

comparative measurements or by weighing of the clipped portions. But if the febrile state continues for some time, the defect may increase from a delicate streak running across the nail to a commencing furrow, partial shedding, total arrest, and finally loss of the nail.

2. *All chronic wasting diseases of the entire organism* will also cause defective nail-formation. The new-growth of the nail becomes insufficient in all disturbances which are followed by defective elaboration of blood, and in diseases associated with pronounced cachexia. Such a nail is usually like an embryonal duck-bill, thin, discolored, lustreless, soft and curling at the end, or brittle, crumbling.

Under this head should be enumerated the distorted nails of chronic tuberculosis, which grow long on account of not being trimmed and acquire this appearance from the morbid development and the atrophy of tissue at the tip of the finger.

3. Those cutaneous diseases and nervous affections which produce hyperplasia of the nails, may give rise under certain conditions to more or less aplasia and complete loss (Joffroy in ataxia, and Pechelin in ichthyosis).

Symptoms, Course, and Termination.—In general we take a nail to be imperfectly developed when it is whitish gray, lustreless, thin, delicate, giving the impression of a thickened membrane; possessing but slight hardness, readily broken, and flexible. At times the substance is so friable that it exfoliates longitudinally and fractures through its thickness, thereby rendering the nail uneven.

If we wish correct information about the several phases of this abnormality, we may inspect the nails during some prolonged febrile condition. Even in the beginning the nails are not affected in an equal degree. Some of them are apparently still quite normal and present merely a diminished lustre. Others show a narrow lustreless strip running across—defective cornification—which on other nails changes to a broad furrow and, eventually, to a pronounced groove bounded in front and behind as with a wall by the termination of the process. Almost without exception the nails of such persons present transitions passing into complete cessation of nail formation. In the middle of the above-described groove we see a lack of substance, often limited by irregular borders, but which affects only the uppermost layers. If of higher degree, the loss of substance extends to the lateral parts of the furrow and through the entire thickness of the nail so that the latter is attached to the bed only by its body. Finally we meet with defects so complete that between the old and the new rather unshapely nail there is an arrest in the formation of substance, the former being easily pushed off as a foreign body.

In cases of ulceration it may happen that the destruction of the matrix is more or less total. Under these circumstances, either only a small degenerated stump or no nail substance at all is formed; the whole nail-bed remaining covered with a dry and resistant mass of horn, and changing into the ordinary cutis.

Treatment.—The first task we have to fulfil must be to render the subsequent condition tolerable to the patient. Therefore, when the nail interferes with the avocation or is otherwise troublesome, we should advise frequent trimming, and covering with a protecting layer (wax) to guard against injury.

In the next place, we shall have to look after the removal of the etiological factors causing the defective nail. The main point is to keep aloof any possible injurious influences; together with traumatic, thermic, and chemical effects; to cure by appropriate means, skin diseases, dyscrasic conditions, nervous affections, inflammations, and ulcerative processes; and, where impaired nutrition or defective elaboration of blood is at fault, to support the constitution of the patient.

Where the defective nail formation is the consequence of incurable diseases, its importance can only be looked upon as subordinate. When the diminished growth occurs in grave febrile conditions, it will cease with the return of health and strength.

In order to hasten the after-growth of the nail, it will be advisable to exert an equable pressure by strips of adhesive plaster on the wax nail fastened to the nail-bed.

III.

We will now discuss a series of other dystrophies, whose type manifests itself either by a deviation of form (deformity), a degeneration, or a discoloration.

1. *Deformitas Unguium.*—Malformation of the plate of the nail is a sequel of disturbed function of the matrix. The following must be enumerated as causes:

a. Primary disturbances of nutrition and defective innervation of the matrix (in cases of paralysis).

b. Secondary interference with the function of the matrix from trauma and malformations of the lateral furrow, inflammations of the underlying connective tissue, periosteum, bone, etc.

Nails suffering an alteration of form may be abnormally long or short, broad or narrow; usually, the nails are flat or curved. Where the latter condition obtains, the process may be lateral, whereby the nails look like long points; or it may affect the surface, when sometimes convexity (in malformation of the heart), sometimes concavity is more prevalent. I remember a case in which the nail of the right index finger was bent to the right on the forward projecting root part, and toward the left in its body. This distortion is said to have formed after a cut from a sharp knife received in childhood. Blech relates a case of deformity of the nail, which is said to have been hereditary, the mother, several sisters and brothers also suffering from it.

To what extent such nails interfere with the avocation cannot be laid down as a rule. Often they merely appear ungraceful; in another case, however, especially when greatly incurvated, they may form a veritable plague for the person affected with them.

In most cases they continue through life, as they are not amenable to treatment.

2. *Degeneratio Unguium.*—As a result of improper nutrition, but chiefly in consequence of chronic inflammatory processes (paronychia sicca) of the matrix, we sometimes observe a morbidly altered nail substance which strikes the eye either by a thick or thin appearance, but more frequently by a fibrous quality, a spreading apart of the mass, and an irregular detachment of particles. Usually such nails deviate also in color, all sorts of transitions from grayish white to a dirty yellowish gray being encountered.

Aside from the disfigurement, these nails are very troublesome, as they break from very slight causes, thus maintaining a partial denudation or a continuous irritability of the nail-bed.

In order to treat the faulty nail-formation effectually, we must always endeavor to remove the cause. Locally it will be well to apply the pressure bandage (wax nail) recommended for defective nail formation.

3. *Discoloratio Unguium.*—A number of medical writers have ascribed to the appearance and especially the color of the nails an exceptional importance which does not belong to it. In cases of cyanosis and during attacks of intermittent fever the nails are



FIG. 40.

said to become livid; in convalescence from febrile conditions, white; in paralysis of both upper extremities, chalky white; in anasarca, light white; in icterus, yellow; in consequence of apoplexy, dark-brown; in hectic conditions, pale; and with certain diseases of internal organs, gray. However, if we devote sufficient attention to all these descriptions, we become convinced that all the alleged discolorations rest partly on well-known processes of nail formation, partly on misconstruction or disregard of the physiological relations, *i. e.*, on translucency of the nail substance and the appearance of the nail-bed.

IV.

In the introduction to the alterations in question it had been stated that a change of texture of the nail may take place also beyond the point of production. In entering on the discussion of this possibility, we must ask, in the first place, what is the nature of the factors producing these anomalies? In my opinion, excepting isolated occurrences enumerated with the various anomalous formations, only influences from without affect the fully formed nail. Among these are:

1. *Traumatic and chemical injuries.* These include the use of tools, or of alkalies or dilute acids in various trades (joiners, hatters, etc.).

2. *Animal and Vegetable Parasites.* *a.* *Sarcoptes scabiei* may give rise to the most manifold changes in the texture of the nail, and, secondarily, anomalies of shape and growth. Boeck states that in the degenerated nail substance the eggs and excrement of the *Sarcoptes* were to be found. R. Bergh demonstrated that the deviations of the nail due to *Sarcoptes* are brought about on the one hand by affection of the nail-bed and matrix, on the other by implication of the substance. The collective result of this influence is, that the nail-bed thereby becomes hypertrophic and greatly bulged out longitudinally in the middle. Corresponding to the degree of this deviation of form, the lower surface of the nail is studded all over with irregular projections and hollows, often even deeply excavated or conically depressed. The nails sometimes have the form of a high, rounded, pyramidal horn, sometimes that of a laterally compressed claw, and between these various intermediate forms occur. On their surface they are irregularly curved, and of variable (up to 16 mm.) thickness and breadth. Their color on the average is dull yellowish white, whitish yellow, and darker in the furrows. They are rather hard, but still can be readily cut. Sections through the substance of the nail show even to the naked eye the asbestos-like whitish, here and there grayish yellow, flaky or fibrous appearance of the axial portion; the pumice-like whitish aspect of the surface; and the more yellow appearance of the cortical mass. On microscopic examination Bergh found in the substance of the nail itch mites, eggs, egg-shells, burrows, skins, and excrement of the parasites.

There are also a number of flies in tropical regions which lay their eggs under the nails. None of these insects, however, is as much feared as the sand-flea (*Pulex penetrans*), which causes first violent pain and subsequent paronychia associated with loss of the nail.

b. Vegetable Parasites. Onychomycosis. When either in the neighborhood of the unguis phalanx or on some other part of the body accessible to the finger, there is a mycosis of the skin, the nail is more easily implicated on account of the continual opportunity for auto-infection. Hence we meet with onychomycoses in disproportionately greater frequency as secondary than as primary affections. And in cases in which no mycosis of the skin can be directly demonstrated, we cannot conclude positively that it has not been present.

In only two mycoses of the skin—favus and herpes tonsurans—has it been clearly demonstrated that transference of their fungi can cause changes of the nail, *i. e.*, onychomycoses.

Of the two causes of onychomycosis, tinea favosa is rarer than trichophyton tonsurans; and on the toe-nails the former is exceedingly rare. The clinical picture of the affection is rather similar in the majority of cases, the taking root of the fungi being particularly conspicuous in the beginning. Such nails are brittle, frayed-out, intersected by furrows; they present a discolored, opaque, grayish yellowish white appearance, and are lifted up according to the quantity of the epidermis accumulated under them. When the process continues for some time, the alteration extends to the entire nail, and the matrix being implicated, changes of growth are also present. The nail becomes gryphotic, thickened, flakes off even on the surface, and being detached here and there and acquiring a faded, dirty yellow color, it often becomes greatly disfiguring. In isolated cases due to favus, the nail shows the sulphur yellow, circumscribed, scutcheon-like depressions peculiar to that disease; but they should by no means be mistaken for the discolorations resembling them which are perceptible at the margin of punctate points of degeneration occurring after grave febrile diseases (small-pox) and which must always be interpreted as a morbid formation starting immediately from the matrix.

Altogether, in forming the diagnosis of onychomycosis we must proceed with great caution, for we must bear in mind that lack of care of the nail, as well as the sequels of chronic eczema, psoriasis, etc., may present exactly similar clinical pictures. When fungi are found, the fact is beyond dispute; if not, we are not justified in positively concluding that the disease is absent.

Longitudinal and transverse sections through a nail changed by the proliferation of fungi show it to represent an either totally or partially loosened, flaky, disintegrating substance to which adheres a dull white or gray yellowish white mass. When the latter is spread apart and clarified by means of glycerin, it is possible to discover under the microscope convoluted threads of mycelium and conidia mixed with varying quantities of cornified epithelial cells. Fine sections of the nail, when carried through the entire thickness and placed in caustic potash solution (1 : 50) show a more concentric arrangement of the fungous parts, whence the threads of mycelium extend between the nail-cells and around them in all directions.

G. Meissner, who discovered the fungi on the nail, leaves the question as to their origin entirely out of consideration; while Virchow arrives at the conclusion that more than one form of fungi occurs in onychomycosis, that even several forms may be present in one and the same nail. Although the latter part of this proposition could not be maintained, subsequent investigations have unquestionably established the fact that both *Achorion Schönleinii* and *Trichophyton tonsurans* are capable of producing the above-described alterations of the nail.

Treatment.—Owing to the extreme intractability of the affection, the treatment must be carried out with great perseverance. It is advisable to trim the nail close as often as possible and to paint it thoroughly several times daily with a solution of corrosive sublimate (0.5 per cent), benzin, petroleum, etc.

As an appendix, we shall discuss the paronychia—acute inflammations of the tissues underlying the nail.

1. *Paronychia traumatica.*—Puncture, concussion, contusion, laceration, penetra-

tion of foreign bodies, etc., may give rise to inflammations, with various results, either on the middle (*P. centralis*) or at the sides (*P. lateralis*) of the subungual tissues. The lesions are often overlooked and in general are not proportioned to the succeeding inflammation. Toward the third or fourth day, the patient will feel some slight disagreeable sensation in the terminal phalanx which increases especially on pressure. Soon, however, a more circumscribed spot becomes reddened, swollen, warmer, and especially painful to the touch. If recovery does not occur at this stage, the inflammatory process will vary according to its site. If superficial, small abscesses form which often evacuate their contents spontaneously and heal completely within a few days. If the inflammation has taken root more deeply, swelling and rise of temperature occur over the whole unguis phalanx; violent pains are present which radiate upward toward the arm. When suppuration has commenced, the symptoms become more violent. In lateral paronychia we observe a projection at the edge of the nail over which the latter is elevated, and the surrounding soft parts, infiltrated with serous fluid, are crowded aside. This form of inflammation offers at least the advantage that the fluctuation is soon recognized, and the patient thus easily relieved. However, when the suppuration is situated farther back or toward the centre, the pulsating pains become almost unbearable. In such a case a considerable amount of the surrounding tissue is inflamed, partly suffused and livid, the epidermis raised in form of a blister, and the root of the nail opaque and projecting in a rounded shape.

The termination of all these inflammatory processes, which often exhibit a phlegmonous character, is always in recovery. Sometimes it terminates in destruction of the nail, of the subcutaneous connective tissue, of the muscles, tendinous sheaths, etc.

Treatment.—The limb must be kept at rest, and when the inflammation affects the fingers, carried in a sling. Cold compresses should be used to moderate the swelling and pain. When suppuration has set in, we should first apply moist heat to hasten the process, and then open the abscess cavity. If pus is not visible under the nail, the latter should be scraped until translucent so as to confirm the diagnosis. If the presence of pus is established, we can penetrate by means of bistouries either from the surface or from in front, in order to give free exit to the pus, and eventually remove any foreign body possibly present there. The subsequent treatment is based on well-known surgical principles.

2. As a consequence of impaired vitality and in patients affected with grave chronic diseases, we occasionally observe a malignant affection of a part or of the whole of the tissue underlying the nail which Wardrop terms *onychitis maligna*. Without any demonstrable cause the individual feels violent pain in the unguis phalanx. With steady increase of the pains, the phalanx begins to swell at some point where heightened temperature is observable. When we attempt to stir the nail at its free anterior edge, we are surprised to see how soon the root is detached from the bed. When the root is lifted by depressing the edge, it is seen to lie in a cavity filled with discolored pus, and its posterior edge appears thinned, dirty gray to brown. When we insinuate the points of the scissors from behind forward under the nail, we can often penetrate in the more advanced cases without any difficulty as far as the anterior end of the nail-bed, and ascertain that the nail is attached only at one or more lateral portions. On inspection of the surrounding portions of the skin, we are struck at once by the great swelling encompassing the root of the nail on which the epidermis is raised as by a blister or perhaps detached, and the cutis of which shows some losses of substance which bleed readily. When exerting but slight pressure upon it, the patient experiences great pain, and from the bottom of the furrow

some offensive sero-purulent fluid mixed with blood is evacuated. When the above-described swelling is crowded backward, we perceive a very dark to bluish red spongy mass which is broken down, friable, and interspersed with small spots of degeneration. This ulcerative process extends sometimes only to the central part, but sometimes over the entire nail-bed. As a rule the patient becomes still more depressed during the continuance of the affection; anorexia, and sometimes even febrile movement are present. The process is very protracted, often lasting many months.

Etiology.—Thus far it has not been possible to ascertain any definite causative factor. As regards the slow course, Rayer expressed the conviction that the nail plates ever newly forming in the spongy tissue maintain the process; against this view Bizzioli has recently emphasized that it is rather the numerous rough places on the under surface of the nail which maintain the suppuration and degeneration. Cases under my observation gave me the impression as if scrofulosis, cachexia, oligæmia, etc., furnished the first instigation for the disease, and as if there were present a process anatomically related to moist gangrene (Billroth).

Treatment.—The conditions to be fulfilled are twofold. By the most scrupulous cleanliness we must guard against the accumulation of pyogenic or the occurrence of septic matters; the dressing—Burow's solution, Lister, thymol, etc.—must be applied in such a manner that cavities and pockets cannot easily form; the luxuriating surfaces are touched with fused silver nitrate or sprinkled with nitrate of lead powder, and in order to learn the condition of the wound, surrounding strips of lead plaster are renewed every third or fourth day. Besides, we must give a strengthening diet, and endeavor to combat the fundamental affection.