

the rate remained moderate and no abnormal rhythm developed, beyond an occasional premature ventricular beat. Digitalis was not indicated.

As the only indication of infection in his case was the oral sepsis and it was possibly streptococcal, he was given injections of cacodylate of sodium, and at the end of the month his teeth were removed under ether and oxygen, an operation which he stood very well. He is now convalescent and has pain only when he walks hurriedly. It would be unwise for him to return to work for some months.

Prognosis:—This is doubtful. He may die from cardiac failure any time. He may get another infarction. He may live for an indefinite number of years if he leads a restrained life. One case of Parkinson's lived  $11\frac{1}{2}$  years after his attack.

P. D. White (3) states that patients often survive for years in good or fair condition. The average duration of life in his 62 cases, half of whom were still alive when he wrote, was close to two years. Sex, age, and hypertension seem to make little difference to the prognosis, while poor heart sounds and signs of congestive failure add to the gravity of the case. White states that the electrocardiogram did not help in prognosis. Complete heart block was a bad sign. Intra ventricular block was more common in the survivors in his cases.

#### REFERENCES.

- (1) Parkinson and Bedford.—The Lancet, Jan. 7, 1928. P. 4.
- (2) Moschowitz.—J.A.M.A., March 10, 1928. P. 736.
- (3) White, P. D.—J.A.M.A., Nov. 6, 1926. P. 1525.

### PYORRHŒA.

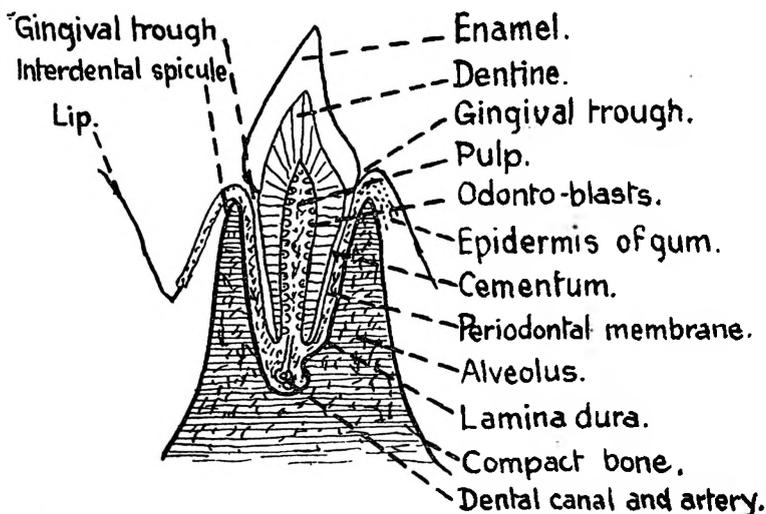
MARCUS BERMAN, L.D.S., R.C.S. (Eng.).

Pyorrhœa is a disease found in the oral cavity and associated with the teeth and its adjacent tissues. Literally, pyorrhœa means "pus flowing" and consequently our modern day practitioners interpret or diagnose any condition of the teeth where pus is present as pyorrhœa. One may even go so far as to say that many ascribe the name Pyorrhœa to any reasonably severe inflammatory condition of the gums.

The dental surgeon would define it as a disease which essentially involves the periosteum of the tooth root (called the periodontal membrane) and its adjacent tissues—the gum and alveolus. Later, more extensive areas of the oral mucous membrane may or may not be involved. These tissues may, however, become affected by other causes and bearing this in mind the author offers this effort in the hope that a more exact and ready diagnosis may be made.

In view of the unfortunate discord between the word and its meaning attempts have been made to reconcile the two and various terms have been evolved to denote it. The British school refer to it as General Chronic Suppurative Periodontitis, whereas the American school favour Periodontoclasis. In addition, others claim that Pyorrhœa Gingival appropriately describes the disease in that it is said to commence in the Gingival Trough. But none of these have proved happy synonyms and the word most current is still Pyorrhœa. One must bear in mind, however, that Pyorrhœa (pus flowing), is a symptom of General Chronic Suppurative Periodontitis and is not in itself a disease entity, though custom and use have made it so.

ANATOMY.—A brief description of a tooth and its anatomical relations is necessary to follow this paper more clearly. (See Fig.) The tooth shown is an erupting single-rooted tooth in situ.



Periodontal membrane has been considerably exaggerated in order that its importance, as a means of attachment to the bony socket, may be more readily understood.

The fibres of this membrane merge into those of the corium of the gum and are attached to the neck of the tooth, i.e., the junction between the enamel and cementum or "Crusta Petrosa." The epithelial tissue is moulded over this, thus causing a potential space between the gum (superficial) and the tooth. Some authorities hold that this space is sterile, its function being to act as a buffer and thus prevent injury to the neck of the tooth. Others claim that it contains phagocytes to resist infection.

There are two further points of interest. In the incisor and premolar region the alveolus is raised into a spine (interdental spicule) between the teeth, In the molar region it runs transversely across from tooth to tooth.

The other point to be explained is the "Health Line," which is a white line formed at the point where the mucous membrane of the upper and lower lip becomes continuous with the mucous membrane covering the alveolus.

ETIOLOGY.—In view of the prevalence of pyorrhœa in modern times, considerable research work has been and is still being done upon it in an endeavour to ascertain the cause and so discover the remedy. Treatment and Bacteriology of the disease has revealed opinions which can only be termed assumptive. The accepted theory is that the causes of the disease may be attributed to four main factors, no one of them solely responsible, yet all contributing to its existence. These in order of importance are:

- A. Traumatic Occlusion.
- B. Dental Hygiene (neglect of).
- C. Modern Diet, and  
General Health.

A. TRAUMATIC OCCLUSION may be defined as that condition in which the teeth occlude in an abnormal manner and thereby cause undue strain to the teeth, resulting ultimately in injury to the gums and their adjacent tissues.

The teeth, which may metaphorically be compared with a

mechanical crusher, should function harmoniously and uniformly. It is in those cases where they fail to masticate uniformly that traumatic occlusion will occur.

In “Mouth breathers” we find typical examples of traumatic occlusion through this cause. In these cases we often find that the development of the maxillae and mandible has been retarded. There are many reasons for this; for instance, the tongue, instead of pressing up against the palate and thus assisting in its growth, lies in the floor of the mouth; the nasal air passages do not function, the bones of the nose and maxillae again being affected. There are manifold other reasons, the effect being the same and resulting in the teeth being unnaturally arranged. The results are two-fold. Firstly, there is a lack of uniformity in the functioning of the teeth. Some have to bear the brunt of mastication, while the others remain idle. Lack of function of any organ is a contributory cause to any disease and the mouth is no exception. Secondly, the teeth being crowded, overlap, and stagnation areas are bound to occur, a putrefaction inevitably following.

A rider on traumatic occlusion due to mouth breathing is traumatic occlusion due to extraction of some of the teeth. Whenever a number of teeth are removed they should be replaced by artificial substitutes, for the extraction of these teeth means that the remaining ones will have to bear a greater proportion of the work while some are rendered functionless. There is therefore over-functioning of some teeth and lack of it in others, and practically the same results as in mouth breathers. As a consequence the resistance is lowered and the bacteria are not slow to take advantage. In addition the functionless teeth collect a whitish-yellow deposit around their necks, especially in the upper molar regions, and here again we have an added bacterial medium.

Unfortunately, even a denture does not entirely eradicate a liability to “pyorrhœa.” The pressure of the denture itself upon the gums may, in certain cases, where the resistance has been lowered, give rise to inflammation and thus form again a suitable nidus for bacteria. However, a partial denture does, in my opinion, minimise this danger, especially where the dentist has adopted the best means for avoiding this pressure and where the patient strictly observes the routine of oral hygiene.

This third most important cause of traumatic occlusion is faulty restoration, namely, “fillings,” “crowns,” “bridges” and “dentures.” We may disregard “fillings” and “crowns;” there is no excuse for their faulty construction, and when such is the case the blame must be attached to the dentist. “Dentures” having already been discussed, there remains therefore only “bridges,” over which so much heated argument has raged and still rages. A perfectly constructed bridge should spread the masticatory stresses over a large area, but in practice one generally finds that the strain on the abutments (the teeth to which the bridge is attached) is usually too great, except in the cases of one- or two-tooth bridges, resulting eventually in the loss of the abutment teeth themselves. We have, however, the moveable bridges, which afford some degree of rest to the abutments, i.e., at night. Though these have not as yet been designed to perfection, regarding them merely as a means of correcting a traumatic bite, they are preferable to the fixed bridge.

DENTAL HYGIENE (NEGLECT OF).—Dental Hygiene has been an unknown quantity to the masses in the past. It is pleasing to notice, therefore, that in recent years steps have been taken to educate people the necessity of caring for their mouths. Neglected mouths are a generous source of bacteria, and must eventually lead to disease of the teeth and their tissues.

In a normal mouth, where the occlusion is correct, we find in many cases that the self-cleansing agencies of the mouth are sufficient to prevent periodontal disease without the aid of external prophylactic measures. S. Colyer found this especially so amongst certain native tribes in Africa. Caries, however, was more or less rife in these cases, and was supposedly due to the sugary nature of the foods eaten. I have found in practice, however, that natives are very liable to "Pyorrhœa," and the blame must then be laid at the door of our modern civilization, of which they are becoming more and more an integral part.

Dental hygiene is, therefore, of the utmost importance, as normal mouths are few and far between, and especially is this so in those cases where crowns and fixed bridges are present or dentures are worn.

It may seem an astoundingly impossible fact, but a case was reported to the British Odontological Society where a woman had worn a denture for twenty years without ever removing it. It said a lot for her resistance that she was still alive. However, the plate had to be cut out from the palate and the state of the mouth was indescribable. This is an extreme case, but there are many people who, from reasons of vanity and other reasons, seldom remove their plates and as seldom clean them. They must of course be removed every night and thoroughly cleansed after every meal.

Bridges and crowns collect putrefactive matter on their underfaces or around their rims, as the case may be, and even those who exercise a scrupulous dental routine are not exempt from the liability of the formation of this very suitable bacterial medium.

It may be added that General Health is a most important factor, and it is but to be expected that when a patient's general health is poor it is difficult to obtain any marked degree of success—if at all—in treating a condition where the invading organisms have all the best of the odds.

It has been proved that the exanthematous fevers are great predisposing factors to a mild gingivitis which, as mentioned before, may lead to Pyorrhœa. Even Tonsillitis, Pharyngitis, and Nasal catarrh, etc., may result in this unfortunate condition, and especially is this so in adults.

Many of our eminent periodontists consider that Pyorrhœa is more prevalent among persons of middle age, whose general health and consequent powers of resistance are waning, and that remedial treatment is consequently more difficult.

**MODERN DIET.**—The third factor which is said to contribute largely towards the existence of Pyorrhœa is the nature of the food in modern days. Food is now so prepared as to offer little difficulty to mastication. This, however, pleasant to the palate, is a source of evil as far as the teeth are concerned. Their functioning is so poor as to result in loss of blood supply, insufficient lymph drainage, and poor gland secretion (both mucous and salivary). Poor gland secretion then becomes an important predisposing factor in the formation of stagnation areas, with the same results as outlined before.

A little space must be given here to the observations of the Mellanbys. They experimented on animals, more frequently dogs.

The control animal was fed on a normal carbohydrate diet. In the experimental animal, the only change made was the substitution of linseed oil fat for the vitamin Fat Soluble "A." The withholding of Fat Soluble "A" resulted in degenerative changes in the bony tissue of the jaw as well as the teeth, and the periodontal membrane had undergone a loose hypertrophy. It was further found that these changes were closely allied to the changes found in General Chronic Suppurative Periodontitis, without the presence of inflammatory changes. It will readily be understood therefore that if such were the case, the tissues would be rendered much more liable to bacterial infection.

There are of course many other etiological factors which may tend to result in Chronic General Suppurative Periodontitis, but those above enumerated are generally regarded as the main ones.

As mentioned before, some authorities hold that "Pyorrhœa" is essentially a disease of middle age, as the general resistance is then becoming lowered. Some again hold that Pyorrhœa has its incipient stages in childhood and that at any time during the progress of the lives, any serious illness is likely to cause a flare up. This may account for the number of young people who are compelled to lose their teeth. Be this as it may, it is certain that all these factors do play a huge contributory part in the causation of Pyorrhœa, and that as yet no one of them has been isolated.

**PATHOLOGY.**—In dealing with the pathology of the disease space and time will not permit of detailed histological and microscopical description of the pathological changes. I shall therefore confine myself more or less to the microscopical changes and draw my conclusions from these.

"General opinion regards the disease as one of local origin—the infection arising at or near the marginal rim of the gum surrounding the teeth, the commencement of the disease being an infiltration and bacterial invasion of the marginal tissues from which small beginnings the remaining manifestations finally follow." (Goadby.)

The causative organisms are generally of low virulence but of great resistance as a result of which, after the gingival margin and troughs have been attacked, the organisms, now in an even more suitable nidus, attack the periodontal membrane and destroys its attachment at the neck of the teeth. Simultaneously the inter-dental spicules of bone are attacked and partially destroyed. At the point of attachment of the gum to the periodontal membrane liquefaction foci and destruction of the connective tissue fibres and alveolus are apparent with the consequent formation of typical pyorrhœa pockets. These pockets can often be recognised by the presence of large inflamed gum-tags (though not necessarily) which are often freely movable. On exploring with a fine probe between the teeth it is found that instead of meeting with immediate resistance the probe sinks into the interproximal spaces, the depth depending on how far the condition has progressed. This then is the condition in its early stages.

The disease now progresses to its more serious termination. The periodontal membrane begins to react and becomes thickened by cell proliferation.

Histologically, commencing signs or well developed evidence of inflammation and infection exist. The blood vessels are dilated and round-celled infiltration exists around the superficial areas. Inter-cellular oedema, nuclear degeneration and finally necrotic patches are seen together with areas of bacterial infection. The appearances are very similar to those seen in a chronic infection of the periostum of the long bones. An increase of fibrous tissue occurs from prolonged infection with the final denudation of the periodontal membrane from the root of the tooth.

Meanwhile the alveolus has not escaped from the ravages of the disease. In the alveolus the earliest manifestations as above described are the destruction of the inter-dental spicules. The resistance offered by the osseous tissues, however, plays an important part in the rate at which the disease progresses. The more compact the osseous tissue the greater is the resistance offered to the organisms. It is considered too that the destruction of the tissue depends upon the functional action of the teeth.

The disease usually takes the form of a rarefying osteitis, and in the destruction two lines of attack are possible, namely, the periosteum and sub-periosteal layers and the interior of the bone via the Haversian canals. The periosteal tissues become raised and invaded by bacteria with round celled infiltration below the periosteal layers. The Haversian canals then themselves become infected from the periosteum setting up changes in the interior of the bone.

The resulting caries leads to the complete destruction of the trabeculae and matrix of the bone and erosion of the surface, which is irregular with formation of pit and cavities of varying sizes. For the rest, it is sufficient to say that the destruction of the compact and cancellous is more or less the same, the latter being far more rapid for the reasons above described.

A few words must be added to describe Productive Periodontitis or "Sclerotic Pyorrhœa." This occurs when the functional activity is of the highest order and the patient's own resistance on a similar plane. In these cases should pyorrhœa supervene from other causes the bone becomes very hard and dense, the matrix being in time entirely obliterated.

CLINICAL APPEARANCES.—The clinical appearances of pyorrhœa are very deceptive. Cases may present themselves in which clinical signs are more or less absent and yet, on X-ray being taken, an incurable condition is found to be present. Happily this is an infrequent occurrence, but it explains the absolute necessity of complete X-ray photographs being on hand to help in a diagnosis.

In most cases the condition is well marked. The gums vary in colour from a "purple" red to a deep red. The gum tags between the teeth, if present, are freely movable and bleed on the slightest touch. Typical pyorrhœa pockets are present and this is one of our surest signs. The gums themselves are very spongy and appear to be minutely spotted or pitted. The teeth are loose, and a good deal of gum recession having taken place, the roots are exposed to various degrees. Plaques of tartar will be found adhering to the necks and parts of the crowns. Cases have been shown where the tooth has been entirely covered.

The health line is very irregular and this is also a very sure sign of a chronic inflammatory condition. The patient's breath is foetid and often has a sour sickly smell due to the indol forming organisms. The patient complains of various symptoms, bad taste in the morning, with headaches, etc. The taste is due to the various toxins secreted and to the pus which is often found to well up around the teeth and even in milder cases can be forced out with a little pressure. There is also a feeling of general malaise, and various other symptoms which may lead one to suspect the teeth. In early stages there is little or no pain, though later the process of mastication may become impossible.

An X-ray photograph of a diseased mouth clearly shows the presence of pyorrhœa pockets and rarefied tracts running up alongside the roots. The inter-dental spicules, it will be noticed, have disappeared, and the alveolar ridge has an undulating appearance.

The periodontal membrane presents a thickened appearance, and in places appears to be raised from the side of the tooth. The Lamina Dura is broken in places and may even be entirely destroyed. In the later stages these latter will have disappeared and the bone shows marked pocketing. Streaks of rarefaction pass through from interdental septa and enter the main body of the bone. In a case of diffuse sclerosis the appearances are more or less the same, but the osseous tissues appear to be non-laminated compact bone. These two conditions may obtain in the same mouth in different parts. The teeth themselves may show

signs of absorption or "sclerosis" known as "cementosis," with considerable areas of infection around their apices.

PROGNOSIS.—The problem of Pyorrhœa has baffled the keenest scientific minds of at least two generations, and is still the subject of much controversy. It is almost impossible, therefore, to give a prognosis with any degree of accuracy, except perhaps in the very mildest of cases, i.e., a superficial gingivitis accompanied by the slightest signs of alveolar absorption.

The difficulty existing in cases where the condition is definite, though not far advanced, is that after treatment these cases lapse into a chronic stage, where the destructive processes are very little apparent, but nevertheless slowly progressive, and the systemic effects are not manifest for some time.

Briefly then, in those cases favourable for treatment, the pockets around the teeth must be shallow, the function of mastication must be efficient, or otherwise the condition of the mouth must be such as to allow it to be made to perform efficiently with the aid of artificial measures. It must be emphasised, however, that these measures may themselves constitute a danger, as has been explained in the treatment. Lastly, but of equal importance, the patient's recuperative powers must be, shall we say, "A1." In this connection the patient's age must be given due consideration, as obviously, the older the person the more difficult the treatment.

In those cases which are slightly more serious, i.e., where the gums have actually commenced to recede, but not to any marked extent, where the alveolus is but slightly absorbed and the periodontal membrane but little injured, treatment may be attempted, if for no other reason than that it may prevent further destruction and so allow the patient to enjoy the use of his own teeth for some number of years.

Where pus, however, is definitely present, few claims of success have been forthcoming from those who have attempted treatment. One may hope, nevertheless, that surgical measures in these cases, when the resistance is good, will stay the progress of the disease, and here again allow the patient to enjoy the use of his own teeth.

In the more serious cases, where denudation of both gums and alveolus has so progressed as to result in loosening of the teeth, complete extraction is perhaps the best policy, in that, treatment should resolve itself into an attempt to save as much of the alveolar ridges as possible. Should any hope be entertained, a short course of remedial treatment is permissible. In the late stages, extraction, to the best of the writer's belief, is the only course.

To recapitulate, then, those cases in which the disease is in its infancy, where the patient is reasonable and healthy, and, of yet greater importance, where his full co-operation may be expected, one is entitled to attempt treatment. Under these conditions one may fully hope to stay the progress, and further, eliminate the absorption of toxins.

It may be stated, however, that where mouth breathing is obvious, treatment even in the above case is rendered many times more difficult, and the experience of many eminent surgeons has shown the necessity of resorting to extraction. Mouth breathing may be ascribed to habit, in so far as that, even after the cause has been removed, many persist in breathing through the mouth. At night a mouth screen is worn; during the day this is of course impossible, and the habit of keeping the mouth open is a difficult one to overcome.

In the other cases referred to, the bulk of opinion in Europe tends to the theory that the disease may be "slowed up" in its progress but not eliminated, and consequently extraction is advised. As stated elsewhere, many Periodontists do not hold with this theory. The fact, how-

ever, that these latter may permit (as a result of their treatment) the patient the further use of his or her teeth for a limited number of years, does not prove that the absorption of toxins has been entirely eliminated, though this may certainly be so in the earlier stages of the cure. Nor does it prove that the absorption of alveolus has ceased. In all fairness to these redoubtable workers, it must be stated that a permanent cure is not claimed. Consequently one must deem it best to extract all affected teeth in the earnest desire that the artificial substitutes may be more firmly retained on ridges which are both pronounced and firm, and about which one may rest assured that very little, if any, further absorption will take place.

The foregoing may seem very drastic and will assuredly find many dissentients. To these the writer offers his apologies, but would have it borne in mind that such has been his own experience, as well as that of many others with whom he has conferred, including the many dental authorities on the subject.

TREATMENT.—So many schools of thought exist where the treatment of pyorrhœa is concerned that it is impossible in a short space to deal with more than one.

The writer has attempted to embody in his treatment most of the principles expounded by the eminent dental surgeons of to-day.

Before proceeding with the treatment itself, it may be stated that those cases in which the alveolus has been attacked to any marked extent must generally be considered as hopeless. Furthermore, it is necessary in attempting treatment to be guided by the patient's general health, which must be reasonably good, and to attempt treatment where alimentary or respiratory tracts are infected, especially at their commencement, is a waste of time. The first step is to impress upon the patient the importance of his or her co-operation, and to request the exercise of his or her assistance in following instructions. We can now consider, therefore, a patient with a fairly clean bill of health and suffering from pyorrhœa not too far advanced. The teeth in the first place are scraped, scaled and polished, with scrupulous thoroughness. Specimens of the bacteria present should be taken and cultures made.

The next item of importance is the making of record models in plaster of paris, and a complete X-ray must be obtained. The X-ray should be taken after scaling, as the tartar present aggravates the condition, and consequently the comparatively exaggerated condition will be reflected on the films. All hopelessly loose or infected teeth are now extracted, and the occlusion corrected as far as possible with the aid of artificial teeth. In some cases, of course, this may prove impossible owing to the lack of necessary functioning of the teeth. An attempt should also be made to correct the diet, and harder and coarser food should replace the soft and finer food usually consumed. A preparation known as "Winrow's Solution" is employed. Two or three drops are placed in the pyorrhœa pockets, the teeth under treatment naturally being isolated. The ingredients of the Winrow's Solution as used in Guy's Hospital, London, are as follows:—

R/.

Zinc Iodide, gr. XV.

Iodine, gr. XXV.

Aqua Dist. M. X.

Glycerine, ad Z. IISS.

Misce.

This solution is one of many employed by practitioners, and I personally have found it to give a considerable degree of success. Another solution which is coming into increasing favour is Ricinoleate. The treatment is carried out three times weekly and any fresh deposits

of tartar are removed on each visit. In addition to this, I have found the use of ultra-violet rays and autogenous vaccines, especially if the patient shows shows of secondary infection, to be of assistance. The patient should clean his or her teeth twice daily at least—after breakfast and last thing at night; after each meal, if possible, is of course, ideal. Any tooth paste may be used provided it is not gritty or too acidic and that the brush is used in the correct manner. In conjunction with this the passing of dental floss silk between the teeth should be urged, its use having been practically demonstrated.

The brush should be placed just above the neck of the teeth and used fairly vigorously in a downward direction in the upper jaw and an upward direction in the lower jaw. By this means the gums are advantageously stimulated. Then it should be placed between each tooth on the interdental papilla, and, keeping the bristles in a stationary position, the handle of the brush used so as to produce an oscillatory movement. Naturally all the other surfaces of the teeth must be well brushed, using a rotary movement, but never in a directly crosswise direction.

The most important part of the routine, in the opinion of many, is massage. In the upper jaw, the gums should be massaged in a downward direction, in the lower jaw in an upward direction, using the thumb and index finger; this massage should be performed regularly and thoroughly. Salt water and alum makes a very useful solution for rinsing purposes after the teeth have been brushed. This solution is especially commendable by reason of its astringent properties, in addition to the fact that it acts as a stimulant to the tissues and encourages a flow of lymph or blood serum to the tissues, by virtue of the difference of the osmotic pressure between the salt solution and blood fluid. I need not dwell on the advantages to be derived from the increased flow of the blood fluids, accompanied as it is by the anti bodies. Occasionally, Ionic medication also helps, although it is a moot point whether ionisation alone would be successful.

When the disease appears to be intractable to the treatment outlined; radical measures become a necessity and recourse must be had to extraction. The reasons for such a course are two-fold; firstly, if the infaction cannot be combatted, the patient, who systematically may become ill through long and ineffectual treatment, must be considered; secondly, the alveolar ridges become absorbed by persisting in ineffectual treatment, so much so that it may sometimes happen that they are reduced to practically the same level as the gums, and cannot therefore afford retention to artificial dentures, and consequently cause the patient prolonged if not lifelong discomfort and pain in becoming accustomed to these substitutes.

There is a school of dental surgeons, more or less confined to America, who claim to cure pyorrhœa, even in its later stages, by adopting surgical measures. Their contention is that drugs of any form are contra indicated in this field of dental therapy, and that any drug capable of killing micro-organisms will also destroy living cells and either retard or inhibit regeneration of tissue. The principle involved is that all pathological tissues are eradicated, the alveolar process smoothed and freed of any necrotic tissues, and the root surfaces scaled of all deposits. There is of course a definite technique, which does not fall within the scope of this article. It is sufficient to say that under local anaesthesia and strict aseptic precautions, they remove all infected gum and bone, in the hope that the new epithelial tissue will eventually reach the neck of the tooth. They argue that a new tissue will bridge the denuded alveolar process and tightly cover the bony structure.

Logically, an appearance of a normally healthy tissue should take

place at the level of the remaining alveolar process. They contend that as a result, there is a marked disappearance of systemic symptoms, and claim that this is due to the eradication of all pathological tissue present in the affected areas.

While there is much to be said in favour of their contention, it is doubtful whether it can prove successful in the later stages. The weakness in their argument is the impossibility of new bone formation and, consequently, the teeth, which will be mainly supported by the soft tissues, are unable to withstand the process of mastication, resulting finally in their loss and the further loss of osseous tissue.

The combination of the two methods employed in cases in which the condition has gone no further than an attack upon the inter-dental spicules of bone have proved to be markedly successful. There is every hope then that in time this dread disease may be eliminated along lines similar to be above if (a most vital "if") the public can be educated to the necessity of having regular dental attention.

#### REFERENCES.

- R. R. Rouch, D.D.S., "The Surgical eradication of Pyorrhœa," *Dental Cosmos Journal*, Feb., 1928.  
 R. H. Blanquie, D.D.S., "Periodontoclasia and its treatment," *Dental Cosmos Journal*, Feb., 1928.  
 R. H. Blanquie, D.D.S., "The Surgical Treatment of Periodontoclasia," *Dental Cosmos Journal*, April, 1927.  
 Paul R. Stillman, D.D.S., F.A.C.D., F.A.A.P., "How to Control Dental and Periodontal Disease," *Dental Cosmos Journal*, April, 1928.  
 J. M. Lewis, D.D.Sc. (Melb.), "Some Observations on the Pathology of Pyorrhœa Gingivæ," *British Dental Journal*, 15th Feb., 1928.  
 Warwick James, O.B.E., L.D.S., F.R.C.S. (Eng.), L.R.C.P. (Lond.), and Arthur Counsell, M.B., B.S., B.Sc., "A Historical Investigation into So-called 'Pyorrhœa Alveolus,'" *British Dental Journal*, 15th Oct., 1927.  
 Benjamin Tishler, D.M.D., Boston, Mass., "Is Suppurative Periodontoclasia a Disease of Middle Age," *Dental Cosmos Journal*, Feb., 1927.  
 Melville Quinby, M.R.C.S., L.R.C.P., D.M.D., "The Mixed Ætiology of Periodontoclasia," *Dental Cosmos Journal*, July, 1927.  
 Andrew Buckley, D.D.S., "Massage," *Dental Cosmos Journal*, March, 1927.  
 C. B. Holman, D.D.S., "Ultra Violet Ray Therapy in Dentistry," *Dental Cosmos Journal*, March, 1927.  
 F. W. Doubleday, L.D.S., M.R.C.S., L.R.C.P. (Eng.), "On Chronic Fusospillary Infection of the Periodontal Membrane and its Treatment,"  
 Sir Frank Colver, "Dental Surgery and Pathology," 4th Edition, 1919; London: *British Dental Journal*, 16th Jan., 1928.  
 Goadby, "Pathology of Suppurative Periodontitis."

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### ESSENTIAL ANATOMY.

By ALEXANDER LEE MCGREGOR, M.Ch. (Edin.), F.R.C.S. (England).  
 Demonstrator in Anatomy, University of the Witwatersrand.  
 Assistant Surgeon, Transvaal Memorial Hospital for Children.

#### No. 1.—Hilton's Line.

Hilton gave his name to a wavy white line in the anal canal. Elliot Smith has given us the true anatomy of the ischio-rectal fossa. Denouvilliers, Proust, Schwalbe and Zuckerkandl have given their names to important spaces or structures in the pelvic outlet. Their work will be elaborated in the second article of this series.

DEVELOPMENT.—The rectum is formed from the hind-gut, though not the hindmost hind-gut. There exists at a very early developmental stage a communication between the primitive gut and the neural groove. This is the neurenteric canal, or post-anal gut, and may be the starting point of pre-sacral retro-rectal tumours.