

fore meals is a suitable dose in these cases. In *chronic gastric catarrh*, whether occurring as an independent affection, or as an accompaniment of other maladies, the tincture of nux-vomica is one of the most effective bitters. In the *gastric catarrh and morning vomiting of drunkards*, this remedy is next in value to arsenic. It may be given, advantageously, with mineral acids. The *poor appetite*, the *feeble digestion*, and the *nervousness and trembling*, which follow the sudden withdrawal of alcoholic stimulants, may be removed by frequent small doses of the tincture. To diminish the *craving for stimulants* when they are withdrawn, and to *sustain the nervous system*, the following combination is exceedingly effective: ℞ Tinct. capsici, ʒvj; tinct. nucis vom., ʒij. M. Sig.: *Twenty drops in water every four hours.* *Intestinal indigestion and flatulence* are also removed by tincture of nux-vomica.

In *atonic diarrhœa*, nux-vomica is a serviceable addition to other remedies, when a paretic condition of the muscular layer of the bowel may be presumed to exist. It is, however, more especially in *constipation* that nux-vomica is useful. It is indicated in those cases in which there are inaction of the muscular layer and, consequently, great fecal accumulations. It may be most advantageously given with purgatives in such cases: ℞ Tinct. aloes et myrrhæ, ʒvj; tinct. nucis vomicæ, ʒij. M. Sig.: *Fifteen to thirty drops two or three times a day.*

Nux-vomica has been signally useful in some forms of *epidemic dysentery*. It is indicated when there is depression of the vital forces, the intestines distended with gas, the stools like prune-juice. In some epidemics of *cholera*, strychnine, combined with mineral acids and opium, has appeared to be effective when the patient was about to pass into the state of collapse; and it has also been used as a prophylactic during the preliminary diarrhœa: ℞ Strychninæ sulphat., gr. ¼; acid. sulphuric. dil., ʒss; morphinæ sulphat., gr. ij; aquæ camphoræ, ʒiijss. M. Sig.: *A teaspoonful every hour or two, well diluted.* This combination is also effective in *summer diarrhœa*, when the evacuations are very watery, and in *colliquative diarrhœa*. When there is much pain, the quantity of morphine may be increased, or the first dose may be doubled. When the character of the case is such as to require continued use of the prescription, of course, the quantum of strychnine must be lessened.

Nux-vomica and its alkaloid strychnine are much used in combination with restorative remedies, in cases of impoverished blood—in *anæmia*, *chlorosis*, *hæmorrhagic diathesis*, *purpura*, etc. In *anæmia* and *chlorosis* strychnine is used with reference to its power to stimulate the blood-making organs, which functionate under some special influence proceeding from the nervous system. ℞ Ferri sulph. exsic., ʒij; quininæ sulph., ʒj; strychninæ sulph., gr. ss. M. Ft. pil. no.

xx. Sig.: *One pill three times a day.* No prescription is more generally useful in these states than the sirup or elixir of iron, quinine, and strychnine, a formula originally proposed by Aitken.

In the treatment of *amenorrhœa*, the preparations of nux-vomica and strychnine frequently enter into the composition of prescriptions. In *post-partum hæmorrhage*, Fordyce Barker prescribes the tincture of nux-vomica (twenty drops), and fluid extract of ergot (thirty drops), "every half-hour until well assured that the uterus is well contracted." It is obvious that not more "than two or three doses" of such strength will be safe. The neuralgic form of *dysmenorrhœa* may be permanently removed by nux-vomica given during the interval.

When *impotence* is due to mere relaxation and atony of the erectile apparatus, and is not dependent on organic defects, the preparations of nux-vomica are indicated and are useful. *Incontinence of urine*, when due to a paralytic state of the sphincter, may sometimes be cured by strychnine. *Nocturnal incontinence*, which is most successfully treated by belladonna, ergot, and iodide of iron, is sometimes not relieved by these agents, when strychnine may be tried. The author can not state with precision the cases in which it succeeds, but it has appeared to him most successful in those cases dependent on simple atony of the bladder, associated with general laxity of fiber.

The most important uses of nux-vomica and its alkaloid are in the treatment of nervous affections, chiefly in *paralysis*. It may be used with advantage in *hemiplegia*, when sufficient time has elapsed to permit repair of the damage done by the extravasation. It is improper to use strychnine during the period of "early rigidity," and it is without avail in cases of "late rigidity" of the paralyzed members. It is most useful when the paralyzed members are completely relaxed. It is useless when the paralysis has existed so long that the muscles have undergone fatty degeneration, so that they no longer respond to a faradic or slowly-interrupted galvanic current. Even if the necessary conditions as respects the state of the muscles are present, strychnine is inadmissible in cases of paralysis of cerebral origin when there are vertigo, headache, and *tinnitus*.

In *paraplegia of reflex origin*, in *rheumatismal paraplegia*, in *sphingoloma of the spinal meninges*, paraplegia continuing after the removal of the deposits, strychnine is a most serviceable remedy.

The best results are obtained from the use of strychnine in *local paralysis*, in *lead-colic and constipation*, and in *drop-wrist*, in *mercurial and paludal palsies*, in *rheumatismal paralyses*—for example, *facial paralysis*, from exposure of the face to cold—*torticollis*, *spinal curvature*, from *paresis of the muscles on one side*, etc.

In certain forms of spasms strychnine sometimes achieves most important results. The evidence which has been accumulated as to the curative power of strychnine in *tetanus* would be very conclusive if

it were worthy of credence, which seems to the author doubtful. In this disease it should be given so as to substitute the strychnic for the traumatic tetanus, but the symptoms induced should not exceed those due to a *full medicinal dose*. Strychnine is most successful—as indeed are all the appropriate remedies—in the more chronic cases of tetanus, and in those of spontaneous rather than traumatic origin.

Trousseau's experience is strongly in favor of the use of *strychnine* in the treatment of *chorea*. The method which he has pursued does not commend itself—it is heroic, and indeed unsafe. It consists in the use of such doses, beginning with one dose a day and increasing them, until stiffness of the muscles of the neck, spasmodic jerkings, and a "meaningless smile," indicate the beginning of strychnic poisoning.

Strychnine is a very serviceable remedy in *idiopathic* or *essential epilepsy*. It is adapted to pale, anæmic young subjects who have the *petit mal*, as well as the *grand mal*, and whose attacks are nocturnal. It exerts no influence but an injurious one over symptomatic epilepsy—that dependent on "coarse organic lesions of the brain." It is said that the state of the retinal circulation furnishes an indication for strychnine or bromide of potassium, fullness of the retinal vessels being an indication for the latter agent, and pallor and anæmia for the former.

In that functional irritability of the nervous system manifested by restlessness and *wandering neuralgic pains*, strychnine affords relief.

Spasmodic asthma of nervous subjects, when the paroxysms are due to an irritable state of the nervous system, are associated with vague neuralgic pains, and are determined by psychical influences, may be so far influenced by the persistent use of strychnine as to occur much less frequently.

Amaurosis of a functional kind, from lead, tobacco, and alcohol, may be cured by strychnine. Paralysis of the ocular muscles (*prosoptalgia*), of the muscle of accommodation, and paralysis of a single muscle, when these affections are due to an arrest of function of the nerve or nerves, and do not involve changes of structure, are curable by strychnine. Nagel, however, reports a cure of amaurosis in which there existed white atrophy of the optic disks!

Holtenhof points out the kind of amblyopia most benefited by this treatment. The cases without serious lesion, those dependent on anæmia, on a reflex effect from some part of the trigeminus or sympathetic, or due to the abuse of tobacco and alcohol, are especially amenable to the strychnic treatment. "In central amblyopia," says Holtenhof, "without lesion of the macula and with decoloration of the temporal portion of the optic disk, I have obtained remarkable improvement by the use of strychnine." Again, when there are lesions resulting from the deep-seated inflammation of the membranes, improvement may be hoped for when the primary inflammation has

ceased and the consecutive atrophy is stationary. In *retinitis pigmentosa* the results produced by strychnine are very striking. In five cases the diurnal dimness of vision and the nocturnal blindness were relieved considerably, in four cases there ensued an augmentation in the acuity of vision, and in two the visual field for white light was enlarged. Holtenhof finds strychnine inferior to electricity in the treatment of paralysis of the ocular muscles.

Strychnine has remarkable powers as a respiratory stimulant. Since the introduction of Aitken's formula for the phosphate of iron, quinine, and strychnine, the fact of its utility in *chronic bronchitis, incipient phthisis, dilated bronchi, etc.*, has been distinctly recognized. The good effects of this combination are due chiefly to the strychnine. We possess no remedy more generally effective in the *vomiting of phthisis* than strychnine. This vomiting is reflex mainly, and occurs at the termination of a paroxysm of coughing, but there is also more or less stomachal indigestion. As the stomach is emptied, the vomiting interferes with nutrition. Strychnine has also, as Murrell has shown, some power to lessen the *sweating of phthisis*. This agent may, therefore, be regarded as an important remedy in consumption. There are several modes of administration, but the best is by solution, the alkaloid dissolved in water with a mineral acid: ℞ Strychninæ, gr. j; acid. muriatic. dil., ℥j. M. Sig.: Five to ten drops in water three times a day.

Strychnine is one of the *antidotes to chloral*, as was first shown by Liebreich, but it is not the chief. It may be utilized cautiously as one of the means of counteracting the respiratory and cardiac depression, but it should not be depended on wholly.

Nux-vomica has been used with success in the treatment of *intermittents*. At present it is rather employed as an adjuvant to quinine, than relied on as the sole curative agent.

HYPODERMATIC INJECTION OF STRYCHNINE.—This important therapeutical measure needs to be separately discussed. The solution which the author advises is as follows: ℞ Strychninæ sulphat., gr. j; aquæ destil. vel aquæ lauro-cerasi, ℥j. M. Sig.: *Ten minims contain one-forty-eighth of a grain.* Some heat is usually necessary to procure a perfect solution.

"The effects of strychnine," as has been well remarked (Echeverria), "are widely different when administered hypodermically or by the mouth. By the latter method the quantity may be repeated and increased, unsuccessfully, . . . and yet a smaller dose of the substance, exhibited hypodermically, be capable of regenerating at once the lost muscular power."

The indications for the subcutaneous use of strychnine are precisely as those given above for its stomach administration: it is contraindicated in cases of hemiplegia when the injury to the brain has been

recent. It generally does no good, but harm, when the paralyzed muscles are rigid. It is most useful in old cases of hemiplegia, the subjects not being advanced in life, the paralysis incomplete, the muscles flaccid but not wasted, and having preserved their electro-contractility. Very remarkable improvement not unfrequently follows from this mode of treatment in suitable cases.

The hypodermatic injection of strychnine sometimes is entirely successful in curing *paraplegia*, but the limits of its utility are well defined. It is not proper, and is in every way injurious, in acute cases involving structural alterations of the spinal cord. In doubtful cases, a strychnine injection may be used as a means of diagnosis between structural and functional diseases of the cord: in the former, the symptoms are increased in definition; in the latter, they are ameliorated by the injection. This mode of using strychnine is curative in *reflex paraplegia*, in *paraplegia due to anæmia of the cord*, in *hysterical paraplegia*, and in those cases of paresis of the muscles of the inferior extremities due to concussion of the cord, to rheumatism of the meninges, and to syphiloma, after the local morbid process has ceased.

In *infantile paralysis*, the hypodermatic injection of strychnine is an important addition to other means of treatment. If the electro-contractility of the affected muscles is not lost, very beneficial results may be expected: the injection promotes the capillary circulation, and increases the growth and power of the muscles.

In no form of paralysis is the use of strychnine more conspicuous for good than in *diphtheritic paralysis*. Few cases are not promptly benefited and most are quickly cured. The utility of the subcutaneous injection of strychnine has been most signally exhibited in the *local paralyses*; e. g., *facial paralysis*, *aphonia from paralysis of the vocal cords*; *paralysis of the extensors by lead*; *paralysis of the sphincter vesicæ, of the sphincter ani*, etc.

The mode of practicing the injection is of considerable importance. The solution should be thrown into the substance of the paralyzed muscles. For example, in hemiplegia, the muscles in turn, of the paralyzed side, should be pierced by the needle, and the solution discharged into them. In drop-wrist the extensors should be grasped, made tense, and the needle of the syringe be thrust well into them. In paralysis of the sphincter ani and prolapse of the bowel, the muscle affected should be penetrated by the needle. When the affected muscles are beyond reach, the injection may be practiced at any indifferent point.

Next to the treatment of paralyses, the most frequent application of strychnine by the hypodermatic method is in certain ocular maladies. In the normal condition, strychnine affects the visual functions. Hippel first studied these effects, afterward Sandi and Cohn, and sub-

sequently, in France, Coumétou and Rouire. According to Coumétou, strychnine augments the excitability of the retinal elements, increasing the sharpness of vision, central and peripheral, and also enlarging the visual field. He advises its use in *amblyopia* without lesions, dependent on functional disorder of the retina, and says it may also, if the lesions are not too far advanced, effect favorable changes in chronic diseases of the optic nerve and retina. Rouire also agrees with previous observers in stating that strychnine affects the optic nerve-fibers, increasing the normal acuity of vision and enlarging the visual field. He advocates its use in *tabetic atrophy*, and calls attention to the fact that in certain atrophies good results are obtained only by a progressive increase in the amount administered. In these ocular maladies the solution may be injected in the temple, or in the nape of the neck, taking the usual precautions against accident.

In *infra-orbital neuralgia*, good results have been obtained from the subcutaneous injection of strychnine. This practice may be very useful in *neuralgia* characterized by anæmia and depression. It may also be highly serviceable in *epilepsy*, the cases selected according to the rules already defined.

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Ignatia.—*Ignatia*. The seed of *Strychnos Ignatii* Bergius (Nat. Ord. *Loganiaceæ*). (U. S. P.) St. Ignatius's bean; *Fève de Saint-Ignace*, Fr.; *Ignazbohnen*, Ger.

Abstractum Ignatie.—Abstract of *ignatia*. Dose, gr. $\frac{1}{4}$ —gr. j.

Tinctura Ignatie.—Tincture of *ignatia* (10 parts of *ignatia* to 100 parts of menstruum). Dose, \mathfrak{m} ij— \mathfrak{m} x.

COMPOSITION.—*Ignatia* has the same composition as *nux-vomica*, but yields relatively larger proportions of the alkaloids *strychnine* and *brucine*. These principles exist in the bean in combination with *igauric acid*. Formerly, the bean of St. Ignatius was the principal source of commercial *strychnine*, but the abundance and low price of *nux-vomica* now compensate for the difference in strength. The preparations of *ignatia* are stronger than the corresponding ones of *nux-vomica*.

ANTAGONISTS, INCOMPATIBLES, and SYNERGISTS are the same as for *nux-vomica*.

ACTIONS AND USES.—*Ignatia*, containing the same principles as *nux-vomica*, must have the same physiological actions and corresponding therapeutical properties.

The tincture of *ignatia*, the most useful preparation, has a powerful and persistent bitter taste, and, in common with bitters, has the effect known as stomachic tonic. It is a very effective stimulant of the gastric mucous membrane, promotes the flow of gastric juice, and hence increases the activity of the stomach digestion, and may therefore be used with advantage in *atonic dyspepsia*, and in the *nausea* and *vomiting* of gastric and cerebral anæmia. It is also often highly serviceable in the *gastralgia* of nervous women having impoverished blood. The *migraine* or *sick-headache* of such subjects, also, may be relieved by *ignatia*. It may be very useful in the various disturbances belonging to *chronic gastric catarrh*, but it is contraindicated in all acute inflammatory affections. It is in these stomachal affections more especially that *ignatia* is preferred to *nux-vomica* by many practitioners.

Ignatia affects the nervous system of animal life in the same way, but more energetically in the same dose, than *nux-vomica* does. It exalts in the same way the reflex function of the spinal cord, and similarly arrests respiration by a tetanic fixation of the respiratory muscles. It is, however, not used in affections of the nervous system, the alkaloid *strychnine* being now universally employed.

Cocculus.—The fruit of *Anamirta cocculus*, or *Cocculus Indicus*. (Not official.)

There are no official preparations except *pirotoxin*, the active principle. A saturated tincture may be used. Dose, \mathfrak{m} ij— \mathfrak{m} xv. A fluid extract can be made, and is a useful form for administration. Dose, \mathfrak{m} ij to \mathfrak{m} x, gradually increased.

COMPOSITION.—The effects of *cocculus* are due chiefly to the presence in it of a peculiar neutral principle known as *pirotoxin*. This has been admitted to the Pharmacopœia of 1880, and is therefore official.

Picrotoxinum.—*Picrotoxin*. Is not an alkaloid, although allied to this group of substances. It does not combine with acids to form salts. It is neutral, crystallizable, forming needle-shaped, stellar, or foliaceous crystals. It is soluble in 150 parts of cold and 25 parts of warm water, and in alcohol, and dissolves freely in alkaline solutions. It is unaffected in solution by the metallic salts, tannin, etc., and is not precipitated by the tests for the alkaloids. It may be administered in pill-form, and can be combined with any of the usual so-called nervine tonics. *Picrotoxin* may be administered subcutaneously, in solution in water—one grain to \mathfrak{z} ss—the dose ranging from $\frac{1}{60}$ of a grain to $\frac{1}{40}$ of a grain. By the stomach it may be given in from $\frac{1}{60}$ of a grain to $\frac{1}{20}$.

ANTAGONISTS.—The carefully-conducted researches of Brown show that chloral is its physiological antagonist in rabbits and Guinea-pigs, and probably will prove to be of value in cases of poisoning in man. The anæsthetics, and the motor depressants in general, are antagonistic in respect to its power to produce spasm.

SYNERGISTS.—All the remedies of this group, notably *strychnine*, *brucine*, and *ergot*, increase the effects of *pirotoxin*.

PHYSIOLOGICAL ACTIONS.—The taste of *pirotoxin* is bitter. It increases the flow of saliva. In what form soever administered, more or less nausea is produced, when the quantity given is sufficient to cause cerebral effects. It is not an irritant to the gastro-intestinal mucous membrane; it increases secretion, and promotes peristalsis, but no hyperæmia of the mucous membrane has been observed after death from a toxic dose. The secretions of the glandular appendages of the mucous membrane, probably also of the pancreas and liver, are decidedly increased, the stools becoming soft and more copious. Administered at any point, *pirotoxin* diffuses readily into the blood, but nothing is known at present of the changes which it induces, if any, in the composition of the blood. After death the right side of the heart is distended, and the left side incompletely emptied and flaccid. The action of the heart varies with the stage of the effects, and doubtless also more or less according to the size of the dose. At first the cardiac movements are slowed, the arterial tension somewhat elevated; during the convulsions the action grows rapid, but, succeeding the convulsions, and during the stage of coma, the pulse becomes slow again. According to Planat, by small doses, the cardiac pulsations are slowed before the convulsions come on; then the muscular excitement