the common people of Europe, and to some extent in this country, is of so little medicinal importance that it may be dismissed with brief mention. It contains a very small amount of volatile oil, with gum, sugar, and a little tannin. It is very mildly antispasmodic and emollient, and, given in the form of a copious warm draught, becomes diaphoretic. *Henry H. Rusby.*

LINEVILLE MINERAL SPRINGS.—Wayne County, Iowa.

Post-Office.—Lineville Springs. Hotel.

These springs are located two and one-half miles southwest of Lineville, a thriving town of 1,000 inhabitants, on the southwestern branch of the Chicago, Rock Island and Pacific Railroad. The Mineral Springs Hotel is a large, convenient, and commodious structure, picturesquely situated amid the hills bordering the Grand River. The scenery is diversified and interesting, and the atmospheric conditions are of a salubrious and invigorating character. Everything has been done to render the house and surrounding grounds pleasant, comfortable, and homelike. The sanitary arrangements are excellent, and, with pure air and the presence of the mineral springs, with hot and cold water, the place offers many inducements to the seeker after health or recreation. The water is brought from a point 150 feet below the surface by means of pipes to the interior of the hotel. It is clear and sparkling, and very pleasant to the palate. The following analysis was made by Mr. A. E. Woodward, late assistant geologist of the State of Missouri:*

One United States Gallon Contains:

Solids.	Grains.
Silica	0.11
Alumina	.28
Calcium sulphate	1.90
Magnesium sulphate	3.18
Sodium sulphate	180.30
Potassium sulphate	1.74
Sodium chloride	15.07
Total	202.58

This is a valuable purgative water. It is useful in dropsical affections due to renal disorders. It has also produced excellent results in cases of chronic constipation, functional disturbances of the liver, certain cutaneous diseases, and other affections. *James K. Crook.*

LINSEED.—Linum. Flaxseed. "The seed of *Linum usitatissimum* L. (fam. *Linaceæ*)" (U. S. P.). The universally known and cultivated flax is a slender, blue-flowered annual, its bark contributing the extremely tough fibres from which linen is made. It is a native of the Old World, but has been in cultivation so long that its wild state is wholly unknown. There is no plant of which the proofs of its ancient use are so substantial; linen coverings are folded around Egyptian mummies more than twenty-five centuries old. It has also been found in the relics of the prehistoric Lake Dwellers of Switzerland. It is frequently mentioned in the Bible, and has been known from the earliest times of ancient Greece and Rome. The employment of the seeds is also of very ancient origin.

The plants being collected for their fibre, and dried, the seeds are combed off from them, and constitute the article under consideration. Since the plants are pulled up, considerable dirt is apt to get into the seed. This is increased by the seeds of many weeds, and these impurities are often very imperfectly winnowed out. In trade, the relative amount of this foreign matter is roughly estimated by shaking up the seeds in an inverted conical bag, which carries the impurities to the bottom, or tip of the cone. The character of this matter, furthermore, conveys to the expert an idea of the geographical source of the product.

The following is the official description of flaxseed: "About 4 or 5 mm. long, obiong-ovate, flattened, obliquely pointed at one end, brown, glossy, covered with a transparent, mucilaginous epithelium, which swells considerably in water; the embryo whitish or pale greenish, with two large, oily, plano-convex cotyledons, and a thin perisperm; inodorous; taste mucilaginous, oily and bitter. *Ground linseed* (linseed meal, or flaxseed meal), for medicinal purposes, should be recently prepared and free from unpleasant or rancid odor. When extracted with carbon disulphide, it should yield not less than twenty-five per cent. of fixed oil. The filtered infusion of ground linseed, prepared with boiling water and allowed to cool, has an insipid, mucilaginous taste, and should not be colored blue by iodine T.S. (absence of starch)." The British Pharmacopœia requires a yield of thirty per cent. of oil, and, as a matter of fact, nearly thirty-five per cent. should be yielded. There are about fifteen per cent. of gum, twenty-five per cent. of albuminous matter, a little resin, and a trace of amygdalin, which gives the bitter taste. The ash should not exceed five per cent. The chief adulterants are starch, and the use of a meal made from the ground cake left after the expression of the oil.

Uses.—Linseed is chiefly, if not entirely, used in medicine as the material of which poultices are made, for which, by its elasticity, its low conducting power for heat, and its retaining qualities for water, it is exceedingly well adapted. The addition of camphor, as a preservative and antiseptic, is common, and gives a stimulant tendency to the poultice. *Henry H. Rusby.*

LINSEED, OIL OF.—Oleum Lini. *Flaxseed Oil.* "A fixed oil expressed from linseed without the use of heat. A yellowish, or yellow, oily liquid, having a slight, peculiar odor, and a bland taste. When exposed to the air it gradually thickens, and acquires a strong odor and taste; and if spread, in a thin layer, on a glass plate, and allowed to stand in a warm place, it is gradually converted into a hard, transparent, resin-like mass (absence of *non-drying oils*).

"Specific gravity: 0.930 to 0.940 at 15° C. (59° F.).

"It does not congeal above −20° C. (−4° F.).

"Soluble in about 10 parts of absolute alcohol, and, in all proportions, in ether, chloroform, benzin, carbon disulphide, or oil of turpentine.

"It should not more than slightly redden blue litmus paper previously moistened with alcohol (limit of *free acid*).

"If 2 c.c. of the oil be shaken with 1 c.c. of fuming nitric acid and 1 c.c. of water, it should neither completely nor partially solidify, even after standing for one or two days (absence of *non-drying oils*).

"If 10 c.c. of the oil, contained in a small flask, be mixed with a solution of 3 gm. of potassium hydrate in 5 c.c. of water, then 5 c.c. of alcohol added, and the mixture heated for about five minutes on a water-bath, with occasional agitation, a dark-colored but clear and complete solution should be obtained.

"If this liquid be diluted with water to the measure of 50 c.c., then cooled, and shaken with 50 c.c. of ether, the clear, ethereal layer, after having separated, should not show a bluish fluorescence, and when carefully decanted and allowed to evaporate spontaneously should leave not more than a slight, and not oily, residue (absence of *paraffin oils*)" (U. S. P.).

This differs from most other fixed oils in its large percentage of albuminous matter, though this imparts no special medicinal properties. Rancidity and septic contamination should be guarded against. Its chief use in medicine is in the formation of the official *Linimentum Calcis*, Lime Liniment or Carron Oil, consisting of equal parts of this and lime water, a favorite application to burns, as is the oil itself. The oil is used upon an immense scale in the arts. *Henry H. Rusby.*

LINT.—A loose, soft, and fine mat or fabric of linen fibre, used as an application to wounds, to check hemorrhage by the mechanical action of the fibre, to serve as packing or padding and as an absorbent vehicle for the application of medicinal substances. The best is the "patent" or woven lint. It is a soft, loosely woven cloth, with a heavy flocculent nap on one side, beautifully bleached and clean, and so tender that it can be easily torn in either direction or pulled into woolly bits. Picked, scraped, and ravelled lints, made, as their names indicate, from old linen cloths, are now mostly of domestic employment, having been superseded in the hands of physicians by the lint just mentioned and the now beautifully prepared "absorbent cotton."

Very similar substances are *tow* and *oakum*. The former is the tangled fibres heckled out in the production of linen fibre. The latter is the former soaked in tar, and adds antiseptic to the mechanical properties of the tow. *Henry H. Rusby.*

LIPANIN.—A fatty compound formed by the addition of five or six per cent. of oleic acid to fine olive oil. It has been proposed by von Mering as a substitute for cod-liver oil. Its use was suggested by the theory of Buckheim that the beneficial action of cod-liver oil was due to the fatty acids it contained. The proposed substitute is more palatable and is easily retained by the weakest stomach, and, when it is desired to do so, it may be readily formed into an emulsion. The dose for children is one teaspoonful before meals; for adults, one tablespoonful. *Beaumont Small.*

LIPOGENESIS.—Under this heading we have to consider how the abnormal accumulation of fat in the tissues takes place, and we divide the subject into two heads: 1. Fatty Infiltration; 2. Fatty Degeneration.

1. *Fatty Infiltration.*—In this process the fat which is formed outside of the cells, elsewhere in the body, simply accumulates in the cells. These contain larger or smaller droplets of fat. In perfectly typical cases the remaining protoplasm of the cell shows no degeneration, although the pressure of the fat droplets may produce a passive atrophy in other cases. Fatty infiltration occurs under normal as well as pathological conditions. Abnormal fatty infiltration of cells can scarcely be distinguished morphologically from those involved in fatty degeneration.

There is another phase of fatty infiltration, as seen in the heart, pancreas, etc., in which the fat accumulates in the cells of the interstitial connective tissue in a manner identical with that in which the normal panniculus adiposus is formed. In such conditions the accumulated fat may cause a secondary pressure atrophy upon the heart muscle cells, or upon the gland cells, etc.

Fatty infiltration and fatty degeneration may take place simultaneously.

2. *Fatty Degeneration.*—In this condition also of abnormal accumulation of fat in the tissues, it has been assumed in the past that the fat is formed by a retrograde metamorphosis, or degeneration, of the proteid elements of the cell protoplasm, by which process the integrity and capacity of the cell are injured. The correctness of this assumption has lately been called in question. It involves in large measure the solution of the physiological problem whether normally the fat in the body is formed from proteids or from carbohydrates. Many experiments and arguments have been made to solve this question, but it does not yet appear to have been satisfactorily answered. We need to know the following in connection with the processes known as fat metamorphoses (fatty degenerations): What are these fats? Do they differ from the physiological fats? Whence are they derived? To a certain extent the pathological questions await the solution of the physiological questions, but the interdependence need not be necessarily complete; for even were it shown that physiologically fats are or are not produced from proteids, the contrary would still be possible under pathological conditions.

Schäfer makes the following statement in his "Physiology": "That fat is formed from proteid has been almost universally accepted by physiologists." This is a question which was for many years held to have been settled by the experiments of Pettenkofer and Voit. But this view has been strenuously attacked of late by Pflüger, Taylor, Athanasiu, and others. When we come into the domain of pathology the subject is still more nebulous. The current pathological teaching is that in fatty degeneration the proteids of the diseased cells become converted into fats. Virchow and Klebs are largely responsible for this. Taylor remarks that in general pathological literature no explanation or discussion of worth attends this statement, and that a serious error has been made in thus dismissing with an unequivocal statement one of the most fundamental problems of biology. To those who would pursue the matter further, I refer, for critical review of the entire subject, to Taylor, "Critical Summary of the Question of Fatty Degeneration," *American Journal of the Medical Sciences*, 1899, cxvii., 569, and *Journal of Experimental Medicine*, vol. iv., p. 399, 1899; and to the article by Athanasiu in Pflüger's *Archive*, 1899, lxxiv.

Taylor, after his critical review of the subject, draws the following conclusions: "1. The formation of fats out of proteids physiologically has not been demonstrated or made probable. 2. A formation of fats out of proteids pathologically has not been demonstrated. On the contrary, the weight of evidence is against it and in favor of the conception of the so-called fatty metamorphosis as infiltrations or formations of fat from carbohydrates."

"This position is provisional, and not conclusive. No one pretends to-day that the formation of fat from proteids is impossible; it has simply not been demonstrated or even made plausible. Future work must confirm or reverse our present conclusions."

In fatty degeneration there is an accumulation of larger and smaller fat droplets in the cell, sometimes so slight as to be scarcely visible, sometimes so great as largely to replace the protoplasm, crowding the nucleus to one side. These strongly refractile fat droplets are not changed by dilute acetic acid, are soluble in ether (being thus distinguished from albuminous granular degeneration), and when fresh are stained black by osmic acid. Macroscopically, organs affected with marked fatty degeneration are usually larger and softer than normal, have a grayish-yellow color, or are mottled with yellowish streaks or patches, and the normal markings of cut surfaces are more or less obscured.

Fatty degeneration may be associated with, or may follow, albuminous degeneration, and may occur under similar conditions. In addition to its local occurrence, as a result of local disturbances of circulation in the vicinity of inflammations or in tumors, etc., it is apt to occur in the liver, heart muscle, and kidney in chronic exhausting diseases, and in conditions and diseases to which profound anæmia is incident, or as the result of the action of certain poisons, such as phosphorus, arsenic, etc.

Clarence Arthur McWilliams.

References.

Delafield and Prudden's Pathology.
Schafer: Text-book of Physiology, vol. i., p. 934.
Taylor, as above.
Athanasiu, as above.

LIPOMA. See the Appendix.

LIQUEFACTION NECROSIS. See *Necrosis*.

LIQUORICE ROOT.—(Glycyrrhiza, U. S. P.; Glycyrrhizæ Radix, B. P.; Radix Liquiritiæ, Ph. G.; Reglisse, Codex.)

The dried root of *Glycyrrhiza glabra* L. (Spanish liquorice) and of *G. glandulifera* Waldstein and Kittaibel (Russian liquorice) (fam. *Leguminosæ*).

The liquorice plants are large perennial herbs, the different species either smooth or hairy. That first named grows principally in southern Europe, the second chiefly in southwestern Asia and adjacent Europe. Both are largely cultivated, the former much more extensively. The plant sends down a very long root, which is nearly vertical, but may have several smaller branches. From

* Geological Report of the Mineral Waters of Iowa, 1892, p. 127.

the crown, just underneath the surface of the ground, a number of long horizontal rhizomes emanate. These, though frequently mixed with liquorice to increase the yield, are not suitable for use. They have, however, an important use for purposes of propagation.

Liquorice root, when first collected, is fleshy and juicy, and is largely employed in this condition. For commercial purposes the roots are thoroughly cleaned and dried rapidly to prevent moulding. The Russian variety has its outer bark removed.

There are great differences of opinion concerning the relative quality of the two varieties. The correct view probably is, that Spanish liquorice is sweeter, while Russian liquorice, when powdered, is lighter in color and of finer appearance. Russian liquorice is rather more inclined to be free from bitterness, provided care be taken to excise all black, knotty, decayed pieces. If these be allowed to remain, even to a slight extent, they impart a marked bitterness to the powder.

Description.—*Spanish Liquorice.*—In long, cylindrical pieces, from 5 to 15 mm. (¼ to ⅝ in.) thick, longitudinally wrinkled, externally grayish-brown to dark brown, warty; internally tawny-yellow; pliable, tough; fracture coarsely fibrous; bark rather thick; wood porous, but dense, in narrow wedges; medullary rays linear; taste sweet, very slightly acrid.

The underground stem, which is often present, has the same appearance, but contains a thin pith.

Russian Liquorice occurs in large, usually crooked pieces, often several feet in length and 5 cm. (2 in.) in thickness, deprived of the outer bark, pale yellow without, internally of a lighter yellow than the Spanish and softer and of lower specific gravity, its cellular elements larger, its taste less sweet, and the wood frequently cleft. Any blackened, knotty, bitter portions should be removed before using.

Composition.—The most important principle is its peculiar sweet substance, *glycyrrhizin*, an amorphous, yellow, intensely sweet powder, soluble in hot water, but not in cold without the addition of an alkali. It is a glucoside, and may be resolved, by boiling with dilute hydrochloric acid, into an uncrystallizable sugar, and an amorphous, bitter substance, *glycyrrhetin*. It is said to be present in the root combined with calcium. Proportion about six per cent. There are also some sugar, three per cent. of asparagin, a variable amount of glycyramarin, a little resin and starch.

Action.—Liquorice has no physiological action beyond that of being slightly laxative. It is, like other sugars and syrups, soothing to the mucous membrane of the fauces, and hence much employed in coughs by itself, or as a vehicle or ingredient of cough mixtures. Syrups of liquorice and the ammoniated glycyrrhizin have been extensively used as vehicles to cover the bitter taste of quinine, which they do in an imperfect manner. The ammoniated glycyrrhizin may be rubbed up with the quinine in powder, or the quinine may be mixed with a syrup of liquorice at the instant of taking.

Administration.—Several preparations are official. Fluid extract (*Extractum Glycyrrhizæ Fluidum*, U. S. P.), in which the liquorice is exhausted with diluted alcohol and ammonia, the latter to make the active principle more soluble. The pure extract (*Extractum Glycyrrhizæ Purum*, U. S. P., so called to distinguish it from the *Extractum Glycyrrhizæ*, or crude Italian stick liquorice), in which the drug is exhausted with water and ammonia, and the percolate evaporated to a semi-solid consistence. It is useful for pill masses and as a vehicle; it is also an ingredient in the compound mixture of liquorice (*Mistura Glycyrrhizæ Composita*, U. S. P.), or old Brown Mixture, in which paregoric and wine of antimony are the active ingredients. *Glycyrrhizinum Ammoniatum*, U. S. P. (ammoniated glycyrrhizin, mentioned above), is prepared by extracting the liquorice with ammoniated water, precipitating the sweet principle with sulphuric acid, washing, redissolving in ammonia and water, precipitating and dissolving again, until it is sufficiently pure. It is in dark brownish-red, shining, brittle scales, of a very sweet, liquorice-like taste, and no odor, soluble in water and alcohol. Compound liquorice powder (*Pulvis Glycyrrhizæ Compositus*) is, properly speaking, a preparation of senna. Besides these, should be mentioned the commercial "stick," or "black liquorice," formerly imported on a large scale from many of the countries and islands of the Mediterranean, now chiefly manufactured in this country. It is chiefly used by children as a confection, but is also in extensive demand for coughs, colds, and sore throats.

W. P. Bolles.

LISSNER'S MINERAL SPRING.—Lewis and Clark County, Montana.

Post-Office.—Helena. Hotels.

This spring is located in Helena, about three hundred yards from the International Hotel, at the corner of Main and State streets. The spring gushes from the foot of a granite mountain, three hundred feet high, at the rate of about 20,000 gallons a day. A qualitative analysis by Messrs. Thomas Price & Son, chemists, of San Francisco, showed the presence of the chlorides, carbonates, and sulphates of lime, magnesia, soda, and potash. It is free from organic or vegetable matter. The water is used commercially and is recommended for indigestion, constipation, liver, kidney, and bladder troubles. We are unable to classify the water in the absence of a complete qualitative analysis.

James K. Crook.

LITHÆMIA. See *Gout.*

LITHIO-PIPERAZINE is a combination of piperazine and lithium which is soluble in water and is used in gout and the uric-acid diathesis in dose of 0.3–1.0 gm. (gr. v.–xv.) three times a day.

W. A. Bastedo.

LITHIUM.—I. General Medicinal Properties of Compounds of Lithium.—As lithium is closely allied to potassium chemically, so its salts exert practically the same kind of physiological influence as the corresponding salts of potassium. The only substantial differences are, *first*, the purely chemical one, that basic lithia forms with *uric acid* a salt much more soluble than the corresponding potassic compound; and, *secondly*, that clinically, in lithæmia and gout, speedier relief seems sometimes to follow from medication with salts of lithium than with those of potassium. But since the results reported have followed the employment of the remedy with the preconceived idea that such results must follow from theory, the clinical superiority claimed for lithium should be received with caution. There is no doubt, however, that the lithic salts are at least as efficient as the potassic, but then they have the disadvantage of being more expensive.

II. The Compounds of Lithium Used in Medicine.—These are the *carbonate*, *citrate*, *bromide*, *benzoate*, and *salicylate*. The first two only will be considered in this place. For the others, see respectively *Bromides*, *Benzoic Acid*, and *Salicylic Acid*.

Normal Lithium Carbonate: Li_2CO_3. The salt is official in the United States Pharmacopœia as *Lithii Carbonas*, Lithium Carbonate. It is a light, white powder, permanent in the air, odorless, having an alkaline taste and an alkaline reaction. It dissolves in 80 parts of cold and 140 parts of boiling water, but is freely soluble in carbonic acid water. It is insoluble in alcohol. Lithium carbonate behaves in a general way like potassium carbonate, except that, because of its feeble solubility in water, it is not locally so irritant. As an alkali it is remarkably potent, because of its chemically low combining number, and hence great saturating power in the neutralization of acids. Its use so far has been mainly as a substitute for potassic alkaline preparations in internal medication in gout and lithiasis. It is given in doses of from 0.30 to 1 gm. (gr. v.–xv.), several times a day, best administered in some effervescing water, since it is freely soluble in such liquids.

Normal Lithium Citrate: $Li_3C_6H_5O_7$. The salt is official in the United States Pharmacopœia as *Lithii Citras*, Lithium Citrate. It is a white powder, deliquescent on exposure to air, odorless, having a slightly cooling, faintly alkaline taste and a neutral reaction. It dissolves in 2 parts of cold water, and in 0.5 part of boiling water. In alcohol it is practically insoluble. It should be kept in well-stoppered bottles. Lithium citrate bears the same relation, in medicinal behavior, to the carbonate that potassium citrate does to potassium carbonate. It is pleasanter to the taste and more grateful to the stomach than the carbonate, but undergoes transformation to the carbonate after absorption into the blood. Constitutionally, therefore, it is the equivalent of the carbonate, and it is used internally in gout and uric-acid diathesis. The salt, it must be remembered, is not alkaline while under its own form, and hence would be useless as a local alkali for the direct neutralization of acid. Dose, from 0.65 to 2 gm. (gr. x.–xxx.), several times a day, in aqueous solution.

A pleasant way to administer the citrate is to prescribe the official preparation entitled *Lithii Citras Effervescens*, Effervescent Lithium Citrate. This preparation is a powder composed of the admixture, in dry powder, of 7 per cent. of lithium carbonate, 37 per cent. of citric acid, and 28 per cent., each, of sodium bicarbonate and sugar. On adding the powder to water the ingredients dissolve, whereupon the citric acid decomposes the carbonates with formation of lithium citrate and evolution of carbon dioxide gas in effervescence. The dose is a teaspoonful of the powder, to be taken in water and drunk during effervescence.

Edward Curtis.

LITHIUM-DIURETIN. See *Uropherin.*

LITHOLAPAXY—(Rapid Lithotrity with Evacuation), λίθος and λάπαξις (evacuation).

This operation, which has superseded the old method of lithotrity, and which successfully disposes of stones that could formerly be dealt with only by lithotomy, has been before the world for twenty-four years.

In January, 1878, Prof. Henry J. Bigelow [1] published his first paper introducing this procedure to the medical profession, and it was at once enthusiastically adopted by the surgeons of all countries.

The writer's association with Professor Bigelow in this branch of surgery lends authority to the description of the operation which follows:

Before the year 1878 lithotrity was performed by short sittings (a few minutes each), with intervals of several days between them. The débris, more or less finely pulverized, was passed with the urine.

If the expulsive power of the bladder was good, the voidance of the fragments was usually successfully accomplished. When, however, the bladder had lost its power, or when, owing to some obstruction, it could not thoroughly empty itself, the discharge of the fragments after crushing was an extremely uncertain matter.

Moreover, in a certain proportion of cases, especially when the stone was a hard one, or when the bladder was much inflamed, the crushing was followed by serious symptoms, with marked increase of the bladder inflammation, which not only put a stop to further crushing, but frequently went on from bad to worse and ended fatally.

This aggravation of symptoms after lithotrity was ascribed largely to the irritation of the bladder wall by the instruments; and operators tried to avoid trouble by making the sittings short, and by extreme gentleness in manipulation.

Sir Henry Thompson, then the English authority upon the subject of lithotrity, had recently stated it as his opinion that a sitting should not be prolonged beyond two or three minutes, and that stones requiring more than three or four sittings for their removal were not advantageously within the province of lithotrity.

Prior to this year (1878) there had been various attempts to remove by suction portions of the débris after crushing, and Clover's apparatus, consisting of a catheter and bulb, was sometimes used to aid a bladder in freeing itself. Such efforts at evacuation were, however, regarded as introducing special dangers into the operation of lithotrity, and writers upon the subject were practically unanimous in thinking that any serious attempt in this direction should be dispensed with, if possible.

In 1875, Professor Bigelow, having devised a more thorough evacuator than those previously in use, tried the plan of operating by a long sitting under ether, with the object of crushing the stone and completely removing the fragments at one operation.

The success of the first cases so treated showed that the previous dread of instrumentation had been to a great degree groundless, and that the presence of sharp angular fragments in the bladder after an operation was a source of more serious danger than that consequent upon the prolonged and skilful use of instruments which resulted in the complete removal of the stone.

These cases showed that, contrary to previous belief, the thorough evacuation of a large stone at one sitting could be accomplished without special danger, and in consequence of this success Professor Bigelow went on to perfect the apparatus which he described in his paper, published in January, 1878, and which he has since that time still further improved, until it has reached the forms which will be described farther on.

The operation of litholapaxy may be divided into two acts: (1) The comminution of the stone; (2) the evacuation of the fragments. We will first consider the instruments concerned in pulverizing the stone.

Lithotrites.—As has been said, lithotritists were formerly possessed with the idea that the bladder was an extremely sensitive organ, prompt to resent any irritation from the use of instruments, and that, therefore, only small stones, not requiring a great amount of manipulation for their comminution, should be crushed.

This belief, together with their failure to recognize the full size of the urethra, led the operators of those days to use instruments smaller and less powerful than the conditions allow, and than those which are now readily and safely employed, when the size and consistence of the stone make their use desirable.

The lithotrite now to be described was devised by Professor Bigelow. The modifications in its form are designed to enable it to meet the needs of the new operation.

It is made in various sizes,* of which the larger are very strong, and, though rarely necessary, enable the operator to deal with larger and harder stones than could be disposed of with the smaller instruments.

The *handle*, which is of hard rubber, is egg-shaped, and gives a better hold with more power than could be attained with the old wheel. By giving a full grasp to the hand it is far more comfortable and less fatiguing in a long operation.

The *lock*. Immediately below the handle is a revolving cylinder cap, which is attached to the screw guard and closes the lock by a mere rotation with the fingers of the right hand while it is grasping the handle.

So far as I know, this is the only lithotrite in which the lock is constantly under the control of the right hand. This arrangement gives the surgeon the great advantage of being able to lock and unlock the instrument indefinitely, and even to complete the operation without disengaging the hold of either hand. It thus saves time and strength, and lends greater accuracy to the manipulations.

The *blades*. In the female blade the rim is low and sharp, while the floor, especially at the heel, is high. A fragment readily falling upon this blade is firmly held by the rim while it is crushed.

The male blade is provided with a series of alternating notches, which expel the débris at the sides and prevent impaction.

In most lithotrites the dust is seriously impacted in the heel of the instrument. This difficulty is here met by raising the floor at the heel, so that no dust can lodge there. A large spur in the heel of the male blade also

* These correspond to Nos. 25, 27, and 30 of the French catheter scale.