ALVEOLAR ABSCESS.

Compliments of the Authr

A TREATISE

ON

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BY

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LOUISVILLE, KY.

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ALVEOLI.—Semi-circular canals or grooves into which the teeth are set. Their size and shape are determined by the teeth that occupy them.

ABSCESS.—From Abscedo, I depart or separate from, loss of substance, a gathering or rising, a collection of pus in a cavity, the result of a morbid process or action in the parts. The French have various distinctive terms for abscess, as *Ab'ces chaudaign sondain*, is one which follows violent inflammation; *Ab'ces froid chronique scrofulux*, cold, chronic or scrofulous abscess, one which is the result of chronic or scrofulous inflammation; *Ab'ces par congestione*, diastheseque, symptomatic abscess, one which occurs in a part, at a distance from the inflammation by which it is occasioned. "Some writers are of opinion that pus is formed by the arterial system, and is deposited by way of excretion in the inflamed parts; others, that it is formed by the destruction of the solid parts." It seems to be a degeneration of the liquor sanguinis and exudation corpuscles. "In Alveolar Abscess we have the whole range of structure involved, from unpronounced amorphous, mucus mass, or chaotic materials in the juices of the flesh, from which arise and by which are

— Typographical errors

nourished the neural and muscular fibrillæ, the vascular and osseous, no less than the glandular and dermal tissue. If then all these must be involved in destruction, just in the ratio of the size of the sac, in every case of matured alveolar abscess, is it not of some moment to us to be able to detect the order of its inception and progress from its first beginning to its most unmistakable presence? Where then is the point of departure from normal activity? Is it in the juices of the flesh? Or is it in the granular living contents of the cells? Or may it not have its inception, in a refusal on the part of the formed material of the cell wall, to afford free transit into and out of the parenchyma of the cell to the pubulum, or juices upon which it subsists? Although it may be clear to him who has investigated this subject, that all departures from healthy action take their origin in the neural sea, or juices of the flesh; yet it is difficult to prove this to the uninitiated mind short of laborious and tedious detail of untrient activities. The oneness of this sea throughout the whole range of the body within the outer pellicle or skin, whether that body be large or small, composed of one organ or many divisions, their sustenance from this elemental mass, renders the whole body or any part of it, subject to change in accordance with the extent of the application and the force of the disturbing agent." *

There is very little difference between alveolar abscess and abscesses in general; the former has its origin within the alveolar border, while the latter may have their origin on the outer surface of the osseous system and in the soft parts.

Abscess is the most common affection to which the alveolus is subject. "Its effects are always exceedingly pernicious," † not only to the sockets of the teeth thus affected, but to the gums, and very often the health is largely affected thereby. When severe inflammation of the lining membrane

* Prof. Atkinson on Alveolar Abscess.

† Harris' Principles and Practice of Dental Science.

of the tooth or the alveolus is produced, causing the death of one or more cells which suppurate and form a pocket, there is an effusion of coagulable lymph, which will harden and form a sac, which attaches itself to the tooth or alveolus at the point of inflammation. This may be averted even after the sac is partially formed, by interrupting or cutting off the poisonous food or supply which feeds the disease. The cells forming the walls of the nucleated abscess having the least power of resistence, give way first, and determine the direction of the abscess. Cold abscess may readily be detected by its appearance, which is recognized by the parts being enlarged, of a soft or spongy appearance, with very little tenderness and slight constitutional disturbance. It progresses slowly, and is found in persons of low vitality and of a scrofulous temperament. The warm variety is almost the exact opposite of the cold, the parts swell, are red, and very tender to the touch. There is a great variety ranging from cold to warm; some will be intermediate, while others will approximate the one or the other extreme.

In evacuations of the cold or chronic variety the pus will be found thick and poorly defined, with very little traces of blood, laying close to the surface, showing a slow development and little variety. It is not so with the warm, the pus is more fluid, with traces of blood, and on evacuation will be found coming from the middle, while red blood will be discharged from the surface cut or walls of the tumor. The last occur in persons of sound constitution, are rapid, and of easy cure, if not complicated with other diseases, while the cold is, as before stated, slow and stubborn, requiring skillful treatment, or in other words, very tedious of cure, often requiring the best skill, and in some cases, resisting curative effort altogether.

DIAGNOSIS.

The correctness of the diagnosis will depend somewhat upon three things, (viz:) Acuteness of perception, the stage of the affection, and the characteristics of the patient. In

its earlier stages, in some peculiar constitutions, diagnosis is very difficult. But to the close observer and the thoroughly conversant it is not so, especially with the acute variety. The presence of abscess may, by some, be detected while yet in its primative or cell state, and in such a case cure is almost certain. The following may be considered some of the unmistakable signs of abscess: In the earlier stages redness of the gums, extreme tenderness of the tooth to the touch, swelling of the gums, &c. At a later period the symptoms become more prominent. Elongation and loosening of the tooth, an increased size of the gum over the point affected, a great rush (apparently) of blood to the part on taking a recumbent position; increase of pain in the parts, a fistulous opening through the gums, cheek, jaw, or at any other point where the pus may be conveyed by the aid of a suture or other channel, susceptible of being traversed by pus. These are the most prominent signs of alveolar abscess, and may be regarded as reliable. The cause and duration of the disease will depend upon the constitutional health of the patient, of the susceptibility to abscess, the stage of the disease when the treatment is commenced, and the kind of treatment adopted.

The warm variety is the most rapid in its course, and the cold is the slowest; the intermediate, in temperature, will vary between the two classes above named in duration. The general health always strongly influencing either variety or class of abscess.

CAUSES.

The causes of alveolar abscess are very numerous. A lack of power, on the part of the system, to take up and appropriate the nutritious food contained in the juices. The presence of irritating matter, dead nerve membrane, dead roots of teeth, mechanical violence, sudden and repeated transitions of temperature, and any other cause that produce acute inflammation. Irritating matter may be secreted at the point of the root of a tooth in which the nerve is dead, and

as long as the canal of the root or roots is kept open there may be no injurious effects, but as soon as the avenues of escape are closed, by any means whatever, the escape of the matter is checked, and as the secretion is still kept up it will soon form, in such quantities, as to produce pressure on the lining membrane of the socket, and a high state of inflammation and congestion is set up. It is not always the case that a dead tooth has a decaying nerve, in some cases the nerve is entirely gone, yet a secretion may exist at the apicial foramin, which, if not allowed to escape, will produce the same effect that a dead pulp will. It is one of the most difficult points in pathology to ascertain just how much inflammation will be tolerated. If the recuperative powers be equal to the inflammatory conditions, one will poise the other, and as one predominates so will be the result.

In some cases there will be evil resulting from the slightest disease, while at other times it will take almost death itself in the parts to produce any change whatever. This is often manifested in other things; sometimes men die from slight scratches, and at other times they may be torn almost to pieces and yet live. I remember, during the late rebellion having seen a man who had received thirteen wounds, either of which seemed sufficient to have killed him; yet he wholly recovered. I allude to this only to show how much the system is capable of resisting at some times as compared with other times. We are all aware that the system can not endure as much at one time as it can at another. This depends somewhat upon the condition of the mind. An abscess is often produced by the simple operation of filling a tooth at an improper time, for instance, when the system is in a reduced condition, or when there is inflammation in the parts or any other unhealthy condition, that contributes to the formation of alveolar abscess. To attempt a clear and concise description of all the circumstances that tend to produce or contribute to the formation of abscess would be a tedious as well as unprofitable undertaking; the

above refers mainly to roots of teeth and teeth in which there is no nerve membrane. The next class of causes that claim our attention are those in which the nerve membrane is yet remaining. A tooth may be slightly decayed, enough so to expose the pulp, and the irritation thereof from contact with the air, from chemical action or otherwise, may be sufficient to produce inflammation in the membrane, and this, if not relieved by topical applications, usually results in the death of the pulp. The power of recupuration in the pulp of a tooth is very low at best, and when inflamed from contact with the air and fluids of the mouth, death is almost sure to follow. The engorgement may be relieved by stimulants or by drawing the blood from this point to some other, thus permitting the part to recover. This may be done by the use of leeches, counter-irritants, activity of body or mind, or both, or any other act that will change the current of blood to some other point. It takes very little irritation in some persons, and especially at certain times to produce inflammation at the apex of the roots of teeth sufficient to cause an abscess, and the conditions mentioned above seem peculiarly to favor this result. There are other cases where the nerve of a tooth is not exposed, but the decay approaches very closely, the cavity is cleansed and filled, and the thermal changes in the filling, together with the close proximity of the same to the pulp, will cause irritation and inflammation; and as the tissue is encased in a firm and unyielding chamber the only egress is through the foramin of the root, and whether the cavity is filled or not an abscess may form. After a tooth is filled the nerve often dies from inflammation produced by the operation. Abscesses may be formed and exist for a long time without being apparent, and in persons of good health, have existed and been cured by nature alone. I have seen cases where there had been abscess and no external signs of lesion, and the persons themselves had no knowledge of its existence, clearly showing to my mind that an abscess may exist and be radi-

cally cured by nature alone. The next among the causes that we shall mention is mechanical violence; this, like many other causes, has its peculiarities. Mechanical violence may be in any direction that will bruise the periosteum of the tooth. But the most favorable is the lateral. You may force a tooth in the socket with such violence that it will bruise or otherwise wound the membrane, and cause inflammation. It may first be in the form of periostitis, but if the inflammation is not allayed a plasma will be wept out and matter formed; but as before stated the most favorable kind of violence for the production of abscess is the lateral. Strike a tooth on either side and not only bruise the investing membrane, but the nerve itself is liable to be injured, either of which will cause thickening of the membrane and produce the same result. An alveolar abscess is sometimes caused by simple inflammation of the periosteum, this is often the result of sudden transitions of temperature. These are some of the exciting causes, there are others that might be named, but for the present we will omit them. There are general or constitutional causes which contribute largely to the formation of abscess. Persons of a manifest inflammatory diathesis or those in which there is considerable local inflammation from some local exciting cause. Those of a manifest strumous diathesis and persons living in miasmatic districts are more likely to be attacked than those of a healthy condition.

HOW THEY ARE PRODUCED.

It will be well to state that the same laws govern alveolar abscess that govern abscesses in general. The healthy action of a single cell, or a number, may be disturbed by a faulty, or diseased supply of nutritious matter, or by mechanical violence, wounding or entirely obliterating them, either of which will deprive the cell or cells of their pure pabulum or food, and death is the result. When periosteal inflammation takes place, whether it be at the apex of the root

or any other point, and continues until suppuration ensues, the periosteum at that point thickens, and as the matter accumulates, the periosteum is distended, and begins to press against the walls of the alveolus, and the consequence is, that the walls at the point affording the least resistance, are absorbed until there is an opening formed for the escape of the matter.

"Let us take, for instance, a case of common phlegmonous abscess, and trace it from its origin to its culmination. The inception depends upon the poisoning of pabulum, or mucus mass, by the accumulation of innutritious or effete matter, which disturbs the nutrient action of one or more cells, by depriving them of their pure pabulum or healthy liquid food. These salts and gasses being held in solution, have a tendency to diffuse themselves in every direction throughout the free juices of the flesh, and this predominance of chemical affinities disturbs the equipois of the currental movement denominated vitality, and is destructive in the exact proportion of its predominance." The healthy parts are constantly making an effort to stay the further advance of the abscess and to some extent limits the size of the sac. The process of the formation is by breaking down cell after cell, until the whole surrounding structure is destroyed; this may be slight or extended, owing to the poisonous condition of the juices, and the state of the health of the patient. There seems to be no settled theory among authors, just how, or by what *modus operandi* abscesses are formed. Some writers assert that the sac is formed by the distention of the periosteum, while others say that it is formed by the hardening of coagulable lymph, which is effused at that point. If the latter be true, then it is certain that the periosteum is destroyed by a sort of chemico-vital process so far as the pressure of the sac extends; then if the theory of the formation of the sac, by the distention of the periosteum be true, that membrane is changed somewhat in character; the healthy periosteum being a white fibrinous substance capable of powerful resistance, &c., while the sac of an abscess is of a different

character, inasmuch as it is much more highly organized, and is capable of greater resistance than healthy tissue.

Prof. Harris says that "whenever there is intense orsevere inflammation at the root, or in the alveolus infusion of coagulable lymph takes place, which hardening attaches itself to the tooth, and ultimately a sac is formed. This, as suppuration takes place distends and presses against the alveolus through which an opening is formed for the escape of the matter."

The character of abscesses is exceedingly variable owing to the constitutional peculiarities and susceptibilities, the condition of the parts immediately concerned, and to the cause producing it. There are exceptions however to all rules, but this is the general rule. Persons of a scrofulous temperament are more liable, as before stated, and an abscess in persons of this temperament takes the chronic form almost immediately; while those of good constitutions will recover with little or no treatment at all. When a part capable of suppuration is subjected to inflammation of the required intensity some of the small vessels give way and blood is effused into the surrounding parts; simultaneously with this rupture, or nearly so, the arteries begin to throw out a peculiar plastic matter, called coagulable lymph, this is capable of becoming organized and being thrown around the diseased parts, and between them and those which are healthy, it forms a barrier to the infiltration of extravasated fluids.

"By some strange process to us altogether inscrutable, the walls of lymph become vascular, and capable of performing the vital functions of secretion and absorption and by them the pus is furnished. As this secretion proceeds the previous contents of the abscess including the effused blood, are gradually absorbed, and fresh pus is deposited in their stead, so that if the tumor be opened at an early stage the pus will be more or less mixed with blood; but if the opening be delayed the cavity will be found to contain only pure pus."*

*Bond's Dental Medicine.

WHERE SITUATED.

The point of attack is usually at the apex of the roots, but not always. In the superior teeth, abscess attacks the incisors sometimes on the side, some distance below the point, and especially on the buccal surface, in the bicuspids there is little difference from the incisors and canine teeth. In the molars the point of attack is frequently in the bifurcations of the roots, sometimes occupying the entire space, if at the apex of the root, the palatine or lingual is most likely to be affected, or in other cases, the anterior buccal root. The same will apply to the inferior teeth as to the superior, except in the single-root teeth. They are rarely attacked except at the apex of the root. The inferior molars are attacked usually, at the point of the roots, but sometimes between them, at or near the bifurcation ; as to which of the roots is most liable, there is really no difference. If the cause is from mechanical violence, it will be at the point where the greatest injury is produced. Abscesses in childrens' teeth are produced more frequently by mechanical violence, than, probably, any other cause, and in the four anterior superior teeth than any others. The third molars and especially the inferior are more liable to the ravages of this disease than any other class of teeth; they are liable to be attacked at all points; probably not in every tooth, but there is no point but is liable to attack at some time or other. The temporary teeth are more liable to the disease than the permanent, and should be more carefully treated, from the fact that the parts about are more susceptible to injury than the adult teeth and jaws. The superior incisors will be found more liable than the canine teeth, and the ten anterior inferior teeth less liable than any other class.

POINTS OF ESCAPE.

There are, perhaps, as many points of escape of the pus of abscesses as there are different points of attack. As a

general rule, the pus will find an opening through the most yielding part involved. If an incisor is affected, it is usually at the apex of the root; especially if it is an inferior tooth; but here we will remark that the six anterior inferior teeth, are rarely ever affected with abscess. Should such be the case it will be at the apex of the root. Not so with the superior incisors; they may be affected very often, and at various points. If abscess be produced from a dead or decaying nerve it will be at the apex of the root, and the opening will be at that point, but not always, though usually through the external wall of the alveolus. If the tooth thus affected be a central incisor, the opening may take a central or anterior course; in that event, when the pus reaches the suture, it will take its course along that suture, and find an escape at the posterior border of the hard palate. There are cases on record, where the pus passed over the floor of the nasal cavity, and was discharged at the soft palate. Such cases, however, are seldom met with. The cases most usually met with, are those that discharge through the anterior wall of the alveolar process, at the apex of the root. There is very little difference in points of attack, as well as of discharge, in any of the ten anterior teeth. They having single roots, except occasionally the first bicuspid which are sometimes double. If a molar of the superior maxilla be the seat of an abscess, it may be at the point of the roots, at the bifurcation, or on one side of the root; if at the apex of the palatine root, the pus will usually be discharged through the process at the point of the root, or it may traverse the alveolus for some distance before it is discharged; the most usual is at the point opposite the apex. Abscesses of the buccal roots discharge their contents through the outer wall and usually at the nearest point. If the anterior buccal root has an abscess at the apex, it is sometimes the case that the discharge is into the maxillary sinus. When this is the case the treatment is complicated. The discharge from a third molar may be an inch or two from the seat of the disease, owing to

its situation. There have been cases where the discharge was on the angle of the jaw, or on the side of the neck, and one or two cases where the pus escaped on the back part of the shoulder. A case of this kind was described to me, by an old and experienced Dentist some time since. In the inferior third molars, the discharge may be on the inner side of the jaw, or at the lower edge, and is sometimes mistaken for scrofula, especially if the patient be of a scrofulous diathesis. The discharge from the first and second inferior molars is always or nearly so at the point of attack.

Before dismissing this part of the subject I will mention a few cases met with in my own practice:

First case. — A little boy about eight years of age — of a manifest scrofulous diathesis, was brought to my office for consultation. On examination I found large abscesses (or an abscess,) situated at the roots of the first and second left superior temporary molars, ulcerated at the roots and discharging the pus over the posterior angle of the malar bone, just under the canthus of the eye. I inserted the probang, and could distinctly feel the permanent teeth.

Second case. — A lady had an abscess at the apex of the root of the left superior lateral incisor, it discharged pus at the apex; in a few days she called to have it further treated as it seemed somewhat indolent. After giving it such treatment as I considered necessary she asked me to look at the opposite side of her mouth, where, to my astonishment, I found a lump as large as a hazel nut, which, on being opened, was found to contain pus; a further examination showed that the latter proceeded from the left side of the mouth. Here were two points of discharge from one abscess, one at the point of the root affected, and the other at a point between the right lateral and cuspidatus, a distance of at least one inch from the first. Another feature in this case is, that the whole face swelled, and beneath the right angle of the inferior jaw was swollen more than any other part. At one time I had fears that suppuration might possibly take place

at that point. The cause of so much swelling and inflammation was, I think, the malarious condition of the system. I have failed to say that the external opening may be through the gum and into the mouth, or it may be through the cheek and skin, making its appearance on the face, and if it be a lower tooth the pus may be discharged through the jaw avoiding the mouth altogether. A very remarkable case of fistulous opening through the inferior maxillary is reported by Mr. Bell, and on account of the singularity of it, I give his report, believing that it will be of benefit to some who have not seen it. This had resulted from an abscess in the socket of a dens sapientiæ of the inferior maxilla. The discharge had been kept up for two years previous to the time that the case was submitted to Mr. Bell for treatment. "At this time a funnel-shaped depression existed in the skin, which could be seen to the depth of nearly three-quarters of an inch, and a small probe could be passed through it into the sac of the abscess underneath the root of the tooth. The abscess had now remained open for nearly two years, during the latter of which the parts had been in the state I have described them. I removed the tooth, and as I had anticipated, no further secretion of pus took place, but so perfectly had the communication been established, that when the gum healed, it left, by its contraction, a fistulous opening, through which a portion of any fluid received into the mouth passed readily to the outside of the cheek, and I could, with care, introduce a fine probe completely through the passage. So free, in fact, was the communication that some of the hairs of the whiskers, with which the external portion of the depression was filled, grew through the external opening and appeared in the mouth."

PUS.

Pus, under all circumstances, is nearly the same, and all chemists give to it the same chemical constituents. Pus, of a good or healthy quality, is of a creamy appearance, of a

yellowish white color, inodorous, and opaque. Alcohol and heat coagulate it. In an analysis, by Schuilque it was found to contain albumen and water, a particular extractive substance, and a small quantity of soda, phosphate of lime, and other salts. "Normal pus consists essentially of two distinct parts: pus corpuscles, or pus globules, and a colorless, aqueous fluid liquor puris, in which the corpuscles are suspended." A variety of globules or corpuscles are described by other chemists, but the above is sufficient for our purpose, hence we will not occupy space in describing them.

Unhealthy pus, the kind usually found in abscesses of an ichorus character, is very irritating to the parts effected, and as long as that condition exists the parts will remain in a diseased condition. It is of a thin dark appearance, and is irritating.

"Although it is true that such pus as is called healthy indicates a convalescent state of an ulcer or abscess, the inference to be drawn from its appearance attaches exclusively to the parts which secrete it, while it may herald the abatement of local inflammation, it may, at the same time, give clear evidence of a state of disease incompatible with integrity of organs, or with life itself. Suppuration of the eye, liver, or of the lungs would be a very serious matter, however healthy the pus might be." *

Some writers have considered suppuration a curative process, and have regarded the pus a valuable covering for the granulations or new growth of flesh, and so it is in some cases, but there are many exceptions.

Some parts of the body have a much greater disposition to form pus when inflamed than others. The cellular tissue, skin, and mucous membrane are very prone to suppurate, while the fibrous tissues manifest no disposition to it.

"Pus is modified, by the nature of the part where it is formed, by the constitution of the individual, by various accidents occuring in the process of its formation, and by cer-

* Macartney on Inflammation.

tain obscure laws which control the phenomena of these affections, which are called specific. It will also present different appearances, as it may be mixed with other fluids, as blood, saliva, bronchial mucus, etc." †

"When pus is irritating it is not so to the surface which secretes it, but to the adjoining healthy structure over which it flows.

"Pus is heavier than water, and this quality assists us in distinguishing it from mucus.

"Mr. Hunter is of opinion that it is coagulable in muriate of ammonia, which peculiarity distinguished it from mucus and all other natural secretions, but this test was disputed.

"From the fact that hard and inflammatory tumors, in the course of inflammation become soft and yielding, and filled with pus, it was naturally supposed that the original solid parts were converted into this fluid, it is now well ascertained that such is not the case, but that pus is secreted by the arteries." ‡

TREATMENT.

By treatment is meant all means employed for the cure of disease. The treatment of abscess may be divided into three classes, *Preventive*, *Therapeutic*, and *Surgical*. The preventive may embrace all means employed, and in order to be the better understood and to avoid confusion, we will arrange our classes of treatment, commencing with

PREVENTIVE.

In this class of treatment we often have to resort to general as well as local means. An abscess may, in some instances, be prevented by antiphlogistic treatment, such as saline cathartics, leeching the gums, and anything of a cooling nature, either constitutionally or locally applied. There are so many different remedies for different cases that it is impossible to give a single remedy that will suit all.

† Macartney on Inflammation.
‡ Bond's Dental Medicine.

Where we wish to prevent the formation of an abscess the first and most important thing to be done is to remove the exciting cause. If the pulp be dead in a tooth, its removal will, in many cases, prevent the formation of an abscess or the removal of any foreign body, such, for instance, as the roots of dead teeth, or any thing that proves an exciting cause. Sometimes the application of a counter-irritant to the gums, when the use of leeches is impracticable. The gums may be scarified and bathed in warm water to promote bleeding which will, usually, prove beneficial. Painting the gums well with compound tinct. of iodine is also attended with good results. I have also found great relief in the application of croton oil to the gums; a saturated solution of creosote and iodine as a local application is invaluable in many cases. For the last year or two I have been using, with great satisfaction, "*Mercurius vivus,*" (third trituration,) which, for acute periosteal inflammation, in many cases has no rival, except where the system is very susceptible to impressions of mercurial agents, then it should not be used. If the case is found to be too obstinate to yield to the preventives used, the only course left for us is to use palliatives until the sac is formed and then adopt the kind of treatment indicated.

"Pressure will limit the outward wave whenever applied upon a purely healthy portion of structure, and define the size of an abscess by turning back the wave of nutrient activity in the deteriorated part upon itself, preserving the outward sea from threatened disturbance." Vigorous or active exercise, both bodily and mental, have a powerful influence on incipient abscess, and sometimes cure entirely. Why, or how this is done may not be very well understood, nevertheless it is true, and may be accounted for by the inviting away of the nerve force and current of blood and literally starving the abscess. When therapeutic agents are used the principle of their action is very much the same as that of pressure in arresting the wave of poi-

sonous nutrition, and in like manner they abate or greatly reduce the size of the sac.

THERAPEUTIC TREATMENT.

Of the remedial agents for the cure of alveolar abscess we will mention *creosote*, *nitrate of silver*, *chloride of zinc*, *chlorate of potassa*, *iodine*, *iodide of potassium*, *bromine*, and *brom.de of potassium*, etc.

CREOSOTE.

Creosote was discovered by Reichenbach, of Blenkso, in 1830; it is procured by the dry distillation of various vegetable as well as animal substances, but is officinally described to be obtained from wood tar. It is a colorless, oily liquid, of a peculiar, disagreeable and penetrating odor, resembling that of wood smoke, and has a burning, acrid taste which is perceived throughout the whole extent of the buccal, nasal, and pharyngeal mucous membrane. Its specific gravity at 68° F. is 1.037. It boils at 397° F., and is frozen at 17° F. It burns with difficulty in the air, emitting large volumes of smoke. It coagulates albumen but exerts no action upon fibrin. Owing to these facts, and its strong antiseptic properties, it is considered one of the best therapeutic agents in the cure of all ulcerative affections. This substance is more peculiarly adapted to the treatment of alveolar abscess than any other known agent. "Creosote is an active caustic. Its escharotic power is due to its affinity for albumen, which is so strong as to take the latter from living tissue and thus destroy vitality to the extent of the combination. Its compound with albumen is white, hence the extent of its escharotic action is readily observed." In addition to its strong affinity for albumen with which it rapidly forms a permanent insoluble compound, it possesses the valuable property of arresting and preventing the decomposition of animal matter, which renders it preferable to any other agent that has hitherto been introduced for the treatment

of abscess. "Its great penetrating power enables it to pervade every part of the cavity and diffuse itself over the entire surface of the sac, thus effectually securing the desired result." It is also one of the most energetic stimulants.

The mode of applying *creosote* is usually by injection. In some cases, however, where the fistulous opening is large it may be applied by saturating a pledget of cotton or lint and forcing it into the cavity formed by the abscess. The most successful means of applying creosote is by injection. I find this most readily done by the use of a syringe when the liquid is to be inserted through the fistulous opening, but if the root of the tooth is well opened then the pulp cavity may be filled with gutta percha or Hill's stopping, through which drill a hole for the insertion of the point of the syringe which will greatly facilitate the operation. Another manner of injecting an abscess is preferable to the above, inasmuch as it is less complicated and will allow a much more thorough operation than with the syringe especially if the foramen be small. This is accomplished by shaping a broach of a piece of pivot or any hard wood, such as straight grained hickory, barb the point, around which roll loosely some cotton, this dip into the creosote and use as a piston, dipping it into the creosote every few seconds and forcing it into the sac until the patient complains of pain. If there be a fistulous opening through the gums the creosote can, in nearly all cases, be forced through the tooth, sac, and gum. This is indicated by the surface around the fistulous opening turning white, and is an indication that the process has been carried far enough for that time. If the operation has been thoroughly performed, the creosote having pervaded every particle of the sac, there is little doubt that a cure will be effected, other things being favorable. I find, in many cases, a cure may be effected in healthy patients with a single application of the creosote. In most cases all can be accomplished with creosote that can be with other agents, I seldom use anything else for that purpose.

Were it not necessary in a paper like this to give all the remedies used I would let the above suffice, but to meet the views of all, other remedies will be given.

NITRATE OF SILVER.

Although this remedy is but little used, it is occasionally employed and is deserving a place in the catalogue of *remedies*, a consideration of its merits will not be regarded out of place.

Nitrate of silver is a white salt having an intensely metallic, bitter taste, it is usually prepared in the form of hard, brittle sticks, at first it is white but becomes gray, and afterward more or less dark under the influence of the air. It was once thought that the light caused this substance to turn dark, but this is shown to be erroneous. The turning dark is caused by organic matter or sulphuretted hydrogen contained in the air. Silver coin will be affected in the same way. Its affinity for animal matter is evinced by its forming definite compounds with albumen and fibrin. *Nitrate of silver* is soluble in its own weight of water and in four parts of alcohol, its solution stains the skin an indelible black color; when exposed to heat it fuses at 426°, and at 600° undergoes decomposition with evolutions of oxygen and nitrous acid.

Nitrate of silver is employed as a vesicant, stimulant, and escharotic, either dissolved in water or in the solid state. It may be used in abscess for two purposes, one to break up the sac, the other to heal the ulcer, and when employed for the latter should be applied in solution of about two or three grains to the fluid ounce of water; a drachm of the salts to an ounce of water forms an escharotic, and may be injected into the sac of an abscess. I usually prefer the solid nitrate to the solution. I find the best and most convenient mode of applying the nitrate in the solid state is by pulverizing the crystals as finely as possible, and by means of a small slightly tapering silver tube they may be carried into the sac with little difficulty. There is another way of introduc-

ing the nitrate that may be well to mention; take a small stick of the salts, about the size of the lead in a common pencil, and upon it form a covering of melted engraver's wax, this done, trim off a portion of the wax at the point and insert it rapidly, not allowing time for the substance to dissolve and stick to the flesh. This method is not so successful or satisfactory as the other. The injecting of the solution may be conducted in the same way as that of creosote.

CHLORIDE OF ZINC.

As this remedy is seldom used I shall not enter into a detailed account of its administration and uses. The chief employment of the chloride of zinc has been externally as an escharotic, applied to schirrhus and cancerous affections and to ulcers of an anomalous and intractable character. When thus used it acts not only by destroying the diseased structure but by exciting a new and healthy action in the surrounding parts. It may be applied in the same manner as nitrate of silver. The greatest benefit resulting from the use of chloride of zinc is in the reproduction of alveolar process, where it has no rival. The chloride should not be used oftener than once a day for one or two days. Then, if the application has been thorough, there is no further use for this agent.

IODINE AND ITS TINCTURES.

Iodine is an elementary non-metalic substance having some resemblance to chlorine. It was discovered in 1811, by a soda manufacturer of Paris. Sometime after this its therapeutic properties were discovered, since which, it has gradually come into general use, so that at the present time it is universally a standard remedy. It is found chiefly to exist in the kelp of sea weeds, in the animal, and mineral kingdom. It is also found as an iodide of sodium in several mineral springs of the United States, and in some minerals in

other parts of the country. As a therapeutic agent, iodine is used as an absorbent—it excites absorption in the alveolus, and in erysipelatious affections. In glandular enlargements and malignant growths, its use is more beneficial than most other stimulants, in bronchocele and other affections of the throat, and thyroid glands iodine is considered invaluable. As the Dentist is not expected to treat such diseases the further consideration of the agent in this connection will be discontinued. It has only been thus spoken of to show its efficacy in such cases.

Iodine is less used by the Dentist than the tincture; as an internal remedy it is seldom used, the iodide of potassa being considered far superior. Iodine may be useful in the local treatment of chronic inflammation or induration of the salivary glands, in dental periostitis, in alveolar abscess, in some morbid states of the antrum, in thickening of the mucus membrane, in tumors of the mouth, and in absorption of the gums and alveolar processes. The officinal tincture will answer very well for periostitis, thickening of the membrane, and sometimes for abscess. For chronic catarrh, or inflamation of the lining membrane of the antrum, the compound tincture very much diluted is a good injection. For destroying the sac in alveolar abscess, a solution of iodine and creosote is a sovereign agent, and when not too concentrated, the same is an admirable application to the margins of the gums and alveolar processes, after the removal of all irritating and dead substances; but care must be taken that it is not applied too frequently. It is an escharotic, and as a general rule it is well to let the slough separate before a second application. To use externally I prefer a colorless solution of iodine, prepared by combining equal quantities of compound tincture of iodine and pure aqua ammonia. As combination takes place, the mixture becomes transparent and will not then color the skin. I do not think of any condition which will require the Dentist to prescribe iodine internally. When its constitutional action is indicated as in scrofulous or syphi-

litic diseases of the mouth more benefit will be derived from the use of iodide of potassium.[1]

IODIDE OF POTASSIUM.

Omitting its history, we will pass immediately to its physiological effects and uses.

"Locally, this salt is an irritant, but is not near so energetic in its action as free iodine. On this account it may be given internally, in larger doses and for a longer period, than iodine. Indeed, iodine can be introduced into the system much faster by the use of the iodide, than when given uncombined. A solution of albumen, fibrin, or gelatin, is not obviously changed by the addition of this salt, and as these are the most abundant organic constituents of the body, we may infer that the chemical action of iodide on the living tissue is but slight. To obtain a clear view of the action of this salt, as a remedial agent, it is necessary to bear in mind its peculiar properties. It is very soluble, and is, therefore, readily absorbed. It passes rapidly into the circulation, and may be detected in all the tissues and secretions. It is composed of two elements, both of which are characterized by strong affinities for other substances, and for some of them stronger than that by which they are held together.

If the salt is decomposed, the potassium takes oxygen and becomes potash, which is a general solvent of the animal tissues. At the same time the iodine is set free, and is thus able to exert its affinities. And as all chemical agents are peculiarly active in the nascent condition, the iodine and potash are both more energetic than if carried in their free state, to the point of action. Each one, as it were, holds the other quiet till the proper point is reached, and then lets it go, to accomplish its work. Each element by neutralizing the other prevents its local, *irritant* action, and each is liberated, atom by atom, in obedience to stronger affinities, each

1. Watt's Dental Materia Medica.

particle being promptly saturated, by the gratification of the affinity, which liberates it. And this explains how it is that such large doses of this salt, can be taken for a long time, without local, or constitutional disturbance. The affinities of iodine and potassa are sufficient to account for all the phenomena, observed in the remedial action of the salt. Highly soluble compounds, are the natural results, and these are naturally carried out by the various excretories. Let us suppose that the iodide is administered for the arrest or removal of morbid growths, or to relieve tertiary syphilis. The latter is often spoken of as a disease of the bones. But does that expression convey the whole truth? Is there not a disease of the formative fluids from which bony tissue is deposited? Now, if these morbid particles are arrested, by the affinities of the elements of the salt, held in solution, and carried out through the various secretions, it is evident they will not further build up the morbid development. And as the particles of morbid structure, like those of normal tissues, perform their functions and pass away, unless new ones are furnished in their places, the abnormal solid is carried off little by little. The diseased growth is literally starved to death, and carried out by the scavengers of the system. It is this action of the remedy which has induced some writers to call it a resolvent, or liquefacient. In some of the above remarks, I have sacrificed technicality, to a desire to be understood by beginners, and those whose opportunities have not been such as they desired. They are not written for the critic, though of course, he may use his pleasure in regard to them. It should be given in solution, and usually, immediately after eating. It may be taken in sweetened water, or almost any way the patient may fancy. The average dose is from 4 to 10 grains. Many use much larger doses, but I have not[1] found it best to do so. For an adult, I frequently prescribe a solution of a drachm of the salt to an ounce of water, and direct the patient to take a teaspoonful three times a day."

1. Watt's Dental Materia Medica.

BROMINE.

Bromine is a volatile liquid of a dark red color, when viewed in substance. Its taste is very caustic, and its smell very disagreeable, somewhat resembling chlorine. It evaporates rapidly, and is sparingly soluble in water, more so in alcohol, and still more in ether. It is valuable for its bleaching properties, and may be used for bleaching teeth, not so well, however, as chlorine, or chlorate of zinc. Bromine is intermediate in its effects between iodine and chlorine. It stimulates the sympathetic system, promotes absorption, and is supposed to be more energetic than iodine or bromide of mercury. It is recommended where iodine has been tried, and does not act with sufficient energy, or has lost its efficacy by habit. I am of opinion that bromine, like iodine, is not as efficacious as bromide of potassium. In case the patient has any syphilitic taint, bromine and bromide of potassium may advantageously be used. They may be used constitutionally or locally, either or both if thought best, for local treatment, make a saturated solution of bromide of potassium, then add 40 drops of bromine to each ounce of the solution, and apply to the effected part, always cleansing the part well before making the application. Apply this remedy in the same manner as creosote. For internal treatment take of bromide of potassium 1℈, distilled water 1℥, misce, and add bromine 1℈. Take a teaspoonful three times a day, one hour before or after each meal. This treatment is only to be used in cases of syphilitic taint.

When local treatment is applied through the canal, it should first be cleansed of all impurities, such as nerve membrane, or any foreign substance contained therein, and the root opened freely to allow a free use of the injection. In case the discharge be fetid, a solution of chloride of sodium should be injected into the cavity, to correct this condition. After this, an injection of any of the above agents, may be

used to break down the sac. The directions for the use of which see CREOSOTE.

Here let me remark, that the young and inexperienced may be easily deceived in their cure. Either of the local remedies used will soon impart a very healthy appearance, and often cause the external opening to heal almost immediately, causing the operator to think he has cured the disease, when really he has hardly checked it. It is frequently the case that the therapeutic treatment alone will not affect a cure, but surgical aid is required. In the treatment of abscess in the inferior Maxilla, there are serious difficulties, which are not met with in the superior. One is, the situation being at the bottom, instead of at the top of the socket, the secretions rest on the diseased parts, while in the superior it is drained off. The presence of this matter is a serious obstacle in the treatment of abscess unless it can be drained off and kept free. Again, the size and shape of the jaw, is such that an opening through the gums can not be well made. Therapeutic treatment, in cases of this kind, is not very efficient unless it be vigorous. The treatment of abscess in the inferior jaw is not generally so successful as that of the superior.

SURGICAL TREATMENT.

The surgical treatment of alveolar abscess is very short and simple. That most commonly resorted to, viz: extraction, is generally successful. There are cases, however, in which it is desirable to avoid the extraction of the tooth, but, there are a great many teeth thus affected that are utterly useless and should be removed; for the irritation which they cause to the surrounding parts, to say nothing of the abscess, is sufficient cause for their removal. Old roots of teeth, and teeth that have lost their antagonists are nearly always a source of irritation, and when that is the case they should be removed. It sometimes happens that an abscess at the root

of a tooth, will burrow into the alveolar process, making the cavity containing the abscess larger a short distance beyond the root than at the socket. In such a case the sac will nearly always be retained in the alveolus after the tooth or root is removed; the abscess now acts independent of the cause which produced it, and the extraction of the tooth will rarely effect a cure, and an operation for the removal of the abscess will be necessary.

When the tooth is a valuable one and should be retained, either for ornament or service, and therapeutic treatment does not accomplish the desired result, it may be aided by the trephine, drill or chisel; with either of these instruments an opening may be made through the alveolus opposite the point of the root of the affected tooth, then, with a suitable instrument cut away or separate the sac from the root.

In some cases of alveolar abscess the alveolus is largely affected, and in such a diseased condition that it will not heal without first cleansing the parts; this may be done by chiseling or scraping off all dead particles of bone in and about the cavity, for as long as anything of the kind remains, the chances of success are greatly diminished. Care should be taken in all cases, that unnecessary pain is not inflicted. I have met and treated cases of abscess, where the outer wall of the alveolus was so largely affected as to present a honey-comb appearance; the only speedy and successful treatment in such a case, would be a breaking down of the diseased wall, and the removal of every particle of diseased bone. Again, in addition to the above, the root of the tooth may be in such a diseased condition, that the removal of the diseased portion of its substance will be necessary to a cure. All diseased bone and tooth substance being removed, a proper therapeutic treatment, and a vigorous constitution, will soon affect a cure. Compresses are necessary to stay the tide of nutritious food to the abscess, together with all other means that assist in the abatement of the disease.

To sum up the whole treatment, in a few words, the forceps and the chisel are the most effective instruments, and will generally be found successful. In the incipient stage of an abscess, if it be at a point where the outer wall of the alveolus is thin, and easily cut through, the knife may be used to advantage, by cutting through the process to the abscess, which will greatly facilitate the escape of the pus, and in this way a cure is sometimes effected. Scarrifying the gums, and thoroughly opening down to the sac with the knife is often successful. These are the surgical means usually employed, and are so plain that the time, and manner need not be misunderstood.

EVIL RESULTS.

We wish now to call attention to some of the evil results of alveolar abscess. I desire to call attention first to children's teeth. In these the greatest evil and most to be dreaded is necrosis which may take place, and extend to the sockets of the permanent teeth, causing exfoliation of their walls, as well as those of the temporary teeth. This is of the utmost importance, as by the destruction of the alveolus the permanent teeth are also very often lost. There have been several cases where the disease occasioned by an abscess caused exfoliation of the sockets of two or three teeth. It is frequently the case where the first or second superior molars are effected, their roots being situated immediately beneath the floor of the antrum, and as the roots very closely approximate, and sometimes even penetrate it, an abscess of these teeth often produces a disease in this cavity, that is very troublesome, and may result in Hydatides of the antrum. They are often very hard to cure, and in some cases are never cured. This is a very serious form of disease, superinduced by abscess. We find about as extensive, and alarming troubles arising from an abscess of the inferior third molars, as in any other of the mouth. Some of the reasons for this are, first,

the difficulty of diagnosing the disease. We find physicians, as a general rule, liable to be misled, and even Dentists are not always free from being deceived, in consequence of the opening for the escape of the pus, being at a considerable distance from the seat of the disease, the patient is often treated for a different disease entirely. Such has been, is now, and will continue to be the case, for those who are called in such cases treat their patients for months, and even years, without knowing what is the real cause of the disease, while, in the meantime, the abscess is still progressing, and as the tooth is situated so closely to the fauces, and soft parts, they will soon become largely inflamed, and if the tooth is very much decayed, the evil is increased by the amount of irritation produced by the ragged edges of the tooth, and thus extending to the lungs, may, so seriously effect the lungs as to finally produce *Phthisis Pulmonalis*. Again, the amount of swelling and inflammation in the mastoid muscles may be such as to render them useless, for the time being, and if the disease continues for any considerable length of time the muscles become ridged, and finally the jaws can not be used with that freedom they should be.

Exfoliation of the alveolus is another of the evils of alveolar abscess. This was mentioned above, but only in connection with children's teeth. I now recur to it mainly for the purpose of giving it a more extended notice, and relate a case or two to show how far this disease will be carried when all things are favorable. When the inflammation is extreme or very great it may produce necrosis, and exfoliation. In an old work published by "Fox & Harris on the Human Teeth," two or three cases are recorded, in two of which, three teeth, and in the third, all of the anterior teeth were lost by the suppurative process, produced by an abscess.

It is unnecessary to mention other cases to prove the evils of the disease in question, any one will admit that those

already mentioned are quite sufficient to show the importance of timely attention. With regard to the treatment of abscess there is yet very much to be learned; in fact very little as compared to what is required is yet thoroughly understood. Yet, enough is known to prove conclusively that very many cases may and can be cured. But the progressive practitioner will not rest contented with what is known on the subject.