

occur but very rarely in children. As the softening progresses, the parenchyma and adjacent cellular tissue become inflamed, abscesses form, and finally the well-known, slowly-healing fistulous tracts and undermining ulcers result.

Symptoms.—Tuberculous glands are most frequently situated on the neck, and a single gland alone hardly ever becomes affected; large convolutions, as a rule, may be felt on both sides of the neck, under the chin, and behind and beneath the ear. When the glands become enlarged very slowly and without any pain, they usually remain tolerably movable; in the contrary case, and particularly when they pass over into suppuration, they become tense and immovable. A lively pain, increased on pressure, then comes on in all cases, the integument constantly grows redder and thinner, finally breaks, and a flocculent, thin pus escapes, with which large tubercular granules are occasionally expelled. Generally several glands break open at one time, or soon after each other, at different places, and the suppuration is always extremely tedious. Very peculiar ulcers, with callous, extuberating edges and lardaceous bases, now form, from which irregular portions of the gland protrude.

Finally, after several months, the callous edges soften, the ulcers become clean and heal up, but not without the formation of disfiguring cicatrices. It is a remarkable fact that the general state of the system does not suffer here at all; the children look blooming, and thrive excellently well, provided the tuberculosis remains confined to the glands, and does not simultaneously attack the lungs, or some other vital organ. The course, aside from the disfiguring cicatrices, is, in the majority of cases, favorable; and usually, when the ulcers have once completely healed up, no new swellings and suppurations ensue.

As regards the complications, according to *Lebert's* famous researches, scrofulous ophthalmia precedes or becomes superadded in seven-sixteenths of all the patients, two-fifths of the cases become complicated with diseases of the bones, one-fourth with cutaneous affections, one-fourth likewise with diseases of the joints, and one-sixth with superficial ulcers and abscesses. According to the observations of the same author, tuberculosis of the glands is very rare between the first and fifth year of life, i. e., one-twelfth of its cases, more frequent between the fifth and tenth year, rate one-fifth; most frequent between the tenth and fifteenth year, viz., almost one-third of all its cases. From the fifteenth to the twentieth the frequency is still considerable, i. e., two-sevenths. From that time on, the disease becomes more rare; for, after that age, tuberculosis more frequently attacks the lungs than the lymphatic glands.

Tuberculosis of the lymphatic glands is of itself devoid of danger,

but very generally tuberculosis of the lungs comes on after puberty, and prognostically, therefore, this danger must always be kept in view.

Treatment.—In the simple and inflammatory hypertrophy of the glands, the cause is, above all, to be taken into consideration. The glands never grow smaller so long as the scrofulous affection of the skin or mucous membrane, that has produced it, still continues. Not till after these have been cured, and the glandular hypertrophy does not disappear, may the effort be made to remove it by the local application of tincture of iodine twice or thrice weekly. Simple swelling of the glands disappears under such a use of iodine continued for some time, but tuberculous very quickly thereby become inflamed and come to suppuration more quickly. Still, this last process need not be looked upon as an unfavorable occurrence, because the tuberculous masses cannot be absorbed, and are really eliminated from the system in this manner.

The tuberculous softening at times goes on surprisingly slowly; it scarcely ever, however, fails to take place, for calcification rarely occurs in childhood. All cutaneous irritants seem to accelerate it, and it is therefore rational to employ them. Here belong all the salves and plasters which make the skin red and inflamed, and a large number of which are current as popular remedies.

The ulcers that have already broken are to be treated according to the generally-adopted rules of surgery. When the healing is protracted for too long a time, a marked progress may be perceived from the use of red-precipitate ointment. Against simple induration, iodine will always prove a sovereign remedy. The greatest caution, however, must be exercised, in its internal use, for the always-to-be-suspected pulmonary tuberculosis occasionally makes visible progress thereby. Mineral waters containing iodine and bromine are best adapted for long use. Hypertrophied glands may soon be reduced in size by the continuous local use of tincture of iodine; it will, however, very seldom be possible to remove them altogether.

Extirpation of glands can only come into consideration when the inflammatory phenomena have long ago disappeared, and only a few glands have remained hypertrophied. In the contrary case, the wound of the operation, instead of healing up, may be expected to assume the character of a glandular ulcer, with the well-known callous edges.

(d.) *Bones, Inflammation of the Periosteum (Periostitis Scrofulosa).*—Inflammation of the periosteum is not infrequently the manifestation of scrofula or local phenomena of other remote affections, and occurs either as an acute inflammation or has a chronic insidious and

sometimes a very destructive termination. In rare instances a transformation of the primitive chronic into an acute periostitis may be observed.

The disease extends over a larger or smaller part of the bone; sometimes it attacks the periosteum of the bone in its entire circumference. Its site is generally on the long tubular bones of the extremities (tibia, femur, and humerus) and other compact bones; spongy bones are seldom affected.

The pathological character of acute periostitis, which occurs as often as the chronic, is distinguished by an acute injection of the periosteum, mostly in the form of a uniform redness and by a swollen, flocculent, and spongy appearance; later on, the periosteum is bathed in a muculent, tenacious, shreddy fluid exudation, and can be easily peeled off. In the insidiously-appearing periostitis, the hyperæmia is less intense, more in the form of a striped or spotted redness; the periosteum changes to a lardaceous, grayish-red, or grayish-white mass, which is less easy to pull off from the bone and adjacent soft parts. When the disease has existed for some time, the latter as well as the periosteum will frequently contain small spiculæ or lamellæ of newly-formed osseous substance; these are always apt to form whenever the periostitis is of some duration.

The additional alterations which the inflamed periosteum undergoes are as follows:

Complete *resolution* and *retrogression* to normal texture are extremely rare; a permanent *hypertrophy* and increase in bulk, with organization of the inflammatory product into solid tissue, occur somewhat more frequently, though on the whole likewise rarely; the termination in *suppuration* or *sanies* is predominantly frequent. In the latter processes pus forms in the inflamed periosteum as well as in the adjacent soft parts, which, uniting with the purulent collections in the bone, may form one large purulent reservoir. If the pus breaks outwardly and the periostitis was limited to a small, circumscribed spot, healing and cicatrization may indeed ensue, still these are very rare occurrences; the periosteum, as a rule, is undermined to a great extent, and separated from the bone; the latter is thus deprived of its nutritive conditions necessary for its existence, and the next effect is necrosis. In other cases, and when the influence of the scrofulosis continues, the suppuration assumes the character of ichorous liquefaction, which also extends to the subjacent bone, and induces in it the same process—*caries* (*S. caries* and *necrosis*).

Scrofulous periostitis less frequently indicates tuberculosis than scrofulous ostitis, for tuberculous masses often appear as the inflammatory product of the last. The symptoms of scrofulous periostitis

are in general those of ordinary periostitis, and differ according as to whether the course is acute or chronic. In most cases there is at first a local, not distinctly-defined pain, diffused along the length of the bone; it has a peculiar dull character, and is aggravated on pressure. Soon the pain, which at the commencement was only transient, becomes more constant and severe, particularly in bad states of the weather, frequently also at night. The afflicted limb swells faster or slower according to the character of the inflammation, the skin becomes tensely stretched, and can no longer be raised in folds; in the first stages the tumefaction is hard and dense; when suppuration ensues, one or more soft places will be found, then distinct fluctuation, and finally the abscess breaks, after the cutis has become bluish red in color and the epidermis elevated. Spongy granulations, which bleed at the slightest touch, exuberate from the openings, which often rapidly become enlarged. The pus that escapes differs in character according to the depth the processes run (*caries* or *necrosis*).

The general condition of the system, in the chronic course, is often but little affected, if it is not disturbed at the same time by other remote scrofulous diseases; on the other hand, in the acute as well as in suppurative stages it is always attacked by febrile phenomena, which may attain to hectic fever in the case of extensive profuse suppuration and weakness of the individual, which are frequently present. It terminates with the destruction of the patient.

According to the described symptomatology, it will not be especially difficult to form the diagnosis.

The *prognosis* must be put down as unfavorable, on account of the *caries* or *necrosis* which so frequently follows. The periostitis, even before these processes have distinctly developed themselves, may endanger the life of the patient by profuse suppuration.

Therapeutics.—The treatment, at the commencement, should be with resolvents, although these will bring about the desired effect in the smallest number of cases only; in addition to these, pain-assuaging remedies (internally and externally) must be employed, combined with absolute rest of the afflicted limb. Cataplasms, as a rule, relieve the pain very quickly, and for a long time, especially in commencing suppuration; but, as soon as that is clearly ascertained, the abscess should be punctured, for, if it is delayed, the rapid accumulation of matter will extensively separate the periosteum from the bone, and large portions of it will be destroyed in most instances.

Inflammation of the Medulla of the Bones (Osteomyelitis—Endostitis).—Inflammation within the medullary canal of the tubular bones occurs tolerably frequently in scrofulous persons. The anatomopathological conditions of this affection are: hyperæmia, with dark-red

discoloration of the marrow, conjointly with which small extravasations of blood now and then also occur, followed by suppuration, at first at small scattered places, which spread more and more, while the hyperæmia subsides. The medulla retains a dirty, brownish-red color, and liquefies; the bony walls are seen either discolored, pervaded by granulations and ichor, undergoing absorption, and becoming carious, or, when the suppuration of the medulla increases rapidly, they are seen to lose their supply of blood, and to be attacked by necrosis (caries and necrosis centralis). After a while the affection may attack the bone in its whole thickness, implicate the periosteum, and induce the same processes, which will be described in detail in the inflammation of the osseous structure and its terminations. The symptomatology and therapeutics are also almost identical with those of that affection.

That form of inflammation of the marrow appearing in scrofulous subjects, in which the contents of the medullary spaces, and the cancellous structure of tubular bones, especially those of the hand and foot, appear inflamed, is of more frequent occurrence than the above; inflammation of the periosteum is always present with it. The process, which in its subsequent stages is known as osteoporosis, osteospongiosis, *spina ventosa*, is of such a character in the first periods that all the osseous cancelli, and the medullary cavities, are found filled with dark-red, bloody fluid, rich in cells, sometimes even with purulent degenerated marrow, while the periosteum is seen hyperæmic and swollen. At a further stage of the evil, purulent dissolution and absorption of the osseous substance take place within the bone through the inflammatory action, by which the cancelli attain to abnormally large size, while, externally, irregularly, thin bony lamellæ form, from the similarly-inflamed periosteum, and, in part, are again destroyed by the process of absorption which goes on from within. In this manner the bone may increase in bulk enormously, while its substance has, nevertheless, become diminished, for its internal part consists of very large, coarse meshes, large cavities, or irregular cells, very much as if the bone has been strongly inflated (therefore, also, the name *spina ventosa*). In the developed state of the affection, it is impossible to distinguish the cancellous structure from the medullary cavities.

The affection frequently occurs, in scrofulous children, on the hands and feet, and generally on the metacarpal and metatarsal bones, or the phalanges, which often become expanded and misshaped, and present bulbous or globular swellings (similar to the enchondroma on the fingers, which the process under consideration also resembles in this respect: that in it, as a rule, the joints remain free or unaffected).

The process often does not attain to suppuration, but, when it does, numerous fistulous openings will form; most of them, however, remain small.

Therapeutics.—By the use of proper remedies, directed against the fundamental disease, in addition, by bathing the afflicted limb (either with tepid or alkalescent water), and by a compressive bandage, applied for a long time, a cure may not infrequently be performed with but slight deformity.

Inflammation of the Bony Structure (*Ostitis Scrofulosa*).—Inflammation of the osseous tissue frequently occurs in scrofulous children, and has its site chiefly in the spongy bone-tissues (in the irregular and short bones of the extremities, in the epiphyses of the long bones, the vertebræ, etc.); still, it also occurs in the flat, compact, and tubular bones; in fact, no bone of the skeleton is excepted.

An inflammatory nucleus forms at some part of the bony structure, which quickly gains ground, or several originate, and then become confluent, under more or less marked hyperæmia, which may attain to actual extravasations of blood. The cancelli of the bone are superabundantly filled with an oleagino-gelatinous fluid, which is soon supplanted by granulations, displaying a profuse quantity of cellular structure; the cancelli of the bony-tissue become larger as the granulations produce an absorption of the osseous tissue (osteoporosis). The bone itself, at the inflamed place, appears larger in bulk, although its structure has not increased, but, on the contrary, become diminished. This condition becomes particularly apparent when the inflammation is situated near the superficial surface of the bone. Abscesses are also often seen to form in the adjacent soft parts, even when the inflammation is situated in the depth of the bone, and does not involve its superficial surface.

In scrofulous subjects the *tuberculous* inflammation, which attacks especially the spongy bones and epiphyses, is the form which most frequently occurs. Accompanied by hyperæmia, one or several nuclei, of a globular form, or a uniform infiltration of the osseous substance, with a semi-transparent, yellowish-gray, gelatiniform exudation, takes place. When there are only a few scattered nuclei, some of them will be surrounded by a sort of envelope, which likewise enwraps the exudation, but it disappears in the progress of the lesion. Softening soon takes place, the several aggregations turn to a yellowish color, a crumbling, cheesy matter is seen in the thick, pultaceous fluid, and, when the process goes on faster, and is more extensive, small fragments of bone will not infrequently be found. By this process cavities form in the bone, which, by constant extension and approxima-

tion, will finally unite into considerable-sized caverns; the bone becomes rotten, and crumbles down, as it were, within itself. In the first stage, recovery may take place by the fluid contents of the nodes becoming absorbed, and these undergoing calcification, while the bony tissue near them becomes condensed; but the breaking of the abscess, and evacuation of the tuberculous matter, with a continuation of the process as tuberculous caries, which then passes through its various metamorphoses, are of more frequent occurrence (S. caries).

Tuberculous infiltration attacks either a whole bone or a part of it—a vertebra, for example—in this manner: a bone is pervaded by the yellowish-gray inflammatory product, and a number of yellow streaks and spots soon appear, which rapidly become enlarged, coalesce, and consist of purulent fluid, intermixed with crumbling granules, which quickly assume the character of a puriform ichor or sanies. Under its influence the bony tissue soon breaks down into small or large particles, which are sometimes found in the ichorous fluid that is discharged. If the process goes on still further, it may next also involve the periosteum, destroy it, and cause death and exfoliation of the bone. In other, rarer instances the disease becomes arrested after the exfoliation of the infiltrated parts, and a recovery takes place by the cancelli becoming filled up with granulations which spring up from the still healthy adjacent part of the bone, or from the periosteum and its vicinity. The terminations of inflammation of the bony substance, after it has existed as such for a longer or shorter period, are:

(1.) *Resolution.* Complete resolution is an exceedingly rare occurrence in scrofulous persons, and is only observed in inflammations implicating small portions of a bone.

(2.) *Suppuration,* with subsequent healing without transition into caries. The transition into suppuration occurs tolerably often; a cure, however, is rarely effected after the breaking and evacuation of the abscess have taken place; in most cases purulent infiltration and protracted caries then follow. In this termination the cancelli are distended, enlarged, and full of pus, and, as the bony substance breaks down, larger or smaller cavities form—a process which may go so far that finally but one cavity is to be found, extending throughout the whole bone, having only a thin osseous shell, which constantly grows still thinner, covered by periosteum—abscess of the bone. If the matter has tunnelled its way into the soft parts, it may then either break through, especially if abscesses preceded by inflammation have already formed in these, either in a straight direction, corresponding to the site of the affection, or it may travel on for a distance between them, and appear at a greater or lesser distance from the original

place. The pus is yellow or yellowish white, devoid of any bad odor, in most instances somewhat thin, and has no corroding properties (it is said to contain a larger quantity of phosphate of lime— $\frac{1}{10}$ to $\frac{1}{100}$ —than pus formed in soft parts— $\frac{1}{300}$). The pus continues to be discharged for some time, and when, in favorable instances, it ceases, the orifice will close, and the cavity becomes filled with granulation, in which, in the course of time, ossification takes place.

(3.) *Caries.*

(4.) *Necrosis.*

Both these terminations of inflammation present such noteworthy peculiarities that they have to be considered separately. The symptoms of osteitis vary according to its site and extent, and as to whether the soft parts are implicated in the inflammatory process or not. Pains are never absent. Sometimes they are stationary, and then again migratory and radiating.

The tumefaction of the affected parts also varies, and, as a rule, it is difficult to decide how much is due to the oedema of the soft parts, and how much to the hypertrophy of the bone and periosteum. The integument is mostly very sensitive and inflamed, particularly when abscesses threaten to break through. Not infrequently such abscesses originate in the soft parts, without any connection with the affection of the bone, break open, cicatrize, and leave behind irregular, depressed eschars.

In chronic osteitis the general condition of the system may be but little perturbed, and only participates when suppuration sets in through febrile phenomena, etc.; in osteitis that occurs with acute fever, emaciation, debility, disturbance of the sleep, loss of appetite, and diarrhoea, are but seldom absent.

Treatment.—When the course is slow and the pains moderate, iodine ointment and mercurial plaster (when the general condition allows the use of the latter remedy) may be employed for the purpose of bringing about resolution, or vesicants and setons, as derivative remedies; in the acute condition, in consequence of the very severe pains that are present in the great majority of cases, pain-assuaging remedies will have to be resorted to along with absolute rest of the limb, as resolution is altogether out of the question: cataplasms, often repeated; when the exacerbations are intense, ice and cold irrigations are remedies which are better tolerated than is generally believed.

When the abscesses have broken externally, the treatment must be conducted with a view to facilitating the discharge of the matter: injections into the fistulous passages and cavities are often necessary.

ULCERATION OF THE BONE (Caries, Ulceratio Ossis).—In scrofulous persons, caries most frequently develops itself from a primary

ostitis in one or several bones, and is predominantly frequent in the spongy bones; it is produced less often by periostitis as a result of the ulceration of the periosteum having been propagated upon the bone. Caries, therefore, almost always progresses from the centre toward the periphery, from within outward (*caries centralis, c. profunda*), or, in the rarer cases, from without inward, from the periphery toward the centre (*caries peripherica, c. superficialis*). Sometimes it is circumscribed, and thus presents the peculiar abscess of the bone; sometimes diffused; sometimes, again, involving only solitary parts of the bone, and then, again, its entire circumference (*caries partialis and totalis*).

Caries develops itself, after the above-mentioned inflammatory processes, in this manner: the granulations secrete a reddish-brown fluid, which, in common with the degenerated fat-cells and the sparsely-present pus-corpuscles, represent the ichor with which the cancelli become filled; then gradual atrophy of the osseous trabeculae takes place, by which the bone so affected becomes soft and compressible, and finally disappears altogether by the destruction which attacks layer after layer.

Frequently, the bony substance is not destroyed by the gradual atrophy and degeneration alone, but also by necrosis, as normal parts of the bone lying next to the carious or already-ulcerated parts are deprived of their nutrition, die of themselves, and form larger or smaller sequestrae (*caries necrotica*).

The ulceration of the bone also spreads upon the surrounding parts, which, as a rule, have already been affected by preceding inflammation. The periosteum undergoes destruction through the purulent infiltration of the soft parts; the cellular tissue, particularly where the periosteum is destroyed, is attacked by ulceration; in it large and small abscesses and sinuses form, and finally one or more break outwardly, and the carious ichor escapes. In the soft parts, particularly those in the vicinity of the periosteum, osteophyte formations are frequently found.

The discharge, in most instances, is thin, of an insipid, nauseous odor (resembling putrid flesh), mixed with particles of bone, or, in tuberculous caries, with cheesy granules and flakes, and likewise with small bits of bone. Soft fungous granulations exuberate around the mouth of the sinus, frequently blocking up its entrance, and bleed at the slightest touch. The fistulous tracts, as a rule, run in a straight or oblique direction to the affected part of the bone; sometimes they also make many twists and curves, for the discharge does not reach the upper surface of the bone in a straight but in a roundabout way. The affected part of the bone will be reached by the probe with more

or less difficulty, according to the course of the sinus, and is felt to be rough and uneven, as if worm-eaten, and easily impressible. (Probes, lead-plaster, etc., when brought in contact with the discharge, become discolored by the combinations of sulphur it contains.)

The general state of the system suffers but little in caries, in case small bones at a distance from the centre of the body are attacked. In other cases, for example, caries of the vertebræ (*s. spondylarthrocace*), it will be deranged in the highest degree. In the great majority of cases recovery will not take place until the cachexia, which lies at the root of the evil, is eradicated, and even then the caries sometimes goes on until the affected bone is destroyed, and, in fact, involves yet other adjacent parts. If recovery is to take place, suppuration and atrophy of the bone have to cease, the granulations then become firmer, more consistent, and richer in fibrin; from these, as well as from adjacent structures, preferably from the hypertrophied periosteum, ossification next ensues, by which the loss of substance is remedied.

The diagnosis, as well as the prognosis, is in greater part inferable from what has already been said. If it is not possible to reach the carious bone even with the probe, owing to the complicated course of the sinuses, the diagnosis can be established with perfect safety from the quality of the pus, the appearances of the orifices of the sinuses, the whole manner of origin, in unison with the locality of the nature of the bony part (*spongiuous bone*), and the nature of the general affection.

Treatment of Caries.—The local treatment consists of bandages and moist compresses, or moist pledgets of charpie, which have to be zealously renewed, while the affected limb is kept in such a position as not to hinder the escape of the pus. Hæmorrhages from the spongy granulations are best controlled by touching them with lunar caustic, or some mild astringent, and a graduated compress. Topical baths are worthy of recommendation, and, whenever the locality permits of their application (hand, foot, etc.), should be employed. Besides warm-water baths, alkaline and sulphurous baths, for the sake of cleanliness, should be frequently ordered, and, when very severe pains are present, they may be rendered narcotic by the addition of laudanum, etc.

General baths are likewise very beneficial, still they should not be employed where there is any great degree of debility, nor should any danger be combined with the bathing (for example, in caries of the vertebræ). Abscesses which are in direct connection with the bone or periosteum, and fluctuate distinctly, should be opened; congestive abscesses as late and as seldom as possible.

Consistent operative procedures may be resorted to in caries, hav-

ing for their object the excision of smaller or larger portions of bone, and even amputations and exarticulations. But the indications for these depend so much upon the circumstances of the individual cases, in reference to their local affections and general state of the system, compared with the benefit that can be derived from an operative undertaking, that no general rules can be laid down.

NECROSIS, GANGRENE (*Death of a Part of a Bone*).—Necrosis of the bones may be brought about in scrofulous subjects by inflammation of the periosteum, of the bone-substance, or of the medulla, in which the bones, through the uprooting of the periosteum, or of the endosteum, by impermeability of its vessels, as an effect of obstruction or pressure by exudation, having its usual nutritive conditions destroyed, must die. In this manner all causes and incentives of caries may also induce necrosis.

Necrosis usually attacks only one part of a bone, and generally either the external bone lamellæ as necrosis externa (n. superficialis), or the inner lamellæ of a medullary canal, or a portion of the spongy bone-substance in the depth, as necrosis interna (n. centralis); it may also involve the bone in its entire thickness, even in its complete totality (necrosis totalis).

Necrosis, it is true, occurs in scrofulous subjects on all the bones, still certain bones are predominantly often affected, especially the diaphyses of long tubular bones (tibia, femur, humerus, radius, and ulna); next to these the flat bones of the skull. In the spongy bones it is observed in common with caries; aside from that, these are less frequently attacked by necrosis. The process of necrosis presents somewhat different features according to its site.

(a.) In central necrosis (necrosis interna) the separated piece of bone that has been deprived of its nutrition—the sequestrum—lies in a cavity lined by granulations—sequestrum capsule—the walls of this cavity consist of old and new bone, which may just as well be formed in the medullary canal as upon the upper surface of the bone by the inflammatory process which is present here and there; the osseous substance subsequently becomes compact, and the bone on that account appears thicker and larger in bulk. A variable number of openings, lined by granulations, form in the sequestrum capsule, which are continued into the cavity, and terminate externally—cloacæ.

The orifices on the bone are round, oval, of various sizes, and surrounded externally by walls of granulations; pus escapes from them so long as the sequestrum is enclosed in the capsule, and, although they occasionally heal up temporarily, still, as a rule, they always break open again.

When the sequestrum is removed the cavity fills up with granulations, and immediately thereafter with compact bone-tissue—provided the general system has not been very much reduced—the sinuses, in most cases, close up with contractions of the soft parts, which remain visible for life.

(b.) In superficial necrosis—the result of periostitis—the sequestrum is not, as a rule, entirely enclosed in a capsule. This form has a more favorable chance of being cured, as the sequestrum is more readily expelled or may easily be removed; the sheath in which it was confined becomes filled up with granulations, and the opening closes up with a cicatrix contracted down to the bone.

(c.) In necrosis totalis a complete capsule forms, although rarely, by the peripheral formation of new bone on the border of the sequestrum, the capsule is complete, has a large cloaca, and the soft parts are mostly intersected by sinuses of considerable size and width. If the bone has been cast off, the large cloaca will be filled up with granulations continuous from the sequestral surfaces, the periosteum and the rest of the soft parts, in which bone-substance forms, in a longer or shorter time.

(d.) Necrosis of the entire bone occasionally occurs, in scrofulous subjects, on the hand and foot, and is always the result of intense periostitis and osteitis. The sequestrum, which consists of the entire bone, exhibits therefore the most traces of inflammation, and is sometimes carious in a high degree, osteoporotic, and lies in a wide cavity filled with ichor and pus. After the sequestrum is removed, the cavity may become filled with granulations, and new circlets of bone may be formed from the hypertrophied periosteum and soft parts.

In regard to the symptomatology of necrosis, every thing is essentially applicable that has been said in the consideration of periostitis and osteitis. When the abscess has broken or been opened, dead bone, if the process has already attained to necrosis, will be reached through the opening. In most instances this necrosed bone, when struck, will emit a dull, dead sound, and is felt to be smooth and firm; still, in total necrosis of the spongy bones, it is also very rough, uneven, and fragile. It is very difficult, in such cases, to distinguish between caries and necrosis, especially since the discharge from the sequestrum capsule may also be ichorous.

As regards the prognosis, it is most favorable in superficial necrosis; doubtful when the affection is located deeper, and extends over a large portion of the bone; and unfavorable when the entire thickness of the bone has been involved. In strumous persons, the intensity