

their consequences are also against the specific theory; and it does not appear that the vascular lesions of periarteritis nodosa ever present nodular foci of cell accumulations with central necrosis such as occur in the gum-mous form of syphilitic arteritis. Periarteritis nodosa must be regarded, for the present, as a distinct disease, histologically and clinically. Syphilitic periarteritis should not be included under periarteritis nodosa, as is done by some writers like Mott in Allbutt's "System."

Many of the clinical symptoms are evidently due to secondary lesions in the internal organs. Although the intramyocardial branches of the coronary arteries are generally involved, the myocardium itself usually presents but slight changes. Whether bronchitis and other inflammatory changes in the lungs are directly secondary to changes in the bronchial arteries, the pulmonary being usually free (von Schrötter), cannot be stated. The mucous membrane of the gastro-intestinal tract has been found to be the seat of multiple ulcers and hemorrhages; the ulcers in the stomach being more of the nature of erosions while those in the intestines may resemble ty-

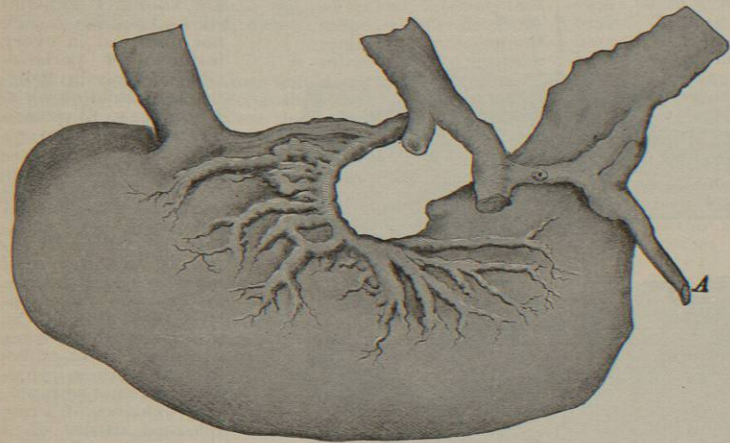


FIG. 637.—Growth of Carcinoma into the Gastric and Portal Veins and the Radicles of the Latter, Secondary to Carcinoma of the Pylorus. The posterior surface of the stomach, which is turned so that the pylorus is to the left, is exposed. A, Cut end of gastro-duodenal vein.

phoid ulcers. These changes are regarded as the result of circulatory disturbances in the areas nourished by the affected branches, many of which become entirely occluded by thrombosis. Enlargement of the mesenteric glands is usually present. The spleen may be the seat of infarcts, in various stages of absorption, caused again by the occlusion of terminal arteries. Pressure of the nodules in the intrahepatic branches of the hepatic artery on the bile ducts may cause jaundice (von Schrötter). Severe changes are produced in the kidneys. Multiple ischaemic necrosis results from thrombosis of the affected arteries. Degeneration of the glomeruli, hemorrhages, parenchymatous and interstitial changes develop, due either to extension of the vascular changes or to the action of toxic substances in the blood. The changes in the peripheral nerves and in the skeletal muscles explain well the nervous and muscular phenomena observed clinically. The pressure of changed arteries upon adjacent nerves may cause degenerations, and in Freund's case foci of degeneration in the nerves were found to correspond to nodules upon intraneural arterial branches. The development of nodules upon the intramuscular arteries gives rise to granular and fatty disintegration of the muscle fibres and to waxy changes.

In Weichselbaum's case the rupture of an aneurism, 2 cm. in diameter (the largest so far recorded in periarte-

ritis nodosa), upon the arteria profunda cerebri gave rise to hemorrhage.

TUMORS.—The primary tumors composed of blood-vessels—the various forms of angioma—are described in the article on *Tumors*. Here is described also the part that blood-vessels play in the general dissemination of the malignant tumors. Primary tumors rarely develop in the walls of blood-vessels. Brodowski has described a primary sarcoma of the thoracic aorta, which started in the adventitia and extended through the muscular coat and into the intima; the sarcomatous infiltration of the intima produced a marked thickening of the latter.

I have described an interesting pedunculated outgrowth of the intima of the basilar artery, which at that time was regarded as a fibroma. It is possible, however, that the outgrowth in reality was the result of an endarteritic proliferation of inflammatory nature.

Several instances of myoma, fibroma, and sarcoma have been described as primary in veins (Orth).

Secondary tumors occasionally occur in the walls of the blood-vessels. Quincke, in "Ziemssen's Encyclopaedia," cites an instance, described by Broca, of cancer at the root of the aorta with rupture into the pericardium. Friedrich describes metastatic nodules of a papillary cystocarcinoma of the ovary in the wall of the thoracic and abdominal aorta and the renal artery; here the metastases evidently occurred through the vasa vasorum. The nodule in the thoracic aorta ruptured into the lumen of the vessel.

Extensive intravascular growth of malignant tumors, especially in the veins, takes place in the case of sarcoma of various kinds, especially of the bones, in adrenal tumors of the kidneys, etc. Intravascular growth of this kind has extended from the renal vein, for instance, to the heart.

In carcinoma of the stomach I have observed an extensive intravenous growth of the tumor resulting in a kind of carcinomatous injection of all the veins about the lesser curvature of the stomach and of the portal vein (Fig. 637). Orth observed the entire venous plexus of the dorsum of the foot filled with sarcomatous masses.

Norica and Haret* describe a carcinoma of the stomach with metastases in the mesenteric, mediastinal, and deep cervical glands, followed by carcinomatous invasion and thrombosis of the superior vena cava, the two brachiocephalic, subclavian, and internal jugular veins. In 1885 Oulmont collected nineteen cases of obliteration of the superior vena cava. He distinguished two groups, namely, obliteration by pressure and obliteration by concretion. The first group comprised five cases due to cancer of the mediastinum or of the lung, two cases due to tuberculous lymph glands, and four cases due to aortic aneurism. The second group included five cases of thrombosis and three cases of cancerous invasion. Comby and Rendu each report a clinical case in which aneurism of the aorta was thought to be the cause. I have examined post mortem a case of this kind, in which an aneurism of the ascending aorta compressed the superior vena cava, which was wholly obliterated by the formation of fibrous tissue in the intima. The occlusion took place gradually and resulted in a great dilatation of the subcutaneous thoracic and abdominal veins which for years furnished routes for collateral circulation. Letulle lays stress on occlusion of the large veins of the neck and mediastinum on account of propagation of carcinomata of the glands, the thyroid, and the thymus.

* Bulletins et mémoires de la Société Anatomique de Paris, 1899, lxxiv., 861.

Gallavardin reports thrombosis of the large cervical veins in mitral stenosis. The extensive occlusion described by Norica and Haret has been equalled by the case of Reid only, which is included in Oulmont's series. There was in Norica and Haret's case dilatation of subcutaneous veins of the right side of the chest and abdomen, showing that the blood in the superior vena cava was diverted into the inferior by way of the azygos vein. This diversion furnished a sufficient collateral circulation. The condition of the thoracic duct was not examined.

Ludvig Hektoen.

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BLOUNT SPRINGS.—Blount County, Alabama. Post-Office.—Blount Springs. Hotel. ACCESS.—Via Alabama and Chattanooga Railroad, also via Louisville and Nashville Railroad to Elyton. The springs are about thirty miles northwest from this station. The waters of Blount Springs may be classed as saline sulphureted. The springs are six in number, and are located in a triangular valley 1,580 feet above the sea level.

ONE UNITED STATES GALLON CONTAINS:

Solids.	No. 1 Red Spring- R. T. Brumby.	Sweet Spring- Brumby.	Spring No. 4. Summers.
	Grains.	Grains.	Grains.
Magnesium carbonate.....	4.40	3.60	9.40
Calcium carbonate.....	6.80	4.48	5.72
Barium carbonate.....	.....	.....	.91
Iron carbonate.....	1.92	1.12	3.19
Sodium carbonate.....	.....	.....	.....
Magnesium sulphate.....	1.60	2.40	1.27
Calcium sulphate.....	.....	.....	Trace.
Calcium phosphate.....	.....	.....	7.07
Potassium chloride.....	32.32	30.88	23.21
Sodium chloride.....	6.00	.....	2.04
Magnesium chloride.....	.....	.....	.14
Iodides.....	.....	.....	.16
Magnesium iodide.....	.....	.....	Trace.
Lithium.....	.....	.....	Trace.
Alumina.....	.....	.....	2.44
Silica.....	.....	.....	55.55
Sulphur.....	.....	.....	.....
Total.....	53.04	42.48	55.55
Gases.	Cu. in.	Cu. in.	Cu. in.
Carbonic acid.....	6.00	6.00	4.72
Sulphureted hydrogen.....	14.96	12.56	30.67
Oxygen.....	.....	.....	7.08
Nitrogen.....	.....	.....	.....

J. K. Crook.

BLUE HILL MINERAL SPRING.—Hancock County, Maine.

POST-OFFICE.—Blue Hill. Hotels. ACCESS.—Via steamer from Portland, also by stage from Ellsworth, fourteen miles distant.

The Blue Hill Mineral Spring is located two and one-half miles northwest of Blue Hill village, and about six hundred feet in perpendicular height above the base of Blue Hill Mountain. Its situation assures freedom from all surface impurities. The existence of the spring was noticed by Dr. Charles T. Jackson in his second report of the geology of the State of Maine, published in 1838. It was not until recently, however, that improvements were made. A handsome and commodious building has been erected for the comfort of tourists and visitors at the springs, and a large bottling plant established. An analysis by Prof. S. P. Sharples, of Boston, resulted as follows:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride.....	0.29
Sodium sulphate.....	.81
Sodium carbonate.....	.15
Calcium carbonate.....	1.87
Iron carbonate.....	.59
Silica.....	1.07
Organic matter.....	Traces.
Total.....	4.78

This is an excellent table water, and it also possesses mild diuretic and tonic properties. It is used commercially. J. K. Crook.

BLUE LICK SPRINGS.—Saline County, Missouri. POST-OFFICE.—Marshall. Cottages at spring. ACCESS.—Via Chicago and Alton, or Jefferson City, Boonville and Lexington branch of the Missouri Pacific Railroad to Marshall, thence eight miles by stage south to springs.

Saline County, Missouri, is entitled to eminent distinction as a water-producing district. Thousands of clear, pure-water springs of more or less volume are well distributed over its surface. They are found in large numbers along the Missouri, Blackwater, and Salt River bluffs, and at the base of the minor hills in all parts of the county, and are unfailing at all periods of the year. The most remarkable natural resources of the county, however, are its mineral waters, which for volume, variety, and medicinal value are among the finest in the country. Not less than two thousand mineral springs, some of them of immense flow, are found in the limits of the county. Some of these springs will, no doubt, take a prominent place among the health resorts of the country when they shall have been properly developed. At the Blue Lick Springs are more than thirty distinct fountains in a pretty valley at the base of picturesque wooded bluffs, all within a radius of thirty feet. The largest of the group, known as the "Gum" Spring, is an immense salt fountain of 57° F., which was formerly the site of extensive salt works, but is now the centre of a large bathing establishment. Nearby is the "Blue Lick" Spring, the most important of the group. Then there are numerous black sulphur, magnesian, chalybeate, and sweet springs, besides uncounted saline springs. Many of these have been analyzed by State Chemist Paul Schweitzer, who found in them the following mineral ingredients:

Sodium chloride.	Calcium sulphate.
Potassium chloride.	Barium sulphate.
Calcium chloride.	Calcium sulphite.
Magnesium chloride.	Sodium sulphite.
Lithium chloride.	Ammonium nitrate.
Calcium carbonate.	Magnesium nitrate.
Iron carbonate.	Calcium phosphate
Magnesium carbonate.	Alumina.
Manganese carbonate.	Silica.
Magnesium bromide.	Sulphur.
Magnesium iodide.	Carbonic acid gas, large quantities.
Magnesium sulphate.	Sulphureted hydrogen gas, large quantities.
Potassium sulphate.	

Many of these ingredients serve to endow the waters with valuable remedial qualities. A complete qualitative analysis of the Blue Lick Spring, for which the collection is named, resulted as follows:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium carbonate.....	57.84
Magnesium sulphate.....	26.13
Magnesium chloride.....	10.94
Sodium chloride.....	493.88
Potassium chloride.....	.64
Silica.....	8.16
Alumina.....	10.23
Organic matter.....	2.48
Total.....	610.30
Gases.	Cu. in.
Free carbonic acid.....	53.22
Sulphureted hydrogen.....	Not estimated

It will be seen that the waters are very similar to those of the Blue Lick Springs of Kentucky, for which these springs are named.

The water is well adapted for the treatment of constipation, especially when due to engorgement of the portal system. On the other hand, it is also said to act beneficially in many cases of chronic diarrhoea. It acts with advantage in many of the conditions due to a sluggish liver, such as hemorrhoids, jaundice, etc. Being a very efficient diuretic, the water is useful in certain renal and bladder disorders. Within sixty steps of the Blue

Lick Spring are three black sulphur springs; two hundred and fifty yards south is the Sweet Spring, which has been found to be a very efficient diaphoretic and diuretic. It is entirely free from sulphur and forms a very pleasant beverage. James K. Crook.

BLUE RIDGE SPRINGS.—Botetourt County, Virginia. POST-OFFICE.—Blue Ridge Springs. Hotel and cottages.

ACCESS.—Via Norfolk and Western Railroad. The hotel is located near the railroad station.

This resort has a picturesque location in the midst of the Blue Ridge Mountains, the elevation being about thirteen hundred feet above the sea level. The springs yield about one hundred and twenty gallons of water per hour, having a temperature of 52° F. the year round. The water has been analyzed by Prof. Henry Froehling, with the following results:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Magnesium sulphate.....	47.01
Calcium sulphate.....	100.13
Sodium sulphate.....	.37
Potassium sulphate.....	.05
Magnesium carbonate.....	1.61
Calcium carbonate.....	3.96
Strontium carbonate.....	.29
Barium carbonate.....	.02
Manganese carbonate.....	.02
Nickel and cobalt carbonate.....	Trace.
Iron (ferrous) carbonate.....	.11
Lead carbonate.....	Trace.
Copper carbonate.....	Trace.
Sodium chloride.....	Trace.
Lithium chloride.....	1.26
Sodium arsenate.....	.04
Sodium iodide.....	Trace.
Sodium bromide.....	Trace.
Calcium fluoride.....	Trace.
Magnesium nitrate.....	Trace.
Ammonium nitrate.....	.35
Aluminum phosphate.....	.03
Aluminum silicate.....	.15
Silicic acid.....	1.35
Total.....	157.37
Carbonic acid combined.....	2.57
Gases.	Cu. in.
Carbonic acid (free).....	38.20
Sulphureted hydrogen.....	3.00

The water is used commercially. It is pleasant to drink and bears transportation well. It is useful in dyspepsia, especially when attended by acidity, and it seems to act as a corrigent or regulator of secretion, being efficacious both in diarrhoea and in constipation. The water also possesses excellent tonic properties. J. K. Crook.

BOCCONIA.—A powerfully medicinal and poisonous genus of plants in the *Papaveracea* or Poppy family. "*B. cordata* Willd.," more properly *Maclaya cordata* (Willd.) R. Br., of China and Japan, is a stout perennial herb, largely cultivated as an ornamental plant, the roots of which are used medicinally. It contains at least three alkaloids (*vide* Schlotterbeck), namely, protopine in large amount, β -homochelidonine, and chelerythrine, and possibly sanguinarine also. *B. arborea* Watson, of Mexico, and *B. frutescens* L. and *B. integrifolia* Kunth, of tropical America, are small trees or large shrubs, the bark of which is used similarly. These barks are rich in alkaloids and resinous matter. The alkaloids have been isolated and somewhat studied in the Instituto Medico Nacional of Mexico, and names assigned them; but apparently insufficient care was taken in comparing them with known alkaloids of other members of the family, notably of sanguinaria. If they are not absolutely identical with the latter, they are at least very similar in physiological action, as well as chemically. These drugs have been very little studied in any way, but richly deserve it. The writer has found the leaves of *B. frutescens* highly prized among the Indians of South America, but their uses there give little clue to their special properties. H. H. Rusby.

BOERNE, Texas, is a town of 800 inhabitants situated in the southwestern part of the State, 30 miles northwest from the city of San Antonio. Its altitude is about 1,670 feet, which gives it somewhat the characteristics of a mountain resort of moderate elevation. The soil is composed of gravel and sand with occasional streaks of adobe, and a substratum of porous limestone. The drainage is good, both on account of the slope and on account of the porous character of the soil.

Dr. I. M. Cline, quoted in Solly's "Medical Climatology," 1897, who has charge of the Texas weather service, describes the country in which Boerne lies as follows:

"Between latitude 29° 45' and 30° and to the 100th meridian on the west, the elevation changes rapidly from one thousand to two thousand feet, with considerable irregularity, and is broken with deep ravines and small creeks, and along the western border, as the two-thousand-foot line of elevation is reached, it is much sculptured by erosion. The soil between these elevations is very irregular in its formation, but is to a great extent of the black, stiff soil over the eastern portion, and then blends toward the west with black and red sand and red loam, with a pebbly soil in some parts; it is also crossed here and there by strips of white, sandy land, with a growth of scrub post-oak."

The monthly mean temperature for eight years, arranged by seasons, is given by Solly as follows: Winter, 50°; spring, 69°; summer, 79°; autumn, 65°. Mean for January, 49°; for July, 81°; for the year, 65°. The total seasonal rainfall, based on nine years' records, is given by the same authority as follows: Winter, 5.9 inches; spring, 9.6 inches; summer, 6.4 inches; autumn, 4.9 inches. Annual mean, 27 inches. The mean relative humidity is from 66 to 72 per cent. Occasionally during the winter months there is a sudden fall in temperature during the prevalence of a "norther"; this fall depends on the velocity of the wind and ranges from 5° to 25° F., and lasts from a few hours to three or four days. The windfall is light, the prevailing winds blowing from the south and southeast, the velocity ranging from four to seven miles an hour, and occasionally increasing to from fourteen to twenty-five miles during a "norther." "From the fact," says Miller ("Boerne and Adjacent Country," by Dr. William Miller, Resident Physician), "that the wind passes over miles of land covered with grass and trees before reaching Boerne, it is not accompanied with clouds of dust or sand," which, as Dr. Miller adds, is a very important matter with persons suffering from diseases of the respiratory organs.

There are a few light morning fogs in the late autumn and winter, not exceeding a total of eight days in the year. The average number of sunny days is 277, and of cloudy 88. The number of days in which there is more or less sunshine, and in which an invalid can be out of doors, is 355. In Boerne and the adjacent country there are no prevailing diseases of a contagious or epidemic nature. The whole of this elevated district is above the yellow-fever line (Miller).

The water supply is chiefly obtained from wells of an average depth of thirty-five feet, and the water is considered fairly good for drinking purposes. Cistern water is also used. About three miles from Boerne are the Indian Mineral Springs, so named from the fact that they were visited periodically by various Indian tribes, who came bringing their sick with them. This water is also used as a table water. The analysis made by C. F. Chandler, Ph.D., of New York, is as follows:

IN ONE UNITED STATES GALLON THERE IS:

Solids.	Grains.
Chlorine in chlorides.....	0.512
Equivalent to sodium chloride.....	.844
Oxides of iron and aluminum.....	.093
Lime.....	45.832
Magnesia.....	6.435
Sulphuric acid (SO ₃) in sulphates.....	67.246
Silica.....	.355
Solids of evaporation.....	138.388

There are several fairly good hotels and boarding houses in the town or near by. Boarders are also received in the ranch houses in the neighborhood. The attractions are riding, driving, hunting, and fishing, and there are various pleasant excursions in the vicinity. The class of diseases which this climate is likely to benefit are pulmonary tuberculosis, chronic rheumatism, renal, nervous, and malarial diseases.

When one considers the low relative humidity, the equable climate, and especially the very large number of sunny days in the year (277), the inference is warranted that Boerne is admirably fitted for the open-air treatment of pulmonary tuberculosis. While experience has verified this conclusion, the fact still remains that here, as in so many other climatically excellent health resorts in this country, there is lacking the certainty of finding such hygienic conditions as the consumptive requires. Climate is only one of the factors in the cure of phthisis, and it will often prove an illusory one unless those other factors are also present, viz., careful medical supervision and opportunities for obtaining proper food, well-ventilated sleeping apartments, and means for the rest cure. Edward O. Otis.

BOIL.—(Synonyms: French, *Furoncle*, *Clou*; German, *Blutschwär*; *Furuncle*.)

DEFINITION.—A boil or furuncle is the result of an acute phlegmonous inflammation of the skin and underlying connective tissue surrounding a skin gland or follicle, which is followed by suppuration and the extrusion of a central slough or core.

SYMPTOMS.—A boil begins with a certain amount of infiltration around a skin gland or follicle, which soon manifests itself as a small, somewhat itchy, and slightly painful pimple. Very soon the lesion assumes a conical shape, becomes more tender, and is surrounded by a zone of reddened skin. The boil increases in size with considerable rapidity until about the third or fourth day, when it reaches its full development. The pain likewise grows in intensity, becoming a dull ache, and there is much throbbing and sensation of tension. All of these symptoms are intensified at night. The area of the furuncle varies considerably, depending upon the density of the skin in the affected part, and the consequent facility with which the infiltration may spread. Finally, at the apex of the boil a point of suppuration appears, and in a week or ten days the lesion matures or becomes "ripe." If pressure is made over a boil before it is quite mature a little pus or bloody serum may be made to exude; but later, either spontaneously or as the result of surgical interference, the core escapes, although not always very readily. The expulsion of the core exposes to view a small cavity which quickly heals, to be followed in turn by a purplish discoloration and ultimately by a minute scar. Lymphangitis and swelling of the lymphatic glands frequently occur in connection with boils, and sometimes constitutional symptoms are marked. When a core does not form, as occasionally happens, it is called a blind boil. Boils may occur singly or in groups; often they come out in successive crops, and keep on appearing for long periods, constituting the condition known as furunculosis. The so-called "furuncular diathesis," especially as seen in children, may produce great restlessness, sleeplessness, anorexia, and emaciation due to pain and the free discharge of pus. It may be of interest in this connection to mention that under the name of "hidradenitis suppurativa" Pollitzer* has called attention to a suppurative inflammation of the sweat glands which results in their destruction and the production of scars. It is the same condition originally described by Verneuil.

SITUATION.—While boils may develop anywhere on the general surface, except the palms and soles, they show a marked predilection for the back of the trunk and neck. They also occur in the armpits and at the borders of the lids (styes) and in the external auditory canal, in which latter situation they excite great pain.

* Jour. Cutan. and Genito-Urin. Dis., January, 1892.

PATHOLOGY AND ETIOLOGY.—It is now conceded that boils are due to the entrance of pus cocci (staphylococcus aureus or albus) into the openings of skin glands or hair follicles. According to the researches of Bockhardt,* if the micro-organisms do not penetrate into the cutis, simple impetigo results; if they pass vaguely into the cutis through some lesion in the epidermis, a skin abscess will occur; but if they pass along the duct of a sweat gland or penetrate the lumen of a hair follicle, the process of suppuration is more acute and a furuncle results, the suppurating gland or duct representing the core. Direct inoculation or experimental cultures show conclusively the contagious nature of boils, as was pointed out long ago by Startin. According to Melsome,† it is not possible to obtain cultures in the oedematous area surrounding a boil; however, when a furuncle is large, or is rapidly followed by others in its immediate vicinity, the pus cocci pass through the abscess walls and travel along the lymphatics, producing swelling of the lymph glands, and in severe cases they may even gain access to the general circulation and induce septicæmia.

It is said that women are less subject to boils than men, and that while boils are not uncommon in infants, they are most frequent in boys and young men. Solitary boils are often found to be due to some local irritation, e.g., chafing of rough or frayed garments, decubitus, etc., the irritated skin more readily allowing the penetration of pus organisms. A condition of furunculosis of the back of the neck is not infrequent as the result of infection from the fingers of barbers and the use of the dirty implements of their trade.

Sweaters and other garments worn by young men in training and in athletic games frequently become infected and give rise to boils in otherwise singularly healthy persons.

It is a matter of common experience that furuncles complicate many disorders of a depressing character, e.g., diabetes, variola, typhoid fever, etc. Severe pruritic diseases are also often complicated or followed by boils; for example, eczema in children. In the hot summers experienced in this country the very frequent prickly heat is frequently followed by boils, both in children and adults.

The condition known as furunculosis, or recurrence of boils in crops, is due to local reinoculation and not to the state of the blood, although it is undoubtedly true that the nutrition of the soil will have much to do with the pathogenetic action of the pus cocci.

With our present knowledge of the pathology of boils it may be readily understood how boils sometimes occur quasi-epidemicly in families and schools.

DIAGNOSIS.—A boil is to be distinguished from a carbuncle by its conical shape and its single suppurating point; a carbuncle, on the other hand, is larger and flatter than a boil, has several openings, and is surrounded by a much more brawny induration. The difference really is one of degree, the carbuncle being, however, clinically, a much more formidable affection.

TREATMENT.—In all cases, especially when the eruption has existed for a long time, it is advisable, in addition to the local measures presently to be described, to look into the hygienic surroundings and general health of the patient. The urine should be examined for albumin and sugar, and if these are discovered the proper treatment for those conditions should at once be adopted. All local sources of irritation and possible infection should be diligently sought and removed. Old smoking jackets, sweaters, etc., should be regarded with suspicion. A proper disinfection of barber's tools should be insisted upon.

Now that the specific character of the furuncle is better understood there is less insistence upon the administration of the host of remedies that are supposed to be "good for boils."

Among such remedies may be mentioned yeast in doses

* Monatshefte für Derm., No. 10, 1887.
† Allbutt's System of Medicine, vol. 1., 1896.

of a half-wineglassful morning and night, and the sulphide of calcium so highly praised by Ringer. It is quite possible that the sulphide of calcium may possess some germicidal properties, but it must be given in much larger doses than those usually recommended. Dilute sulphuric acid in ten to twenty drop doses, well diluted, every three or four hours, is highly esteemed by some physicians. Medicines that improve the general nutrition, thus rendering the individual less susceptible to local infection, are of undoubted value in furunculosis; for example, iron, arsenic, cod-liver oil, the hypophosphites, and the syrup of the lacto-phosphate of lime may be prescribed with hope of benefit in suitable cases.

As regards the direct treatment of the boil itself an effort should be made to prevent if possible, or at least limit, the suppuration. Very often a boil may be aborted by the application of a salicylic acid plaster, as after L. Heitzmann's formula:

R Acidi salicylici ʒ ij.
Emplastri saponis ʒ ij.
Emplastri diachyli i.
M. S. Spread on cloth.

Other remedies of this class are iodine, boric acid in saturated solution, and ichthyol. Halle and Jamieson advise the following application:

R Tincturæ iodii ʒ i.
Acidi tannici ʒ ss.
Pulveris acaciæ ʒ ss.

A few drops of carbolic acid injected into the apex of a boil will often cause it to abort. An electrolytic needle will do the same thing. If a hair occupies the centre of a furuncle it is best to extract it.

Unna's mercuric-carbolic plaster often succeeds in aborting a boil; but if suppuration has already begun, nothing succeeds so well in hastening it. A hole should be cut in the centre of the plaster corresponding to the apex of the boil. When boils are very painful the common practice is to apply a hot flaxseed poultice, but unless it is rendered antiseptic by the addition of carbolic acid it is apt to prove mischievous by favoring reinfection in the vicinity. The following ointment serves all the purposes of a poultice, does not encourage reinfection, and allays pain most decidedly:

R Pulveris iodoformi ʒ i.
Unguenti vaselini plumbici ʒ i.
M. S. Spread on patent lint.

If the patient exhibits any idiosyncrasy in regard to iodoform, aristol or xeroform may be used in its place.

The internal administration of appropriate doses of phenacetine will usually secure sleep at night. If incisions are imperatively demanded the parts may be rendered insensible by a spray of ethyl chloride. It is an absolute necessity, especially where boils are multiple, to smear the intervening and surrounding skin with a paste made of equal parts of oxide of zinc and vaseline and four-per-cent. boric acid. Washing the skin with green soap and warm water and mopping on a solution of bichloride of mercury 1 to 1,000 often puts a stop to reinoculation. Clean underclothes should be put on frequently and the patient warned against carrying infection to other parts with his fingers. Squeezing and other manipulation of a boil should be avoided. After the boil has burst the resulting cavity should be treated on ordinary surgical principles. W. A. Hardaway.

BOLDO.—The leaves of *Peumus Boldus* Molino (fam. *Monimiaceæ*). This is a large, much-branched shrub or small tree of Chile, evergreen and highly aromatic, the leaves opposite, the flowers small, white, panicle, dioecious. The leaves usually dry of a brownish color. They are coriaceous and very thick, ovate or oval-ovate,

blunt or emarginate, entire, rough, papillose and stellate-hairy. They contain numerous large oil vesicles, and have a strong, somewhat turpentine-like odor and an aromatic, burning taste.

Boldo contains about two per cent. of a powerful volatile oil, with resin, a little tannin, three per cent. of the glucoside boldin, and one-tenth per cent. of the alkaloid boldine. The statements concerning the properties of the constituents are very discordant. According to Merck, the hepatic properties reside in the glucoside, the dose of which is 0.065 to 0.2 gm. (gr. i. to iiij.), and the hypnotic properties in the alkaloid, the dose of which is 0.002 to 0.0065 gm. (gr. $\frac{1}{50}$ to $\frac{1}{16}$).

The properties of the leaves are very marked, and it seems strange that the drug should not have acquired a higher repute. Its original use was that of an alterative, with special reference to the liver. Marked sedative properties were encountered, and it has been considerably used as a hypnotic in insomnia. For the latter purpose the dose should be 2 to 4 gm. (ʒ ss. to i.), for the former a fourth as much. The drug should be systematically investigated. It is now very little used.

H. H. Rusby.

BONDUC.—*Bonduc Nut; Nicker Tree.*

The seeds of *Casalpinia Bonducella* (L.) Roxb. and of *C. Bonduc* Roxb. (fam. *Leguminosæ*).

These plants are not only abundant in India, where they are native, but have been very largely introduced to most tropical countries. The seeds have the shape of a smooth pea, but are one-half or three-fourths inch in diameter, and smooth and shining. Those of the *C. Bonducella* are of a peculiar gray lead-color, those of *C. Bonduc* yellowish brown. The former especially are classical in the medical history of India, the uses being numerous and varied, and some of them doubtless ignorant. Its chief reputation appears to have been in the treatment of malaria, and careful trial has shown it to possess antiperiodic properties of some importance. The seeds contain twenty-five per cent. of fixed oil, which has been expressed and used like other fixed oils. They also contain about two per cent. of an amaroid, which is a white powder, and apparently the active constituent. Like all seeds of their class, they are rich in protein. The shell contains tannin. The antiperiodic dose of the bitter principle is 0.1 to 0.2 gm. (gr. iss. to iiij.).

H. H. Rusby.

BONE. (HISTOLOGY.)—Bone tissue is closely allied in genesis and in many of its structural features to the other members of the connective-tissue group, the most evident difference between it and other tissues of the same class consisting in the solidity and firmness of the basement substance. For in this, as in other connective tissues, we have to consider the cells and the basement substance and the way in which they are arranged to form the different varieties of tissue. The solidity of the basement substance of bone depends largely upon the deposition within it of calcium phosphate and carbonate, with small amounts of calcium fluoride, sodium chloride, and salts of magnesium. These inorganic salts, which form about two-thirds of the weight of the bone, are deposited in an organic matrix in such a condition of minuteness that they are not recognizable as particles even with high powers of the microscope. They may be dissolved out of the bone with dilute acids, leaving a translucent flexible material behind, which preserves the shape and general structural features of the bone.

The soft matrix which is left, after the extraction of its inorganic salts, may be converted into gelatin by boiling in water. It is sometimes called the cartilage of bone, or ossein; but there is no sufficient reason for using these names, since the matrix is really, both in chemical nature and in minute structure, closely allied to the basement substance of fibrillar connective tissue.

The varied gross appearances which different bones or different parts of the same bone present have given rise to the names *compact bone tissue* and *cancellous bone tissue*

or *spongy bone*. But the essential structure of the tissue is the same in both, the difference consisting largely in the arrangement of the bone tissue proper, and its abundance in proportion to the marrow spaces or vascular canals which it encloses. The compact bone tissue is in general found in the outer portions of the bones, while the cancellous tissue is situated internally, either entirely filling the central portions or bordering the marrow cavities.

Bones are surrounded by a layer of vascular connective tissue called the *periosteum*, and contain, either in large central cavities or in the smaller spaces with which they are everywhere permeated, a delicate vascular tissue called *marrow*. We have, then, to consider: 1. bone tissue proper; 2. the periosteum; 3. the marrow.

1. *Bone Tissue Proper.*—If we remove the inorganic salts from one of the long bones, by soaking it in dilute chromic or picric acid (see article on *Histological Technique*), and then make a thin longitudinal section, microscopic examination with a low power of these sections, stained with eosin and mounted in glycerin, reveals a picture like that represented in Fig. 638. The more solid portions of the bone show a series of narrow ca-

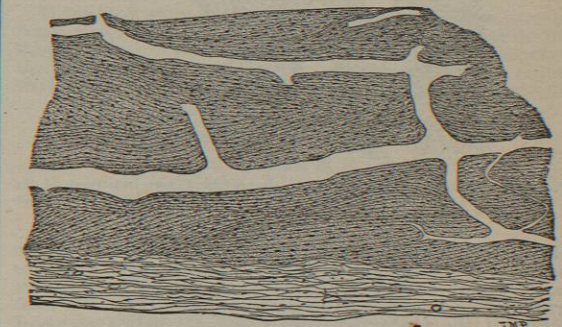


FIG. 638.—Longitudinal Section of Human Tibia, Decalcified and Mounted in Glycerin. (× about 20 and reduced.)

nals, running in a direction in general parallel with the long axis of the bone, and in frequent communication with one another by similar short transverse or oblique canals. These are the so-called *Haversian canals*, and contain blood-vessels, and, depending upon their size, few or many variously shaped cells. Along these Haversian canals the basement substance will be seen arranged in a series of lamellæ, while in and between these lamellæ lie small, elongated cavities called *lacunæ*, in which are the bone cells. Transverse sections, however, through the middle of a long bone, reveal with more distinctness the arrangement of the lamellæ of the basement substance (Fig. 639). The Haversian canals, which are cut transversely or obliquely across, are surrounded by a series of concentric lamellæ. These Haversian lamellæ, with their enclosed lacunæ, together with the canals and their contents, form the so-called *Haversian systems*. Filling the larger and smaller irregular areas between the Haversian systems are other parallel lamellæ, which run in various directions, and which are called *intermediary systems*. Beneath the periosteum, at the external surface of the bone, is a thinner or thicker system of lamellæ called *circumferential* or *general lamella*, which cover over large numbers of the Haversian systems and surround the entire bone. Sometimes similar but less well-defined general systems of lamellæ border the marrow cavity, but more often the internal surface of the compact bone is beset with a series of projecting bony trabeculae, consisting of lamellæ similar to those forming the systems of the compact bone, and inclosing large, irregular spaces. This is the cancellous tissue bordering the marrow cavity. In the heads of long bones, and in