

cases of hanging. Roth, in 49 cases, found discharges of feces in 17 and of urine in 4; in 15 cases, not noticed.

Harvey mentions a case in which internal piles had burst and there were stains and clots of blood about the perineum and anus. In such cases without careful examination there would naturally be a suspicion of violence.

The abdominal organs are generally darkly congested in asphyxia, although Maschka denies this for the liver and spleen. The congestion of the viscera generally is doubtless due largely to the prior congestion of the lungs and engorgement of the heart. In hanging, the stomach is often much congested, and this fact might sometimes suggest the possibility of poisoning. The liver, spleen, and kidneys are usually much congested; Hofmann says that this occurs in the kidney only when the body has been hung a long time.

Maschka considers the rounded pinhead ecchymoses of the inner surface of the scalp and pericranium valuable evidence of asphyxia. The brain and membranes are sometimes congested, occasionally apoplectic. Maschka found congestion of brain and membrane 48 times, and anemia 30 times in 234 cases. In hanging, the brain is rarely much congested. In 101 cases Remer found hemorrhage but once, and in 106 cases Casper failed to find it. Tardieu says the brain is oftenest anemic. If, however, the body is cut down and placed horizontally, the blood-vessels of the brain may fill up. Evidence may be found in the brain suggesting insanity and therefore an explanation of a probable suicide. Harvey says that hemorrhages in or about the brain are found in a much larger proportion of cases of hanging in India than in Europe. "No common condition likely to cause extravasation is apparent, only one man being noted as plethoric, but in many the rope seemed to have been very tight." Wilkie reports a judicial hanging in which a man, aged about twenty-five, fell about three and one-half feet; a recent clot was found in the brain. The experiments of Brouardel of hanging rabbits showed the brain anemic.

The conjunction of the following appearances would suggest that the hanging has been of some duration: lividity of face, congestion and prominence of eyes, dryness of skin under the ligature, deep furrow, congestion of sexual organs, swelling and lividity of lower limbs, hypostatic congestion of lungs.

Page experimented on a young cat and young dog; both were hung in the same way. Examination of the cat showed the veins generally engorged; sublingual veins much engorged; tongue protruded slightly and much swollen; no frothy mucus in bronchi. In the dog the tongue did not protrude and was not swollen; right cavities of the heart contained blood, left empty; brain and other organs normal. In the cat the lungs were uniformly congested, dark red; no ecchymoses. In the dog the lungs were much distended, posterior borders mottled violet; emphysematous patches on surface; no apoplectic effusions; subpleural ecchymoses bright red, irregular, clearly defined in outer surface, most numerous toward the roots and on the lower lobes.

Pellereau gives an account of hanging as seen by him in warm climates. He had not seen the elongation of the neck described nor the erection of the penis, subconjunctival ecchymoses, fracture of larynx, rupture of walls of carotid artery, subpleural ecchymoses, nor fracture of vertebra. He always found a mark on the neck; the left cavities of the heart always empty, the right always full of black blood. Mackenzie says that in 130 cases of suicidal hanging the protrusion of the tongue between the teeth, the open and protruding eyes, clinched hands, and blue nails were very frequent; the tongue was found bitten many times; there were urethral and rectal discharges and rupture of the carotid artery. The penis was found erect several times. The hyoid bone was fractured 24 times in 93 cases. In no case was the larynx or vertebra fractured. In 73 cases ropes were used; in 30, portions of clothing. The marks of ropes were always well defined, indented, and parchment-like; the marks of soft ligatures faint and reddish. In no case were the muscles of the neck, the larynx, trachea, or large bronchi injured,

and in none was there subcutaneous hemorrhage or blister.

Hofmann says that the rupture of the carotid in hanging is always transverse, may be simple or multiple, and may occur in suicides; more apt to occur when the ligature is thin. Lesser tabulated 50 fatal cases of suicidal hanging; in 29 he was satisfied that the hanging occurred during life; in 3 of these the skin of the neck alone showed any lesion; there was a double mark, the skin being otherwise bloodless; in 5 the deeper soft parts were the only ones affected; in 3 the skin showed lesions, the deeper soft parts none, but either the hyoid bone, larynx, or vertebrae were involved; in 12 the skin showed no mark, but the deeper soft parts and either the larynx or hyoid bone were involved; and in 6 the hyoid bone only or the bone and larynx were injured. In the remainder it was not possible to say that the hanging occurred during life. In two cases there were no marks at all; in 9 there were changes in the skin; in 4, changes in the skin and deeper parts; in 2, changes in the skin, deeper parts, and hyoid bone or larynx; in 3, changes in the skin and hyoid bone, or larynx, or both. In 14 of the 50 cases the hyoid bone was fractured; in 20, the larynx; and in 1, the vertebrae. The common carotid arteries were injured in 6. The number and severity of the lesions bore no constant relation to the thickness of the ligature nor to the force used, but rather to the position of the body.

Daniel S. Lamb.

STRAWBERRY. See *Rosaceae*.

STRONTIA MINERAL SPRING.—Baltimore County, Maryland.

Post-Office address, 305 and 307 Exchange Place, Baltimore. No hotel near springs.

This spring is located about nine miles from the heart of the city of Baltimore. It is reached by the Green Spring branch of the Northern Central Railroad to Strontia Spring station, thence one-half mile to springs. The elevation of the locality is about six hundred feet above the sea-level, and the average summer temperature is about ten degrees lower than that of Baltimore. An analysis of the spring water made in 1887 by Prof. W. W. Simon, of Baltimore, resulted as follows: One United States gallon contains (solids): Potassium nitrate, gr. 2.71; sodium nitrate, gr. 0.83; sodium chloride, gr. 7.50; magnesium chloride, gr. 3.91; calcium chloride, gr. 20.67; calcium bicarbonate, gr. 3.93; strontium sulphate, gr. 0.13; strontium bicarbonate, gr. 1.08; iron bicarbonate, gr. 0.51; alumina, gr. 1.08; silicic acid, gr. 1.19; and traces of phosphoric acid, iodine, ammonia, and organic matter. Total, 43.54 grains. Gases: Oxygen, cub. in. 0.48; nitrogen, cub. in. 0.71; carbonic acid, cub. in. 2.04.

Since 1876, when the properties of this water were discovered, it has acquired a wide reputation in the treatment of sea-sickness, dyspepsia, gout, rheumatism, and diabetes. It is used commercially and as a table water. It has found its way into many of the leading hotels, clubs, and cafés of New York, Baltimore, and other cities. It is a saline-calcic, and has tonic, diuretic, and alterative properties. It is probable that the considerable quantity of strontium in the water modifies its action to some extent, but in what way cannot be explained in the present state of our knowledge.*

James K. Crook.

STRONTIUM.—General Medicinal Properties of Compounds of Strontium.—Salts of strontium resemble those of calcium in being practically non-poisonous to the human system and in tending to improve nutrition. Also they are of low diffusion power, and accordingly are comparatively slow of absorption. Strontium has been proposed in medicine as affording a base for medicinal salts that is non-poisonous and even agreeable to the stomach. Accordingly strontium has been suggested for

*Some of the strontium salts are now used in the treatment of epilepsy, diabetes, parenchymatous nephritis, muscular and subacute articular rheumatism, and acute gastritis.

the basic carrier of bromine, iodine, and salicylic acid, and the bromide, iodide, and salicylate of the metal are considered preferable to the corresponding potassium and sodium salts, because better borne by the stomach. The United States Pharmacopœia recognizes strontium bromide and iodide (see *Bromides* and *Iodides*), and also the lactate, which latter salt will be considered here, since its effects are not due specifically to its acid radical.

Strontium Lactate.—The salt is official in the United States Pharmacopœia under the title *Strontii Lactas*, Strontium Lactate. It occurs as a white, granular powder, permanent in the air. It is odorless, with a bitterish, salty taste. It dissolves in about four parts of cold water, and freely in boiling water and in alcohol. Strontium lactate is a harmless salt, whose use in medicine is because of a reputation, in chronic Bright's disease, for diminishing the albumin in the urine and improving the patient's condition generally. In the form of the disease accompanying rheumatism and gout, it is praised, but it should not be used in conditions of acute inflammation with high fever. In albuminuria from heart disease, also, the medicine is reported to diminish the albumin. The drug may be given in doses of from 1.3 to 2 gm. (gr. xx. to xxx.) or more, two or three times daily.

Edvard Curtis.

STROPHANTHUS.—(*Kombe*, Arrow Poison, *Inée*, *Onaye*, etc.) The dried ripe seed of *Strophanthus Kombe* Oliver, and perhaps of other species (fam. *Apocynaceae*), deprived of its long awn. The British Pharmacopœia names the plant as above, under the title *Strophanthi Semina*. The German, under the title *Semen Strophanthi*, says "very probably from *Strophanthus Kombe*." The United States Pharmacopœia, because at the time of its revision ten years ago information on this point was very imperfect, specifies the seeds of *S. hispidus* De C., which we now know to be incorrect.

The strophanthus plants are woody climbers of tropical Africa, where an extract of the seeds of several of them is used as an arrow poison and in other ways for poisoning. The seeds occur in lanceolate or lance-ovoid follicles, of which two develop from each flower. These are 15 to 30 cm. (6 to 12 in.) long, and about a sixth or a fifth as thick. They are densely filled with seeds, the bodies of which are embedded among the long, white, plumose awns. The seeds are imported either in the pods or after removal, and in the latter case either with or freed from their awns. They should be imported and reach the consumer in the pods, since this permits the identification of the contents by the testing of one seed from each pod. This is an almost necessary method of examination, since good and poor varieties of seeds so closely resemble one another that an admixture is very difficult to detect in the cleaned seeds. Some varieties are practically inert, while others are extremely powerful, and in different ways, so that the employment of correct methods of identification of the seeds is of vital importance to the patient. Although all parts of the plant are bitter, the seeds alone have been investigated.

DESCRIPTION.—Good strophanthus seeds are of a peculiar pale greenish-brown color, and are densely covered with very fine, closely appressed silky hairs. This appearance of the surface constitutes the best guide to selection, outside of chemical examination. Two classes which should be rejected are those of a distinctly brown to dark brown color, and those of a very pale yellowish or yellowish-white, without greenish tinge, and the hairs coarse and more or less roughening the surface by their irregular projection. Strophanthus seeds are about 1.25 cm. or a little more in length, and one-fourth to one-third as thick, lanceolate, obtuse at the base, gradually pointed at the summit; they are somewhat flattened or even a little hollowish on one side, and have a narrow ridge running along the other, and are often warped or even semi-twisted. They are brittle, the fracture whitish and oily, the kernel consisting of rather long cotyledons, enclosed in sparse albumen. They have a slight odor and an extremely bitter taste. On being crushed and tested with

strong sulphuric acid, a green color should quickly develop, due to the reaction of the strophanthin, which is mostly contained in the albumen or endosperm. In this way, the testing of a single seed taken from a pod determines the identity and quality of the entire contents. However, should the test fail, it should be repeated with one or two more seeds from other parts of the pod, as individual seeds sometimes occur which are imperfect.

CONSTITUENTS.—With various ordinary constituents of seeds, strophanthus contains two or three bodies of therapeutical interest. The important medicinal constituent is two to three per cent. of strophanthin, considered below. The properties of the twenty-five to thirty per cent. of fixed oil are not known with certainty. We should expect it to be inert, but indications of its irritating and toxic properties are not wanting. On the other hand, these are more likely due to contained substances than to the oil itself. Some species of the seeds contain the very poisonous glucoside *pseudostrophanthin*, and, since the commercial seeds are almost always mixed, it may be the presence of this in the oil which makes the latter poisonous. The poisonous properties referred to are not the same as those of over-doses of strophanthin, since the greater toxicity is not accompanied by a correspondingly greater cardiac tonic effect, but often by a lesser one. *Kombic acid* is present, but its properties have not been investigated, and the name has apparently been applied to more than one substance. Other constituents reported are uncertain, since the specific identity and freedom from admixture of the seeds analyzed has not been determined. *Strophanthin* is a crystalline glucoside, usually appearing amorphous, as a fine white powder, soluble in alcohol and water, especially the latter, insoluble in ether and chloroform. The formula usually given (C₂₁H₄₀O₁₂) cannot be considered as fully established. Upon decomposition, it yields *strophanthidin*. Commercial strophanthin is very rarely, if ever, pure.

ACTION AND USES.—The therapeutical action of strophanthus is that of strophanthin, and is directly and almost wholly referable to the heart. It is commonly stated as being identical with digitalis, but the statement is very misleading, unless certain differences in other directions are carefully considered. Although its direct action is almost identical with that of digitalis, the resultant effect is quite different, owing to the absence of those complications from arterial effects which result from the use of digitalis. Strophanthus does not contract the arteries, hence none of the gain from cardiac stimulus is counteracted, and there is none of that danger of damming back the blood upon an incompetent heart, which sometimes exists when digitalis is used. Another very important difference between the two is the great promptness with which strophanthus gets to work, its effects being observed in from a third to a half of the time required for digitalis. This is partly due to its purely cardiac action, partly to the fact that the absorption of strophanthin is very rapid. Strophanthus strengthens and slows the heart beat, prolonging the diastolic period, and it is especially valued for its power of restoring rhythm to an irregular beat. It is thus especially useful when a very prompt action is desired, and also where cardiac action is weak relatively to arterial. Even in those cases in which digitalis is properly called for, a great gain may be secured by giving an initial dose of strophanthus, following it with the digitalis.

On the other hand, the effect of strophanthus is far less prolonged than that of digitalis, and is not cumulative like the latter. Hence, small doses, repeated at frequent intervals, is the rule for the administration of strophanthus. Even in this way its effects cannot be prolonged like those of digitalis, for the beneficial effects first seen soon decrease. It cannot therefore be regarded, like digitalis, as a mainstay, but rather as an emergency remedy. The effect upon the stomach is far less irritating than that of digitalis, hence there is not the same tendency to emesis. The same principle applies to the kidneys, the local effect upon the latter being very

slight. Yet strophanthus is an indirect diuretic, through increased cardiac action. It is often even more strongly diuretic than digitalis, owing probably to the absence of obstruction by vascular contraction. For the same reason, the danger of damage in cases of complication with organic kidney disease is wanting. Strophanthus is also a safer and more comfortable remedy for children.

ADMINISTRATION.—Owing to the facts stated above, it is not so difficult to secure genuine and pure strophanthus seeds, and therefore corresponding preparations of them, as it is to secure pure strophanthin, and the former are to be preferred in all ordinary cases. The official preparation is a five-per-cent. tincture of the seeds, made with sixty-five-per-cent. alcohol, and the dose ranges from three to ten minims. When larger doses are required, it is usually because the very inferior "brown seeds" have been employed. These are several times cheaper and they have been used extensively even by some large manufacturers. On the other hand, a preparation of the "white seeds" will prove irritating and will act as a poison without a corresponding increase in therapeutic effect. Strophanthin may be given in doses of 0.0006 to 0.0012 gm. (gr. $\frac{1}{150}$ to $\frac{1}{75}$). Henry H. Rusby.

STRUMA.—This term has been used in a general way to indicate a swelling or protuberance in any part of the body, but particularly with reference to enlargements of the lymph glands and the thyroid gland. Since such enlargements are most frequently due in the case of the lymph glands to tuberculosis, and in the thyroid to goitre, the word struma has come to be largely used as a synonym for both scrofula and goitre. Further, it has been applied to enlargements of the lymph glands other than those of a tuberculous nature, also to enlargements of the thymus, to enlargements of the kidneys and suprarenal bodies due to tumors arising from adrenal tissue, and in rare cases to splenic enlargement. Such a widespread application of the term, as well as its failure to convey any definite idea concerning the etiology or pathological nature of the conditions so designated, would appear to be sufficient reason for its abandonment, and in pathology it is gradually falling out of use. At present there occur in the literature the following different applications of the term, given in the order of frequency of usage.

1. As a synonym for *scrofula*. So common is this usage in the literature of a generation ago that the term strumous has come to be used almost entirely in the sense of scrofulous (see *Scrofula* and *Tuberculosis*).

2. As a designation for *goitre* or *bronchocoele*. At the present day the term struma is probably more frequently applied by clinicians to enlargements of the thyroid than to tuberculous enlargements of the lymph glands, and in this connection a great number of modifying terms occur in the literature: *struma colloides*, colloid goitre; *struma gelatinosa*, also applied to colloid degeneration of the thyroid; *struma hyperplastica*, an enlargement of the thyroid due to hyperplasia either of the parenchyma (*s. parenchymatosa*) or of the interstitial connective tissue (*s. fibrosa*); *struma cystica*, colloid degeneration of the thyroid with cyst formation; *struma follicularis*, synonym for colloid, hyperplastic, or parenchymatous struma; *struma mollis*, soft or colloid goitre; *struma petrosa*, hard or hyaline goitre; *struma cystica petrosa*, cystic goitre with hyaline change in the interstitial connective tissue; *struma cystica ossea*, cystic goitre with calcification in the hyaline connective tissue; *struma hyperplastica vascularis* or *aneurysmatica*, a vascular goitre with hyperplasia of the connective tissue; *struma aneurysmatica*, *pulsans* or *vasculosa*, vascular goitre with dilated vessels; *struma hypertrophica simplex*, simple colloid or parenchymatous goitre; *struma intrauterina congenita*, a simple parenchymatous hyperplasia of the thyroid in the new-born as distinguished from the swelling of the thyroid region in face presentations; *struma congenita*, congenital goitre; *struma maligna*, sarcoma or carcinoma of the thyroid; *struma amyloidea*, supposed amyloid goitre, incorrectly applied to hyaline goitre; *struma gan-*

glionosa, enlargement of a portion of the thyroid separated from the main gland; *struma endothoracica*, enlargement of isolated or accessory thyroid tissue or of a deeply lying thyroid in the anterior mediastinum (retrosternal or retroclavicular struma); *struma chlorotica*, the enlargement of the thyroid frequently seen in chlorosis, and sometimes, when associated with prominence of the eyeballs, mistaken for exophthalmic goitre; etc.

3. *Struma lymphatica*, a synonym for *status lymphaticus* or *lymphatic constitution* (see *Status Lymphaticus*).

4. *Thymus struma*, the enlargement or persistence of the thymus after the period at which this organ usually undergoes retrograde change. As this condition is associated with lymphatic struma, it is usually included under that designation.

5. *Strumae lipomatodes aberratae renis*, or *hepatis*, *strumae lipomatodes suprarenales*, *adrenal struma*, are terms applied to the tumors of adrenal tissue arising within the kidney or its capsules, in the adrenals, or in the neighborhood of these organs or in the liver (see *Hyper-nephroma*).

6. The vicarious use of struma to indicate enlargements in other parts of the body, as of the spleen, bones, etc., may in the majority of cases be traced to the influence of the association of the term with scrofula or diathesis.

Aldred Scott Warthin.

STRYCHNINE.*—*Strychnina* ($C_{21}H_{22}N_2O_2 = 333.31$). "An alkaloid obtained from *nux vomica*, and also obtainable from other plants of the family *Loganiaceae*."—U. S. P.

The origin of strychnine has been fully discussed under *Nux Vomica*. Its extraction from the seed is accompanied by much difficulty, owing to its strong retention in the cells of the horny albumen. Naturally, various methods have been employed for overcoming this difficulty. The seeds are either powdered in their original condition, or first subjected to a steaming process and then dried. The strychnine can be dissolved out by alcohol in the form of its natural salt or by water acidulated with hydrochloric acid. The concentrated and filtered solution is then treated with an alkali, such as acetate of lead or lime, to decompose the alkaloid, which is then precipitated and purified. The principal impurity liable to exist is brucine, the tests for which are indicated in the following description:

Colorless, transparent, octahedral or prismatic crystals, or a white, crystalline powder, odorless, and having an intensely bitter taste perceptible even in highly dilute (1 in 700,000) solution. Permanent in the air.

Soluble, at 15° C. (59° F.), in 6,700 parts of water and in 110 parts of alcohol; in 2,500 parts of boiling water and in 12 parts of boiling alcohol. Also soluble in 7 parts of chloroform, but almost insoluble in ether.

When heated to 268° C. (514.4° F.) strychnine melts. Upon ignition it is consumed, leaving no residue.

Strychnine has an alkaline reaction upon litmus paper.

If a minute quantity of strychnine be dissolved in about 0.5 c.c. of concentrated sulphuric acid on a white porcelain surface, and a small crystal of potassium dichromate slowly drawn across the liquid with a glass rod, there will be produced at first, momentarily, a blue color, which quickly changes to purplish-blue, then gradually to violet, purplish-red, and cherry-red, and finally to orange or yellow.

On dissolving 0.02 gm. of strychnine in 2 c.c. of nitric acid (specific gravity 1.300), in a small test-tube, the acid should not turn more than faintly yellow (limit of *brucine*).

* ACTION AND USES.—Strychnine is one of the most intense and energetic of poisons, acting deleteriously upon nearly all forms of animal and vegetable life. There are, however, considerable differences in the susceptibility of different creatures to its influence, and in general those which are destitute of or have but a primitive nervous system withstand it better than the higher organisms.

* Also spelled strychnin.

On this account, its antiseptic and antizymotic properties, though distinct, are decidedly weaker than those of quinine and some similar substances; for this reason and because of their being but a little poisonous, the latter are far more desirable of employment for such purposes.

ABSORPTION AND ELIMINATION.—Strychnine is promptly absorbed from the mucous membrane and rather freely from abraded surfaces and from the subcutaneous tissue. It circulates in the blood as strychnine and is thus eliminated, though a small part of it is oxidized. Elimination is principally by the kidneys, to a considerable extent through the saliva, and to a slight extent through most of the other channels. This prompt absorption and slow elimination render it one of the most notoriously cumulative drugs, a fact which is considered more at length in the article on *Nux Vomica*. Tolerance, by its continued use, is not much increased.

LOCAL ACTION.—The disinfectant properties of strychnine are noticed above. It exerts a prompt though mild stimulant action upon the tissues with which it comes into contact. In the mouth and stomach it acts like the ordinary simple bitters, in promoting the appetite, but, unlike the most of them, its presence in the stomach promotes rather than inhibits digestion, so that it is probably the most valuable of all stomachic bitters, especially in view of the fact that its local effects are strongly reinforced as soon as absorption begins. In the intestine, its local effect is to stimulate peristalsis, making it a valuable laxative, and this effect is again reinforced by its systemic action through the spinal centres.

Upon the heart the operation is somewhat different, since the local effect of stimulating the rate, through its action on the muscle, is just about counteracted by its systemic effect upon the vagus centres, which checks such increase.

SYSTEMIC ACTION.—The effects of strychnine upon all the bodily systems are to be understood by regarding it as a direct and pure stimulant, its action upon the motor centres of the cord, and to a lesser extent upon those of the brain, vastly predominating. Thus it stimulates the circulation (the vagal effect having been considered above), both through the heart and through the vasomotor system, promptly and strongly increasing blood pressure; it powerfully stimulates the respiration, increasing both the rate and the strength of the respiration; it increases metabolism and waste and raises the temperature moderately; it increases the activity of all muscular tissue, both voluntary and involuntary, partly, as already stated, by direct action, increasing excitability, but to a far greater extent through stimulation of the motor centres. Thus, slighter stimuli are required to set the movements going, and the movements themselves exhibit increased strength. All the special senses are sharpened, especially that of sight, and this more particularly for blue colors. All of these effects will be more thoroughly understood by consulting our account of strychnine poisoning under the head of *Nux Vomica*, which account will serve also to explain the reverse symptoms, occurring as after-effects in that condition.

THERAPEUTICAL USES.—The very numerous therapeutical uses for strychnine may, for the most part, be inferred from what has preceded. It can be employed to stimulate almost any of the lagging vital powers. It is so employed, most largely perhaps, in promoting the functions in the aged. It is also very valuable in the stimulation of those persons whose habits of life are unnatural, in that they do not take sufficient exercise or perform other ordinary hygienic duties. If careful attention be given to the patient, the most valuable effects can be secured from strychnine by utilizing its action as an aid in inducing the indolent to take needed exercise while under its influence. While it cannot be relied upon for overcoming a condition of chronic constipation, it becomes, in connection with other drugs, a most valuable aid in this direction. Its uterine stimulation cannot be overlooked, either from the standpoint of undesirable effects or from that of desirable effects. It is a pronounced aphrodisiac. In rendering cardiac support in

such exhausting diseases as pneumonia, it is of the utmost value. Its value as a tonic in all ordinary forms of impaired digestion has been indicated above.

Although these beneficial effects from the use of strychnine are almost marvellous, it is to be remembered that, since its action is purely stimulating, it can easily be so used as to result in the most damaging way. It must never be relied upon to take the place of natural powers and conditions, but should always be considered as a means of inducing their activity. Otherwise the system can easily become exhausted, a condition of depression made to follow that of stimulation, it being then found extremely difficult to discover any other means for again stimulating them.

COMPOUNDS, PREPARATIONS, AND DOSES.—Strychnine, because of its high insolubility, is rarely used except in the form of its salts, of which the sulphate is official. It occurs in intensely bitter, white, prismatic crystals, which effloresce in the atmosphere. It is soluble in fifty parts of water, and in one hundred and nine parts of alcohol, but is nearly insoluble in ether. The dose of strychnine itself is 0.001 to 0.006 gm. (gr. $\frac{1}{300}$ to $\frac{1}{50}$). Strychnine is combined in many popular formulæ with the hypophosphites, and with iron, quinine, and other tonics. Two such are official: the Citrate of Iron and Quinine (*Ferri et Strychninae Citras*), containing one per cent. each of strychnine and citric acid, with ninety-eight per cent. of iron and ammonium citrate, the dose 0.06 to 0.2 gm. (gr. i. to iij.); and the Syrup of the Phosphates of Iron, Quinine, and Strychnine (*Syrupus Ferri, Quininae et Strychninae Phosphatum*), containing 0.02 per cent. of strychnine, two per cent. of soluble ferric phosphate, three per cent. of quinine sulphate, 4.8 per cent. of phosphoric acid, ten per cent. of glycerin, and five per cent. of water, in syrup, the dose 2 to 4 c.c. (fl. 3 ss.—i.). Henry H. Rusby.

STRYCHNIN AND NUX VOMICA, POISONING BY.

—The poisonous quality of *nux vomica* was referred to by Wepfer and by Valentine in the latter part of the seventeenth century. Strychnin was discovered by Pelletier and Caventou in 1818. Blumhardt, in 1837, was probably the first to report the death of a human being by this poison. Although Wainwright probably used strychnin as an instrument of murder in 1831, the first homicidal case which was the subject of a trial of which we find record occurred in Canada in 1851.

A collation of 529 cases of strychnin poisoning shows a relatively high proportion of homicidal and suicidal poisonings. Of the whole number, 264, or 49.9 per cent., were suicidal; 100, or 18.9 per cent., homicidal; and 150, or 28.3 per cent., accidental. Poisonings by strychnin are of more frequent occurrence in Great Britain than in the United States, owing to the fact that rat poisons used in the former usually contain strychnin, while those used in this country contain arsenic or phosphorus.

SYMPTOMS.—The symptoms of poisoning by strychnin or *nux vomica* are very characteristic.

If the dose be relatively small, although capable of causing death, there is frequently at first an initiatory stage of nervous exaltation without any violent symptoms, whose duration varies inversely with the magnitude of the dose and the rapidity of absorption. The special senses are much more acute than normally, the mental functions are active, the patient is restless, and experiences a sensation of itching. But with large doses the onset is usually very sudden.

Soon twitchings of individual groups of muscles occur, followed by violent tetanic convulsions. During the spasms there is, in the great majority of cases, marked opisthotonos. The head is thrown sharply back, the body bent backward, the abdominal and thoracic muscles firmly contracted, the lower extremities rigid, and the soles of the feet bent inward and strongly arched. The lower jaw is fixed, the eyeballs are protruded, the pupils dilated, the expression of the countenance is distorted, the lips are cyanotic, the mouth is marked with froth—frequently bloody from the tongue being caught between the