HOWARD SPRINGS, LAKE COUNTY, CALIFORNIA.—

POST-OFFICE.—Putah. Hotel and cottages.

ACCESS.—From San Francisco, Sacramento, or Woodland to Calistoga, thence by stage. These springs are fourteen in number and are picturesquely located in a mountainous pine region 2,240 feet above the level of the sea. Following is a quantitative analysis of the principal springs by Prof. W. T. Wenzell, California College of Pharmacy:

ONE UNITED STATES GALLON CONTAINS:

Solids.	No. 1—Excelsior. Grains.	No. 2—Twin Springs. Grains.	No. 3—Eureka. Grains.	No. 4—Neptune. Grains.	No. 5—Soda. Grains.
Sodium chloride	101.67	30.96	35.70	29.61	9.38
Potassium chloride	1.13	19.71	25.65	14.64	12.81
Lithium chloride	8.35	.03	.09	.06	
Sodium bicarbonate	34.10	73.97	82.35		37.72
Magnesium bicarbonate	2.81	114.10	110.25	73.34	59.32
Calcium bicarbonate	6.30	10.88	5.84	32.14	35.62
Iron bicarbonate	1.85	1.14			
Alumina	.03	.15	.10	.19	.13
Oxide of iron			4.95	.20	.09
Silica	34.10	9.24	3.40	8.34	6.95
Organic matter	.14	.32	.20	.25	.26
Total	190.48	260.50	268.53	158.77	152.28
	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.
Free carbonic acid gas	134.00	77.50	150.00	120.00	117.00
Temperature of water	75° F.	102° F.	110° F.	85° F.	60° F.

It will be observed that the "Excelsior" spring is quite similar to some of the Saratoga springs of New York. The percentage of sodium chloride, however, is much less than that of its Eastern namesake, the Saratoga Excelsior, while the amount of sodium bicarbonate is about twice as great. The water is mildly purgative, and on account of the considerable quantity of lithia which it contains is useful in a number of urinary complaints, especially calculus and gravel. The "Twins" No. 2, although only six feet apart, show a remarkable difference of temperature, one being cold at 50° F., the other thermal at 102° F. The water of the hot spring is a very efficient cathartic, and is used in habitual constipation, chronic dyspepsia, and in certain diseases of the liver and kidneys. On account of the large quantity of iron contained in the "Eureka" spring, No. 3, it has gained great celebrity in the treatment of anæmia, debility, etc. The "Neptune," No. 4, is also quite rich in iron, besides containing considerable quantities of magnesia, lime, and sodium. The water is tonic and mildly laxative in its action. The "Soda" spring, No. 5, being very rich in carbonic gas, forms a pleasant cooling effervescent draught, if the water be taken directly from the spring. It contains a little iron and has mild tonic properties.

James K. Crook.

HOWARD SPRINGS, LAUDERDALE COUNTY, ALABAMA.—

POST-OFFICE.—Florence. Hotels at Florence.

The springs are located one mile and a half from the Tennessee River, and half a mile from Florence at the junction of the Memphis and Charleston, and Louisville and Nashville railroads. The river is navigable for ten months in the year. Florence has a population of 8,000 and possesses abundant hotel facilities.

The climate in this section is mild and equable and the weather is not subject to sudden changes. In 1890 it is said that the highest temperature was 89.5° F., the lowest 64° F. The average summer temperature ranges from 79° to 84°, and the nights are almost always cool, requiring light blankets. The usual winter temperature ranges from 54° to 59° during the day, and from 40° to 48° at night. The coldest weather ever known in Florence was in January, 1893, when the mercury fell to 9.5° above zero. The elevation here is about 1,100 feet above the sea level, and the surrounding country is gently undulating. The springs are three in number. No quantitative analysis has been made, but according to an old qualitative examination by Professor Tuomey, State Geologist, Spring No. 1 contains:

Hydrochloric acid.	Sulphurous acid.
Sulphuric acid.	Sulphuric acid.
Calcium carbonate.	Alum.
Iron carbonate.	Magnesia.

Another spring is said to contain ferric alum in large proportions, and has a considerable reputation in the treatment of diarrhœa and dysentery. The third spring, about 500 feet distant from No. 1, contains sulphur, and is used in skin diseases. The waters of No. 1 have an extensive reputation in the treatment of Bright's disease, diabetes, and other disorders. For various reasons these springs have been more or less neglected since the Civil War.

James K. Crook.

HUANUEO BARK. See *Cinchona*.

HUBBARD SPRINGS.—Lee County, Virginia.

POST-OFFICE.—Jonesville.

ACCESS.—Viâ Louisville and Nashville Railroad to Hubbard Springs station, thence a walk of two hundred yards to springs. These springs are located seven miles from Jonesville in southwest Virginia. The surrounding country is rugged and broken in character, the springs being in a charming valley at the foot of the Cumberland Mountains. The elevation is about 1,450 feet above the sea level. There are four springs located in a space of thirty feet square, and known respectively as the "White Sulphur," the "Black Sulphur," the "Chalybeate," and the "Frustom." An analysis has been made, but the results are not known at this time. The waters are stated to be much valued in rheumatism and in disorders of the liver, kidneys, and gastro-intestinal mucous membrane. No special accommodations are provided for visitors, but board and lodging may be obtained in the neighborhood.

James K. Crook.

HUDSON HOT SPRINGS.—Grant County, New Mexico.

POST-OFFICE.—Hudson. Hotel.

ACCESS.—Viâ Atchison, Topeka, and Santa Fé Railroad (Silver City branch to Hudson, thence by coach to springs). The location is twenty-five miles from Deming, at the junction of the Southern Pacific and Atchison railroads. At present the accommodations for guests are limited, the hotel having been destroyed by fire and not rebuilt. Plans are completed, however, for the erection of a hotel of fifty rooms with all modern conveniences, and it will no doubt be ready for occupancy before this work is printed. The location is 5,000 feet above the sea level, and is in a broad valley open on the south for many miles, and surrounded on other sides by mountains distant from ten to fifteen miles. On the east, four miles distant, flows the Mimbres River, whose valley, from one to two miles in width, is dotted with a succession of fine farms and orchards. The variations of temperature are never extreme in this region, the air being pure and dry and the rainfall light, occurring almost entirely in July and August. The flow of water from the springs has not been measured, but it is sufficient to irrigate eight acres of land. The following analysis of the Hot Springs was made by Prof. W. D. Church, chemist:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Silica	1.55
Oxide of iron and alumina	.50
Calcium carbonate	4.45
Magnesium carbonate	2.62
Soluble sulphates and carbonates of sodium and potassium	13.55
Sodium chloride	2.27
Total	24.94

Temperature of water, 142° F.

It is said that certain of the diseases of the blood, liver, kidneys, and stomach are much benefited by the hot-water baths conjoined with the internal administration of water of the cold spring. On account of the equable climate it is safe to visit this resort at any season of the year.

James K. Crook.

HUNTER'S HOT SPRINGS.—Gallatin County, Montana.

POST-OFFICE.—Springdale. Hotel and sanitarium.

ACCESS.—Viâ Northern Pacific Railroad to Springdale, where stages connect with the springs, three miles distant, the road crossing a magnificent iron bridge on the Yellowstone River. Hunter's Springs are situated at the base of the foothills of what is known as the Crazy Range of mountains. The location is 1,000 miles west of St. Paul and 920 miles east of Portland, Ore., and has an altitude of 4,480 feet above the sea level. The surrounding scenery is of the grand and romantic character commonly found in the Rocky Mountains. The climate is dry and salubrious, and severe storms are unknown. The thermometer seldom reaches as high as 98° F. in summer or as low as zero in winter. The springs boil up from a rocky ledge in the bottom of a little valley or basin enclosed by gently undulating hills. They are twenty-seven in number and are arranged in three principal groups, varying in heat from 148° F. to 168° F., with a combined outpour of about 90,000 gallons per hour. The water is clear and sparkling and remarkably soft. At present only the waters from the upper springs are used for the baths of the sanitarium. The baths for ladies and gentlemen are in separate buildings, each fitted with a plunge, tub, and vapor baths, and heated by the hot waters. About eighty rods from the bath-house is an outdoor summer bath, about one hundred and five feet square and from four to six feet deep, supplied with water from the lower group. This is said to be the largest bath of hot mineral water in the United States. The sanitarium connected with the springs has recently been enlarged and is adequately prepared for the reception of various classes of patients. Cases of rheumatism, liver disorder, bronchial catarrh, asthma, gout, and uterine diseases have been benefited or cured by a sojourn at this resort and the use of the waters and baths. An analysis by Professor Noyes, of the Minnesota State University, resulted as follows:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Silica	4.52
Alumina	.07
Iron carbonate	Trace.
Calcium carbonate	.23
Magnesium carbonate	Trace.
Lithium carbonate	Trace.
Potassium carbonate	.32
Potassium iodide	Trace.
Potassium bromide	Trace.
Sodium chloride	1.44
Sodium sulphide	.85
Sodium sulphate	.61
Sodium phosphate	Trace.
Sodium biborate	Trace.
Sodium carbonate	8.79
Ammonium (free)	.02
Albuminous ammonia	Trace.
Total	16.85

James K. Crook.

HUNTER'S PULASKI ALUM SPRINGS.—Pulaski County, Virginia.

POST-OFFICE.—Sassin. Hotel.

These springs are located eight and one-half miles north of Pulaski City, from which point they are reached by carriages and stages. The location is very pleasant and picturesque, being about 2,000 feet above the sea level, and surrounded by beautiful mountain scenery. The average summer temperature at Pulaski Springs is 71.6° F., and malarial disorders are said to be unknown. Immediately surrounding the springs are shady lawns and charming walks and drives, which, with the pure air and romantic landscapes, render the place very attractive during the summer months. Excellent fishing and hunting may be had in the vicinity. The springs are two in number. They have been analyzed by Dr. William H. Taylor, State Assayer and Chemist, with the following results:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Potassium sulphate	0.31
Sodium sulphate	.32
Lithium sulphate	Trace.
Calcium sulphate	.99
Magnesium sulphate	1.26
Aluminum sulphate	16.40
Iron sulphate	1.99
Manganese sulphate	Trace.
Sodium chloride	.11
Silica	3.87
Free sulphuric acid	.63
Total	25.88

The chemist states that his analysis was not complete, and that further tests would show the presence of additional mineral ingredients. The water is recommended in dyspepsia, diarrhœa, and dysentery, and locally in catarrhal states of the mucous membranes. It is used commercially.

James K. Crook.

HYALIN.—This is the chief organic constituent of the walls of hydatid cysts, and is related chemically to chitin. The walls of the older transparent cysts are composed of pure ash-free hyalin; those of the younger cloudy cysts are albuminous and contain various salts. Hyalin has been found only in echinococcus cysts. From the older cyst walls it is obtained in water solution under high pressure.

Pure hyalin is opalescent, transparent, insoluble in cold water, alcohol, and ether, but soluble in over-heated water (150° C.). It is not soluble in acetic acid, and only slightly in cold hydrochloric and nitric acids, but dissolves completely in hot solutions of the latter two. In concentrated potassium and sodium hydroxides it is slowly and incompletely dissolved. According to Lücke its composition is as follows: C. 44.1–45.3, H. 6.5–6.7, N. 4.5–5.2, O. 43–44.7 per cent. From the water solution it is precipitated by alcohol, acetate of lead, and mercuric nitrate, but not by acetic acid and potassium ferrocyanide or mercuric chloride. By the latter reactions it is distinguished from albumin. Neither tannic acid nor chlorine water precipitates it. If the water solution is boiled with dilute sulphuric acid reducing substances are formed, which with yeast yield alcohol and carbonic acid, and are strongly dextrorotatory, proving to be grape-sugar. It has been estimated that the older cyst walls yield fifty per cent. of their weight of this substance. From chitin, to which it is most closely related, hyalin is distinguished by its solubility in water at 150° C.

Aldred Scott Warthin.

HYALINE DEGENERATION.—Under this head there is classed by various writers a large number of pathological processes of widely differing origin and nature, characterized in common by the production of a clear, homogeneous, refractive material to which the name hyalin is applied. The most comprehensive use of this term is that employed by von Recklinghausen who defines hyalin as a homogeneous, refractive, albuminous body, staining well with eosin, carmine, picrocarmine, and acid fuchsin, resistant to water, alcohol, acids, and ammonia; in these respects resembling amyloid, but giving none of the specific amyloid reactions with iodine or the aniline stains. In accordance with this definition, he classes as hyaline substances epithelial colloid and keratohyalin (*epithelial hyalin*), the hyaline products of connective-tissue cells and intercellular substance (*connective-tissue or conjunctival hyalin*), hyaline products of coagulation (*blood hyalin*), hyaline inflammatory exudations on surfaces, into tissues, urinary tubules, etc. (*exudation hyalin*), and tissue necroses presenting a hyaline appearance (*hyaline necrosis*). Further, the hyalin formed in connec-

tive tissues is to be divided into two classes: that formed by a secretory process on the part of the connective-tissue cells, and that resulting from a degeneration or infiltration of the interstitial substance. Since these various substances are of different origin and are not chemically identical, as shown by their great difference in staining, the above classification, resting as it does only upon a common physical property, has not been accepted by the majority of pathologists, who class the greater part of these processes under other heads than that of hyalin, and restrict the term hyaline degeneration almost entirely to the hyaline changes occurring in connective tissue.

Hyaline Degeneration of Connective Tissue.—The group of changes occurring in connective tissue, in which the fibrous basic substance becomes structureless and homogeneous, is at the present time usually understood by pathologists when the term hyaline degeneration is used. In the earlier stages of this degeneration the connective-tissue fibrillæ become swollen and are gradually transformed into coarse, irregular hyaline strands or even into nodular masses; in other cases they may become confluent, forming uniformly homogeneous masses; or masses of hyaline substance may be formed between the fibrillæ, the latter gradually disappearing. Neither the hyaline material into which connective tissue may be transformed nor that by which it may be replaced has yet been shown to be a distinct chemical entity. In both cases the substance closely resembles amyloid, but differs from it in that it has no specific reactions with iodine and the aniline dyes. There are, however, reasons for believing that the chemical relationship of these substances is very close, inasmuch as it has been shown that the two are frequently found in combination and that under certain conditions amyloid may lose its specific reactions and become changed into hyalin. The formation of hyalin, similar to that of amyloid, in many cases partakes more of the nature of a *deposit* than a *true degeneration*.

The most characteristic staining reaction of hyalin is with acid fuchsin. This is best brought out by the methods of Van Gieson and Pianese. By means of this reaction it may be distinguished from amyloid, colloid, mucin, though its behavior with this stain is not always constant. The staining variations are, however, largely dependent upon the age and density of the hyaline substance, and the ease with which it is penetrated by the staining fluid. Recently formed hyalin stains light rose-red; old hyalin a very deep red when penetrated by the stain, but with Van Gieson's method it often stains yellowish, the acid fuchsin not having penetrated. It is very probable, however, that the hyaline changes in connective tissue are not identical, but represent a class of closely related conditions.

As in the case of amyloid, hyalin is most frequently found in the walls of blood-vessels, but differs from the former in being found in connective tissue without showing any relation to the vessels, particularly in the case of glandular stroma. Physiological hyalin occurs in large masses in ovarian corpora fibrosa, where it constitutes a normal formation in the process of obliteration of the corpus luteum. The formation of hyalin in the blood-vessels in old age is also to be regarded as of the nature of a physiological process. Under normal conditions the blood-vessels of the ovary are the first to show this change, and this organ at the menopause shows extensive hyaline change in the walls of its arterioles. A similar change is found at this time in the uterine vessels.

The pathological formation of hyalin may occur in apparently normal connective tissue, or in that altered by pathological processes, in newly formed connective tissue following inflammatory processes or that developing in tumors. Hyaline degeneration occurs most frequently in the walls of the blood-vessels, heart valves, endocardium, kidney glomeruli, lymph glands, splenic follicles, connective tissue of the thyroid, parotid, lachrymal and mammary glands, tunics of the testis, periosteum, bursæ and tendon sheaths. In the connective tissue of tumors it is of very frequent occurrence, particularly in the case of the endotheliomata of the serous glands and meninges. The reticulum of tubercles is often hyaline in character, and hyaline connective tissue is not infrequently formed about old tubercles, in old scars, granulomata, etc.

Hyaline change is rarely massive enough to be visible to the naked eye. When present to such an extent it is manifested by whitish, semitranslucent, hard and dense areas resembling scar tissue, replacing the normal structure. It is usually whiter and less translucent than amyloid. In blood-vessels showing much change the walls may be thickened, stiffened, and the lumen partially or wholly blocked. From the hard and dense character of the process hyaline degeneration is usually spoken of as sclerosis; in blood-vessels, either arterio- or phlebosclerosis.

Sclerosis of veins is not nearly so common as that of arteries, but is of quite constant occurrence in organs and tissues affected by chronic inflammatory processes. The sclerosis of arteries may be considered pathological when it occurs at an early age or to an excessive degree. The small arterioles of the splenic follicles, kidney glomeruli, brain and spinal cord, and the intima of the larger arteries are particularly subject to hyaline change. In many cases the hyaline substance is formed immediately beneath the endothelium in a manner similar to that of amyloid; in other cases there is first a proliferation of connective tissue beneath the endothelium, the new tissue gradually losing its nuclei and becoming converted into hyalin. Not infrequently the formation of hyalin takes place only in the outer coat of the vessel. The small arterioles of the splenic follicles and the kidney glomeruli are often the first vessels in the body to show sclerotic change. The extent and location of this change are, however, very variable; in some cases it may be confined to the coronary arteries, while in others the small arterioles of the central nervous system may alone be affected.

The connective tissue of fibromyomata very often undergoes hyaline change. Similar processes occur in the endothelial tumors of the brain, meninges, and serous glands. In these tumors the chief part of the growth may sometimes consist of hyaline material. When formed into cylinders or columns about the vessels the tumor is designated a cylindroma. In the mixed endothelial tumors of the serous glands hyaline material is formed after the manner of a secretion on the part of the endothelial cells lining the lymph spaces. A similar formation of hyalin at the expense of the interstitial cells occurs in the connective tissue of the conjunctiva and thyroid. In the latter the formation of hyalin in large amounts causes atrophy and compression of the glandular elements, so that not infrequently there is but little functionating gland structure left, the entire organ becoming changed into a hyaline mass in which the glandular remains are with difficulty made out. The basement membrane of Bowman's capsule and of the acini of the mammary gland, as well as that of the tubules of kidney and testis under certain conditions, becomes hyaline. Atrophy of the parenchyma usually follows this change. Hyaline glomerular scars (obliterated glomeruli) are almost constantly found in the kidneys as the result of the destruction of the glomerular parenchyma; a similar sclerosis of the areas of Langerhans in the pancreas may occur in association with advanced general arteriosclerosis.

Fibrinous exudates upon serous membranes may become organized and the newly formed connective tissue suffer hyaline change. Such hyaline formations are not infrequently seen upon the surface of the spleen, liver, pericardium (so-called soldier or milk spots), and pleura. Old pleuritic and pericardial adhesions may be entirely composed of hyaline material, all cells having disappeared. The hyaline bodies called rice bodies or corpuscula oryzoidea found in pathological conditions of the tendon sheaths and bursæ are for the greater part composed of loosened masses of organized fibrin which have undergone hyaline change. In cirrhosis of the liver and in chronic nephritis the new connective tissue frequently is hyaline in character. Old infarct scars show a like

change. After complete organization of obturating thrombi, blood-vessels may become replaced by hyaline cords. Similarly in chronic obliterative appendicitis the appendix may become changed into a hyaline cylinder in which even all traces of the muscle coats may have disappeared.

In lymphatic glands large masses of hyalin are frequently found, particularly in the atrophic glands of old age, or in association with chronic inflammatory processes. Here the change seems to be more of the nature of a deposit or infiltration. Large deposits of hyalin occur also in the hæmolymph glands. Rarely, a progressive hyaline degeneration of many organs occurs—heart, vessels, serous membranes, spleen, lymph glands, intestinal wall, etc.,—involving these either simultaneously or one after the other. In these cases portions of the hyaline substance may give an amyloid reaction. From this it may be inferred that there is a form of hyaline degeneration which is closely related to amyloid.

Of the nature of hyalin practically nothing is known. The disappearance of the nuclei, the subsequent retrograde changes in the hyaline substance, and its sequestration from normal tissue stamp the process as being essentially degenerative in character. The causes of the thickening and homogeneous transformation are entirely obscure. It has been believed by some writers to be due to a coagulation of proteid material after the death of the cells, or that it is due to a local disturbance of metabolism. According to the latter theory the cells are unable to make use of the proteid material brought to them; this becomes precipitated or infiltrated into the interstitial substance. The cells are thus pushed apart, and gradually atrophy. In many cases the formation of hyalin just beneath the endothelium of the blood-vessels points, as in the case of amyloid, to a secretory action on the part of these cells in removing certain substances from the blood. In the cylindroma and also in the mixed endotheliomata of the parotid, the formation of hyalin appears to be due partly to a secretory action on the part of the tumor cells and partly to a degeneration of these cells. In the case of the lymphatic glands the appearances more often suggest a deposit than a degenerative process. While not bearing the same relation to tuberculosis, chronic suppurations, etc., that amyloid does, hyaline degeneration is most frequently associated with chronic intoxications. Syphilis, lead poisoning, alcoholism, over-eating, etc., are conditions favoring or leading directly to hyaline change in the blood-vessels. It is probable that hyaline material can be reconverted, absorbed, or removed. The corpora fibrosa of the ovary undergo contraction and decrease of size until they come to consist of a narrow line of hyalin only. Further, hyalin is very unstable, being frequently calcified, converted into myxomatous tissue, or undergoes complete disintegration. The hyalin of sclerotic vessels frequently suffers a fatty change with later formation of cholesterin. The effects of hyaline change upon the tissues are similar to those of amyloid.

Hyaline Bodies.—In this connection should be considered also the so-called hyaline bodies (fuchsinophile bodies, Russell's bodies, etc.) which are frequently found in normal tissues as well as in a great variety of pathological processes. They are globular, hyaline bodies of varying size, often occurring in mulberry-like conglomerations. They may be found both within cells and free in the stroma. With acid fuchsin they stain red, and with Weigert's fibrin-stain a deep blue. They are found particularly in glandular proliferations of the stomach mucosa, chronic inflammatory processes, lymphadenoid tissue, and in malignant tumors. They may occur in either epithelial or mesoblastic cells. Their frequent presence in malignant tumors has led them to be regarded as parasites, either blastomycetes or protozoa. They are almost constantly present in the hæmolymph glands where they undoubtedly represent products of the disintegration of red blood cells. In pernicious anæmia phagocytes filled with these bodies are found in large numbers in these glands. Many of the bodies give an iron reaction. In other cases the granules may arise from the oxyphile and basophile granules, the process partaking of the nature of a coagulation. The exact chemical nature of hyaline bodies is not known.

The hyaline bodies found in the central nervous system are more closely related to colloid and the corpora amylacea. Under certain conditions in gliomata arising from the spinal cord glistening hyaline masses are formed from degenerating glia cells. The condition is known as *degeneratio micans*. In other varieties of tumors arising from the central nervous system, hyaline masses staining red with fuchsin are frequently found. In the majority of cases they are probably obliterated blood-vessels that have become hyaline. *Aldred Scott Warthin.*

HYDRACETIN.—*Acetyl-phenyl-hydrazin*, $C_6H_5.NH.NHC_2H_3O$. Hydracetin is a derivative of hydrazin in which two atoms of hydrogen are replaced by the phenyl and acetyl groups. It differs from acetanilid only by the presence of an imido group (NH). *Pyrodin* of commerce is an impure form.

Hydracetin occurs as a white, odorless, and almost tasteless, crystalline powder. It is soluble in fifty parts of cold water, more soluble in hot water, and very soluble in alcohol. Dose, from one-sixth to three-quarters of a grain. It was brought to the notice of the profession by Saltman (*Pharm. Central.*, May 16th, 1889) as an antipyretic and analgesic. It was thought to be of much service in rheumatic fever, phthisis, and typhoid fever. Its employment has not become general owing to its intense action and the frequency of toxic symptoms. It is a very decided blood poison, exerting a destructive action on the corpuscles and giving rise to hæmoglobinuria. Seven and a half grains are sufficient to kill a rabbit. It produces marked depression, coldness of the extremities, cold sweating, and enfeebled respiration and pulse. A ten-per-cent. ointment has been used for psoriasis and other skin diseases, its value being due to its reducing power, but this has also caused toxic symptoms (*Lancet*, 1890, ii., 38). *Beaumont Small.*

HYDRAMNION, HYDRAMNIOS.—The normal quantity of amniotic fluid at full term is from 400 to 1,000 c.c. An excessive accumulation of this fluid is known as hydramnion; ten to fifteen times the normal amount may be present. A slight excess is probably of frequent occurrence, and passes unnoticed, but an increase over 2 litres is very likely to give rise to symptoms. In the majority of cases the formation of the fluid is slow at first, but toward the end of pregnancy it increases at a more rapid rate. Occasionally the fluid may accumulate very rapidly, giving rise to serious symptoms from the sudden distention of the uterus (acute hydramnion). The condition is said to occur in one of every one hundred cases of pregnancy. It usually develops in the fourth to sixth month. Hydramnion in itself is not a disease, but is to be regarded as a secondary condition to many widely differing processes, both of the fœtus and the mother.

No constant pathological changes in the amnion itself have been found in this condition; fissuring of the epithelial layer, fatty degeneration of the epithelial cells, etc., have been described. Hypertrophy of the decidua and hyperplasia of the chorionic villi have also been found in cases of hydramnion, but the connection between these conditions has not been proved. Neither physiological nor chemical investigations as to the composition of the fluid, have yielded positive information as to its source.

The etiology of hydramnion is in many cases obscure. Inasmuch as the question of the origin of the normal amniotic fluid remains unsettled, we are not yet in a position to solve the more complicated problem of the manner of formation of the fluid under pathological conditions. The view most generally held at the present time that the normal fluid is the product of both fœtal and maternal structures is borne out by the fact that hydramnion is produced by or at least accompanies pathological

changes in both mother and fœtus. We may therefore distinguish two classes of hydramnion, one of fœtal origin, the other of maternal.

Hydramnion of Maternal Origin.—Hydramnion due to pathological conditions of the mother is of much less frequent occurrence than that associated with diseased processes of the fœtus. It occurs particularly in anæmic, dropsical, tuberculous, leukæmic, and syphilitic women. In pneumonia, hepatic cirrhosis, failure of compensation in valvular lesions, and all other conditions leading to venous stagnation in the maternal body, hydramnion may occur. In such cases the condition is usually chronic, but acute heart failure with sudden development of ascites or general œdema may lead to an acute hydramnion. Loss of tone of the uterine wall is also said to favor the production of an excessive amount of amniotic fluid. Hydramnion is very likely to recur in successive pregnancies of the same individual.

Hydramnion of Fœtal Origin.—Hydramnion occurs frequently in connection with ascites and general œdema of the fœtus caused by cardiac and renal disease, and syphilis of the lungs and liver; less commonly in cases of obstruction of the ductus Botalli, stenosis of the umbilical vein, twisting of the cord, velamentous insertion of the cord, fœtal tumors interfering with the circulation, tumors of the placenta, placental hypertrophy, hydrocephalus, anencephalus, etc. In general, any condition raising the blood pressure in the umbilical vein and placenta may give rise to hydramnion.

Hydramnion has also been explained as being due to a persistence of the vasa propria of Jungbluth, but the presence of these vessels in the late stages of pregnancy is considered by some writers to be secondary to an increase of blood pressure in the umbilical vein. Excessive urinary secretion in fœtal diabetes and cardiac hypertrophy, increased activity of the fœtal skin, serous inflammations of the amnion, deficient absorption of the amniotic fluid, and increased activity of the chorion are other causes assigned by various authors. Both fœtus and mother may under rare conditions contribute to the formation of the increased amount of fluid. This occurs most frequently in cases of syphilis of both mother and child when both are dropsical.

A more recent theory for the explanation of hydramnion is based upon the hypothesis that there is in the fœtal blood a substance which causes an increased passage of fluid from the maternal vessels to those of the chorion, so that the fœtus becomes plethoric. As a result of the plethora the heart's action is increased, and this in turn leads to increased urinary secretion. The lymph-forming substance, being excreted in the urine, passes into the amniotic fluid. When the latter is swallowed by the fœtus the substance is again absorbed into the fœtal blood and a vicious circle is thus set up. This hypothetical substance in the end produces toxic effects upon the liver and kidneys leading to fœtal dropsy.

Hydramnion is not infrequently associated with unioval twin pregnancy, in that in the case of one fœtus there is a normal or lessened amount of amniotic fluid while in the case of the other there is hydramnion and hypertrophy of the fœtal organs. This has been explained in various ways, but none of the theories presented is adequate. According to Küstner one of the twins receives more abundant nourishment than the other, and this overnutrition leads to increased heart action and resulting cardiac hypertrophy. Increased urinary secretion into the amniotic sac consequently follows and causes an increase in the amniotic fluid. Ultimately insufficiency of the heart occurs with venous stasis and liver cirrhosis, both of which factors add to the hydramnion already existing. According to Schatz one fœtus transfuses more blood into the circulation of its twin than the latter gives back to it, whereby the heart of the latter becomes hypertrophic and increased urinary secretion follows. Against both of these theories may be raised the objection that in the circulation of the twins a condition of equilibrium must ultimately be reached so that in one case blood must transfuse from the circulation of the stronger to that of the weaker; and in the other, as soon as the hypertrophic heart becomes insufficient, the normal heart of the weaker fœtus must act relatively with much greater strength than the insufficient hypertrophic one. In the case of twins arising from two ova either one or both sacs may become hydramniotic.

Symptoms.—In acute hydramnion the sudden distention of the uterus causes intense pain, and there are extreme dyspnœa, cyanosis, frequent and severe vomiting and fever. In chronic hydramnion the symptoms are very much like those of cystic ovarian tumors. As the uterus becomes more and more distended it may give rise to pressure symptoms, dyspnœa, pain in the sides, œdema of legs and genitals, varices, etc. In cases of very gradual development the uterus may attain a very large size without causing much discomfort.

Prognosis.—The pressure symptoms may be so severe as to endanger life, but inasmuch as the process may be controlled by the production of abortion the prognosis, in so far as the mother is concerned, is a favorable one. In the majority of cases the fœtus is either under-developed or malformed, only about one-third of the children surviving. Hydramnion of moderate degree may produce no symptoms and does not endanger either fœtus or mother.

Treatment.—Against the formation of hydramnion there are no therapeutic measures of avail. When the fluid accumulates in such large quantity or so rapidly as to produce serious symptoms, relief by evacuation is indicated. This is accomplished by rupturing or puncturing the membranes and allowing the amniotic fluid to escape. Premature labor usually follows this procedure and the fœtus, in case it has not reached a viable age, is lost. In the mild cases no treatment is necessary, but it is to be remembered that in such cases abnormal presentations of the fœtus are of frequent occurrence.

Aldred Scott Warthin.

HYDRANGEA.—"Seven Barks." The dried root of *Hydrangea arborescens* L. (fam. *Saxifragaceæ*). This is a medium-sized shrub with softish stems, opposite, glabrous, ovate, serrate, bright green leaves, and flattish cymes of greenish flowers. It is a native of the middle, and especially of the southern United States. The root is very much and crookedly branched, from a knotty crown an inch or two in diameter, and is usually cut into pieces from one to several inches in length before marketing. The largest of these roots are usually of about the thickness of the little finger. The color is a very pale grayish-yellow, with rusty yellow patches and streaks, but the bark has a great tendency to peel off, leaving the nearly white, very smooth wood exposed. The wood is light, tough, and splintery, and is tasteless and inactive. The bark is first sweetish and feebly aromatic, then slightly acrid.

It contains starch, a little resin, saponin, and a crystalline glucoside (hydrangin, $\frac{1}{10}$ per cent.). It has had some employment in urinary disorders, especially those accompanying "gravelly deposits," and is mildly diuretic. Dose from 2 to 4 gm. (gr. xxx. ad ʒ i.).

Henry H. Rusby.

HYDRASTIS.—Golden Seal. "The rhizome and roots of *Hydrastis canadensis* Linné (natural order, *Ranunculaceæ*)." (U. S. P.).

The *Hydrastis canadensis* is a small herbaceous perennial plant with an erect, simple, pubescent stem, from six inches to one foot in height. There are usually but two leaves, one at the top of the stem, the other attached a short distance below. The leaves are pubescent, roundish, generally five-lobed. The flower is solitary and rises from the base of the upper leaf. It is whitish or purplish and consists of a colored calyx which falls very shortly after the flower expands. The fruit is a globose, compound berry, somewhat resembling a raspberry. The rhizome is of oblique growth, 2.5 to near 5 cm. (1 to nearly 2 in.) long, and 0.5 to 1 cm. ($\frac{1}{5}$ to $\frac{2}{5}$ in.) thick, cylindraceous, usually with a few short branches

longitudinally wrinkled, but plump, somewhat annulate, externally brownish-gray, often with a yellow tinge or yellowish patches; fracture short and sharp, waxy, golden-yellow or bright reddish-yellow, with a thickish bark, about ten short and narrow wood wedges and broad medullary rays; roots, if present, rather coarse, brittle, with a thick bark and somewhat quadrangular wood; odor slight, characteristic; taste very bitter, but not disagreeable, producing a somewhat astringent effect.

The plant is indigenous to North America and grows abundantly in the north and west of the United States and Canada. Only one other species of hydrastis is known, *H. Jezoensis* Sieb., which is found in Japan.

The therapeutic properties of hydrastis depend upon the active principle *hydrastine*, which is separated in white crystals, without odor or taste, and insoluble in water. With acids it forms salts which are freely soluble in water. Much trouble has arisen from the confusing of this name with *hydrastin*, an "eclectic" extract, which is made up of the various alkaloids and resin, and is many times weaker. It is a yellowish powder. *Hydrastinine* is an artificial alkaloid formed by the oxidation of hydrastine, which breaks up into hydrastinine and opianic acid. The hydrochlorate is official in the United States Pharmacopœia, and occurs as light yellow, amorphous granules, or as a pale yellow, crystalline powder, odorless, but with a bitter, saline taste. It deliquesces upon exposure and is very soluble. *Berberine* is also present and the tonic properties of the plant are, in a manner, due to its action.

Hydrastis exercises, both locally and after absorption, an action upon the system which is beneficial in all states of congestion and hyperæmia. The results of physiological experiments with hydrastine show that it increases the activity of the nerve centres. Both the sensory and motor functions are stimulated and reflex action becomes very marked. The tone of all muscular tissues is particularly raised, the striped, unstriped, and cardiac cells being influenced, as a result of which effect there is produced an acceleration of the heart's action and of the circulation throughout all tissues. A like effect is manifested upon the uterine tissue, and this effect, if the uterus is in the pregnant state, may prove sufficient to cause abortion. There is also produced an increased activity in all the secreting organs, the flow of saliva, bile and other intestinal secretions being greatly augmented. The urine is also increased, and the alkaloid may be detected in the urine within twenty-five minutes of its hypodermic injection.

In excessive doses the action of the drug somewhat resembles that of strychnine. There are excessive motor activity with cardiac distress, and convulsions which may prove fatal. In the latter event death results from extreme depression followed by respiratory failure. In a case reported[1] two doses of twenty drops of the liquid extract produced most alarming cardiac distress in a case of bronchitis with copious expectoration. The lethal dose is given by Cerna as 0.5 gm. for each kilogram of body weight.[2] Phillips and Pembrey[3] during experimental work upon animals found that death followed 15.4 grains when given to a full-grown cat.

The action exerted upon the blood-vessels has led to its employment as an hæmostatic. Attention was directed to its use for this purpose, in Germany, in 1883, by Dr. Schatz, at a meeting of the Association of Physicians and Naturalists. He reported decidedly in its favor for the treatment of chronic hyperæmia and chronic inflammation of the internal genital organs attended by losses of blood. Since that time it has been extensively employed with very general satisfaction. In menorrhagia and metrorrhagia without organic disease, as in the various forms of metritis and endometritis, it is said to check the flow more rapidly than any other remedy. In the hemorrhages occurring at the climacteric, and the excessive menstruation of young girls in which the tissues are relaxed and congested, it has proved itself particularly useful. It also relieves all conditions of congestion of the pelvic organs, ovarian pains, dysmenorrhœa, and other distressing symptoms arising from this cause. Its effect when the hemorrhage is due to myomata appears to be uncertain, some observers claiming for it decided curative properties, while others have failed to derive any benefit from its employment. It should be administered with care during pregnancy on account of its tendency to provoke abortion, although many claim to have used it without any ill effect. One of the earliest applications of hydrastis was as a cardiac tonic, and its effect upon the heart makes its action very similar to that of digitalis. It is not equal to the older drug, but has been found very serviceable when a change from digitalis is necessary.

As a local remedy hydrastis exerts a marked action upon mucous membranes whenever altered by local congestion. It is astringent and tonic, lessening the congestion, and promoting a freer and better circulation in the part. It is employed in all catarrhal conditions of the vagina, urethra, rectum, nose and pharynx, in their subacute or chronic stages. It also exercises the same local effect upon the mucous membrane of the stomach and bowels when administered internally, and has proved of benefit in all catarrhal conditions of these organs, its local action being assisted by the increased secretions of the liver and other intestinal secretions. In hemorrhoids it is thought to act with much advantage.

The fluid extract is the preparation looked upon with most favor for local use. When diluted with water it makes an undesirable-looking mixture, but it offers the advantage of depositing the insoluble resinous material directly upon the mucous surface, which is considered most necessary if its full effect is to be secured. The strength of the solution should be from ten minims to two drachms to the ounce. For rectal and vaginal use it may be applied in the form of suppositories. For internal use the dose is from one-half to one fluidrachm.

Hydrastine has been used as a wash, in the strength of two to five grains to the ounce, as a substitute for the extract, but has not proved as serviceable. For internal use it is to be preferred, as it possesses the hæmostatic and tonic action of the drug, and is of a more definite strength. The dose is from one-eighth to one-half grain, and may be given in all conditions in which hydrastis is indicated.

The eclectic remedy, hydrastin, has been employed for many years as a stomachic, tonic, and antiperiodic, but is never used for any hæmostatic action.

Hydrastinine hydrochlorate is probably the most desirable preparation for internal administration. It acts rapidly, and reports indicate that its action is more trustworthy than is that of hydrastine or the fluid extract. The dose is from one-half of a grain to one grain and a half, every three to six hours. It may also be given hypodermically in a ten-per-cent. solution in distilled water.

Beaumont Small.

[1] British Medical Journal, report No. 258, September 8th, 1899.
[2] The Therapeutic Gazette, May, 1891.
[3] British Medical Journal, October 8th, 1901.

HYDRIODIC ACID.—Hydriodic acid (HI) is a gaseous body, freely soluble in water. The aqueous solution, however, is very unstable, constantly tending to disengage free iodine. Accordingly the United States Pharmacopœia makes official *Syrupus Acidi Hydriodici*, Syrup of Hydriodic Acid, wherein the acid is preserved from change by the presence of sugar. The syrup is clear and colorless, or slightly straw-colored, and contains one per cent., by weight, of absolute hydriodic acid. It has a sweet, acidulous taste.

Syrup of hydriodic acid has similar general properties to the other diluted sour mineral acids (see *Sulphuric Acid*), but its special employment in medicine is, because of the iodine of its composition, as a substitute for the alkaline iodides. It seems beyond question to possess the general medicinal properties of the iodides, and may be given in doses of from one-half to one teaspoonful, well diluted, several times daily.

Edward Curtis.