Lectures on tumors from a clinical standpoint / John B. Hamilton.

LECTURES ON TUMORS

FROM A

CLINICAL STANDPOINT.

BY

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FOR THE USE OF STUDENTS.

SECOND EDITION.

1892.
GEORGE S. DAVIS,
DETROIT, MICH

PREFACE TO THE SECOND EDITION.

The fact that a new edition of this book has been called for so soon after its first appearance is a gratifying evidence that it was needed, and that it measurably met the wants of those for whom it was intended. It made no pretense of being exhaustive; it simply dealt with the elementary principles of the subject, and was intended for students. Extended references to more elaborate works, it was thought, would detract from its simplicity by overloading, and thus tend to create confusion in the minds of beginners in the study.

The author sincerely thanks the reviewers of the Medical Press who gave the first edition such a very cordial reception, and were

> "To its virtues very kind
> And to its faults a little blind,"

and he sincerely hopes that they will find the second edition an improvement on its predecessor. He also thanks the publisher for the promptness with which the work was published after the manuscript was placed in his hands.

JOHN B. HAMILTON.

United States Marine Hospital,
Chicago, Dec. 31, 1891.

PREFACE TO THE FIRST EDITION.

I have been repeatedly asked by my students to recommend a book on Tumors, in English, which would give them, in condensed form, a practical acquaintance with the subject. I was obliged to say I knew of no single treatise which brought together the varieties of tumors set forth in our present nomenclature, and gave the symptomatology and treatment.

I therefore had a stenographer take the lectures as they were delivered, and, as the colloquial form has thus been preserved, it is thought to bring a little relief to the hard-and-fast lines in which articles on tumors are usually cast.

Original discovery has not been attempted; but with knowledge of the fact that the subject is always considered a bugbear by the student, the lectures only aim to impart the current information in a form intended to fix it in the memory.

The experience of the author in over twenty years of surgical practice has been freely made use of, and the statements made in the course are naturally such as square with the clinically observed facts.

For the last ten years the surgical wards of the Providence Hospital have afforded abundant material for the prosecution of the clinical study of tumors, and a specimen of every tumor removed has been submitted to my friend, Prof. E. M. Schaeffer, the accomplished histologist, for his opinion and remarks.

In a short time it is proposed to supplement this volume by another on the "Tumors of the Regions," in which the operative surgery will be fully considered.

As these lectures only give the general pathology, clinical history, and treatment of neoplasms, the illustrations are necessarily limited to simple types, with the exception of the remarkable specimens inserted as surgical curiosities.

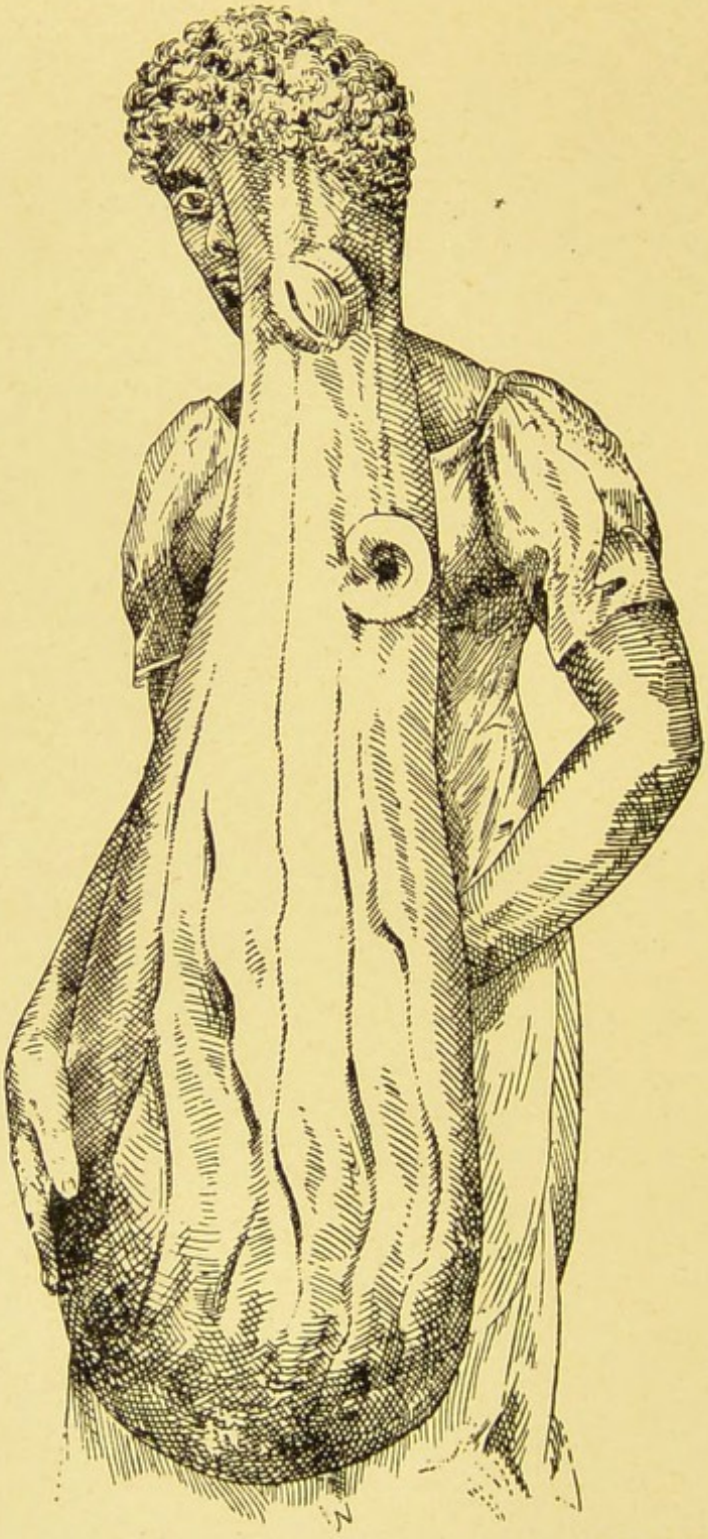
JOHN B. HAMILTON.

924 McPherson Sq., Washington City,
October 30, 1890.

DEDICATION.

This book is respectfully
DEDICATED TO THE STUDENTS
OF THE
MEDICAL DEPARTMENT
OF
GEORGETOWN UNIVERSITY,
To whom the lectures were originally delivered.

LIST OF ILLUSTRATIONS.



Representation of a tumor growing nearly the full length of the body. From the Medical Repository.

INTRODUCTION.

The purposes of diagnosis usually require that the microscope be employed in the examination of specimens. The student wishing to perfect himself in the knowledge of the histology of tumors should make their microscopical examination a part of his course, but it is certain that nearly constant practice in microscopical technique will alone produce satisfactory results. The busy and often overworked practitioner has sometimes little inclination to make sections and mount specimens, and oftener has no time to do the work. It thus results that in most places there are within reach physicians devoting themselves especially to microscopy, who may be depended upon for furnishing a diagnosis at short notice and much more accurately than a diagnosis arrived at by imperfect methods of examination.

The appliances necessary for the histological examination of tumors are: Jars for temporary preservation of the specimens; preservative fluids; staining fluids; microscope slides and cover-glasses; section cutter, or freezing microtome; watch-glasses; a special razor for cutting sections; forceps; and a good microscope. Expensive stands and elaborate stages are not necessary, and scarcely desirable, but the lenses should be good and should well define the edges of the ob-

ject. Four lenses, 1 inch, $\frac{1}{4}$ inch, $\frac{1}{8}$ inch, and $\frac{1}{12}$ inch, respectively, will be quite sufficient.

The easy solubility of the hæmoglobin causes the fading of the material in ordinary preservative fluids. Hamilton (of Aberdeen) recommends the following composition:

"Make a saturated solution of arsenious acid in water by boiling; filter, and, when still warm, mix together equal parts of this, of glycerin, and of methylated spirit. It is well to mix the glycerin and arsenious acid solution, to heat them, and afterwards to add the spirit. The advantages of this liquid are that it keeps the color of the organs better than spirit, it does not destroy their pliability, and it is a good preservative. If several organs are placed in one jar they should be separated by pieces of washed linen cloth; and a piece of the same, soaked in saturated solution of corrosive sublimate, should be placed over them. They should not be steeped long in water before being placed in the preservative; it is usually sufficient simply to wash them. Hearts, livers, kidneys, lungs, and muscular structures keep beautifully in it."

The fluid above described is only intended for the preservation of organs, as preliminary to section-cutting.

Before proceeding to cut a section of an organ or pathological specimen it is usually placed in a hardening fluid, and experience has shown the fluids

best adapted to each variety. The reagents and solutions necessary are as follow: (Altered from D. J. Hamilton.)

1. Methylated spirit.
2. Absolute alcohol.
3. Müller's fluid.
4. Müller's fluid and spirit (1 part spirit and 3 parts Müller's fluid).
5. Chromic acid (¼ to ⅙ per cent. solution).
6. Chromic acid and spirit (keep in the dark).
7. Perosmic acid (¼ to ⅛ per cent.).
8. Gold chloride (½ to 2 per cent.).
9. Picric acid.
10. Decalcifying and hardening solution (Rutherford).

The solutions have the following formulæ:

3. Müller's fluid.

Potassic bichromate...	45 grammes.
Sodic sulphate.....	20 grammes.
Water.....	2 litres.

M.

10. Rutherford's fluid.

Chromic acid.....	1 gramme.
Water.....	200 c. c.
Then add:	
Acid nitric.....	2 c. c.

Frequent changes of the fluids are necessary when the specimens are bloody, and friction with the

tissue is prevented by wrapping each piece in a thin sterilized linen cloth before dropping it into the fluid. When the tissues have been sufficiently hardened to enable a thin section to be cut, the section after cutting may then be placed in an appropriate staining fluid.

I pass over the technique of embedding and section cutting, for full instructions may now be found in almost any recent work on pathology and in the different manuals of histology. After cutting the section, before staining, it is usually dropped into a watch-glass containing glycerin. The following carmine solutions are in common use as staining fluids:

a. Carmine..... gm. 4.
Liquor ammon (fort)..... c. c. 6.
Water..... c. c. 120.

[*D. J. Hamilton.*

Mix the carmine into a paste with a little of the water in a mortar, add the ammonia, and when thoroughly mixed, the remainder of the water.

b. Carmine..... gm. 0.5.
Sodii bibor..... " 2.0.
Aquæ destill..... .. c. c. 100.
M.

[*D. J. Hamilton.*

These are mixed in a porcelain evaporating dish and heated to boiling. To this bluish-red liquid, dilute acetic acid (about 5 per cent.) is added till the

color changes and comes to be more like that of ammonia carmine. It is allowed to stand for twenty-four hours, decanted, and is then filtered. A drop of carbolic acid is added to preserve it.

c. Picro-carmine..... .....
Carmine..... gm. 1.

[*Ranvier.*

Dissolve in 10 c. c. of water and 3 c. c. liquor ammoniæ in a mortar, add this to the 200 c. c. cold saturated solution of picric acid. Evaporate either on a water-bath or by exposure to the air, to one third, and filter.

d. Picro-lithium carmine.....
Carmine..... gm. 2.50.

[*Friedländer.*

Dissolve in 100 c. c. saturated solution lithium carbonate. To this add from 2 to 3 c.c. of a saturated solution of picric acid.

There is also an alum-carmine and an indigo-carmine solution.

To stain nuclei logwood is used. The following is given by D. J. Hamilton:

Hæmatoxylene..... gm. 12.
Alum..... " 50.
Glycerin..... c. c. 65.
Distilled water..... c. c. 130.

Boil, and while hot add 5 c. c. liquid carbolic acid. This mixture should be exposed to the sun-

light for at least a month before using. This stains nuclei a most beautiful blue almost instantaneously after application. After the section has been stained, it may be placed on a slide and examined.

For directions for making museum preparations, and mounting sections in permanent form, the student is referred to the large works on pathology and histology. It is impossible, in the scope assigned to these general lectures, to undertake to give directions for examination of the various micro-organisms and for "smear" preparations, made according to bacteriological methods.

LECTURE I.

GENERAL CONSIDERATIONS.

We are about to consider one of the most interesting subjects in the whole range of surgical topics, and when we think how often the patient's knowledge of his chances for life or death hangs on our diagnosis of a tumor, whether or not it is malignant, we cannot fail rightly to regard its importance as second to no other. If we will examine the records of the civil hospitals in this and other countries, we will find that tumors of one form or another constitute a very large proportion of all the cases in the surgical wards, outside of the general class of injuries.

Technically the term tumor is applied to a neoplasm only, but to conform to the existing nomenclature, which includes cysts and hæmatomata, we define a tumor to be a generally non-inflammatory, abnormal swelling of some of the tissues of the body, due either to retained secretions, extravasated fluid, or new formation. The term tumor, surgically applied, means more than a simple swelling. If that were a true definition, the colloquialism which makes use of the word tumor, to describe the projecting end of a luxated bone, would be correct.

I have said non-inflammatory, but, our Professor of Pathology will doubtless tell you, it is a moot point whether or not certain new growths have their origin

in the exudation thrown out in the inflammatory process. True inflammatory products are temporary in their character, and the part in which they are seen has passed through the various stages of inflammation, hyperæmia, congestion, and exudation.

A tumor rarely terminates by a natural process. It grows until removed by the surgeon, or ulceration takes place, or the patient is poisoned through the lymphatics. We may qualify that statement by saying that a tumor may occasionally be the seat of an inflammation; pus is formed by the infection and death of the exudate and escapes, the tumor consolidates and contracts. This is necessarily rare and confined to certain non-malignant growths.

A foreign body is sometimes mistaken for a tumor, when imbedded in the tissues, especially when encapsulated. In one of the European Universities, where the *code duello* was the rule, it is reported of Dupuytren that a medical student was brought to him, who said he had a tumor which had been growing for some time. He thought it originated from an injury received in a duel. A conical swelling over the buttock was the outward indication. On cutting into the tumor, Dupuytren found the point of a sword.

The celebrated Professor South, who edited a translation of Chelius, relates a case where a man was in bed smoking a chalk pipe, and while asleep received an injury. Time passed on, and a swelling supervened. He consulted surgeon after surgeon, until

finally it was decided that there was a tumor in the check, which should be removed. Upon examination it was discovered that a piece of the pipe-stem, one and one-half inches long, had broken off in the cheek. In the Museum of the Royal College of Surgeons, London, there is a piece of glass mirror, which was found encysted in a patient's breast. Dr. Jos. M. Toner, of this city, related to me a case where a wax tube (one and three-fourths inches in length) remained encysted in the breast for one year. There are numerous examples of these encysted bodies which are likely to be mistaken for tumors. In the Army Medical Museum, at this Capital, you will find a specimen deposited by myself, consisting of exfoliated pieces of bone, as large as a grain of rice and upward. These I found, packed together and encysted in the thigh of a patient. From the history of the case, they appear to have been the bony debris of an antecedent abscess of the periosteum.

Chemistry in the diagnosis of tumors is of little use. You will find that the same chemical elements enter into the composition of a tumor as into the body in general. With the microscope, however, you have an exact means of diagnosis. Very incorrect ideas prevail about the microscope. Some apparently believe that you can put a small piece of tumor under the glass and at a glance tell just what the specimen is. You cannot do anything of the kind. To use the microscope intelligently you must become an expert.

It is not enough to make a thin section and place it on a slide. One must be familiar with the different forms of cells and animal tissues; and its use requires constant and steady practice. Not one man in a hundred can demonstrate the bacilli of tuberculosis, or the comma bacillus. The specimen must be properly treated by staining in order to render the bacilli visible. This staining process requires a special training. So it is with the diagnosis of tumors. A man must prepare himself, before he can make a correct diagnosis. Many surgeons content themselves with an approximate diagnosis, or bring the services of an expert into requisition, and here, as in most other schools, opportunity will be given you by the Professor of Histology to see all forms of tumors under the microscope. I have made this statement for the simple reason that a man giving a snap diagnosis, in making up his opinion of a tumor, will in many cases make a mistake, especially if one have a preconceived notion.

Now let us compare morbid growths with hypertrophy. In hypertrophy there is no departure from the normal structure. The hand of a baseball player, the arm of a blacksmith, the leg of a *danseuse*, are well known examples of hypertrophy. These hyperplasia are not circumscribed. We see the same increase of growth in any organ called ito excessive action for a considerable time.

NOMENCLATURE.

The ancients recognized three grand divisions of tumors: *Tumores secundum naturam*, *tumores supra naturam*, and *tumores præter naturam;* but in the beginning of this century clinicians had practically agreed on an extremely simple classification of tumors by which they were divided into two great classes: Benign and malignant. It was of practical utility. A benign tumor was one which did not directly destroy life. A malignant tumor was one which, sooner or later, destroyed life. It was, however, found that these classes shaded into one another so that sometimes the line was obliterated. It was seen that a tumor which might be "benign" in the beginning became "malignant" later on. The advance of anatomical knowledge and of knowledge of the development of cells necessitated subdivision. Then the type of structure began to be discussed, and there was invented the term "homologous," meaning similar in morphological structure to that of the organ in which the neoplasm grows; and "heterologous," meaning a variation from the normal type of structure. The degree of "heterology" was supposed to represent the degree of malignancy. This proved to be not all the truth. Virchow says: "One cannot, in my opinion, distinguish these tumors according to the tissues in such a manner that tumors which inclose in themselves certain tissues may be regarded as homeoplas-

tic, and those inclosing other types of tissues heteroplastic; on the contrary, the same species of tumor may be in one circumstance homologous and in the other heterologous—for instance, where you have a hair developed in the stomach or in a vessel wall, or a cartilaginous tumor growing in the muscle; if you have a mucous tumor growing in the bone, such a tumor would be a heterologous tumor—that is to say, a growth which may be like a normal structure, but not like the structure in which it is located." Broca has used the terms "homomorphic" and "heteromorphic" to denote similarity or dissimilarity of structure. The modern terms homotopia and heterotopia are perhaps more correct. Now we define hyperplasia as equivalent to the term neoplasm, except that a neoplasm must be circumscribed—that is, all growths growing from a parent cell from the edges of the tumor. These tumors may be single or multiple; we have, for instance, multiple fibromata; these may grow all over the body. I have had a case on which I think there must have been twenty-five tumors of the size of a filbert—so that would be called a multiple tumor. The large cancerous growths are usually single, primarily. So much for the general nomenclature, but I shall again revert to this topic when I speak of the classification.

A tumor's growth varies according to the relative malignancy of the tumor—the more rapid the growth the greater the malignancy. A carcinoma (which is a

malignant tumor) attains its growth and destroys the life of the patient comparatively soon. This is a very interesting point in the diagnosis, with reference to the future of the patient, and with reference to an operation. If you have a clear case of fibrous tumor, you need be in no hurry about the operation. It does not destroy life, and its growth is comparatively painless. In a case of cancer, on the contrary, its growth is rapid, and surgical interference must be immediate if success is to be hoped for. So that the rapidity of growth of a tumor is a guide to the diagnosis of its variety, and a sure guide to the therapeutics of the case. In regard to the diagnosis of tumors, the configuration and outward appearance give you something of an idea of the nature of the case. If it be a chain of glands which is involved, such as those of the groin, axilla, or neck, and there be a clear history of tuberculosis, in that case you know that it is not a malignant tumor. If you find in the breast small nodules, that feel like small filberts, or hard bodies like hazel nuts, but distinctly connected together by connective tissue, then you probably have carcinoma. Then in the cervix uteri, when carcinoma is present, it is common to find nodules. If you put your finger on the side of a raspberry you have almost the same sense of touch. Palpation in some circumstances does not give you a conclusive conception of the actual condition present. It may have progressed to the stage of abscess, and when that comes you simply feel fluctuation in the tumor.

The size of the tumor is another element to take into account. I should, in speaking of the configuration of the tumor, mention that lipoma and fibroma are usually conical, and may weigh anywhere from a few grains up to fifteen or twenty pounds. They are sometimes to outward view as conical as a sugar loaf. Such tumors frequently have a long pendulous body, pedunculated. Cancerous tumors are generally broad at the base, and not very movable. The mobility of a tumor depends very largely on its site. If it springs from the bone it is fixed and immovable. If it is located on the soft parts it may be movable. Sometimes it is located directly over an artery, and may then be mistaken for an aneurism. The infiltration of the skin and tissues is another guide to the diagnosis of the malignancy or benignancy of a tumor. I doubt the entire propriety of the term "benign." I do not think a tumor, as we understand the term, is meant to be a part of the normal frame; in that sense all tumors are malignant. If you substitute the French term *bonne nature*, or good natured, for benign, you have an expression of sentiment more properly characterizing those tumors which do not destroy life. The infiltration of a tumor is a pretty fair measure of its malignancy. We have, for instance, the carcinomata. We find that there is an infiltration or projection of epithelium, with much dense fibrous structure (*stroma*). The connective tissue is separated laterally and great pain produced. The intense pain of a

cancerous tumor is due to the infiltration of the tissues, precisely as if a foreign body were driven into the flesh. That is one direct reason for the pain. We do not find infiltration in a case of fatty tumor. It does not push anything but the skin out of the way. I have now given you a general reason for painless and painful tumors, excepting those composed of nervous tissue, neuromata, which cannot occur without producing great pain. You would suppose that an intra-ocular tumor would be very painful, whether malignant or not, but the rule holds good even here. Then the extent of the growth of the tumor alone produces great pain. I remember a case that I referred to Professor Burnett some years ago. (November, 1883.) In that case there was no pain. The patient was unable to see, and there was a growth filling the lower part of the posterior chamber of the globe. The globe was extirpated, and the patient in 1890, six years later, was still living in the enjoyment of good health.

Now as to the color of tumors. They are usually situated under the skin, and not much can be judged from that. There are, however, certain tumors characterized by pigmentous infiltrations, so that two forms of tumor are named from the black pigment (melano-carcinoma and melano-sarcoma). The glandular extension of tumors depends almost entirely upon their malignancy. I will take cancers of the female breast as an example. They are sooner or later

followed by glandular infection. The fluid follows the lymphatic channels, and the gland itself becomes infiltrated; cancer cells effect a lodgment, and set up a new growth like the original typical structure from which they sprang. Now as to recurrence: You might suppose that rapid recurrence would be evidence of its malignity. Not so. You might remove a polypus, and it might recur in a few days. Polypus of the ear may recur very soon; it is the same with uterine polypi. So that the mere recurrence of a tumor is no evidence of its malignity. The site of a tumor is variable; you may have one in almost any structure of the body. The ulceration of a tumor is a matter of time. In the case of a fluid tumor, the pressure of the clothing, any injury to the skin, may produce ulceration. In the case of other tumors, where an inflammatory process has gone on, there will be a breaking down of the tissues, due to inflammation, and an abscess will result. The vascularity of these tumors is considerable. Sometimes a tumor will be supplied by a blood vessel of considerable size, and the vessel may grow proportionately with the tumor. In Professor Frank Hamilton's Surgery, he describes a case where he was operating for an extensive tumor of the neck. He was explaining to the students there present how easy it was to separate the tumor from the tissues so that no hæmorrhage could result. He got ready to lift the tumor out, when a gurgling sound was heard, and a gush of blood fol-

lowed, and he thought he had lost his patient. He found that a large artery was attached to the tumor at the base—a thing that could not have been discovered before. He relates how easy it is to be surprised in a case of that kind, so that in operations you should in all cases be prepared for hæmorrhage. Remember that the venous blood vessels are, not uncommonly, abnormally distended. In a sarcomatous growth you will find that the superficial veins are very greatly distended. You can see them swelling through the skin, almost changing the configuration of the tumor by their immense size, their profusion, and tortuous course.

For our knowledge of the general pathology of tumors we must depend principally upon the microscope Tumors may be called typical, that is, composed of typical structure—where they are formed of normal tissue. For instance, the fatty, fibrous, cartilaginous, and lymphatic tumors are typical.

All these are formed from structures like the type from which they are named; they are properly called typical. We may further classify them according to their constituent structure, as neuromata, lymphangeiomata, angeiomata, myomata, etc. Now the term *histoid* is applied to this class of tumors; that is to say, where they are composed of a single typical structure. A neuroma is a histoid structure. Then we have the *organoid*, where there is more than one kind of structure. The term teratoid is applied

to the highest type of development of these abnormal growths. Also the "combination" tumor of Professor Gross, which consists of two or more different structures, as nævoid, cystic, fatty, fibrous, calcareous, or osseous, in the same neoplasm. It is not an infrequent thing to find several kinds of cells in an ovarian tumor.

The origin of tumors is sometimes very obscure. They are frequently the direct result of an injury. Polypus of the nasal passage for, example, is apt to follow an injury to the nasal bones. The so-called cryptorchids, or persons whose testicles have not descended fully, or are lodged in the inguinal canal, are very apt to have carcinoma or sarcoma in the retained testicles, by reason, perhaps, of the pressure of the abdominal muscles; especially if the testicles be partially descended so that they are lodged in the inguinal canal. In regard to the non-traumatic origin of a tumor, we have the cell theory of Schwann, by which the "caudate corpuscles" were the supposed progenitors of the fibres of connective tissue. That is the original theory on which all modern cellular pathology is based. Müller then followed with a study of morbid growths. Johannes Müller, you no doubt recollect, was the originator of the term "connective tissue." Then Vogel started the dyscrasia theory. That is the theory that the blood alone is principally affected; but, in fact, the solids as well as the blood are affected. Then the theory of "consti-

tutional taint;" that is, that all cancerous growths depend upon constitutional taint, which involves the supposition of congenitally defective cells. Then came Virchow (still living, in this year of our Lord, 1892, and at this time as active as ever), who by the production of his immortal cellular pathology laid down clear lines for the study of abnormal growths. His later work on tumors gave a classification which has been adhered to for a quarter of a century almost without change. Virchow adopted the law of Müller, "which is in effect that the substance of all tumors has its counterpart in some tissue existing normally in embryonic or after life." Cohnheim, the pupil of Virchow, who died in August, 1884, believed that al tumors are congenital. They may exist in all forms, and are simply, while undeveloped, stored up for future use, and remain latent until the conditions are favorable for the formation of a new growth. Then we have the abnormal "nerve influence" theory; that the cell, by reason of some chemical change in its structure, begins the generation of an abnormal brood; but an atypical cell cannot produce a healthy cell. It is impossible, within the intended scope of these elementary lectures, even to glance in passing at the various ingenious theories that have been propounded on the origin of tumors, and we cannot to-day satisfactorily explain that indefinable factor in their production which we term individual susceptibility. We cannot understand, for example, why one of a dozen

shoemakers, each pounding a piece of sole leather on his thigh, should have a sarcoma of traumatic origin, and all the others escape. So, gentlemen, you need not fear but there are plenty of unsolved problems to engage your highest powers.

LECTURE II.

CLASSIFICATION.

In the preceding lecture, I briefly referred to the classification of tumors. I do not pretend to defend the classification on which I shall base the description of these tumors. In fact, I am convinced that the classification is inaccurate, and that it should be changed. Why, then, you naturally say, do you use it? I answer, because it is the nomenclature and classification adopted some years ago by the Royal College of Physicians of London and the American Medical Association. American physicians had a voice in the Committee that drew up the nomenclature, at its last revision, and I adhere to it simply for the purpose of uniformity. I am confident that, in many respects, this classification will be changed. My dear friend, Professor Gouley, of New York, in one of the most learned works produced in any language on the subject of medical nomenclature, says of Virchow's classification:* "The high reputation of this great master in patho-anatomy has caused his nomenclature and classification of tumors to be largely accepted by the profession without question. This classification answered a good purpose twenty-five years age, and

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* Diseases of Man: their Nomenclature, Classification, and Genesis, New York, 1888, page 334.

was a forward step, but the advances since made in patho-histology forbid its continued use. Nevertheless, there are many physicians and surgeons who still adhere to this arrangement of tumors. In the present light of science, probably no one sees better than Professor Virchow the faults of this as well as of all other classifications, and if his occupations should permit him to undertake its reconstruction, he would doubtless do so consistently on the anatomical basis which does not abrogate, but rather enforces, Müller's law. He would probably abandon the word tumor, and reject the hæmatomata, and also the cysts. He would drop the terms histoid and organoid, and place the teratoid growths under the caption terata, and make a very different disposition of the mixed growths of his fourth group." Cornil and Ranvier, in proposing their classification, say that their aim has been "to treat simply from the histological point of view, and we have therefore included under the head of inflammation and hæmorrhage what seemed to us to rightly belong to them, blood tumors; hygromata for example. We also think we have a right to reproach Virchow with having invented new words, drawn from gross physical characters, whereby to designate certain tumors, instead of employing words representative of the tissue. Thus, he uses the word psammoma to signify a tumor of the meninges, because it contains calcareous granules similar to fine sand, and the word glioma is applied to tumors of the brain, because they

are of a consistency analagous to glue. He thus departs from the classification which Müller's law suggests, and which we intend to follow absolutely."

There is no denying the impeachment in the instances cited, but Gouley has pointed out that the authors are themselves inconsistent in many instances.

Cornil and Ranvier, however, admit that no anatomical classification can serve to determine the degree of the gravity of a tumor, and it must be apparent that the correct classification can only follow positive and unchanging facts of histogenesis. Recent research has shown us positively that certain forms of tumors are due to the presence of a specific micro-organism, and that a great many of them at the next revision must therefore be taken from the class in which they are now arbitrarily placed by our nomenclature I many particularly mention tubercle, lupus, syphilitic gumma, and leprosy.

I trust, therefore, that you will take our nomenclature as an arbitrary one, subject to decennial revision, as we now revise the Pharmacopœia; and bear in mind that we already have considerable material for the Committee of Revision. Every man cannot have his own classification, because there would then be no uniformity of terms in medical literature.

CLASSIFICATION OF TUMORS, COMPREHENDING MALIGNANT NEW GROWTHS, NON-MALIGNANT NEW GROWTHS, AND CYSTS.*

CLASSES.

I. Extravasation Tumors.
II. Transudation and Exudation Tumors.
III. Retention Tumors.
IV. Proliferation Tumors.

} Cysts.

Class I.—Extravasation Tumors.

1. Hæmatoma: Synonym, blood-tumor.
   - *a.* Cystiform.
   - *b.* Parenchymatous.
   - *c.* Polypoid.

Class II.—Transudation and Exudation Tumors.

1. Hygroma: Synonym, watery tumor, or dropsy.
2. Dropsy of bursæ mucosæ.
3. Proliferating hygroma of bursæ mucosæ.
4. Ganglion.

[In deference to the needs of the various registration authorities, a distinction has been made in the general and local tables between malignant and non-malignant new growths. The tumors are, however, here classified accord-

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* From the last revision of the nomenclature of diseases of the Royal College of Physicians.

Class III.—Retention Tumors, or Cysts.

1. Retention in loco formationis.

   a. Ranula.
   b. Parovarian cyst.
   c. Wen: Synonym, sebaceous cyst, or tumor.
   d. Mucocele.

2. Retention in loco distante.

Class IV.—Proliferation Tumors.

1. Fibroma: Synonym, fibrous tumors.

Varieties:

   a. Diffuse.
      1. Elephantiasis.
   b. Papillary.
   c. Polypoid: Synonym, fibrous polypus.
      1. Molluscum fibrosum.
   d. Tuberous.
      1. Epulis in part.
   e. Bony.
   f. Keloid.

ing to their mode of origin and their structure Such a classification involves, in certain cases, the association under one head of malignant and non-malignant growths, as, for instance, under Sarcoma. To facilitate returns under the general tables, the malignant growths are here marked by two asterisks; the names which include both kinds of growth, by one. The classification of tumors, to be complete, must include cysts as well as new growths. The cysts are accordingly introduced, but in italics; and should be returned severally among the local affections of organs.]

2. Lipoma: Synonym, fatty tumor.
*3. Myxoma: Synonym, mucous tissue tumor.
4. Chondroma: Synonym, cartilaginous tumor.

Varieties:

a. Ecchondrosis.
**b.* Enchondroma.
**c.* Osteoid Enchondroma.

5. Osteoma: Synonym, bony tumor.

Varieties:

a. Exostosis.
b. Hyperostosis.
c. Osteophyte.
d. Odontoma.

6. Psammoma: Synonym, brain-sand tumor.
7. Melanoma: Synonym, pigment-tumor of meninges.
8. Myoma: Synonym, muscle-tissue tumor.

Varieties:

Myo-fibroma: Synonym, fibroid tumor of uterus.
Striped muscle tumor: Synonym, rhabdomyoma.

9. Neuroma: Synonym, nerve-tissue tumor.
10. Adenoma: Synonym, glandular tumor.

a. Mucous polypus.
b. Chronic mammary tumor: Synonym, adenoid tumor.
c. Molluscum contagiosum.

11. Dermoid cyst.
12. Angeioma: Synonym, blood-vessel tumor.

    a. Simple: Synonym, teleangeiectasis.
    b. Cavernous: Synonym, nævus.
        1. Arterial.
        2. Venous.
        3. Mixed.

13. Papilloma: Synonym, warty tumor.

    a. Wart.
    b. Mucous tubercle.
    c. Condyloma.
    d. Urethral caruncle.

*14. Glioma: Synonym, neuroglia tumor.
15. †Granulation tumors.

Varieties:

    a. Simple.
    b. Lupus.
    c. Gumma.
    d. Lepra Arabum, or elephantiasis Græcorum.
    e. Yaws.
    f. Glanders.
    g. Farcy.
    h. Tubercle.

*16. Lymphoma: Synonym, lymphatic-tissue tumor, including lymphadenoma.
*17. Sarcoma.

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† Due to infective organisms.—J. B. H.

Varieties:

a. Round-celled.
b. Spindle-celled.
c. Melanotic.
d. Myeloid: Synonym, sarcoma gigantocellulare.
1. Epulis, in part.

**18. Carcinoma: Synonym, cancer.†

Varieties:

a. Epithelioma.
Sub-variety: Rodent ulcer.

NOTE.—Chimney-sweeper's cancer is to be returned under epithelioma.

b. Scirrhus.
c. Medullary.
d. Melanotic.
e. Osteoid.
f. Cylindroid: Synonym, adenoid.
g. Colloid: Synonym, reticular or alveolar cancer.

SYPHILIS.

1. Primary: State the part affected.
2. Constitutional: State if congenital.

a. Inflammatory and exudative.
b. Gummatous.
c. Ulcerative and destructive.
d. Cicatricial.

} Of parts of body according to order of local disease.

† See page 129.

Tubercle.

1. Grey.

a.	Simple.	Of parts of body according to order of local disease.
b.	Inflammatory.	
c.	Ulcerative and destructive.	
d.	Retrograde and cicatricial.	

2. Yellow.

a.	Simple.	Of parts of body according to order of local disease.
b.	Inflammatory.	
c.	Ulcerative and destructive.	
d.	Retrograde and cicatricial.	

LECTURE III.

EXTRAVASATION TUMORS—HÆMATOMA—TRANSUDATION AND EXUDATION TUMORS—HYGROMA.

The only one of the extravasation tumors is the hæmatoma, or blood tumor. We have three varieties—cystiform, parenchymatous, and polypoid. We have first the hæmatoma auris—that is, the blood tumor of the cartilage of the ear. This you have in the insane more frequently than in any other class—hence it is usually called the "insane ear." It consists partly of extravasated blood between the perichondrium and the cartilage, is occasionally found in the sane, and is supposed to be due to general cerebral congestion. Then we have pelvic hæmatoma, or hæmatoma proper. We may have this when the blood is infused in the pouch between the rectum and the uterus. Then hæmatoma pudendæ, situated in the vulva, and generally coming on after labor. Then hæmatoma scrotal. Then hæmatoma of the cord.

Pelvic Hæmatoma. Strictly speaking, this is not a tumor, but as the classification puts it in this place, we will now consider it. It is frequently taken for pelvic cellulitis. Now remember that pelvic cellulitis is an inflammation of the connective tissue of the pelvis, and hæmatoma is first due to the rupture of a vein or veins between the ovary and the Fallopian tube, in

the broad ligament of the uterus, and takes place most frequently after confinement. It comes with a sharp pain generally, but sometimes there is not much pain. Very rarely there is a chill, whereas in cellulitis the disease is ushered in with a marked and distinct chill (rigor). Now if we look at the anatomical structure of hæmatoma, we find that the blood flowing out pushes one or more of the coverings of the broad ligament before it until the tumor is gradually formed. It pushes aside the pelvic fascia, presses upon the vagina, or rectum, and then we have what is called pelvic hæmatocele.

It is not proper to speak of hæmatometra as a tumor, because of the damming up of the blood in the uterus from an imperforate hymen, as it is simply retention of the blood. When we have pelvic hæmatoma it is due to rupture of the blood-vessels from external or internal violence. The first symptoms are those of internal hæmorrhage in general—a blanched appearance, white lips, weakness and debility, rapid pulse, watery condition of the blood, and great thirst. After a while this effused blood becomes encysted by a false "membrane," called the limiting fibrin. Then one of two things happens: Either this blood clot softens, becomes infected, and degenerates into pus, or it becomes absorbed and taken up. In either case there is a subsidence of the tumor. The surgeon rarely sees a case until after coagulation has taken place; for this blood does not remain fluid, but by reason

of the pressure upon it, or the density of the tissue surrounding it, becomes coagulated, slowly but surely. Then after a while a tumor is formed. Very often an ovarian tumor is suspected. The question will then arise as to the differential diagnosis. As I told you, the history of the case will afford pretty clear indications—the absence of the initial chill, the cessation of pain (for the pain of hæmatomata does not usually continue); the blood slowly coagulates, and it is a painless swelling. In this case we frequently have a complete anteversion of the uterus, as the blood pushes the uterus forward. In cellulitis the uterus is not necessarily displaced, so that in making a vaginal examination you will find that the swelling is uniform, whereas in hæmatoma there is a soft tumor situated just behind the cervix, in the *cul de sac*. In this case there is no fever, while in cellulitis there is fever. Now, you say, how can we make a diagnosis between pelvic hæmatoma and hæmatometra? The history of the case, and the imperforate hymen or impervious cervical canal, would show you the difference, and you could probably tell at once what was the matter. There is another point of difference between hæmatoma—pelvic hæmatoma—and pelvic cellulitis, in this, that usually the swelling does not materially increase in hæmatoma after the tumor is formed. Prognosis: The simple form of hæmatoma has a tendency to recovery, but the recovery is always slow. Sometimes the tumor points in the vagina or rectum, rupturing

the tissue of those organs and making its appearance externally. Another symptom of pelvic tumors, common to all where they press upon the rectum, is spasmodic, violent tenesmus. Sometimes we have a very severe inflammation of the rectum due to mechanical pressure.

Pelvic hæmatoma, coming on in the male or female after an injury, does not materially differ from the form already described, except that in such cases you have a clear history of the injury. If the disease is not recognized, and surgical interference is not made at this point, there will be recurrence, with all the disastrous consequences which follow septicæmia or sapræmia, not from coagulated blood, but from blood that has broken down and from the formation of pus. In very rare cases these tumors may originate spontaneously. When we have hæmophiles, or persons having a tendency to hæmorrhage in general, the blood does not readily coagulate, death is very speedy, and it occurs from syncope due to internal hæmorrhage. The length of time the patient may live will vary, but usually depends upon the amount of blood poured out. I once saw a case of rupture of the spleen where that organ was torn directly across. There was no external wound. The man lived two or three hours. Upon his death, on opening the abdomen, a clot of blood was found filling the entire cavity; so that the man lived an unusually long time, considering the amount of blood lost.

Treatment: The first indication is rest in a recumbent position. This is the primary indication. Then, if the bleeding is still going on, and the coagulum not formed (but unfortunately you will be very rarely called at that early stage), you must apply some form of hæmostatic, ice into the rectum, etc.; and speaking of ice in the rectum, it may be applied by a gold-beater's skin bag probably better than in any other way; the bag being filled with pounded ice, and put directly into the bowel. There is very little difficulty in introducing it, if the anus is first dilated by the finger and the outside of the bag well oiled. As to internal means, we may use acetate of lead and opium, aromatic sulphuric acid, or ergot, which latter is a very valuable remedy for the treatment of these cases. I remember a case where gallic acid in combination with ergot was used to decided advantage. The man recovered, and I have every reason to believe that it was due to the hæmostatic. Another antiphlogistic, apart from rest, is a proper diet. The bowels must be kept very quiet for some days. You must do nothing to create any irritation in them. Do not give cathartics. Do all you can to arrest inflammation. You must wait until the coagulation is completed and the tumor consolidated. If you find that after an apparent consolidation it fluctuates, it is proper to open it freely through the posterior wall of the vagina. By a free opening I do not mean a large incision. Take a narrow-bladed knife, or bistoury,

and push it directly upwards into the swelling, and having done so, work your finger in and enlarge the wound. Professor Simpson recommended that the trocar and cannula be used, but he later retracted that recommendation, saying that he frequently found the blood too thick to flow through the cannula. He subsequently put in a piece of lint to keep the wound open and wash out the cavity. At present I use a very weak bromine solution, and the ordinary rubber drainage tube to keep the wound open. Stimulants are to be given the patient, of course. I had a case in 1885, illustrating the traumatic form, in a patient in the Providence Hospital, upon whom I had performed laparotomy for a gun-shot wound. There was a pelvic hæmatoma pressing on the rectum, and violent tenesmus was present. I passed a knife through the anterior wall of the rectum and evacuated the contents of the tumor. The patient finally recovered.

I have now to speak briefly of pudendal hæmatoma. By hæmatoma of the pudendum I mean thrombus of the vulva, which is one of the results of pressure upon the veins of the labia during labor. Sometimes an enlargement of the veins and a swelling of the parts begin prior to labor, and the veins are often varicose. Rupture of the veins causesthr ombus and great pain, which require surgical interference. The only treatment is to open the thrombus freely after the coagulum is formed, and if there is considerable hæmorrhage it should be arrested by pressure.

The varieties of hæmatoma are: Cystiform, parenchymatous, and polypoid. One of the most typical forms of hæmatoma is scrotal hæmatoma. This, as its name implies, is an effusion of blood into the scrotum, and, if you will pardon me for omitting to mention it before, I found in the College museum a specimen of an ovarian hæmatoma which shows the internal structure very beautifully, and is well worth looking at. It was removed by the late Prof. Ashford. If you will observe, one of the ovaries seems to be perfectly sound, while the other has apparently taken on a cystiform action. But let us return to the scrotal hæmatoma. This is nearly always caused by direct violence—a kick or blow, or something of that kind, in the groin. I saw it once produced where a sailor had fallen from aloft and caught on the yard-arm of the main mast, striking his scrotum so that it produced this tumor. The history of the case is almost invariably a history of external injury; and you will find that the swelling comes on almost immediately after the injury, the pain not ceasing and the swelling remaining. That forms an element in the diagnosis between scrotal hæmatoma, sarcocele, orchitis, hydrocele, and the various other diseases of the testicle and scrotum. In hæmatocele, the increase in the size of the scrotum is sudden, pointing directly to its cause, the sudden outflow of blood producing it. If the first effect has subsided, it is painless; whereas, if it were orchitis, sarcocele, or any other form of car-

cinoma, there would be continuing pain. So that if you find a tumor of the scrotum which has grown suddenly after an injury, with no further tendency to increase, then you may suspect that you have to deal with scrotal hæmatoma. If you examine the tumor by transmitted light—that is, by placing the patient on a table and looking directly through the scrotum with a cylindrical speculum or tube—if it be hydrocele, it will be translucent, whereas hæmatoma will be nearly opaque, the area of opacity depending upon the amount of coagulation present. Opacity would be found in sarcocele also; but you have the history of the case to guide you, sarcocele being of slower growth and, like hydrocele, keeps on growing. Now, in hernia the diagnosis is made by an examination of the abdominal rings and by grasping the swelling to detect an impulse. If it be hernia, and the patient be directed to cough, the abdominal impulse will be transmitted to the tumor, and can be felt by the fingers. In case of scrotal hæmatoma, there is no transmitted impulse on coughing. Then we have hæmatoma of the cord, in which the diagnosis is much more clear, but you must depend on the history of the case to correct any errors in the physical examination. The diseases known as bubonocele and varicocele may confuse the student. Bubonocele is caused by the projection of a knuckle of the intestine which does not pass entirely through the external ring. Of course that disease must be diagnosed from

hæmatocele of the cord. You can sometimes get the transmitted impulse in bubonocele, but not always. The tissues surrounding the canal are so dense and fibrous that the transmitted impulse is less distinct. When the contents of the bubonocele consist of omentum there is frequently no impulse. If you can push the tumor to its natural place so that the swelling entirely disappears, it is probably bubonocele and not hæmatoma. Varicocele consists of a swelling and enlargement of the scrotal veins. The swelling feels like a bunch of angleworms, so they say. I have never felt many angleworms, but that is the way it is said they would feel, if we may believe the text-books.

In the treatment of scrotal hæmatoma and hæmatoma of the cord, you must evæcuate the coagulum unless you should find it disperses of its own accord, for a simple extravasation usually disappears spontaneously—but if you find in a few days that it does not disappear, you must evacuate it. One of the best means is what Professor Frank Hamilton called a long incision. When the scrotum is swollen, an incision three inches long, for example, through the great retraction will not be more than an inch long—so you need not be alarmed about making a long incision in the scrotum when it is distended, for it retracts fully two-thirds. If the incision has been made and you have turned out the clot, you must clear out the wound, and inject a solution of bichloride of mercury, 1 to 4000 parts, or the compound solution of bromine, and put in a drainage tube.

There is another form of hæmatoma, or rather the same form in a different part of the pelvis. Some of the vesical veins sometimes burst and form pelvic hæmatoma of the recto-vesical tissue. That is always the result of injury. It is scarcely possible to diagnosticate this form except through the rectum, and even that is quite difficult.

I will now speak of the cystiform variety. By this we mean any effusion into a cyst by sanguineous exudation from the cyst wall, so that when the contents of the cyst are evacuated they seem to consist of blood. Sometimes there seems to be a passive exudation of the blood, without any visible rupture. In such cases you will find the cyst walls quite rough, from inflammatory exudations. It commences as a sort of vegetative growth. We find sanguineous effusion into the cyst, making cystiform hæmatoma, also occurring in hæmatoma of various organs of the body, and throughout the serous and synovial sacs generally. The bursæ mucosæ sometimes exhibit this form. Some of the older students of this college will remember a case in the Providence Hospital of a young negress with double "housemaid's knee"—that is, a bursa over each patella. One of them was entirely sanguineous, and seemed to contain nothing but watery blood. The case was cured. There is no difficulty in curing such cases. The treatment is the same as the treatment of cyst, of which I shall speak hereafter.

The next form is the parenchymatous. One of the best known varieties, aside from those collections of blood sometimes formed in one of the solid viscera, such as you find occasionally in the liver, is hæmatoma of the heart. It is better known than any other because the heart is most carefully looked after in case of death when a post-mortem follows. So that this disease, hæmatoma of the valves of the heart, has been brought into considerable prominence. These little tumors are situated chiefly in the edges of the valves, sometimes extending along their entire circumference. Then we have, clinically, valvular murmur, and all the symptoms due to valvular disease of the heart. Of course no treatment is of any avail in such a case.

The polypoid is also quite a rare form of hæmatoma. The most common form is that which originates very rarely after the removal of the placenta. The tumor more frequently occurs in abortion than in natural labor. It varies in size from a filbert to a walnut. It seems to be formed where a portion of the placenta has grown to the uterine wall. Just there a clot is formed, which is pushed out and projects into the uterine cavity, in some cases almost entirely filling it. It is termed polypoid because it is like a polypus in appearance, but it is only apparent, as you shall presently see.

I will now proceed to class 2:—Transudation and exudation tumors. The chief variety is hygroma, or

watery tumor, or serous cyst, as it is sometimes called. We have dropsy of the bursæ mucosæ, proliferating hygroma of bursæ, and ganglion.

First is the *hygroma*, which is the common watery tumor sometimes called a barren cyst, or watery cyst. Sometimes they are called cysts of dilatation, in order to distinguish them from the cyst proper, which is due to retention. Now let us clearly understand what is meant by dilatation and retention. When a cyst is formed by the damming up of a duct, that is a cyst from retention. A cyst from dilatation means a cyst formed by dilatation from an inflammatory process of the sac wall and an actual increase in the natural fluid produced, so that it does not appropriately come under the term "cyst," though ordinarily speaking we would call it such. Hygroma proper is, therefore, different from a diseased bursa. Those cysts that are found along the fascia lata are of this variety.

A *proliferating hygroma* is an abnormal structure from the beginning. The contents of the bursa are constantly augmenting. They push aside the covering tissue, and form new fibrous coverings. They are sometimes traversed by bands of connective tissue, which subdivide them, and they are then called multilocular. Housemaid's knee is one of the most common varieties. The origin of housemaid's knee is very doubtful. If this old skeleton, hanging in our lecture room, were a recent subject

instead of a dried-up old veteran, we would see that the weight of that knee rested upon the condyles of the femur and the head of the tibia, and not upon the patella. The patella is entirely out of harm's way. So that it is very doubtful if housemaid's knee is caused by working in that position. But the irritation of the quadriceps tendon may produce it. If kneeling were the constant cause, carpet-layers would have it; but they are not predisposed to housemaid's knee. The diagnosis is easily established. Upon pressing the patella from side to side, the tumor moves with it. In enlargement of the joint you must remember that the synovial sac extends two or three inches above the patella; so that if you were to press it at the side and above the patella you would find fluctuation. In housemaid's knee you cannot do that. There is no distinct fluctuation behind the patella from side to side above the upper border. All fluctuation that you can obtain is from before backwards. Then the configuration of the tumor in case of housemaid's knee is conical. It projects directly in front of the patella.

The treatment of this affection may be external, or you may be able to produce absorption by the internal use of iodide of potassium and the external application of iodine. It is well to try that in the beginning, but usually you must not expect to cure your patients by these means. You may finally cure them, for in the majority of cases the treatment will be that

of making an incision into the tumor and evacuating its contents, or by a trocar and cannula and the injection of tincture of iodine. Very frequently you will find the contents consist of thick fluid. In that case the use of the trocar will be impracticable, but a free incision might be made directly into the swelling, or you might inject iodine, passing it freely around into the structure. If the sac is multilocular, great care will have to be taken to reach all parts of the structure. It must be almost completely extirpated, or the disease will recur.

Dropsy of the bursæ mucosæ is an increase in the natural fluids of the part. They are usually chronic and pendulous. They do not give the patient any uneasiness or pain, but they are in the way. Proliferating hygroma of bursæ mucosæ may sometimes co-exist with sarcomatous growths, and it is very doubtful whether they do not belong more properly to proliferation tumors. When co-existent with a sarcomatous growth, they partake of its nature. The treatment of uncomplicated dropsy of bursa is by free incision; and if there is great hæmorrhage from the tumor, it should be treated with the thermo-cautery.

Last is the so-called *ganglion*, which is a simple abnormal swelling caused by an exudation or increase in the synovial fluid. The word ganglion is a misnomer as applied to these tumors. The term has not the slightest significance as to the nature of the tumors

—but they are called ganglions. I think I can give you a little diagram here which will show you the nature of this ganglion. We will say that this broad

line is a tendon, the sheath of the tendon lying just above it. Now you will observe that this sheath has been pushed up. It is simply a protrusion above the tendon. The sheath is not ruptured; it simply protrudes, and raises the skin. The contents of this ganglion do not differ from the natural contents of the sheath, except in amount. They most commonly appear on the tendons on the dorsum of the hand, but I have had under treatment a case where the ganglion was situated underneath the flexor tendon of the index finger, under the palmar fascia. The treatment is almost the same as in the other varieties of hygroma. You may lay them open, but the quickest and easiest way is to take a book and break them by a sharp blow. The forcible rupture of the ganglion will cause it to disappear; placing a bandage on it with moderate pressure will be sufficient. I saw one at Providence Hospital I was unable to rupture by the hardest stroke. It seemed to be multilocular. Failing to rupture it in the usual way, I made an incision entirely through the tumor down to the tendon, and laid in a pledget of lint saturated with bichloride of mercury solution, after having first injected tincture of iodine, pressing it about so that the iodine

penetrated every portion of the tumor sac. The man made a good recovery. We call the thick fluid "meliceris," or honey wax. When the ganglion occurs in the palm you will be unable to rupture it by a blow; incision and injection will be required.

LECTURE IV.

RETENTION TUMORS.

At the last lecture we considered the first of the two classes of tumors—extravasation tumors, and transudation and exudation tumors; but I did not quite finish the discussion of that class. I should have said that transudation, exudation, and retention tumors are of the cystic variety, as you may notice by looking at your classification table. Now, what do we mean by "cystic"? We mean a sack or bag containing fluid. In the case of retention tumors, it is simply an extension or distension of the normal membrane; in transudation and exudation tumors, the membrane is formed *de novo* from the inflammatory action, as well as by the proliferation of the edges of the original sac.

According to the Virchownian classification, the retention tumor is simply a damming up of a duct from some gland, or the retention in the gland itself of matter which is there secreted and usually thrown out. In that case we have a dilatation of the natural sac, and a cyst is formed.

Cysts may be formed in almost every portion of the body, except perhaps in the substance of the lymphatic glands. It is quite probable that this degeneration may take place in all parts of the body, but it is a fact that the lymphatic glands are notably

free from cystic degeneration. Billroth says that closed follicles of the lymphatic glands never give rise to cysts, but "any tissue rich in cells may be transformed into a cyst by metamorphosis of protoplasm, or, as others express it, by separation of the mucous substance, through cells, without connection with development of the mucous glands." Bone cysts, as you may readily imagine, not having any normal membranous structure, must always originate by softening, and are, therefore, practically exudation tumors. Of the bony cysts to which I will direct your attention, perhaps the most important are those of the upper and lower jaw. These cysts are usually in the beginning multilocular—that is to say, divided into compartments—but finally become monolocular. Sometimes we find them in the upper jaw, constituting a cystic degeneration of the *antrum Highmorianum.*

In this cavity the mucous lining first becomes irritated at some point, where a papilla appears and a cystic degeneration takes place. Sometimes these cysts entirely stud the inside lining membrane of the canal. In other instances they coalesce and fill up the antrum, and after a while push out its walls so that the face is much deformed, and the jaw becomes diseased. Sometimes these cystic tumors of the upper jaw spring from the alveolar projection of the socket of the teeth, where the fang projects into the antrum. If you examined the inside of the upper jaw, you would see that the fangs of the teeth pro-

jected deeply into it, covered by the bony alveolar process. Sometimes a cystic degeneration takes place from the alveolar process on the outside. First there is a damming up of a mucous duct, which causes distension, and a cystic tumor is formed. We find it occasionally in the case of delayed or displaced teeth, and sometimes in the case of children, where the temporary teeth have been delayed far beyond the normal period. Occasionally the permanent teeth are delayed, and a cyst forms, which contains teeth. These are called dentigerous cysts.

The size of a tumor of the antrum may vary from the size of a pea upwards. Sometimes they will be proliferating and hard, and you will scarcely know them to be cysts except by examination after removal. At other times the face is greatly distorted and deformed. The contents of these cysts will be found the usual color and consistency of cystic tumors elsewhere in the body. There is generally a pea-green, albuminous fluid, thinner than the white of an egg, which upon examination is sometimes found to be highly albuminous. Sometimes the contents of these tumors calcify; chalk concretions are formed and disappear; occasionally, by reason of the rapid growth of the cyst and the pressure of contiguous parts, it creates inflammation, when, by means of the suppurating process, we have a spontaneous cure. All these cystic tumors, especially the benign class, are of very slow growth, and that is one point in the diagnosis. Where these cystic tumors

form in the upper jaw, a bulging will take place which not infrequently forces the hard palate down into the mouth. You can sometimes see that the hard palate is pushed down almost to a level with the teeth, and by the finger you can push into the tumor or feel it fluctuate. These tumors are not painful as a general thing.

Diagnosis: If you take into account their painlessness, their slow growth, the absence of any constitutional taint, the character of the fluid on examination, you may give a pretty positive diagnosis as to the character of the tumor.

Treatment: There are several methods of treatment. You may open the cyst and evacuate the contents, trusting to nature for a sufficient amount of inflammation to be caused to complete the cure. Or you may push a trocar into the tumor and evacuate its contents, and then inject it with iodine. That is perhaps the best method; but you must take care that every part of the diseased membrane is reached by the iodine. When these tumors are very large you will usually find that the simple tapping and injection of iodine will not perfectly cure them; so that you must thoroughly extirpate them with the knife and bone-gnawing forceps, or the curette, arresting any hæmorrhage during the process by means of Pacquelin's thermo-cautery, or the electric cautery.

Cystic tumors of the lower jaw usually appear near the upper border of the bone. They usually

originate in the cancellous structure of the bone—that is, between the two plates—so that in case of cystic disease of that bone it separates the plates. It is not true, however, that the two plates diverge equally; the inner plate being thinner, the tumor encroaches on the mouth. A cystic tumor of the lower jaw is usually quite painful, owing to the pressure upon the inferior dental nerve at that point, and, perhaps, to the stretching of the nerve. I have spoken of the malignant form of cystic tumor, and should tell you, before going into the subject of proliferation tumors proper, that cystic tumors of the lower jaw are very apt to take on malignant forms—that is to say, cancer cells may be developed therein. Multilocular cystoma of the lower jaw is frequently cancerous, so it is very important to make an accurate diagnosis, which can only be done by the aid of the microscope. You also find that in these tumors the ordinary cystic, and I might say the sarcomatous tumor as well, does not recur after extirpation, except in cases of round-celled sarcomata, which are malignant.

It is only necessary to thrust the trocar into the cavity of the tumor, evacuate the contents, and inject tincture of iodine. Some surgeons press the bony walls together with the thumb and finger, in order to crush the outer plate; this is not always practicable, although the plate is thin. When a sarcomatous tumor has involved the bone so as to cause its enlargement, you will find it necessary to remove the

entire bone, by making an incision, separating the bone at the symphisis, with a chain-saw, and disarticulating the lower jaw. When the periosteum can be saved, it is very desirable to do so, because a bony structure may be formed which will aid in preserving the normal contour, and prevent deformity. If not, you have done no better nor worse than the majority of cases; but you have at least had the satisfaction of curing your patients, for they almost invariably get well after the operation.

The soft parts also take on cystic degeneration, not only in the softer mucous tissues, but the myomatous growths and the various viscera of the body. Speaking of myomatous growths, you know what myomata are? They are tumors composed of muscular structure, and are very frequent in the uterus. By means of what is known as cystic degeneration, they sometimes soften and become cysts. The glands—the thyreoid, for instance—often become the seat of cystic tumors, which originate in the alveolæ of the gland, and gradually distend it. Sometimes a hæmorrhage occurs into the sac, and then they are called hæmorrhagic cysts.

Cystic Bronchocele. This always originates as a minute cyst. It may be as small as a pin-head in the beginning, but greatly enlarges, and finally becomes an immense cystic growth. When the cysts of the thyreoid gland are very large, they are called thyreoid goitre. They extend sometimes entirely across

the front of the neck, swelling it and raising the chin. Hæmorrhagic bronchocele is comparatively easy to diagnose from goitre, because goitre proper is simply a hypertrophy of the thyreoid gland—fibrous goitre. There is no fluctuation in goitre. In a cyst there is fluctuation, because it is fluid. As to the history of the case, it is proper to say that cystic disease of the thyreoid occurs about as often as goitre in those localities where goitre is prevalent, in some of the valleys of the Alps. Professor Frank Hamilton, in speaking of goitre, said he had occasion to go over to Switzerland, and wanted to see why goitre was more prevalent in the Alps than in other localities of Europe. He found it most prevalent in those deep valleys where the sun never shone, where it was continuously damp, where twilight came early, and daylight late. The inhabitants were languid and insufficiently fed; so that not only the climate, but inadequate food, aided in its production. But this is a by-path. Let us return to the cystic tumor of the thyreoid. Like its predecessors, its growth is very slow. It is annoying to the patient, not from pain, but from pressure. Sometimes it presses on the trachea, and then there is difficulty in breathing and in swallowing. Whenever you are in doubt as to the precise character of the tumor, use the exploring needle. One of the oldest forms of treatment is by the seton, originated in the time of Celsus; but it is not without danger, principally from hæmorrhage and septicæmia. In fact, modern anti-

septic surgery practically excludes the seton as a therapeutic measure. Occasionally a blood-vessel or vein is involved, and the vein becomes ulcerated; then we may have phlebitis, and pyæmia follows. Tapping is another method of treatment, but not altogether safe, a case having been reported in which rupture into the larynx and pharynx followed. Tapping, followed by the injection of iodine, has been more satisfactory, and injection of carbolic acid was practiced by the late Professor Gunn, of Chicago, in cases of cystic goitre, with considerable success.

Incision into these tumors has been practiced very frequently, but that, like all other methods, is dangerous, the gland being always vascular. A puncture in any part is followed by hæmorrhage, and an incision by very great hæmorrhage. The larger the cyst, the more formidable it is for treatment by incision. If it be treated by incision, it should be tightly packed with lint, having been previously washed out with the mercuric bichloride solution, or tincture of iodine injected. Beck, of Freiberg, prefers a much more radical treatment. Freiberg is a place where more of these growths are reported than in any other place in the world. Beck treated thirteen cases by complete extirpation. Two of the cases recovered after a long and tedious suppuration; eleven died. The dangers of the operation do not cease with the closure of the wound, for it has been found that after the removal of the gland myxœdema was apt to fol-

low, and Horsley has shown that there is a great connection between the mental disease and the loss of the gland. But in cystic disease the gland must necessarily have been previously destroyed by the progress of the disease, so that while the observation of Horsley may hold good in true goitre, it has much less weight in the cystic goitre. Many other operators have followed this plan. Electrolysis has been proposed as one of the best means of treatment in these cases; but we must learn a great deal more about electricity before we can treat these tumors with it successfully. The method of treatment by the electric pole is simply by dissolving the tissue. All that you see is a little greenish fluid about the pole, and a bubbling up of gases. In other words, the tissue in contact with the electrode is dissolved into its original elements. It is as near total annihilation of that tissue as you can well imagine. While I would recommend you to use the thermo-cautery in cases where the whole gland is involved, I prefer extirpation when they are unilateral. It might be well to note in passing the occasional success of the treatment of solid bronchoceles by the internal use of iodide of potassium and the external use of iodide of lead. The operation of removing one-half the gland, having at its commencement tied the isthmus, is quite satisfactory in the young. It is said that myxœdema does not follow in any case where a portion of the gland is allowed to remain, and I have seen no case

of partial extirpation where any serious results followed this operation.

Retention Tumors. There are several varieties of these to which I shall hereafter invite your attention:

a. Ranula.
b. Parovarian.
c. Wen.
d. Mucocele.

The above class belongs to the true cysts. We will take up retention tumors in the various structures of the body. First, in the skin: The retention cysts of the skin are mostly found about the face and nose, in the ducts of the sebaceous glands. They are little black specks on the face, are called comedones, and are due to the damming up of the sebaceous ducts, and the lodgment of dirt, giving the appearance, upon being squeezed out, of a maggot with a black head. This is a true cyst. The trachea, almost the last place where we would expect to find a cyst, is frequently the seat of cystic tumors. The mucous glands throw out the secretion which, by retention from damming of the ducts, forms the cystic tumor of the trachea. The stomach is also occasionally the seat of cystic tumors; the result is hypertrophy of the mucous membrane, a gastritis called gastritis mucosum occurs, and, as a result, polypoid growths follow. At the base of these polypoid growths we have the dilated mucous ducts, which dilations become cysts, which cannot be distinguished during life. In the liver we some-

times find similar cysts, supposed to be distensions, being composed of minute bile ducts, containing bile, cholesterin, and other salts. The pancreas has a cyst of the ducts. They become filled with a secretion —the so-called *acne pancreaticus*, sometimes called pancreatic ranula. Once in a while these pancreatic ducts become filled with a chalky concretion, and in that case an inflammatory process results. The intestines are occasionally the seat of cystic tumors, produced by the swelling of the ducts of the intestinal follicles. In speaking of intestinal cysts I have not mentioned cyst of the gall-bladder, due to the formation of a large gall-stone; nor of that due to obstruction in the appendix vermiformis. We have a variety of small pin-headed cysts in the kidney; also in the tubules from interstitial nephritis. These are very small, and can be seen only with the microscope. Finally, in the kidney we may have cysts of the most variable size. We have that peculiar cyst found in the new-born child, *hydrops neonatorum.* In that case it is enormously enlarged. Cysts of the kidney usually follow chronic inflammation of the organ—very rarely the acute form. Now, the cysts of the kidney sometimes grow very large, and inflammation is set up; and if the patient lives long enough for suppuration to develop, or for the cyst to acquire considerable size, the case may fall into the hands of the surgeon. Simple cysts of the uterus are formed from the retained matter of the utricular glands. The

mouths of the ducts of these glands become entirely closed, and the secretion is retained. Sometimes the entire surface becomes so generally obstructed that we have the acne formation, like that of the pancreas.

LECTURE V.

RETENTION TUMORS, CONTINUED.

At the last lecture I spoke to you hastily on the cysts of the organs in general, the internal viscera of the body, and referred to that other variety of cysts due to the occlusion of the larger canals, such as the bile duct, and those cysts of the liver due to the occlusion of the smaller tributaries of the main duct, and also of the ureter, or kidney. There are still other varieties of cysts which I mentioned, such as those small cysts due to closure of the ducts, with dilatation of the bronchial and tracheal mucous glands. Dropsical or sacculated bronchiectases and trachiectases are simple mucous cysts, due to the occlusion of the mucous glands situated in the trachea and bronchi. They cut a very important figure in diseases of the air passages, but are of little practical interest to the surgeon.

We will now take up the subject of ovarian cysts. I may say at the commencement that I do not intend to discuss it from the standpoint of the gynæcologist, or go deeply into that field, because the gynæcologists have almost captured that branch of surgery. It is yearly growing less common in the larger cities for the general surgeon to be called upon to perform ovariotomy.

I have a couple of specimens here which I wish to show you, that were removed by the late Professor Elliott, and beautifully exhibit the structure of the ovarian cyst, which, as a general thing, originates in the Graafian follicles. It is composed of a very tough, dense, fibrous structure, due to the dilatation and growth of the cyst wall—the proper tunic or sac of the ovary. Now this tumor differs from ovarian dropsy very materially, because the latter was originally an inflammation of the membrane. This, on the contrary, is a cystic degeneration of the follicle, while the dropsy originates in the membrane, and the fluid is the serous exudate. Ovarian cysts generally originate before puberty. Virchow relates the case of a child ten years of age in which the cyst was fully formed. I once assisted Professor J. Taber Johnson in performing Battey's operation for hygroma of the ovary, and in its removal we found not only hygroma, but several young cysts of the size of hazel nuts, which in the course of time would doubtless have developed into fully formed ovarian tumors. I will leave the pathology of the ovarian cyst to the Professor of Gynæcology, and go on to the diagnosis. In the first place, a fæcal accumulation may be mistaken for an ovarian tumor. In fashionable society it is not very uncommon for young ladies to allow great accumulations in their rectums. It is inconvenient to go to the closet; they become perfectly unconcerned as to results, and finally there is a dis-

inclination to go to stool more than two or three times a week. This results in the development of an enormous amount of gas and a swelling of the abdomen. The means of making the diagnosis between ovarian tumor and fæcal accumulations will be, knowledge of the history of the case; examination by passing the finger along the wall of the vagina and conjoined manipulation of the abdomen will detect the swelling in the bowel caused by the fæcal accumulation. A more common affection, known as pregnancy, has been mistaken for tumor. Of course, you will understand that the general signs of pregnancy will be almost entirely absent in such cases. Fibro-muscular tumors of the uterus are very frequently mistaken for ovarian tumors. If you introduce a sound into the uterus where there is an extra-mural muscular tumor, it will not pass so far as in the impregnated state; in the former three or four inches, whereas in the pregnant uterus it may pass in eight to twelve inches. In uterine tumors, except fibroids, there is but little change in the menstrual flow. In ovarian tumors the flow usually ceases—not always, however, for, if one ovary remains healthy, the menses are affected in a less degree. Ordinary dropsy is sometimes difficult to diagnose from large ovarian tumor. If the patient be placed on the back in ordinary dropsy there will be a general flattening of the tumor, owing to the fluid passing into all parts of the cavity; whereas, in ovarian tumor there is less

flattening, because the tumor is firmly held by its sac, and does not flatten by the simple weight of its own contents, as a dropsical accumulation would. Then the history of the case gives pretty conclusive evidence of its nature. You will remember in the one case there had been pain in one or other of the iliac fossæ. The growth was slow and the health not generally affected, while in ascites there is little pain, and almost always impairment of the health. The ovarian cells, so-called, have not been found so constant as the discoverers claimed they would be in the beginning, so that the microscopical examination is not looked upon as a positive diagnosis. Absence of albumen is said to be another diagnostic point, but this also is fallacious, because you will find that the ascitic fluid is, in a greater or less degree, albuminous. Hydatid tumors of the uterus—cystic tumors due to parasites, the echinococcus, etc.; these are also to be differentiated. It is very difficult to make a diagnosis between hydatid and ovarian tumor. It is found, however, on investigation of the history of the case, that when it originated there were some uterine disorders, with pain referred almost entirely to the uterus, and swelling referred almost entirely to the median line. I might mention that upon microscopic investigation of the fluid, which can be obtained by means of an aspirator or hypodermatic syringe, you may see the parasite under the microscope. Hæmatometra, which is an accumulation of menstrual blood

from an imperforate hymen or from closure of the cervix, might possibly be confused with uterine hydatids in diagnosis. There is still another disorder liable to be mistaken for uterine or ovarian tumor—spurious or phantom pregnancy. This will frequently occur in married ladies past 30 years of age, and more frequently in those who have a great desire to have children. There will be observed the same swelling of the abdomen, frequently quite tense. It may be diagnosticated from tumor by giving an anæsthetic, when the tumor will disappear in spurious pregnancy, and the abdomen immediately flatten. The percussion note is quite different in a fluid from a solid tumor, and by percussion its outlines may be mapped out. Then, if the wall of the cyst be not very tense, you can get fluctuation. Sometimes in multilocular tumors, and those with thick walls, there will be very little fluctuation, if any. Both of the patients from whom these tumors were removed recovered. In this case there was no fluctuation. The cyst wall was so dense, and firm, and strong, that the only means of making the diagnosis was the history of the case, the contents as disclosed by tapping, and bringing the tumor into view during the operation. The exploration of these tumors is best performed with an extra-long exploring needle, the trocar and cannula, or the needle of the aspirator. Aspiration with a fine aspiration needle is perhaps the safest method of making a surgical exploration of them.

Treatment: Instances of spontaneous recovery have been reported, but they have usually been preceded by violent rupture of the ovarian cyst, setting up inflammation, suppuration, etc. Tapping is not infrequently the first operation resorted to, and several cases have been cured by that simple process. A special cannula to prevent the entrance of air should be used. Drainage by the ordinary rubber drainage tube, after tapping, is frequently resorted to. There may be many cases where, from advanced age or feebleness of the patient, tapping must be resorted to. I saw such a case last year, in consultation with Dr. Chamberlin, of this city. The patient, 77 years of age and very feeble, was tapped, and about five gallons of melanotic fluid drawn out. After six months had elapsed the tumor had not refilled. About a gallon of fluid was removed May, 1891.

Incisions have been practiced and injections of iodine given. Peasley announced that the unilocular cyst was the only form that should be subject to incision, because in the multilocular we cannot get inflammatory action to supervene in the smaller divisions, whereas in the unilocular the inflammation speedily extends to all parts of the sac. Galvanopuncture is also used; and finally the method most commonly used, that of total extirpation, the operation of ovariotomy. I will not stop to describe that now.

There is another cyst, known as *parovarian cyst*,

which I take up a little out of its regular order for convenience. The parovarian cyst originates in the small Wolffian bodies which form the parovarium. Its symptoms, diagnosis, and treatment do not differ materially from those of the ovarian cyst proper, so I shall not go into its minute description. Professor Thomas relates a case of cyst of the broad ligaments, under which name the parovarian cyst is more commonly described, in which ovariotomy was performed and both ovaries found entirely normal; so you will see that it is possible for the parovarian cyst to develop to a considerable size without any disease of the ovaries being present.

Entire removal is probably the only treatment practicable. Some expert microscopists claim that the difference in the contained fluids is very considerable, that of the broad ligament approaching more nearly the ascitic fluid found in dropsy.

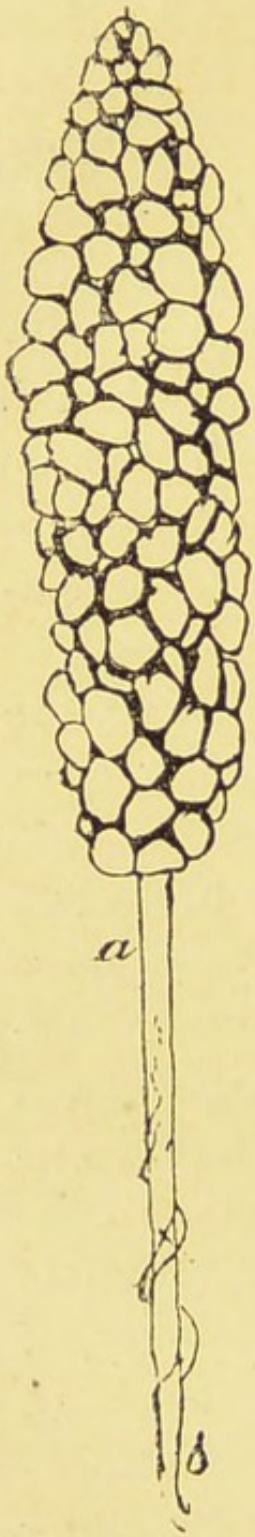
We have still another variety of cyst—the parasitic. These are formed in consequence of the presence of echinococcus, cysticercus, etc., and are found in all parts of the body, frequently in the liver and brain. A case occurred in the Marine Hospital at Detroit, Mich., November 23d, 1882, as reported by Surgeon W. H. Long. The cut shows actual size of the tumor.

W. G. T., captain of schooner "S. H. Lathrop;" aged 50 years; nativity, New York; was admitted to the United States Marine Hospital at Detroit, Mich.,

November 23d, 1882, suffering from hemiplegia of right side, and marked aphasia.

History: The patient was corpulent and weighed about 225 pounds. He was brought to the hospital a few hours after the onset of the attack, which was ushered in by a severe convulsion and all primary symptoms of apoplexy. Full doses of ergot and potassium bromide were administered, with friction over spine and to extremities. The patient sank rapidly, and died comatose on the following day, November 24th.

Necropsy: When the skull cap was removed, the meninges were found very much congested, a large quantity of fluid in the subarachnoid space, and connective tissue on surface of brain. The brain was removed, and weighed 63 ozs. (a fraction over 2,000 grammes). A careful examination was made to discover an extravasation or ruptured artery, but none was found. The brain tissue was congested, and surface of cerebellum infiltrated, but the ventricles contained only a trace of fluid. In each lateral ventricle there was found a pedunculated polycystic body, of an elongated and ovoid shape, about two inches in length (figure natural size), and free from any attachment, except to choroid plexus. They were lying loose on the floor of each ventricle, and connected with one end was a long stem (pedicle), which sprang from within a large capillary given off from the choroid plexus—the attachment above mentioned. These



(*a*) Stem, terminating in (*b*) capillary attached to choroid plexus.

polycysts were composed of a large number of cysts of varying size, and examination by the microscope showed them as containing a large number of small, round bodies on the inner surface of the cyst walls; they are of different structure from the cysts, as shown by their polarizing, while the cyst walls do not. It is believed they were echinococci. While "hydatid" tumors containing echinococci are commonly single in the brain, they not infrequently occur in groups, each group having its pedicle, as shown in this specimen.

Ranula. The next variety of these cysts to which I shall call your attention is the so-called ranula. Exactly why it is called ranula is one of those things past finding out. It comes from "rana," a frog; "ranula," a little frog. The name is a very ancient one, and will have to stand. Columellus, a Roman writer on agriculture, speaks of a swelling on the tongues of beasts as ranula. We have it as far back as any history of the disease, and several languages have perpetuated it. Although the French usually speak of it as *grenouillette*, "a little frog," they also

use the term "ranule." This disease is due to the damming up of the secretion from sub-maxillary and sub-lingual glands. This is precisely the same form of cyst that I described to you in speaking of pancreatic cysts. Ranula is sometimes due to a concretion blocking up some of the ducts or the main excreting duct. When the main duct becomes occluded, there is marked swelling in the mouth, which will sufficiently indicate where the obstruction is located. I might say that when the small canals are unaffected, and the main duct itself obstructed by a stone, it is called a ptyalith. Dermoid cysts in this region are sometimes mistaken for ranula, but the diagnosis is easy if the history of the case and the fluid from the tumor be carefully examined. Sometimes, indeed, they are so enormous that the patient might be said to have what Mark Twain describes as "double chins all the way down to his stomach." In these cases not infrequently both the sub-lingual and sub-maxillary ducts are occluded. In ranula, the patient will have great difficulty in speaking, owing to the pressure of the tongue up towards the roof of the mouth. He will have this difficulty of speaking, besides the deformity. Ranula is almost always painless.

Treatment: Two or three methods; one, little used at present, by seton, allowing the fluid to escape gradually along the side of the thread until an inflammatory process has been set up. Another method is by excision of a portion of the cyst wall. This has

been done with scissors, snipping the membrane by thrusting one blade into the tumor and cutting out a triangular section; as soon as the fluid escapes, the tincture of iodide is injected. This is the treatment commonly pursued, and is usually followed by no return of the tumor. Occasionally the retained saliva becomes inspissated, and the tumor requires extirpation.

The next form of retention tumor—the *wen*—simply refers to the collection of sebaceous material by the closure of a sebaceous duct. They may be single, or occur in groups, and may follow where there has been any outside irritation. I have seen several cases where it seemed as if the pressure of a hat obstructed the sebaceous ducts, and a wen formed directly under the hat-band. They are usually painless, however, and only annoying on account of their size and the occasional interference with wearing the hat. Treatment is quite simple—that is, the removal of the cystic tumor. On cutting down through the scalp they are seen as white, shining tumors, easily enucleated from the surrounding tissue, and may be removed by the fingers or scalpel handle without difficulty. The operation is followed by little hæmorrhage.

Mucocele is that form of tumor or cyst due to retention of mucus from closure of the duct. It is formed wherever there is mucous membrane. Mucocele of the vagina is usually due to obstruction of the

vulvo-vaginal glands. These mucoceles are irritable and very apt to terminate in suppuration. This is due, perhaps, to their anatomical position, which renders them liable to invasion by infective organisms.

LECTURE VI.

RETENTION TUMORS, CONTINUED—PROLIFERATION TUMORS.

I have not by any means exhausted the subject of cysts. There is one other cyst to which I shall direct your special attention, and to which I referred in my last lecture—that is, the galactocele, or milk cyst of the mammary glands. I used to think, and it has been frequently taught, that abscess of the female breast, following parturition, was usually due to neglect on the part of the accoucheur or the nurse. But I am sure that I have seen these tumors and abscesses form in the mammary glands where every precaution was taken; galactocele formed, followed by suppuration—for that is the usual termination of these cysts of the mammary glands. They arise sometimes by reason of a sudden "cold," accompanied by a rise of temperature, and followed by a closure of the smaller milk ducts; and then, when the milk is dammed up, the gland will be enlarged to a considerable size. There will be a severe rigor; the patient shakes as she would with acute ague. Fever follows the chill, and in a little while the tumor is formed; it proceeds through the various grades of inflammatory action, and abscess results, due to inflammation of the connective tissue around the milk ducts and subsequent infection. These tumors can

be usually prevented by pumping out carefully the retained milk from the glands, at the same time having the nurse make gentle pressure both on the lower and upper surface of the gland, rubbing the surface towards the nipple; the danger is thus sometimes averted by the removal of the obstruction. Then a sling may be placed round the breast; this has a tendency to prevent any further accumulation, for it will usually be found that these accidents occur when the patient has been allowed to walk around, and then the weight of the gland and the accumulation of milk has a tendency to produce obstructions. The treatment does not differ from that of ordinary abscess. It must be evacuated, provided the milk cannot be drawn out through the natural ducts.

We now take the fourth class, or proliferation tumors:

1st. *Fibroma:*

a. Diffuse.
  1. Elephantiasis.
b. Papillary.
c. Polypoid.
d. Tuberous.
  1. Epulis.
e. Bony.
f. Keloid.

The diffuse fibroma is a sub-variety. Then the papillary and the polypoid, of which there is one variety, molluscum fibrosum, and the tuberous with its variety, the epulis; bony, and the keloid. Now,

recollect that I mentioned in the beginning that the proliferation tumors were the new growths, the true tumors. All tumors, as I said, may be classified into two general forms: Neoplasms and cysts—neoplasms where there is a new growth, and cysts where there is a retention of fluid. There is another term which makes clear the word proliferation, and that is vegetation tumors—tumors characterized by budding. In their origin they are due to the preliminary stage of the inflammatory process, the stage of irritation, preceding the congestion. The proliferating tumors exceed in number those of any other of the four classes. There are more than 56 varieties of the proliferation tumors under the present classification. They may grow from the cartilage, the bone, the periosteum covering the bone, or from any tissue of the body; and the substance of the fibrous tumors may be composed of any one of these structures. So much for the proliferation tumor in general. We will first take up that class of tumors composed almost exclusively of connective tissue; that is, fibrous tissue. The word fibroid is also used to describe the fibrous tumors. The term desmoid has also been proposed, because of its resemblance to the ligamentous tissue. The fibrous tumors are then to be considered as wholly composed of connective or fibrous tissue. Sometimes, however, in the interstices between the fibres, we find cartilage cells and bone cells, or cells of any other natural structure, but they are always natu-

ral tissue cells. They may be, according to the Virchownian classification, heterologous—that is to say, a cartilage tumor developed in a muscle is a heterologous tumor, because it is developed and grows away from its normal situation, although the tumor itself may be composed of tissue entirely normal—so there is no departure from the normal type. The seat of a fibroma may be anywhere in the body. The uterus is a favorite seat of fibroid tumors. I will not now stop to describe fibrous tumors, but will say in passing that they are very slow in growth, and very firm in texture, owing to their structure. They are also painless, except where they have developed on the brain, spinal cord, or in the substance of a nerve. The fibromatous neuromata are very painful, and they are the only ones attended by pain. So much for the general characteristics by which they may be recognized. When a particular organ is involved, there are special means of diagnosis adapted to the organ in which the fibroma is seated. The first or diffuse form is elephantiasis. The seat of this disease is in the skin. We say it is diffuse because in the more limited form it may be papillary, that is, enlarged papillæ, or it may be polypoid, or it may be tuberous, the so-called tuberculosis of skin. We have still another variety of the papillary form, known as the verrucose or warty fibroma. *Elephantiasis*, the diffuse variety of fibroma, is a comparatively rare disease. It is usually congenital. Small tumors are formed all

over the skin of a particular part. Sometimes it extends over the entire body, but it is usually confined to some particular part, as the leg, arm, scrotum, vulva, or neck. It is conjoined with hypertrophy of the skin, and has various names, according to the country where it originates. Thus we have elephantiasis Græcorum, of the Greeks, elephantiasis Arabum, of the Arabs, etc. There are other forms of elephantiasis, which are said to be endemic in certain countries; elephantiasis Græcorum and Arabum are not absolutely confined to Greece and Arabia, and hence are not endemic. The Barbadoes leg—Cochin China leg is similar to Barbadoes—for example, is found only in the tropics. The form known as spedalsky is very common in Norway and Sweden. All these forms of elephantiasis are something like leprosy. There is, however, a very distinct characteristic by which the two diseases may be recognized, for in leprosy we have an excessive tendency to ulceration. Moreover, leprosy is constitutional, having a special bacillus, and therefore inoculable. There is no evidence whatever that elephantiasis is contagious in any degree. It is most frequent in men. Elephantiasis commences, when it appears on the scrotum or on the inferior extremities, as a slow inflammation. There is pain, turgescence of the skin, and a tendency to spread; generally there is fever, but not always; the lymphatic glands are hot, swollen, and painful, as well as the lymphatic ducts. There is an exudate—a clear yellowish liquid, which

coagulates slowly, depositing a mass of fibre. If you carefully examine the growth of complete elephantiasis, if the disease can ever be said to be complete, you will find that it consists of layer upon layer of the fibrous element of the skin, following an inflammatory process. It is true in elephantiasis as in leprosy that the bones become affected. Sometimes, with elephantiasis of the leg, the disease affects the periosteum in such a degree that bony osteophytes are thrust out and bone forms, so much so as to entirely unite the tibia and fibula. I have seen such a specimen. The bony growth had apparently commenced along the interosseous membrane on both sides. In stating that one of the distinctive points between leprosy and elephantiasis was that in leprosy the tendency was towards ulceration, I should say that in certain hot countries elephantiasis ulcerates, but that ulceration is almost entirely local; whereas, in leprosy there is a general contamination of the system, a constitutional taint—the patient has all the appearance of scrofula, and eventually becomes worn out by the disease. Again, leprosy may ulcerate at any part of the body—not alone in that which is the apparent seat of the disease; whereas, in elephantiasis it is confined to the part affected. These diffuse forms of fibromata are sometimes soft, notwithstanding on microscopic examination they are found to be almost entirely connective tissue; yet between the fibres there will be found a gelatinous substance constituting the soft, as distin-

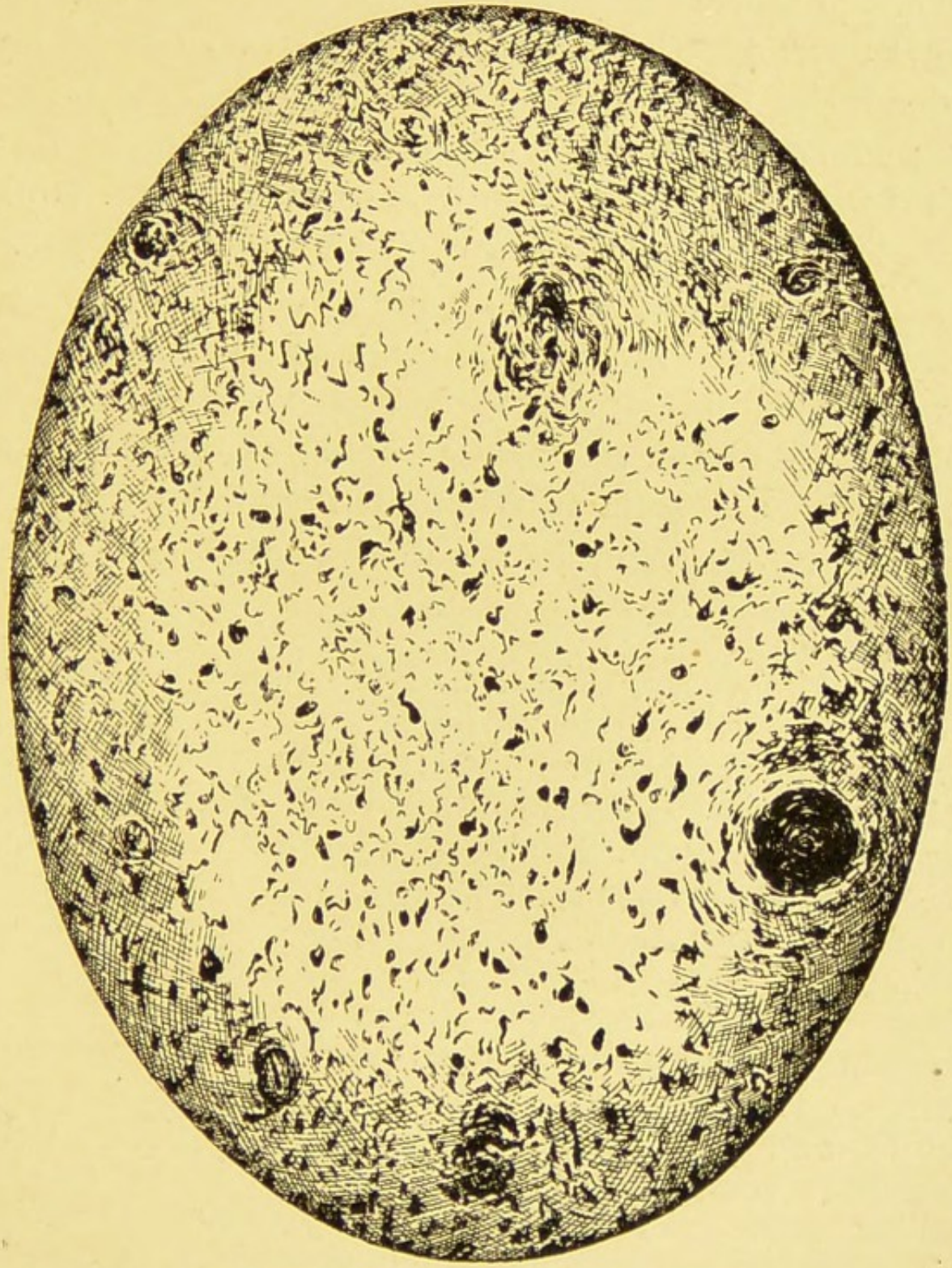
guished from the hard, variety. In the recent investigations of Manson and others, the disease is believed to be produced by the hæmatozoon called *filaria sanguinis hominis*. Elephantiasis of the scrotum is an example of the soft variety of this disease. This is a very common form of the disease in China. Elephantiasis of the scrotum occupies a very considerable amount of the medical reports of the Chinese Customs medical reports. Sometimes the scrotum grows very large, extending down to the knees—sometimes almost to the feet. In such cases the penis will be entirely hidden. The folds of the skin over the organ will have grown and developed until the penis will be entirely out of sight. The testicles cannot be felt. The skin will feel hard and tubercular, and the patient will complain of the immense weight of the tumor. A notable instance occurred in this country—in Alabama, I think—where the tumor was removed, and did not recur after extirpation. In this disease of the scrotum we find that the fibrous tissue is almost always infiltrated with liquid. There does not seem to be much growth in the blood-vessels, but rather in the lymphatics. Usually there is a pigmentary discoloration due to the pigmentary glands in the outer layer. They become quite painful through the weight of the scrotum, and almost always require extirpation. In operating on these tumors it is very difficult to preserve the penis. In the case of which a full report was made in the New York Medical Journal for 1868, a

large flap was made directly over the front of the tumor, in which flap the penis was raised. The flap itself was about an inch and a half or two inches long. A sound was passed into the sinus through which the urine had flowed, for the sinus will generally indicate the direction in which the penis will be found. Of course, next to the penis it is important to preserve the testicles. That is a matter of extreme difficulty in these cases of great enlargement. In this case, however, it was successfully done, and the organ and its appendages presented a very creditable appearance. So much for elephantiasis of the male organ. Elephantiasis of the female breast was known for some years as "hypertrophy of the breast," but the microscope showed that it was composed of this fibrous structure. They grow very large sometimes, so that the breast hangs down over the front of the belly—sometimes entirely down to the knees. The remedy is the same as for elephantiasis of the scrotum—extirpation. Birkett has observed this difference between hypertrophy of the natural tissues and a tumor, or fibrous growth. He observed that true hypertrophy commenced in the glandular tissue, itself, and that it was a growth of the organ in its entirety, whereas in elephantiasis the growth of the tumor was in the interstitial tissue, between the glands and the integument. The neck is a frequent seat of the soft or lymphatic form of elephantiasis. Some years ago Dr. Carnochan, of New York, ligated con-

secutively the common carotid artery, right and left, and the patient recovered. The tumor was very large. It involved the neck on both sides, so that the mouth was scarcely visible, and the chin entirely covered up by the excessive growth of skin, and the neck itself existed only in name. It extended from the clavicle directly upwards, the base towards the clavicle. The patient recovered. Those of the neck are almost always of the soft variety; that is, where there is a gelatinous infiltration of the fibrous structure of the tumor.

The papillary form of fibroma is simply hypertrophy of the papilla in the beginning, but finally a papilla grows out from the cutis, and grows very large. It is sometimes pedunculated; that is, has a foot stalk. It grows late in life. It is not confined, however, to the skin, but is found sometimes in the brain, in the breast, and in the bladder. This form constitutes the so-called condylomata, and is generally multiple. There may be on the surface of the uterus 100 or more. The polyoid variety is the fibrous variety as distinguished from the mucous variety. It originates from the connective tissue lying just underneath the mucous membrane, and pushes the mucous structure out with it. The mucous polypus is quite soft, and liable to bleed. The fibrous polypus does not bleed. Wherever accessible, the remedy is extirpation. One of the varieties of polypoid form is the *molluscum fibrosum;* that occurs all over the body, par-

ticularly on the face, neck, and trunk, and is a small tumor, varying from the size of a pea to a walnut, quite



Section of Molluscum Fibrosum.

moveable, and entirely painless. I have here a report of a case made by Dr. Hamlin, of Bangor, Maine, found in Marine Hospital Report, 1882. He sent me the tumor, and through the courtesy of some of my friends in the Navy Medical Department, I had it photographed. It is the only photograph of that kind with which I am familiar. We had a very handsome heliotype made from it, which I will show you.

The photograph gives a pretty clear idea of the structure of the tumors. It is not so good as the one in Virchow, but perhaps it represents a different section of the tumor, this being transverse, whereas that of Virchow is apparently longitudinal in section. A year later Dr. Hamlin reported another case. He says:

In February, 1882, I had the honor to forward to the Department the report of a case of molluscum, which appeared in the annual report of the Marine Hospital Service for the same year. On November 27 last, Charles M. Smith was admitted to the Marine Hospital at this port, suffering from acute cystitis of one week's duration. In making an examination of this patient I at once recognized another case of molluscum. Patient's age, 42; height, 5 feet 5¼ inches; weight, 130 pounds; figure, spare; birthplace, Boston, Mass. He removed to this State (Maine) when a child, and performed ordinary coarse labor until about 20 years of age, since which time he has been a sailor, sometimes going before the mast, at other times acting as steward. His health had always been good up to the recent attack of cystitis. His family

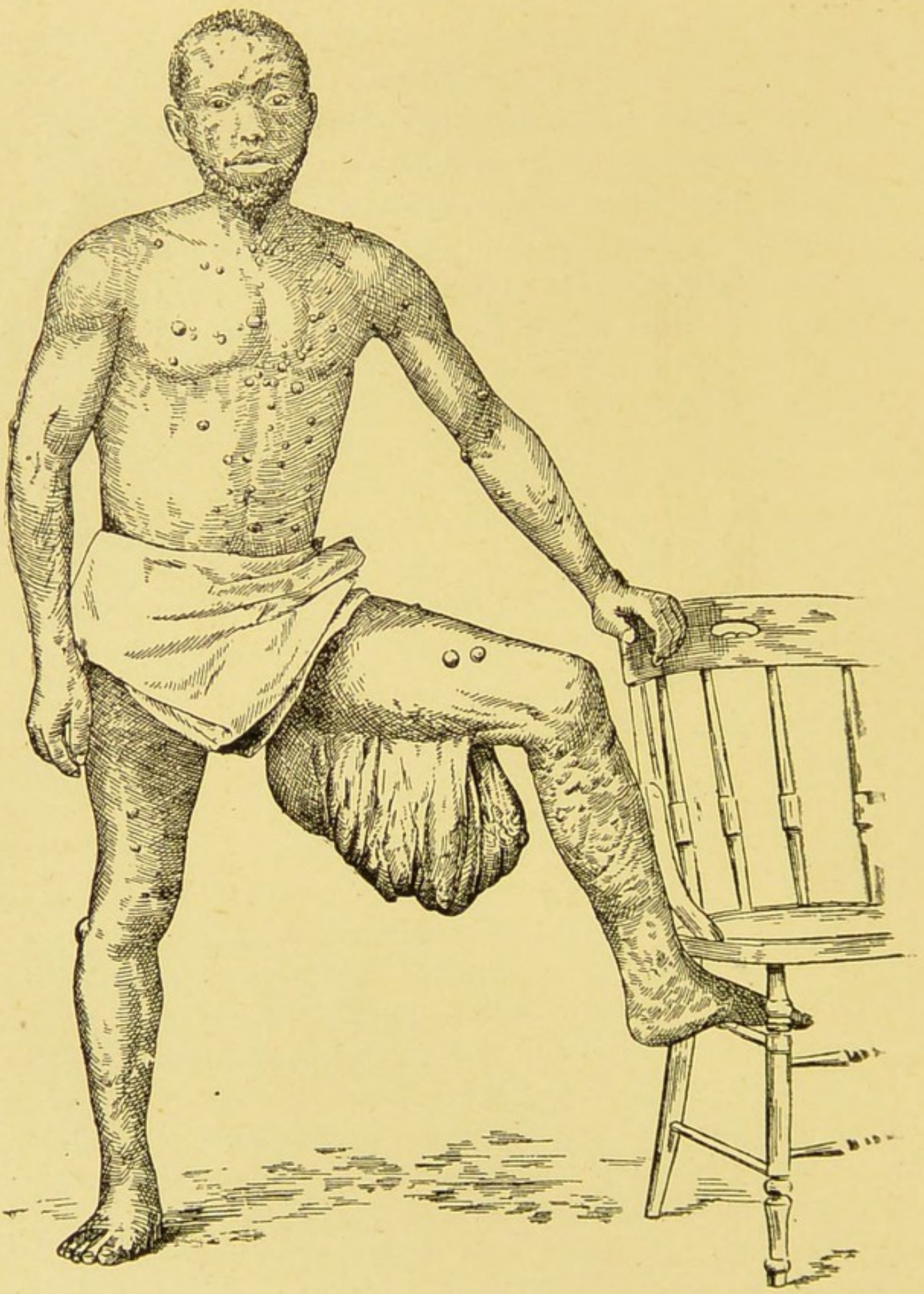
record revealed no history of morbid growths of any kind. Fifteen years ago he first noticed these tumors on his face and neck, and since then they have from time to time appeared on other parts of the body, causing neither pain nor discomfort. These growths were particularly numerous on the face, forehead, neck, trunk. They were fewer in number on the extremities, though as a rule larger in size; several on the left side of the thorax, as well as one over the left patella, ranked among the largest. There were none on the scalp, and, excepting one over the left instep, none below the knees. These tumors were too numerous to count accurately, but I estimated that there were about three hundred. In size they varied from a pin's head to that of a large marble. None were pedunculated; some were oval, some dome-shaped, while others were nipple-like in form. To the touch they were rather soft superficially, but fibrous in their interior. It would appear in this case that the tendency of the lesions was to increase in number, and to any considerable extent in size. It is interesting to note that the mental powers of this individual were decidedly dwarfed. This patient was unwilling to part with any of the growths, and consequently none could be obtained to examine microscopically.

These cases are of decided interest. I have in my mind now a medical man whose face and neck are entirely covered with these fibroid tumors. There is no danger to health from any of the fibromata, with the single exception of the epulis. The tuberous fibroma may be the starting point of epulis. It is simply another form of the fibrous growths, taking its origin from the skin. For the most part, all these

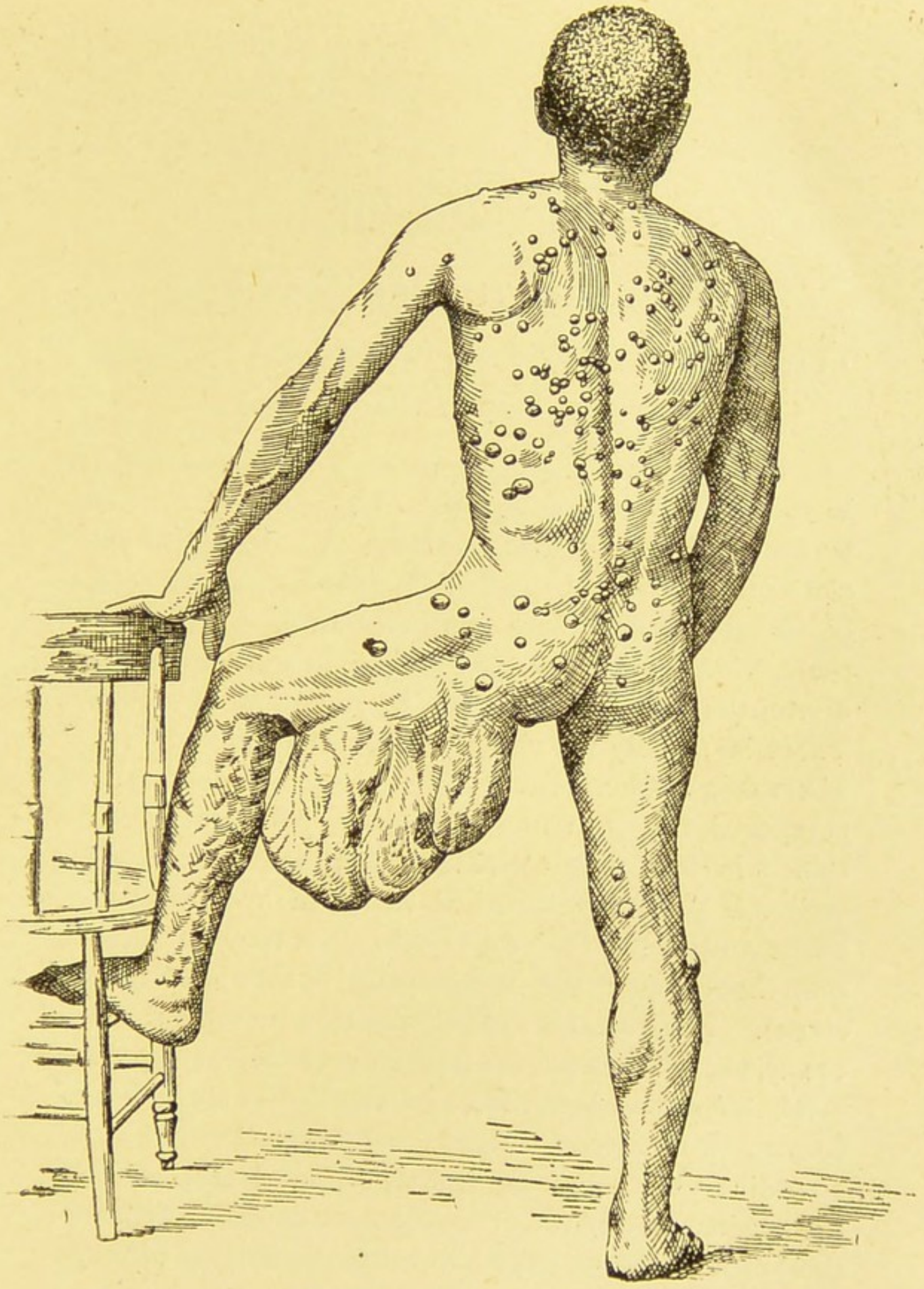
tuberous fibromata are characterized by multiplicity. It is in this class of tumors that the subvariety of tuberous fibroma is found in the fibrous epulis. This is a small tumor situated on the gum, usually springing from the periosteum of the socket of the tooth. If the tooth be not removed, caries follows, and it is first noticed as a little warty excrescence along the side of the tooth. When the surgeon is called, not infrequently it is found that caustics have been applied, and the tumor is removed down to the gum; but its rapid recurrence has created alarm on the part of the patient, and he thinks that perhaps the growth is cancerous. But, recognizing that the tumor springs from the socket of the tooth, it will be readily seen that the removal to the level of the gum does not prevent recurrence. The proper remedy will be to remove the tooth, and scrape out the tumor from the alveolus.

There are numerous forms of fibromata that are called by Virchow "heteroplasia," because they have a tendency to form different structures from that in which they grow. For example, osseous fibromata do not proceed from the connective tissue, but from the medullary membrane, or from the periosteum. The last form is the keloid. This usually occurs after burns, or in cicatrices. Some of you may remember a negro who was a patient in Providence Hospital a year or more ago, with an extensive burn of the neck and side of the shoulder. In every one of the scars

that formed by contraction of the tissues, a small tumor developed. That tumor was the keloid. It is very liable to recur after extirpation. It is non-malignant in character, and should cause the patient no annoyance except to appearance. I have seen a great many of these keloid growths growing from the lobe of the ears after piercing for ear-rings.



FIGS. 3–4.—Photograph of an unusual tumor of the thigh (from a Marine Hospital patient). Front.—[Dr. Glennan.]



The same patient. Back.

LECTURE VII.

PROLIFERATION TUMORS, CONTINUED.

CLASS 4. LIPOMA, MYXOMA, CHONDROMA, ENCHONDROMA, OSTEOID ENCHONDROMA.

By the term *lipoma* we mean a fatty tumor, that is to say, a tumor composed of normal fat. There was once a term used—steatoma—to designate this class of tumors, but they were confounded with sebaceous tumors, and there is a great difference between them. The sebaceous cyst is, as you will remember, a retention tumor. It is due to retention of sebum. There is usually no cholesterin in the fatty tumor—whereas in steatoma there is cholesterin. Lipomata are composed, then, of true fatty tissue. "The fat is contained in cells with membrane surrounding it, which cells are generally identical with the ordinary fatty tissue and contain the fat crystals, but they are larger than the fat of the adipose tissue which they join" (Virchow). They are always proliferation tumors; that is to say, they vegetate from neoplasms. "Every lipoma is lobulated; that is, contains lobules between which are formed the connective tissue and vessels" (Virchow). In ordinary lipoma, a small fatty tumor, the fat greatly predominates over the connective tissue lying between the lobes. But we have several varieties; the fibrous

(for one), where the connective tissue predominates. The lobes are smaller than in the ordinary variety. We may have still another form of lipoma—teleangeiectatic—where there is an increase in the number and size of the blood-vessels. Then we have the "petrified" lipoma—a calcareous degeneration, and an osseous form. Finally, we have the epiploic lipoma, which is lipomatous hernia, so-called, where the epiploon has passed out through the hernial opening, and fatty degeneration or proliferation has commenced. Lipomata are also named from their shape. Thus we have polypoid lipoma; that is where the tumor has a foot stalk connected with the tissue. Then we have the arborescent, arranged like leaves on the branches of a tree. These tumors may extend into the serous and synovial membranes. So much for the normal varieties. We have also the so-called sclerous form, where there is hardening and induration. Sometimes cartilage cells are thrown out and form one of the so-called cartilaginous tumors, part fat and part cartilage. Sometimes it takes on cretaceous degeneration. The outer layer becomes almost as calcareous as a calculus in the bladder. Finally, we have fatty tumors in the parenchyma of the organs. We find them in the liver, in the kidneys, and in the brain. Ordinarily the lipoma is a single tumor, but occasionally you will find a patient who has several tumors in different parts of the body, but they seem to have no connection with each other. Ordinarily,

obesity will possibly degenerate into fatty tumor whenever it projects beyond the body so that the skin is forced out and the fat is no longer in layers, or there is an extra deposition of the fat and it becomes encapsulated—then it is a tumor. But there is this difference; let the patient be put on low diet, starvation diet, if you please, and the fat which is connected with the general circulation, and is deposited in the natural places, will be taken up, and the patient will become less stout, whereas in lipoma no amount of starvation will diminish the size of the growth. As to the progress of the tumor: Inflammation is somewhat rare; it is painless, and its growth is slow. Occasionally, however, from weight and pressure of the clothing, inflammation of adjacent tissues will result. It is usually in mild degree, but occasionally may progress to the formation of pus, ulceration, or even gangrene, from obstruction of the blood-vessels going to the tumor. In the ordinary lipoma, especially where it is in a prominent place, you will find that the skin, if it is rubbed through, causes an ulcer. I have seen a lipoma over the buttock of a young man 22 years of age. There was an opening into it where the skin seemed to have been rubbed through, about the size of a silver dollar, through which the fatty structure could be distinctly seen. It was painless, and through it exuded a serous exudation. That tumor would weigh perhaps 25 pounds, but he was unwilling to let it go, it having been his constant companion for many

years; I could not persuade him to part with it at the time, and I lost sight of him. The treatment of lipoma is extirpation, no remedy having been found that will exercise the slightest influence over its progress or retard its growth. The diseased skin should be removed with it, and every prolongation—every lobule—should be removed, otherwise there may be a recurrence. The next form of tumor is the myxoma, a semi-malignant tumor, to which an asterisk has been affixed in the nomenclature, so that you may know that tumors having that mark are either malignant *per se*, or may become so from situation.

Myxomata are the mucous tumors. They differ from the mucous cysts, for which you might confound them if your attention were not directed to them, in this: The mucous cyst is simply an obstruction of a mucous gland, whereas myxoma is composed strictly of mucous tissue. It is not a cyst, but a vegetative or proliferative tumor. These tumors are all soft and painful. They differ from the fibroma, in that they are composed less of connective tissue than of mucous tissue, and they do not impart that hard feeling that is found in the fibromata. Sometimes we have fluctuation in them; that is, where the mucous glands have been stimulated, secretion increased, and mucus accumulated. The myxomata are very frequent in the eye. We have them in that situation as the "hyaline." They may be seen sometimes in the aqueous humor, and are harmless. I think Virchow terms them het-

erologous; but they are true mucous tissue, although technically heterologous. We term it medullary myxoma where the myxoma starts from the medullary membrane. When a myxoma liquefies, we term it cystoid, because it is like a cyst, although not a true cyst. Whenever the connective tissue predominates over the mucous tissue, it is then termed fibrous myxoma; and when fat globules predominate, it is called lipomatous. When the cartilaginous prevails, it is called cartilaginous myxoma. So it is with the increase of blood vessels, when it is termed teleangeiectatic. Then there is the myxoma peculiar to females. We have a myxoma of the placenta, which was formerly called cavernous mole, and hydatids of the placenta, but is now known as myxoma. The heterologous myxoma may be developed in any organ or tissue of the body. The nerve sheaths are very common sites for myxoma, the neuromatous variety. I have spoken of the fibrous tumor of the nerves, the neuroma, so-called. There is also a myxomatous neuroma composed of mucous structure, which gives rise to as much pain as the fibrous neuroma. The diagnosis of myxoma is always uncertain before removal. It usually requires a microscopical examination to determine the nature of this tumor. Usually it does not recur after extirpation, but occasionally it does, and then it generally assumes the so-called malignant form. The tumor may not be malignant in its incipiency. It may not be malignant in

most of its growth; but sometimes a change in the cells commences and a marked departure in the type of its issue, and then the tendency to destroy life is developed.

Chondroma. There are three varieties of chondroma: The ecchondroma, the enchondroma, and the osteoid enchondroma. The ecchondroma is a tumor arising directly from the cartilage. The enchondroma rises from the connective tissue, the bone, or periosteum. We have the ecchondroma most frequently in the larynx and trachea, springing from the cartilage; if on the internal aspect, they speedily destroy life by obstruction of breathing, unless extirpated. We find it also in the symphysis pubis, where it grows to a great size. Also in the spheno-occipital articulation in the early period of life, springing from the edges of the fontanelle. Death results from perforation of the dura mater. Then we have enchondroma of the intervertebral cartilages, and from the occipital cartilages. We have in the chondroma, as well as the myxoma and lipoma, the so-called heterologous growths. Ecchondroma may also grow directly from the inter-articular cartilage of the joint. In the first year of my practice I had a case of enchondroma on the finger of the right hand of a farmer, who said the swelling was caused by the plow handle. He consulted several practitioners, and a great many diagnoses had been given. I advised the removal of the tumor. On cut-

ting down I found a tough, white, dense, fibro-cartilaginous structure, springing from the periosteum. The patient recovered, and the tumor did not recur. I had recently a case of a private patient in Providence Hospital, where the tumor, about the size of a walnut and distinctly cartilaginous, developed on the right thigh, springing from the fascia lata. The cartilage cells, you remember, are from $\frac{1}{700}$ to $\frac{1}{500}$ inch in diameter. The tumor gave him considerable pain by rubbing against his clothing, and was in the way of his hand when he put it in his pocket. He said he almost invariably struck the tumor. It was removed with some difficulty, owing to its fibrous connective tissue attachments. Enchondroma, or I may say chondromata in general, are generally non-malignant, but they occasionally recur after extirpation. Mussey reported a case some years ago where enchondroma commenced in the hand, which was amputated. It followed in the arm, which was amputated, and finally proceeded to the shoulder of the patient, who lost his life. Syme had a case where the shoulder was amputated for enchondroma of the arm, and it recurred in the stump and in the axilla. Virchow reports a case of enchondroma of the scapula where the tumor was removed seven times, and the patient finally recovered. The remedy for this tumor is extirpation. The next variety is *osteoid chondroma.* This is composed of osteoid tissue, but is more properly classed as an osteo-sar-

coma. There is great vascularity in these osteoid enchondromata, and extirpation is the only remedy. In these tumors, wherever the bone is involved, amputation is the only remedy.

LECTURE VIII.

PROLIFERATION TUMORS, CONTINUED.

OSTEOMA, PSAMMOMA, MELANOMA, MYOMA, NEUROMA, ADENOMA, DERMOID CYST, ANGEIOMA.

Osteoma.—The next variety of tumor is the osteoma, or bone tumor proper. We have, first, the eburnated osteoma, where the bone is harder than normal; it differs from bone in the apparent absence of blood-vessels and cancellous tissue; the bony canals have become obliterated by the hardening process. We have in some cases the cancellous or spongy osteoma, which merely differs from the other bony tissue by being a hyperplasia of the normal cancellous structure, simply an increase of growth. We classify into exostosis, hyperostosis, and osteophytes. Exostosis of the bone is an extra deposition of osseous particles, which grow in an irregular shape. Sometimes the bone becomes one-third larger than normal. Now that is entirely homologous—that is, like the normal bone. We have the heterologous class of osteomata in what are termed osteophytes. That is where the bony structure is developed away from the bone. These osteophytes usually grow from the articular cartilages, cartilage cells being formed with the true bony structure. Sometimes they grow from the connective tissue, but usually

from the cartilage. Rarely we find them growing after a fracture. There is what is termed the bony or ossific diathesis; that is, a tendency to produce bone anywhere. We find it occasionally in chronic rheumatism of the articular variety, and in gout. This form rarely falls under the observation of the surgeon unless it becomes so large as to inconvenience the patient. Odontoma is a term applied to an exostosis composed of dentine growing from the cement of a tooth.

Psammoma, the brain sand-tumor, so-called because it is apparently composed of a granular black substance called brain sand, is found principally in the choroid plexus, and in the dura mater. This black cerebral sand is also found in the lymphatic glands, or complicating other tumors by forming in their substance, and it may occur in various forms. It is now known that these tumors contain spindle cells, and are hence classed among the sarcomata; Woodhead called them "angiolithic sarcomata." Sometimes when they grow very large on the choroid plexus or dura mater, they produce pressure, and then the usual cerebral symptoms will manifest themselves. This is one of the tumors wrongly placed in our classification.

Melanoma. We call this the seventh variety of proliferation tumor. It is the pigment tumor of the meninges. It is to be carefully distinguished from melanotic cancer, which is a pigment encephaloid

(medullary cancer). Now this melanoma, more properly a melanotic sarcoma, occurs primarily in the pia mater, and in the choroid. It occurs also in the fascia, and in the membranes of the spinal cord, and in the nervous centres of the body. In addition to the choroid, we may find it in the iris, in the conjunctiva, and the skin. In fact, melanoma occurs most frequently in those tissues in which pigment is the normal constituent. There is hypertrophy of the pigment glands, and hyperplasia of the pigment cells. When it contains spindle cells we term it melano-sarcoma, and it is then the most malignant of all the sarcomatous growths.

Myoma. This tumor is composed entirely of muscular structure. Both kinds of muscular fibres, the striated and non-striated, enter into it, so that we find it in both the voluntary and the involuntary muscles. When the tumor is composed of striped muscular tissue, it is termed rhabdomyoma, and when of unstriped muscular tissue, it is called leiomyoma. Where there is a great abundance of connective tissue in the myoma, it gives rise to great difficulty in diagnosis between myoma and fibroma. Where thus mixed, the tumor is called myo-fibroma. These tumors are non-malignant, and entirely homologous. They frequently have hæmorrhage as one of their symptoms, due to a rapid growth and to the weight of the tumor. It is a passive hæmorrhage. It also sometimes takes on cystic degeneration, where the tumor is broken

down. We may have the occurrence of teleangeiectasis where the tumor contains an excessive number of anastomosing capillaries or blood vessels. They are sometimes cavernous and sometimes varicose. Carcinoma occasionally takes the place of myoma. The tumor then becomes infiltrated with epithelial cells, and as the disease departs from the normal type by displacement and degeneration of the muscle cells, becomes true carcinoma; so it is scarcely proper always to say to a patient afflicted with myoma that it is non-malignant, as there is a possibility of the carcinomatous substitution. The liability to this substitution is admitted, but on account of that liability, however limited, it is better to give your prognosis with exceeding care. The most common seat of myoma is in the uterus, and in that situation, owing to the greater abundance of connective tissue between the muscle cells, it takes the form of myo-fibroma.

The diagnosis is a matter of considerable difficulty. They are comparatively slow in growth, which distinguishes them from carcinoma. They are comparatively painless; another point where they may be distinguished from malignant tumors, which are generally painful. The diagnosis of this tumor from ovarian cyst, which is also painless, and of slow growth, can only be made by the history of the case, the general symptoms, and conjoined manipulation. In ovarian cyst the swelling will have been first noticed in the iliac fossa—in the majority of cases in

the left iliac fossa. Now, myo-fibroma of the uterus is usually directly in the centre, behind the bladder. Sometimes, if upon the anterior wall of the uterus, there will be great difficulty in retaining the urine in the bladder. A myomatous tumor sometimes becomes affected by cystic degeneration, and then we have fluctuation, so that it will be almost impossible during the life of the patient to make an accurate diagnosis. These tumors frequently project in the cavity of the womb, springing from the tissues of the interior wall (intra-mural). In such cases removal by instrument is practicable. This is best done by enucleation, a process very similar to taking an onion out of its skin. Various enucleators have been invented, the number of which is a very good sign that there is still room for improvement. Professor Thompson has invented a spoon saw. To reach the tumor, the cervix must be dilated until the cavity of the womb can be reached with ease. Dr. Yarrow has an enucleator which is a claw-shaped spoon with a cutting edge. It is passed into the tumor, which is gradually gnawed away. Emmett had one like a thimble, and the operation was done entirely by manipulation with the finger. In case of uterine myoma, where there is great hæmorrhage, and the recurrent periods are characterized by menorrhagia and great ovarian pain, it has sometimes been found necessary to perform Tait's or Battey's operation for removal of the ovary. It is well to bear in mind that menstruation does not im-

mediately cease on removal of the ovary, even when the Fallopian tubes have been removed.

Now, when these myomata are attached to the external wall of the uterus and the connective tissue to such an extent that they gradually crowd out the muscle-cells, and become in time a true fibromata or fibroid of the uterus. The treatment has always been very unsatisfactory. The treatment by electrolysis according to the method of Apostoli is still *sub judice*, but as between that method and the more heroic one of hysterectomy, prudence would indicate first a trial of the former, leaving hysterectomy for the *dernier ressort.*

The next class of tumor is the *Neuroma.* Neuromata are composed entirely of nervous tissue. Now, don't make the mistake of calling the fibrous tumor or fibroma which occurs in the nerve-shaft a neuroma. You should make the broad distinction that the neuroma proper is composed of nervous tissue. In speaking of fibroma I told you that there was a tumor which developed upon the nerve itself which was very painful and essentially a fibroma—that is, fibrous "neuroma" in which the nerve-fibres may be seen unchanged passing through the mass of hypertrophied connective tissue—but it differs absolutely from true neuroma, which is composed entirely of nerve structure. This neuroma occurs most commonly after amputation when the nerve is cut across. The Pension Office records are full of cases where the pen-

sioner is unable to wear an artificial limb on account of the great pain or neuralgia in the stump. This is usually due to enlargement of the nerve from neuritis. Of course it is highly sensitive. There is usually but one available remedy, excision of the neuroma, which will generally cure the patient. Sometimes it may be practicable to divide the nerve above the tumor. These irritable stumps may sometimes be very effectually treated by dividing all the tissues to the end of the bone-stump. Neuromata never recur after removal. Irritable stumps may frequently be prevented by taking care during the amputation to pull the nerve and divide it as high up as practicable.

Neuroma may also be caused by *bruises*. Professor Kleinschmidt had a case in this city a few years ago in which I was called to make an operation, where the supra-orbital nerve had been wounded. A man had been struck by a beer-glass on the supra-orbital nerve, finally resulting in most agonizing recurrent attacks of neuralgia at the seat of the injury. On examination it was found that the eyebrow had been badly torn. A swelling of the size of a lead pencil could be felt in the cicatrix. A longitudinal incision was made at the margin of the orbit, the lid drawn down, and the nerve exposed. It was flattened and spread over a considerable surface, three times its normal size. It was removed as far as possible; the pain disappeared, and has never returned. So far as I know, that is the general course of neuro-

ma proper. Where we have facial *tic*, which is a disease of the dental nerve, sometimes of centric origin, due to ganglionic changes, a resection of that nerve does not cure the patient, because it does not appear that there has been an increase of nerve-tissue at the point where the pain is most acute. It seems to be a longitudinal inflammation of the entire nerve-sheath, so that removal of a section of that nerve, while affording temporary relief, does not cure the disease.

In *tic-douloureux* the removal of a section of the inferior dental nerve will usually cure the patient for five or six months. After that it recurs, though some cases are on record where the patients have been free from pain for two years—but I think the invariable history is that it returns. Lately Mr. Rose, of England, and Professor Andrews, of Chicago, have proposed the excision of the Gasserian ganglion. The operation was successfully performed by Mr. Rose.

Adenoma is a gland tumor—composed of glandular structure. We may find adenoma in any gland of the body, from the pineal down to the lymphatics. It is proper to say, however, that in the gland tumor, or adenoma, there are a variety of mixed forms; adeno-sarcoma, which is produced by the admixture of sarcomatous cells with the gland structure proper; adeno-myxoma, which is a gland tumor with mucous cells intermixed. Under our classification the mucous polypi were classed as adenomata because they were supposed to be a hypertrophy of the mucous glands,

but it is now taught that they are really fibromata. They originate, according to Hamilton, of Aberdeen, "in the fibrous tissues of the mucous membrane, and grow in the direction of least resistance, namely, into the cavity which the mucous membrane lines. It pushes the epithelium in front of it, and insinuates itself between the glands of the membrane." They may grow in any part of the mucous membrane. They are quite soft to the touch; sometimes translucent; sometimes pale or opalescent. This is the ordinary polypus of the nares, the uterus, and the external auditory meatus; as will be seen, it is wrongly placed in the classification. The diagnosis of the adenoma proper is very difficult. It is especially so when the adenoma is in an inguinal gland, when the question whether the disease is due to syphilis or specific infection of some kind will arise. The only means of diagnosis in such cases is the history of the case, and if the patient is inclined to prevaricate, you will be obliged to have recourse to anatomical consideration. Of course it is easy to tell bubo from an antecedent gonorrhœa, or chancre from adenoma. Bubo is above Poupart's ligament, and adenoma is below it. Differential diagnosis between adenoma and cancer is very important and very difficult. So far as the patient is concerned, the remedy will usually be the same—extirpation. But it is a great thing to be able to tell the patient that the disease is non-malignant. Now, in adenoma of the mammary gland you should always

treat it like cancer, for fear of carcinomatous proliferation.

There is another variety of adenoma, known as *molluscum contagiosum*, so-called because it was formerly believed to be contagious. It is a homologous epidermic growth. It is situated in the gland adjacent to the hair follicle, and is sometimes called epithelial molluscum, because it is situated in the sebaceous glands. Virchow states that this tumor does not show the fatty glands or oil globules, found in sebaceous tumors. Owing to the great number and variety of the mollusca, extirpation is hardly worth considering, as they involve so great an extent of surface. They are precisely like molluscum fibrosum, so far as distribution over the body is concerned. It is now believed that the former growth is due to a micro-organism.

Dermoid Cyst. This is not a true cyst, because it is not due to damming up of any duct. These cysts contain sebum, the cells of epidermis—that is, pavement epithelium—and the walls of the cyst are usually like true skin. Sometimes these tumors contain hairs, sweat-glands, teeth, etc., and the products of these glands are retained in the cysts, and add to their size and keep the growths constantly increasing. The hair found in these cysts is sometimes very long and in great bunches. This is produced by the hair follicles found in the cyst wall. Teeth are sometimes found in them, encased in bone. Sometimes the

teeth are loose. The reason why it has been classed as a proliferating tumor is because of the growth of these dermoid appendages. It is nearly always congenital, but it was formerly supposed that the dermoid cyst was due to an undeveloped fœtus. This is disproved by very many things, one of which is that as many as one hundred teeth have been found in one cyst—enough teeth for a great many fœtuses. It is usually found in the ovaries, and the treatment is the same as for other ovarian cysts; it has also been found in the orbit of the eye, in the testicle, and in the mouth.

Angeioma is a tumor composed mainly of newly-formed blood-vessels, or of blood-vessels with newly-formed elements in their walls. We have the simple angeioma, the cavernous, venous, arterial, and mucous. The names will give you an indication of the pathology of that form of tumor. Simple angeioma is an enlargement of all the blood-vessels of the part constituting the tumor. Cavernous angeioma is applied to that form where the vessels are greatly dilated, the form usually taken on by nævus, or mother's mark. The sub-varieties of cavernous are arterial, venous, and mucous. The simple angeioma is a vascular tumor, from which comes the term Teleangiectasis. The common seat of the angeioma is the face and neck. You may often see patients on the street with the simple variety, the growth spreading over the entire cheek, or any part of the skin of the face. They

are best treated by subcutaneous ligation. They are also treated by cauterization and by electrolysis. Angeiomata are occasionally coëxistent with sarcoma. A sailor came to me Feb. 22d, 1877, having an immense angeioma directly between the shoulders, over the spine. It projected considerably beyond the surface, and was congenital, but lately had given him some pain by reason of its increased size. I passed a needle directly through it, with a double ligature, in one direction, and another at right angles, also armed with a double ligature. The ends were then cut, and the tumor tied in four sections. It came off in a few days, the cicatrix healed, and the man apparently recovered. After I left the station I was informed that the man returned in a few weeks with an immense sarcomatous growth in the axilla, of which he finally died, so that the prognosis after removal of this tumor is not always favorable.

The cutaneous nævi on the face and other parts are best removed by the red-hot needle thrust into them subcutaneously, cauterizing with the galvanic needle from an 8- or 10-cell battery. When the eschar is formed by the cautery, you must allow it to become perfectly hard and dry. Electrolysis is a favorite method of treatment. The operation is performed as follows:* "One or more steel, platinum, or irido-platinum needles are connected with the negative

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* Shoemaker, Diseases of Skin, p. 48. 1st ed. 1888.

pole of the battery, and, if the nævus be large, one needle or a charcoal point with the positive pole; both needles are introduced at the same time into the growth, and allowed to remain in the tissue for a few moments until gas bubbles ascend through the orifice, a clot forms, and the spot assumes a blueish-white color. The negative needle is first removed. The current being reversed, the positive becomes the negative needle, and is easily removed."

The still more superficial forms are often treated by subcutaneous ligation, the knot known by the English surgeons as Ferguson's being that usually employed.

Then there is the linear scarification; done by making lines of scarification in one direction, and then crossing them at right angles. Then there is the puncture. A number of needle-points are thrust directly into these surfaces. Sometimes vaccination has been used to destroy these tumors where the patient has not been vaccinated. The virus is inserted directly into the angeioma, and a cure is said to result.

LECTURE IX.

PROLIFERATION TUMORS, CONTINUED.

PAPILLOMA, GLIOMA.

Continuing the subject of proliferation tumors, I will speak of the *papilloma*, which is the 15th in order of the 4th class:

a. Wart.
b. Mucous tubercle.
c. Condylomata.
d. Urethral caruncle.

The papilloma consists of hypertrophied and branched papillæ, and always occurs in one of the three surfaces, cutaneous, mucous, or serous. The first one of this variety is the common wart—the so-called verruca vulgaris, which is simply an enlargement of the papilla. There are various forms of them, such as the verruca senilis, which is the wart of the old people, usually situated on the back, and highly pigmented; verruca filiformis, a very small filiform wart, $\frac{1}{8}$ to $\frac{1}{2}$ inch in length, painless, and looking much like a piece of thread projecting from the skin, and which can sometimes scarcely be detected except by attempting to pull it off; a flat form called verruca plana; moist warts, from which a constant secretion is produced. The cause of the wart is not known. Virchow states that anatomy bears out the statement

that it is simply an enlargement of the papilla. Sometimes they disappear spontaneously. This fact is taken advantage of by charlatans and so-called "cancer doctors;" all forms of warts being called cancers, and subjected to all sorts of cauterizations, and among the negroes to Voudooism. The child's remedy of a pencil mark around the growth, ointments, and a variety of applications are in popular repute as wart cures. Some are amusing, and a recital of them would make an interesting chapter. Warts may be treated by snipping them off with scissors, or cauterizing with nitric acid. The mucous tubercle is another form of papilloma, being an enlargement of the mucous papilla. Sometimes it takes on softening and general cystic degeneration, and in that way the duct becomes obstructed, and we have a mucous cyst resulting from an originally verrucous growth.

The *condyloma* is a form that is deserving of considerably more attention. There is a general predisposition to the formation of papillary growths in the inter-natal fold, in the groin, and in fleshy females where the mammary glands hang over the chest, and anywhere where mucous or cutaneous surfaces rub against each other. The condyloma appears not only from natural causes, but is frequently and usually due to a specific cause. We find it on the glans penis and the corona glandis. There is a considerable secretion flowing from them, which is highly

odoriferous and disagreeable. There is great irritation when it is situated in the glans penis, or concealed beneath the prepuce, and there may be pain, not directly from the condyloma itself, but from the irritation caused to the prepuce and gland. When concealed, it may be mistaken for gonorrhœa or a concealed ulcer. The operation for phimosis will reveal at once the cause of the difficulty; or by using a pair of forceps, as a speculum, the prepuce may be separated so that the growth may be seen. The treatment is excision with the knife or cautery, or, as I prefer, the actual cautery, or fuming nitric acid. The next form is *urethral caruncle.* When this is large, it constitutes a very serious affection. It consists of enlarged papillæ situated at the meatus urinarius of the female, and sometimes entirely within the urethra. Anatomically these structures are found to be very richly endowed with nerve filaments and blood-vessels, on account of which they are very painful and bleed very freely. Not only that, but they sometimes form a considerable obstruction to the flow of urine, making urination painful. Cases are recorded where the caruncle has attained the size of a goose-egg, though ordinarily they are the size of a pea. When they are found in the urethral canal, instead of the margin of the meatus, they give rise to greater obstruction to the flow of urine, and necessitate the passage of the catheter; a very painful operation.

The prognosis is good if single, but if multiple

they produce persistent neuralgia of the membranes, so that the removal of the caruncle does not stop the pain, and you must give a guarded prognosis in such cases.

Treatment: To remove them, you may use the ordinary polypus snare, or excise them by scissors, or use the thermo-cautery. If situated in the canal, it will be necessary to dilate the urethra and apply a stick of nitrate of silver or fuming nitric acid, by means of a glass rod, to the stump of the tumor. For the persistent neuralgia following these carunculi, forcible dilatation of the urethra is the best remedy.

**Glioma.* Following the nomenclature, I shall fix to glioma an asterisk to denote that it is malignant. As its etymology would indicate, it is a gelatinous tumor. Virchow gave the name to this tumor, which comes from the gelatinous substance between the nerve proper and the connective tissue of the nerve; the gelatinous substance of Rolando. This, you will remember, differs from the neuroglia proper (the connective tissue of the spinal cord). The tumor is found most frequently on the retina and choroid. Williams states it is the only tumor of the retina; but other forms of sarcomata are frequently found among the intra-ocular tumors. It is highly malignant, and invariably destroys life. An operation may prolong but does not save life. It was formerly termed encephaloid, but, as I shall show you in speaking of encephaloid, there is a very marked and wide differ-

ence between glioma and encephaloid. Occasionally we have glioma of the mucous surfaces, or springing from the nerve; again, we have them intermixed with mucous structure—myxo-gliomata. Gliomata on the serous surfaces, the arachnoid for example, are harder than these, which are always soft. The former approach to the fibroma, and are sometimes called from that circumstance fibro-glioma. It is now claimed that the glioma is a variety of the round-celled sarcoma—the view adopted by the most recent pathologists. It is, I may say, a disease almost entirely of early life, very seldom occurring in the adult, and in this respect markedly different from ordinary sarcoma. Sometimes the gliomata have branching, spider-like cells, called Dieter's cells. These tumors may take on calcareous or fatty degeneration. On looking into the pupil of a child affected with glioma, we find a white, glistening appearance, sometimes called the "cat's eye." There is great tension and great pain. Sometimes after the eye has been enucleated we find that the disease has extended along the optic nerve and into the substance of the brain; occasionally it breaks out afresh, extending to the soft structures in the orbit. In the *American Journal of Medical Sciences* for October, 1884, I find a case reported by my friend Dr. Dickey, of Wheeling, which is so typical that I shall take up your time by reading it:

Virginia ———, a bright, attractive child of very fair and beautiful complexion, when two years old

was found to be entirely blind in the left eye. The pupil was widely dilated, and through it shone a satiny, lemon-colored reflex. There was some ptosis and convergent strabismus. None of the vessels were congested, nor had there ever been any evidence of pain. The growth was probably congenital, for shortly after birth the child's aunt had noticed something peculiar about the eye, and in a picture taken at three months can be observed a slight degree of ptosis and deflection inward and upward.

The little patient was examined by several prominent surgeons and oculists of Philadelphia, where the family then lived, and enucleation was advised. The operation was performed successfully a few months later, and there was never any recurrence in the left eye. Six months afterward vision began to fail in the right eye, and the child was taken to Philadelphia—the family having removed to this city in the meantime—but an ophthalmoscopic examination revealed nothing but a slightly congested condition of the retina. In the following fall vision had entirely failed, the ball being constantly turned upward in a vain effort to see. The pupil gradually became dilated, and the same salmon-colored reflex could be observed that had been noticed in the other eye. The tumor gradually grew until it could be easily seen in a good light at the distance of several feet. It appeared to be lobular in form, and tortuous vessels traversed its surface. These were plainly visible as the refracting media retained their transparency. The pupil became dilated *ad maximum*, tension increased, the scleral vessels were congested, and attacks of sharp pain became frequent. An operation was deemed advisable, and on January 15th, with Dr. R. W. Hazlett and Dr. E. L. Hoge, I removed the

globe. We found the optic nerve considerably thickened, and resected it as far back as possible, removing some of the orbital cellular tissue about the nerve. We made a microscopical examination of the eye, and found the sclerotic coat near the ciliary region very thin and almost ready to burst. The vitreous humor had degenerated into a dirty, watery fluid full of floating specks of caseous matter. On the back wall of the eye, with the papilla as a centre, was a tumor the size and shape of a Lima bean. The specimen was sent to Dr. Knapp, of New York, who kindly examined it microscopically, and reported that it was a well characterized glioma of the retina, spreading to the surrounding choroid by a cake-like transition.

There was a speedy recovery from the operation, but on March 1st, about six weeks after the enucleation, the tumor re-appeared in the right orbit, and grew rapidly, pushing out between the lids. It assumed a cylindrical form, and extended from the orbit about six inches, with a circumference of about nine inches. The tumor was covered with the stretched integument of the lids out to the end, where it presented a rough, fungous, bleeding surface, which eventually became quite offensive, having the heavy, peculiar odor of an open cancer. The growth hung downward by its own weight, projecting so far as to make it difficult for the little sufferer to drink from a cup, and pressing upon the nose until the right nostril was occluded, and the left considerably obstructed. The cervical glands became very much enlarged, especially on the affected side, and the inguinal glands of both sides were indurated. Several metastatic tumors formed on the head, the first one, which appeared in the lambdoidal portion of the occipital bone, attaining the size of a hen's egg. The other tumors,

ranging in size from a hazel nut to an English walnut, were on the parietal bones. They were quite hard, and were probably caused by metastases in the diploë, as described in Case 1, and illustrated in Figures 10, 11, and 12, in Knapp's work on Intra-ocular Tumors.

The patient gradually grew weaker, finally becoming greatly emaciated, and died of exhaustion, July 25th, 1884, four years and three months old, about a year and a half after the first enucleation, and about six months after the second. She retained full consciousness to the last. There was entire absence of cerebral symptoms through the whole course of disease. The child was an unusually intelligent one, and at no time was there perceptible dullness of intellect. A *post-mortem* examination could not be obtained.

I read this case in detail, because it gives you a better idea of the growth and progress of glioma than hours of lecturing on obscure conditions of that kind.

LECTURE X.

PROLIFERATION TUMORS, CONTINUED—GRANULATION TUMORS.

TUMORS DUE TO INFECTIVE MICRO-ORGANISMS; LUPUS, GUMMA, LEPRA ARABUM, YAWS, GLANDERS, LYMPHOMA.

Granulation tumors—the 15th variety of class 4—are all due to micro-organisms. First there is simple granulation; then lupus; then gumma; lepra Arabum; yaws; farcy or glanders; and tubercle proper—that is, granulation tubercle. This form of tumor is characterized by a tendency to formation of granulations, having, however, great affinity to the sarcomatous tumors. They are by some included among the round-celled sarcomata. Virchow, who gave their name, admits the great difficulty in distinguishing them from sarcomata. They are characterized by inflammatory action, and differ from the ordinary products of inflammation by infectivity, and a failure to complete the process of repair. They should be classed among the microbic diseases. They are wrongly placed among the proliferation tumors in our nomenclature.

Lupus, as the name would indicate, is a corroding tumor—an eating tumor—from "lupus," a wolf. We find it, however, in two forms—"exedens" and

non-exedens. The lupus non-exedens sometimes cicatrizes and heals spontaneously, but the other variety does not. Friedländer, in 1874, first suggested that lupus was a tubercular disease, and Koch subsequently (1882) demonstrated the tubercle bacilli in some specimens. It is, therefore, a tuberculosis of the skin. Its frequent seat is the nose; commencing at the external opening of the nasal duct, it extends down the side of the nose into the interior nasal passages, destroying the entire nose, lips, eyelids, and the soft tissues of the face. I remember an old physisician who lived a short distance from my boyhood home. I remember how all the children ran away when he came on the scene. Although the disease had then ceased to progress, he presented an appearance not only disgusting, but horrifying. His lips, nose, and eyelids were gone, and the mouth was simply a ghastly opening, from which the saliva flowed, dribbling over the deformed chin, and the lachrymal secretion went dribbling down over the front of the raw face. His teeth were still left, the gums sound, and by his teeth he was able to retain a handkerchief to catch the salivary flow; and so he walked about for many years. Finally, secondary lymphatic infection of a malignant form intervened and destroyed his life. Lupus does not always destroy life; sometimes, instead of occurring on the face, as in the case I have just described, it occurs on the hand, or it may be on any portion of the skin. It

closely resembles syphilis, and in the form of "*Lupus syphilitica*," which is really syphilis, the two may be confused and the syphilis be treated for lupus; it is very painful. It may be mistaken for epithelial cancer, and, if the disease is not recognized and properly treated, will destroy life.

The treatment for lupus is the actual cautery or fuming nitric acid, to destroy the granulations and the specific character of the ulcer; or by any of the more common forms of caustic, one of the best being pure bromine, mopping it on the diseased tissue. Bromine is said to almost certainly arrest the progress of the disease. Mercury as an internal remedy may be administered in combination with iodide of potassium, or in the form of protiodide of mercury, or corrosive chloride. Treatment by injection of "tuberculin" has proved a failure. I have seen the most marked changes occur in the lupus ulcer after the injection of the "tuberculin," but at the date of revising this proof I have not seen *any* case of recovery from its use.

Gumma. This is not malignant, and is amenable to treatment, so much so that medication alone usually suffices. It is a soft, fluctuating tumor, due to the bacillus of syphilis. It is rather a circumscribed degenerative change than a new growth. The gumma may be found on the periosteum of the long bones, and in the soft tissues. The brain, the liver, and the spleen and the kidney are not infrequent seats of

gummata. When the gummy tumor springs from the periosteum, you will generally find that the patient complains of nocturnal pains, and that the general symptoms of periostitis are present.

The treatment consists in the external use of iodine ointment and "mixed" treatment internally.

Lepra Arabum. This "leprosy of the Arabs" is also called elephantiasis Græcorum, but it differs from the fibrous elephantiasis already described; first, as to its inoculability; and second, as to its anatomy. Some claim that it is not inoculable, but the lepra Arabum, or true leprosy, is in its nature essentially contagious, being caused by an infective organism. There is a tendency to ulceration. From time immemorial the leper has been excluded from the society of his fellows, and most recent investigators have decided that the segregation of the leper is a necessary precaution. The report of the health officer of the Kingdom of Hawaii shows that there are two islands set apart for lepers—one for leprosy which has not proceeded to ulceration, and one for lepers who have reached the ulcerative stage. On reading the report I was struck, in the first place, by the extreme care with which a home is provided for that unfortunate class of people, and the great desire to prevent, if possible, the further spread of the disease. In Norway; in Maracaibo, Venezuela; and in Havana, Cuba, there are special institutions for the treatment of lepers; there is also a leper settlement in New Brunswick. A few cases were reported in

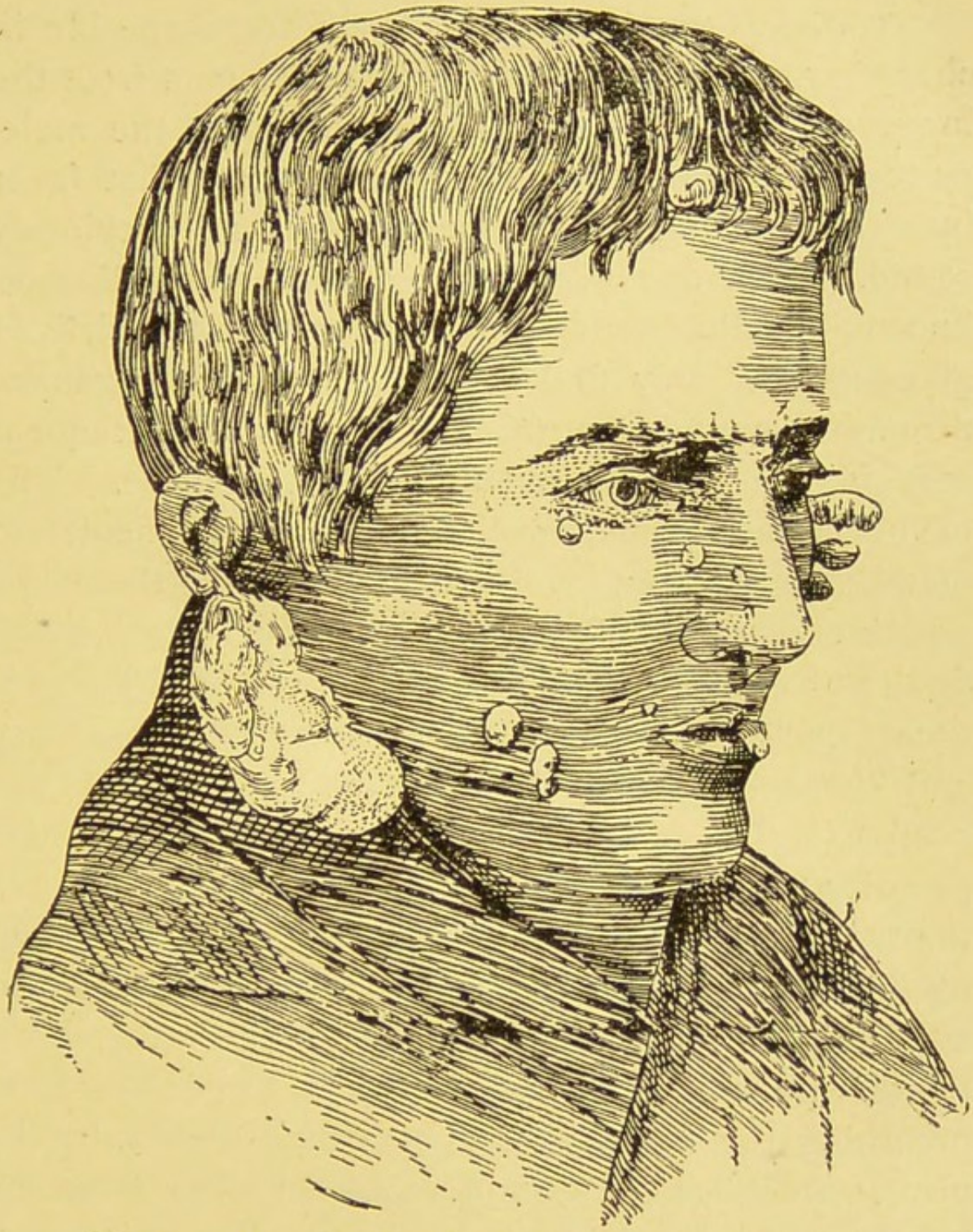
Louisiana, and some in Minnesota, mainly among the Norwegians, who probably brought the disease with them. It has not been known to develop or materially spread in this country, but in New Brunswick I believe the disease is spreading; it certainly is in Norway; and in the Hawaiian Islands the leper population is believed to be increasing. The bacillus of leprosy demonstrated by Dr. Arman Hansen, of Bergen, in 1873, resembles that of tubercle; these bacilli are very numerous. Unna states that an examination of one of the leprous tubercles shows that almost the larger half of the tissue consists of bacilli and their products. Leprosy is incurable at present, although much is hoped from the new studies in bacteriology.

Symptoms: There is sometimes pain present, and in the beginning there is usually hyperæsthesia of the part. The swollen tubercles are quite painful, but as the disease progresses, the nerves are impinged upon so that they are not capable of transmitting secretion. Then anæsthesia follows. I have twice visited the Leper Hospital in Havana, and made careful inspections of the inmates. All varieties and stages of the affection may be seen at this hospital; cases where the patients are totally blind from destructive ulceration of the eyes, those without fingers and toes, and those with tuberculated faces are most common. The series of photographs sent the Marine Hospital Bureau by the U. S. Consul at Maracaibo are most interesting. Leprosy is slower in its course than syphilis.

A leper may live for years, but when the disease progresses to ulceration, if not before, there is fever, which is persistent, and daily exacerbations.

Treatment: The general treatment is most unsatisfactory. The Chinese remedy is the Hoang Nan. Analgesin for the febrile symptoms is said to have been administered with good effect. Then we have Chaulmoogra oil, and the Gurjun-wood oil. The Hoang Nan is the bark of a tree of the Strychnos family, and is said to owe its curative property to the strychnine and brucine, in small quantities, which it contains. Of course, such patients should be promptly isolated.

Yaws, also called framboœsia, is a disease of the West Indies and tropical islands, and endemic in the mountains of Peru. It is also known as Peruvian *verruga*. The disease has a febrile stage and an eruptive stage. When the eruption appears, the tumor grows until it reaches the size of a raspberry; some remain about the size of a currant. The accompanying illustration from Dr. Nielly's *Éléments de Pathologie Exotique* shows very clearly the appearance of these eruptive growths. Yaws also grows in the cutaneous folds, in the wrinkles of the neck, axilla, groin, and in those places in which condylomata appear. It first occurs in small, reddish spots, which are hæmorrhagic; they enlarge, and finally ulcerate. The disease is contagious, and the exudation from it inoculable. It is, however, amenable to treatment.



Treatment: In the first place the tumors should be excised or cauterized, and the febrile symptoms controlled by appropriate medication. In Peru descent from the mountain is insisted upon, and general tonics are administered.

Glanders or Farcy. This is a disease specific in character, which may be transmitted to man from the lower animals, most frequently the horse, the mule, or the ass. Man himself may reciprocate that favor by retransmitting the disease to an animal previously sound. It is one of the most contagious diseases known, but Professor Senn asserts that the virus of glanders can only find entrance into the organism through a wounded surface. It has its most frequent seat in the mucous membrane of the nose. The membranes become swollen, and the Schneiderian membrane becomes involved; after a while there is a nodular eruption of the skin, "farcy buds," which finally ulcerate; and high fever is present. There is great swelling of the glands, generally the axillary and those of the neck and ears. The bowels are costive, and there is general *malaise.* The bacillus peculiar to glanders is called the *bacillus Mallei.* In the treatment of these cases great care must be taken to prevent the disease being carried to yourself and attendants. The period of incubation is very short, the disease setting in actively two or three days after breathing the contaminated air or inoculation by the virus. Pustules are seen in about ten days after the beginning of the disease. When the disease is external, and the internal organs are not involved, the patient may recover, but glanders is one of the most fatal maladies. It has been noted that the glands are swollen and sometimes change the same as in

oriental plague, which causes a swelling of all the glands of the body, and hence has been termed bubonic plague.

Treatment: The treatment of glanders has been very unsatisfactory, and death generally takes place in from one to three weeks. Of course, if called to such a case, the most active local disinfection should be practiced. From the beginning the mercuric bichloride solution should be mopped upon the nasal membrane, the glands themselves being injected with a dilute solution of carbolic acid or bromine. The attendants and surgeon should have their hands carefully oiled, and every precaution taken so far as quarantining the patient is concerned. Treat the case as you would when there is an asthenic tendency requiring quinine and tonics, basing your highest faith on local disinfection.

**Lymphoma.* This is the lymphatic tissue tumor, and usually malignant. These are neoplasms of the connective tissue. Now, this tissue is found in every tissue of the lymphatic glands, and also in the Malpighian corpuscles of the spleen, in Peyer's patches, the glands of Lieberkühn, the thymus gland, and the glands of the pharynx. You will see, then, that the lymphatic system is composed of glands and lacunæ, or "lymph spaces" and fibrillæ; these last are the connective tissue of the lymphatics. The fibrillæ form a net-work, and between the meshes of the net-work are the so-called corpuscles. Lymphoma would seem

to be a hyperplasia or outgrowth, or proliferation of normal lymphatic tissue. In that peculiar disease known as Hodgkin's, the lymphatic glands throughout the body are infected. Lymphomata are usually non-malignant, but epithelial cells are sometimes infiltrated from the adjoining tissue, and the more rapidly they proliferate, the more malignant the tumor. Sometimes they are simple hyperplasiæ—non-malignant. It should be remembered that there is some variation in lymph tissue structure in health, but when the cells are atypical then they become malignant. The cells are like those of small round celled sarcoma. Lymphoma of the mammary gland is as fatal as any carcinoma. In Hodgkin's disease the spleen is found to be diseased in four-fifths of the cases. The Hodgkin's disease has been termed by Mr. Paget lymphatic adenoma; but as it is a specific disease, it is very doubtful if it should be included in lymphoma proper. Simple lymphoma is very difficult to diagnosticate from adenoma. Owing to the character of the cells and the stroma, some consider it a sarcoma of the lymphatics, and others term one variety of it lymph-sarcoma.

LECTURE XI.

PROLIFERATION TUMORS, CONTINUED.

SARCOMA.

Sarcoma. The disease known as sarcoma is one of the most important of the tumors, whether we consider its variety of forms, its effects on the patient, or the attention that must be given by the surgeon. Among the older writers, nearly all malignant and fleshy tumors of whatever character were included among the sarcomata, and I am not sure but you may conclude, when considering the number of tumors that, having separate names, are yet classed among them, I am fast returning to the ancient practice. This tumor is generally, but not always, malignant. The initial growth of the sarcoma is from the connective tissue, in whatever organ or tissue the tumor may be found; but there is a cellular structure in the sarcoma in addition to the type cell of the matrix from which it sprung. The cells are infiltrated between the fibrillæ of the connective tissue. The starting point may be normal connective tissue, or that of another tumor, such as myoma, fibroma, or cyst. The sarcoma springing from the connective tissue then becomes a myo-sarcoma, a fibro-sarcoma, or a cysto-sarcoma; and that is what is meant by the sarcomatous transformation. The cells of a sarcoma are the formative

cells of connective tissue, but they never complete the formation; hence they are termed embryonic. This holds true of all varieties of sarcomata; and these embryonic cells are constantly reproduced in the proliferation growth of the tumor. There are three broad varieties of sarcomata. The first has a simple or round cell, and is the most malignant; the next has the so-called giant cell; and the remaining one the spindle cell. The giant cells have also been termed myeloid, because they are like the protoplasms found in the marrow of fœtal bones. They are the largest of all human cells. They sometimes have hundreds of these nucleated cells; these may have a great many nuclei. The sarcomata are very vascular. There is a variety of sarcoma, characterized by an excessive development of blood vessels, called angeio-sarcoma, or erectile sarcoma. Sometimes fat cells grow out of the other cells, producing fatty degeneration, which is more apt to take place in spindle than in round or giant-cell sarcoma. It differs in malignity in the character of the cell, the round cell being more, the spindle cell less, and the giant cell least malignant. It has a progressive tendency and, if allowed to remain, and neither fatty nor calcareous degeneration occurs, it destroys life. The method of recurrence of this tumor, after extirpation, constitutes one of the observed differences between it and carcinoma. A cancer, when removed, recurs, but not necessarily on the site of the old tumor; whereas

sarcoma recurs nearly always in the exact site of the original tumor. In carcinoma it is more apt to occur in what is termed the secondary form, by making its appearance in some of the internal organs, the nearest lymphatic gland, or even some point quite removed from the original infection. The lymphatic glands are not always affected, except those in the path of circulation from the tumor to the center of the lymph system; there is no "cancer juice." The sarcomatous cells also form continuous portions of tissue; whereas in carcinoma the reverse of all this occurs. There is

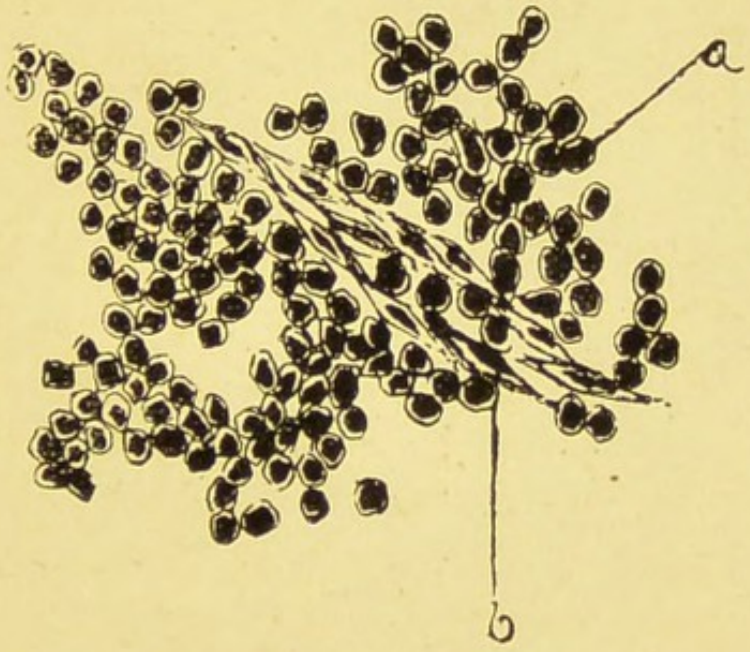


FIG. 6.—Small round-celled sarcoma. (x 300, after Woodhead).

a. Small round cells, with nuclei and nucleoli.

b. Flattened spindle cells forming walls of embryonic blood vessels.

great pain; the lymphatic glands are affected; and there is "cancer juice." The cells do not form part

of the tissue. There is a difference in the malignancy of sarcoma, according to its site. Sarcoma of the testicles, for some unknown reason, is more liable to destroy life than sarcoma of the ovary; why this should be, is not understood. Then we have sarcoma of the hand, which will surely destroy life unless amputation is performed. A medical officer of the army called upon me some years ago, having a diffuse swelling or thickening of the hand. It showed more

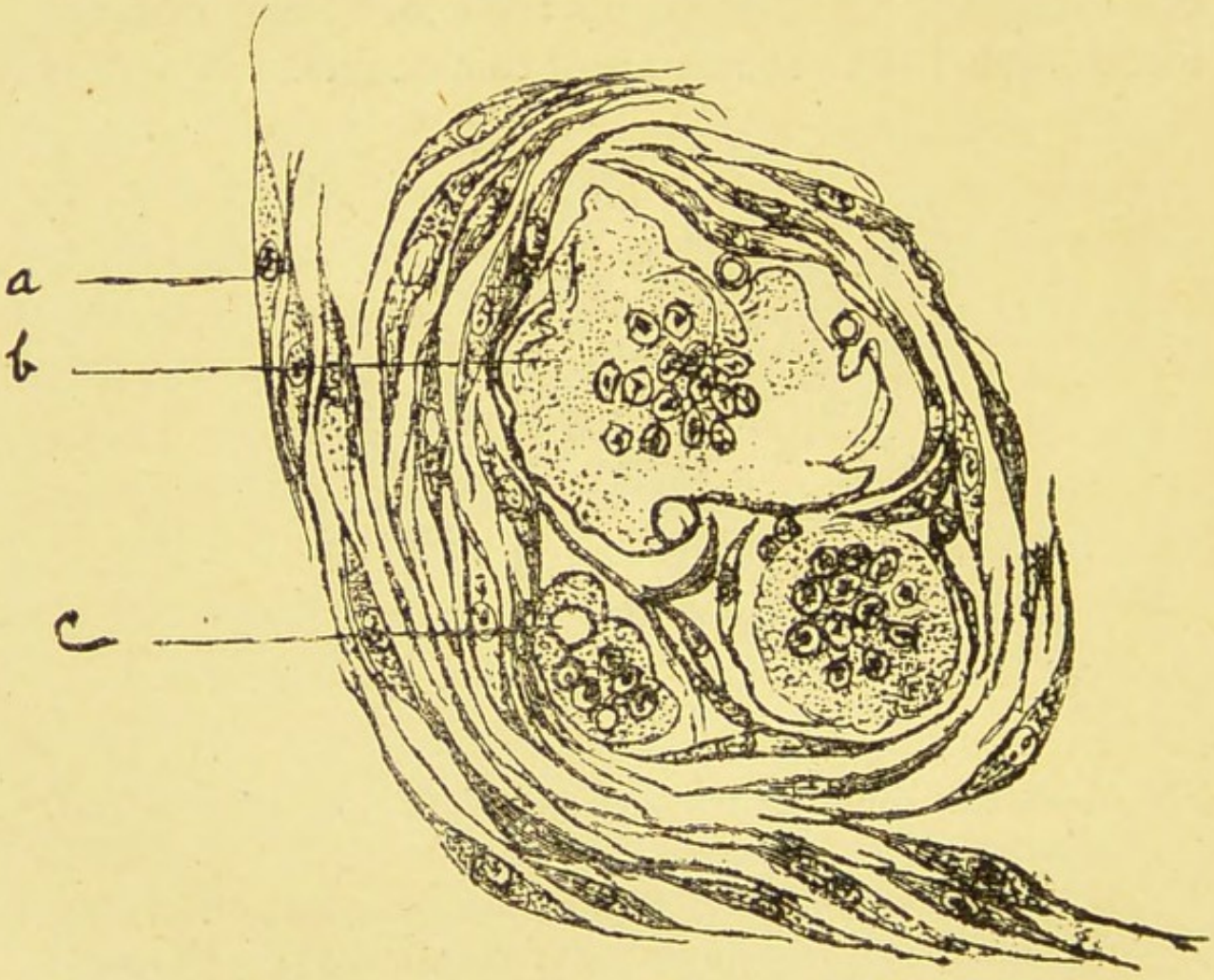


FIG. 7.—Giant-cell sarcoma (x 400, after D. J. Hamilton.)

a. Spindle-cell basis round the giant-cell.

b. Giant cell, containing many nuclei.

c. Vacuole in a giant cell.

externally than in the palm. It was discolored, but painless, and I regarded it as not carcinomatous. A puncture was made, and some of the fluid which flowed out was submitted by the officer to the late Surgeon Woodward for microscopical examination. He found

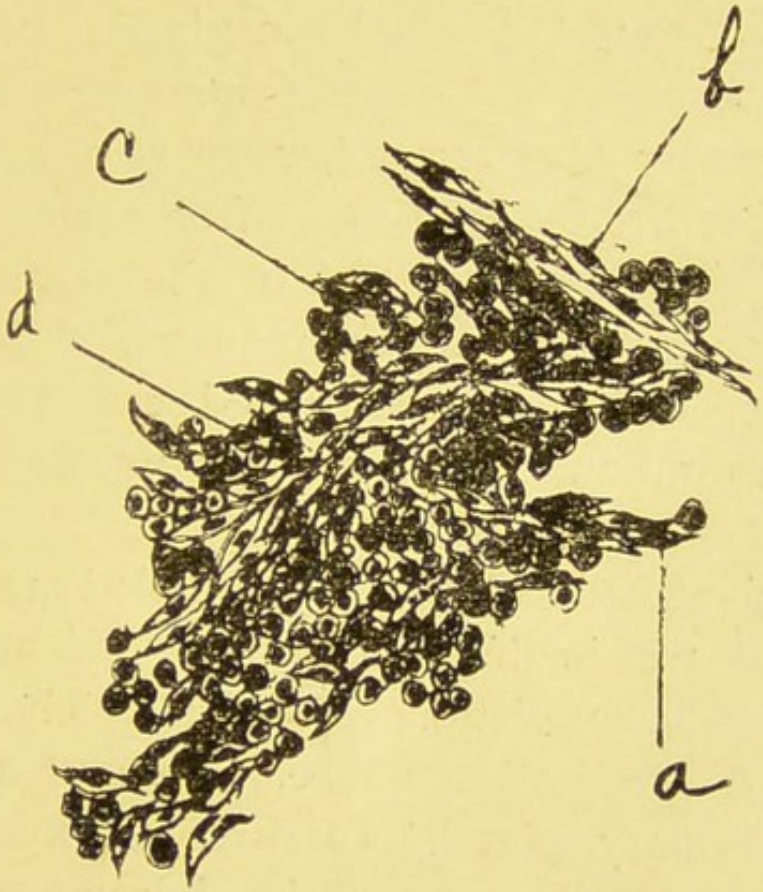


FIG. 8.—Small spindle-celled sarcoma. (x 300, after Woodhead.)

a. Well formed spindle cells.

b. Elongated spindles bounding one of the blood vessels.

c. Embryonic blood vessel cut transversely.

d. Transverse section of spindle cell. (This transverse section with the section of the nucleus must not be mistaken for the round cell.)

the round-celled sarcoma. The patient was then on leave of absence, and died about four months thereafter. The swelling was not at that time very great, and there was no pain.

There is a melanotic or pigment sarcoma, having its seat mostly in the skin, and in the choroid of the eye—sometimes in the lymphatic glands, but it may be found elsewhere. A case of melanotic cysto-sarcoma was under my care a few years ago, in which the tumor recurred three times after extirpation. In this case the mammary gland of the right side was alone affected, and the tumor recurred at the site of operation. The patient finally died with all the symptoms of general anæmia accompanying the cancerous cachexia.

The giant-cell sarcoma, or so-called myeloid, has its common seat in the bone, although it may appear in the mammary gland. There is a characteristic difference between all the sarcomata and adenomata of the mammary gland. In sarcoma, upon section the cut surface will present little pink vascular points of different shades of color, which afford a pretty ready coarse means of distinguishing sarcoma from adenoma by the eye, for in adenoma, on the contrary, there is only the usual appearance of glandular structure.

The following table from Woodhead will be useful to you in making your comparison between sarcoma and carcinoma:

DIFFERENTIAL DIAGNOSIS (FROM WOODHEAD).

	SARCOMA.	CARCINOMA.
1. Origin	Entirely mesoblastic.	Meso- and epi- or hypo-blastastic.
2. Stroma	Intercelluar. Does not form alveoli only.	Forms alveoli, which communicate with one another, and surround masses of cells.
3. Cells	Granulation tissue or embryonic cells, not epithelial (shape various).	Epithelial, shape and size various. Distinct nuclei and nucleoli.
4. Intercellular substance.	Present.	Absent, or merely fluid.
5. Vessels	Embryonic in character. In contact with the special cells of which tumor is composed, and formed by modification of them.	Well developed, entirely contained in the walls of the alveoli. Not in contact with the cells, except in very rare cases.
6. Spread	By blood-vessels.	By lymphatics, except in the later stages, when they may also spread by blood-vessels and then very rapidly.
7. Malignancy.	Great.	Greater.

Treatment: Whenever possible, it should be extirpated early. You must not allow your patient to take any chance as to the malignancy of the disease,

bearing in mind that unless fatty degeneration, calcification, or ossification occurs, the disease will steadily progress, and the life of the patient be destroyed. When the bone is involved, constituting osseous sarcoma, amputation will almost invariably be required. In regard to amputation, the rule is to amputate the whole bone involved, or the tumor will reappear in the stump. Careful examinations should be frequently made after operation, and on the appearance of any neoplasm it should be promptly extirpated, passing the knife in healthy tissues.

LECTURE XII.

PROLIFERATION TUMORS, CONTINUED.

CARCINOMA.

I have long been of opinion that the true origin of carcinoma must be found through a study of cases in their incipiency. We usually see carcinoma after it is fully developed, but I firmly believe that some one having leisure and opportunity will make examination of a sufficient number of cases to establish the character and conditions of this neoplasm from the first point of departure from the normal structure to the completed carcinoma.

We will now take up the study of the last remaining variety of Class 4—carcinoma, and the cancerous tumors. The term cancer is one that has been applied to so many different forms of tissue and so many different forms of tumor as to have lost its significance in a scientific sense. Sometimes adenoma (which, as you know, is a simple hyperplasia of the glandular tissue) is called cancer, because it occasionally assumes cancerous degeneration. Sarcoma has also been called a cancer, hence the present tendency among pathologists to discard the term cancer, and employ always the word carcinoma. Carcinoma prevails in all parts of the world; there is no geographical region exempt, nor can you find any particular region that is specially favorable to the formation of cancer.

In England alone, from 1838 to 1842, there were 11,662 persons who died from carcinoma. Of these, 8,746 were women and 2,916 men. In the U. S. census of 1870 there were recorded 6,224 deaths from carcinoma; of these, 3,923 were females and 2,301 males; making about one in thirty in that census report. The report of the Census Bureau for 1880 shows 13,068 deaths from carcinoma, of which 4,875 were males and 8,195 females.

In the Marine Hospital reports, the proportion of deaths from carcinoma is 1 in 70, occurring among adult males exclusively. It is more prevalent in women than in men, because the larger number are found in the mammary glands and the uterus; so when you exclude carcinoma of the mammary gland and of the uterus, the death-rate is reduced very materially. There have been at different times great disputes as to the particular cancer cell that is to be found in each special variety of carcinoma. There is no longer belief in any specific cancer cell; that is to say, the cancer is now believed to be a growth of epithelial tissue which has grown out of place. You will not be far wrong if you view all carcinomata as one disease, the alleged subdivisions as many of them arbitrary, and all of them founded on clinical differences, some of which may be accidental. Hamilton's (of Aberdeen) definition of cancer is "a neoplasm formed of any tissue whose fibrous interspaces and lymphatic vessels are infiltrated with

actively proliferating epithelial cells." Carcinoma may be developed in any part which has epithelial tissues, or any organ of the body which has epithelial tissue in its substance. Now, we distinguish carcinomata in general from other tumors of the body by what we term the alveolar structure, wherein the so-called cavity or cell is formed. I show you here a diagram from Cornil and Ranvier, which exhibits this alveolar structure very clearly. We find that these alveolar spaces are filled with epithelial cell infiltra-

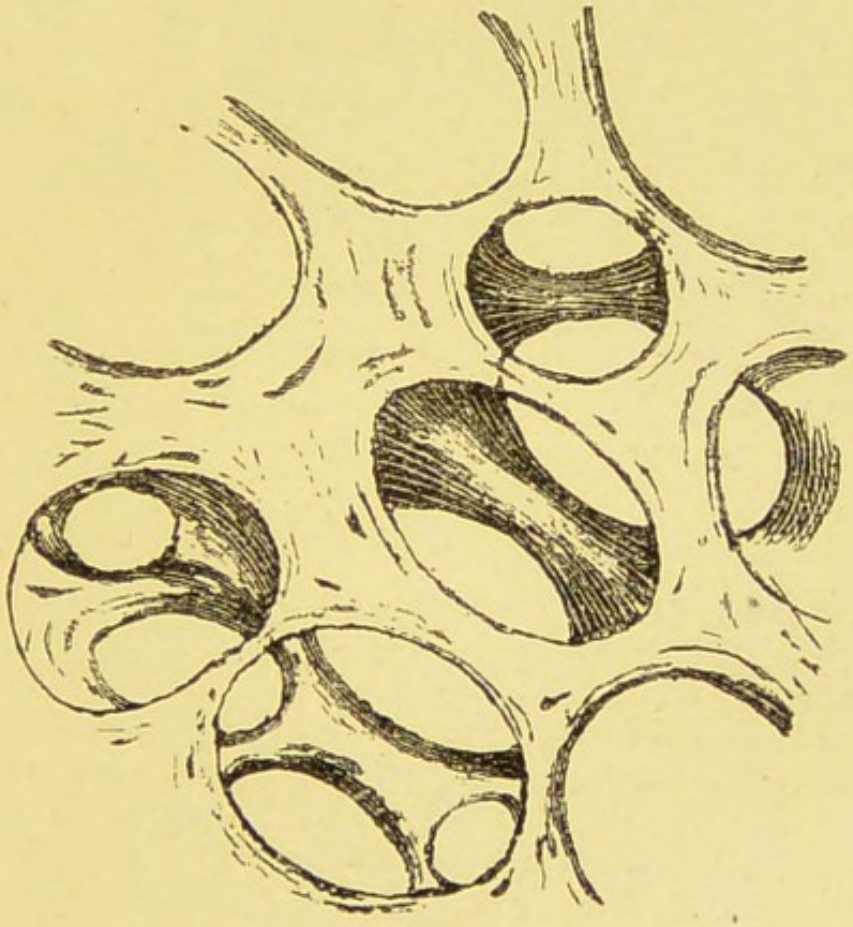


FIG. 9.—Stroma of Carcinoma, lying in which are the alveoli from which the epithelial cells have been removed by penciling. (x 300, after Cornil and Ranvier.)

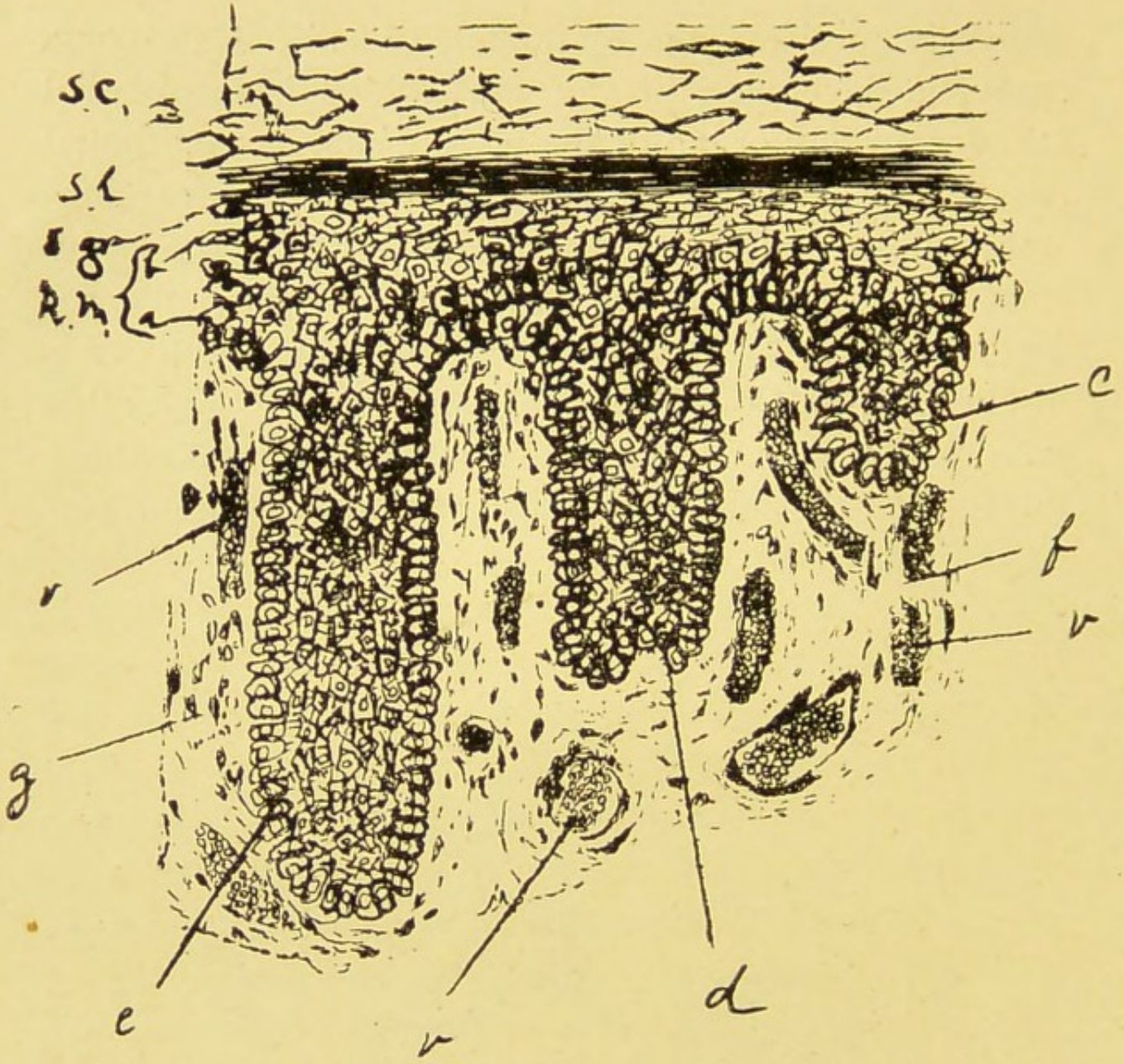


FIG. 10.—Diagram to represent changes which take place during the invasion of connective tissue by epithelial columns. (After Woodhead.)

s. c. Stratum corneum, or horny layer of cuticle.
s. l. Stratum lucidum—*s gr.*—Stratum granulosum.
r.m. Rete Malpighii. *b* Superficial more flattened cells, beneath which are the well-formed prickle cells.
a. Layer of columnar or germinal cells.
c. Epithelium at normal level.
d. & *e.* Epithelial bands passing between the papillæ.
f. Normal connective tissue papillæ.
g. Cellular and vascular connective tissue.
v. Blood-vessels.

tions. I say infiltrated, because they are not naturally there; they do not belong to the part. All these cells have nuclei; not, however, in the same manner as the giant-celled sarcoma. There is usually a single nucleus to each cell. This alveolar structure (pure fibrous tissue) constitutes the stroma of the cancer. It contains the blood-vessels, and grows at an equal pace with the young epithelial cells. These cells keep pushing on, and extending into the tissues, forming cylinders, or what the charlatan cancer-men call the "roots" of the cancer. This is simply a prolongation. In these structures there is no capsular or limiting membrane. In speaking of lipoma I told you that all fatty tumors, hygromata and cysts, were encapsulated by dense fibrous connective tissue, and this when cut down upon would show a white shining surface, and that the tumor itself does not directly enter the tissue. Now in carcinomata there is no capsule. These prolongations enter directly into the tissue. At the outset all these growths of carcinomata are distinctly local. That is not the case later on, when we shall speak of cachexia. All the carcinomata are malignant, for they sooner or later destroy life. The degree of malignancy is different in the different forms of tumor, and of that I will speak in giving the varieties.

Although I say that it is not primarily a disease of the blood, it is a well known clinical fact that the child of a cancerous parent has a predisposition to

the formation of cancer—that in a family where one brother or sister has a cancer there may be others similarly affected. At first blush you will say that is an evidence of blood infection; but if you recall what I said in my opening lecture, about the theory of Cohnheim that all tumors are congenital, you will see what is now meant by the term hereditary, viz., that there is some local defect causing an atypical cell, which may remain dormant or latent. Our classification recognizes seven varieties of carcinomata, but at least four of them should not be so classed; thus, the *medullary*, or *encephaloid*, is a carcinoma like the type, except that the stroma is very slight, the alveoli large, and the cells are greatly increased. The *melanotic carcinomata* differ only in having the pigment or melanine. It is doubtful if a true carcinoma of bone exists. There is of course an osteoid sarcoma, but as there are no bone cells in it, it is a sarcoma springing from the periosteum.

The *colloid carcinoma* consists in distinct alveoli filled with a gelatinous mucoid mass, especially common in the ovary and the abdominal cavity.

In *epithelioma* we have the true carcinoma which constitutes the type—epithelial cancer. Epithelioma is slower in growth than the scirrhus, and in certain circumstances, when extirpated early, does not recur. Indeed, it is probable that none of the carcinomata would recur after extirpation if it were possible to make a diagnosis and operate upon them in their

incipiency. Epithelioma of the lip may be taken as a type of the class. It is one most amenable to treat-

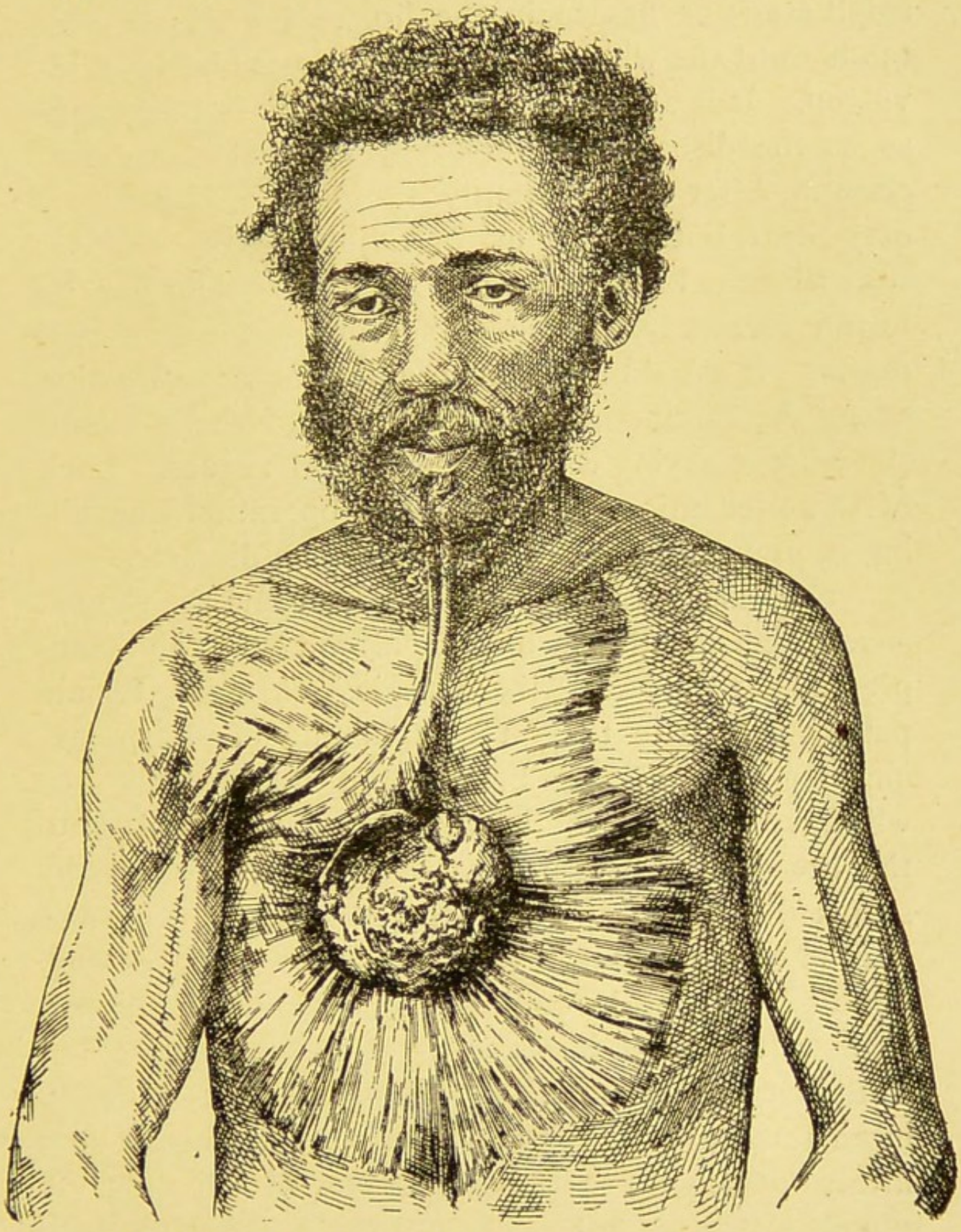


FIG. 11.—Case of epithelioma growing from a cicatrix. From a patient at Providence Hospital.

ment. The disease occurs in the beginning as a small crack or fissure in the lip, and gradually extends until the whole lip, and sometimes cheek, is involved. It is at first not very painful, but becomes so as the disease progresses; hæmorrhages are frequent. After an apparently thorough extirpation it may recur, but always at, or adjoining, the original site; whereas in the scirrhus the recurrence may be in the nearest lymphatic gland, or in some internal organ. It should be an invariable rule in extirpation of all the carcinomata, to keep clear of the diseased structure, carrying the knife in sound tissues. Lack of this precaution will render this operation unavailing in preventing the recurrence of the disease.

Scirrhus. In this form of carcinoma the stroma is very dense and firm, and the alveoli small and compressed. I will describe a typical case: A female patient will come to you complaining of sharp lancinating pain in the breast; not infrequently she will have a history of some injury, such as striking the breast on a sharp corner, or being accidentally struck with the elbow, etc., etc. At any rate, on examination of the breast, if the case be not far advanced, you find a painful swelling just beneath the nipple, or at one side of it. This is at first moveable, but as the case progresses the nipple becomes retracted more and more, the tumor rapidly grows larger and firmly attached to the periosteum of the ribs; the glands in the axilla become swollen, and the patient's

sufferings greatly increase. She will then have the cachectic appearance, the general appearance of anæmia; and the more malignant the growth, the

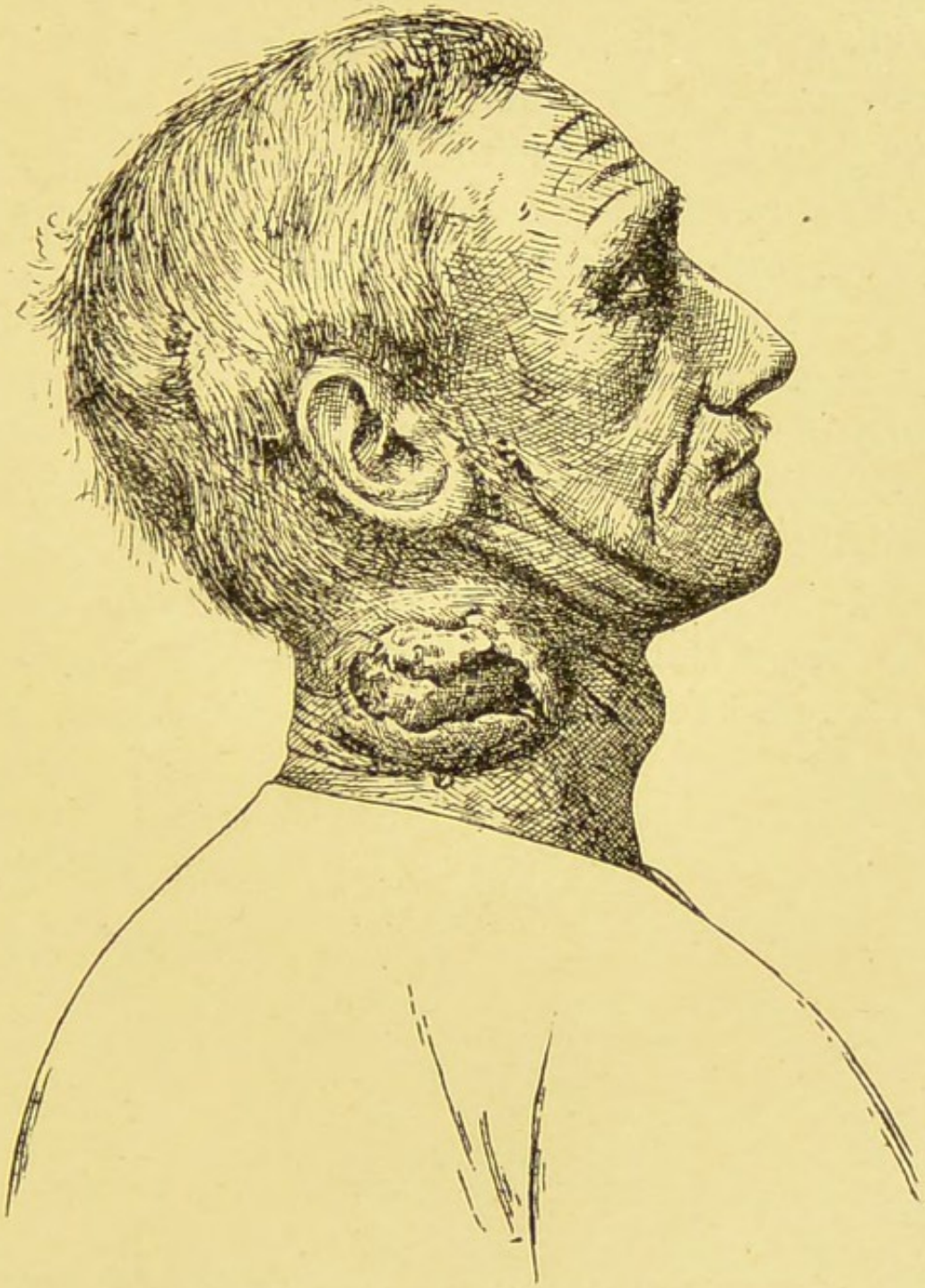


FIG. 12.—Case of scirrhus of the neck. From a sailor in Providence Hospital.

more characteristic the cachexia. When the carcinoma has grown so that the entire mammary gland has become involved, the skin over the tumor usually becomes infiltrated, ulceration sets in, and the patient speedily dies. This is the usual course of this form of carcinoma. In other organs the symptoms, of course, vary according to the location and the physiological functions of the organs involved. These will all be separately considered in my forthcoming volume on TUMORS OF THE REGIONS, in which the diagnostic points will be fully considered. It is proposed to fully illustrate the work, and describe the respective operations necessary for their removal, in detail.

I have only glanced at the general principles underlying our knowledge of morbid growths, and, as science never stands still, you must constantly study if you would keep abreast of your fellows.

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