Sumbul occurs in transverse segments, varying in diameter from about 2 to 7 cm., and in length from 15 to 30 mm.; light, spongy, annulate or longitudinally wrinkled; bark thin, brown, more or less bristly fibrous; the interior whitish, with numerous brownish-yellow resin dots and irregular, easily separated fibres; odor strong, musk-like; taste bitter and balsamic.

Constituents.—The most important constituent is the *resin*, of which there is nine per cent. (Flückiger); it has a musky smell, more developed in contact with water, and a bitter, aromatic taste. The root contains also a small quantity of dull-bluish-colored oil.

Action and Use.—Sumbul has not any important medicinal value; like asafœtida, and its namesake, musk, it is gently stimulant and slightly antispasmodic, and may be given for the same nervous conditions as they; but its principal employment is in the preparation of some perfumes, where it takes the place of musk. A tincture (*Tinctura Sumbul*, strength one-tenth) is official.

W. P. Bolles.

SUMMERVILLE, SOUTH CAROLINA.—This popular winter resort, among the pines, is situated in the southeastern portion of the State, twenty-two miles northwest from Charleston. Its favorable features as a health resort are its dry sandy soil, pine forests, equable mild temperature, and freedom from the enervating heat peculiar to points farther south. The pines are an especial feature of the place, and abound not only about the town but are thickly scattered throughout it "in the middle of the streets, on the sidewalks, in the gardens, and in fact everywhere." There are local laws prohibiting the cutting down of these trees. The atmosphere is permeated with their balsamic odor, and if there is any virtue in such a naturally medicated air it must surely be found here.

The population of the town is about 5,000 souls, and there are various churches, schools, shops, good markets, etc.

The sanitary condition is carefully supervised by an efficient board of health, of which Dr. A. H. Hayden is president, to whom the writer is indebted for climatic and other information contained in this article. Tuberculosis is included in the list of contagious or infectious diseases required to be reported to the board, and whenever in a hotel or any other building a case of consumption has "lived, resided or died," it must be reported in writing to the secretary of the board of health; and "immediately upon receipt of each report, the health officer shall, at the expense of the occupant or owner of the premises, cause said premises to be at once fumigated and properly disinfected." [Extract from the Rules and Regulations of the Board of Health.]

The natural drainage is excellent, and this is supplemented by an open canal, on one side of the town, some miles in length, and into this accessory canals or ditches empty. Soil carts are also employed by the town.

The water supply is very generally derived from open wells, although the Pine Forest Inn and Pinehurst (Tea Farm) have artesian wells.

The accommodations are good, there being several first-class hotels and many boarding-houses.

The outdoor attractions and amusements are walks and drives among the pines, golf, many excursions in the vicinity to various historic and ancient landmarks,—old churches, plantations, and the like,—the Pinehurst Garden Park, with its large variety of ornamental trees and shrubs, and the Pinehurst Tea Gardens where the tea plant is successfully grown. Twenty-two miles distant is Charleston, with all its attractions in and about the city. There are also opportunities for shooting and fishing.

The subjoined meteorological table affords an index of the various climatic features. It will be seen that the winter temperature is comparatively mild, the mean maximum and minimum temperatures not extreme, and a large majority of the days are sunny, so that one can be out of doors the most of the time. The mean average annual rainfall for nineteen years was 56.76 inches, and for the four years of the chart, 59.16 inches. On account of the character of the soil the ground is quickly dry after the heaviest rainfall. The average relative humidity appears high, but it is said that there is no sensation of dampness in the atmosphere. According to Dr. W. H. Prioleau, of Summerville (*Therapeutic Gazette*, September, 1897), the climate is most beneficial to invalids from October to May, "for during that time there is bright sunny weather, and the atmosphere changes are seldom so sudden as to cause any serious anxiety or discomfort." "The town is near enough to the sea coast," says the same authority, "to cause the atmosphere to lose the aridity of a sandy plain; at the same time sufficiently distant to be free from all dampness."

* Climate of Summerville, S. C.—Period of Observation from January, 1899, to January, 1903.

	November.	December.	January.	February.	March.	April.	July.	September.	Year.
Temperature—Degrees Fahr.									
Average mean	59.3°	47.5°	46.8°	46.6°	54.4°	59.2°	80.1°	72.5°	
Average maximum	79.5	74.7	74.8	76.2	81.2	83.7	96.2	91.0	
Average minimum	39.5	19.0	21.4	16.7	27.6	34.7	65.2	53.5	
Mean maximum	66.5	58.7	58.4	56.3	67.7	68.1	88.3	82.7	
Mean minimum	51.2	46.2	36.8	37.1	44.9	50.2	71.2	65.2	
Average daily range	15.3	12.5	21.6	19.2	22.8	17.9	17.1	17.5	
Average monthly range	51.2	55.0	53.4	57.4	53.6	49.0	31.0	37.5	
Humidity— (The humidity was recorded only a portion of the period.)									
Average relative	77.4%	76.8%	70.8%	70.9%	72.5%	73.0%	83.5%	79.5%	
Precipitation—									
Average in inches	2.77	3.73	3.49	4.67	3.01	4.08	5.25	3.56	59.16
Wind—									
Prevailing direction	N. E.	S.W.-N.E.	S. W.	S., N. W.	S. W.	S. E.	S. W.	N. E.	N.E., S.W.
Weather—									
Average number of clear days	18.2	15.0	13.0	10.4	13.4	15.7	15.2	19.7	
Average number fair days	6.7	7.5	9.2	10.0	11.2	9.2	12.5	5.2	
Average number clear and fair days	24.9	22.5	22.2	20.4	24.6	24.9	27.7	24.9	
Average number cloudy days	5.0	8.2	8.8	7.6	6.4	5.0	3.2	5.0	

Frost occurs from November to April, with ice and occasional snow in the coldest months of the year.

* These data were obtained through the kindness of Dr. A. H. Hayden, of Summerville, S. C.

The diseases and conditions for which this climate is suitable are pulmonary tuberculosis in the early stage, laryngitis, bronchitis, asthma, influenza, neurasthenia, and insomnia. Further, it is a favorable place for a winter residence for the many who, for one reason or another, desire to escape the cold of the North or West. "I must admit," says Elizabeth Stuart Phelps, writing in *McClure's Magazine*, "that Summerville is a land of lovely dreams, with more conveniences and fewer discomforts, more tonic and less enervation than any other Southern health or pleasure resort I have seen. Roses run riot over it; its homes are gardens, and gardens are its homes. There the winds are laid. . . . There it is always dreamland, and there the knotted Northern nerves may relax and rest."

One can reach Summerville by various railroad routes or by water from New York to Charleston and from thence by rail. The time from New York by rail is twenty-four hours.

Edward O. Otis.

SUMMIT SODA SPRINGS.—Placer County, California.

Post-Office.—Summit Soda Springs. Hotel and cottages.

Access.—Viâ Central Pacific Railroad to Summit station, thence by stage or carriage, twelve miles to the springs. The location is near the summit of the Sierra Nevada Mountains, at an altitude of 16,000 feet above the sea-level. The region is one of picturesque grandeur, and the magnificent view from the neighborhood of the springs is unobstructed for miles around. The air is pure, dry, and invigorating, being cool and pleasant all the summer. The springs are situated in an expansion at the head of a deep canyon, along which winds one of the forks of the American River. The hotels and cottages are pleasantly located, and good bathing facilities are at hand. Two analyses have been made. They are as follows:

One United States Gallon Contains:

Solids.	Dr. Winslow Anderson, 1888. Grains.	J. T. Randolph, 1878. Grains.
Sodium chloride	26.18	26.22
Sodium bicarbonate	4.11	....
Sodium carbonate	5.75	9.50
Potassium carbonate	.82	Trace.
Magnesium carbonate	4.05	4.20
Calcium bicarbonate	38.93	43.20
Calcium carbonate	6.55	....
Ferrous oxide	....	1.75
Ferrous carbonate	2.70	....
Borates	Trace.	....
Alumina	1.13	1.75
Silica	1.94	2.06
Organic matter	Trace.	....
Total solids	92.16	88.68

Free carbonic acid gas, 187.25 cubic inches (saturated).

The water has antacid, diuretic, aperient, and tonic properties, and is useful in the treatment of dyspepsia, torpidity of the liver and bowels, Bright's disease, stone in the bladder, etc.

James K. Crook.

SUNDEW. See *Droseraceæ*.

SUPERFŒTATION.—Ordinary multiple pregnancy is generally the result of the simultaneous fertilization of more than one ovule. Should such fecundation be *successive* instead of *simultaneous*, it is called *superimpregnation*. Of this, there are two varieties: (1) *Superfecundation*, which occurs when two (or more) ovules belonging to the *same* period of ovulation are impregnated by successive acts of coitus. (2) *Superfœtation*, which occurs when two or more ovules belonging to *successive* periods of ovulation are impregnated, so that a woman who is already pregnant becomes again pregnant a month or more later, and carries simultaneously in the uterus both these products of conception. Thus a second ovum is fertilized after the first has been developing for a month or more, and the two fœtuses continue to develop simultaneously and independently.

The term *superimpregnation* has been used in two senses: (1) as a generic term including both superfecundation and superfœtation; and (2) as synonymous with superfœtation or superfecundation. We believe the former to be the more correct usage, though the term might well be abolished.

Superfecundation is now well recognized, and needs no discussion. There have been reports of too many well-authenticated cases to allow of any doubt on this point. The most conclusive proofs are furnished by those cases in which a black woman has at the same time given birth to twins, of different colors, the one a mulatto and the other black, and whose features have unmistakably indicated their paternity. In many of these instances the mother has explained that both a white man and a black man had had intercourse with her within a short interval of each other. Similar, but not so frequent, are the reported cases in which a white woman has had intercourse successively with a white man and a black man, and has given birth to twins of different colors and races. Illustrative cases in abundance may be found in the pages of works on medical jurisprudence, notably those of Tidy and Beck.

But *superfœtation* has not been so readily admitted. Like other theories which have subsequently crystallized into facts and been accepted, the possibility of superfœtation has been alternately asserted and denied. Thus, according to Beck, Brassavolus, who lived between 1500 and 1555, said that he had known *superfœtation to be epidemic!!!* By later physicians, the possibility of superfœtation was generally accepted, and many cases were brought forward to support the claim; but it is doubtful how many of these cases would stand the test of a thorough investigation at the present day; and some of them are certainly capable of much simpler explanation. The next stage was that of vigorous denial. This view has been taken by Lusk, who says: "That impregnation can take place at two periods distant from one another—must be regarded as an inadmissible hypothesis, until physiologists shall succeed in demonstrating in a single instance, by the presence of corpora lutea of different ages, that ovulation ever occurs during pregnancy" ("Midwifery," 1896). No doubt ovulation does ordinarily cease during pregnancy; and this may be one of the reasons why there are so few cases of superfœtation. But that ovulation can occur during pregnancy has been demonstrated by Christopher (*Am. Jour. of Obstet.*, 1886), who also cites Slavjansky's case, as follows: "Professor Slavjansky, of St. Petersburg, in a laboriously exact paper in the *Annales de Gynécologie*, vol. ix., furnishes a report of a very interesting and instructive case. A woman, twenty-four years of age, had menstruated since her seventeenth year, and had been delivered of a child three years previous to her present pregnancy. Her last menstruation occurred November 5th, 1876, but conception is supposed to have taken place early in December. Death occurred March 23d, 1877, from a rupture of the left Fallopian tube, due to tubal pregnancy. The legal autopsy was made thirty hours after death, and the generative organs afterward given to Slavjansky for examination. He found on the left ovary a tumefaction which presented a cavity 1 to 3 cm. in diameter, and on microscopic examination presented all the characters of a Graafian follicle. The contents, which had been coagulated by alcohol, were carefully separated by a needle, and on examination under the microscope were found to be the cells of the discus proligerus, and within them was found the ovule with its eccentrically situated germinal vesicle and germinal spot clearly marked. In the cortical substance of this ovary were found numerous Graafian follicles in all degrees of development, from the primordial follicle up to the follicles of 0.3 cm. in diameter. A corpus luteum of 0.4 cm. in diameter was found immediately under the principal cavity. In the cortical substance of the right ovary were numerous follicles of varying degrees of development, one being 0.3 cm. in diameter. A recent corpus luteum 1 cm. in diameter was clearly outlined in the surrounding tissues." Of even more value, and apparently unassailable, is Cosentino's case: "A woman in the sixth month of pregnancy died of heart disease. The ovaries were subjected to a careful microscopic examination, and in them were found

follicles in all stages of development; also one ruptured follicle of a diameter of 15 mm. with ragged margins and a rich arterial and venous network surrounding the theca folliculi. Between the granular layer and a lot of detritus a perfectly mature ovum with all of its elements was found" (quoted by Herzog, in Chicago *Medical Record*, July, 1898). Even more emphatic in his rejection of superfœtation is Kleinwächter; he says: "The whole claim as to superfœtation, however, collapses, because the base on which this alleged occurrence rests does not exist. As soon as pregnancy has occurred, ovulation ceases. Superfœtation, therefore, is a physiological impossibility. However, even if ovulation did take place, superfœtation nevertheless could not occur, since the sperma, in consequence of the plug of mucus in the cervix, cannot reach the ovum. This plug of mucus which forms in the cervix, the proliferation of the mucosa of the uterus, the fusion of the decidua reflexa with the decidua vera, which takes place in the twelfth week, make it impossible, even if an ovum should be discharged from the uterus, that it could come into contact with the sperma deposited in the vagina" (Herzog, *ut supra*). But these objections are more fanciful than real, for it has now been proved that: (1) Ovulation can occur during pregnancy (*vide supra*). (2) The plug of mucus which is found in the cervix of the pregnant uterus is also found in the cervix of the non-pregnant uterus, and, therefore, if it were a bar to superfœtation, it would also prevent pregnancy! Indeed, it has been asserted that, so far from this plug of mucus preventing the entrance of the spermatozoa, it, by absorption, rather assists them into the uterus. (3) The fusion of the decidua vera and the decidua reflexa occurs "at the fourth month" (J. Whitridge Williams, "Obstetrics"), and until this fusion occurs there is abundant opportunity for the spermatozoa to pass upward toward the Fallopian tube.

At the present day, both the possibility and the probability of superfœtation are fully admitted; that it is of frequent occurrence, or that the majority of the cases formerly reported under this heading are correctly designated, is not conceded. It must be remembered that superfœtation is neither normal nor physiological; it is a pathological condition. In an ordinary normal pregnancy we note the following (among other) characteristics: (1) It is single; (2) it is intra-uterine; (3) menstruation and ovulation both cease; (4) the uterus is neither bifid nor septate, but single. Now, variation in any of these conditions may produce pathological or abnormal results; and superfœtation is one such pathological variation. The possible results of superfœtation are two: *either* two children equally well developed, but born at different times; *or* the birth of twins, one of which is developed and the other not. Those who deny the possibility of superfœtation have explained these conditions as being due *either* (1) to an ordinary twin pregnancy, or a superfecundation, in which one fœtus was "crowded," or for some other reason did not obtain adequate nutrition during gestation, and was therefore not properly developed; *or* (2) to an ordinary twin pregnancy or superfecundation in which one ovum became blighted, and possibly suffered compression and partial mummification (= *fœtus papyraceus*); *or* (3) to a bifid uterus, in which one ovum was developed in each half.

There can be no doubt that many of the earlier reported cases of superfœtation can be explained as above; but there still remain some that are intelligible only on the ground of superfœtation. Thus, where viable children are born at an interval of *four months*, and the uterus is not double, there is at present no explanation to be offered beyond the one that forms the subject of this article. Tidy, in his "Legal Medicine," quotes one such case from Naphey: "Mary Anne Bigaud, at thirty-seven, gave birth, on April 30th, 1748, to a full-term mature boy, which survived its birth two and one-half months, and to a second mature child (girl) on September 16th, 1748, which lived for one year. The mother was proved after her death not to have had a double uterus. (This case is vouched for by Professor Eisenman, and by Leriche, surgeon-major of the Strasbourg Military Hospital)." And several such cases are given by Bonnar (*Edin. Med. Jour.*, January, 1865), "cases that prove, as far as anything of the sort can prove, that superfœtation is a positive fact." *R. J. E. Scott.*

SUPRARENAL BODIES, PATHOLOGY OF.—Inasmuch as this subject has already been discussed to some extent in the article on *Addison's Disease*, only those conditions will be mentioned here which were not considered under that head.

Anomalies and Malformations.—Total absence of the adrenals has been reported, but in some of the cases it is impossible to state positively that the absence was congenital and not the result of an extreme atrophy. Congenital absence and hypoplasia have, however, been observed in cases of hemicephalus and anencephalus and in certain forms of malformations of the genito-urinary organs. According to Zander, the adrenal hypoplasia is associated only with defects of the frontal lobes. Aplasia of the medullary portion of the suprarenals has been seen in cases of chronic hydrocephalus, but the connection between these conditions is not clear. Fusion into one organ, abnormality of shape and form, displacement, separation into several bodies, and hypertrophy have been described. As a rule, the malformations of the suprarenals bear no relation to those of the kidneys, though in one case reported of horseshoe kidney there were four adrenals. Malformations of these organs appear to stand in a closer relationship with those of the sexual glands. Marchand has reported a case of marked hyperplasia of the suprarenals and of the accessory suprarenal structures in the broad ligament, in a case of rudimentary development of the ovaries and external hermaphrodism.

Accessory Suprarenals (Adrenal Rests).—Small isolated portions of adrenal tissue, varying in size from a pinhead to a cherry, are of very frequent occurrence in the immediate neighborhood of the main organ, lying in the peri-adrenal connective tissue, in the solar plexus, in or under the kidney capsule, in the kidney substance, or even in the liver. Small bodies consisting of tissue resembling that of the adrenal cortex are also found in the broad ligament, along the spermatic vessels, in the inguinal canal, on the spermatic cord, and in the retroperitoneal connective tissue. By a number of authors the adrenal tissue found in the last-named regions is regarded as analogous to the suprarenal organs of the lower vertebrates, the main adrenal organs of man representing the interrenal bodies of these animals. Marchand having been the first to observe their presence in the broad ligament, they have been designated the "adrenals of Marchand" ("Marchand'sche Nebennieren"). By other writers they are regarded as misplaced adrenal tissue referable to some disturbance of development. The chief pathological importance of these bodies is the possibility of the development in them of the same form of new growths as arise in the adrenals themselves, or in the adrenal "rests" of the kidney, liver, etc. Adrenal tissue has been found in a cystic tumor of the broad ligament. The small masses of adrenal tissue found in the inguinal canal or upon the spermatic cord have been mistaken for lipomata. It is also possible that these accessory bodies may undergo a compensatory hypertrophy in the case of destruction of the main organs in early life. Accessory adrenals or "adrenal rests" are of a yellowish color, and have a fatty shine. From their close resemblance to fat tissue they have frequently been mistaken for lipomata. In the great majority of cases the microscopical structure resembles that of the fascicular zone of the adrenal cortex; and very rarely do these bodies contain cells resembling those of the medullary portion of the organ.

Circulatory Disturbances.—Chronic passive congestion of the systemic veins gives rise to a *passive congestion* of the adrenals, which in consequence are enlarged and of a deep brownish-red color. *Hemorrhage* into the adrenals

may occur in congenital or acquired hæmophilia, in pernicious anæmia, in leukæmia, after thrombosis of the veins, and as a result of trauma or of general passive congestion. Severe injuries, such as fracture of the spine, are frequently associated with hemorrhage into or about the adrenals. Hemorrhage into the suprarenals appears to be of frequent occurrence in the new-born. According to Mattei and Spencer, some degree of congestion of the suprarenals is always present in the new-born. As the border line between slight hemorrhage and congestion is not well defined, it is very probable that some cases of congestion have been regarded as hemorrhage. If not confirmed by microscopical examination, no diagnosis of adrenal hemorrhage should be made unless distinct hemorrhagic spots or bands are seen in the tissue of the organ, or unless the hemorrhage is so extensive as to convert the organ into a cyst filled with fluid or coagulated blood.

Hamill has collected ninety cases of adrenal hemorrhage occurring in the new-born. Various causes are given, but it is probable that the most common etiological factor in still-born children is prolonged and difficult labor requiring manipulation, especially in the case of breech delivery. In some of the infants dying within a few days after birth, the hemorrhage may be the result of injuries received during labor, but in the great majority of such cases some form of infection is to be regarded as the cause; in practically all cases dying after the tenth day some form of infection produces the condition. Of the ninety cases collected by Hamill, twenty-eight were seen in still-born children, twenty-seven between birth and the separation of the cord, and eleven after the latter event. The hemorrhage may be unilateral or bilateral, the lesion apparently being more common upon the right side, this being due probably to anatomical reasons. The hemorrhage is usually into the medullary portion, and the appearances vary with the amount of extravasation. The gland may be greatly enlarged and the blood may break through into the peritoneal cavity when the extravasation is large. When not immediately fatal the hemorrhage may lead to cystic or fibrous change in the gland, and it has been suggested that possibly some of the cases of Addison's disease in which a marked fibrosis of the gland was found may have been the result of a hemorrhage occurring at an earlier period. Old hemorrhages may become calcified.

Hemorrhagic infarction of the suprarenal due to thrombosis of the central vein has been reported as occurring in a child of eleven months. The etiology of the thrombus was not clear, but it was thought to be marantic in origin. A similar condition may follow thrombosis of the renal vein.

Retrograde Changes.—Simple *atrophy* of the adrenals occurs in old age and in cachectic conditions. A marked atrophy has been observed in cases of Addison's disease. The atrophic organs may be no larger than peas. Associated with the atrophy of old age there is frequently seen a marked pigmentation of the medulla.

Necrosis of the adrenals occurs in tuberculosis, eclampsia, in certain infections and intoxications, in extreme passive congestion, and following hemorrhage and thrombosis of the central vein. Focal necrosis has been observed in malaria. Inasmuch as the medulla of the adrenals very quickly undergoes a post-mortem disintegration, such change occurring even within from half an hour to one hour after death, the presence of a soft brownish substance in a cyst-like cavity representing the medulla should not be mistaken for a pathological condition. The post-mortem change may be recognized by the absence of hemorrhage or of changes in the cortex. The cyst-like cavities formed by post-mortem change gave rise to the designation "suprarenal capsule."

Cloudy swelling of the cells of the adrenals occurs in severe general intoxications.

Fat in the form of small droplets is almost constantly present in the cortical cells of the adult adrenal, particularly in those of the fascicular zone. Large droplets are often present. Excessive fatty change has been described as occurring in marasmic infants and in cases of congenital syphilis, and has also been regarded as a cause of Addison's disease.

Amyloid change is of frequent occurrence in the adrenals in cases of general amyloidosis. The amyloid is deposited in the walls of the blood-vessels and in the connective tissue. The parenchymatous cells become atrophic and may entirely disappear, the organ becoming larger, hard, waxy, and bluish-gray in color. The cortex usually shows the greatest change, but the medulla is not infrequently affected alone or coincidently. Amyloid change of the adrenals has also been regarded as a cause of Addison's disease.

Calcification of the adrenals may follow caseous necrosis or hemorrhage, and is not infrequently present without any signs of other pathological changes.

Pigmentation of the cells of the medulla is increased in old age and in conditions of excessive blood destruction.

Inflammation.—Simple inflammation of the adrenals is very rare. Metastatic abscesses occur in pyæmia and may lead to total destruction of the organ; they may rupture into the intestine or into the retroperitoneal connective tissue. Fibrosis of the adrenals due to chronic interstitial inflammation has been reported, but the nature of these cases is obscure. Such changes have also been reported as occurring in Addison's disease.

Tuberculosis.—Miliary tubercles may be found in the adrenals, but tuberculosis of these organs is usually of the fibro-caseous type. The glands in the latter condition become enlarged, hard, and often nodular. The capsule is thickened, the parenchyma either wholly or in part replaced by a firm, dry, cheesy, yellowish or a soft pus-like material. About the capsule there may be present a large amount of scar tissue involving the semilunar ganglia. Tubercle bacilli are found in the caseous areas. Calcification or liquefaction may follow the caseation. In many cases only one organ is affected. The condition is rarely primary, but is in the great majority of cases secondary to a chronic pulmonary tuberculosis. When primary it may form the starting-point for a tuberculosis of the peritoneum. (See *Addison's Disease.*)

Syphilis.—Gummata have been found in the adrenals, and in both congenital and acquired syphilis thickening of the blood-vessels may occur. Total fatty degeneration has also been described as occurring in cases of congenital syphilis.

Actinomycosis of the adrenals has been reported as extending from actinomycotic processes in the liver.

Progressive Changes.—*Hypertrophy* and *hyperplasia* of adrenal tissue may occur in young individuals after loss of the main organ or organs. In the latter case the adrenals of Marchand or other accessory adrenal tissue may undergo a compensatory hypertrophy. The diffuse hyperplasias are very rare, but localized nodular hyperplasias are frequent.

Tumors.—The most common form of tumor is that arising from adrenal rests (see *Hypernephroma*). These growths may reach a very large size, and occasionally present the appearance of a large cyst filled with a brownish pultaceous material produced by the extensive fatty degeneration characteristic of these growths. The smaller growths appear as yellowish nodules resembling fat tissue. The microscopical picture is usually that of the fascicular zone of the cortex, but growths consisting of medullary tissue have also been described. Though frequently benign except for size, the hypernephromas of the adrenals may through continued atypical growth take on the characteristics of a carcinoma. It is probable that the majority of the malignant tumors arising primarily in the adrenals, which have been reported as carcinomata, in reality belonged to the hypernephromata, though it is also possible that tumors of the type of carcinoma may be primary in this organ. The term *adenoma* or *malignant adenoma* is frequently applied to these growths (*struma suprarenalis*); at present they are classed with the hypernephromata.

Sarcoma.—Melanotic and non-pigmented sarcomata have been reported as primary in the adrenals. Lym-

phosarcoma is of rare occurrence. There exist in the literature numerous accounts of sarcoma of the adrenal, but it is very probable that these tumors belonged to the hypernephromata and not to the true sarcomata. This is especially true of the cases reported as "malignant tumor," "adenosarcoma," "alveolar sarcoma," "carcinoma," etc. Through the occurrence of hemorrhages the growths may become very large, and occasionally break into the veins and set up metastases. The latter are found chiefly in the lungs.

Gliomata and *neuromata* of the adrenals have been described, but the true nature of the cases is uncertain. They arise from the medulla or from the sympathetic system.

Connective-tissue growths are very rare. Cystic lymphangiomata have been very rarely observed. Ganglionic fibromyoangioma has also been described.

Secondary tumors (sarcoma and carcinoma) are of not infrequent occurrence. Metastasis takes place usually through the lymphatics. Secondary carcinoma may be associated with Addison's disease.

Parasites.—In very rare cases *echinococcus* has been found in the adrenals. *Aldred Scott Warthin.*

SUPRARENAL BODIES, PHYSIOLOGY OF. See *Secretion, Physiology of.*

SUPRARENAL CAPSULE, EXTRACT OF. See *Adrenalin,* and *Organotherapy.*

SUSPENSORY BANDAGES are employed for prophylactic purposes when the scrotum and its contents are normal, but exposed to injury or disease. Thus they are recommended to men whose occupation compels them to stand for hours in the upright position, to lift heavy weights, to take severe physical exercise, or to ride a horse or a bicycle for hours at a time. Athletes usually wear bandages technically called "jock-straps" in place of suspensories. These "jock-straps," however, while immobilizing the external genitals, drag them upward, and, in fixing them upon the pubes, may produce abnormal pressure of the scrotal contents, and expose them to the injuries which they are intended to prevent. Among the prophylactic uses of suspensory bandages, they are recommended in gonorrhœa to prevent epididymitis and orchitis. Experience, however, has proven that they are not always effective in this regard. The therapeutic uses of suspensory bandages are as varied as are the diseases which affect the scrotum and its contents. In general depressed states, where relaxation of the scrotum causes it to hang down below its normal level, a well-fitting and properly adjusted suspensory bandage gives the organs within it the needed support. In local conditions, such as scrotal dermatoses, it serves to immobilize the sac and thus compels any medicaments which may be applied to the skin to remain in direct contact therewith. In varicocele of a minor degree it oftentimes renders operation unnecessary. In funiculitis, epididymitis, orchitis, and orcho-epididymitis, when the swelling is not too great to be controlled by a suspensory bandage, it serves its purpose admirably. When the swellings in these diseases are very great, they require modifications of suspensory bandages, called compressors, such as the Miliano, Zeissl, Langlebert, Casper, and other scrotal compressors. These modifications not only support the scrotum firmly against the ascending rami of the pubis, but, having a firm, strong bag with lace-strings, they render it possible to subject the scrotum and its contents to uniform compression. It is essential to suspensories and compressors that traction should be exerted in a posterior direction upon the lower (posterior) apex of the bag. This traction is made by means of counter-straps. If these straps are omitted, as they sometimes are, especially in the cheaper forms of suspensories, these contrivances then become useless and even at times injurious. Firm support and compression are not possible without these counter-straps. When they are absent the scrotum is dragged upward and forward by the waist-band, and the posterior margin of the bag is likely to cut into the posterior surface of the scrotum. Many forms of excellent suspensory bandages are made, but no one form can be recommended for all prophylactic or therapeutic uses. The individual conformation of the external genitals varies as much as does that of the hand or foot. Suspensory bandages must therefore be "fitted" to the genitals, with consideration for the individual peculiarities as well as for the object to be attained. The inflexible rules regarding the effective use of suspensory bandages are, first, that they must not produce the slightest discomfort, and next, that they must instantaneously give at least marked, if not entire, relief from pain. If these ends are not attained, the bandage employed is not applicable to the case or has been defectively applied. In epididymitis, when the cord is not much involved, strapping the testicle by Fricke's method often enhances to a marked degree the value of a suspensory bandage. It must be remembered, however, that the application of strips of adhesive plaster for the accomplishment of the desired end is painful, unless it be done by an operator of great experience in the use of this form of dressing. When it is properly applied this dressing promptly reduces swelling and pain, and renders the patient entirely willing to have the operation repeated as often as may seem desirable. Gerson, of Berlin (*Berliner klinische Wochenschrift,* No. 3, 1897), devised "scrotal elevating strips" as a substitute for suspensory bandages. These strips (*Suspensionsbinden*) are elastic, adhesive bandages, with the upper margin softly fringed. Before applying them it is desirable to empty the lower part of the scrotum as much as possible by crowding the testicle firmly up against the external ring. In a certain number of cases these strips prove successful, and as it is an easy matter to apply them they may well be recommended for trial.

Ferd. C. Valentine.

SUTHERLAND SPRINGS.—Wilson County, Texas.

Post-Office.—Sutherland Springs. Hotel and boarding-houses.

Access.—From San Antonio viâ the San Antonio and Gulf Railroad, thirty miles distant.

The resort is pleasantly located on the Rio Cibolo, at an elevation of about 400 feet above the sea-level. The surrounding country is of a gently undulating character and presents much pleasing scenery of a mild and tranquil character. This part of the State is celebrated for its genial climate and its freedom from malarial and miasmatic disorders. At the date of our correspondent's letter (December 27th), the flowers were in full bloom out of doors and the gardens were as green as in summer. There is no ice at any time, and the frosts are seldom sufficiently severe to cause the trees to shed their leaves. Many persons who begin the baths during the summer continue them during the winter months, as it is seldom cold enough to interfere with this pastime. No analysis of the water has been made, but the numerous springs are said to offer a variety of therapeutic properties—tonic, alterative, astringent, laxative, diuretic, etc. This combination of valuable spring waters with a mild, dry, equable climate makes the location a very attractive one for a large class of sufferers from various ailments. It is said that a fine modern hotel will soon be built.

James K. Crook.

SUTURES.—Suture Materials.—The materials used for sutures are very varied. The ones most employed are silk, catgut, silkworm gut, silver wire, horse-hair, and kangaroo tendon.

Silk, not being absorbable, is not good, except in the smaller sizes, for deep sutures or ligatures, and finds its use chiefly in uniting the skin and in intestinal work. It is also used for tying off pedicles where great strength is requisite. It is best sterilized by boiling it on spools in alcohol or in a one-per-cent. solution of carbonate of sodium. The small sizes are usually dyed black for easier detection. When the suture is small it may be encapsulated and thus remain in the tissues indefinitely; but, on the other hand, it may give rise at any time to inflammation and the formation of a fistula.

Catgut is used largely for deep sutures, *i.e.,* those which are buried in the deeper parts. They are absorbed

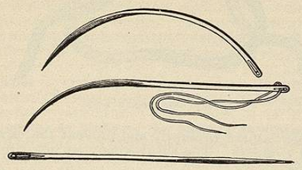

Fig. 4564.—Surgical Needles.

and thus produce no subsequent irritation, which is possible in non-absorbable materials. In order to prevent too rapid absorption the catgut may be "chromicized." Chromicized catgut may remain unabsorbed for as long a period as from two to six weeks. The gut is soaked in ether for twenty-four hours and placed for twenty-four hours more in a four-per-cent. solution of chromic acid in water. The gut is now dried in a hot-air sterilizer and disinfected by one of the usual methods. The most serious objection to catgut as a suture material is the difficulty of sterilizing it completely. This difficulty has given rise to a great number of methods of disinfection. Boiling in ninety-five-per-cent. alcohol for an hour with the use of a still is a very satisfactory method. For other methods, see under *Dressings* (*Surgical*). Catgut is not so satisfactory as silk for suturing the skin.

Fig. 4565.—Interrupted suture.

Silkworm gut is an excellent material for tension sutures, but should not be used for buried sutures, as it has sharp ends and is non-absorbable. It is used extensively in perineum and cervix operations. It is prepared by boiling it in alcohol or water. It may be dyed black for easier detection. When boiled too often it breaks easily if drawn tight.

Silver wire is used in holding bone fragments together and also as a tension suture for the skin. The suture is twisted on itself and then it holds the parts in contact. It can be satisfactorily sterilized by boiling it in water.

Horse-hair is occasionally used for the skin when there is not great tension on the edges of the wound. It is sterilized by boiling it in water or alcohol.

Kangaroo tendon is obtained from the kangaroo's tail or leg. It is very strong and pliable. It can be satisfactorily used for buried sutures, and has found its chief employment in hernia operations. It should be chromicized. It is finally absorbed, but only after several weeks.

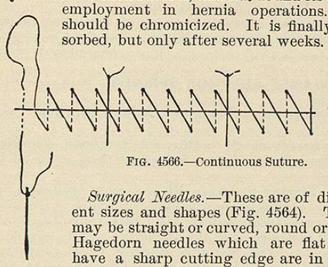

Fig. 4566.—Continuous Suture.

Surgical Needles.—These are of different sizes and shapes (Fig. 4564). They may be straight or curved, round or flat. Hagedorn needles which are flat and have a sharp cutting edge are in very general use. In intestinal work round needles are preferable, as they do not cut the thin tissues, causing the suture to pull out. For suturing deeper parts, as in pelvic operations, a needle-holder is useful, and there are many forms. Needles are sterilized by boiling or by placing them in carbolic acid, 1 to 20, for fifteen or twenty minutes.

The Different Kinds of Sutures.—Wounds can be united by a variety of forms of suture.

Interrupted Suture (Fig. 4565).—This is the usual form of suture for uniting the edges of the skin. The needle

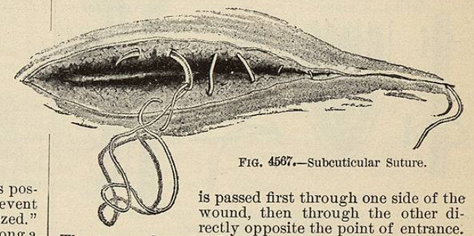

Fig. 4567.—Subcuticular Suture.

is passed first through one side of the wound, then through the other directly opposite the point of entrance. The two ends are tied with a reef-knot and cut short. The knot should be on one side of the line of the wound. When there is tension of the wound the so-called tension sutures are used, which are inserted at a further distance from the edges of the wound than ordinary coaptation sutures. The interrupted sutures should be placed near enough together to insure good approximation of the edges of the wound. The suture is removed by cutting the thread close to the skin and pulling on the knot. Medium-sized silk is generally employed for the skin.

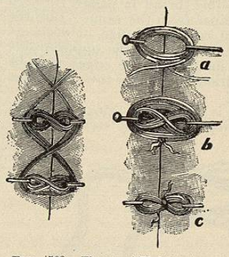

Fig. 4568.—Figure-of-Eight Sutures.

Continuous Suture (Fig. 4566).—This is begun at one end of the wound. Instead of cutting the thread after the first suture, the latter is continued throughout the whole length of the wound. The needle is inserted at points directly opposite each other. In this way the visible part of the thread forms a row of parallel oblique lines and the invisible part a row of transverse lines. The suture is tied by tying the double thread on one side to the single portion on the opposite. This suture can be inserted more rapidly than the interrupted, and is well adapted for long wounds.

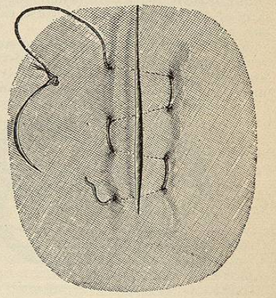

Fig. 4569.—Mattress or Quilt Suture.

Subcuticular Suture (Fig. 4567).—This is a catgut suture in which the curved needle is passed in and out below and parallel to the skin and then drawn up tight so as to bring the skin surfaces in contact. The advantages of it are that it leaves only a small scar and minimizes the danger of stitch-hole abscesses from penetration of the skin with its bacteria.