agreeable features (Quaglino, Wecker, and others), simple sclerotomy, and either anterior sclerotomy or posterior sclerotomy have been proposed and introduced in place of iridectomy. The efforts which have been made to supersede the iridectomy by the sclerotomy have, however, failed. This failure is not only due to the danger arising from prolapse or from incarceration of the periphery of the iris in the corneo-scleral wound, but also to the fact that the combined experience of many observers has shown that this operation is insufficient, and especially so in the inflammatory forms of glaucoma. It may be performed with more success in chronic simple glaucoma, and in cases in which an iridectomy has not been able to cut short the progress of the disease altogether, and in which a second iridectomy has by some authors been advocated. It may, furthermore, be considered of value in cases of glaucoma absolutum, when the pathological changes of the iris tissue no longer allow of the performance of an iridectomy.

Several authors have tried to replace iridectomy by an operation which aims at cutting the ciliary muscle (Hancock) or the tendinous portion at its insertion into the corneo-scleral tissue. These procedures seem not only to be of doubtful value, but also to be fraught with danger from subsequent sympathetic ophthalmia. The latter objection has, however, also been urged against sclerotomy. The most recent procedure is excision of the superior cervical sympathetic ganglion as introduced by Jonnesco. This operation is still *sub judice*, having its ardent admirers as well as enemies. A careful critical paper on the subject by Ziehe and Axenfeld says that in all cases of glaucoma in which our present therapeutic measures have not sufficed, the extirpation of the cervical sympathetic is a justifiable and advisable experiment, although it does by no means afford help in every instance.

Aside from the operation, the general condition of a patient suffering from glaucoma ought to be attended to. He ought to be especially restrained from everything which may in his case be apt to act as an occasional cause for a glaucomatous attack. If there is—and this is the rule—an error of refraction or accommodation, or of both, it must be corrected. In fact it is claimed that careful attention to refractive errors as practised in this country has reduced the number of cases of glaucoma.

Glaucoma not always being easy to recognize, it will be always well to examine carefully, with regard to the possible presence of this disease, every patient who comes to his physician complaining of, and seeking relief from, neuralgia of the eye and head, combined with obscurations of sight and with nausea. *Adolf Alt.*

GLECHOMA. See *Labiatæ*.

GLEN ALPINE MINERAL SPRINGS.—El Dorado County, California. Back in the mountain fastnesses at a distance of seven miles from Lake Sahoe, and at an elevation of 6,700 feet above the sea-level, are Gilmore's Glen Alpine Mineral Springs and Health Resort. The wild, rugged gorge in which they are situated runs back from Sahoe a distance of some ten miles. It is diversified throughout its length with varied scenes of beauty and grandeur, and terminates abruptly in a glacial amphitheatre. The region is rich in exquisite flowers and ferns. "Those dimpling lakes, with the wild beauty of their surroundings are sufficient to enthrall the heart of him who visits them; but if he be devoted to the rod and reel he will find an additional charm in the swarms of speckled beauties which sport in the clear depths and rise to the glancing fly."

This region has been opened to the public with great labor and expense by the construction of a wagon road as far as Glen Alpine Springs, and mountain trails to all the lakes, including a path for the ascent of Mount Sallac, which rears its head 10,000 feet above the level of the sea, and commands a wide and magnificent view of the distant peaks and numerous lakes. Good accommodations for guests will now be found at Glen Alpine Springs. Analysis by Dr. Anderson:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	21.17
Sodium carbonate	32.75
Potassium carbonate	Trace.
Magnesium carbonate	9.96
Calcium carbonate	45.09
Calcium sulphate	4.10
Ferrous carbonate	1.80
Alumina	1.43
Borates	Trace.
Silica	2.50
Organic matter	Trace.
Total solids	118.80

Free carbonic acid gas, 138.36 cubic inches.
Temperature of water, 39.6° F.

The water is very palatable and sparkling. Its action is gently aperient and diuretic, and the water is useful in dyspepsia and torpidity of the bowels as well as in renal and cystic disorders. It contains sufficient iron to give it important properties as a ferruginous tonic.
James K. Crook.

GLEN ALPINE SPRINGS.—Sevier County, Tenn.
POST-OFFICE.—Newport, Cocke County. Hotel.
ACCESS.—Viâ Southern Railroad to Newport, Cocke County, thence by stage 12 miles west to springs.

These springs are located in a mountainous region, 3,000 feet above the sea-level. The usual charming scenery and exhilarating climate of the East Tennessee mountain district will be found here. The springs are four in number, and yield about sixty gallons each per hour. No analysis has been made, but the water is said to be chalybeate and very serviceable in debilitated and anæmic states, especially those arising from disorders of digestion and assimilation. Hay-fever patients are said to improve rapidly as a result of a sojourn at these springs. The improvements at the resort are by no means elaborate at present, but the location offers many attractions during the summer months to persons not afraid to grow strong by roughing it. *James K. Crook.*

GLEN SPRINGS.—Schuyler County, New York.
POST-OFFICE.—Watkins. Hotel and sanitarium.
ACCESS.—Watkins is situated on the Northern Central Railroad, between Elmira and Rochester. This road (a division of the Pennsylvania system) runs from Rochester to Baltimore, Philadelphia, and Washington. It connects at Rochester with the New York Central, West Shore, Michigan Central and other railroads, at Canandaigua with the Auburn branch of the New York Central, and at Elmira with the Erie and the Delaware, Lackawanna and Western Railroad. The Fall Brook Railroad also has a depot one mile and a half from Watkins. This beautiful and modern health resort and watering-place stands upon a broad plateau 300 feet above Seneca Lake, whose winding course it overlooks for nearly thirty miles. It is surrounded by pine forests and backed by an amphitheatre of hills rising in regular terraces to nearly 1,500 feet. At the foot of the hill, less than a quarter of a mile away, lies the village of Watkins, with its churches, shady streets, and lovely homes, while the entrance to the famous Watkins Glen and the landing of the Seneca Lake steamers are both within seven minutes' easy walking distance. Seneca Lake is one of the most remarkable bodies of water known. It is fed by deep springs, and has been frozen over only twice during the last century. For beauty of scenery and richness of coloring it has no superior, its shores are grand and picturesque, the sides thickly wooded in places, in others covered with fruit orchards and vineyards. This great body of water, nearly forty miles long and from two to four miles in width, exerts an unquestioned modifying influence on the atmosphere, tempering it in winter and cooling and freshening it in summer. A remarkable feature of this region is the great number of its sunny

days during the fall, winter, and spring. The record for 365 days has shown that there were only 55 cloudy days, and 17 of those were in May. These features tend to make the location a very desirable winter as well as summer resort. The Glen Springs Park comprises sixty acres of woodland and lawn, about equally divided, and one can wander for miles over well-built walks, obtaining from almost every point grand and beautiful vistas of lawn, lake, forest, and glen. Within the park are bowling-alleys, tennis courts, croquet grounds, and golf links. Pleasant drives abound in every direction, while to those who prefer the water the fine, large steamers of the Seneca Lake Navigation Company, plying six times a day between Geneva and Watkins, afford every comfort and luxury. Good fishing is found in Seneca Lake, and within easy driving distance over good roads one can reach Keuka, Lamoka, Cayuta, and Little Lakes, all famous fishing resorts. The main building of the Glen Springs sanitarium, heated by steam and lighted by electricity and gas, consists of four stories and a basement, constructed in a substantial manner of brick and stone. The annex, a new building, has accommodations for one hundred guests. The two buildings are connected by a wide corridor enclosed in glass and heated in cold weather by steam. It affords ample space for exercise, and forms an excellent solarium during the winter months. These buildings are provided with all modern comforts and luxuries. On the grounds there are several large mineral springs which are used for drinking and bathing. The following analyses of the first four springs were made by Prof. S. A. Lattimore, of the University of Rochester. The fifth spring was analyzed by Prof. Charles F. Chandler.

SENECA SPRING—CALCIC.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium carbonate	9.90
Calcium sulphate	.47
Magnesium carbonate	2.10
Sodium chloride	.12
Silica	.07
Iron oxide	Trace.
Total	12.66

The water is entirely free from organic matter. This spring is situated two hundred feet higher than the buildings. It flows about 4,000 gallons of water per hour, and is used in the buildings for general domestic purposes.

VULCAN SPRING—ALKALINE-SALINE, CHALYBEATE.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium carbonate	29.80
Magnesium carbonate	11.37
Iron carbonate	1.87
Sodium chloride	149.06
Alumina	Trace.
Silica	Trace.
Total	192.10

Carbonic acid gas, large quantities.

This is a clear, sparkling water, and issues from the rocks at a depth of 100 feet. It resembles the waters of Kissingen, and has diuretic, tonic, mildly aperient, and slightly alterative properties.

SALUBRIA SPRING—MURIATED-SALINE.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	196.28
Calcium carbonate	19.68
Magnesium carbonate	.05
Silica	Trace.
Total	216.01

This spring issues from the rock at a depth of 250 feet, and resembles the class known in Germany as muriated (chloride of sodium) alkaline springs. It is somewhat similar to the waters of Vichy, Sachingen, and Bilin, but is more like those of Kissingen, Homburg, and Wiesbaden. The water has a stimulating effect upon the mucous membrane of the stomach and bowels and increases the flow of gastric juice and bile and promotes digestion and absorption. It has about the proper quantity of sodium chloride favorably to influence the process of osmosis. In large doses it is purgative.

NEPTUNE SPRING—SALINE, CALCIC, IODO-BROMATED.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium chloride	3,499.08
Magnesium chloride	635.67
Sodium chloride	6,368.33
Sodium iodide	Trace.
Sodium bromide	Trace.
Iron and alumina	Trace.
Total	10,503.08

This water constitutes a strong brine. It is quite remarkable for its large proportion of calcium chloride and its total freedom from calcium sulphate (gypsum). In its principal ingredients it resembles the brine springs of Michigan and the springs of Nauheim, Rehme, and Jaxtfelt. It may be classed as an iodo-bromated saline spring, and while not adapted for drinking purposes, is of great value for bathing. By charging the water with carbonic acid gas it becomes very similar to the Nauheim waters, and the treatment of glandular and rheumatic troubles, gout, lumbago, and sciatica, as well as the Schott method in chronic diseases of the heart, is carried out at Glen Springs. This water is also employed in the electro-chemical and electro-vapor baths, douches, sprays, etc. The spring is said to have its origin about 1,700 feet below the surface of the earth.

DEER LICK SPRING—ALKALINE, SALINE, CHALYBEATE.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	114.75
Potassium chloride	.23
Sodium bromide	.59
Sodium iodide	.04
Potassium sulphate	Traces.
Lithium bicarbonate	Traces.
Ammonium bicarbonate	1.08
Iron bicarbonate	1.73
Calcium bicarbonate	41.77
Magnesium bicarbonate	19.28
Alumina	.34
Sodium phosphate	Traces.
Silica	.64
Total	180.45

This water is clear and sparkling, without odor, and with a slightly astringent, mildly saline taste. Containing, as it does, besides chloride of sodium and iron, the rare ingredients of iodine and bromine (in combination), it may be ranked as a ferro-iodo-bromo-muriated spring. It is also rich in carbonic acid gas. It resembles in many respects the waters of Kreuznach, Hall, Duerkheim, and Krauenheit. It is an excellent drinking-water and, unlike many of the foreign iodo-bromated waters, may be taken as it flows without dilution. The Deer Lick water possesses tonic, alterative, diuretic, and mildly aperient properties. Tissue metabolism is promoted and the red globules of the blood are increased. Its physiological action fits it for use in anæmia, neurasthenia, chronic renal diseases, glycosuria, and chronic diseases of the uterus. *James K. Crook.*

GLEN SUMMIT SPRINGS. — POST-OFFICE. — Glen Summit, Luzerne County, Pennsylvania. Hotel.
ACCESS.—Viâ Lehigh Valley Railroad, about 150 miles from New York and 125 miles from Philadelphia.

This attractive summer resort is on the summit of the

Nescopic Mountain, 2,000 feet above tide-water. The romantic scenery of the surrounding country and its easy accessibility, coupled with an excellent modern hotel furnished with all the recent improvements, have of late years served to bring the place into well-deserved prominence. The charming surroundings and pure, invigorating mountain air offer an enticing refuge from the toils and cares of city life during the hot weather. Numerous cases are cited of the apparent complete arrest of incipient lung disease after a few weeks spent here. The springs about Glen Summit are of the ascending variety, welling up along the lines of jointing in the Catskill formation from far down in the subterranean recesses below. The temperature of the water is acquired from the rocks at depths sufficient to be beyond the influence of surface temperatures, and is cold enough to cause an unpleasant chill to the hands when submerged for a few seconds. An examination, however, will show that these waters owe their value rather to their purity and palatability than to their chemical ingredients. The following analysis was made by Prof. W. H. Dean, chemist, of Wilkesbarre, in 1896:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	0.23
Calcium sulphate	.20
Calcium carbonate	.20
Silica	.11
Iron oxide and alumina	.03
Free ammonia Nitrogen as nitrates Nitrogen as nitrites Albuminoid ammonia	.00
Loss on ignition	.33
Total	1.10

This shows a very pure and valuable water for domestic uses. Among other excellent pure-water springs in the neighborhood are the "Great Indian" Spring, yielding over 4,000 gallons hourly (if supplies the hotel); the "Twin" Springs, the "Bear" Spring, and the "Counterfeiter's" Spring. There are also other springs which have not been named. *James K. Crook.*

GLENN SPRING.—Tipton County, Tennessee.

POST-OFFICE.—Atoka. Cottages.

ACCESS.—Viâ Chesapeake, Ohio, and Southwestern Railroad (Mississippi Valley route) to Atoka; thence seven miles to springs.

This spring is situated under the shadow of Chickasaw Hills. It has quite an ancient reputation in Western Tennessee in the treatment of liver, kidney, and digestive disturbances. The spring is surrounded by a magnificent grove of trees, which lends a romantic charm to the neighborhood. It yields about ninety gallons of water per hour. The following analysis was made in 1880 by W. S. Lupton, analytical chemist:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium carbonate	1.58
Calcium carbonate	9.64
Magnesium carbonate	7.10
Potassium carbonate	.05
Iron carbonate	.54
Potassium sulphate	.27
Calcium phosphate	.01
Sodium chloride	.16
Silica	1.38
Total	20.73

Carbonic acid gas, 14.64 cubic inches.

This is a very good antacid and mild diuretic water with ferruginous properties. *James K. Crook.*

GLENN SPRINGS.—Spartanburg County, South Carolina.

POST-OFFICE.—Glenn Springs. Hotel and cottages.

ACCESS.—From Spartanburg, a distance of 12 miles by the Glenn Springs Railroad; double daily service.

These springs are located in a charming section of the country, broken by granite and sandstone hills. The elevation is about 1,000 feet above the sea-level. Many improvements have recently been added, the hotel having been greatly enlarged and comfortable cottages built. Many additional improvements are under way, and when completed Glenn Springs will bid fair to compete with the leading spas of the country. The following analysis of the Glenn Springs water was made in 1880 by C. U. Shepherd, Jr.:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Magnesium carbonate	3.32
Calcium sulphate	91.50
Sodium chloride	2.21
Potassium chloride	.53
Total	97.55

This analysis is probably incomplete. We are informed that a more recent partial examination of the water showed the presence of lithia in considerable quantities. The water has been in use many years. Numerous well-known physicians of South Carolina attest to its virtues, especially in disorders of the alimentary tract, dyspepsia, diarrhœa, dysentery, hemorrhoids, etc. It is said to be very useful in functional uterine affections, dysmenorrhœa, amenorrhœa, leucorrhœa, etc., as well as in torpidity of the liver and biliousness. *James K. Crook.*

GLENOLA SPRINGS.—(Formerly Wayland Springs) Nottoway County, Virginia.

POST-OFFICE.—Jennings Ordinary. No accommodations at present. These springs are located in a fine undulating stretch of country, half a mile from Jennings Ordinary, on the Southern Railroad, and six miles from Burkeville Junction on the Norfolk and Western Railroad. The location is about 500 feet above the sea-level, and the climatic conditions are of a very desirable character. The average summer temperature range is 77° F., winter 38° F. The temperature of the water is 48° F. There are several springs in the neighborhood, only one of which has been chemically examined. The following analysis was made by Prof. M. B. Hardin, of the Virginia Military Institute:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium carbonate	0.55
Lithium carbonate	.01
Magnesium carbonate	.26
Calcium carbonate	.70
Strontium carbonate	.03
Iron carbonate	.06
Manganese carbonate	Traces.
Potassium sulphate	.05
Potassium chloride	.09
Sodium chloride	.34
Sodium iodide	Traces.
Sodium nitrate	.11
Sodium phosphate	.01
Aluminum phosphate	.04
Ammonium nitrate	Traces.
Silica	1.92
Aluminum silicate	.20
Calcium fluoride (suspended)	Trace.
Titanium dioxide	"
Organic matter	"
Carbonic acid in the bicarbonates	.71
Total	5.08

Carbonic acid gas, 6.65 cubic inches.

This water is distinguished by the presence, in small but perceptible quantities, of the iodide of sodium. It may be ranked as an iodic-alkaline-carbonated water. The spring yields about thirty-eight gallons per hour the year round. Since its discovery, in 1883, it has been extensively used in cases of rheumatism, dyspepsia, and renal diseases. The location offers excellent advantages as a health resort. *James K. Crook.*

GLENWOOD SPRINGS.—Garfield County, Colorado.

POST-OFFICE.—Glenwood Springs. Hotels: The Colorado and numerous smaller hotels.

ACCESS.—Viâ the Denver and Rio Grande and the Colorado Midland branch of the Atchison, Topeka and Santa Fé Railroad. (For climatic and topographical features of Glenwood Springs, *vide* vol. iii., p. 222.)

The following analysis of the waters at Glenwood Springs was made by Prof. Charles F. Chandler of New York.

YAMPA SPRING—MURIATED, SALINE, SULPHURETED.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	1,089.83
Magnesium chloride	13.09
Sodium bromide	.56
Sodium iodide	Trace.
Calcium fluoride	Trace.
Potassium sulphate	24.04
Calcium sulphate	92.38
Lithium bicarbonate	.22
Magnesium bicarbonate	13.55
Calcium bicarbonate	24.37
Iron bicarbonate	Trace.
Sodium phosphate	Trace.
Sodium biborate	Trace.
Aluminum	Trace.
Silica	1.97
Organic matter	Trace.
Total	1,260.01

Carbonic acid gas is copiously discharged from the springs. Sulphureted hydrogen is discharged in perceptible quantity.

The temperature of the Yampa, the largest spring of the group, as taken by the writer late in October, was 124.6° F., and of the "Chicken-broth" or "Cocktail" spring, 126.4° F. The specific gravity of the former when cooled down to 83° F. was 1.013, and of the latter a trifle less. . . . That the waters here are strongly impregnated with sulphureted hydrogen is amply attested by the heavy deposit of sulphur crystals on stones seen in the springs, and on the surrounding sandstone walls. In the Yampa Spring the gas is in sufficient quantity to impart a decided bluish tinge to the water, rendering it slightly opalescent. The atmosphere immediately surrounding the springs is heavily charged with the escaping vapor. . . . The waters of the springs in flowing into the great swimming-pool are cooled to some extent by contact with the air and by evaporation, but the temperature is further lowered by an artificial cold-water geyser near the western end of the basin, supplied from a nearby mountain reservoir. An average temperature of 93° to 98° F. is thus maintained, and bathing may be indulged in the year round. Another interesting and unique feature of Glenwood Springs should not pass unnoticed. Across the Grand River from the Hotel Colorado, and two or three hundred yards upstream, is the entrance to a cave which extends for a considerable distance under the mountain. This cave has a natural temperature ranging from 105° to 110° F., and the atmosphere is saturated at all times with the vapor of water strongly impregnated with sulphur like that at the springs. After one has remained for a few minutes in the cave the surface of the body becomes bedewed with a profuse perspiration. Advantage has been taken of this ready-made Russian-bath vapor chamber, and a bath-house with the requisite adjuncts has been constructed at its entrance. The cave itself is lighted by electricity, and attendants are on hand to supply the wants of bathers either in the caverns or in the private rooms.

As we have thus seen, the waters at Glenwood, besides being saline and sulphureted, are highly thermal. Fuller data concerning their exact remedial value are desirable. During the writer's sojourn at the springs a considerable number of persons, some of them from distant points, were using the baths, but they were for the most part acting under their own guidance and were not under medical observation. As far as could be learned, however, the evidence is strongly in favor of the utility of the baths in cases of chronic rheumatism, gout, cutaneous and renal diseases. . . . In common with all hot baths, these waters are contraindicated in fatty degeneration of any important structure, in atheroma, aneurism, or structural heart trouble, and in the predisposition to pulmonary, cerebral, gastric, or intestinal hemorrhage. *James K. Crook.*

GLIOMA.—The glioma is a tumor consisting of proliferated neuroglia (the supporting tissue of the central nervous system) and of blood-vessels which are accompanied by a small amount of connective tissue. As the neuroglia cells are derived histogenetically from the epithelium lining the neural canal, the glioma is a tumor of which the essential or characteristic part is of ectodermic origin.

The glioma is found exclusively in the central nervous system of which it forms the commonest tumor. It occurs most frequently in the cerebrum, although the cerebellum is also a favorite site; it is found less commonly in the spinal cord. In the cerebrum it is often limited to the white matter and adjoining central ganglia, or it may arise from the latter and extend to the neighboring parts. Sometimes it reaches across the median line from one hemisphere to the other. It is more common in early than in adult life.

As a rule gliomata are solitary, but cases of multiple tumors have been reported Although the new growth generally appears well defined, the periphery is rarely sharply limited because a glioma is not surrounded by a capsule but tends to spread by infiltration of the adjoining brain tissue; it does not simply shove it back. By invasion of portions of convolutions it may enlarge them and render them denser or softer than normal. Gliomata do not, except possibly in rare cases (authorities differ), extend through the meninges or affect the bones of the skull, although they may set up a localized adhesive meningitis over the tumor. A zone of softening and of œdematous swelling often occurs for a greater or less extent around the growth.

In general a glioma of the brain is round. It varies ordinarily in size from a pea to a walnut, but in exceptional cases may be as large as an orange. In the spinal cord a tubular form is more common, probably on account of the pressure exerted by the narrow canal in which the cord lies.

The color of a glioma generally does not differ greatly from the white matter of the brain; it usually appears gray or yellowish-gray and rather translucent; but the more cellular forms may have a pinkish or reddish-gray or even dark red color from the numerous blood-vessels present. Degenerations, necrosis, and hemorrhages often cause marked changes in color, at least within the areas affected.

The consistence varies between hard and soft, depending chiefly on the number of cells and the amount of intercellular substance present in a given tumor, but œdema may also play an important part.

Two chief varieties of gliomata are recognized, depending on the consistence of the growth; these are the *hard* and the *soft* gliomata, but these descriptive terms really represent only the extremes of consistence, and all intermediate degrees occur. The term *myxoglioma* has in the past been applied to an œdematous glioma, but is manifestly incorrect because mucin has not been demonstrated to be present. A glioma containing numerous blood-vessels is sometimes called *glioma teleangiectodes*.

Secondary degenerations and necrosis are very common, as shown by yellow areas and by cysts of softening; the latter may occupy a large part of the original growth; they may contain a clear, cloudy, or dark brown fluid. In consequence of the numerous blood-vessels present, especially in the more rapidly growing gliomata, large and small hemorrhages are not infrequent; occasionally such a hemorrhage may be the cause of sudden death. As such vascular forms usually are soft, a large part of the tumor may be destroyed, so that careful and even microscopic examination may be required to determine the origin of the hemorrhage.

A glioma is essentially a benign growth; it does not give rise to metastases, but is dangerous partly on ac-

count of the pressure it exerts, partly from the destruction of the nervous tissue which it infiltrates.

Histologically the picture presented by gliomata varies greatly. In those of which the structure most resembles normal neuroglia the tumor tissue consists of round or oval vesicular nuclei surrounded by a slight amount of protoplasm and of chemically differentiated fibrillæ which are not processes of the cells but are an intercellular fibrillar substance. Several methods for staining them have been published. As in normal neuroglia tissue, these fibrillæ do not start from or end in the cells to which they owe their origin, but simply touch or adhere to the surface of the protoplasm in passing. They are generally straight or moderately curved, solid, smooth, and of uniform size, although the separate fibrillæ vary considerably in thickness; they do not branch or anastomose. This type of glioma (Fig. 2316) is particularly prone to infiltrate the surrounding nervous tissue. The peripheral limit of its growth is even more difficult to recognize under the microscope than in the fresh condition. Moreover, this type of glioma closely resembles the secondary growth of neuroglia tissue (*gliosis*) which takes place when nervous tissue is gradually destroyed, and also always forms to some extent around gliomata. It bears the same relation to gliosis that in the mesenchymal tissue a fibroma does to the fibrous or scar tissue formed in the liver and other organs under analogous conditions. There is this point to aid in the recognition of a gliosis: the form of the part affected is preserved in its normal relations, but shrunken in size.

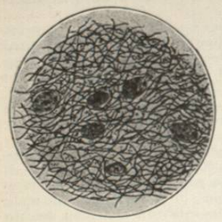

Fig. 2316.—From a Section of a Fairly Hard Glioma of the Small-Celled, Usually Infiltrating Type. The fibrillæ generally correspond in size to those of the normal neuroglia.

Fig. 2317.—From a Dense, Sharply Circumscribed Glioma Containing Few Cells and many very Coarse Fibrillæ.

The density of this form of glioma depends chiefly on the relation between the cells and the fibrillæ; the more fibrillæ the greater the density. In one case studied the tumor (Fig. 2317) was very discrete in outline and dense to the touch; microscopically it contained few nuclei and great numbers of very coarse fibrillæ which could easily be distinguished from the fine fibrillæ of the gliosis surrounding the growth.

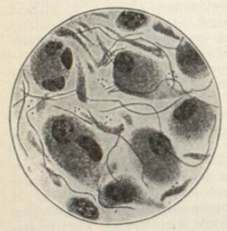

Fig. 2318.—A Large-Celled Glioma. The cells are often multinucleated, some have protoplasmic processes; the neuroglia fibrillæ are delicate.

In the cellular forms of gliomata (which correspond to the sarcomata of mesenchymal origin) the size of the cells in the different tumors varies greatly; large- and small-celled varieties are recognized. Whether differentiated fibrillæ are always produced by these rapidly growing gliomata is still an unsettled question. In a large-celled variety examined, in which mitotic figures were numerous, differentiated fibrillæ were fairly abundant in places (Fig. 2318).

To the above well-recognized types of gliomata another variety, never before described, must be added. It is as yet an unsettled question whether the ependymal cells lining the ventricles of the brain and the neural canal of the cord produce neuroglia fibrillæ; the relation of the ependymal cells to the neuroglia cells in post-embryonic life is therefore undecided. Weigert, however, has called attention to one peculiarity of ependymal cells: they each contain in the edge of the protoplasm lining the canal a small cluster of dots which stain by the differential methods for neuroglia fibres. In the cord just outside of the neural canal are often seen small clumps of epithelial cells in whose protoplasm similar differentiated dots appear. A very vascular tumor 4×5×3 cm., which hung from the roof of the fourth ventricle of the brain, was composed of cells arranged for the most part in clumps. The protoplasm of the cells was fused together; the nuclei, often six to a dozen or more in number, were arranged chiefly at the periphery. In the central part of nearly every one of these compound cells was a group of differentially staining dots lining a light staining circle in the protoplasm (Fig. 2319). Sometimes two or three clumps of dots were present. Similar groups of dots were found within single cells (Fig. 2320). There were also present in the tumor numerous small and large cysts (Fig. 2321) lined with epithelial cells in whose inner border occurred similar groups of dots. The so-called dots were not always round, but often appeared as short rods. Outside of the cells and cysts was a fine network of fine fibrillæ which stained differentially. This tumor would certainly suggest an origin from ependymal cells and the other cells mentioned above as occurring outside of the neural canal. It would also favor the view that at least some gliomata have their origin in congenital defects of development.

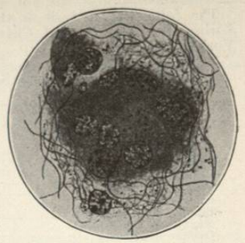

Fig. 2319.—From a Glioma Probably of Ependymal Origin. A clump of cells fused together and containing in their protoplasm differentially staining dots similar to those described by Weigert as occurring in the inner edge of ependymal cells and in the protoplasm of groups of epithelial cells lying near the neural canal.

Fig. 2320.—(From same tumor as that shown in Fig. 2319.) A Single Cell Containing Similar Dots.

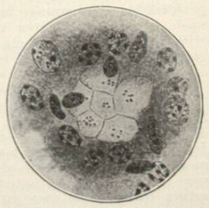

Fig. 2321.—(From same tumor as that shown in Fig. 2319.) The Bottom of a Small Cyst Showing the Dots in the Surface of Cells which do not Appear in the Section.

Gliomata of the retina have not been discussed because no one has yet shown by modern differential stains that they occur. The term *gliosarcoma* has been commonly applied to cellular gliomata; it can properly be applied only to a mixed tumor composed of rapidly proliferating neuroglia and mesenchymal tissues; it is extremely doubtful if such a tumor occurs. Another term that should be given up is *neuroglioma*. It should be applied to a new formation both of neuroglia tissue and of nerve cells. No evidence has yet been brought forward to prove that nerve cells in the central nervous system ever proliferate to form tumors. Nerve cells and nerve fibres often occur in gliomata in consequence of having been surrounded by the new growth. In certain large-celled gliomata some of the cells have protoplasmic processes and more or less resemble nerve cells, but they do not possess axis-cylinder processes or Nissl-granules; consequently they cannot be regarded as nerve cells.

The relation of glioma to syringomyelia will be discussed under the latter heading.

For the modern views on neuroglia tissue the reader is referred to Weigert's monograph, "Die Neuroglia," 1895. For a summing up of the neuroglia question to date, for the various differential stains for neuroglia fibres, and for complete bibliography see Huber, "Studies on the Neuroglia," *American Journal of Anatomy*, 1901, vol. i., p. 45. Consult also the article on *Neuroglia*.

F. B. Mallory.

GLOSSY SKIN. See *Hand and Fingers, etc.*

GLOTTIS, ŒDEMA OF. See *Laryngitis, Œdematous.*

GLOVES, USE OF, IN SURGERY.—Gloves have occasionally been used by surgeons at operations in order to protect the hand of the operator from foul discharges; but their general use to protect the patient from infective material introduced by the operator's fingers, has been developed in the last five years. The reason for this is the universally admitted fact that it is very difficult perfectly to sterilize the human hand. A secondary advantage of gloves lies in the saving of time and epidermis to the surgeon.

Various materials have been used to make surgical gloves. Wash-leather was one of the first, rubber cloth another; but as any thick glove is certain to make the fingers clumsy and blunt the sense of touch, such materials were found to be unsatisfactory. Gloves made of Lisle thread, and thin gloves of pure rubber have proved to be the most satisfactory, and these will alone be considered in detail.

Each material has its advantages. The cotton glove is cheaper than rubber, is more durable, is less easily torn, and is not slippery, a great advantage in some circumstances, as in tying ligatures, or in holding a slippery loop of intestine. Blood-smeared tools and fingers are slippery, and rubber increases this, while cotton does away with it.

On the other hand, the rubber gloves have certain advantages. Rubber is not porous, and hence no infective material can pass from the fingers to the wound through the glove if it is not pricked or torn. The tactile sense is better preserved through a thin rubber glove than through a thin cotton one. The very slipperiness of the rubber may be an advantage, as in thrusting the hand into the abdominal cavity. The chief point of difference, however, is the porosity of the cloth and the imporosity of the rubber. This makes the cotton more comfortable to wear, since the perspiration is not increased. The protection of the patient from infection is probably less perfect with the cotton gloves, especially if much fluid is used by the operator, or the operation requires much handling of wet tissues. In the ordinary dry operation, if the surgeon keeps his hands on the instruments and out of the wound as much as possible, the risk of infection must be a minimal one. If the cotton gloves become soiled they can be changed in a moment for others. In this way the risk of infection can be made still smaller.

Attempts have been made to render cotton gloves impervious to moisture by soaking them in various oils and other substances. The best results are obtained by use of a ten-per-cent. solution, in xylol, of paraffin of a low melting point. The gloves should be first dried in an oven, then immersed in pure xylol, and then for fifteen minutes in the paraffin solution. They are then taken out, dried, and sterilized by dry heat or steam. When soiled they may be washed with soap and water, dried, and again paraffined and sterilized. If cotton gloves are to be worn it is better to render the hands as nearly sterile as possible, before drawing them on, if the operation is such that the fingers must become wet.

Opinion is divided on the necessity of sterilization of the hands before operation, if rubber gloves are to be used. Theoretically this is not necessary, unless the glove is pricked or torn. In that case a new glove should be put on, or a thin rubber finger cot should be pulled on the affected finger. Some surgeons say that infection may take place in this way, and that therefore the hands should be disinfected before the operation. Even if this is done in a thorough manner, the gloves cause such an increase of perspiration, that the hands are certainly not sterile at the close of an operation, no matter what their condition may have been at its beginning. McBurney therefore advocates washing the hands simply with soap and water, drying them, and rubbing them with sterilized starch powder, to facilitate the putting on of the gloves. By avoiding the use of irritating antiseptic solutions, he says he is able to keep the skin of his hands in good condition, and thus to feel as well through the glove finger, as he could do without a glove if the skin of his fingers was harsh and rough.

The sterilization of rubber gloves is not so simple as that of the cotton ones, but it need by no means be so complicated as some of the directions imply. A simple and efficient method is as follows: Wash the gloves inside and outside with soap, hot water, and a little ammonia. Boil them for fifteen minutes in a one-per-cent. soda solution, taking care that they do not come into contact with any metal while in the sterilizer. Remove the gloves with sterile forceps and lay them in a sterile towel, which is then to be wrapped around them. It is not necessary to fill the glove fingers with gauze, nor to attempt to dry the inside of the gloves, as this necessitates some handling. If the hands are dry and are covered with sterile powder, the gloves can be drawn on without difficulty. This is a much better method than to fill the gloves with sterile water before putting them on. Water and perspiration will then continue to drip from the wrists at intervals during the operation, and the wound may in this way become contaminated.

A more complicated way in which to sterilize the gloves, but one by which they are kept perfectly dry, is the following: Wash the gloves on both sides with a one-per-cent. sodium-carbonate solution, rinse them in sterile water, and dry them over a flame. Dust them with sterile soapstone powder, wrap them in gauze or a towel, and sterilize them for two hours in a formalin oven.

There is no difficulty in having absolutely sterile clothing, water, sponges, towels, ligatures, sutures, instruments, and other utensils. The air and floor probably never cause infection. The skin of the patient must rarely do so, or stitch abscesses would be more common. The hands of the surgeon must therefore be held responsible for nearly all of the infection which arises in clean operative cases. In regard to the use of gloves McBurney naively remarks: "Those surgeons who already with naked hands have entirely satisfactory results certainly do not need rubber gloves. But I am sure that they will be useful to those who too frequently meet with imperfect results." The extent to which gloves have been taken up by the younger men as a routine surgical procedure in their operations, is a sufficient proof that their use will in a few years be recognized everywhere as a precaution which few careful surgeons will care to disregard.

Edward Milton Foote.

GLUCIN is the sodium salt of amido-triazin-sulfonic acid, and is obtained by the action of fatty aldehydes on the dye-stuff chrysoidin, with conversion of the condensation products into their mono- and di-sulfonic acids. Like saccharin, glucin is used as a sweetening agent in diabetes; but, while it is less sweet than saccharin, its taste is more like that of sugar. One part is equivalent to about one hundred parts of cane sugar. It is said not to interfere with the digestive functions.

W. A. Bastedo.

GLUTOID CAPSULES are gelatin capsules which have been hardened in formalin. They are made in three grades, capable of resisting the action of the gastric juice for from one and a half to twelve hours, and were introduced by Sahli for the conveyance of drugs which it is desired not to have set free in the stomach. As a stomach test, Fromme proposes the following: Potassium iodide is administered in these capsules, and if the iodide reaction in the saliva occurs within three and one-half to five hours there is good gastric motility and normal pancreatic digestion. The capsules are said to disintegrate readily in the pancreatic juice, but no statement is made as to the effect of the formaldehyde set free.

W. A. Bastedo.

GLUTOL, formacoll, formaldehyde-gelatin, or glycoform, is an odorless, coarse brownish-white powder, made by dissolving 500 gm. of gelatin or isinglass in water, adding twenty-five drops of formalin, and reducing to dryness in formaldehyde vapor. It is stable, indifferent, not liquefied or changed by heat or moisture, and can be sterilized. It is not of itself antiseptic, but, though tough and insoluble, it sets formaldehyde free and is absorbed when applied to raw animal tissues. It is said not to allow the formation of granulations, and to form a very hard clean scab. This, of course, must be watched lest it retain the secretions from the wound, or allow the collection of pus. In incised and lacerated wounds and abscesses, Foote (Vanderbilt Clinic, New York) has not succeeded in getting primary union, and the dressings were followed by pain lasting several hours, yet he considers it of much value. He uses it in the following manner: the skin is cleansed with soap and water, turpentine, ether and bichloride, cocaine is injected, a free incision is made, and pus and sloughing tissues are curetted away. The wound is then filled with glutol and a dry dressing applied. The glutol is soon absorbed so that the surfaces of the wound are not kept apart as by gauze packing. No drain is necessary, as the powder allows drainage by capillary action. It has not power to kill pus germs, but will control their development. Schleich, its introducer, Keen, Da Costa, and many other foreign and American surgeons have found it a valuable succedaneum for iodoform. Schleich sprinkles it over the surface line of sutures when operating.

W. A. Bastedo.

GLYCERIN.—Glycerin ($C_3H_8O_3$) is, chemically, an alcohol—propenylic alcohol ($C_3H_5(OH)_3$), and results from the decomposition of natural fats by alkalies. The United States Pharmacopœia recognizes under the title *Glycerinum*, Glycerin, "a liquid obtained by the decomposition of vegetable or animal fats or fixed oils, and containing not less than ninety-five per cent. of absolute glycerin." Glycerin can be obtained as a by-product in the making of lead plaster or of soap, but is derived in purest condition by acting on fats with water at a high temperature, under pressure. Under those conditions the fats break up into glycerin and fatty acids. Glycerin so prepared is known as *distilled glycerin*, and the famous Price's glycerin is of such kind. Glycerin appears as "a clear, colorless liquid, of a thick, syrupy consistence, oily to the touch, odorless, very sweet and slightly warm to the taste. When exposed to the air, it slowly abstracts moisture. Specific gravity: not less than 1.250 at 15° C. (59° F.). Soluble, in all proportions, in water or alcohol; also soluble in a mixture of 3 parts of alcohol and 1 part of ether, but insoluble in ether, chloroform, carbon disulphide, benzin, benzol, and fixed or volatile oils" (U. S. P.). On heating, glycerin undergoes some decomposition: boils at 329° F., and finally is wholly decomposed and dissipated.

In its medicinal relations glycerin is unique, because of the following combination of qualities: It is at once viscid, non-volatilizable, unalterable on exposure, antiseptic yet non-poisonous, and has an unusual range of solvent powers, dissolving bromine, iodine, sulphur iodide, the fixed alkalies, lime, tannic and other vegetable acids, many vegetable organic principles, such as salicin and santonin, sugar, gum, and pepsin, and very many inorganic salts. Physiologically glycerin, in concentrated condition, is somewhat irritant to very sensitive parts, probably because of abstraction of water from the tissues; but upon ordinary surfaces it is perfectly bland. Swallowed by the human subject in quantities of an ounce or more, glycerin produces no other effect than a very mildly laxative action; but experimentally administered to the lower animals it proves toxic, producing tetanus in the frog, apparently from direct action upon the muscular tissue (Amidon: *Archives of Medicine*, October, 1881), and varied signs of nervous derangement in rabbits and dogs, even to death by conjoint failure of respiration and heart action.

The uses of glycerin are, pharmaceutically, as a solvent, preservative, and sweet-tasting viscid addition to fluid preparations, or pill masses; and surgically, as an antiseptic, bland, and unalterable viscid application to wound surfaces and sores. Medically, glycerin has been used as a laxative in cases of hemorrhoids, as a preventive of flatulency, pyrosis, and the fermentation of the ingesta in the alimentary canal (Ringer and Murrell), and as a harmless sweetening addition to foods in cases of diabetes mellitus. A reputation which the substance once enjoyed, of tending directly to oppose the morbid process of diabetes, is now no longer credited. Glycerin may be given internally in quantities varying from a teaspoonful to a tablespoonful.

The United States Pharmacopœia makes official *Suppositoria Glycerini*, Suppositories of Glycerin. These suppositories are compounded of glycerin, with a little sodium carbonate and stearic acid, and each suppository contains 6 gm. (about gr. xciij.) of glycerin. They are used for the relief of constipation, but should not be employed habitually, for fear of irritating the bowel.

Certain solutions of substances in glycerin constitute pharmacopœial preparations called *Glycerites*.

Edward Curtis.

GLYCOSOLVOL is a diabetic remedy made by the action of oxypropionic acid on peptone, and by the action of sodium theobromine upon the zymogen of trypsin.

W. A. Bastedo.

GLYCYRRHIZIN. See *Licorice*.

GODBOLD MINERAL WELL.—Post-Office.—Summit, Pike County, Mississippi. Hotels and boarding-houses in Summit.

Access.—Viâ Illinois Central Railroad to Summit, thence a few minutes' walk to the well. This well-known chalybeate well is located in the suburbs of Summit, a village 108 miles northwest of New Orleans and 75 miles south of Jackson. The location is 420 feet above tide-water. The well has a depth of eighteen feet and a diameter of four feet. The supply of water is unlimited. The following analysis was made by J. H. Laster, chemist, of New Orleans:

One United States Gallon Contains:

Solids.	Grains.
Iron protochloride	11.42
Calcium sulphate	Trace.
Sodium chloride	1.73
Calcium carbonate	Trace.
Silica	"
Loss	.84
Total	13.99

The water is said to possess much value in the treatment of diarrhœa and dysentery and in disorders of the liver and kidneys. It is bottled and sold, but many persons visit the well in person for the purpose of drinking its waters. The water is almost a pure chalybeate, the remaining ingredients being practically inert.

James K. Crook.

GOERBERSDORF—This place is mentioned chiefly because it is the locality in which the renowned Brehmer Sanatorium - the oldest in existence, founded in 1854—is situated. The village of Goerbersdorf is located in the Southeastern part of Germany, in the province of Silesia, at an altitude of 1,840 feet. It is in the valley of the Steine, which runs from northwest to southeast, and is sheltered by densely wooded heights. The climate is not unlike that of the Adirondacks, for example, its main features consisting of "atmospheric purity, freedom from dust, dryness of soil, shelter against strong wind, and abundant sunshine." Its altitude is not sufficient to give it the character of an Alpine climate, though in a general sense it is a mountain climate. The season is an all-the-year-round one.

Fig. 2322.—Brehmer's Sanatorium at Goerbersdorf.

Here, nearly fifty years ago, Brehmer founded his famous sanatorium, the parent of all the others. Begun in a small way, it now consists of large and handsome buildings with several detached villas, surrounded by very extensive grounds. Meeting with much opposition at first, Brehmer, before he died in 1889, had the satisfaction of seeing his method adopted more or less closely in all systematic attempts to cure phthisis; other sanatoria established on the principles laid down by him; and more favorable results than had ever before been obtained in the treatment of the disease. To-day the Brehmer hygienic-dietetic treatment, with perhaps some modifications, is the best we have, when weighed by results.

Brehmer's theory of the underlying cause of phthisis was a disproportion between the heart and lungs, the latter relatively voluminous, the former small, with thin, flabby, feeble walls. Consequently he considered that the most important object in the treatment was to strengthen the heart, and methodic hill-climbing the best means for obtaining this result. For this purpose, in the park of about 300 acres surrounding the sanatorium, he constructed over nine miles of footpaths of gentle ascent, with frequent benches and pavilions for resting. Measured walks of measured steepness constituted at that time a fundamental principle of his treatment, and only the febrile cases and those with some contraindicating complication were exempt. The other sanatoria have modified this plan, and place the emphasis upon the *Ruheluft-Kur*, rest in the open air. This method is followed, to be sure, at Görbersdorf, but not to the extent that it is at Falkenstein and Hohenhonnef. At these latter it is the striking feature of the treatment.

The sanatorium building is a large gothic structure of brick, of very imposing appearance, in the midst of a beautiful garden; and besides the old and the new *Kurhaus* there are three annexes or villas. The internal arrangements are very extensive, consisting of a winter garden, conversation and reading rooms, large dining halls, various reception rooms, an imposing gothic staircase, and bedchambers hygienically arranged. One notices various suggestive maxims painted on the walls, like the following: "Wolle nur eins, und das wolle von Herzen" (Desire but one thing and that with all the heart). "Die lohnendste Arbeit für einen Kranke ist: gesund zu werden" (The labor which best repays a sick man is to get well).

Besides the sanatorium proper, there are two detached buildings of plainer construction, where patients are received at a reduced price. There is also a chemical and bacteriological laboratory, a meteorological observatory, and a medical library. The clientage comes from Germany, Russia, Hungary, Poland; and I found two patients from America. The supervision of the patient's life is most exact and continuous; every two weeks he is examined anew by the physician in charge, and is always under the observation of one or another of the physicians, all of whom, except the director, take their meals with the patients. Each is individualized in his treatment. As an illustration of the painstaking care, I noticed in the little reading library certain starred books, and on

inquiry I found that they were of a rather exciting nature and were forbidden to those of nervous temperament as likely to produce a rise of temperature or some other unfavorable symptom. There are five meals a day, reinforced by milk. Kefir is prepared on the premises in large quantities and is much used, especially in gastro-intestinal troubles and in conjunction with alcoholic drinks for night sweats. Most of the patients use wine or beer. In fever milk is the principal diet, and as much as three litres in twenty-four hours is given a patient.

Hydrotherapeutics, as in the other sanatoria, is an important adjunct of the treatment in the form of simple bathing with acidulated water, the wet pack with mas-

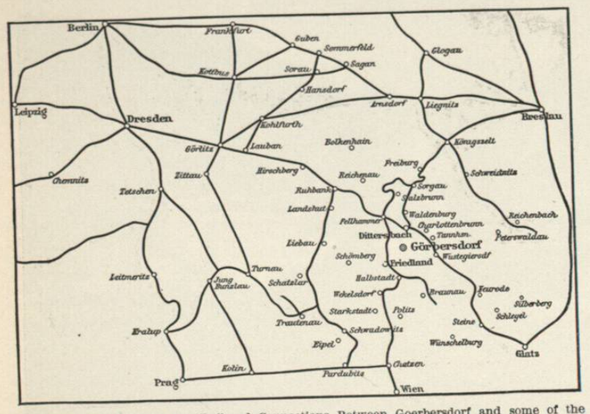

Fig. 2323.—Map Showing the Railroad Connections Between Goerbersdorf and some of the Chief Cities of Central Europe.

sage, and cold douches. I was interested in watching the method of giving the latter. In a room adjoining the douche sits a physician at a table, with a watch provided with a second hand, and with the names of those for whom the bath is prescribed. The attendant informs the physician through a speaking tube when the patient is ready, and the doctor turns on the water (which he alone manipulates) for the specified number of seconds, as indicated in his list. When the douching is completed, the attendant throws a blanket about the patient and rubs him down. Only the stronger and convalescent patients are allowed this douche.

The sputum is deposited in shallow cuspidors containing sawdust, scattered about the building. Each patient also has a Dettweiler pocket spit-cup. The sputum is destroyed by burning.

A few minutes' walk from the Brehmer establishment brings one to Dr. Römpler's sanatorium, which is also extensive, accommodating about one hundred patients. Although not so imposing as Brehmer's, it is equally comfortable and complete, and, on account of the lighter character of the architecture, gives one a very pleasing and cheerful impression. In common with the other sanatoria, it possesses a fine winter garden, which is practically a great conservatory affording an extensive and beautiful view even to the horizon, and is the favorite lounging place for the inmates when the weather forbids outdoor life. The "Liegehalle" is in the second-story balcony with a glass roof, which seemed to me preferable to those on the ground floor. The extensive park is laid out with pleasant paths of varying grades (some protected) extending up to the richly wooded mountain-side, with seats, terraces, and pavilions, which afford comfortable and picturesque resting places. The method of treatment is similar to that of the larger establishment; it comprises abundant alimentation, outdoor air (rest in the reclining chairs and walking in the paths of gentle ascent) and hydrotherapeutics.

Dr. Römpler's personality is most pleasing, which doubtless has much to do with the success he attains. He is a great lover of nature and inspires his patients with his enthusiasm for outdoor life. In a few words he well sums up the conditions of cure: "Upon the ability of the organism to *resist* depends finally the possibility of cure. To increase this power of resistance through gradual blunting of the susceptibility to irritation (hardening); through the improvement of the nutrition and quality of the blood; and, finally, through the avoidance of hurtful influences and through instruction and training for future guidance, is the principal problem of the phthisiotherapeutist."

The third sanatorium at Goerbersdorf is that of Dr. Weicker, which is a small one, and, as Dr. Weicker says, on the plan of a home rather than on that of a large institution, he and his wife living in the institution with his patients; and the method is essentially that of the others. It was originally founded by the Gräfin Pückler, under whose name it still stands. Dr. Weicker also has charge of a people's large sanatorium in Goerbersdorf, consisting of seven villas, which received 256 persons during the year 1896. It was established for working people who are members of the so-called insurance society for the disabled and aged; the expense being defrayed by the society, which allows each member a certain sum. The insurance societies of Germany of this nature are finding it to their interest to send their consumptive members to such an institution and have a certain proportion of them returned to their usual avocation, rather than support them indefinitely as invalids. Of 185 persons who were dismissed in 1896, 70.3 per cent. were capable of resuming their work; and for the three years from 1894 to 1896 inclusive, of those communicated with who were dismissed in these respective years as capable of resuming their work, 60, 71, and 89 per cent. respectively, still remained so at the beginning of 1897; so that from an economic point of view this plan of people's sanatoria is a profitable venture for the insurance societies.

Goerbersdorf is reached either viâ Breslau and Friedland, or from the station of Dittersbach on the Silesian Mountain railway. Either from Friedland or Dittersbach one has to ride four or five miles to the sanatoria. As to the results obtained at Brehmer's sanatorium, of 75,032 patients treated from 1876 to 1886, 26.6 per cent. were reported "cured and almost cured," of the first, second, and third stages of the disease collectively.

Edward O. Otis.

GOITRE.—(Synonyms: *Bronchocele, Struma, Derbyshire Neck, Kropf* [Ger.].) German writers apply the term "struma" solely to enlargements of the thyroid gland. Among English writers the word has a double meaning. It is used to indicate not only disease of the thyroid gland but also a tuberculous condition of the lymph nodes. Hence its use may lead to confusion.

The word "goitre" is probably a corruption of the Latin "guttur," the throat. Like many terms of popular origin it cannot be defined satisfactorily in scientific language. It is used rather loosely. It seems best to apply the term goitre to all enlargements of the thyroid gland. Wölfler, Orth, Kaufmann, and Ziegler use the word in this sense. Virchow, Murray, and Ewald attempt to restrict it to the benign thyroid tumors. If the use of the word is to be limited at all it would be better to designate as goitre that form only of thyroid tumor which occurs endemically or epidemically in certain regions of the world.

Historical Note.—The occurrence of endemic goitre is known to antedate the Christian era. That the disease abounded among the Alps was well recognized by the ancients. Juvenal asks—"*Quis tumidum guttur miratur in Alpibus?*" References to goitre by Greek and Roman physicians are few and indefinite. Paracelsus, who studied endemic goitre in the Duchy of Salzburg, was the first medical writer to treat of the subject in a satisfactory manner. In his work, which was based on personal observations, he indicated the relation of goitre to cretinism. Scientific inquiry in regard to goitre, according to Hirsch, may be said to date from the work of Malacarne, published toward the close of the eighteenth century.

Knowledge of the pathological anatomy of thyroid tumors began with the studies of Ecker, Frerichs, and Rokitansky. A little later Förster's monograph on the malignant tumors of the thyroid appeared. In 1867 Virchow published his classical description of the anatomical forms of goitre. Wölfler in 1883 finished his monumental work on the development and structure of thyroid tumors. Clinical knowledge of the subject has been greatly advanced by the work and writings of Lücke, Kocher, Ewald, Berry, and Murray.

In America, the first and only attempt at a systematic study of the distribution of goitre was made by Benjamin Barton, professor in the Medical School of the University of Pennsylvania, and was issued in 1800. The monograph was entitled "A Memoir Concerning the Disease of Goitre as it Prevails in Different Parts of North America." W. Gibson in 1820 published an able essay which included a study of the morbid anatomy and means of diagnosis of thyroid tumors.

In Dr. Osler's paper on cretinism published in 1893 he showed that endemic goitre no longer exists in those regions where, early in the last century, it prevailed extensively. The endemic disease has been studied in Michigan by Dock, and among the North American Indians by Munson.

Anatomy.—The thyroid (*glandula thyreoidea*) is a ductless gland, which consists of two lateral lobes connected by a middle portion, varying markedly in size, called the isthmus. The thyroid gland lies in front of the larynx and trachea, and is bound to them by fibrous bands so that it follows the movements of these organs in deglutition. The outer margins of the lateral lobes are anterior to the common carotid arteries. Sometimes a slender pyramidal process (*lobus pyramidalis*) projects upward from the middle of the isthmus to the hyoid bone. The lateral lobes (*lobus dexter et sinister*) measure 5 to 7 cm. in length, 3 to 4 cm. in breadth, and 1.5–2.5 cm. in thickness. The weight of the entire gland varies between 30 and 60 gm. (Orth). Weibgen found that the most active growth occurs between the eleventh and twentieth years. The average weight between the sixth and tenth years was 11.9 gm., between the eleventh and twentieth years 36.7 gm. The thyroid is slightly heavier in men than in women. It is relatively larger in the young than in adults.

Although a portion of the lateral lobes is developed from the fourth branchial clefts, the greater part of the gland arises as a diverticulum of the pharynx.

In the embryo the thyroid body consists of solid nests and strands of epithelial cells. Later these solid masses become converted into closed vesicles filled with colloid and lined with a single layer of cylindrical or cuboidal cells.

Wölfler holds that small nodules of embryonic tissue are normally present in the developed gland, and furnish the congenital *Anlage*, in the sense in which Cohnheim used that term, for the development of tumors. It is fully as probable, however, that these embryonic remains which Wölfler describes are in reality small adenomas.

His has described what he considers to be the rudiments of an excretory duct (*ductus thyreoglossus*) which extends from the thyroid to the tongue and opens at the site of the foramen cæcum. The finding of accessory thyroid tumors in the root of the tongue is certainly in support of this view, although Kanthack was not able to confirm the observations of His.

The thyroid vesicles range from 0.045 mm. to 1 mm. in diameter. The epithelial cells vary in size and shape. Sometimes in young individuals they have a cylindrical form, but usually they are cuboidal. Low, flat cells, according to E. Schmid, are seen chiefly in old age. On fresh examination colloid droplets and a varying number of fine and coarse granules can be demonstrated within the cells. The granules are most abundant near the free margin of the cell.

The viscid, homogeneous colloid substance present in the vesicles usually appears vacuolated in hardened specimens (see Fig. 2324). It takes nearly the same color with eosin as do the red blood corpuscles. Ernst has shown that colloid can be distinguished from hyalin by staining more deeply with fuchsin when treated with Van Gieson's mixture.

The origin of colloid has not been fully determined. It is probably a secretion of the epithelial cells. These have the characteristics of secreting cells. Virchow believes that the cells secrete a clear fluid into the vesicles, and that the colloid is formed from the fluid. Many histologists and physiologists hold to the view of Frerichs that colloid is formed within the cells or is the product of a specific transformation of the cells. They regard the process as partly secretory and partly degenerative. Reinbach holds that colloid in normal glands is a secretion, but the colloid in goitres is formed by the degeneration of the cells. He adduces little evidence in support of the latter hypothesis, and Müller is probably right in regarding the colloid substance of both normal and goitrous thyroids as a secretion and not a degeneration.

How the thyroid secretion enters the circulation is not known. The explanation of Biondi and Schmid that rupture of the vesicles occurs as a physiological event and thereby the colloid escapes into the lymphatics is

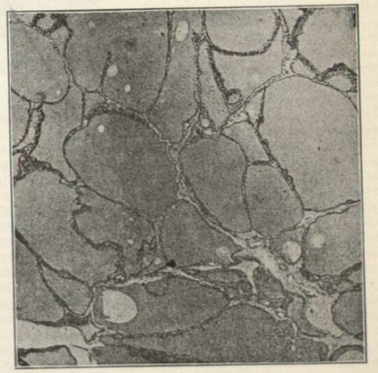

Fig. 2324.—Accessory Thyroid Tumor from Root of Tongue. The vesicles are filled with colloid and lined with low epithelium. (× 41 diam.)

improbable. The existence, between the epithelial cells, of ducts communicating with the lymphatics, as described by Hürthle, is doubtful.

A number of histologists have described colloid within the lymphatics of the thyroid, and Podack found it in lymphatics outside of the thyroid. The observation by