(*angiomyoma cutis*). They are usually circumscribed and solitary, deeply seated. In relation with the nerves they form irritable tumors (ganglion dolorosum myomatosum).

II. *Hyperplasias of the arrectores pili:*

a. As portions of vasculor nævi (Virchow);

b. Forming multiple tumors.

III. *Neoplasms derived from the deep muscular layer of the skin* (myome dartique, Besnier):

a. Diffuse, as forms of *elephantiasis lymphangiectodes* and *pachydermia myxomatodes;*

b. Circumscribed. This may be polypoid, telangiectatic, multiple, and in the latter case painful.

IV. Myomas which reach the skin secondarily or originate in misplaced germs.

Myomas of the skin are benign, slowly growing tumors, whose variable origin gives rise to different modes of appearance. Sometimes they appear similar to soft or hard fibromas. The location in the genital sphere, perhaps also spontaneous contractility, would lead especially to the supposition of a myoma. The small, multiple, superficial forms might be easily mistaken for sarcomas, but their seat—especially on the mamma—their elasticity, their slow growth, and mainly their painfulness, will permit a diagnosis.

The relative frequency of the latter symptom in the subcutaneous, as in the most superficial forms, finds its explanation, in the former, in their situation by the side of nerves; in the superficial forms, perhaps in an (essential ?) participation of the terminal nerve apparatus which is easily irritated by the spontaneous contractility of the muscular elements.

Myomas which are troublesome on account of their size, location, or painfulness are most rationally removed by operation with the knife or the galvano-cautery, and do not return after extirpation.

NEUROMA, ADENOMA, EPITHELIOMA MOLLUSCUM, AND CARCINOMA OF THE SKIN.

BY

PROF. E. GEBER,

IN KLAUSENBERG.

NEUROMA.

VIRCHOW recommended that the term true neuroma be applied only to those tumors which develop from the nervous tissue itself, and are formed of this tissue in great part in their further development. A neuroma is therefore a nervous neoplasm of hyperplastic character.

But this definition does not suffice for all cases. Tumors are frequently found which, in their origin and the primary implication of the nervous tissue, are undoubtedly of a nervous character, but which acquire later such a fibromatous, myxomatous, or carcinomatous nature that scarcely any of the original type remains. At other times, the recognition of the nervous tissue which yet remains is attended with no inconsiderable difficulty, so that the diagnosis cannot be made with certainty.

Despite these objections, we think that Virchow's conception of neuroma should be strictly maintained, in order to avoid the association of growths of different kinds in the same group as neuromata. It seems to me that a tumor, for example, of a fibrous nature, should be called a neuro-fibroma in the same manner that we speak of osteo-sarcoma, myosarcoma, etc

For this reason, we will exclude the consideration of all those homœoplastic and heteroplastic growths in which the nervous tissue plays a subordinate part.

For similar reasons, I will also exclude the so-called painful tubercles, first described by William Wood in 1812. Apart from some unessential peculiarities—that they occur chiefly in the neighborhood of the joints of the upper and lower limbs, particularly upon the smallest cutaneous branches, that they manifest themselves at an advanced age, but may usually be traced back to an earlier period, and that the female sex presents a marked predisposition—the clinical phenomena present such a variety that we will sometimes find the symptoms of neuromata, at other times of fibromata, myomata, and even of cavernous angiomata. From an histological standpoint, we can sometimes

discover in them entering and emerging nerves and an unusual abundance of nerve-fibres; but such appearances may also be absent, and in these cases we find the appearances either of a connective tissue growth, varying from a soft to a cartilaginous structure, or of some other neoplasm.

It may be, therefore, that we are not always able to make a correct diagnosis of painful tubercles, but it is more probable that the term represents a group of cases which have not been sufficiently differentiated, in which event it should not be permitted to represent a species of tumor, but the tubercles of really nervous character must be separated and exclusively termed neuromata dolorosa (Virchow).

Furthermore, I think that the neuroma plexiforme of Verneuil should also not be regarded as a true neuroma. In all the cases (about twenty-five) hitherto described, the nodular thickenings (in places) of the hypertrophied, usually pre-existing nerve plexuses (sympathetic, frontal, and supraorbital nerves, lumbar, sacral, brachial plexuses, etc.) were imbedded in proliferated connective tissue, so that even when the latter did not form a circumscribed prominent tumor, but a diffusely thickened, more or less pendulous fold of skin, its predominance threw the nervous element far in the background. This relation of the two varieties of tissue does not arise gradually in the course of development of the neoplasm, but exists to a certain extent as soon as the congenital predispositions are manifested. In large growths of this kind, we may satisfy ourselves that the tumor in the large proportion of cases is diffuse and passes insensibly into the neighboring tissue, or it is circumscribed, and then incloses a nucleus of varying size. Upon section, it is found that the plexiform tumor is formed of the sum of proliferations of the cutis (corium, subcutaneous cellular tissue, vessels, glands, etc.) or that it is derived immediately from the nerve-fibres, but that the lamellar sheaths of the latter have proliferated in such a manner that they in part separate the individual nerve-fibres entirely from one another, and in part cause their total disappearance.

It is, therefore, not surprising that P. Bruns, Czerny, Cartatz, and others have found, in plexiform neuromata, young and developing nerve-fibres, and that Winiwarter lso found muscle-cells in them. Winiwarter has also seen these neuroma nodules transformed into sarcomata.

In my opinion, the growths collected under the term plexiform neuroma should be divided among fibromata, neuro-fibromata, elephantiasis arabum, etc.

Nature of Neuroma.—Neuromata of the skin occur either on the trunks, branches, and twigs of the nerves (peripheral neuroma) or upon their terminations (terminal neuroma). They are more frequent on the spinal nerves, rare on the sympathetic. They are composed usually of nerve-fibres (fibrillary, fascicular neuroma), exceptionally of ganglion cells (cellular, ganglionic neuroma). In any event, the latter rarely occur upon the peripheral nerves, and it has not been decided hitherto whether they have not been mistaken for small nodules of nerve-fibres in a condition of irritation.

The hyperplastic fibres of neuromata are either medullated or non-medullated. The former constitute neuroma fibrillare myelinicum (Virchow) and are rare, apart from their occurrence as the result of injury; the latter constitute neuroma fibrillare amyelinicum. In almost all cases, however, both kinds of fibres are found intermingled, inasmuch as the medullated fibres represent an advanced stage of development of the non-medullated fibres.

Both varieties grow very slowly, rarely acquire dimensions greater than a child's fist, and are usually single. As a rule, they are round, though some are of an elongated oval or spindle shape, with a uniform or lobulated surface. They are firm and hard to

the feel, and generally do not become painful for a very long period or even not at all, as they are situated usually upon the deeper, relatively less sensitive fibres. The tumor occupies either the entire nerve (total neuroma), or a portion of it (partial neuroma). In the latter event, it is situated either centrally or laterally.

Diagnosis.—Upon section, the neuroma presents a smooth, variegated appearance from the inosculation of the fibres and bundles; it is quite dry and anæmic. Medullated neuromata have a grayish white look and silky gloss, while the non-medullated ones are grayish yellow to yellowish white. The medullated fibres are readily detected upon thin sections which have been cleared up by means or acetic acid or stained with 0.5% hyperosmic acid. The recognition of non-medullated fibres is more difficult, and requires teasing and skilled observation. Remak's fibres are best isolated by carefully teasing the tissue, whereupon a freely anastomosing meshwork of fibres makes its appearance. Upon closer observation, the fibres show a somewhat granular longitudinal striation, with large oval nuclei situated at irregular intervals. Upon being treated with acetic acid, the fibres swell and become transparent, aud the nuclei become more distinct. Various other reagents may be used, such as picric acid, followed by picro-carmin, etc., the object being to differentiate the nerve fibres from the connective tissue. Quite frequently, however, Remak's fibres cannot be distinguished from connective tissue and the diagnosis between neuroma and fibroma will remain undecided unless a connection can be demonstrated between Remak's fibres and other medullated fibres or unless entering and emerging nerves can be detected.

Etiology.—In a few cases neuromata have been observed in childhood; in others,

Fig. 75 *a*.—Cicatricial Neuroma.

Fig. 75 *b*.—Amputation Neuroma.

people of more advanced age have stated that the nodules were present, though in a latent condition, at an early period of life. This fact, together with the experience that neuromata may be combined with affections of the central organs (idiocy and cretinism or neuropathies of the peripheral nerves) or with a diffuse neuromatosis, though perhaps of a neuro-fibromatous character, justify the assumption that the tumors, or at least a predisposition to them, is congenital. Schiffner, Hitchcock, and others have observed neuromata in various members of the same family; usually, however, neuromata are acquired, either spontaneously or as the result of traumatism. Virchow believes that a predisposi-

tion is engendered by scrofula and phthisis. The large majority of cases, however, are due to direct injuries to the nerves, such as compression, partial and total section, resection and ligature of the nerves, deep-seated ulceration and amputation of the limbs. The neuromata may develop within a few weeks (if a predisposition is present) or only after the lapse of years, either directly at the site of injury or at a distance of 1–2 cm.

It must be assumed that the irritated end of the nerve becomes intimately united with the granulations, and that, when the cicatrix has fully formed, the nodule is intimately united with it, and is often provided with a fibrous prolongation, which constitutes a nidus for the new formation of nerves (Fig. 75 *a*). Or the ends of a large nerve trunk form nodules by uniting with the cicatrical tissue as in the amputation neuroma shown in Fig. 75 *b*, and which are united with one another in such a manner as to form neuromata of plexiform appearance. In exceptional instances, I think that amputation neuromata are due to the combined retraction of the muscles and vessels of the stump.

Symptoms, Course, and Termination.—Neuromata may exist for a long time without being noticeable and may not be notably painful, even upon pressure. The interference with nervous function is either sensory, motor, trophic, or psychical in its nature, according to the location of the tumors. As these are situated with relative frequency on the peripheral nerves, sensory disturbances (hyperæsthesia, neuralgia, hypæsthesia, anæsthesia) are most commonly observed. This is particularly true of neuralgia, which is often so severe as to cause the patient to lead a miserable existence, and presents little chance of recovery even after removal of the tumor, on account of the tendency to recurrence. The motor disturbances, which are more infrequent, consist of paresis, paralysis, or temporary or permanent contracture. Trophic disturbances, in the form of eruptions, atrophy of the skin, muscles, etc., may develop either alone or in combination with one or both of the series of disorders mentioned above. With regard to the psychical manifestations, I refer to the remarks under the head of etiology, and will simply add that they may occur at any period during the course of the disease.

The character of the nervous disturbances depends not alone upon the quality of the affected nerve, but also upon its special relation to the neuroma. Thus, a tumor situated on a mixed nerve will produce varying symptoms according as it occupies its whole extent or is situated centrally, laterally, or peripherally, and also according as the nerve fibres are compressed, stretched, etc.

Neuromata grow gradually and come to a standstill as soon as they have reached their limits, viz., the size of a child's fist. When situated superficially, injuries or inflammations propagated from the vicinity may give rise in them to a similar inflammatory process and they may then lead to cutaneous or phlegmonous ulcers and abscesses. More frequently the tumors undergo a retrogressive metamorphosis, viz.: calcification, softening, and fatty degeneration, in consequence of which they feel like resistant nodules, or assume a myxomatus consistence and become cystic if the process occurs centrally. True neuroma never assumes a malignant character.

Treatment.—The indications for treatment depend upon the severity of the symptoms, but operative procedure alone offers chance of successful removal. No internal remedy or external application will cause the disappearance of a neuroma. So-called neuromatosis precludes the idea of removing the tumors separately. We must also hesitate to remove large and deep-seated growths, if they do not produce too serious disturbances, because the result is often disproportionate to the severity of the operation, and also because relapses are not infrequent.

In performing the operation, the morbid tissue must be thoroughly removed, but the healthy tissue spared as much as possible. When the neuroma is situated laterally, it should be peeled off from the healthy portions of the nerve; when it occupies the entire nerve, extirpation or resection must be performed. If the portion of nerve removed is small, conduction may be restored by the new-formed nerve fibres which develop in the cicatrix or by stitches (catgut) passed through the ends of the perineurium. In animals, resected portions of the nerve have been restored by transplantation, but it is undecided whether this can be done in man. In cases in which the excised part is more than 1 cm. in length, there is little chance of a restoration of the statu quo ante.

When neuromata of the limbs become intolerable on account of their size, pain, interference with function, relapses, ulceration of neighboring tissues, etc., amputation often offers the only chance.

Unfortunately, however, the recurrence of the growths in the stump gives rise to renewed intolerable complaints. Relief of such conditions must be sought in the use of narcotics, electricity, cold, warmth, inunctions of belladonna, aconite, hyoscyamus, etc.

ADENOMA OF THE SKIN.

General Considerations.—The glandular organs of the integument may proliferate in various ways, independent of the circumstance whether they are organs capable of function or are merely rudiments left over from fœtal life. If the proliferation occurs in such a manner that the glandular cells and stroma develop together into an independent neoplasm, and the tubuli or acini, together with the connective tissue boundary, retain the typical glandular structure, it will result in a perfectly typical adenoma.

Adenomata of the skin present the same characteristics with regard to development and clinical history as the other glandular formations of an epithelial nature. Microscopical sections show that the glandular elements constitute the greatest part of the tumor, and that, apart from those partial tumors due to hypertrophy of the cells, adenomata arise in the large majority of cases from hyperplasia of the glandular cells. This may lead either to a numerical increase of the elements within individual parts of the glands, or to a growth of solid offshoots of varying length and thickness, which push the surrounding connective tissue before them. If the proliferation extends still farther, these become the source of further similar formations.

If the offshoots remain in this condition, they become detached by the growing connective tissue, and then atrophy after a longer or shorter period of time.

The course of affairs is different when the offshoots contain a central lumen, and the cells are converted into secretory elements. In this event, the entire tumor or a portion of it continues the glandular function so long as this is not prevented by mechanical obstacles, such as impermeability of the duct, closure of its mouth, etc. The adenoma may thus, for a time, maintain the function of the gland.

These tumors may be sharply circumscribed, and appear encapsulated and usually pedunculated, or they may be diffuse and present a tendency to ulceration, relapse, and degeneration. The consistence is moderately firm, varying with the amount of proliferated epithelium, and the size varies from a nut to a fist. They may occur in any part of the body, but usually in those situations in which the corresponding mother gland is generally found.

A permanent or temporary standstill in the growth of the adenoma may occur at any time, often without any known cause. Sometimes the tumor presents obstacles to its own further enlargement by the peculiarity of its proliferation, inasmuch as the

stroma, either on account of a special tendency or a reactive inflammation, forms a massive wall around the glandular portion, and thus prevents its spread in all directions. Such tumors may remain almost unchanged in the body for whole decades.

More frequently, however, retrogressive changes occur in the tissue of the adenoma after its growth is checked. These changes are manifested macroscopically by diminution of size, changed consistence, color, etc. Microscopical examination usually shows a diminution in the size and number of the cellular elements, and also a degeneration of some sort (hyaline, colloid, mucous, fatty, etc.). But none of these changes deserve greater consideration than the cystic form, both on account of its relative frequency and extent. If the secreted contents of the gland or one of the offshoots cannot be discharged, or if morbid products, such as thick, mucous secretion, epithelium cells, etc., are collected and the walls lose their tonus, a cyst is gradually formed, which contains one or more cavities, and, in the latter event, is often converted into a single cavity by the disappearance of the septa (cysto-adenoma).

Adenomata may also grow uninterruptedly from the start, and thus very large tumors may result. Their mere size may cause all sorts of local disturbances, and by the uninterrupted pressure on the neighboring tissues may give rise to severe nutritive disturbances, even to erosion of the bones, etc. If they have pushed so far towards the surface of the integument that this receives insufficient nourishment on account of impaired circulation, degeneration of the tumor will soon be produced. Such ulcerations, when covered with easily bleeding granulations, cannot be readily distinguished from carcinoma.

The conversion of an adenomatous into another variety of tumor is observed usually in those which have existed for a long time and have been steadily growing. At times we are able to demonstrate the causative irritating influence or other constitutional influence; at other times we must be content with the assumption of a diminished resistance on the part of the organism and a thereby induced predisposition to the degeneration in question. Insufficiently as we can explain why an adenoma discontinues its previous regularity and the glandular elements become irregularly arranged and increased—our ignorance becomes still more palpable when we ask, why should the epithelium elements at one time, the connective tissue elements at another time, undergo this or that change into carcinoma, sarcoma, myxoma, etc. ?

Apart from these fortunately rare terminations, adenoma usually pursues a favorable course. Relapses may occur after imperfect extirpation, but they are always of a local nature.

Adenoma of the skin is comparatively rare and Virchow even doubts its occurrence. It may affect either the sebaceous or sweat glands, more frequently the former.

1. *Sebaceous Gland Tumor or Adenoma Sebaceum.*

These tumors are found either in the walls of sebaceous and dermoid cysts, or they develop primarily and then maintain an independent character during their subsequent course. The latter variety, which we will now consider, may be found wherever sebaceous glands occur, but chiefly where relatively numerous and large glands, which are often subject to mechanical injuries (scalp, nose, back, etc.), are congregated.

The origin is rarely found in a single gland, though Robin observed such a case on the labia. As a rule, whole sections of glands in one or more parts of the body undergo the hyperplastic process. This renders probable the assumption of a congenital predisposition.

The increase of the glandular substance, usually by proliferation of its elements, may start from any part and, as I have noticed, does not require that the gland be capable of function; the origin may take place in glands which are in a condition of cystic or colloid degeneration. With regard to the further course of the offshoots it must be mentioned that they often persist for a long time as solid, epithelioidal projections interspersed here and there with pearly globules, until, after continued proliferation, an increasing number of sebaceous cells gradually develop and the offshoot assumes the character of the mother structure.

Sebaceous adenomata vary greatly in size. It is not rare to find them as large as a

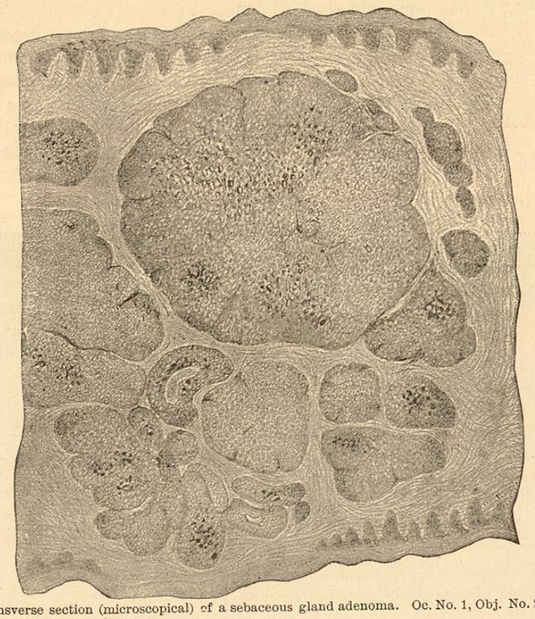

FIG. 76.—Transverse section (microscopical) of a sebaceous gland adenoma. Oc. No. 1, Obj. No. 2, tube drawn out (Verick).

pea or a hazelnut; some have been reported larger than the size of a fist. If the tumor has started in superficial glands, the general integument will be irregularly raised and assume a papillary or nodular appearance. This irregularity of the surface diminishes with the progress of the proliferation. The shape of the tumor itself is extremely variable and the growth may even extend into the neighboring tissues as a diffuse infiltration. On account of the predominance of sebaceous cells in these tumors, they have a yellowish white or dirty yellowish brown color and are moderately firm to the feel. If the stroma is very rich in connective tissue, the consistence may increase even to that of cartilage. In the smaller ones, especially those which have developed in hairy parts, moderately long hairs or lanugo may protrude from the dilated mouths of the follicles, but disappear in the further course of development.

Upon lateral pressure, comedo-like fatty plugs may be squeezed out of some of the ducts, while dry clumps of epidermis emerge from others. So much more importance should be attached to the possibility of removing such contents of the tumor since experience teaches that neither shape, size, color nor consistence are sufficient to permit a diagnosis and the feature mentioned above may first lead us to a recognition of sebaceous adenoma.

Upon cross-section we may often recognize, at the first glance, two kinds of tissue, viz.: the glandular and connective tissue. The former is yellowish and presents an acinous structure; the latter is darker and sends septa of various thickness into the former, dividing it into larger and smaller lobules.

In the adjoining figure, the acinous structure of the glandular substance is unmistakable. It is also evident that the tumor is formed of larger and smaller glands and their parts (lobules of 1 to 6 mm. diameter), that each acinus has a basement membrane, and each little group a number of terminal vesicles. It will also be noticed that the smaller cells (the majority) are situated deep in the corium or the reticular portion of the skin, and those which are markedly hypertrophied occupy the entire thickness of the skin. The normally formed general integument passes over the highest part of the tumor.

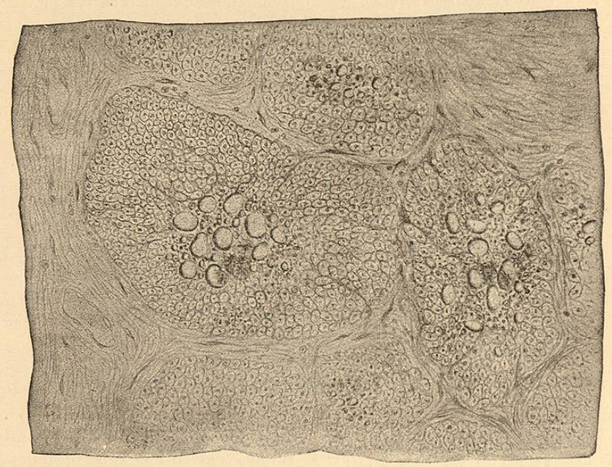

Fig. 77.—Part of an adenoma sebaceum. Oc. No. 2, Object. No. 7 (Verick).

Under higher powers (Fig. 77) it is found that the cells immediately within the membrana propria are compressed laterally, and as they approach the centre become larger and present a marked granular cloudiness. Around the centre, *i. e.*, in the neighborhood of the lumen of the excretory duct, the fat in the cells is often accumulated into large drops, and large cholesterin and margarin crystals are deposited there together with carbonate of lime. The interlobular connective tissue is infiltrated in spots with small cells and contains normal blood-vessels. Bock found no changes in the neighboring sweat glands, and this I can corroborate; Porta and Broca found the glands in a condition of atrophy or degeneration.

So long as adenomata of the sebaceous glands exist as such, they are noticeable only from their extent. For this reason small tumors may exist for a long time without being noticed and even the larger ones give rise to annoyance only on account of their pressure upon surrounding parts and the feeling of weight. The tumors take the first step in an unfavorable course when they cease to be circumscribed and become diffuse. If they retain the glandular character, the danger consists in the fact that they often attain very considerable dimensions and can be removed, therefore, with so much more difficulty. Moreover, on account of the excessive increase of the epithelioidal elements, the nutritive supply of the tumor proves insufficient and is thus a source of degeneration. But more important than all else is the fact that the adenoma, on account of its tendency to proliferation, forsakes the physiological plan of structure and that, inasmuch as the epithelium cells break through the basement membrane and proliferate in an unrestrained manner, the growth becomes converted into an atypical tumor of malignant character, into a carcinoma, sarcoma, etc. The existence of irritants or long-continued ulceration is therefore not absolutely necessary to the metamorphosis of the tumor, for example into a carcinoma.

Small sebaceous adenomata should be removed, therefore, merely as a matter of precaution. If they are large but circumscribed, the local disturbances constitute a further reason for extirpation. Diffuse growths should always be removed as soon and as thoroughly as possible, without any regard to their size or to the signs of degeneration. Caustics, such as Vienna paste, Canquoin's or Landolf's paste, etc., are not successful. Relapses cannot always be guarded against, even with the greatest of care.

II. *Sweat-gland Tumor, Adenoma sudoriparum s. glomiforme.*

Lebert first called attention to the fact that a tumor may be formed by hypertrophied sudoriparous glands. But the diagnosis of this variety should be closely criticised, since, from a clinical standpoint, we possess too few data, as a rule, to draw any safe conclusions with regard to the character of the growth. We must also admit that even a microscopical examination quite often furnishes entirely unsatisfactory results, as we will show in discussing the differential diagnosis. But we do not, by any means, wish to convey any doubts with regard to the existence of this form of tumor, in view of the authentic descriptions which have been reported.

Adenomata of the sweat glands may occur in any part of the body, but they have been found chiefly in the face, neck, and back. Thierfelder found a tumor of this kind in the diploë of the cranial bones. On account of the normally more marked twisting of the blind end of the gland in the deepest layers of the corium (thus simulating a small, spherical glandular body), sweat gland tumors have their starting point in this situation and thus require a shorter period to become noticeable, despite their relatively slow growth. They are more frequent in older individuals, but are also met with in childhood. Their consistence, which is harder than that of sebaceous adenomata, is due probably to their location; the large size which they usually attain must also be regarded as the result of anatomical conditions.

These tumors have a dirty grayish white color and an irregular nodular surface. The cut surfaces look somewhat like those of the mammary glands. Microscopical examination discloses tubuli similar to those occurring normally, and also solid prolongations filled with epithelium, bud-like offshoots, which are isolated or pass in an irregular