

the increase in size takes place and, by the fifth month, is too large to occupy a posterior position. Certain conditions, however, may hinder the elevation of the fundus: the uterus may be adherent and unable to break away; an over-prominent sacral promontory may not give sufficient space for the fundus to swing upward; a tumor in the posterior uterine wall, or one superimposed, may imprison the organ. No doubt retention of urine, with the consequent distention of the bladder, is a mechanical hindrance at times. If the uterus is unable to rise above the pelvic brim either abortion takes place or the symptoms of *incarceration* show themselves. There are two varieties of *incarceration*, *complete* and *partial*: in the complete form the entire organ is held beneath the pelvic brim; in the partial the uterus becomes sacculated, a portion, made up of the posterior wall, remains in the pelvis, while the fetus develops in the anterior free portion.

Symptoms.—Symptoms rarely appear before the third nor after the fifth month; after the latter date the uterus is too large to become retroverted and before the third it is too small to give rise to signs of compression. At first, owing to the increased weight of the gravid womb, the symptoms are merely an intensification of the common signs of backward displacement. There are back-ache, dragging sensations, feeling of weight in the pelvis, irritation of the bladder and rectum, and, at the same time, there may be considerable difficulty in emptying those reservoirs. When the displacement occurs suddenly there are no prodromal symptoms; the patient experiences a sudden pain in the lower abdomen followed by signs of pressure. After the incarceration has developed the prominent symptoms come from the urinary organs. The cervix presses upon the urethra and a cystitis results which may pass into a gangrenous form, the urine becoming foul and containing pus, blood, and broken-down tissue. The patient may have chills and fever, and the infection ascend to the kidney, causing death by uremia. In some cases the bladder cannot empty itself and rupture occurs. If the incarceration continues the pelvic pain becomes very intense and the uterine wall may become gangrenous, leading to a termination of the case through septic peritonitis. In rare cases the fundus has been expelled through a ruptured vaginal wall and perineum.

Prognosis.—In retroversion of the pregnant uterus the prognosis is very serious unless the condition relieves itself or is promptly treated. Unless abortion occurs incarceration is always fatal if left to itself. Gottschalk's statistics, based upon 67 fatal cases of backward displacement, give the causes of death as follows: uremia and collapse, 16; septicemia from the bladder, 4; gangrene of the bladder, 3; rupture of the bladder, 11; peritonitis from injury of the bladder, 17. The other causes of death were peritonitis, pyæmia, and gangrene of the intestine. These figures illustrate the frequency with which the urinary organs are involved.

Diagnosis.—In addition to the presence of pressure symptoms there are certain important physical signs. On digital examination the finger detects an elastic rounded body lying in Douglas' pouch and filling more or less of the pelvic cavity; the cervix may be hard to reach or found directly behind the symphysis, the external os looking upward in cases of retroversion or more or less downward in flexion. On feeling above the pubes the fundus of the uterus is missing from its normal position and its place may be occupied by a cystic tumor formed by the distended bladder unless catheterization has been performed in advance. Per rectum more of the tumor is accessible to the finger. A retroversion must be differentiated from all those tumors which may lie in Douglas' pouch, such as an ovarian cyst, ectopic gestation, or a fibroid; a combination of tumor and normal pregnancy is particularly difficult to diagnose unless an anæsthetic be administered.

Treatment.—As soon as retroversion of the gravid uterus is discovered efforts at reposition must be made. The woman should be placed in the knee-chest position, a Sims speculum introduced, and the fundus pushed up-

ward while the cervix is drawn down by means of a tenaculum; sometimes the upward pressure can be made to better advantage through the rectum. In difficult cases an anæsthetic should be administered, the patient put in the lithotomy position, and, by means of bimanual manipulation, the fundus swung around the promontory to the front. As soon as the uterus is in proper position tampons or a pessary must be employed until its growth has rendered it too large to enter the pelvis again. When adhesions exist three courses of treatment are at the disposal of the physician: 1. Repeated tamponade of the vagina with cotton or wool soaked in boroglyceride and ichthyol with the hope of causing gradual absorption of the restraining bands and elevation of the fundus. This method of treatment can be carried out only in those cases in which there are as yet no urgent symptoms. 2. Posterior vaginal section followed by manual separation of the adhesions and replacement of the uterus. 3. Abdominal section and manual replacement.

The choice of methods will depend upon the urgency of the case. When incarceration has developed attention must first be paid to the bladder, and if careful attempts at catheterization fail the urine must be evacuated through a suprapubic puncture. If manipulations through the vagina fail the abdomen should be opened and the fundus lifted into position. Abdominal section by M. D. Mann, twice by Mouchet, and eleven times by Jacops; all the cases were successful except one of Jacops' which was aborted. Artificial abortion needs to be performed but very seldom and the difficulties and dangers of emptying and draining the incarcerated uterus are much greater than those connected with the intra-abdominal method of treatment if the case is in skilled hands. Vaginal hysterectomy would be proper for those cases in which the uterine walls have become inflamed and damaged by the compression.

Anterior Displacements of the Pregnant Uterus.—These may occur in the first or last part of pregnancy. When the ovum develops in an ante-flexed uterus usually the fundus elevates itself without trouble unless the uterus is bound down by inflammatory deposits, pressure from above, or the operation of ventral fixation has been performed. If the organ does not right itself there are more or less pain and disturbance of the bladder followed by abortion.

The diagnosis is made by bimanual examination, and treatment consists in elevating the fundus by the use of tampons and massage. If the uterus is fixed on account of adhesions or previous operation abdominal section would be justifiable. In the latter months of gestation an anteversion may take place from weakness of the abdominal muscles and especially from a separation of the recti. Multiparity, contracted pelvis, lumbar lordosis, and excessive distention of the uterus are all predisposing causes.

The symptoms are marked when the patient is upon her feet; she experiences discomfort and difficulty in locomotion. When the patient is standing or sitting the uterine tumor is very prominent, the fundus may incline directly forward and the external os look backward; in exaggerated cases the uterus is inverted so that its anterior surface rests against the thighs. On external palpation the foetal parts may be easily felt, as the uterus is covered only by a layer of skin and peritoneum. The cervix may be inaccessible unless the entire hand be introduced within the vagina. In the dorsal position both the signs and symptoms disappear.

The treatment is to keep the patient upon her back as much as possible and order her to wear a well-fitting abdominal supporter. During the last weeks of gestation it is important to keep the uterus in the correct axis of the superior strait so as to insure proper engagement of the presenting part.

Prolapse of the Pregnant Uterus.—This displacement is an uncommon complication of pregnancy. The increase in weight is likely to produce a recurrence in those patients who already have suffered from this form of uterine

dislocation; in rare instances blows, falls, or strains have produced a sudden descent of a uterus which heretofore occupied its normal position. As pregnancy advances usually the prolapsed organ becomes spontaneously replaced, but if such be not the case either abortion takes place or the symptoms of incarceration appear. A few authors claim that it is possible for gestation to go to term in a uterus prolapsed between the thighs of the patient.

The treatment consists in replacing and retaining the organ until danger of repetition of the displacement is prevented by the size of the uterus. If replacement is impossible and there are signs of incarceration abortion should be induced; removal of the uterus is justifiable in septic cases.

Lateral Displacement of the Pregnant Uterus.—Pathologic lateral deviations of the uterus are rare during gestation, the inclination of the fundus to the right being regarded as physiologic. Excessive lateral flexion will produce symptoms of pressure, such as edema and pain in the leg corresponding to the side toward which the axis inclines. The chief importance of lateral deviations is their influence in producing faulty presentations or positions at the time of labor.

Relaxation of the Pelvic Joints.—In certain cases the physiologic softening of the interarticular cartilages is carried to excess and an abnormal amount of movement in the joints is permitted. The symptoms come on during the last two months of gestation and consist of pain in the region of the symphysis, groin, and lumbar region; walking becomes difficult or impossible both on account of the pain and from the effort required to maintain the proper balance of the body. Pressure over the symphysis is painful. The patient should be examined in the standing posture by introducing a finger into the vagina and pressing against the inner surface of the symphysis while the patient supports her weight first upon one leg and then upon the other; in this way the movement in the joint will be appreciable to the examining finger. The same result will be attained when the woman is lying down, by directing her to flex the thighs alternately.

Treatment.—During pregnancy a snug bandage about the pelvis will give some relief, except in bad cases when the patient must remain in bed. General tonics are sometimes beneficial. The condition usually cures itself in a month or two after labor, and during the interval a harness to immobilize the pelvis should be worn.

Traumatism and Surgical Operations during Gestation.—There are instances in which a gravid woman has suffered from severe injuries without interruption of the pregnancy and yet sometimes trifling accidents will cause abortion. The irritability of the uterus, the seat of the injury, and the amount of blood lost are important factors in affecting the result. According to Cohnstein penetrating wounds of the abdomen, without injury to the uterus, are apt to arrest gestation; but Harris has reported a case in which the abdomen of the woman, six months pregnant, was lacerated by the horn of a bull so that the omentum and intestines protruded, yet the pregnancy went to term. The existence of pregnancy seems to have no influence upon the healing of wounds, although there is evidence that the gravid state may cause retardation in the union of fractures.

Major surgical operations, such as amputation at the hip-joint, the removal of ovarian tumors and even fibroids from the uterus, do not necessarily interrupt the pregnancy. Sir James Paget summed the matter up by saying that it would be mere recklessness to operate upon a pregnant woman without good cause; yet, if good cause exists, she may be treated very successfully. Operations upon the rectum seem to be particularly dangerous as regards the risk of inducing abortion and, to a less extent, do those upon the vulva. Pregnancy is not a contra-indication to removal of the breast for cancer. When fixing the date of an operation upon a gravid woman the time of the menstrual epoch should be avoided, and in all cases particular care should be taken to diminish shock and hemorrhage.

Hernia of the Pregnant Uterus.—The gravid uterus is very rarely found occupying the inguinal canal, and when such is the case the ovum usually is in one horn of a uterus bicornis. In the *Arch. f. klin. Chir.*, xlix., 4, W. Rosanoff has reported a case of inguinal hernia of the gravid uterus in which the tumor reached almost to the knee; its largest circumference measured 80 cm. After delivery he reduced the uterus into the abdominal cavity, the left ovary and a part of the left tube remaining in the canal until an operation for radical cure was performed. Rosanoff considered that in the beginning the canal was occupied by the ovary, left tube, and coils of intestine, the uterus gradually following.

Montgomery A. Crockett.

GETTYSBURG SPRINGS.—Adams County, Pennsylvania.

Post-Office.—Gettysburg. Hotels. Gettysburg is reached by the Philadelphia and Reading and by the Western Maryland Railroads (separate depots). The springs are easily accessible by street car or omnibus. Two prominent springs, known as the Gettysburg "Katalysine" and the Gettysburg "Lithia" Springs, are reported by the Government Geological Survey. The following remarks refer to the former, as we have not been able to gain any recent information concerning the Lithia springs. The Katalysine Springs are located in a picturesque valley a short distance west of the town. It is said that the great battle of Gettysburg began in the immediate vicinity (Walton). The following analysis of the Katalysine water was made by Professor Genth, of Philadelphia:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium carbonate.....	0.22
Magnesium carbonate.....	.33
Iron carbonate.....	.02
Manganese carbonate.....	Trace.
Calcium carbonate.....	5.02
Sodium chloride.....	.66
Lithium chloride.....	Trace.
Potassium sulphate.....	.21
Sodium sulphate.....	.25
Magnesium sulphate.....	6.78
Calcium sulphate.....	.83
Calcium phosphate.....	Trace.
Calcium fluoride.....	Trace.
Magnesium borate.....	.63
Silicic acid.....	.29
Organic matter, with trace of nitric acid, etc.....	.70
Impurities suspended in water, like clay, etc.....	1.10
Total.....	16.35

In addition, traces of carbonate of copper, sulphate of strontium, alumina, carbonate of nickel, carbonate of cobalt, and sulphate of baryta have been found. This water is said to be efficient in gout and rheumatism, and has proved of value in gravel, catarrh of the stomach, and dyspepsia. The combination of an alkali with the salts of lime, as observed in this spring, is a very valuable one. The water is used commercially.

James K. Crook.

GEUDA SPRINGS.—Cowley County, Kansas.

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

The Geuda Mineral Springs are located on the St. Louis and San Francisco Railroad, one mile distant from the Arkansas River and eight miles north of Indian Territory. The town of Geuda Springs, which has about 800 inhabitants and is rapidly growing, is pleasantly situated at the edge of a beautiful and undulating plateau, which is everywhere dotted with fine farms and neat farm-houses. The elevation above the sea is about 1,400 feet, and the atmosphere is pure and wholesome. The winters are short and open, making constant outdoor exercise possible. There are very few hot days in the summer, the thermometer rarely extending above 100° F., but, as a rule, the days are balmy and the nights cool and refreshing. The springs are seven in number, and bubble

up in a space less than twenty feet square. Near the springs is a beautiful lake of salt water, with an area extending to the westward nearly two miles, and another to the southward nearly half that distance. The evaporation of the water causes the beach to be covered with pure, crystallizable salt. This picturesque body of salt water, constantly fed by salt springs, furnishes fine advantages for bathing. The lake bottom is hard and sandy, and bathers can secure any depth of water desired. A commodious bath-house in connection with the springs affords opportunities for any variety of bath which may be desired. Following is a detailed analysis of the seven springs by Professor Bailey, of the Kansas State University:

NUMBER OF GRAINS IN EACH UNITED STATES GALLON OF 231 CUBIC INCHES.

	Spring No. 1.	Spring No. 2.	Spring No. 3.	Spring No. 4.	Spring No. 5.	Spring No. 6.	Spring No. 7.
Sodium chloride	1030.93	1056.28	815.68	671.76	357.05	432.20	504.21
Calcium sulphate	199.64	204.73	167.58	158.29	145.88	147.33	100.17
Magnesium sulphate	25.56	24.24	28.53	26.64	24.98	27.43	22.86
Magnesium chloride	16.55	19.96	10.01	7.90	8.45	4.95	9.66
Calcium bicarbonate	3.70	5.90	5.99	6.86	10.67	12.50	5.51
Potassium sulphate	12.12	1.69	1.90	1.90	.82	.54	.47
Sodium phosphate	.02	.02	.02	.02	.04	.08	.08
Sodium bromide	.02	.02	.01	Trace			
Sodium iodide	Trace		Trace				
Sodium borate	.16	.16	.16	.08	.12	.12	.25
Sodium nitrite	.38	.40	.18		.02	.06	.03
Sodium bicarbonate	.41	.32	.30	.60	.49	.31	.60
Sodium sulphide						.65	
Lithium chloride	Trace	Trace	Trace	Trace	Trace	Trace	Trace
Iron bicarbonate	.07	.19	.07	.05	.03	.06	.08
Alumina	.06	.01	.01	.01	.01	.01	.01
Silica	.07	.86	.81	.79	.92	.73	.79
Organic matter	Trace	Trace	Trace	Trace	Trace	Trace	Trace
Total	1280.29	1314.78	1031.14	874.90	549.48	626.92	704.72
Free carbonic acid gas in cubic in.	34.96	27.69	18.32	17.64	23.98	22.16	29.05
Sulphureted hydrogen gas						Trace	Trace
Specific gravity	1.018	1.016	1.013	1.012	1.008	1.009	1.009
Temperature	63° F.	63° F.	63° F.	63° F.	63° F.	63° F.	63° F.

These waters may be classed as belonging to the muriated and sulphated-saline variety (carbonated). They have found their most suitable application in liver, kidney, and stomach disorders, general debility, anæmia, and rheumatism. Some of the springs have gained considerable celebrity in the local treatment of conjunctivitis, indolent ulcers, leucorrhœa, etc.

James K. Crook.

GEUM. See *Arens*.

GIANT CELLS.—These are very large cells of mesenchymal origin, often many times as large as other cells with which they are associated. They frequently have many nuclei—sometimes as many as two hundred,—or a single nucleus which may be deeply lobulated or "beaded," that is, broken up into a number of portions connected by threads of nuclear material. But the giant cell is sometimes distinctly mononuclear and on the other hand there are in the body many polynuclear cells, such as the ordinary polymorphonuclear leucocytes and the striated muscle fibres, which cannot be classed as giant cells. Therefore the important point in the definition is the size rather than the number of nuclei.

FIG. 2294.—Bone Marrow, Showing Giant Cells. $\times 830$.

not probable, as has been believed, that they ever arise by the fusion of small mononuclear cells. Occasionally, under artificial conditions, cells without cell walls may fuse, but the formation of a true syncytium is rare and the appearance is generally due to faulty technique (Henneguy). It is more probable that each giant cell begins as a single mesenchymal cell in which growth continues while the process of division fails or is not completed. Nuclear division, when it occurs, usually follows the direct or amitotic method, though the indirect or karyokinetic may be seen. Nedjelsky, who studied chiefly cell division in malignant growths, describes different varieties of amitosis in which the separation, partial or complete, usually began in the nucleolus, and later often failed to involve the rest of the nucleus or the protoplasm. A multinuclear giant cell may subsequently divide into a number of small mononuclear cells.



FIG. 2295.—From Section of Snout of Embryo Pig, Showing Osteoclast. $\times 410$.

Without attempting to ascribe a common function to all giant cells we may safely assert that there is often evidence of phagocytosis. Thus in tuberculosis the giant cells often contain bacilli; in tumors degenerating elastic fibres may be seen in them; and in the case of the osteoclasts they undoubtedly play an important part in the removal of lime salts in developing and growing bone. Phagocytosis is even more clearly seen in the giant cells which are found in the neighborhood of foreign bodies.

Giant cells occur most commonly in connection with reticular and related tissues and in the blood-forming organs. Normally they are perhaps most familiar in marrow. Here, away from the bone, are large giant cells with partially divided and irregularly lobulated nuclei, and also large masses of nuclear matter having an obscurely reticulated structure and not appearing to be surrounded by protoplasmic bodies. Close to the bone are osteoclasts, large cells with few or many nuclei, apparently completely divided. They lie in shallow excavations in the bone, Howship's lacunae. Their action leads to the destruction or dissolution of the adjacent calcareous matrix.

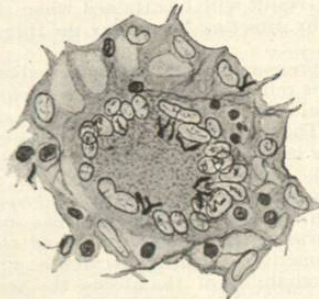


FIG. 2296.—Portion of a Tubercle, Showing a Giant Cell Containing Bacilli. $\times 410$.

In the spleen we can recognize large mononuclear cells, in which the presence of red corpuscles suggests phagocytosis. These cannot properly be called giant cells; but in the young of many animals and in the embryo the spleen contains larger cells with lobulated nuclei (megacaryocytes)—not as a rule to be found in the adult. Giant cells are also described as occurring in hæmolymph glands and in the embryonic liver.

Pathologically, giant cells are more widely distributed. They arise from fixed tissue cells of the diseased part, connective-tissue cells, or endothelial cells of blood and lymph capillaries—not, as some have believed, from leucocytes. Multinucleated forms are seen in hyperplastic and regenerative growth of connective tissue. They occur in tumors, especially in sarcomata originating in the marrow or periosteum. Large polynuclear forms may also be seen in the vicinity of foreign bodies, which they

As to their origin, it is

enclose in their protoplasm if small, and whose dissolution they otherwise tend to bring about.

Perhaps their most familiar occurrence is in tuberculosis. Here, though not always present, they are often large and prominent and are important landmarks in the identification of the disease. They occupy the centres of miliary tubercles. Their nuclei are very numerous, completely divided and commonly arranged about the border of the cell or gathered into unequal or irregular groups at the poles. They often have protoplasmic processes, whose relation to the reticulum is not at present clear. They may have necrotic centres and contain tubercle bacilli.

Ralph C. Larrabee.

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Nedjelsky: Beitr. z. path. Anat. u. z. allg. Path., 1900, Bd. xxvii.
Roma: Beitr. z. path. Anat. u. z. allg. Path., 1900, Bd. xxvii.
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Ziegler: General Pathology, 1900.

GIANTISM. See *Acromegaly*, and *Hand and Fingers*, etc.

GILROY HOT SPRINGS.—Santa Clara County, California.

POST-OFFICE.—Gilroy Springs. Hotel. These springs are located on the Coyote River, nine miles northeast of the town of Gilroy, in the Santa Clara Mountains. They are reached by the Southern Pacific Railroad to Gilroy, and from thence by stage over a picturesque mountain road. The springs lie nestled in among the mountains, surrounded by fragrant forests of spruce and pine. The atmosphere is rich in ozone, and the climate very genial. There is one main spring, which flows in great abundance. The temperature of the water varies from 108° to 115° F. Anderson's analysis:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride	31.75
Sodium carbonate	1.42
Sodium sulphate	.75
Potassium iodide	Trace.
Potassium sulphate	2.16
Magnesium carbonate	2.45
Magnesium sulphate	9.04
Calcium chloride	8.50
Calcium sulphate	2.70
Ferrous carbonate	.26
Ferrous oxide	Trace.
Arsenic	Trace.
Silica	3.51
Organic matter	.52
Total solids	62.86
Gases.	Cubic Inches.
Free carbonic acid gas	12.17
Free sulphureted hydrogen	9.25

The analysis shows a light alkaline-sulphureted water. It is used with considerable benefit in syphilis, rheumatism, and tuberculosis, in glandular swellings, in chronic skin eruptions, etc. The water is also used for bathing, for which excellent facilities have been constructed.

James K. Crook.

GINGER.—ZINGIBER. The rhizome of *Zingiber Zingiber* (L.) Rusby (*Z. officinale* Roscoe, U. S. P.) (fam. *Zingiberaceae*). This plant belongs to a remarkable order of tropical perennial herbs with horizontal, fleshy, often lobed and branched rhizomes, more or less developed upright stems, with two-ranked, alternate, parallel-nerved, sheathing leaves, and, theoretically, trimerous, irregular flowers in various clusters.

The flowers vary greatly in color, from nearly white to a purplish-blue. The richer the soil, the better the

ginger, and the product of newly cleared land holds a special place in commerce. It is probably a native of Southern Asia, but is not known wild, having been cultivated for many hundred years. It has also been transplanted to tropical Africa and the West Indies, besides many other places, where it is extensively cultivated.

It has been used as a spice, even in Europe, almost since the beginning of this era, having been imported from the East by way of the Red Sea. The plant was carried to the West Indies soon after the discovery of the



FIG. 2297.—Ginger Plant about One-third Natural Size. (Ballou.)

New World, and a few years later ginger was exported from St. Domingo back to Europe.

DESCRIPTION.—Ginger is either coated, that is, simply washed and dried without removing the cuticle, or else scraped, when the outer surface is peeled or scraped away. When the bark is stripped from the two flat sides, it is known as "half-coated." It is in pieces technically called "hands," "about three-fifths of an inch broad, flattish on one side, lobed or clavately branched; deprived of the corky layer (peeled ginger), pale buff-colored, striate, breaking with a mealy, rather fibrous fracture, showing numerous small, scattered resin cells and fibrovascular bundles, the latter enclosed by a

nucleus sheath; agreeably aromatic, and of a pungent, warm taste." When ginger is not peeled it has a grayish or brownish wrinkled surface. Inferior and dark-colored grades are sometimes bleached with sulphur, chlorinated lime, etc., or are even "whitewashed" with chalk and water, or some such mixture, to give them a whiter and more salable appearance. This treatment also protects them against the attacks of insects. The relative commercial and medicinal values of ginger do not agree. For medicinal purposes it is better with the very active rind left upon it, but its commercial value depends more upon its ability to yield a clear, light-colored preparation, which is true of the peeled articles. The principal varieties in the order of their estimation are Jamaica, Cochín, and African. The last, though the cheapest, contains the largest amount of active constituents, and is to be preferred for medicinal use.

COMPOSITION.—Ginger contains a pale yellow volatile oil to the extent of about one or two per cent., having its odor and taste without its pungency. The remaining constituents are a composite resin, besides the real source of its pungency, gingerol, which, however, is not volatile or aromatic. Twenty per cent. of starch, fat, gum, and various amorphous and uninteresting substances make up the rest. The oil and resins are contained in cells resembling those of the parenchyma, and irregularly scattered among them. The ethereal extract (*Oleo-resina Zingiberis*, U. S. P.) is composed of these resins in combination with the essential oil, fat, etc., and is yielded by different varieties to the extent of five to ten per cent.

ACTION AND USE.—Ginger is a spice more aromatic and less pungent than pepper, and, like others of its class, in suitable dose is gently stimulating to the stomach and intestines, and in its way a carminative tonic. In large doses it is irritating; locally applied to the skin it is rubefacient to a less degree than mustard, and useful where a mild counter-irritation is desired. It is used in colics, atonic dyspepsia, flatulence, etc., and is a favorite flavor for cakes, drinks, and preserves.

ADMINISTRATION.—In powder the dose may be taken as from 0.5 gm. to 1 gm., usually mixed with other aromatics. An infusion, under the name of "ginger tea," is a favorite preparation in the country. A fluid extract is official (*Extractum Zingiberis Fluidum*, U. S. P.), but not much used. The tincture (*Tinctura Zingiberis*, U. S. P.) is in universal employment; its strength in this country is twenty per cent. The oleoresin or ethereal extract (*Oleo-resina Zingiberis*, U. S. P.) is a very concentrated form suitable to add to pills and boluses. Dose, a decigram or so. The official syrup contains three per cent. of the fluid extract, and the troches each about three minims of the tincture, with a little of the syrup. Ginger also enters into the compound rhubarb powder and the aromatic powder, both official.

A little of the preserved ginger of the shops makes a delicious and wholesome addition to the meal.

The alcoholic preparation popularly sold under the name of "Jamaica Ginger" is used to some extent, especially in mining communities, as an intoxicant. The cerebral effects have not been suitably studied, but are markedly distinct from those of ordinary alcoholism, there being narcotic effects apparently due to the ginger itself. A number of cases of blindness may be due to the employment of methyl alcohol. *Henry H. Rusby.*

GINGER, OIL OF.—This is an article of commerce, possessing the odor and flavor, but not the pungency nor full physiological effects, of ginger. It is pale yellow, with a specific gravity of 0.880 to 0.885, and contains camphene as one of its active parts. *Henry H. Rusby.*

GINSENG.—A name applied to the roots of several species of *Panax* L. highly prized in superstitious Chinese medicine, and chiefly so used, though they have some mild aromatic properties (see *Araliaceae*). The original Ginseng ("Schin-Seng") is *P. Ginseng* C. A. Meyer, of China, never seen in commerce here. The American

variety, from *P. quinquefolium* L. (*Aralia q.* Decne), is chiefly exported to China and is bought eagerly, at high prices, by Chinese merchants for that purpose. It used to be very abundant in rich forest lands of the Eastern United States, but has been largely exterminated, except in remote sections. It is of very slow growth and, when well developed, presents two principal branches, and occasionally a small intermediate one. From this peculiar form, it is regarded as effective in determining the sex of the unborn child, whence its high repute in China. It contains considerable gum and starch and a little volatile oil and resin and the peculiar, but apparently inert, sweetish substance *Panaquilon*, soluble in alcohol and water. Obviously, there is no dose for so inactive a drug. *Henry H. Rusby.*

GLANDERS.—An infectious disease caused by the *Bacillus mallei* and characterized by foci of inflammation, often assuming nodular form, in the skin, subcutaneous tissue, muscles, and lungs. The disease is most commonly found in the horse; the cases in man arise by infection from the horse or some member of the Equidae. According to Hecker,¹ the disease was first described under the name malleus in the fourth century. The first reliable observation of the disease in man was made by Schilling in 1821, and this was followed in 1837 by a monograph by Rayer² on the human form of the disease. The idea that the disease was contagious was held by all the early writers, and it was not until 1749 that Lafosse³ affirmed it to be a spontaneous disease not transmitted by contagion. In 1840 the contagiousness of the disease was definitely established by animal inoculation.

The *Bacillus mallei* was discovered by Löffler and Schütz⁴ in 1882. They isolated the bacillus in pure cultures, and by animal inoculations proved that it was the cause of the disease. The bacillus is slightly curved, not quite so long as the *Bacillus tuberculosis*, but somewhat thicker than this. The ends are rounded. It is non-motile in fluid cultures. It is a facultative anaerobe. In old cultures various involution forms are seen. The bacilli may grow out to long rods with irregular swellings along them, or they may form chains of small granules resembling cocci. In cover-glass preparations made from the lesions the bacilli usually appear somewhat longer and thicker than the tubercle bacilli, and show numerous sharply defined, clear, or faintly stained areas in their protoplasm. According to Csoker,⁵ there are five pale and five dark points in each bacillus. They grow readily on most of the culture media, and have a characteristic growth on potato. On potato, after thirty-six hours in the incubator, a rather thick, colorless viscid growth appears which soon assumes a brownish tint and resembles honey in appearance. Later, the brown color changes to a dark reddish-brown, and the growth becomes thicker and more opaque, while the potato takes on a dark gray color. No other organism produces on potato exactly the same growth. The bacillus of glanders is one of the most easily destroyed of all the microorganisms, and to this is probably due the relative infrequency of the disease. In pure cultures the bacilli die usually at the end of a few weeks, and they lose their virulence by the eighth day. Being vegetative forms only, heating to 55° or 60° C. for a few minutes destroys them. They are destroyed in the pus in forty-eight hours, when this is dried in a thin layer, and under the best conditions they will not stand drying more than three weeks. They are also very susceptible to the action of germicides. The bacilli are decolorized by the Gram stain. They easily stain in the basic aniline colors, but are easily decolorized. In sections they may be stained by Löffler's solution, but are less intensely stained than the nuclei of the cells. From the impossibility of staining them intensely it is often difficult to demonstrate them in tissues even when they may be present in considerable numbers.

A substance to which the name mallein is given is obtained from cultures of the bacilli. When this is injected into an animal affected with glanders in any form

a characteristic reaction is produced which is diagnostic. This substance was prepared in 1888 by Helmen, a Russian veterinarian. Its diagnostic value was first demonstrated in 1891 by Kalming, of Dorpat, who became infected with the bacilli in the course of his laboratory experiments, and died of glanders.⁶ Since this time its use as a diagnostic agent has become general. The mallein is obtained by the sterilization and filtration of a virulent culture of the bacilli in glycerin bouillon. The culture should be one month old. The filtrate is then evaporated to one-tenth of the weight of its volume, which gives a brownish syrupy fluid, and this is diluted ten times with one-half-per-cent. solution of carbolic acid. The dose is 0.5 cm. of the undiluted, or 5 cm. of the diluted solution. When this dose is injected subcutaneously into a healthy horse no reaction is produced. In a horse with glanders the injection is followed by extensive oedema of the subcutaneous tissue around the point of injection, chills, and an elevation of temperature which begins some hours after inoculation, reaches 3-4° C. above normal in twenty-four hours, and persists for several days. The method is especially important in making possible the diagnosis of latent glanders in which no lesions are evident. It is absolutely sure as a means of diagnosis when certain precautions which have been formulated by Nocard⁷ are observed. The reaction can be considered typical only (1) when there is fever of from 1 to 5 degrees Centigrade; (2) when there is a large, hot, sensitive oedematous swelling around the point of injection; (3) when there is a general affection shown by weakness, loss of appetite, and muscular trembling. If there is no reaction, it is proof that the animal is not affected. It is necessary to see that the animal has no fever at the time and that afterward it is not exposed to weather conditions which may affect the temperature. In some of the animals which show the reaction there may be very insignificant lesions consisting only of a few small nodules in the lungs.

McFadyean⁸ considers the local reaction of the most importance and sufficient alone for the diagnosis. In healthy horses there may be a slight local reaction, but the swelling is rarely more than three inches across and reaches its acme in from fourteen to sixteen hours. In infected horses the swelling is rarely under five inches across, often twice this, and continues to increase for twenty-four hours.

The ass is the most susceptible to natural infection, and the disease assumes a more acute form in this animal than in the horse. The mule is also more susceptible than the horse. Field mice are very susceptible, while white mice and rats are immune. Cats, guinea-pigs, squirrels, and rabbits are all susceptible in the order named; sheep and goats are less susceptible; dogs, birds, with the exception of the dove, beef cattle, and hogs are immune. Natural infection is very rare except in the Equidae and in man. Lions and other carnivorous animals in menageries have been infected by feeding on the flesh of glandered horses.

In the horse various forms of the disease may be recognized, dependent upon its situation and acuteness of course. In the acute form the period of incubation is short. The disease begins with intense fever preceding all local manifestations. The prostration is extreme, the animal is insensible to excitation, locomotion is painful, the hair is rough, and there are muscular twitchings of the shoulders and chest. Appetite disappears completely, cold water is drunk greedily, and emaciation is rapid and extreme. According to Nocard,⁹ the loss in weight may be more than 20 kgs. in twenty-four hours. These primary symptoms give place in from one to three days to the specific local symptoms. The lesions are in the mucous membranes and skin. The mucous membrane of the nose is intensely reddened or often of a violet tinge, and small ecchymoses may be seen. An abundant secretion flows from the nostrils; at first it is thin and watery, but later it becomes muco-purulent and often contains streaks of blood. In the swollen mucous membrane small pustules appear which open and give rise to small shallow ulcers,

with raised edges and a bright red base. These ulcers rapidly enlarge, they become confluent and give rise to large irregular ulcerated surfaces covered with muco-pus. The ulcers are sometimes formed by the rupture of oedematous areas beneath the surface. In these areas extensive destruction of tissue seems to take place without any reaction, the softening finally extending to the surface. When the ulceration is advanced the nasal discharge is very abundant and contains fibrinous coagula and portions of necrotic tissue. While these lesions are taking place in the mucous membranes, hot painful tumors appear in various places, especially on the extremities, the flanks, and the shoulders. The oedema about them disappears, leaving hard, solid nodules which ulcerate rapidly. The ulcers become confluent, forming large irregular surfaces which produce an abundant, thin, odorless, often bloody pus. A similar infiltration extends along the course of the neighboring lymphatics, leaving hard cord-like swellings which ulcerate at various points and form thinner chains of ulcers uniting the larger. The lymph nodules belonging to the affected regions become swollen and indurated, finally breaking down into abscesses. The disease owes its name to the frequency with which the affection involves the lymph nodes (lymph glands). During this period the temperature continues high, often reaching 42° C. The loss of appetite and emaciation continue, there appear evidences of occlusion of the nasal respiratory passages, and at the last either general oedema of the lungs makes its appearance or foci of pneumonia develop. The acute form of glanders is always fatal, the disease lasting from eight to thirty days.

The chronic variety of the disease does not take the definite course of the acute, and may assume a number of forms which differ so much the one from the other that they have been regarded as different diseases. Thus the skin lesions have been considered a separate disease under the name of farcy. In the two classic types of the chronic form the predominant lesions are found in the one in the skin, and in the other in the mucous membranes and parenchymatous organs. The chronic lesions are of the same general type as the acute, their evolution is much slower, and their special characteristics are better marked. The first lesions to appear in the skin are the hard nodules (farcy buttons) followed by ulceration. Hot, painful, oedematous tumors appear in various places in the subcutaneous tissue, especially where the skin is thin and the subcutaneous tissue abundant. These tumors may be the size of a nut or of an egg. Gradually they become smaller in size by the absorption of fluid, and the central mass becomes hard and definitely circumscribed. The hair falls out, the skin becomes thinned, and finally an abscess is formed which contains a viscid yellowish liquid streaked with blood. The opening does not close, and the abscess gives rise to an ulcer. The edges of this are elevated and covered with thick granulations. The ulcer may extend laterally or in depth, both by continuous extension and by the formation of neighboring nodules which follow the same course and finally unite with the main ulcer. The skin in the vicinity is hard and indurated. The ulcers may finally cicatrize. The same swelling which preceded the formation of the nodules and ulcers extends along the subcutaneous lymphatics. The acute swelling subsides, leaving a hard cord (farcy pipe). A number of lymphatics may be affected, giving rise to a network of cords. These may persist for a long time without change, or in some cases nodular swellings appear along them at intervals, and these nodules may soften and ulcerate in the same way as the nodules first described. The ulceration may extend between adjoining foci along the course of the vessel and in this way large irregular ulcerated tracts may result. The lymph nodes are swollen and become finally converted into hard, indurated, adherent masses. They rarely soften and give rise to abscesses as in the acute cases.

The specific affections of the nose are very similar to those in the skin, with differences due to the different character of the tissue. They consist in the formation of