, in virtue of the antiseptic properties of its secretion, can at first destroy the ordinary pyogenic organisms which enter it from external sources, but in those cases where the supply is constant as in pyorrhœa alveolaris, the acidity of the secretion is gradually diminished, and thus its antiseptic power is lost, so that a gastritis is set up.

Again, it is only when the acidity of the gastric juice is considerable—for example, an hour or two after taking food—that it exercises any direct bactericidal action, not in the intervals between digestion. When, therefore, the acidity reaches a low level, bacteria are quite capable of living in the stomach and passing on into the intestine, so that there is nothing left except the resistance of the person attacked, to prevent the occurrence of an enteritis.

The pathological changes in the stomach and intestine in such a case are a chronic catarrh of a septic nature with glandular atrophy.

The following is a brief history of a case of pernicious anæmia which points to the mouth as being the source of origin of the disease :—

CASE I.—The patient, aged fifty-six years, active and accustomed to a country life, gave a history of increasing weakness, with intermittent periods of improvement extending over two and a half years, but especially marked during the previous three months. On examination the tongue was clean and moist. The teeth, however, were very bad, being black and decayed both in fangs and crowns. The stomach was dilated with splashings and flatulence. There was no actual vomiting, but uneasiness and discomfort were marked symptoms. Patient had diarrhœa five or six times daily with very offensive stools.

There were nervous symptoms, numbness, tingling, loss of knee-jerks and ataxia. The illness ended fatally, its duration being about three years. The blood showed 760,000 red-blood corpuscles per cubic millimetre, and 18 per cent. of hæmoglobin.

In this case no other source of infection than the mouth could be traced, and the healthy open air life which the patient was accustomed to live excluded the possibility of exposure to any source of drain or sewer poisoning.

Another case, of a man aged fifty-two years, is useful in discussing the cause of pernicious anæmia :—

CASE II.—The patient gave a history of indigestion and impaired appetite extending over a period of about eighteen months. He stated that he had been ill with anæmia for six months. He had no vomiting, but his bowels were irregular, with diarrhœa at times. Slight fever was present occasionally. The tongue was clean but flabby. The teeth were very bad, and covered with tartar and sordes. The upper molars were gone, but the roots were left, and one of them was loose and could be pulled out with the finger. The breath was very offensive, digestion very feeble, and the bowels were loose. Towards the end of the illness there was gastric pain on eating. The case ended fatally in about nine months after admission to hospital. The blood showed a count of 1,390,000 red cells per cubic millimetre, and 34 per cent. of hæmoglobin.

These two cases merely serve to illustrate the fact that the gastro-intestinal tract is infected in pernicious anæmia, the original focus of the infection being pyorrhœa alveolaris. That it is the cause of the anæmia is suggested by the fact that certain cases have recovered under the influence of therapeutic inoculations, the vaccines for which were made from microbes derived from the pus around the teeth.

The next group of diseases which I think it is important to mention are certain joint affections which have been observed to occur in pyorrhœa alveolaris and other chronic septic conditions.

For some years the belief in the infective origin of rheumatoid arthritis has been gaining ground, and, indeed, many

authorities have accepted the infective theory altogether. No one organism has, however, been isolated to which the disease can definitely be said to be due.

It seems probable that the disease has a very close relationship to chronic septic conditions, from which absorption either of micro-organisms or their toxins is continually taking place.

Many authorities consider the gastro-intestinal tract as the source of the infection.

The close connection between gastro-intestinal affections and oral sepsis has been demonstrated by Hunter and others, who have found that the organisms which prevail in chronic gastro-intestinal lesions are identical with those which are found in oral sepsis.

It is true that septic conditions of the mouth are extremely common and rheumatoid arthritis is comparatively rare, nevertheless the fact remains that in the majority of patients suffering from rheumatoid arthritis, a septic focus of a chronic nature, or the history of such, can be made out.

Doubtless in those cases with chronic septic trouble who do not develop joint disorders, it is a case of their stronger resistance to the infecting organism.

Goadby states that for some time his attention has been drawn to the presence of various so-called rheumatic symptoms in persons suffering from septic conditions of the mouth, particularly that type known as pyorrhœa alveolaris.

Lindsay, in 1908, gave a report of 172 cases of rheumatoid arthritis in which particular inquiry was made for infective foci, and in eighty-eight of these cases a definite infective focus was found, twenty of which were due to pyorrhœa alveolaris.

Lambert, in the same year, reported 190 cases, 76 per cent. of which had badly decayed teeth, or the teeth had dropped out, and 24 per cent. showed teeth in fairly good condition. He also reports two cases in which progressive disease of the joints was present, in both of which the disease was arrested by treating the septic condition which was present in the mouth.

Wynn Wirgman and Watson Turner have observed a large number of rheumatoid cases, and have not as yet failed to find a septic focus, usually oral, and in most cases pyorrhœa alveolaris.

It is found by experiment that if a culture be made from the discharge in pyorrhœa, and if small quantities of this be injected into rabbits, the latter will develop stiff joints in a few days. The inoculation of the joints themselves has resulted in many cases in the occurrence of joint changes indistinguishable from those which occur in rheumatoid arthritis.

In support of the relationship of acute rheumatism to septic conditions of the mouth, it has been frequently noticed that the first cleansing of a septic mouth has resulted in an attack of rheumatism, and that the severity of the attack seemed to depend on the amount of injury to the soft parts, caused by the cleansing manipulations. The attacks also tended to disappear after the first few treatments.

Cases are not uncommon in which rheumatoid arthritis, infective polyarthritis, and acute rheumatism have followed one another in succession.

It is possible that these diseases owe their origin to a specific infective organism, probably the streptococcus, and that the difference in the causation of each disease is either a difference in the degree in virulence of the organism or a difference in the resistance of the individual attacked, to that organism. This, however, would not account for the fact that acute endocarditis so often follows acute rheumatism, but is never caused by rheumatoid arthritis, or other diseases which are still styled "rheumatic."

Whether endocarditis is in some cases caused by the presence of a septic focus such as pyorrhœa alveolaris, is still an unsettled point. The *Streptococcus rheumaticus* is the commonest cause of acute endocarditis, and this organism is very commonly found in the discharge of pyorrhœa. Without doubt, the ulcerative variety is, in some cases, due to the streptococcus.

If we could accept the fact that acute rheumatism originates

from the presence of a septic source, the probability that acute endocarditis may do so also, is considerably increased.

Similarly, the occurrence of some cases of acute nephritis has been attributed to the presence of pyorrhœa alveolaris. An argument in favour of this is the fact that in those cases of acute nephritis which occur in the course of an attack of scarlet fever, the *Streptococcus conglomeratus* is undoubtedly the cause, and this organism is characteristic of pyorrhœa.

There is no doubt that pyorrhœa alveolaris and other forms of oral sepsis are accountable for many conditions of suppuration in bones, especially that known as acute infective osteomyelitis, so common in children, and less commonly for primary suppuration in joints.

As an example of the latter, an interesting case came under my notice a short time ago. This was the case of a boy, aged fifteen years, who was admitted to hospital suffering from a subacute septic arthritis of the hip-joint. The boy had all the symptoms of a fairly rapid destructive process going on in the joint. Surgical treatment was at once undertaken, and pus was evacuated and examined. The boy was the subject of pyorrhœa alveolaris, and the pyogenic organisms found in the gums corresponded in detail with those in the evacuated pus.

Any form of oral sepsis is extremely liable to give rise to gastro-intestinal lesions, a fact which does not surprise one when one realises the multitude of bacteria which are constantly poured into it.

A chronic form of gastritis and enteritis, to which I have referred before, is an extremely common occurrence. But more serious complications than these occur in the form of gastric and duodenal ulceration and appendicitis. In the two former conditions I have frequently observed the teeth in an extremely unhealthy state. Whether the anæmia which is so often present in these conditions is a predisposing cause or a result of the oral sepsis is a point for consideration, but its presence probably aids the onset of ulceration.

It is not surprising that the appendix, containing as it does, a relatively large amount of lymphoid tissue in its walls, is

frequently inflamed as a result of a condition such as pyorrhœa alveolaris.

Poynton and Paine have produced appendicitis in young rabbits by injecting them with the *Diplo-streptococcus rheumaticus*. This organism is constantly present in, and pathognomonic of, pyorrhœa.

Probably many of those cases of appendicitis to which no cause is attributable are due to some form of oral sepsis.

The treatment of pyorrhœa alveolaris has been rendered much more satisfactory since the introduction of vaccines, the treatment by local applications alone bringing only temporary relief in most cases. Among the most efficient local treatments are the application of iodine to the gums, and the frequent washing out of the pockets of pus with hydrogen peroxide by means of a fine nozzled syringe.

Carious teeth should also be removed, but it is recommended not to remove many at the one sitting, and also that the gums and pockets should previously have been rendered as aseptic as possible, in order that toxic absorption from the raw surfaces may be as slight as possible.

Unfortunately, in order to get the best results out of the vaccine treatment, one would require to be closely acquainted with the art of preparing and the method of administering vaccines.

The most satisfactory method is to prepare the vaccine from the patient's own organisms. The reason of this is that although other organisms may belong to the same class or group, yet they are usually of a different strain, and this difference is found in practice to be a very important one. In cases in which many varieties of organisms are present, the doubt as to which is the infecting one is cleared up by means of the opsonic index, a high or low index to that organism indicating its infectivity. A culture of the offending organism is then grown, suspended in normal saline solution—the number of bacteria per cubic centimetre being estimated—sterilised by heat, and divided into suitable doses. As a rule only small quantities should be injected at first, and the opsonic index should be estimated in the intervals in order

to determine—firstly, whether the doses are being given in suitable quantity; and secondly, that the next dose may be given at the proper time.

In the first case, if the dose is too large there will be a fall in the index, but this is not followed by a rise, as in the case in which a suitable dose of vaccine is given. With regard to the proper time to give the succeeding doses, Wright has shown that the best time to give them is when the opsonic index reaches the highest point of its positive phase. Even in this case there will be a temporary fall, but this is again followed by another rise to a level still higher than that produced by the preceding dose.

The vaccine treatment for pyorrhœa alveolaris has met with very satisfactory results, but one must bear in mind that in many cases it is necessary to prolong the treatment over long periods of time.

ART. VII.—*Epidemic Cerebro-spinal Meningitis.*^a By
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CEREBRO-SPINAL meningitis, or cerebro-spinal fever, is an acute infectious disease, the lesion being in the meninges and tissue of the brain and spinal cord.

The synonyms for the disease have varied from time to time according to the prominence of certain symptoms, thus the name "spotted fever" has been applied to it owing to the fact that petechiæ may occur on the body during the course of the disease. In one epidemic in Ireland these petechial eruptions were so extensive that at that particular time the disease was commonly spoken of as the "Black Death." The term cerebro-spinal fever was an attempt to compare the disease with pneumonia owing to similarities in the course of both affections. However, the facts that it is generally epidemic and primarily a meningitis, show that the modern name of epidemic cerebro-spinal meningitis is probably the best.

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