cytosis or by so altering the red cells that they are particularly susceptible to phagocytosis.

The lesions produced in the organs of animals injected with hæmolytic agents are usually pronounced and quite characteristic. There is often a subcutaneous œdema, frequently blood-stained, and similar fluid may be present in the serous cavities. The fat is yellowish, and the muscles are darker in color than is normal. The spleen is usually much swollen, soft, friable, and very dark in color. The liver is usually swollen and mottled with red areas in a yellow background. The renal cortex is dark in color, even chocolate-colored, and the pyramids are comparatively light; in the urine is frequently hæmoglobin. In the lungs are often hemorrhages or areas resembling small infarcts. The blood may be thin and even distinctly transparent. Microscopically the red corpuscles are found in all conditions of degeneration, and often fused together. In the liver, besides patches of congestion, fatty changes are present if the animal lives long enough. Large phagocytic cells packed with red corpuscles are abundant in the spleen, as well as diffuse accumulations of blood, often fused, and pigment both free and in the cells. Pigment also accumulates in the renal epithelium, which also often shows much disintegration; congestion is prominent and hemorrhages into both interstitial tissue and glomerules are frequent.

Bacteriolysis.—It is not our purpose in this article to discuss the specific micro-organisms in this relation, but merely to indicate the relations of hæmolysis and bacteriolysis. Whatever has been said in preceding paragraphs about the mechanism of hæmolysis can be transcribed to apply to bacteria and bacteria-immune serum. Pfeiffer's observation of the solution of bacteria by serum of immunized animals was the precursor of the modern studies of hæmolysis and the extension of Ehrlich's theory. Indeed the chief reason for the great interest in hæmolysis lies in the understanding that whatever may be learned about hæmolytic processes can be directly applied to the processes of immunity against bacteria. Therefore we understand that in the serum of an animal immunized against bacteria themselves, and not merely their toxins, there is present an intermediary body that is specific for the injected organism. This intermediary body attaches itself to the bacterium by one haptophore group, and with the other anchors the complement of the serum which then destroys the bacterium. Now as during immunization only intermediary bodies are produced in excess, while the complement is not increased, it often may be that defence may fail because of deficiency in the amount of complement. This possibly explains why it has so far been impossible to secure immune sera that will protect against bacteria as effectively as antitoxin protects against toxin, for with toxin no complement is required. The results of decreased complement content would be an increased susceptibility to infection, and this is seen in snake bites, when the venom uses up the blood complement and the patient often succumbs to bacterial infection after surviving the direct effects of the poison. In chronic diseases Longcope claims that in the later stages the amount of complement is much decreased, probably accounting for the occurrence of terminal septicæmias.

It is probable that hæmolytic complement is quite distinct from that causing bacteriolysis, and that complements for different bacteria can be separated from one another as well as from the agglutinins.

Welch has suggested that possibly the bacteria in their turn may develop antibodies to the tissues and fluids in which they are growing. If so, we have a reasonable explanation of the development of toxic substances with marked action on specific cells of the host, *e.g.*, endotheliolysins, leucolysins, hæmolysins; and also the peculiar manner in which bacteria often attack only certain tissues, *e.g.*, multiple septic arthritis.

Cytolysis.—Red corpuscles being merely a particular sort of body cell it might be expected that lysins for other cells could be obtained in a similar manner, and such is the case. Such lysins are called by the generic term *cytolysins*, or *cytotoxins*, and are specifically indicated by the name of the cell concerned, as endotheliotoxins or endotheliolysins, hepatotoxins, nephrotoxins, etc. The lysins or toxins in this case are similar in composition to the hæmolysins, that is, an amboceptor and a complement group, and these groups are in all respects similar to the components of the hæmolysins except that the cytophile group of the amboceptor is specific for certain tissue cells rather than for red corpuscles. Such specific cellular toxins may be obtained by immunizing the animals against the tissue which is injected emulsionized into its peritoneal cavity; but, as with the hæmolysins, they may occasionally appear in normal serums of various sorts of animals. It is by no means as easy to determine the results with tissue cells as with red corpuscles, where the liberation of the highly colored hæmoglobin is easily detected. To some degree lytic changes can be observed in tissue cells under the microscope, but this is not usually very satisfactory. Another method of observation consists in injecting the immune serum into the body of an animal, and studying both the symptoms and the anatomic changes brought about in this way. The latter method has found the most general application. A disturbing element in all such experiments lies in the difficulty of securing tissue cells of one kind alone for injecting. For example, when hepatic-tissue suspensions are injected there are introduced at the same time endothelial cells, connective-tissue cells, and usually red corpuscles and leucocytes. Therefore an immune serum obtained in this way would contain immune bodies for all these cells, and it becomes impossible to ascribe any changes that follow its injection into an animal solely to effects of the hepatotoxins. While there are possible ways of avoiding many of these difficulties they have not been generally applied, and much of the earlier work is very questionable on this account. At the same time that cytolysins are formed agglutinins also appear, and agglutination of specific cells occurs as it does with bacteria and corpuscles. One of the earliest pieces of work in this direction was with sperm agglutinins, obtained by immunizing with sperm. Such serum, however, was not spermolytic. In view of the elementary condition of cytolytic investigations, and the afore-mentioned sources of error in much of the work that has already been reported, I do not feel justified in this article in more than briefly discussing the specific results so far obtained. It should also be mentioned that recently some investigators who have used care in avoiding hæmolysins, etc., in preparing specific sera have not been able to obtain as marked results as had been earlier reported.

Leucocytolytic Serum.—This may be obtained either by immunizing with leucocytes obtained from exudates or from the blood, or by using emulsions of lymph glands. The latter method introduces so many cells besides the lymphocytes that it is not desirable. Specific leucocytolytic sera agglutinate leucocytes and produce observable morphologic changes, in the way of solution of the cytoplasm and cessation of amœboid movements. Of the leucocytes the large granular cells seem most affected and the lymphocytes least. When injected into the peritoneal cavity such serum causes an apparent initial leucopenia, and later a decided leucocytosis in the peritoneal fluid. Corresponding with this, if bacteria are injected at the same time as the serum, resistance is found decreased, but later it is much increased. Such serum also contains anticomplement, according to Wassermann, indicating that the injected leucocytes contain complement. Leucotoxin obtained by immunizing against lymphatic tissue is very thermolabile, being destroyed by 55° C. for thirty minutes, and the serum can be only partially reactivated by the use of fresh serum. Undoubtedly leucotoxic amboceptors are present in many normal sera, and their presence in the serum of certain cold-blooded animals and in venom has already been shown.

Endotheliolytic Serum.—Every attempt at immunizing an animal with any sort of fixed tissue must of necessity

involve the injection of endothelial cells as well as those specific to the tissue studied. Therefore it is possible that cytotoxic serum so obtained will contain endothelial toxins and so complicate any results of *intra vitam* experiments. There is every reason to believe that endotheliolytic substances are produced in this way. Ricketts found that serum of animals immunized against lymph glands was toxic to endothelial cells, which was indicated by hemorrhages at the point of injection, and marked desquamation of endothelium when the injection was made into a scrous cavity. In snake poisoning the extensive hemorrhages are also due to an endotheliolytic principle, called by Flexner *hæmorrhagin*. This is destroyed by heating at 75° C., and is particularly abundant; in fact, the chief toxic agent in rattlesnake venom.

Lymphatolytic Serum.—This serum has been studied recently by Ricketts and by Flexner, immunizing animals with lymph glands. As might be expected from the nature of the injected glands the resulting serum contained endotheliotoxin, leucotoxin, hæmolysin, hæmaglutinin, leuco-agglutinin, and precipitins. When injected into animals this serum had a marked effect upon the spleen and lymph glands, producing great enlargement of these structures, which were also congested. The bone marrow was also somewhat affected, and when marrow was used in immunizing, the *myelotoxic* serum produced marked proliferative changes in the lymph glands as well as in the marrow. The changes produced in the leucocytes were the same as those described for leucotoxic serum, indicating that the different forms of leucocytes can combine with immune bodies produced against lymphocytes.

Nephrolytic Serum.—It has been claimed that if a kidney is destroyed by ligating its vessels or ureter the remaining kidney develops serious degenerative changes, which are not present if one kidney is entirely removed. This has been attributed to the development of nephrotoxic substances produced in reaction to the absorption of the injured renal tissue that has been left in the body. Other methods of renal injury have been thought to produce similar effects, and serum of animals with kidney disease was said to injure the kidneys of normal animals. From this basis it has been thought to explain the progressive nature of the chronic nephritides as the result of nephrotoxins produced through the absorption of the injured cells, and which nephrotoxins injure still other cells. Such a process, however, involves the production of cell toxins in an animal toxic for its own cells, that is *autocytotoxins;* and as it has so far been practically impossible to produce autolysins of other sorts, it is not altogether probable that the kidney is an exception. Furthermore, the latest writer, Pearce, was unable to produce *isonephrotoxins*, and could not corroborate the results said to have been found in the remaining kidney after ligating the vessels of the other. He did obtain an active *heteronephrolysin*, but also found that immunization with liver produced just as actively nephrolytic serum as immunization with kidney.

Neurolytic Serum.—Even so highly specialized cells as those of the nervous tissue seem to produce a reaction with the formation of immune bodies. Perhaps because any symptoms produced by action on the nervous system are so readily detected, and because of the advanced condition of our knowledge concerning the minute structure of ganglion cells, the results obtained with neurolytic serum have been particularly striking. Perhaps the most positive results are those of Ricketts and Rothstein, who found that serum of rabbits immunized against the brains or cords of guinea-pigs, when injected into the vessels of guinea-pigs was highly toxic, causing death with various symptoms only explainable on the assumption of nervous lesions. Microscopically the ganglion cells showed marked changes in those animals that survived the injection long enough. All the results so far obtained have been with heterogeneous serum. Venoms, particularly that of cobra, possess strong neurolytic substances, that are the chief toxic agents in most of the venoms (the rattlesnake excepted). This neurolysin can be removed by saturation with nervous tissue from the hæmolysin, and conversely the hæmolysin can be removed by saturating with red corpuscles, thus corroborating Wassermann's experiments with tetanus toxin and supporting Ehrlich's theory.

Thyrolytic Serum.—There are but few reports on this serum, but of these the latest, that of Portis, indicates that after removal of all hæmolysis as a factor there do occur changes in the nature of excessive absorption of colloid, and proliferation after the order of that seen in regeneration. However, the clinical picture of thyroidectomy was not produced in any case, and the anatomic changes were not great.

Numerous reports may be found indicating attempts with varying success to obtain sera toxic for other tissues. Among them may be mentioned *epitheliolysin* (for ciliated epithelium), *spermatotoxin*, *hepatolysin*, *cardiolysin*, *splenolysin*, and *syncytiolysin*. Attempts at the production of immune serum with adrenal by Abbott resulted only in a serum with great hæmolytic power, but with no particular effect on the adrenal. The principle in all is the same, but the results as a whole are not now in a state to warrant extensive consideration. In general, it can be said that it has not been found possible in this way to throw out of function one particular organ, with or without involvement of other structures. It must be borne in mind that we can have grave functional disturbances without corresponding anatomic alterations. There is no reason known why a group of receptors of essential importance to the functional manifestations of the cell may not be quite independent of vegetative functions; and with impairment of these alone there need be no visible cell changes. *H. Gideon Wells.*

Bibliography.

Excellent reviews bearing upon these topics, to which the reader is referred for the bibliography of the earlier works, are found in: "A Review of Current Theories Regarding Immunity," by James Ritchie, Journal of Hygiene, 1902, ii.; Ehrlich's "Croonian Lecture," in the Proceedings of the Royal Society of London, 1900, lxvi.; and in the book by Vaughan and Novy, "Cellular Toxins," 1902.
References to all the later literature of importance will be found in the reviews of pathologic literature by Hektoen, in Progressive Medicine, each year since 1900.

HEMLOCK, POISONING BY.—The water hemlock (*Conium maculatum*) is a small herb, belonging to the natural order *Umbelliferæ*. It must not be confounded with the hemlock tree (hemlock spruce), a well-known product of the forest regions of the United States. Conium maculatum is indigenous in Europe, but has established itself to a limited extent in other countries. It is regarded as the poison which was used by the ancient Athenians in putting to death certain criminals, and has become famous in consequence of its use in the case of Socrates.

The poisonous properties exhibited by several parts of the plant, especially the fruit, are due to several alkaloids, of which coniine (sometimes called coniin) is the most important. This is a distinct alkaloid, forming a series of salts, and is one of the few of its class that are liquid at common temperature and do not contain oxygen. Its formula is $C_8H_{17}N$. It is a colorless liquid, specific gravity about 0.880, not very soluble in water. It boils at a temperature considerably above that of water, and has a distinct rotatory action on polarized light. Its odor is usually said to be mouse-like, a rather vague description, but it cannot be more directly described, except to say that it is strong and disagreeable.

Cases of hemlock poisoning have been mostly accidental, parts of the plant having been mistaken for edible herbs, such as parsley. The recorded cases give diverse symptoms, and it is highly probable that mistakes have been made as to the identity of the plants in several instances. The following summary represents the marked features: Headache, vertigo, dilated pupils, a prickling sensation in the extremities, with gradually developing paralysis. This latter usually begins in the legs. The paralytic condition extends to the muscles of the trunk and neck, speech and deglutition become im-

perfect, and finally asphyxiation may occur by failure of the respiratory muscles. The mind is not much impaired until the latest stages of the case. Convulsions may occur at an advanced stage. A case may last several hours, but is likely to be much more rapid in its progress, death sometimes occurring in a few minutes. The poisonous dose is small, but cannot be accurately fixed from the data at hand. Probably one drop of coniine would be fatal to an adult in most instances if treatment was not promptly instituted.

Treatment must be of the type used for the alkaloids in general. Tannin and animal charcoal have some antidotal value, but the thorough washing out of the stomach will be found to be of most advantage and should be instituted as soon as possible. Artificial respiration may be required in the advanced stages of the case. The marked paralytic condition suggests the use of strychnine in very small doses hypodermically, but such treatment must be used with caution.

The detection of the characteristic alkaloid is a difficult matter, but its peculiar odor will be of value. More important, from a practical medical point of view, is the recognition of parts of the plant. These should be carefully examined, and compared with authentic specimens, or mistakes will be made, for species of Umbelliferæ are often difficult to differentiate. The post-mortem appearances are not characteristic. *Henry Leffmann.*

HUNYADI JANOS SPRING, AUSTRIA.—A mineral spring at Ofen, Hungary, a part of Budapest. The water bearing this name, so universally used, especially in this country, is one of the "Hungarian bitter waters"; others, almost as well known and obtained from the same locality, are the Franz-Josef and the Apenta. These three are the strongest of the bitter mineral waters, and are used either as a laxative or as a cathartic, the effects depending upon the quantity of the water taken. The active ingredients are the sulphates of sodium and magnesium. The following table shows the proportions in which they occur in the various Hungarian waters; and, for purposes of comparison, several other waters of like constituency are included.

ONE LITRE OF WATER CONTAINS:

	Sodium sulphate. Grams.	Magnesium sulphate. Grams.
Hunyadi Janos	22.55	22.35
Franz-Josef	23.18	24.78
Apenta	15.40	24.40
Puellna	9.59	10.85
Friedrichshall	6.05	5.15
Kissingen Bitterquelle	5.80	5.00

The following is an analysis of the Hunyadi Janos water by Professor Bunsen. One pint contains: Sodium carbonate, gr. 13.20; ferrous (oxide) carbonate, gr. 0.08; calcium carbonate, gr. 6.04; strontium carbonate, gr. 0.19; sodium chloride, gr. 11.54; potassium sulphate, gr. 1.67; sodium sulphate, gr. 128.97; magnesium sulphate, gr. 137.98; silicious earth, gr. 0.09. Total, 299.76 grains. Free and partly combined carbonic acid, 8.06 cubic inches.

Other well-known waters of like character are those of the Rubinat Condal, Rubinat Serre, and Rubinat Llorach Springs in Spain.

The taste of these waters is disagreeably bitter, much like a solution of "Epsom salts," although it is said to be somewhat modified by the presence of free carbonic acid and the other salts; at best, however, they are not a pleasant drink.

These sulphated bitter waters are much employed either as an occasional aperient, or in habitual constipation and in dyspepsia accompanied by constipation. They are also a serviceable laxative in small doses in pregnancy, arteriosclerosis, cardiac disease, and other morbid conditions in which an unstimulating laxative is desired. In large doses they are indicated where a rapid, full evacuation of the bowels is the end in view. In brief, in all the innumerable conditions in which a "dose of salts" is indicated, these bitter waters, which are practically a solution of salts, can be used. The usual dose of the strong bitter waters is from a half to one wineglassful taken on an empty stomach. In emergency cases a larger dose can be taken—from three-quarters to one tumberful. *Edward O. Otis.*

IRON, POISONING BY.—Metallic iron and those compounds of iron which are insoluble in water are not poisons. The soluble salts, however, though not active poisons, have an irritant action, and are capable of destroying life when taken in large doses and in a concentrated state. The continued administration of medicinal doses even produces, after a time, decided gastric disturbance. It is probable that all the soluble preparations may act as irritant poisons when administered in large doses. The most important, however, from a medico-legal point of view, are ferrous sulphate (copperas, green vitriol), ferric chloride (perchloride), which is used medicinally in the form of tincture, and the tannate in the form of ink.

The salts of iron are rarely administered for criminal purposes. Most of the reported cases of poisoning have been the result of accident, or of the use of the sulphate or the tincture of the chloride of iron in attempts at abortion. The symptoms which follow the administration of large doses of the preparations named are essentially similar to those produced by the irritants in general. There are a styptic taste in the mouth, nausea, vomiting, pain in the stomach and intestines, and purging. The evacuations are black, owing to the conversion of the iron salt into a tannate by the tannic acid of the food, or into a sulphide by the sulphureted hydrogen resulting from decomposition in the intestines. Irritation of the genito-urinary passages is sometimes observed. The tincture of the chloride of iron is more corrosive in its action than the sulphate, by reason, apparently, of the free hydrochloric acid which it frequently contains. Its injection into the cavities of the body, for the purpose of arresting hemorrhage, has proved fatal.

The amount of any of the preparations of iron required to endanger life is not accurately known, but appears to be quite large. In most of the cases in which the sulphate has been taken, the amount was unknown. Recovery has taken place after a dose of 31 gm. (℥ i.) of the sulphate (Christison). A case is reported in which 48 gm. (fl ℥ iss.) of the tincture of the chloride of iron proved fatal in about five weeks (Christison). Recovery has taken place after doses of 32–96 gm. of this preparation. The favorable issue is probably due, in many cases, to the early occurrence of vomiting.

The results of experiments on animals are not uniform. Gmelin states that 7.7 gm. (℥ ij.) of the sulphate of iron administered to dogs by the mouth caused vomiting only; that 2.6 gm. (gr. xl.) administered to rabbits produced no injury; and that 1.3 gm. (gr. xx.) injected into the veins of a dog produced no symptom whatever. Dr. Smith, however, states that 7.7 gm. will prove fatal to dogs when administered by the mouth or applied to a wound.

The post-mortem appearances are those of a simple irritant, and are confined, so far as has been observed, to the stomach and upper part of the intestines. In acute cases the contents of the intestines will probably present a black appearance, owing to the presence of the tannate or the sulphide of iron.

Iron is eliminated to some extent in the urine. A small amount only is absorbed in any event, the greater part escaping in an insoluble form with the fæces.

Treatment consists in the use of the stomach-pump, or of emetics if necessary. Magnesia or dilute solutions of alkaline carbonates should be administered as antidotes, and these should be followed by demulcents. *William B. Hills.*

LIPOMA (Adipoma, Steatoma) is a tumor consisting essentially of adipose tissue. Such growths belong to the mature connective-tissue tumors, and have for their

physiological prototype the adipose tissue found beneath the skin and serous membranes. Between normal adipose tissue and the fat tissue of lipomata there are no essential differences of structure. In the majority of lipomata the fat cells as well as the fat lobules are usually larger than those of normal adipose tissue (the former three to four times as large); but this difference does not hold good to such an extent that it can be used as a point in differential diagnosis. In general, a lipoma presents the structural characteristics of a localized mass of fat differing in no respect from normal subcutaneous fat. The chemical reactions of the fat contained in lipomata likewise correspond to those of normal fat.

Since the resemblance in structure to normal adipose tissue is so very close, it may sometimes be difficult to draw a line between a simple hypertrophy of adipose tissue and a lipoma. Both general and local hyperplasias of adipose tissue occur which are not classed with lipomata (general lipomatosis, lipomatous elephantiasis, the deposit of fat about an atrophic kidney or between the bundles of atrophic muscles); but other local hyperplasias of a similar nature have by various authors been styled lipomata. Thus the hyperplasia of the fatty capsule of the mammary gland which occurs sometimes in scirrhous carcinoma of this organ or in chronic interstitial mastitis has been called *lipoma capsulare*, an excessive deposit of fat beneath the epicardium has been styled *lipoma cordis capsulare*, and the deposit of fat in the villous fringes of the joints is known as *lipoma arborescens*, although analogous to the fatty hyperplasia so frequently seen in the epiploic appendages of the large intestine. Such local fatty hyperplasias may be styled *pseudolipomata*. An exact use of the term lipoma would limit its application to those formations of adipose tissue alone in which an actual new formation of fat tissue occurs. Such a criterion has, however, but little practical value, since in the fully developed growth of fat tissue it may be impossible to say whether the latter has arisen from a circumscribed hyperplasia or represents a true neoplasia. This difficulty is increased by the fact that lipomata are usually found in those parts of the body in which there is normally more or less fat tissue. A more practical guide will therefore be found in the principle that the term lipoma should be applied to *circumscribed proliferations of adipose tissue which show a certain anatomical and physiological independence of the neighboring tissue, even when the latter is fat tissue.*

The application of the term lipoma made by some writers to tumors other than connective tissue, the cells of which have undergone fatty degeneration or contain an abundance of fat, is wholly incorrect. The true lipomata belong to the mature connective-tissue tumors —that is, the tissue of which they are composed is of the type of adipose tissue.

HISTOGENESIS.—The histogenesis of lipomata is not yet definitely known. Their very frequent development in regions where fat tissue is normally found has led to the belief that the majority arise from a hyperplastic proliferation of adipose tissue with new formation of fat cells and fat lobules. Such an explanation would hold good even for the lipomata which are sometimes found in the submucosa of the gastro-intestinal tract, since in well-nourished individuals fat cells are usually present in small numbers in this region, and from these a lipoma could take its origin. Another view is that lipomata arise from undifferentiated embryonal cells which have persisted from fœtal life, or are formed by the proliferation of connective-tissue cells. The development of fat tissue from these follows the same course as that of the normal development of fat cells from fœtal myxomatous tissue. It is not improbable that undifferentiated "primitive fat organs" (developing fat lobules in the fœtal mesenchyma) may persist quiescent until adult life and later resume active proliferation, giving rise to localized growths of fat tissue which in their development would be more or less independent of the normal laws of nutrition and cell growth. Support is given to this theory by the fact that some lipomata in their growth appear to be entirely independent of the laws governing the general nutrition of the body, since they continue to increase in size or at least do not become smaller under conditions of cachexia, etc., when the normal fat tissue is being reduced in amount. The fact that a combination of myxomatous tissue and adipose tissue is frequently found under pathological conditions may also be taken as an indication of the close histogenetic relations of these tissues. In many lipomata areas of myxomatous tissue occur, and occasionally the appearances presented suggest the development of the fat tissue out of the myxomatous. Moreover, there are rare forms of lipomata in which the fat cells resemble those of embryonic adipose tissue, in that the fat droplets are of small size and do not coalesce into larger drops filling the entire cell.

A further origin for lipomata may be found in atrophic lymphadenoid tissue, a physiological paradigm being found in the development of fatty marrow from the lymphoid marrow, and the fatty transformation of the thymus, and later in old age that of the lymphatic glands. The relationship between lymphoid tissue and adipose tissue is very close. In the fœtus the development of the lymph glands is either coincident with that of the primitive fat organs or follows it; in the latter case the lymphadenoid structures (both ordinary lymphatic and hæmolymph nodes) developing out of the fat organs. In adult life under certain conditions a new formation of lymph glands takes place from adipose tissue, and in old age the lymph glands become to a large extent replaced by fat tissue. Throughout life it is very probable that there is a constant cycle of alternation between lymphoid tissue and adipose tissue. As the result of some disturbance of these processes it is possible that lipomata may arise, either from atrophic lymph glands or from anlage of undifferentiated cells. Askanazy traces the origin of multiple lipomata in particular to a replacement of lymph glands by fatty tissue.

The lipomata of the uterus, kidney-cortex, brain, spinal cord, etc., are to be referred to misplacements of anlage of fat tissue or of fibrous connective tissue which later undergoes a fatty metaplasia. Such lipomata are to be classed with the heterotopous teratomata. It should be borne in mind also that lipomatous masses not infrequently form the bulk of teratomata found in other regions as well.

ETIOLOGY.—As in the case of the other true neoplasms but little is known of the etiology of lipomata. Some of them may arise as the results of trauma or chronic inflammation. Such an origin has been ascribed to the fatty tumors sometimes found in the hands of working people in the parts most exposed to injury. In other cases fatty tumors have been found developing from scars. The fatty growths in the villi of the joints are usually associated with a chronic arthritis. There also seems to be some association between multiple lipomata and rheumatoid affections. In the case of the multiple and symmetrical lipomata a nervous or trophic origin is assumed by many writers. In such cases other symptoms suggesting a neuropathic origin are not infrequently present. According to Grosch, multiple lipomata of the skin arise from a disturbance of fat secretion by the skin glands due to a trophoneurosis. A connection between lipomata and disease of the thyroid and hypophysis has also been assumed by some authors. In the majority of cases it is very probable that lipomata are to be regarded as congenital, that is, they arise from misplaced anlage. A tendency to the development of lipomata appears also to be inherited in some families.

Gross Appearances.—All lipomata possess a more or less definite capsule. In the sharply circumscribed forms the capsule may be well defined, of varying thickness; in the diffuse forms the capsule is not perfect and often sends prolongations of connective tissue into the surrounding tissues, which if not removed may lead to a recurrence of the growth. The size of lipomata varies greatly; in the kidney, submucosa of the intestinal tract, etc., they may be very small, while in the subcutaneous tissues of the shoulder and back and in the retroperito-