inflammation; the effect upon the soft parts is always good. The treatment which should succeed the incisions is only to be determined by the circumstances of each particular case; not infrequently it will be found amply sufficient to keep the parts well cleansed, and await the coming away of the sequestrum; never, however, forgetting to meet the constitutional indication. In other cases, as when, for example, the phagedenic type is assumed, the most vigorous and well-directed local treatment is necessitated. When cases are first seen in the open ulcerated condition, semi-indolent, as is frequently the case, no treatment seems superior to packing the sore with cotton saturated with creasote and iodine, with phénol sodique, or with dilute aromatic sulphuric acid. Cases have come to the writer for treatment where the bone would be found exposed to the size of a silver three-cent piece, and where all the consequences of a large opening into the nares were to be apprehended, yet, by such applications, repeated every other day, allowing the cotton to remain in the ulcer the intervening time, in the course of two weeks the denuded bone would be entirely granulated over, and the parts remain permanently cured.

Breaks occurring in the hard palate, associating the oral cavity with the nares, are easily remedied by a covering of gold or silver plate. An impression of the full roof of the mouth is taken in wax; into this is poured plaster in a cream form; to the cast thus procured is fitted the plate of metal, supported by the teeth, or by atmospheric pressure, precisely as in the case of a plate for the attachment of teeth. Any reasonably ingenious mechanical dentist can meet the indications. (See *Obturators.*)

In breaks of the soft palate a simple wad of cotton may be temporarily used with a considerable degree of satisfaction. Astonishing results in the way of diminishing or closing breaks, both in the hard and the soft palates, are not infrequently secured by freshening the edges and touching every second or third day with iodine, zinc, dilute sulphuric acid, or the compound tincture of capsicum. Great care is, however, to be exercised in this practice not to over-stimulate, very troublesome degenerating inflammations being sometimes the result of over-excitement.

An ugly feature in a syphilitic ulcer is its tendency to recur: a palate, looking healthy to-day, will assume to-morrow an indolent relaxed type, becoming semi-yellowish; some point or other will take on a fatty look, and in a few hours break down into an ulcer. This may recur a dozen times; explanation lying in the systemic condition. Such recurrence of ulceration may extend over a period of six or eight months, in defiance of the most careful attention. The author has certainly found it so in his own practice, and believes it to be a common experience. The salt-bath is found in these cases invaluable, affording, as it does, increased vitality.*

* To Professor Sigmund, of Vienna, are we indebted for an appreciation of syphilitic manifestations occurring where there is associated with the disease nothing of the ordinary history. Syphilis of the mucous membrane of the mouth and jaws (*Wiener Med. Wochenschrift*) is recognized as a secondary or tertiary form of the disease commencing in the genitals or region of the anus. Those cases, on the other hand, are rare in which syphilis most undoubtedly, or with a probability amounting almost to a certainty, occurs as a primitive affection of the oral mucous membrane, especially the lips, and thence extends to the general system. Professor Sigmund, long ago, called attention to the increasing frequency of affections of the lips of primitive syphilitic forms,—indurations, papulæ, ulceration,—and this opinion has been confirmed by subsequent experience in his own private hospital practice. This observation has, in addition to its importance with regard to pathology and treatment, a deep social significance. During a given time seventy-three cases of these primary affections of the lips came under the notice of Professor Sigmund. Of these, thirty-two were presented at the hospital, and forty-one in private practice. These seventy-three cases of syphilitic affections of the lips occurred out of 5551 patients. The disease was observed much more frequently in the upper than in the lower lip. The most frequent explanations as to the cause of its having been contracted were, in males, smoking, and the use of certain tools, and in women, the rubbing of a spoon against the upper lip, and also the habit of holding between the lips thin, sharp, and pointed instruments, such as are used in sewing, arranging flowers, drawing, painting, working in cardboard, and similar occupations. It is worthy of remark that these affections of the lips occur in all ranks of society. Professor Sigmund passes over the special etiological reports appertaining to these affections, as they are in many cases doubtful, and, moreover, savor of scandal. Labio-genital coitus could be clearly proved in some cases, and in others contagion by means of paint-brushes, tobacco-pipes, drinking-vessels, etc., was made out. The syphilitic affections of special importance to the practitioner are those produced through kissing. Any method of transferring syphilis to a healthy individual from one previously affected at an earlier or later period, but evidently, and to a superficial observer, cured of the disease, is of the greatest importance; and even these methods have, according to Sigmund's experience, occurred with great frequency, and form a very noteworthy, but often neglected, mode of origin of the affection.

Interesting cases of specific inoculation by kissing are recorded in considerable number in American medical publications.

Mercurial Necrosis.—Ostitis, and exfoliation from the undue use of the mercurials, are so common as to have come under the notice of almost every physician. These cases have generally a history regular and distinctive in progress. First is observed by the patient, while the medicine is being taken, a coppery or metallic taste. Quickly associated with this is an enlargement of the tongue, recognized through the indentations made by the teeth as the organ encroaches on these bodies. The next stage is puffiness remarked about the necks of the teeth, commencing generally with the inferior incisors; the congestion of the oral mucous membrane, which soon extends over the entire cavity, produces a sense of dryness, and not infrequently of burning; the tumefaction, which has now become general about the necks of the teeth, assumes a livid color, and presents a grayish, œdematous surface, which extends more or less widely throughout the mouth; the inflammation, attended with cacoplastic exudate, next intrudes on the alveolo-dental membrane, and the teeth soon become so loose as readily to be lifted from their cavities, and when so thrown off are found covered with the sticky, grayish lymph in abundance.

Uncombated, the effect of the metal passes rapidly to the alveolar processes, this tissue seeming to undergo a process of liquefaction and absorption.

Necrosis, when it ensues, may be partial or complete. Many interesting cases of such condition have come under the notice of the author, some of which will be found alluded to in other parts of this volume. Children, during the dentitional period, are found most in danger of mercurial necrosis, the parts seeming preternaturally susceptible; a result, without doubt, of the excitement related with dental genesis. When the mercurial poisoning is conjoined with a scrofulous condition, the ravages are found most marked. The writer has known a single two-grain dose of calomel given a child of this cachexia kill half the lower jaw. Inflammation accompanying mercurial necrosis is apt, from its sloughing tendency, so to destroy neighboring soft parts that not infrequently the mouth is permanently closed, requiring for relief plastic operations of the most difficult and complicated character; and, unfortunately, even these proceedings are not always able to restore to the patient the lost offices of parts. (See *Atresia Oris.*)

The state of salivation, so characteristic of the mercurial poisoning, comes on at varying periods, the susceptibility being influenced by different conditions: the increase of saliva changes, also, from that which may scarcely elicit attention, to a secretion which shall keep the mouth of a patient constantly over a vessel. Persons occasionally are to be met with who will be salivated by the simple smell of a mercurial; there are others, on the contrary, who appear unimpressible. It would seem to be a just experience that mercurials, as a rule, are not wisely given to teething children, or to scrofulous subjects, and assuredly it can never in many cases be productive of good to push the medicine, let little or much be demanded, beyond that point at which its effects are observed on the festoons of the gums.

In the treatment of mercurial ulitis (which see) attention has been called to a practice by free scarification and the local use of iodine. Many cases of threatened necrosis have by these means been aborted; but very great care is to be exercised that a low vital force be not still further depressed.

Medication that applies to ulitis applies also to ostitis.

In the special treatment of the mercurial, as of any other sequestrum, it is to be looked on as a matter of importance that the dead piece be detached by nature alone, assisted by the surgeon only as in other paragraphs described. Particularly does this seem important in the young jaw, as thus it may happen that we shall not disturb, unnecessarily, the germs of developing teeth.

Much stress has been laid by some practitioners on the preservation of such teeth as are associated with the sequestrum, and advice given that incisions be made through the soft parts which shall allow the bone to be drawn away from the loosened organs. Such treatment can certainly only apply to very few and peculiar cases. As a rule of practice, the author is confident it will be found of little signification.

The ill odor and putrescence associated with mercurial necrosis are to be antagonized by the free use of antiseptic injections.

Necrosis from Injuries.—Accidental injuries received by the jaws are not infrequent causes of necrosis. Having such origin, the recognition and comprehension of the condition are but the apprehension of the common pathological expression. Traumatic influences capable of provoking an ostitis or periostitis which may result in necrosis, can be independent of external wound; depending entirely on concussion. The treatment of such a case is the treatment of inflammation anywhere. Death of the bone, in whole or in part, resulting, the case has the common history of necrosis.

Exanthematous Necrosis.—As a result of the exanthemata, it occasionally, though fortunately quite infrequently, happens that a subacute inflammation of the jaw occurs, resulting in limited or, it may be, in extensive necrosis of the part affected. To this form of disease, as the recognition of its associations is concerned, attention seems first to have been directed by S. James A. Salter, of Guy's Hospital, who records twenty-three cases as being met with in the associated population of that institution. The author in his own practice has seen quite a number of examples.

The accompanying cut is from a photograph of pieces, constituting the full half of the lower jaw, removed from the mouth of a German boy six years of age, the bone being in the museum of the Hospital of Oral Surgery. The earlier history of this case could only be procured to the extent of learning that some time after an attack of measles the child commenced to complain of a sore mouth, the gums swelling as in an attack of periodontitis, the swelling after a few weeks being followed by the continuous discharge of pus, which the parents stated had been troubling the child for several months; could not say whether it might be two or four. When first presented at the clinical service, the boy was so emaciated that little hope was entertained of saving his life; but, after having been placed on vigorous tonic medication for two weeks, taking iron and quinine, drinking beer, using salt-baths, and having the parts almost hourly syringed, thus washing away the offensive semi-putrid pus in place of allowing it as before to pass to the stomach, and at the same time using local means of a stimulating nature, the reaction was of the most promising character, and invited and indorsed the attempt to remove the sequestrum.

FIG. 505.

Sequestrum after measles.

Making at a second clinic thorough examination, it was evident that the body of the bone in mass was dead, and that not the slightest attempt had been made toward the formation of any new osseous structure. In this instance, all proper attempt was made to excite the production of osteophites, the necrosed structure only being removed when to leave it longer in its bed would have been to risk life.

The removal of the sequestrum in this case resulted in a considerable immediate deformity, but which, after two years, had so completely disappeared as to be scarcely observed, while the natural motions of the jaw seemed quite as good as in other children.

In a second case, the disease attacked the upper jaw, resulting in a repetition of small inflammatory sequestra, together with the crowns of the undeveloped bicuspidati of the side affected; the trouble continuing, in defiance of medication, for over a year, and yielding finally only to a summer spent by the patient among the mountains.

In the treatment of such cases, nothing special seems demanded, unless it is that we be able to recognize and administer the specific for the peculiar poison. Lacking such knowledge, the cure is to be conducted on general principles: great cleanliness, conjoined with stimulating and antiseptic injections, constitutes the principal local demand; while systemically, the patient is to be supported under the drain which, to a greater or less extent, always attends the process of exfoliation.

In cases of slight signification where the exfoliated part may involve the edge of the alveolar process only, so little attention is demanded as to deny the surgeon not unlikely even opportunity to see the condition.

Phosphor-Necrosis.—This is a term applied to that lesion of the maxillary parts dependent on phosphorus-poisoning, being a disease peculiar to workmen in match-factories, and confined here almost exclusively to such as are engaged in the processes of dipping and packing. How phosphorus affects the maxillary bones, whether from a systemic or a purely local relation, continues to excite discussion. That persons possessed of carious teeth are alone affected, seems sufficiently verified; while, on the other hand, as shown first by Dr. Letheby, of London, phosphorus has a systemic relation, as exhibited by its detection in excess in the urine of the poisoned patients. Von Bibra and Geist, holding to the theory of a local contamination, direct attention to the fact that "toothache invariably precedes the more severe affection," that a carious state of some tooth or teeth is a "*sine qua non*," and that "so long as the teeth remain good the affection does not show itself." Lorinser, who was the first to describe the phosphorus-disease, holds to the analogy of the affection with mercurial poisoning,—a view which the experience of the author of this volume leads him to sympathize with, although it is not to be denied that it is in opposition to that which at the present time is generally held: this common view being that phosphorous oxide, in a low form, finds a way to the periosteum through the dental pulp-canal, producing, as a result, the peculiar and specific inflammation.

A jaw, however, fretted and vascularly excited by teeth in a state of disease, would naturally be expected to be in a more susceptible condition than one strictly healthy: hence it may very well be that such special susceptibility can explain the attack, the natural resistive force of the part being to such extent lowered. Such supposition certainly tends to add force to the views of Dr. Lorinser, "that the fumes act by infecting the blood, laying the primary foundation for a disease which remains dormant until an exciting cause fixes the spot for the outbreak." In proof of his inference, attention is directed to the peculiar sallow skin, combined with a dull expression, together with

the gastric derangements, which are prodromous to the local affection; expressions which the author has observed as characterizing his own patients. In certain Nuremberg cases, however, mentioned by Von Bibra and Geist, these prodroma were not only lacking, but, on the contrary, the majority were seen to be of healthy, florid complexions, which some retained to the last stage of the disease. Let the true expression of the condition be as it may, a prophylactic always to be commended to workers in phosphorus is found in that continuous attention to the mouth and teeth which insures the most perfect cleanliness, combined with the immediate filling of every tooth which becomes carious, thus preventing exposure of the pulp. A second prophylactic is one suggested by Mr. Salter (see Holmes), who expresses the belief that by keeping the atmosphere of the factories ammoniuretted, and thus neutralizing the acid vapor, few, if any, cases of the disease would occur.

Still another means having general commendation is found in the employment of a respirator, of which perhaps the best is that devised by Mr. Graham for persons exposed to carbonic acid vapor. This consists of a mixture, in equal bulk, of fresh-slacked lime and sulphate of soda, worked into a cushion, through which it shall be easy to breathe. Carbonate of magnesia, used in teaspoonful doses twice each day, and applied with all freedom locally, will be found of great service in antagonizing the acid.

Outside of the association of the patient with phosphorus, there is nothing which, to an ordinary observer, would distinguish the incipient condition of this loathsome disease from a case of chronic periodontitis.

The first sign of a commencing phosphor-necrosis is found commonly in one or more teeth becoming sore to the touch, feeling, on occlusion, as if raised in their sockets; in a short time the surrounding gum begins to swell: in the character of this swelling is the first distinctive sign. It is not the acute, firm, inflammatory swelling of periodontitis, or of traumatic ostitis, but from the beginning has a puffy, debased, and degenerating look. One feels as if he might hesitate in adopting any very decided antiphlogistic treatment, or, indeed, in employing any other than an expectant one.

Phosphorus acts on both the upper and the lower jaw-bone, but seems to have a decided predilection for the latter; as twelve to nine, perhaps.*

The history of a case of phosphor-necrosis is to be epitomized as follows: a degenerative inflammation commences in the alveolo-dental membrane, or in the substance of the bone; the author inclines most strongly to the belief of its commencement in the latter. The degeneration of this bone progresses until its enveloping periosteum—which remains unaffected as its vitality is concerned—separates from it. The bone dies in bulk, or in part. In the

* Of twenty-two cases reported by Dr. Lorenser, nine were of the upper jaw, twelve of the lower, and one in which both were affected. Of fifteen cases occurring in Nuremberg, five were in the upper, nine in the lower, and one in both. Of eight cases recorded by Dr. Neumann, three were of the upper jaw, four of the lower, and one of both.

lower jaw, the body alone commonly dies, the rami remaining unaffected. In the upper, one cannot well infer where the demarkation will occur. During the process of dying, the periosteum, particularly in the lower jaw, is most active in the reproduction of new bone, of osteophytes, so called; this new material exhibiting markedly its endeavors to envelop and replace the old. The separation of the dead from the living bone, in the lower jaw, when the dead part is at all extensive, is found to occupy a period of from seven to nine months. It is attended with the formation of many sinuses, both in the mouth and about the neck, and is very exhaustive to the patient, on account both of the great suppurative drain and of the nauseating character of the discharge. All the soft parts associated with the affected jaw, the periosteum perhaps excepted, sympathize warmly during the process of decomposition and separation, looking, indeed, as if very badly affected with scurvy. At the period above alluded to, exfoliation being complete, the surgeon may remove, with little effort, the sequestrum; the sinuses then heal, and the parts may recover with as little deformity as attends the extraction of the teeth and the ordinary absorption of the alveolar process.

This will be found a common history of the disease. The author has seen and treated quite a number of cases, and it is thus that it has presented itself to his observation. It might perhaps be added that the teeth, influenced by the advancing disease, loosen one by one, so as to make necessary their removal long before the bone is ready to come away.

In phosphor-necrosis the death of the bone seems to be a result of morbid porosity, the loosening and expansion of the structure proving antagonistic to its nutrition; as vitality diminishes, so, as the result of a cacoplastic exudate, the periosteum is found to separate itself, such exudation explaining, in its degeneration, the characteristic abundance of fetid pus. Indeed, it is to be seen, almost from the earliest affection of the bone, that the periosteum is aroused to efforts for self-protection; so marked is this in many instances that attempts at the formation of new bone, made by separating the periosteum from the dead tissue, result in numberless osteophytes, if indeed a perfect wall be not secured. The writer has seen not infrequently the whole floor of the mouth, back to the base of the tongue, occupied by such new bone.

As is to be readily recognized, the tendency of this exudate to degeneration is marked: thus, the osteophytes are found in inverse proportion to the quantity of pus. These osteophytes, in characteristics, are seen also to be greatly influenced by a treatment employed in a case: in the beginning they are, it is to be inferred, uniform; from such uniformity we see them as slender shreds, in masses, and indeed in every irregularity of form and feature; decidedly disposed also are they to break down and disappear, and this particularly where extreme cleanliness is not observed, or the system at large is left without the support of tonic medication. It is, indeed, simply the common

history of lymph degeneration,—an inability on the part of the plasm to the maintenance of a self-supporting organization.

A dull, dirty-yellow complexion is almost universally associated with phosphor-necrosis: this has been variously attributed to dyscrasia, to the pain, the impeded ingestion, and to the immense drain made on the system in the progress of the exfoliative process. The most reasonable hypothesis is that all these causes are alike implicated: certain it is, that to get a patient clear of such a complexion, all require to be considered in a treatment.

The tendency to the burrowing of pus in acute phosphor-necrosis is remarkable, and to a great extent such burrowing will occur in defiance of treatment: if the lower jaw be the seat of the disease, the sinuses will riddle the neck: if the upper, the antrum tends to receive the pus, while in grave cases the matter not infrequently finds its way to the ear and to the mastoid cells of the temporal bone.

Salivation is another of the marked characteristics of the condition: the author has had patients who were compelled to have a handkerchief constantly at the mouth to receive the drainage. Another source of discomfort resides in vomiting: particularly does this tend to occur in the morning; the result of the pus swallowed during the night. Fever, diminution of appetite, and derangement of the bowels follow the progress of the disease, and, if not vigorously combated, are apt to end in an inanition fatal to the patient.

The sequestra of phosphor-necrosis in the lower jaw look somewhat like

FIG. 506.

Phosphor-necrosis sequestrum.

pieces of rotten sponge, being almost as light and porous; this arises from the suppuration and discharge of the primary exudate which was the cause of the original enlargement: the organic material being all discharged, nothing remains but the cell-riddled, inorganic structure.

TREATMENT.—The treatment pursued in phosphor-necrosis is to consist in the employment of means that shall circumscribe as much as possible the disease, that shall hasten the process of limited death and the accruing sep-

aration, and that shall support the patient under the drain to which he is necessarily subjected.

When a case presents in its incipiency, that is, simulating a developing periodontitis, we commence the local treatment just as we would that of the tooth lesion. If the inflammation have about it anything of a healthy acuteness, we limit as much as possible all external irritation, by softening in a gas-flame or by the stove a piece of gutta-percha, and moulding it over some opposite organ, or tooth farthest removed from the seat of disease; a mouthful of cold water hardens this cap, and thus occlusion against the sore tooth or teeth is prevented. A dose of Epsom salts or other saline cathartic is ordered, and a sinapism is applied to the back of the neck. A hot pediluvium is found sometimes to act very happily as a derivative; or a diaphoretic, such as the spirits of Mindererus, may serve a very good end. Depletion by leeches, however, has never seemed to the author to be an indication: the affection has its foundation in asthenia.

If we first see the case—and this is most apt to occur—when a discharge has made passage for itself by opening through the gum at the neck of a certain tooth or teeth, we immediately make a free incision through the soft parts down upon the bone, and syringe thoroughly with some medicated water, stimulating or antiseptic, or both, as indicated. Having the parts well cleansed, the wound which has been made is stuffed with cotton or sponge saturated with aromatic sulphuric acid. This is repeated the next day and the next, until, particularly as the syringing is concerned, it may be absolutely necessary to repeat it a dozen or twenty times per diem, the progress of the disease being so marked by discharge and offensiveness. As day by day the cotton or sponge stuffing is renewed, it is insinuated gently between the separating periosteum and bone. This manipulation will be found to hasten the separation wonderfully; it may abort the disease.

It might here be asked, perhaps, by some one, Is not this process of working off the periosteum an unsurgical proceeding, compelling an extension of the destruction beyond that which would have been a result if the bone was let alone? The author can only answer from his own experience in different modes of treatment, and say that he is perfectly satisfied that this is not the case, and that the result is for the good of the patient in every way: the portion of bone destined to die has the destruction markedly hastened; the sooner the death, the sooner the separation; the sooner the separation, the less the exhaustion.

The compound tincture of capsicum, with an excess of myrrh and an addition of the permanganate of potash, is an excellent wash for the mouth in these lesions. Dilute phénol sodique is almost indispensable. Cold water, with a little salt and magnesia dissolved in it, can be used *ad libitum*.

The sinuses which are so apt to form upon the neck, in defiance of all treatment, and which greatly annoy by their discharge, are most comfortably treated with dressings of patent lint. Once formed, it is a waste of time to attempt the healing of them: they will get well only when the source of offence in the dead bone is away.

It has been remarked that the death is limited in the lower jaw to the body of the bone, the horizontal portion, the demarkation occurring at the angle. This, in the majority of instances, will be seen to be the case, particularly if the treatment has been properly directed. Seven months has been found, in the practice of the writer, the minimum required for the course of the disease, nine months the more common time, and fifteen the maximum, although this latter does not accord with German experience, cases being reported of two years and a half standing. The drain during most of this time is immense, the patient requiring generous tonics and substantial fare. Attention to repair of wear and tear is, perhaps, of greater consequence than any local treatment; certainly, if one could not have both, his chances would be best with the former. Both are to be esteemed of vital consequence. To commence, however, with the ordinary medicinal tonics, is ill advised. One cannot well keep on with them, and by employing such means in the beginning of the disease their powerful assistance is lost at a time when every help is found weak enough at the best. Good underdone roast beef is enough for the first two or three months; then addition is to be made of generous malt liquors, together with the salt-bath. The latter portion of the time demands iron, quinine, brandy. The hemorrhages, sometimes profuse, are held in check by exhibitions, once or twice weekly, of five-drop doses of tincture of Erigeron Canadensis; otherwise the bleeding points are to be packed.

The period at which a sequestrum is ready to be taken away can only be known by repeated examination, the proper treatment being to wait always until exfoliation is complete, be such time longer or shorter. Nothing is gained by expediting the removal through operative proceedings, as by breaking away the bone, using the chain-saw, etc., while the risk to life is very considerable. To wait patiently, keeping the system equal to the demand on it, is the surgeon's highest duty; to do more is to do harm.

The removal of the bone is always to be effected from the inside; it does not seem that an outside incision could ever be found necessary. If the opening along the gum, obtained in the treatment, be not great enough, it is easily enlarged to an extent desired.

A step preliminary to the removal of the body of the lower jaw is its division at the symphysis. This is easily accomplished by means of a straight-cutting forceps, or still better by the engine and drill. It is better to cut little by little, from above downward, than to crush through the bone with a single cut; it does not hurt nor shock nearly so much. The operation with the drill pains little or none, never demanding the patient to be etherized.

To take away the bone, no instrument is found better than ordinary tooth forceps, such as is in common use for the extraction of the inferior incisors and bicuspidati. With such forceps, complete control of the part is secured, and the removal, as a general thing, is quickly effected.