where it formed the jelly of Wharton in the umbilical cord, and was also abundant in the subcutaneous tissue. In the subcutaneous tissue it afterward became converted into fat, and when it was found elsewhere in the body Virchow regarded it generally as an antecedent to fat formation. Its cells either take up fat directly, and so become changed into fat cells, or they proliferate and the young cells so formed become fat cells. In the adult tissues it occupies but a small field, being found only in the vitreous body of the eye and in the subcutaneous tissue in a few places, here principally over the pubes. Histologically the tissue consists of cells embedded in a homogeneous matrix. The cells may be of various shapes, round, spindle-, or star-shaped. Generally they have the latter form, and are abundantly provided with processes which freely anastomose with the processes of neighboring cells, and form a fine meshwork through the tissue. On section of the tissue abundant fluid escapes, which has the same properties as those fluids which contain mucus. The mucin in the ordinary secretions of mucous surfaces is the result of the action of the epithelial cells, and is formed in them; but in the mucous tissue it is not found in the cells, but in the intercellular substance. The mucin contained in the fluid has some of the chemical properties of albumin, but can be distinguished from it in various ways. On the addition of alcohol to fluids containing mucin, there is formed an abundant precipitate, which can be distinguished from the albuminous precipitate, formed in like manner, by the fact that it swells up and dissolves on the addition of water. The albuminous precipitate is not affected by water. Mucin is not dissolved by an excess of the organic acids, but is readily soluble in an excess of mineral acids.

The result of later investigations has been to throw much doubt on the existence of mucous tissue as a distinct type of tissue, such as Virchow has described it. Even in the place where he supposed it to be most typical, *i.e.*, in the umbilical cord, it has been shown that this is only ordinary connective tissue with an abundance of fluid in its meshes. A tissue almost analogous to mucous tissue is found in every subcutaneous œdema, and can be produced artificially by puncturing the skin with a fine hypodermic needle and injecting salt solution. A doughy swelling is so produced, and on section the injected fluid will not flow out again, but is held in the meshes of the tissue and along the fibres. On microscopic examination of sections, made by clipping out a piece of the swollen tissue with a pair of sharp scissors, the cells are found separated from one another, often anastomosing, and the fibres of the connective tissue do not appear so prominent. The fact that the supposed mucous tissue of Virchow contains mucin cannot be held as peculiar to it, and as distinguishing it from other forms of connective tissue. Mucin is found in all the connective tissues, and the gelatinous œdematous tissue does not contain any greater proportion of it than do other tissues of its class. The fatty tissue which Virchow supposed to be developed from the mucous tissue does not stand in any immediate connection with this, but, according to Ranvier, takes its origin from cells which from the beginning are destined to form fat cells.

Following this, Rumler and Koster have taken the ground that the myxoma is not to be considered a special type or class of tumors, but that it simply represents conditions which might arise in any of the tumors which contain connective tissue. This myxomatous condition of the connective tissue consists in its saturation with serum in consequence of circulatory disturbances in the tumors, passive congestion, etc. They regard this tissue, wherever found, simply as ordinary connective tissue infiltrated with fluid, or œdematous. In every tumor there can be numerous conditions which might give rise to this. The veins can easily be compressed by the growth of certain parts of the tumor, and we cannot suppose that the vessels of a tumor of any sort are less prone to allow of transudation, in case of passive congestion, than those of any other tissues. On the contrary, it seems probable, from the numerous areas of small-cell infiltration in tumors of every description, and from the frequency with which red corpuscles are found in the tissues, that the vessels are easily traversed by the corpuscular elements of the blood, and where this is the case the fluid elements pass through also. The serum would be most readily taken up in the meshes of the connective tissue, enlarging these, and the connective-tissue fibres would be forced apart and rendered less distinct. The fact that we scarcely ever find a pure myxoma, such as Virchow has described, but almost always this so-called myxomatous tissue in connection with some variety of the tumors which contain connective tissue, as fibroma, sarcoma, carcinoma, etc., speaks much in favor of the correctness of this view of Koster. Still the term myxoma or myxomatous tissue, to denote this swollen and œdematous connective tissue, is a convenient one and will be retained, although the myxoma, in the light of these recent investigations, should occupy no place in the category of tumors. The myxoma was first described by Virchow, and his descriptions of it are in all respects so full that they have undergone but little modification by subsequent writers on the subject. The writer has thought it best after this preface, which sheds a clearer light on what has been a complicated subject in *onkology*, to give, in the main, Virchow's description of the tumor.

The cells in the tumor vary in shape and in numbers, this variation depending chiefly on the stage of development of the tissue. The younger the tissue is, the more the cells are inclined to be round and the more numerous they are. In the older portions the cells are rather star- or spindle-shaped, and have numerous processes which communicate freely with one another, producing a reticular or areolar tissue, in the meshes of which round cells are frequently enclosed. When these cellular elements are fewer in number, the whole tissue has a transparent, gelatinous appearance, and is similar to the vitreous body of the eye. This forms the variety *myxoma hyalinum*. Virchow has described several other varieties, which depend on various, for the most part minor, differences in the structure of the tumor.

Myxoma Medullare.—In this the cells are more abundant, and this gives the tumor a whitish, opaque, medullary appearance.

Myxoma Fibrosum.—In this the tumor contains a considerable amount of fibrous tissue, especially elastic fibres, which often form dense bands which appear on the cut surface.

Myxoma Lipomatodes or Myxo-lipoma.—In this the tumor contains a considerable amount of fat, either in the shape of small drops contained in the cells or as fully formed fat cells. There may be so much fat present that the tumor has most of the characteristics of lipoma.

Myxoma Cartilagineum or Myxo-chondroma.—A large proportion of the myxomata contain islands of cartilage. This is especially the case in the compound tumors of the parotid gland and of the testicle.

Myxoma Cystoides.—In some cases the cells of the tumor enclosed in the mucous tissue undergo mucous or fatty degeneration, and there are formed large cavities filled with viscid fluid.

Myxoma Telangiectodes.—As is the case with most tumors, the vessels here also may be enormously developed, and this name has been given to the condition.

Mucin is found in numerous other tumors, as a result of the physiological activity or of a degeneration of the tumor cells. It is found, for instance, in the cystic tumors of the ovary and in most other epithelial cysts. Virchow excludes these from the myxomata, and has limited this term to those tumors in which the mucin is contained in the interstices of the tissue and forms an integral part of the tumor. Billroth has included with the myxomata all such tumors, among them goitre. Just as the most typical formation of mucous tissue is found in the fœtus, the most typical examples of myxomata are found in tissues belonging to the fœtus. The myxoma of the chorion, forming what has been termed mole pregnancy, is the most typical example of this myxoma. Abortion takes place in this case at an early period, and

the chorion will be found covered with transparent, gelatinous vesicles, which are connected with the membrane by a narrow pedicle. Sometimes several of these vesicles are connected with the same pedicle, and are strung along it like rows of beads. The vesicles vary in size from a pin's head to a nut. On microscopic examination they are found to be covered with epithelium, and composed of a tissue similar to that of the umbilical cord, *i.e.*, branched cells lying in a homogeneous matrix. Other parts of the fœtal appendages may be the

FIG. 3476.—Section of a Myxoma of the Subcutaneous Tissue of the Thigh. × 300.

seat of similar formations. Cases have been seen in which the umbilical cord contained along its course a series of such vesicles. Also in the placenta itself there may be an abundant formation of mucous tissue in the form of circumscribed tumor masses. Retained portions of the placenta may form the starting-point of tumors which reach a considerable size.

In the adult the subcutaneous cellular tissue is the most frequent seat of the myxomata. Here they are principally found on the thigh, on the buttocks, on the labia majora, and on the lower lip. The fat in the orbit may be a point of origin for the tumor. Such tumors may reach considerable size; those of the size of a child's head have repeatedly been seen. These large myxomata have a distinctly lobular structure, and when they break through the skin they become ulcerated and often very foul. They may have a deeper origin, as from the intermuscular tissue. In some localities, where the skin covering them is not tense, they become distinctly pedunculated.

The long bones are often the seat of this tumor. In this place it seems to originate in the bone marrow. In these tumors various combinations, as with sarcoma and enchondroma, are seen. The spongy osteomata, with soft cellular marrow, may be confounded with them. The pure myxoma of the bones is a soft, spongy tumor, which ordinarily originates in the bone marrow, and in the course of its growth becomes covered with a thin shell of bone. At a later stage it breaks through this and grows as a soft mass. It is always accompanied by a new growth of bone, is generally lobulated, and here and there portions of the old bone may be enclosed in its substance. The tumor is soft and grayish-white or yellow. Virchow compares its tissue to the flesh of oysters. An abundant formation of blood-vessels may give a reddish tint to the tumor.

The myxomata often have a heteroplastic origin, and in these cases the starting-point is most frequently located in the central nervous system. A considerable proportion of the brain tumors belong in this category, especially those of the cerebral hemispheres. The dura mater of the brain and cord may also be the place of origin.

When seated on the peripheral nerves the tumor does not originate in the neurilemma, but in the interstitial tissue. Such tumors along the nerves are often mistaken for neuromata. They give rise to severe neuralgic pains, and are often multiple. All the nerves of an extremity may be affected, in some cases several being seated on a single nerve trunk. In many cases the nerve does not pass into the substance of the tumor, but over it, and is generally flattened from pressure. It is often possible to dissect out the nerve from such a tumor and remove the tumor, leaving the nerve intact. The consistence of these tumors is so soft that they may be easily mistaken for cysts. They have a tendency to return after removal.

Myxomata may also be found in the glandular organs, where they arise from the interstitial tissue. Such tumors are found in the female breast. The tissue of the tumor grows into the milk ducts in the form of polypoid masses. The duct becomes dilated into a cyst, which is filled with the branching growth. The whole tumor may in this way be enclosed in one large duct, and may be removed from it, leaving a cavity with smooth walls. On microscopic examination the section often appears to be composed of small islands of myxomatous tissue surrounded by epithelium. The islands of tissue are the cross sections of the branching dendrate growth in the duct. This manner of growth is not peculiar to the myxomas of the mamma, but is seen also in fibromas and sarcomas in the same locality. The tumor finds the least resistance to its growth in the milk ducts, and grows into and dilates these. Jungst has recently described one of these tumors in which a great part of the tissue had undergone hyaline degeneration. When the superficial ducts are the seat of this growth, the tumor may project as a nodular mass from the breast. This is particularly apt to take place in the region of the nipple. The skin covering the tumor becomes thin and finally breaks, and a soft, fungous, often gangrenous mass appears. This may have an appearance very similar to that of an ulcerated cancer. If it is closely examined, spaces may be found in which a probe may be pushed deeply down between the single masses of which the tumor is composed.

The mixed forms of the tumor deserve especial attention, for they are much more common than the pure forms. They are most apt to be seen with tumors of the connective-tissue type, as the fibroma and sarcoma, but may be found with any tumors which contain connective tissue. In the spindle-cell sarcoma the tissue may be seen to pass into myxoma. The cells become separated from one another by an increase in the interstitial tissue and lose their spindle shape. In carcinoma the most typical mucous tissue may be found between the masses of epithelial cells. These mixed forms have been given special names, as carcinoma myxomatodes, etc. The fact of the presence of such tissue in a carcinoma or sarcoma does not influence the growth of the tumor, nor its prognosis, but may lead to errors in diagnosis. Wherever this tissue is present the tumor is softer. The mixed tumors of the parotid gland always contain a considerable quantity of myxomatous tissue.

In general the tumors described as myxomata are not malignant. Some, however, are. Those of the central nervous system are malignant from their position, and those of the peripheral nerves have a tendency to multiple formation and to return after extirpation.

The best and most typical pictures of this tissue are to be obtained by examining fresh sections made by the freezing microtome in salt solutions. After the tumor has been hardened in almost any of the hardening agents, the tissue loses its fluid and shrinks very much.

W. T. Councilman.

NÆVUS.[1] — (Greek, σπίλος, σπίλωμα; French, *nævе, couenne, envie, signe, tache congenitale, ou pigmentaire, ou de naissance;* German, *Mal, Muttermal, Muttermohl, Mutterflecken;* Italian, *neo* [*materno*], *nevo;* Spanish, *nevo, lumar.*) (Synonyms: Mother's mark, birthmark, etc.)

DEFINITION.—A nævus is a congenital alteration of the skin, confined to a limited area and characterized by an increase in the amount of pigment deposit, and by a certain amount of hypertrophy of one or more of the other elements of the skin, especially the vascular and connective tissues, as well as the hair, fat, nerves, and

lymphatics. Unna[2] aptly describes nævi as: "Circumscribed, small malformations of the skin, which have a hereditary basis, or have their foundations laid in embryonic life, become evident at different periods of life, develop very slowly, and are distinguishable by their color or the form of their surface."

The following varieties of nævi may be distinguished: *Nævus fibromatosus; N. lipomatodes; N. pigmentosus; N. pilaris* or *pilosus; N. unius lateris* (*N. linearis*); *N. vascularis; N. verrucosus.*

Nævus fibromatosus is marked by excessive connective-tissue development; it varies in size and involves the skin in different parts of the body. As subdivisions may be mentioned: N. foliaceus, in which the central portions are fibrous, while the circumference is vascular; N. mollusciformis, a protuberant pedunculated form (Fig. 3477); and N. sarcomatodes, which at first is a simple congenital nævus, but afterward undergoes sarcomatous degeneration.

FIG. 3477.—Case of Angio-Fibroma of Congenital Origin. (Case of Dr. Isadore Dyer.)

Nævus lipomatodes is a congenital fatty tumor (lipoma), usually more or less fibromatous.

Nævus pigmentosus, the commonest form of nævus, is characterized by an excessive deposit of pigment in a circumcribed area of the skin. The discoloration thus produced varies from pale yellow to purple or even black. The lesion, which is usually level with the skin, occurs especially on the face, hands, neck, arms, and back. This variety of nævus is often verrucose, or elevated; at times it is more or less covered with hair and is then designated as *Nævus pilosus* or *N. pilaris.*

Nævus vascularis, N. sanguineus—"mother's mark," includes a large number of forms, among which are now classed varieties of angiomata, which embrace tumors of embryonic rudimentary vessels.

The vascular nævus may involve the capillaries, the smaller veins, or the terminal arterial branches.

The capillary nævus is distinctly cutaneous and in size varies from a pin's head to the palm of the hand or even a larger area; at times it involves whole regions of the body. This is the form of nævus most commonly met with. It is usually only slightly elevated, or it may even be level with the surface of the skin. It is often seen as a tiny red spot with lines (dilated capillaries) radiating from a central point of vascular hypertrophy, and to it are applied the terms "spider nævus," or "spider cancer," or *nævus araneus.*

Vascular nævi often begin indistinctly and spread gradually until they cover large surfaces. On the other hand, nævi, present at birth, may within a few months entirely disappear spontaneously.

The venous nævus is apt to be more elevated than the capillary. It is smooth, stands at a higher level than the surrounding surface of the skin, is soft and compressible, and often is lobulated. The thin-walled veins of which it is composed communicate directly with one another and are bound together by delicate bands of connective tissue, thus constituting a network of intercommunicating venous sinuses. Such a formation should be called a nævus cavernosus or an angioma, for such in reality it is. These tumors are markedly irregular in form, reddish or bluish in color, and at times erectile (in women this is especially noticeable at the time of menstruation).

Although there have been reported many instances of congenital nævi which seem to confirm the belief that prenatal events, through the impressions which they make upon the mother, sometimes play a part in the causation of these tumors, the best modern authorities are opposed to this view.

Nævus Verrucosus.—A warty nævus, often having a hairy growth, and at times highly vascular and erectile.

Nævus unius lateris is excluded, by Unna, from the nævi, but only provisionally. I am disposed to believe that this type of growth may properly be classed among the nævi. It embraces a number of types of nævus, in which the essential feature is the arrangement in a linear way following the distribution of the superficial nerves. Some attempts have been made to show the association of this form of nævus with previous neurotic influence, injury, shock, etc. The terms N. neuroticus, N. linearis, papilloma neuropathicum (neuroticum), etc., have been applied to this type. That the term *unius lateris* is a misnomer is evident from the fact that the author has had two cases of bilateral distribution. To these he has given, by preference, the name "linear nævus."

It is certain that there is a distinct difference in the arrangement of the lesions between this variety and the ordinary nævi. The arrangement is in sprays and clusters of lesions, which vary in character, some of them having a pale yellow pigmentation, while others are black. Then again there are also differences in structure, some of the growths being clearly vascular nævi while others

are mere papillomatous growths. In some cases there is even involvement of the lymph vessels (lymphangioma) (see Figs. 3479 and 3480).

FIG. 3478.—Vascular and Verrucose Linear Nævus of the Cheek. (Case of Dr. Isadore Dyer.)

The Pathology of nævi is of only indirect importance, as the condition is not difficult of diagnosis and the treatment is essentially radical.

Unna (*op. cit.*) quite exhaustively reviews the histological evidence in regard to the different types of nævus, and discursively argues the embryonic origin and course of the several varieties classed by him under the term nævus. Soft nævi, or the warty, epithelial types, are recognized as embryonic deposits in the upper part of the cutis, while the hard nævi are either of prickle-cell layer origin or else are found chiefly in the horny layer. The more complicated nævi are also considered by him in their complex pathology.

Treatment.—The necessity for treatment of nævi must depend upon the character, the location, and the size of the lesion or lesions. Simple pigmentary moles are of little serious importance, and, on account of their harmless character, they need not be removed. In exceptional cases the melanotic mole calls for early operative interference. Even the simple moles, when there are several of them, often cause sufficient disfigurement to warrant their removal by surgical interference. Hairy moles are especially disfiguring. In the case of vascular nævi, on the other hand, the danger of accidental hemorrhage must also be taken into consideration.

There are not a few different ways in which nævi may be treated. For the simple pigmentary moles and also for those of a verrucose character the employment of escharotics will often suffice. Of these we might name carbolic acid, chromic acid, glacial acetic acid, picric acid, acid nitrate of mercury, corrosive sublimate, cantharides (in collodion or in ether), pyrozone, sodium ethylate, nitrate of silver, nitric acid, salicylic acid (alcoholic solution or in collodion), chrysarobin, chrysophanic acid, pyrogallic acid, liquor potassæ, etc.

In the case of large lesions, or where the location forbids the use of caustic applications, the actual cautery—the Paquelin or the galvanic—should be used.

In small pigmentary nævi electrolysis is preferable. To the negative pole of a galvanic battery a small needle (steel, platinum, or gold) is attached. The positive pole carries the sponge, which is customarily held in the patient's hand. The needle is introduced beneath the pigmented mole and the current is gradually increased until the lesion blisters. To accomplish this a current of about 8 or 10 milliampères is required, or, if cells with switchboard are used, there should be as many as from twelve to twenty cells. Where the moles are hairy, a blunted broach or needle should be employed. The hairs are removed first by electrolysis, and then the mole itself is removed by the ordinary operative procedures. In removing the hairs the needle should be gently introduced into the hair follicle, the hair shaft serving as a guide and care being taken not to pierce the follicle. The current is gradually applied until there is frothing at the orifice of the follicle, when the hair is ready to come away. If there is resistance on the part of the hair, the operation is not complete. Not more than from 3 to 5 milliampères is needed in this operation; in fact, in some instances a single milliampère will be found sufficient. The negative pole of course must be used here.

In the treatment of vascular nævi, electrolysis is likewise of service, but more particularly in those in which the area of skin involved is small, and the vessels forming the growth are simply capillaries. The object of the treatment here is either to cause the absorption and atrophy of the blood-vessels or to effect their destruction. Various procedures, all of them more or less inefficient, have been suggested for the accomplishment of these objects, but as the space at our command is limited, we shall describe only those which have stood well the test of time.

There are two methods for using the ligature. First of all, it is a good plan in smaller nævi to circumscribe the growth with a single or double silk ligature, drawing tightly and tying on opposite sides of the growth, when the double ligature is used. In the case of the larger nævi, the ligature is applied at a point a little remote from the growth. An incision is made above the vein, or small artery, a catgut ligature is applied, and the wound closed. In either instance the growth begins to pale after several days. In superficial nævi the whole patch grows bluish in color. Here and there a spot grows white where the blood has been absorbed, and finally, in the successful cases, the whole patch grows whiter and whiter. When it is thought best to resort to excision, as in the case of deep-seated nævi, it will often be found advisable to ligate a few days or weeks before the excision. When the cautery is employed, several methods may be followed. A fine platinum needle may be attached to the galvano-cautery, raised to a red heat, and then introduced into the growth several times in succession. Linear cauterization may equally well be carried out by means of the needle or with the small plat-

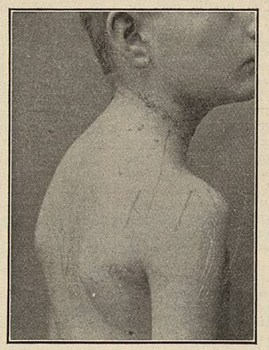

FIG. 3479.—Right Side.

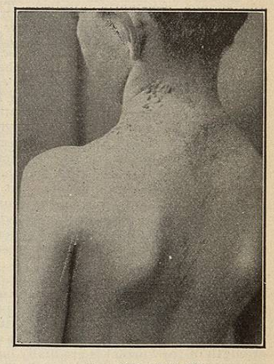

FIG. 3480.—Left Side.

FIGS. 3479 AND 3480.—Linear Nævus: Verrucose, Deeply Pigmented, and Affecting Different Parts of the Surface of the Body. (Case of Dr. Isadore Dyer.)

inum knife. The Paquelin cautery will serve the same purpose.

Caustic pastes (Bougard, Felix, Marsden, etc.) act as the cautery does, by producing an eschar, and finally a slough. With caustics, however, the slough is apt to be more extensive than when the cautery is used. Hence the need for caution in using them.

Vaccination has been used in locations where an irregular scar is no objection. The slight bleeding need not be stopped, except by a temporary compress.

The injection of pure carbolic acid or the tincture of iodine is followed quite often by gratifying results. Little scarring remains, plugging of the vessels is rapidly obtained, and the operation is less painful and of shorter duration than when other methods are employed. The injection of a one-per-cent. solution of chloride of zinc is used for the same purpose. The perchloride of iron may be used by injection, or, as is frequently indicated in the more elevated growths, silk threads, saturated with the perchloride solution, should be passed in several directions through the nævus, and be allowed to remain until they are absorbed in the contraction, or else slough out.

Except in the case of small nævi, the treatment is never highly satisfactory, and the methods employed may have to be changed several times before the whole of the growth is removed. It is always well to impress upon the patient the necessity of perseverance in the matter.

Where the patient will submit, the use of repeated ignipuncture with the Paquelin cautery under a general anæsthetic will effect good results; otherwise the electric needle is of most service. A number of cures have been reported after long use of electrolysis. For extensive nævi of the capillary variety, multiple needles (as many as a dozen) attached to the negative pole of the galvanic current may be employed. This does not answer so well as the single needle frequently introduced. The amount of current required varies with the patient and should be regulated accordingly, a mild current being used at the start.

The technique of this operation is as follows: The patient should hold the sponge electrode and should turn on the current when the needle is introduced and turn it off when the needle is withdrawn; or, if he does not mind the greater painfulness of the procedure, he should keep the sponge constantly applied. The needle may be pushed in to a depth of at least half an inch below the surface of the skin and parallel with it, and it should be allowed to remain until a distinct eschar, in the form of shrivelled skin, shows itself along the line of the needle. This procedure is to be repeated at each sitting as often as the patient will permit. As this linear operation almost always leaves ridges as the ultimate result, it is probably better to introduce the needle simply at a right angle to the surface of the skin, leaving it in position until a small blister forms. Several such punctures should be made at each sitting, and they should be located as closely together as possible. At each sitting, for a few succeeding days, a new area should be selected, and then each area in turn, beginning with the one first selected, should be gone over a second or even a third time, until finally the region so treated presents the appearance of a white superficial scar.

For the cavernous variety of nævus the electrolytic method is not so well adapted. In the treatment of this condition by electricity the positive pole is supplied with a platinum and the negative pole with a gold needle, or *vice versa*, and both are introduced at once, deeply. The strength of the current is gradually increased to the limit of the patient's endurance, and is kept applied as long as possible.

In both varieties of nævus it requires months of treatment before any result is obtained, but usually the patient's endurance is finally rewarded.

Isadore Dyer.

[1] Foster: Encyclopedic Medical Dictionary.
[2] Unna: Histopathology of Diseases of the Skin, Walker's translation, p. 1128.

NAFTALAN is a greenish-black, soft, gelatinous material, with a slight empyreumatic odor, and consists of 96 to 97.5 per cent. of a peculiar Russian naphtha, purified and mixed with anhydrous soap. It is readily miscible with oils, fats, ether, and chloroform, and is insoluble in water, alcohol, and glycerin. Kolbl found it of distinct value in minor skin lesions such as urticaria, scabies, psoriasis, burns, and bee stings. Bloch considers it almost specific in burns, but in psoriasis not so good as chrysarobin. Several authors report good results from its use in chronic eczema, though it is not recommended in acute eczema, or when the skin is moist. Skin parasites are destroyed. It is applied as a thick coat and does not melt at body temperature (melting point, 70° C. or 158° F.).

W. A. Bastedo.

NAILS, DISEASES OF THE.—Terminology.—As the study of the nails demands its own vocabulary, it is necessary to define clearly the various terms which will be employed in this article.

The root or matrix is that part of the finger under the lunula from which the nail substance is formed.

The bed is that portion of the finger lying directly anterior to the matrix, which forms the floor on which the nail rests, but which plays no part in the formation of the nail.

The plate is what is commonly termed the nail. The lunula is the white, opaque, rounded part of the plate which lies over the matrix and under the eponychium.

The walls of the nail are those parts of the finger which lie along the sides of the plate.

The eponychium or "quick" is the horny layer which forms a selvage to the skin over the bed of the nail.

Pterygium is a forward growth of the eponychium over the plate.

Transverse or horizontal will signify the direction across the plate, while vertical will mean the direction from eponychium to free or distal border of plate, *i.e.*, the line in which the nail grows.

Anatomy.—The normal shape of the plate is convex both horizontally and vertically. The vertical ridges which appear on many nails in youth and adult life, and which increase markedly in old age, are due to the presence of the papillæ in the underlying bed of the nail. The color of the nails should be a delicate pink, due to the subjacent capillaries which transmit their color through the normal, translucent plates above. The plate is composed of flat, polygonal, keratinized, nucleated cells between which are air spaces. Wherever these air spaces exceed their normal size the plate becomes opaque and white, a condition which is called leuconychia. The lunula is white in color because the underlying matrix is not supplied with vessels. On the thumb the lunula appears distinctly anterior to the eponychium, but on the other fingers it does not extend so far forward.

The nail bed is not sharply marked off from the adjacent parts of the finger, there is never a clearly defined boundary, and the contiguous parts blend into each other. The lower layer of the bed merges gradually into the periosteum of the last phalanx without the interposition of the panniculus adiposus. The blood-vessels are arranged in an upper and a lower layer as in other parts of the skin, and the lymph vessels are well marked.

Embryology.—The nail arises from the ectoderm and makes its first appearance between the third and fourth months of fœtal life.

General Pathology.—Disorders of the nail may be symptomatic of general infections of the skin or of the body, or may be simply local affections.

Inheritance.—Diabetes, tuberculosis, cretinism, eczema, psoriasis, or epidermolysis in the parents have been known to cause marked disturbances in the nails of the child, while serious disturbances in the nails and hair have been a family dyscrasia for several generations (*vide* observations of Nicolle and Halipré in France and of the present writer in America).

Psychic disturbances are frequently the cause of nail derangements. Such examples have been recorded after "apparitions," severe lightning, hysteria, delirium, mania, overwork, or worry.

Disturbances of the nutrition are common causes, among which Heller mentions typhoid fever, gastric disorders, icterus gravis, infantile atrophy, pneumonia, anæmia, phthisis pulmonalis, erysipelas, epididymitis, severe angina, parotitis suppurativa, scarlatina, measles, influenza, gout, rheumatism, accidents, and childbed. These conditions are often followed by the appearance of transverse furrows in the nail plate.

Localized Nail Affections.

Anonychia or absence of nails may be congenital or acquired. The former origin is rare, but the latter is not uncommon, and loss of the nails is frequently observed after syphilis, injuries, chemical irritants, burns from *x*-rays, constitutional diseases, eczema, psoriasis, pus under the nail, ringworm, felon, paronychia, shock, hydroa æstivale, and ichthyosis.

Onychatrophia almost always results from the separation of the plate from the bed of the nail, a condition which usually follows any hyperkeratosis of the bed itself. Another source of separation is the invasion of blood after trauma or in connection with certain nerve diseases—for example, cerebral paralysis, multiple sclerosis, or tabes dorsalis.

Onychorrhexis.—This term is applied to the condition of the brittleness of the nail which follows decreased production of nail substance, and is usually associated with some trophic disturbance.

Onychauxis.—An increased growth of nail substance, and when associated with curving or hooking of the nail the word *onychogryphosis* is used. The etiology of this condition is somewhat obscure, but the deformity has been observed in connection with wounds, pressure of shoes, old age, deformities of toes, especially hallux valgus, syphilis, tinea tricophytina, central or peripheral nerve disorders, old tuberculosis, circulatory disturbances, such as thrombosis and aneurism, leprosy and confinement to bed.

The pathology of onychogryphosis was carefully studied by Virchow in 1855, and his description which follows remains the best to-day. There are three gradations in the formation of a truly gryphotic nail: First, the flat or plate shape; second, the conical form; and third, the perfected claw. At first the bed becomes shortened and the pulp of the last phalanx diminishes in size; the subungual vessels dilate and the stratum spinosum proliferates with the formation of abnormally high, transverse ridges, and an accompanying hypertrophy of the stratum corneum. These changes separate the plate from the bed, especially at the distal border, and the plate itself thickens, becomes yellow or dark brown in color, and shows on its surface overlapping transverse ridges. These ridges, of course, denote an intermittent process. The second or conical stage results from a continuation of the previous changes. The bed becomes deeper and forms a distinct transverse ridge, behind which the plate is almost perpendicular, yellow, translucent, and very hard; while in front it is opaque. The cells of the plate are no longer nucleated and apparently lose their boundaries. In the deeper portions of the bed the cells soften and blood finds its way into the intercellular spaces as in cutaneous horns. The third stage shows a still further advance from the normal. The downward pressure of the plate has caused an almost total disappearance of the bed. The ridge noted in the second stage has widened and the distal portion of the plate has become smaller; in fact, the last stage is one of atrophy. The resulting claw may grow simply downward or downward and backward, or in rare cases may assume the spiral curves of a ram's horn.

Leuconychia (leukopathia unguium, canities unguium).—The appearance of white areas in the nails follows three types, the punctate, the striate, and the total. Pathologically, we find this normal color due to the faulty production of nail cells with subsequent imbibition of air. This abnormality has been observed following wounds, trophic disturbances, relapsing and typhoid fevers, stimulation of nerves by electricity, and, rarely, congenital examples have been recorded.

Koilonychia, or spoon-nail, is the concave appearance which the plate assumes at times. This condition is usually the result of an underlying eczema, but may appear after other diseases, or without any apparent etiological cause.

Agnail, or hangnail, is caused by the drying up of the eponychium after insufficient nourishment. With the formation of the hangnail an easy entrance is afforded to bacteria, and in this way arise many of the syphilitic chancres and the more numerous cases of paronychia and of panaritium.

Hemorrhage.—The invasion of blood below the nail is usually traumatic in origin. A squeeze or a blow is followed by the bursting of a vessel in the bed or in the matrix; and when in the latter, the plate is sure to fall. The blood forms a clot between bed and plate, and if small, is usually absorbed while a large hemorrhage will often lift up the plate and produce subsequent atrophy or possible loss of the nail. Cases of vicarious subungual menstruation have been recorded, while other etiological factors in hemorrhage of the nail are scorbutus, morbus maculosus Werlhofii, tabes dorsalis, or the introduction of foreign bodies below the nail plate.

Trauma.—Wounds of the plate mean nothing serious to the nail, while similar injuries to the matrix always lead to scars which produce permanent deformities.

Unguis incarnatus.—Ingrowing of the nail is most commonly met with in males between the ages of fifteen and twenty, and is usually coincident with lack of care of the feet and the wearing of ill-fitting shoes, but flat-foot, wounds of the nail walls, and great convexity of the nail are other possible etiological factors. The first symptom is pain, followed by swelling and the formation of pus, and finally a granulating sore is produced, which shows no tendency to heal. Constitutional symptoms sometimes make their appearance, and finally the disease may result in necrosis; but this event is fortunately rare.

Subungual Tumors.—The presence of new growths under the nail is distinctly uncommon, but, according to Heller, cases of subungual corns or horns, fibroma, papilloma, leiomyoma, angiosarcoma, angioma, colloid sarcoma, exostoses, cancer, and enchondroma have been recorded.

Symptomatic Pathological Involvement of the Nails.

Onychomycosis tricophytina.—Ringworm of the nail is a rare condition, and is usually caused by the megalosporon. The disease first appears at the distal end of the nail and gradually spreads backward. The plant first attacks the bed, producing an opacity and discoloration of the plate, which usually assumes a whitish-yellow tint. As the disease progresses, the color darkens even to a brown, but never reaches black, as is so often the case in favus. Coincident with the progressive color changes the bed becomes more and more hyperkeratosic, the plate is raised more and more from the bed and shows transverse depressions, transverse elevations, or vertical ridges, and finally the plate itself is attacked and becomes rough on the surface, exfoliates in lamellæ, atrophies or splits, and is finally cast off. The disease is essentially a very chronic one, and even when properly treated requires at least two years for its thorough eradication. If left to itself, the plant has been known to remain active in the nail substance, even up to thirty years. The diagnosis is extremely difficult, for even although we have to our satisfaction excluded all other possibilities, the spores may elude the most diligent microscopical investigation—in fact, it is only when one has demonstrated conclusively the glistening, rectangular spores with rounded corners, five to seven micromil-