PRACTICAL TREATISE

ON

POISONS AND ASPHYXIES,

ADAPTED TO GENERAL USE.

FOLLOWED

BY DIRECTIONS FOR THE TREATMENT OF BURNS,

AND

FOR THE DISTINCTION OF REAL FROM APPARENT DEATH.

BY

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TRANSLATED FROM THE FRENCH,

WITH NOTES AND ADDITIONS,

BY

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WITH

AN APPENDIX,

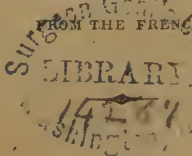
CONTAINING THE PRINCIPLES OF MEDICAL JURISPRUDENCE,

AND

CHEMICAL AND ANATOMICAL CONSIDERATIONS,

ADDRESSED TO PHYSICIANS

FROM THE FRENCH.



BOSTON:

HILLIARD, GRAY, LITTLE, AND WILKINS.

1826.

PREFACE.

The celebrated author of the volume entitled "Secours a donner aux Personnes Empoisonnées et Asphyxiées," has therein presented to the public, and adapted to general use, the practical parts of his great work on Poisons; those parts which should be within the reach of all, whose standing in society, or whose profession may render them liable to be called upon for aid and advice, in cases of accident or crime.

Most of the cases of death by drowning, hanging, and poison, which are daily recorded in the public journals, proceed to their fatal termination only through the ignorance of those who, having the opportunity and the disposition to render aid, are destitute of the requisite means and knowledge. The frequency of these events sufficiently attests the necessity of a work of this kind, freed from technical language, and proposing remedies and means, which are procured and executed with the greatest facility.

The plan, which the author proposed to himself, and which he has completed with the greatest accuracy, is set forth in the Introduction, pp. 1—7; it was, to describe the effects produced by the several poisons, and by various accidents; the means of knowing the presence of these poisons, and the nature of these accidents; and the

remedies necessary for preventing and counteracting the injuries and diseases, to which they may give rise.

The merits of the work might be permitted to rest on the reputation of its celebrated author. The following extract from a "Report made by M M. Percy, Pinel, and Vauquelin, to the Society of the Faculty of Medicine of Paris, 1818," will serve to show the estimation in which it is held by the most distinguished physicians and chemists in France.

"In designating the properties of the different poisons, M. Orfila has selected those which are most important, and most easily ascertained; and of which one or two are frequently sufficient for the discovery of the poison."

"The simple and accurate manner, in which M. Orfila has treated this interesting subject, renders the work still more useful."

"This work of M. Orfila must become generally esteemed, as it is freed from scientific terms, and is reduced to precepts the most simple, yet sufficient to effect the object proposed."

"It is to be wished that Government would take the necessary measures to distribute it among all classes of society; and especially that it may be in the hands of *medical practitioners*, *the clergy*, and *municipal officers*, to whom, being often called upon to administer succour, the knowledge of the improvements which science has made of late years in the treatment of persons poisoned, or in a state of suspended animation, has become indispensable."

Some considerations relating to Medical Jurisprudence; particular directions for conducting the Analysis of the poisons, and the Opening of the corpse; and the manner in which the Report of the investigating physician is to be drawn up, have been added in an Appendix. They were

translated from "A Medico-legal Manual of Poisons," published in Paris, 1824, under the direction of Professor Chaussier.

It is thought that this addition has rendered the volume more useful to medical practitioners, and to all who may be called upon to investigate and judge in cases of sudden and violent death.

The Appendix also contains, Treatment of the Effects of Lightning, Prevention and Treatment of the Effects of drinking cold Water, and Means of rendering Assistance to Persons drowning.

The characters and effects of some poisonous plants, native in this country and not noticed by the author, have been inserted, and some notes* and references have been attached to the text.

The translator has used the third edition, printed in Paris, 1825; he has endeavoured to render his version correct and intelligible, and hopes that he has adapted to the taste of the community a work, which was urgently demanded by its necessities.

* The notes marked by figures were written by the author; those marked by an asterisk *, †, &c. were written by the translator.

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PRACTICAL TREATISE

ON

POISONS AND ASPHYXIES.

INTRODUCTION.

Of all severe diseases, those which call for the most prompt relief are the Asphyxies,* and the various kinds of poisoning. Indeed the preservation of persons suffering under asphyxy and poison always depends upon the rapidity, with which the appropriate remedies are applied; and daily experience proves that diseases of this nature seldom terminate fatally, except in consequence of the ignorance of those, who surround the sick at the commencement of the affection.

This consideration induces us to publish the manual, which is now offered to the public, and which we wish to be regarded as a collection merely of the precepts, which are to be followed

* By "Asphyxy" is understood a suspension of the pulse and the respiration; or "suspended animation."

in the cure of individuals who are poisoned, or are laboring under asphyxy.

We have particularly detailed the manner of preparing and administering the remedies, and have pointed out their doses and the proper time for their exhibition. If we should be charged with too great minuteness and repetition, the interest of the sick must serve as our apology.

It may be useful to premise some general remarks upon the subjects which we propose to treat.

Mineral Poisons.

The mineral poisons, the history of which we shall present, are the concentrated acids and alkalies, the preparations of arsenic, of copper, antimony, mercury, bismuth, zinc, tin, gold, and silver ; nitre, the artificial Barèges baths, sal ammoniac, etc.

We shall begin with the description of the *effects* which they produce, after they have been introduced into the stomach, or applied to wounds. When the effects are similar to those of another poison which have been previously described, we shall content ourselves with pointing out the number of the paragraph [§] in which they are detailed ; and shall thus be able to avoid a great number of repetitions.

Under the title of *General Considerations on the Employment of the Preparations of Copper, Mercury, etc.*, we shall make known the dangers which attend the use of many of these preparations without medical advice; we shall dwell more particularly on those which are deleterious when applied to wounds; and shall finally give all the necessary directions to escape poisoning.

Under another title, *Means of distinguishing the Preparations of Arsenic, Copper, etc.*, we shall describe the most important characters of these poisons, and those which may be verified with the greatest facility; and frequently one or two of these characters will be sufficient for the recognition of the poisonous substance. By the aid of these instructions, physicians, who may be called upon to relieve the sick, will be able to determine easily the nature of the poison which has been swallowed, and of course to counteract its effects with the greater certainty.

Before speaking of the treatment that is to be extended to the poisoned, we shall, under the title of *Counterpoisons* or *Antidotes*, examine the claim to this character, which has often been awarded to various substances; shall reject all those which are useless or dangerous, and recommend those only, the efficacy of which has been proved to us by repeated trials; such are, for example,

the *white of egg*, *milk*, *common salt*, *vinegar*, *lemon-juice*, *soap*, *gallnut*, and some other articles, which may always be procured with great ease.

After the examination of all that relates to counterpoisons, we shall minutely describe the *method of treatment* of the different poisonings; pointing out the preparation of the remedies which are to be administered, their dose, and the order in which they ought to be taken from the commencement of the affection to convalescence and the complete re-establishment of health.

Vegetable Poisons.

We shall divide the vegetable poisons into three sections, *the irritating*, *the stupifying*, and the *narcotico-acrid; (the acrid narcotics.)*

Each section will begin with the enumeration of the poisons which are comprised in it, and with a general description of their effects. The succeeding article will contain the treatment which should be adopted for the cure of the poisoning; so that the particular histories, which will come next in order, will have no other object than to describe the energy of these poisons, the dangers that attend their use when employed by the ignorant, and the means of distinguishing them one from another.

If, therefore, it is wished to learn the effects and the mode of treatment of poisoning by a vegetable substance, it will be necessary to consult the beginning of each section.

Animal Poisons.

The animal poisons will be arranged under several heads. We shall first describe the *venoms*, or the effects of the bite of venomous reptiles, of the sting of the scorpion, the bee, the wasp, the hornet, the spider, the tarantula, the gnat, etc. We shall detail the symptoms produced by these animals, and the methods of relieving them.

Next will come the history of *muscles* and of some fishes, which under certain circumstances have proved poisonous.

Finally we shall treat of *hydrophobia*, and of the malignant pustule, the carbuncle, pointing out minutely the means of opposing the ravages, and of preventing the access of these dreadful diseases.

Asphyxies.

These will be treated of with all the particularity which they require. We shall speak of as-

phyxy by the vapor of charcoal, of lime-kilns, of vats containing wine or other liquids in state of fermentation; of the asphyxy of privies, sewers, drains, etc.; of the asphyxy of drowned and hanged persons; and of that which is caused by want of air, by cold, by heat, etc.

We shall describe *the processes by which air may be introduced into the lungs of individuals laboring under asphyxy.*

Under the title of *Aid to be extended to Infants born without giving any Sign of Life*, we shall speak of the asphyxy and of the apoplexy of new-born children, diseases which cannot be confounded without danger, as the remedies demanded in the one would be hurtful in the other.

Signs of real Death, and Precautions by Means of which the Confusion of the Living with the Dead may be avoided.

In this article we shall attach their just value to the signs which have been regarded as distinguishing real from apparent death; and shall show that no one of them, taken singly, except the well-marked state of putrefaction, can determine this question; and that to avoid the most grievous errors, the judgment should be formed upon a consideration of all the signs collectively.

Burns.

We shall first speak of those burns which are superficial and of small extent; next of superficial burns, involving a large part of the surface of the body; and lastly of deep burns, giving rise to ulcers of greater or less size.

GENERAL CONSIDERATIONS

ON

POISONING.

BEFORE speaking of the treatment which is to be employed in each kind of poisoning, it will be useful to give a succinct history of its various symptoms considered in a general way, and to fix some precepts relating to the aid which is to be extended to persons poisoned.

Symptoms of Poisoning considered in a general Manner.

It may be suspected that an individual is poisoned, when a certain number of the symptoms about to be enumerated, are suddenly manifested in him. A nauseous and tainted smell; a disagreeable, acid, alkaline, acrid, styptic, or bitter taste; acrid heat in the fauces and stomach; frothy mouth, or complete dryness of this cavity; sense of constriction in the throat; tongue and gums livid, yellow, white, red, or black; pain more or less acute throughout the alimentary canal, and especially in the throat, region of the

stomach, and some other parts of the belly; this pain is very shifting, and is felt successively in all parts of the intestinal canal, and even in the chest; fetid breath; frequent eructations; nausea; painful vomiting of mucous, bilious, or bloody matter of a white, yellow, green, blue, red, or brown color, and producing various sensations in the mouth; sometimes this matter effervesces, or fumes, if ejected upon the hearth or a stone floor, and reddens the water of turnsol; sometimes it undergoes no action on the floor, in which case it changes the syrup of violets to a green; hiccough; costiveness, or alvine dejections more or less abundant, with or without tenesmus, various in color and nature, like the matter that is vomited from the stomach; difficulty of breathing, distress; cough more or less severe; pulse frequent, small, contracted, irregular, often imperceptible, or strong and regular; a burning thirst, liquids sometimes aggravating the pain, and being soon rejected by vomiting; shiverings from time to time; the skin and lower limbs are as if frozen, though sometimes there is intense heat; painful eruption on the skin; cold and clammy sweats; difficulty in passing the water; urine in small quantity and hot.

The countenance is not greatly altered at first; but soon the complexion becomes pale and livid;

there is loss of sight and hearing; sometimes the eyes are red, and project out of their sockets; dilatation of the pupil; agitation, acute cries (screams), inability to sit and lie still; furious or gay delirium; convulsive motions of the muscles of the face, jaws, and extremities; sardonic laugh; the jaw stiff or locked; horrible contortions; the head often turned over upon the back; extreme rigidity of the limbs, accompanied by a general contraction of the muscles of the chest, rendering its walls immoveable. Sometimes there are stupor, numbness, heaviness of the head, and desire to sleep, which is at first slight, but afterwards insurmountable; dizziness; palsy and great weakness of the lower limbs; apoplectic state; extreme prostration of the strength; alteration of the voice; obstinate and painful priapism.

Most frequently, when no proper aid is rendered, the symptoms above described go on increasing in severity from the moment of their appearance until death; cases, however, sometimes occur, in which these evils cease completely, and do not appear again till after a certain period; so that there is evidently a lucid interval, and it may be said that the poisoning is intermittent.

If to these symptoms are added those which follow the bite or the sting of a venomous animal (to be described hereafter), an exact idea will be

formed of the various phenomena which may be observed during life in individuals laboring under the influence of poisonous substances, which have been introduced into the alimentary canal, or have been applied upon the ulcerated skin.

Treatment of Persons poisoned.

In the treatment of poisoning, *two stages* are to be distinguished. First; when much time has not elapsed since the poison was swallowed, and this is still in the intestinal canal, it is necessary to prevent its action, as far as is possible, by expelling it either upwards or downwards, or by *combining it with some substance which will neutralize its deleterious qualities:* this object being fulfilled, the symptoms which have been produced by the poison, must be counteracted by means which vary in different cases. Secondly; when the poison has been swallowed a long time, and copious vomitings and purgings announce that all the poisonous substance, which retains its activity, has been expelled, the life of the individual would be endangered, if processes for acting upon the poison should be persevered in; and it is now necessary simply to oppose the progress of the disease by appropriate general means.

First stage. The individual poisoned must be relieved of the poisonous substance which has not yet acted; for if it continues to exercise its action on the intestinal canal, the evils will be greatly aggravated, and the remedies employed will with difficulty produce their good effects. Now there are two ways to prevent the action of poisons upon the alimentary canal; the first is to cause them to be rejected upwards or downwards; the second consists in neutralizing them so that they can no longer act deleteriously upon the textures of the body.

Evacuants. Medicines employed in cases of poisoning for the purpose of producing vomiting, are of two kinds: one class consists of substances which have a real emetic power, such as tartar emetic [tartarized antimony], white vitriol [sulphate of zinc], etc.; these are employed when the poisonous substance introduced into the stomach does not irritate it: the second class consists of aqueous, mucilaginous, and emollient substances, which produce vomiting merely by distending the stomach and forcing it to contract; these are employed in cases where the poisons are irritating, acrid, and corrosive, and where, consequently, it would be dangerous to have recourse to violent emetics, which would increase the irritation of the stomach.

Counterpoisons, or antidotes. This name is given to substances capable of decomposing the liquid or solid poisons, or of combining with them at a temperature equal or inferior to that of the human body, and of forming a new product which does not exert any hurtful action on the animal system. These substances should be capable of being taken in large doses without danger; their action ought to be prompt, and independent of the presence of the gastric juice and the mucous and bilious fluids which the stomach may contain. The principal antidotes are, albumen [the white of egg], milk, light infusion of gallnuts, decoction of cinchona [Peruvian bark], very weak solutions of the sulphate of soda [Glauber's salt], or of magnesia, [Epsom salt], and of the hydrochlorate of soda [common salt], magnesia, and solution of soap in water.

Second stage. If the physician is called to the poisoned man a long time after the introduction of the poison into the alimentary canal, from which it is now entirely expelled by vomiting or purging, instead of making use of antidotes or of emetics, which in many cases might be injurious, he should examine the state of the individual with great attention, the nature of the symptoms which he exhibits, the organs which are affected primarily or secondarily, and the kind of

poison to which the existing evils may be ascribed, and then proceed according to the indication that presents itself to be fulfilled. No general precepts will be given under this head, since the mode of treatment which is proper to be followed in one case, might in another be fatal.

CLASSIFICATION OF POISONS.

All poisons may be arranged in the four following classes:

First; irritating poisons causing an inflammation of the parts to which they are applied:

Second; narcotic, or stupifying poisons:

Third; narcotico-acrid poisons:

Fourth; septic, or putrefactive poisons.

FIRST CLASS.

IRRITATING POISONS CAUSING AN INFLAMMATION OF THE PARTS TO WHICH THEY ARE APPLIED.

This class includes the *concentrated acids* and *alkalies*, *corrosive sublimate* and all the *mercurial preparations*, *arsenic* and all *its compounds*, *verdigris* and the other *salts of copper*, *tartar emetic*, *butter of antimony* and the other *antimonial preparations*, the *oxides* and the *salts of tin*, *gold*, *bismuth*, and *zinc*, *lunar caustic* and the *crystallized nitrate of silver*, *nitre*, *sal ammoniac* [muriate of ammonia], the *liver of sulphur* [sulphuret of potash], the *salts of barytes*, *phosphorus*, *glass in fragments* or badly powdered, *can-*

tharides, the salts of *lead*, *all acrid plants* or certain parts of them, such as *gamboge*, *coloeynth*, *mezereon*, the various species of *euphorbia* [spurge], the family of *ranunculus*, or *crowfoot* [buttercups], the *anemones*, *chelidonium*, *sedum acre* [wall pepper, or stonecrop], the *aconites* [monkshood, wolfsbane], *savine*, etc.

1. All the poisons mentioned above inflame the parts of the body with which they come in contact, though in different degrees. Some of them produce an inflammation so intense, that they may be considered to be caustics almost as powerful in their action as the hot iron: these are called corrosives, and escharotics, and evidently cause death by an action similar to that of burns; the concentrated acids, most of the alkalies, lunar caustic, mezereon, etc. are of this nature. There are others which, though their caustic effects are less intense, destroy life with the greatest rapidity; they are probably absorbed into the system, mixed with the blood and caried to every part of the body, and destroy the vital powers of the heart, lungs, brain, or nervous system, organs so essential to the preservation of the individual, that death is the inevitable result of any important alteration in them. Arsenic, tartar emetic, corrosive sublimate, barytes, aconite [monkshood, or wolfsbane] are of this description.

From this difference in the action exercised by poisons of this class, it follows that the symptoms which they occasion are not always the same; and consequently in describing their effects with precision, and in giving the precepts of treatment, it will be useful to make a certain number of subdivisions.

EFFECTS PRODUCED BY THE CONCENTRATED ACIDS.

SCIENTIFIC NAMES.	COMMON NAMES.
Sulphuric acid	Oil of vitriol. Vitriolic acid. Acid of sulphur. Spirit of do.
Sulphuric acid holding indigo in solution	Liquid blue.
Nitric, or azotic acid	Aqua fortis. Spirit of nitre.
Muriatic, or hydrochloric, or hydromuriatic, acid	Marine acid. Acid of sea salt. Spirit of sea salt.
Nitro-hydro-chloric acid	Aqua regia. Royal acid. Nitromuriatic acid.
Phosphoric acid.	
Hydrophthoric, or fluoric acid.	
Oxalic acid	Acid of sorrel, or of sugar.
Tartaric acid	Acid of tartar.
Acetic acid	Radical vinegar. Acetous acid. Spirit of Venus. Vinegar of wood. Vinegar. Pyroligneous acid.
Citric acid	Acid of lemon.
Chlorine	Oxymuriatic acid. Dephlogisticated marine acid.

Symptoms.

2. Immediately after a concentrated acid has been swallowed, the following effects will be manifested: a very unpleasant, sour, burning taste; an acute pain in the throat, which very soon spreads to the bowels; insupportable fetidness of the breath; frequent eructations; efforts to vomit, and copious vomiting of substances of various colors, sometimes mixed with blood, producing in the mouth a sensation of bitterness, effervescing if ejected upon the hearth or a stone floor, and reddening vegetable blues; hiccough; constipation, or more often copious evacuations, more or less bloody; colic, or rather pain in the abdomen so acute, that the individual cannot support the weight of the bed-clothes, or of his shirt; these pains extend to the chest; difficulty of breathing, and great distress; pulse frequent and regular; ardent thirst; drinks augment the pains, and are soon rejected by vomiting; shiverings from time to time, and the skin and especially the lower limbs, are almost always like ice; cold and clammy sweats; frequent fruitless attempts to make water; inability to keep the same position; convulsive motions of the lips, face, and limbs; state of great prostration; the physiognomy is little altered at first, but the

complexion soon becomes pale or leaden ; in most cases the mental faculties are entire. It frequently happens that the inside of the mouth and the lips are burnt, thickened, and covered with white or black patches, which becoming detached irritate the patient, and produce a very fatiguing cough ; in this case the voice is changed : sometimes there is a painful eruption on the skin.

The whole of these symptoms are not always presented in the same individual. In addition to these effects, *nitric acid*, or aqua fortis, produces yellow spots upon the lips and the parts of the skin which it has touched.

Antidotes.

3. The result of the many trials we have made is, that *calcined magnesia* is the best *antidote* to the acids. The poisoned individual must be made to drink largely of water, in which magnesia is diffused in the proportion of an ounce of magnesia to a quart of water ; a tumblerful of this mixture must be given every two minutes, in order to favor the vomiting and to prevent the deleterious action of that portion of the acid which has not yet exercised its corrosive powers. However, as magnesia is not generally kept in

families, the time spent in procuring it at the apothecary's must not be lost upon the patient; he should be made to drink copiously of water, flaxseed-tea, or any other mild drink; for we must be impressed strongly with the conviction that the success of the treatment depends upon the activity with which these drinks are given, and that a few moments of delay may determine the fate of the patient. If magnesia cannot be procured, half an ounce of *soap* dissolved in a quart of water, must be administered; chalk, powdered coral, crabs' eyes, or burnt hartshorn, diffused in water and given in any dose, may be extremely useful in case neither magnesia nor soap can be procured. Injections prepared with the above-mentioned substances, should also be given.

Potash and soda are too irritating to be employed like the magnesia: theriaca* is entirely useless.

* Theriaca. This is an opiate composed and introduced into the practice of medicine by Andromachus, physician of the Emperor Nero. It contains sixty-five ingredients, one of which is the flesh of vipers, and others are opium, pepper, blue-vitriol, roses, and the juice, roots, bark, leaves, flowers, and fruit of various and most discordant plants; the gums and resins are not neglected, and the animal kingdom, besides furnishing the most important basis of the compound, is otherwise represented. All these substances are dissolved in wine, and "from the mutual action and reaction of their many contrary qualities, there results an

4. If, notwithstanding the employment of the antidote, no vomiting is occasioned (which will happen very rarely), the administration of tartar emetic, ipecacuanha [Indian root], and other irritating substances, must be strictly avoided; and care must be taken not to tickle the throat, which is already inflamed by the poison, with the fingers, the feather of a quill, etc. When it is rendered certain that all the poison, which has not acted, is neutralized, the attention must be given to the cure of the inflammation which is developed. For this purpose linen cloths dipped in a strong decoction of flaxseed, of the root of marsh mallow [althæa officinalis], or of the flowers of the common mallow [malva silvestris],

Alexiterium, or antidote to venoms and poisons." The learned Pharmacologist, Bricius Bauderonus, concludes his paraphrase and remarks on this medicine, which extend through eight pages folio, by holding out this threat to whosoever should presume unreasonably to cavil at its composition; "eundem honorem illi habebo, qui solet asinis suis nativis haberi; nempe permittam illum rudere, cum satis superque sciam, venenum improbi ex lingua deprehendi, virtutem autem sapientis sedem in auribus consistere."

See Brici Bauderoni paraphrasin in Pharmacopœiam. Londini. 1639.

For this obsolete preparation the Opiate electuary of the Massachusetts pharmacopœia may be substituted in the dose of one or two scruples.

should be applied warm to the belly ; and if the patient is not able to support the weight of these cloths laid upon his abdomen, it should be kept wet with the liquids by means of a sponge ; or, what is still better, he should be put into a warm bath. If prompt and marked relief is not obtained, venesection must be performed in the arm, and twelve to fifteen leeches be applied to the most painful part of the abdomen. If, under the application of the leeches, the pain should shift to another place, this new point of irritation must be, without hesitation, surrounded with the same number of leeches ; and should a new displacement of the pain require it, no danger is to be apprehended from the third application of fifteen or twenty : the salvation of the patient depends absolutely on the abundance with which the blood is made to flow : the debility, then, which may result from this evacuation, is to be regarded as a slight inconvenience.

These external means of cure will be much assisted by the use of mild drink, such as water holding gum in solution, flaxseed-tea, decoction of marsh mallow, etc.; all kinds of food whatever, not excepting mild soups, must be interdicted.

5. If the patient should be unable to swallow, and the inflammation of the throat seem threat-

ening, twelve or fifteen leeches must be immediately applied to the neck.

6. The cramps, contortions, and convulsive motions will disappear with the inflammation that gave rise to them; should they continue, however, the use of the emollient drinks must be persevered in.

7. When the severe effects of the poison are mostly removed, and the patient is relieved of the fever, he may be allowed to take veal or chicken-broth; and during convalescence he should take barley-water and oatmeal-gruel, mealy potatoes, rice-water, soups, toast and water; but solid food, wine, and spirituous liquors, which would irritate the stomach and cause a return of the inflammation, must be carefully avoided. It should be constantly remembered that wine, which is considered by many persons to be proper for raising the strength and powers that are apparently exhausted, is, in the present case, a new poison, which acts exactly like that, the effects of which have just been counteracted.

After three or four days' progress in convalescence, solid food, that is easy of digestion, may be given in a small quantity.

8. Should an extremely severe case occur, in which the person poisoned should be unable to

swallow any of the liquids prescribed, either on account of a convulsive locking of the jaws, or a constriction in the throat, or any other cause, recourse must be had to the means proposed by Boerhaave, and perfected by MM. Dupuytren and Renault, which consist in introducing the medicines into the stomach through a gum-elastic catheter armed with a syringe. "The catheter," says M. Renault, "should be of such a length, that one of its ends may be thrust into the lowest part of the stomach, and of such a diameter as to give passage to soft solid matter like half-digested substances; it should be open at each end; the end which is to remain out of the mouth, should have attached to it a metal ferrule, which may be received into the pipe of a syringe. The catheter is introduced through the mouth or the nostrils, and passed down into the stomach, the syringe is fitted on, and a certain quantity of liquid is gently injected for the purpose of diluting, suspending, or dissolving the poison: the piston is then drawn back, and a certain quantity of the matter contained in the stomach is sucked out. By the multiplied repetition of this operation the stomach is washed, and all the poison is extracted without violence, almost without pain, and in a very short time. Those who are a little acquaint-

ed with natural philosophy, will readily see the possibility of extracting the poison by this process, whenever it has not passed the pylorus, and is not in large pieces. As soon as experiments on men shall have demonstrated the efficacy of the operation, its employment will become very general; and in the mean time I will repeat the results of experiments on living animals. I have injected as much as eight ounces of water into the stomach of a great many dogs, and have always succeeded in pumping out the whole by the process above described. This result indeed is to be anticipated when we remember the success with which analogous means have been employed for emptying the bladder of coagulated blood."

9. The concentrated acids, when applied to the external surface, are not absorbed, and confine their action to the production of a burn, which is to be treated in the ordinary way. [*See Burns, at the end of the work.*]

Means of distinguishing the Acids.

10. The acids have the property of reddening blue vegetable infusions, such as infusion of purple cabbage, tincture of litmus, turnsol, etc. The *sulphuric* acid is destitute of smell; heated with

charcoal or with mercury, it is partially decomposed, loses a portion of its oxygen, and sulphurous acid gas is disengaged, having the odor of burning sulphur. The sulphuric acid poured into barytes-water, or into a solution of any salt of barytes, immediately throws down a white precipitate of sulphate of barytes, insoluble in water and in nitric acid. *Sulphurous* acid is characterized by a pungent, suffocating odor, which is exactly like that given out by burning sulphur.

The concentrated *nitric* acid is transparent and colorless, when it is pure ; the nitric acid of commerce has a tinge of yellow. When put upon metallic copper, it is partially decomposed, boils with violence, and gives out the orange-red and suffocating fumes of nitrous acid. In combination with potash it produces a neutral salt, which being evaporated to dryness and placed on burning coals, increases their combustion to such a degree that there is a considerable disengagement of light and heat, and a dilatation which occasions more or less of a crackling or hissing noise, and the projection of some of its fragments. If this neutral salt [nitrate of potash, nitre] is mixed with concentrated sulphuric acid, it is immediately decomposed at the ordinary temperature of the air, and nitric acid is disengaged under the form of thin white fumes.

The concentrated *hydrochloric* acid [muriatic, or acid of sea salt] gives out a white vapor, when it is exposed to the air; with the nitrate of silver, it produces a white, heavy, curdled precipitate, which is not soluble in water nor in nitric acid, but will dissolve in ammonia. When heated with the peroxide of manganese [the black oxide of manganese], the hydrochloric acid is decomposed, and chlorine gas is disengaged, which is easily recognised by its smell and its greenish yellow color.

Aqua regia, composed of the concentrated nitric and hydrochloric acids in equal quantities, is of a yellow color; with nitrate of silver, it gives a white precipitate; the precipitate formed of the chlorine and silver is curdlike, insoluble in water and in nitric acid. Aqua regia, when poured upon metallic copper, is decomposed with effervescence; the nitrous gas, which at first remains dissolved in the liquid, is afterwards extricated, and diffuses its orange-red vapor.

Phosphoric acid, heated in a crucible with charcoal, furnishes phosphorus which takes fire and burns; this phenomenon does not take place when the acid is heated alone. The watery solution of phosphoric acid gives a white precipitate with a solution of barytes, or strontian, or lime; this precipitate is readily dissolved in an excess of acid.

Fluoric [or hydrophthoric] acid corrodes glass with great rapidity; exposed to the air it gives out dense white fumes. If a few drops are poured into water, a hissing noise is produced similar to that made by plunging a red hot iron into this liquid.

Oxalic acid is most commonly seen in the form of little white crystals in needles or plates; when heated in a phial it is almost wholly volatilized, though a portion is decomposed, and yields a little carbon. The aqueous solution of this acid forms a white precipitate with lime-water; and this precipitate, which is insoluble in an excess of oxalic acid, is readily dissolved in the nitric acid. Pretty strong solutions of potash, soda, and ammonia, added to a solution of oxalic acid, form salts, which if neutral are soluble, while they are much less soluble if they contain an excess of acid.

Tartaric acid, which in commerce is generally found in a crystallized state, is wholly decomposed by heat, and leaves a great deal of carbon in the phial in which it has been heated. It gives a white precipitate with lime-water; but this precipitate readily dissolves if the tartaric acid is added in excess. It acts upon potash, soda, and ammonia, like the oxalic acid.

The *citric* acid is decomposed by heat, leaving a residuum of charcoal. Its solution does not form any precipitate with lime-water, unless the mixture of the two is boiled. With potash, soda, and ammonia, it does not present the same phenomena as do the tartaric and oxalic acids.

The *acetic* acid is characterized by the smell of vinegar.

Chlorine is of a yellowish green color, and has a very disagreeable, suffocating smell. It dissolves gold-leaf, changes blue vegetable infusions to yellow, and with a solution of the nitrate of silver, gives a precipitate similar to that formed by the hydrochloric acid. *See page* 28.

EFFECTS PRODUCED BY THE CONCENTRATED ALKALIES.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Potash	Potash.
	Caustic vegetable alkali.
Silicated potash . . .	Liquor silicum, or liquor of flints.
Subcarbonate of potash .	Salt of tartar.
	Pearl-ash.
Soda . . .	Caustic soda.
Subcarbonate of soda .	Marine alkali.
Liquid ammonia .	Volatile alkali.
Lime . . .	Quicklime
	Milk, or cream of lime.

Symptoms.

11. The effects of the concentrated alkalies are nearly the same as those described above [§ 2, p. 19.] in speaking of the acids; it is only necessary to remark that the taste of these poisons is acrid, burning, and urinous; and that the matter ejected by vomiting, instead of being acid and effervescing on the hearth or a brick floor, is alkaline, and gives a green color to syrup of violets. The *concentrated volatile alkali* [ammonia] acts with more violence than the others, and produces dreadful convulsions with much greater

rapidity: experience proves that it is very dangerous to make persons who are faint, breathe it for a long time; for when very strong, it evaporates, and the vapor occasions death by inflaming the throat and lungs: a bottle containing volatile alkali, therefore, should not be held for a long time to the nose of a person in a swoon, but should be passed lightly beneath it.

Antidotes to the concentrated Alkalies.

12. Frequent direct experiments have proved that vinegar and lemon-juice are the best antidotes to the alkalies comprised in this section. In case, then, of a poisoning of this kind, haste must be made to administer a great many tumblerfuls of acidulated water, prepared by putting two table-spoonfuls of vinegar, or the juice of a lemon, into a tumbler of water; if these liquids cannot be procured immediately, the poisoned individual must be made to swallow water until he vomits. Care must be taken not to give tartar emetic, nor ipecacuanha, nor any other irritating substance. Should the symptoms not be relieved, recourse must be had to emollient drinks and fomentations, to leeches, and, in short, to the treatment detailed in the twenty-second and following pages.

Means of distinguishing the Alkalies.

13. Dissolved in water, they give a green color* to the syrup of violets. The *volatile alkali* has a very strong smell, by which it may be at once distinguished. *Lime-water* gives a white precipitate with carbonic acid or any of the carbonates, and is not rendered opaque by the addition of sulphuric acid. Solutions of *potash* and *soda* do not lose their transparency by the addition of either of the above acids: *potash* yields a yellow precipitate with the hydrochlorate of platina [muriate of platina]; while soda remains transparent, when mixed with this hydrochlorate.

* Added to a solution of turmeric, they change its light brown to a very deep tint.

EFFECTS PRODUCED BY CORROSIVE SUBLIMATE AND THE OTHER MERCURIAL PREPARATIONS, ARSENIC AND ITS COMPOUNDS, VERDIGRIS AND THE OTHER SALTS OF COPPER, TARTAR EMETIC, BUTTER OF ANTIMONY AND OTHER ANTIMONIAL PREPARATIONS, THE SALTS OF TIN, GOLD, BISMUTH, ZINC, AND SILVER.

14. Before speaking of each of these poisons particularly, it will be well to describe the effects of them in a general way, since these effects are almost the same in all.

The taste of these poisons is harsh, metallic, more or less similar to that of ink, less burning than the taste of the concentrated acids and alkalies. The individual poisoned sometimes complains of a closing or constriction of the throat; severe pains soon assail the fauces, stomach, and bowels; these quickly become intolerable; and desire to vomit and actual vomiting succeed with more or less rapidity. The substance thrown up is of various color, often mixed with blood, and does not effervesce upon a brick floor; it never changes the syrup of violets to a green, and whenever it reddens the blue tincture of turnsol, or litmus, it is in a very slight degree: there is costiveness or diarrhœa; the discharges

from the bowels are sometimes bloody. To these alarming symptoms are added frequent and fetid eructations, hiccough, difficulty of breathing almost amounting to suffocation: the pulse becomes accelerated, small, hard; it appears, in some cases, to vibrate beneath the finger like a chord of cat-gut; it is not rare to find it irregular and intermittent, that is, having its beats separated by different intervals of time. An unquenchable thirst, difficulty in passing the urine, cramps, icy coldness of the extremities, dreadful convulsions or a general prostration of the strength, a dissolution of the features of the face, and delirium, supervene and announce the near approach of death, if proper assistance is not rendered with promptness and energy. In some circumstances the individual preserves all his mental faculties to the very moment of death.

MERCURIAL PREPARATIONS.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Bichloride of mercury .	Corrosive sublimate.
	Muriate of mercury.
	Oxymuriate of mercury.
Peroxide of mercury . .	Red oxide of mercury.
	Precipitate *per se*.
	Red precipitate.
Protosulphuret of mercury	Æthiops mineral.
Bisulphuret of mercury .	Red sulphuret of mercury.
	Cinnabar.
	Vermilion.
Subsulphate of mercury .	Turpeth, or turbith mineral.
Nitrate of mercury . .	Mercurial nitre.
Binitrate of mercury . .	Nitrous turbith.
Mercurial ointment . .	Blue ointment.

EFFECTS OF MERCURIAL PREPARATIONS.

(See § 14, p. 34.)

Remarks on the Employment of Mercurial Preparations.

15. Most of the preparations of mercury are excellent remedies in the hands of the able and honest physician; but as quacks often abuse the confidence of the people, and use these powerful agents without any precautions, it becomes of

importance to indicate the dangers to which the sick are exposed from the employment of them.

It generally happens that the dose of a grain of *corrosive sublimate* in solution, occasions serious evil, which is augmented, of course, if the dose is double or triple this quantity. Applied to wounds, cancers, and sores with the purpose of healing them, it acts like a violent poison, and produces death, as we have often witnessed, at the end of ten, fifteen, twenty, or thirty hours; in such affections, therefore, its external application is inadmissible.

The *blue ointment*, with which the head and other parts are often rubbed for the destruction of vermin, is not always used without hazard; experience shows that in certain cases, when the ointment is employed in too great quantity, when the friction is continued too long, and the skin is very delicate, many of the symptoms of poisoning are produced.

Antidotes to Mercurial Preparations.

16. We have proved by numerous and incontestable experiments that the *white of egg mixed with cold water* is the best antidote to corrosive sublimate and to all the compounds of mercury. If the white of egg cannot be readily procured,

milk and water may be employed with great success. The *saline* and *earthy alkalies*, *liver of sulphur*, *sulphuretted hydrogen*, the *hydrosulphurets*, infusion of *Peruvian bark*, *charcoal*, and charcoal-water, which are recommended by many authors, are always useless, and often dangerous, and should, therefore, be banished from the treatment of affections of this nature.

Treatment.

17. When a person is poisoned by a mercurial preparation introduced into the stomach, or applied to the surface of the body, the whites of ten or twelve eggs (and the yolks too may be used without inconvenience) should be *beaten up* in two quarts of water, and a tumblerful of this mixture be given every two minutes, in order to promote vomiting. If this number of eggs is not at hand, let the drink be prepared with as many as are, until more can be procured. In case eggs cannot be obtained, let milk and water be given copiously; and finally in default of eggs and milk, gum and water, flaxseed-tea, decoction of the root of marsh mallow [althæa officinalis], of the flowers of the common mallow [malva silvestris], sugar and water, and even simple water, should be administered without delay.

If, after having given the prescribed number of eggs, the vomiting and other ill symptoms are not alleviated, the same number must be repeated; and they should always be kept mixed ready for this exigency, in order that we may be enabled to act with more promptness.

M. Taddei has proposed to substitute pulverized gluten* for albumen, for the following reasons: First, much less of it is required for the decomposition of the same quantity of corrosive sublimate: Secondly, the albumen requires a certain time to be mixed with the water, and in the treatment of poisoning it is necessary to act promptly: Thirdly, the white of egg exerts but feeble action on the deutoxide of mercury [red precipitate], on its subsulphate, and nitrate, while gluten, acting at once physically and chemically, envelops these poisons, combines with and neutralizes them: Fourthly, the most minute quantity of the sublimate is precipitated in flakes by the emulsion of gluten, while with albumen only a milky liquid is obtained which does not throw down its precipitate until after some hours, and even then retains a part of it in solution. The

* "When wheat flour is made into a paste with cold water, and then washed carefully with successive portions of that liquid, the fecula or starch separates, and the substance which remains is gluten." Gorham's Chemistry: vol. ii.

method in which M. Taddei proposes to use the gluten, is as follows; a soft paste is made by triturating in a mortar five or six parts of fresh gluten with ten parts of a solution of soft or hard soap; when the gluten has disappeared, the emulsion thus formed is to be exposed on plates to the heat of a stove until it is dry; it is then to be detached, reduced to powder, and kept in glass bottles. This is put into a cup containing water at the ordinary temperature, stirred up with a spoon, and given to be swallowed by the person poisoned. But whatever advantages gluten may possess over albumen, this latter will often be preferred to it, because it is so easily procured, and its use is attended with success whenever it is administered in time.

After the employment of these first means of relief, the individual must be treated as we have described in speaking of the acids, § 4, in the twenty-second and following pages, except that vomiting should be promoted by the introduction of the fingers into the mouth, and by tickling the fauces with the feathers of a quill.

Means of distinguishing Mercurial Preparations.

18. All the mercurial preparations, when heated to redness with potash in a glass tube, afford mercury [quicksilver] which is volatilized.

Corrosive sublimate is white, and soluble in water: with potash it produces a yellow precipitate; with ammonia, one that is white; it throws down a dark colored sediment with the hydrosulphuric acid [sulphuretted hydrogen], and the hydrosulphurets; the precipitate which it yields with the prussiate of potash and iron, is white, which on standing changes to yellow, and then to blue; the precipitate formed by the addition of nitrate of silver, is white.

The *nitrate of mercury* dissolved in water gives a white precipitate with hydrochloric acid and the hydrochlorates [muriatic acid and the muriates]; a black precipitate with ammonia, potash, soda, or lime-water; a black, with sulphuretted hydrogen and the hydrosulphurets; and an orange yellow, with the chromic acid and the chromates.

The *subsulphate of mercury* [turbith mineral] is yellow; it is almost insoluble in water; rubbed upon polished copper, it renders it white, brilliant, and silvery; it turns black immediately

upon being placed in contact with the hydrosulphuret of ammonia; treated with pure potash, it furnishes the peroxide of mercury and sulphate of potash.

The *peroxide of mercury* is red, is dissolved by hydrochloric [muriatic] acid, and changed into corrosive sublimate. *Cinnabar* is red, insoluble in water and in hydrochloric acid. *Mercurial ointment* boiled with water, is decomposed, the fat is separated, and the quicksilver sinks to the bottom of the vessel.

PREPARATIONS OF ARSENIC.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Deutoxide of arsenic, or arsenious acid	White arsenic. White oxide of arsenic.
Peroxide of arsenic, or arsènic acid	Arsenical acid.
Arsenate of potash . . .	Neutral arsenical salt of Macquer.
Arsenate of soda . . .	Arsenical salt of soda.
Arsenate of ammonia . .	Arsenical ammonia.
Arsenite of soda . . .	Arsenical salt of soda.
Yellow sulphuret of arsenic	Orpiment.
Red sulphuret of arsenic .	Realgar.
* Protoxide of arsenic, or Black oxide of arsenic	This is the black powder which forms on arsenic exposed to the air.
Arsenical paste.	

EFFECTS OF THE PREPARATIONS OF ARSENIC.

(See § 14, page 34.)

Remarks on the Employment of Arsenical Preparations.

19. Certain powders and pastes have long had an extensive reputation in the cure of cancers and ill-conditioned ulcers, under the names of *cancer* powders and cancer pastes. Experience, how-

* Auct. Berzelio et Thenard.

ever, proves, that the white oxide of arsenic, which enters into their composition, may occasion all the symptoms of poisoning, and produce death within twenty-four or forty-eight hours. Applications of this sort, therefore, should be employed with the greatest caution. Other *arsenical* preparations are much more poisonous when applied to wounds.

The compounds of arsenic, swallowed in doses infinitely small, are powerful poisons, which do not produce death according to the vulgar opinion, by burning the stomach and bowels; but probably they are absorbed, carried into the circulation, and destroy the vital powers of the heart: they often cause inflammation and ulceration of this organ. These facts being established, how hazardous is it to treat tertians, quartans, and other intermittent fevers, with this poison, as has been recommended by some physicians who have dared to administer it frequently and for a long time? Indeed we believe it to be dangerous in diseases of this kind to continue the use of arsenic, whenever it has been given without relief three or four times, *in very small doses and with the greatest caution;* for not only may severe accidents arise soon after the administration of the medicine, but also observation seems to have shown that the patient may acquire a disposition to organic disease of the heart.

Treatment.

20. In case of poisoning by an arsenical preparation, whether introduced into the stomach or applied to the external surface, the best method of treatment consists in making the patient drink many tumblerfuls of *sugared water*, of *warm* or of cold water, decoction of marsh mallow root, or flaxseed-tea; by this means the stomach is distended, vomiting takes place, and of course the poison is rejected. Some glasses may be given also containing a mixture in equal parts of lime-water[1] and sugared water. *Theriaca*,* *oil*, *gallnut*, *cinchona*, the *bark of the pine* and *the pomegranate*, *liver of sulphur*, and *vinegar*, recommended by some physicians, ought not to be employed, because they are always useless and often dangerous.

When the most urgent evils are alleviated, the patient is to be treated according to the directions § 7, p. 24: but if the above means do not afford relief, and the disease continues or becomes aggravated, if the pains in the abdomen are very great and the individual has convulsive motions,

[1] Lime-water may be prepared by heating, for five or six minutes, a quarter of an ounce of hydrate of lime [slacked lime] in two quarts of water: the liquor is then strained through linen.

* For the composition of theriaca refer to page 21, note.

leeches and bleeding must be prescribed, and the same management employed that was directed § 4, twenty-second and the following pages.

*Means of distinguishing the Preparations of Arsenic.**

21. *White Arsenic* [deutoxide of arsenic] is found under the form of a white powder like sugar; but it is much more heavy; is volatilized and diffuses the odor of garlic when put upon a hot iron† or burning coals; is not soluble, in any sensible quantity, in cold water; and it affords a beautiful green color by the addition of the blue ammoniacal sulphate of copper. The solution of white arsenic in water, gives a white precipitate with lime-water; a yellow, with hydrosulphuric acid [sulphuretted hydrogen], and with the hydrosulphates, if a few drops of nitric acid are added; the precipitate by the ammoniacal sulphate of copper, is green.

Arsénic acid is white; gives out the odor of garlic when placed on burning coals; dissolves readily in water; and changes to a clear blue,

* See Gorham's Chemistry, page 159, vol. ii; and Bigelow's Sequel, page 36.

† When a hot iron is used, some inflammable substance must also be present; otherwise the smell of garlic will not be given out.

when it is mixed with the ammoniacal sulphate of copper. Its aqueous solution reddens water of turnsol and litmus; forms a white precipitate with the waters of barytes, and of lime; a brick-red, with nitrate of silver; and a bluish white, with acetate of copper. *Orpiment* is yellow; exposed to a red heat with potash, it gives out the odor of garlic; as does also *realgar*, which is distinguished by its red color. The protoxide [fly-powder] is of a blackish color; placed upon burning coals, it gives out fumes having the odor of garlic; and becomes green, after remaining some hours in the ammoniacal sulphate of copper.

PREPARATIONS OF COPPER.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Subacetate of copper .	Verdigris. Oxide of copper.
Crystallized acetate of copper	Distilled verdigris. Crystals of Venus.
Subcarbonate of copper .	Natural verdigris. Verditer.
Sulphate of copper . .	Blue vitriol. Blue copperas. Roman vitriol. Blue stone.
Hydrochlorate of copper .	Muriate of copper.
Nitrate of copper . .	Nitre of copper.
Oxide of copper . . .	Copper rust.
Ammoniacal oxide of copper.	
Ammoniuret of copper .	Sapphire water.
Hydrochlorate of copper and of ammonia	Ammoniacal flowers of copper.

EFFECTS OF THE PREPARATIONS OF COPPER.

(See § 14, p. 34.)

Remarks on the Employment of the Preparations of Copper.

22. All the preparations of copper in the preceding table are poisonous when introduced into the stomach, even in very small quantities: most

of them, on the contrary, may be applied to wounds without any inconvenience other than a local inflammation. *Natural verdigris* [subcarbonate of copper] which is found upon pieces of money, in cisterns, and on brass cocks is insoluble in water, and may, therefore, remain in contact with it without communicating any injurious properties; but if a portion of this natural verdigris is swallowed with the liquid which has rested upon it, all the symptoms of poisoning are produced; and for this reason it is prudent never to drink liquids that have been kept in vessels covered with this green powder.

Artificial verdigris [the subacetate of copper] is easily dissolved by water, and is always poisonous, whether swallowed in powder, or drunk in water with which it has rested in contact. Too great caution cannot be observed in preventing the formation of this salt in kitchen utensils. While it is true that the use of copper pans well tinned is not attended with any danger, it is equally certain that when they are badly tinned, wine, vinegar, sorrel-juice, oil, fatty bodies, and many other substances, cause the formation of verdigris which mixes with the food, and gives rise to the most fatal accidents. The quantity of verdigris is very considerable, especially when the substances above enumerated are permitted

to stand and grow cool in copper vessels; it is therefore important, when utensils badly tinned have been employed in the preparation of food, to pour the contents out of them while yet boiling. It also happens sometimes that an individual is poisoned after having eaten salad dressed with vinegar that has been kept in copper pots; this is from the verdigris contained in the vinegar. For the same reason, medicines prepared and left for some time in vessels of copper, have been known to produce poisoning.

Antidotes to Verdigris and the other Salts of Copper.

23. The result of our experiments is that the *white of eggs* is the best antidote to verdigris and other salts of copper. *Sugar*, which has been regarded as such, may be useful in cases of poisoning by the preparations of copper; but it is not their counterpoison or antidote. The *liver of sulphur*, the *alkalies*, *gallnut*, *cinchona*, *charcoal*, etc., which have also been reckoned as antidotes, are useless, often dangerous, and of consequence ought to be banished from the treatment.

Treatment.

24. A person poisoned by verdigris or any other salt of copper, is to be treated according to

the method detailed in speaking of corrosive sublimate, § 17, page 38.

*Means of distinguishing the Preparations of Copper.**

25. The salts of copper dissolved in water have in general a blue or green color, though when the solutions are very weak, they may be colorless. They give blue precipitates with potash, soda, and lime-water; black, with hydrosulphuric acid and the hydrosulphates [sulphuretted hydrogen and the hydrosulphurets]; green, with the arsenite of potash; the precipitate by the arseniate of potash is bluish white; and that by the prussiate of potash and iron [ferruretted chyazate of potash] is reddish brown: this last is the most sensible reagent for the detection of minute portions of the salts of copper. Ammonia forms with these salts a soluble compound of a beautiful blue color. Metallic iron and phosphorus immersed in their solutions, separate the copper in a metallic form.

Artificial verdigris [the subacetate] is not wholly soluble in cold water; boiled in water it furnishes a blue liquid and a dark brown powder.

* See Gorham's Chemistry, page 206, vol. ii.

Exposed in a crucible to a red heat, it is decomposed, the acetic acid is driven off, and metallic copper is left behind. When it is treated with concentrated sulphuric acid, fumes of acetic acid having the smell of vinegar are disengaged.

Natural verdigris [the subcarbonate] is green, insoluble in water, and soluble with effervescence in diluted sulphuric acid, with which it forms the sulphate of copper [blue vitriol].

PREPARATIONS OF ANTIMONY.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Tartrate of potash and antimony	Tartar emetic. Tartarized antimony.
Chloride of antimony	Butter of antimony. Muriate of antimony.
Hydrosulphate of antimony	Kermes mineral. Hydrosulphuretted oxide of antimony.
Sulphuretted hydrosulphate of antimony	Golden sulphur of antimony. Yellow hydrosulphuretted oxide of antimony.
Hydrochlorate of antimony	Muriate of antimony.
Sub-hydrochlorate of antimony	Powder of Algaroth. Submuriate of antimony.
Protoxide of antimony	Argentine flowers of antimony.
Deutoxide of antimony	Antimonious acid.
Tritoxide of antimony	Antimonic acid.
Tritoxide of antimony with potash	Diaphoretic antimony. Antimoniate of potash. Calcined antimony.
Tritoxide of antimony by nitric acid	Mineral bezoard.
Oxide of antimony more or less sulphuretted, and mixed with silex.	Liver of antimony. Crocus metallorum. Glass of antimony.

Tartar emetic, kermes mineral, etc., which are every day employed by physicians with the most happy results, may be dangerous, even in small quantity, if they are not vomited. The evil effects to which they may give rise, have already been described in a general way § 14, page 34. But it is to be remarked, that these preparations more particularly occasion copious and obstinate vomiting, large evacuations by stool, great difficulty of breathing, and often such a constriction in the throat, that the patient is unable to swallow any thing; and finally very painful cramps, a sort of intoxication, and a more or less considerable prostration of the vital forces.

Remarks on the Employment of Antimonial Preparations.

26. The preparations of antimony are often administered carelessly, because no danger is thought to attend their use. Experience, however, proves that tartar emetic, if it does not excite vomiting, may produce death when given in the quantity of a few grains: instances, indeed, have occurred, in which an extreme prostration and debility have succeeded the administration

of a single grain of this poison, when it has not occasioned any evacuation. Sometimes, on the contrary, and particularly in infants, it excites vomiting so copious and painful as to require an immediate arrest. Hence the imprudence of taking this medicine without the advice of a physician.[1]

Mixed with lard and other substances, and applied as an irritant to the surface of the body, tartar emetic may produce poisoning and death.

The butter of antimony, which is used with benefit in cases of bites by a mad animal, should never be introduced into the stomach; for it would excite a violent inflammation that would speedily terminate in death.

Treatment.

27. If the individual poisoned vomits freely, and has pain and cramp in the stomach, the vom-

[1] Perhaps it will be said that tartarized antimony, kermes mineral, and other compounds of this metal, have been for some years administered in doses of many grains at once, without producing either vomiting or any of the evils we have mentioned. In truth, the method of treatment called that of *Rasori*, or of the *Italian new medical doctrine*, is founded on the possibility of making the patient swallow without inconvenience many grains a day of an antimonial preparation, or other active medicine. But it is to be remembered that the medicine is here employed upon individuals attacked by pneumonia, rheumatism, etc., who

iting is to be promoted by drinking many tumblerfuls of sugared water, or of simple water. If, notwithstanding these means, the vomiting and pains continue or increase, twenty-five drops of laudanum, or a grain of extract of opium, dissolved in a tumbler of sugared water, must be given, and repeated three times with intervals of fifteen minutes, if the symptoms are not relieved. If extract of opium is not at hand, let an ounce of the syrup of white poppies [diacodium] be taken, dissolved in a tumblerful of water; and if this syrup cannot be procured, a decoction of poppies may be administered, which is prepared by boiling three poppy-heads, or capsules, in a pint of water for fifteen minutes, and adding three ounces of sugar; this potion may be given in three doses with intervals of a half-hour.

Should the symptoms not yield to this treatment, it will be necessary to apply twelve or fifteen leeches to the pit of the stomach; and the same application must be made to the neck, if the constriction of the throat renders the patient unable to swallow.

If it happens that the individual who has taken a preparation of antimony, should not vomit

are in a condition very different from that of those persons, who being in good health may take strong doses of tartar emetic, kermes, etc.

and should present the symptoms of poisoning, several tumblers of sugared water ought to be given. If vomiting does not now take place, four or five gallnuts or an ounce of cinchona [Peruvian bark], must be bruised, and boiled for ten minutes in two quarts of water, and tumblerfuls of this drink be frequently administered: in default of the above medicines, oak-bark, or willow-bark, may be employed.

Experience has proved that the gallnut is to be preferred to the other substances enumerated. Care must be taken not to give the patient ipecacuanha [Indian root], nor white vitriol [sulphate of zinc], nor blue vitriol [sulphate of copper], with the design of exciting him to vomit: these medicines would aggravate the disease by increasing the irritation.

If the means now indicated are fruitless of relief, and the disease continues to make progress, recourse must be had to leeches and to the management detailed § 4, page 22.

Means of distinguishing the Preparations of Antimony.

28. All the antimonial preparations, when exposed to a red heat in a crucible with potash and charcoal, yield metallic antimony, which is easily

recognised, first, by its bluish white color; secondly, because when heated with nitric acid [aqua fortis], it furnishes a yellowish white powder, soluble in hydrochloric [muriatic] acid; this solution forms a white precipitate with water, and one that is orange yellow with the hydrosulphuric acid.

Tartar emetic is white; put upon burning coals, it becomes black, and leaves a residuum of metallic antimony. It is soluble in water; it gives an orange precipitate with hydrosulphuric acid; a grayish white with gallnuts; and a white precipitate with the sulphuric, nitric, and hydrochloric acids.

Kermes mineral has a velvet-like appearance; its color is a brick red, which passes to a yellowish white when it is heated with potash dissolved in water. Golden sulphur of antimony has an orange color; with potash it undergoes the same changes as the kermes does.

Butter of antimony is grayish white, and melts like fat: it renders water, with which it is mixed, opaque, and furnishes a white precipitate.

The other salts of antimony are precipitated of a white color by water, and of an orange yellow, or a red, by hydrosulphuric acid, and the hydrosulphates.

The oxides of antimony are soluble in hydrochloric [muriatic] acid, and furnish a salt of antimony which may be recognised by the marks we have affixed.

*Of Emetine.**

29. Emetine, or emeta, is a vegetable alkali, discovered by M. Pelletier in ipecacuanha, which produces upon the animal economy effects similar to those produced by tartar emetic. It is a solid, white powder, slightly bitter to the taste, and with difficulty soluble in water. It is decomposed and blackened when laid on burning coals. In combination with the mineral acids, it forms soluble salts, which by the addition of gall-nuts are precipitated in copious flakes of a dirty white color. Emetine is readily dissolved in alcohol, and its solution restores the blue color to paper of turnsol which has been reddened by an acid. See *Treatment*, § 27, page 55.

* This proximate principle is somewhat differently described by Profess or Bigelow; "emetine is in the form of dark red, transparent scales, having an empyreumatic odor, and a bitter, but not nauseous, taste, followed by some acrimony. It deliquesces in a moist atmosphere, is very soluble in water and alcohol, but is not soluble in ether. Nitric acid converts it into oxalic acid." See Sequel to Pharmacop. page 231.

PREPARATIONS OF TIN, BISMUTH, GOLD, AND ZINC.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Hydrochlorate of tin; or Perchloride of tin, or Stannanea [Davy] . .	Muriate of tin. Fuming liquor of Libavius. Butter of tin.
Protoxide and deutoxide of tin	Gray oxide of tin. Tin putty. Flowers of tin. Tinstone.
Nitrate of bismuth . . .	Pearl white. Magistery of bismuth.
Subnitrate of bismuth .	White oxide of bismuth.
Hydrochlorate of gold .	Muriate of gold.
Oxide of zinc	Flowers of zinc. Lana philosophica.
Sulphate of zinc . . .	White vitriol. White copperas.

EFFECTS OF THE PREPARATIONS OF TIN, BISMUTH, GOLD, AND ZINC.

[The effects of these preparations are described § 14, page 34.]

Remarks on the Employment of Tin, Bismuth, Gold, and Zinc.

30. The preparations of tin are poisonous, and must not be confounded with common salt, as has taken place in the art of dying, in which a salt of tin is used as a mordaunt. Metallic tin

is not injurious, and may, therefore, be employed without danger in covering vessels of other metals.

Pearl-white [subnitrate of bismuth], which is often used as a cosmetic, has the double inconvenience of impeding the transpiration by stopping up the pores of the skin, and of giving rise to chronic diseases, such as rheumatism, nervous disorders, etc.

Zinc is usefully employed in making boilers and bathing tubs: but it ought not to be used as a material for cooking utensils; for experience shows that water, the weakest vegetable acids, butter, and some salts attack and dissolve it, so that the use of vessels of this nature may occasion, particularly in delicate persons, diarrhœa, vomiting, and other ill effects.

The salts of zinc have all, in greater or less degree, an emetic operation.

Treatment.

31. Experience has proved that *milk*, diluted with water, is the best antidote to the salts of tin; many tumblerfuls of it should be administered; but if it cannot be procured immediately, vomiting must be promoted in the mean time by copious draughts of warm or cold water: if relief

is not thus obtained, the treatment must be conducted according to the rules, § 4, in the twenty-second and following pages.

Poisoning by the salts of gold, bismuth, and zinc, is to be treated in the same manner as poisoning produced by arsenic. See § 20, page 45.

Means of distinguishing the Preparations of Tin, Gold, Bismuth, and Zinc.

32. The salts of *tin* are not precipitated from their solutions by distilled water; they afford a white precipitate with potash, and a yellow or chocolate one, with the hydrosulphates.

The salts of *bismuth* are precipitated white by distilled water, black by the hydrosulphates, and white by potash or soda.

The salts of *gold* are yellow; they are precipitated from their solutions, black by green copperas [sulphate of iron], of a deep chocolate color by the soluble hydrosulphates, and yellow by ammonia.

The salts of *zinc* give a white precipitate with potash and the hydrosulphates; the oxide precipitated by potash, and treated with charcoal at a high temperature, is decomposed and yields metallic zinc.

PREPARATIONS OF SILVER.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Nitrate of silver . . .	Lunar caustic.
	Lapis infernalis.
	Gall of metals.
Ammoniuret of silver . .	Fulminating silver.

EFFECTS OF THE PREPARATIONS OF SILVER.

(See § 14, page 34.)

33. The nitrate of silver, which has been well recommended in epilepsy, is poisonous when it is swallowed. Applied to the skin, or to wounds, however, its action is confined to inflaming and burning them; so that it is doubtful if the surgeon will ever discover a caustic that has fewer inconveniences in its operation than the lunar caustic has.

Treatment.

34. Our experiments have proved that common salt is the best antidote; and persons poisoned by the nitrate of silver, should be made to swallow many glasses of salt and water, prepared by dissolving two spoonfuls of salt in four quarts of water: vomiting will take place, and

relief will follow. If the symptoms should not yield to this medicine, recourse must be had to leeches, emollient drinks, fomentations, and all the means detailed § 4, page 22.

Characters of Nitrate of Silver.

35. Nitrate of silver [lunar caustic] may be recognised by the following characters: first, exposed to a red heat, it yields metallic silver; second, its aqueous solution will afford a white precipitate with the solution of common salt; a yellow, with the phosphate of soda, and the arsenite of potash; a red one, with the chromate of potash; its precipitate by the hydrosulphuric acid and the hydrosulphates is black, and that by potash is of an olive color.

POISONING BY NITRE, SAL AMMONIAC, AND THE LIVER OF SULPHUR.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Nitrate of potash, or Nitrate of potassium	Nitre. Salt of nitre. Saltpetre. Sal prunelle.
Hydrochlorate of ammonia	Muriate of ammonia. Sal ammoniac.
Sulphuret of potash . .	Liver of sulphur.

NITRE.

Effects of Nitre.

36. Notwithstanding the opinion of many physicians, nitre is poisonous to man and other animals, *unless it is vomited up*, when administered to a person in health, in the dose of some drachms, and in powder or concentrated solution. It gives rise to obstinate, sometimes bloody, vomitings, to an active inflammation of the stomach, and of course to the whole train of symptoms which are the consequences of such inflammation, and which more or less resemble those that have been described § 14, page 34. It is to be remarked particularly that it affects the nervous

system, and frequently occasions a sort of intoxication, a palsy of the limbs, convulsions, etc.[1]

Treatment.

37. Persons poisoned by nitre should be treated in the same way as are those poisoned by arsenic, except that the administration of lime-water is to be omitted. [*See* § 20, page 45.]

Characters of Nitre.

38. It is particularly important to distinguish nitre from Glauber's salt [sulphate of soda], instead of which it has sometimes been furnished by the apothecary, and administered. Nitre, when thrown upon burning coals, crackles, and produces a clear, white flame; sulphate of soda, on the contrary, melts, swells up, and becomes opaque. When reduced to a fine powder and mixed with oil of vitriol [concentrated sulphuric acid] nitre gives out white fumes; while Glauber's salt produces no such appearance.

[1] The remark holds true of nitre equally as of antimonial preparations, that it may be given without inconvenience in large doses to persons attacked by rheumatism, and some other affections. See note, page 55.

SAL AMMONIAC.

Effects of Sal ammoniac.

39. Sal ammoniac, which is often employed by physicians and surgeons, is poisonous when it is introduced into the stomach, or applied in too great quantity to wounds and sores. It occasions vomiting, convulsive motions, a general rigidity or stiffness, pains in the belly, a decomposition of the features of the face, and death.

Treatment.

40. Vomiting must be promoted as speedily as possible by water, or, what is better still, by sugar and water, many tumblerfuls of which should be given; by the introduction of the fingers into the mouth, and by irritating the fauces with the feathers of a quill. Afterwards the nervous symptoms are to be calmed by the administration of a decoction of poppy-heads, of which we spoke, § 27, page 55. Should the pain in the abdomen increase or continue, let twelve or fifteen leeches be applied, and the same course pursued that was pointed out in § 4, page 22, under the article *Treatment of Poisoning by an Acid.*

Characters of Sal ammoniac.

41. Exposed to heat, the muriate of ammonia is volatilized, and rises in white vapor; triturated with quick-lime, it diffuses the odor of the volatile alkali; dissolved in water and mixed with nitrate of silver, it produces a very heavy, curdlike, white precipitate, which is insoluble in water and nitric acid, but soluble in ammonia.

LIVER OF SULPHUR.

Effects of the Liver of Sulphur.

42. The liver of sulphur [sulphuret of potash], which is employed in the preparation of artificial Barèges baths, so far from being an antidote to arsenic, lead, etc., as many physicians continue to believe, is itself a violent poison. We had long before established this fact by experiments made upon animals, when the terrible accident which in 1817 befel the Countess of * * * *, furnished an irresistible proof of the deadly action of this substance. Having by mistake swallowed a part of a quantity of sulphuret of potash, which had been procured for the preparation of a bath, this unfortunate lady expired after a few

minutes. We take this occasion to state, that there is no danger in employing two or three ounces of this poison in the form of a bath; but that the introduction of the twentieth part of this quantity into the stomach, may give rise to the most serious evils, and even to death.

The effects produced by the liver of sulphur very closely resemble those of nitre; though they are much more violent. [*See* § 36.]

Treatment.

43. As soon as an individual has swallowed sulphuret of potash, he should be made to drink copiously of some mucilaginous fluid prepared with flaxseed, gum arabic, etc. When vomiting has been promoted by these means, twelve or fifteen leeches are to be applied to the most painful parts of the abdomen, if the symptoms are at all urgent; finally, the treatment must be conducted according to the directions laid down in the twenty-second and following pages.

Characters of the Liver of Sulphur.

44. The sulphuret of potash is solid, of a greenish yellow color; mixed with water and vinegar, it gives out the intolerable smell of rotten eggs. It is very soluble in water; its aqueous solution is decomposed by the strong acids, which precipitate sulphur, and disengage hydrosulphuric acid gas, which is at once recognised by the smell of rotten eggs which it exhales: this solution gives a black precipitate with the solutions of mercury, lead, bismuth, and copper, and with the solution of tartarized antimony, a reddish orange precipitate.

PREPARATIONS OF BARYTES.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Protoxide of barium or barytes.	
Carbonate of barytes.	
Hydrochlorate of barytes	Muriate of barytes.

Effects of the Preparations of Barytes.

45. These preparations are extremely poisonous, whether they are introduced into the stomach, or applied to wounds and sores: they are rapidly absorbed, carried into the tide of the circulation, and occasion vomitings, convulsions, palsy of the limbs, pains in the belly, hiccough, dissolution of the features of the face, and death. It is important that physicians, who make use of the hydrochlorate of barytes, should be aware of the accidents that may arise from its administration in large doses; and it is equally important that the sick or the apothecary should not (as has lately happened in England) confound it with Glauber's salt.

Treatment.

46. The individual poisoned by a preparation of barytes, must be made to swallow, as speedily as possible, many tumblers of water in which sulphate of soda [Glauber's salt], or sulphate of magnesia [Epsom salt], is dissolved; about two drachms of either one of these salts may be added to a quart of water. Our experience has proved that there is not a better counterpoison to the preparations of barytes. Should these salts not be at hand, well-water that contains much sulphate of lime, or is *hard*, may be given with great success. When by these means vomiting has been promoted, the poison which had not consumed its activity has been decomposed, and the most urgent evils alleviated, sugared water or any other mild drink must be given; and in case the disease should continue, the rules of treatment must be adopted, which were proposed in the twenty-second and following pages.

Characters of the Preparations of Barytes.

47. All the soluble preparations of *barytes*, mixed with well-water, or with a solution of Glauber's salt or Epsom salt, give a white precipitate, which is insoluble in water and in the purest nitric acid: and hence they need not be confounded with the sulphate of soda, which does not render those fluids turbid.

Barytes, dissolved in water, gives a green color to the syrup of violets, and affords a white precipitate with the carbonic and sulphuric acids.

Effects of Phosphorus.

48. Phosphorus is poisonous when introduced into the stomach in small pieces; but it is much more so, if dissolved in oil, ether, etc. It always gives rise to the same symptoms that are produced by the mineral acids, of which we have already spoken; and its effects are to be counteracted by the same means.

Phosphorus may be recognised by the following properties: it is solid, soft, of a yellowish white* color, and having a very sensible odor of garlic. Exposed to the air at ordinary temperatures, it diffuses a white smoke remarkable for presenting a green light in the dark: at higher temperatures, it burns brightly, and produces solid phosphoric acid, which appears under the form of thick, white vapors.

* As brought to this country it is usually of a flesh red color.

CANTHARIDES.

Spanish flies, or blistering flies.
Tincture of cantharides.
Cerate of cantharides.
Blistering cerate or plaster.

Effects of Cantharides.

49. Applied to the skin or introduced into the stomach, cantharides often occasion serious accidents which may be followed by death. The following are the symptoms produced when they have been swallowed: an unpleasant and nauseous smell; a very disagreeable, acrid taste; burning heat in the fauces, stomach, and other parts of the abdomen; efforts to vomit; frequent vomitings, often mixed with blood; copious and more or less bloody evacuations from the bowels; violent pain in the abdomen, especially about the pit of the stomach; obstinate and very painful priapism; heat in the bladder; great difficulty in passing the urine; sometimes the urine is entirely suppressed, and when the patient succeeds in passing a few drops, it is with the greatest difficulty and pain; sometimes it is mixed with blood: the pulse is frequent and hard; in some cases it is impossible to make the individual

swallow drinks, they are rejected with horror; the jaws are tightly closed; at length dreadful convulsions, and a general stiffness, and delirium manifest themselves, and death hastens to close the scene.

This faithful picture of the symptoms occasioned by cantharides, shows how dangerous it is to swallow them for the purpose of giving a momentary excitement to the organs of generation, which have become weakened by age, by diseases, or, as is more frequent, by debauchery.

Treatment.

50. The patient must be made to drink copiously of water, or, which are still better, sugared water, milk, decoction of marsh mallow, or common mallow, or flaxseed; afterwards the treatment should be regulated according to the circumstances of the case, as in the twenty-second and following pages. Olive oil, which has been hitherto praised as an antidote, is justly rejected by M. Pallas, because it increases the evils. In truth, it is well known that it dissolves the active principles of cantharides; and we have seen that a few hours terminated the life of animals who had been made to swallow oil that had acted for some time on the powder of cantharides.

Besides these means, some one of the emollient liquids mentioned above, should be injected into the bladder for the cure of its inflammation. If, notwithstanding the employment of these means, the heat of the bladder and difficulty in passing the urine continue, frictions must be made upon the skin of the inside of the thighs and legs with two ounces of sweet oil, in which by the aid of heat a quarter of an ounce of camphor has been dissolved. Many cups of flaxseed-tea with a little nitre and camphor dissolved in it, should be given to the patient; this liquid may also be injected into the anus and bladder.

If the poisoning is the effect of the application of cantharides to the skin, it is unnecessary to excite vomiting: the patient should be placed in a warm bath; half a tumblerful of sugared water should be given him every five minutes; the frictions just recommended are to be made; and if he complains of much pain in the region of the bladder or of the stomach, twelve or fifteen leeches are to be applied without delay to the painful spot; the painful parts should also be covered with cloths soaked in a decoction of marsh mallow, or of flaxseed.

Characters of Cantharides.

51. The powder of cantharides, even after it has passed through a sieve of silk, is of a grayish green color, and presents many shining points of a brilliant green; it has an acrid and nauseous smell; placed upon burning coals it disengages a fetid odor similar to that of burning horn, and leaves a residuum of charcoal.

GLASS AND ENAMEL.

52. Glass and enamel in fine powder may be swallowed without any danger: but if they are in sharp pointed fragments, they produce the same injury as any other sharp body would, by lacerating and inflaming the membranes of the stomach. A person who suffers pain in the stomach, heat and other bad symptoms after having swallowed glass or enamel, should eat a great quantity of beans, potatoes, cabbage, soft of bread, or any other unirritating food, by which means the stomach will be filled, and the sharp particles of glass will be enveloped: next, two or three grains of tartar emetic in a glass of water are to be given, by which vomiting will be excited, and the glass will be expelled; afterwards milk and

injections must be administered, and emollient fomentations applied to the belly; the patient should be put into a warm bath, and if the inflammation of the stomach continues or becomes more severe, its region should be covered by twelve or fifteen leeches.

PREPARATIONS OF LEAD.

SCIENTIFIC NAMES.	ANCIENT NAMES.
Acetate of lead . .	Sugar of lead.
Subacetate of lead . .	Extract of lead.
	Vegeto-mineral water.
	Goulard's extract.
Carbonate of lead . .	White lead.
	Cerusse.
Protoxide of lead . .	Massicot.
	Litharge.
Peroxide of lead . .	Minium.
	Red lead.
Emanations of lead.	

We have elsewhere demonstrated that the effects of large quantities of the preparations of lead introduced into the stomach, ought not to be confounded with those which result from the emanations of this metal, and which constitute the colic of painters.

EFFECTS OF THE PREPARATIONS OF LEAD INTRODUCED INTO THE STOMACH.

53. When a person has swallowed a pretty large dose of sugar of lead, or any other of its preparations that is soluble in water, he manifests the following symptoms: disagreeable, sweetish, astrin-

gent, metallic taste; sense of constriction in the throat; pains more or less acute in the region of the stomach; efforts to vomit; obstinate, painful vomitings, sometimes mixed with blood; in short, all the symptoms which are the result of inflammation of the stomach, and which have been detailed § 14, page 34, in speaking of corrosive sublimate. If, instead of taking a large dose of lead at once, a person drinks water or wine containing a very little of this metal, no inconvenience is felt at first; should he, however, continue for a long time to make use of such drinks, he will contract a chronic disease which in general bears a resemblance to the painters' colic to be hereafter described, but which in certain circumstances is a real palsy.

Remarks on the Employment of Lead and its Compounds.

54. Metallic lead may be swallowed without any inconvenience; but kitchen utensils made of this metal should never be employed, because it is attacked by many acid articles of food, which dissolve it, change it into a salt, and render it poisonous. Nevertheless, the fact is perfectly established that no danger attends the use of utensils made of an alloy consisting of equal parts

of lead and tin. Vinegar and lemon-juice do not attack this alloy.

It is very dangerous to drink water that has been kept for a long time exposed to the air in leaden vessels; for though immediate poisoning may not be produced, the most serious effects, which may even occasion death, are not slow in manifesting themselves. It is equally necessary to avoid drinking well-water that has been drawn in leaden buckets. Finally, mischievous accidents have been observed to happen to persons who had drunk rain or aqueduct water conveyed in lead pipes, or which having fallen upon roofs covered with this metal has been received in cisterns. Wines of a bad quality which have been allowed to stand some time upon litharge for the purpose of sweetening and improving them, are still more poisonous than water that contains lead.

Syrups, spirits, and cordials clarified with sugar of lead, retain a portion of this poisonous salt when they have been badly purified; it is therefore imprudent to procure them at the shops of those persons, who may be deficient in the knowledge necessary for effecting this purification. It is thought proper to make this observation, as the practice may be the source of some mischief.

Treatment.

55. It is proved that Glauber's salt, Epsom salt, and plaster of Paris or hard well-water, are the best antidotes to the salts of lead, to water containing this metal, Goulard's extract, etc.; it is precisely the same as in the case of the salts of barytes, and the treatment should be the same as if a salt of this kind had been taken. *See* § 46. Liver of sulphur, recommended by some practitioners, is dangerous and to be avoided.

Characters of the Preparations of Lead.

56. All these preparations, when exposed with potash or charcoal to a red heat, yield metallic lead. A solution of a *salt of lead*, or *water holding lead* in solution, may be recognised by the following properties: first, if sulphuric acid [oil of vitriol] is poured into it, a white precipitate will be produced; secondly, sulphuretted hydrogen produces a black precipitate; thirdly, a yellow precipitate will be thrown down by the addition of chromic acid, or a chromate; lastly, the liquid will have a sweet taste.

The presence of lead in wines that have been impregnated with litharge, may be known by

evaporating them in a basin, and calcining the residuum in a crucible; at the bottom of which, at the conclusion of the experiment, will be found a button of metallic lead: such wines also will have a sweetish taste.

EFFECTS OF THE EMANATIONS OF LEAD, OR PAINTERS' COLIC.

57. Painters, plumbers, glaziers, potters, manufacturers of colors, workers in glass, gilders, printers, and in general all artizans who employ lead and its compounds, who either handle them or breathe their effluvium, are subject to a disease known under the name of *Painters' colic*, *Devonshire colic*, which is a real poisoning by *emanation:* most commonly the patient first complains of dull colic pains, the duration of which is short, and the return is speedy; these, as they become more severe, extend from the pit of the stomach upwards to the arms and downwards to the navel, back, loins, rectum, and bladder, frequently to the thighs and legs, and at length become insupportable: the mouth is dry: retching and vomiting come on, and sometimes continue for many days; the matter ejected is bitter and of a green or black color; there is obstinate constipation, and the evacuations by stool, that

may occur, are yellow, hard, rounded, and in shape resembling sheep's-dung; sometimes, on the contrary, there is a looseness; the belly is drawn in, particularly about the navel; it appears to sink in so as to touch the back-bone, and this effect is the greater, in proportion as the colic-pains are more intense. These pains are sometimes relieved by gradual pressure with the hand upon the navel. Fever is hardly ever present, and it is rare that the patient complains of head-ach, dizziness, etc. In some cases, though very seldom, these symptoms, instead of being developed gradually, present themselves with the greatest rapidity.

Treatment of Painters' Colic.

58. Experience has proved that the method of treatment employed in the "Charity hospital" at Paris, is attended with wonderful success. Its details, therefore, will be given in full.

FIRST DAY.

Cathartic Injection.

In the morning is administered a clyster prepared by boiling fort en minutes four ounces of senna-leaves in a pint of water, and adding to the liquor strained through a cloth, a half ounce of sulphate of soda [Glauber's salt] and four ounces of tartar emetic wine.* The following drink is given throughout the day:

Cathartic Draught.

Boil two ounces of bruised cassia pods in a quart of water, for fifteen minutes; strain through a cloth, and add an ounce of sulphate of magnesia [Epsom salt], and three grains of tartar emetic. If the disease is very severe, an ounce of syrup of buckthorn, and two drachms of the con-

* M. Ratier, in his 'Formulary of remedies employed in the hospitals of Paris,' printed in Paris in 1823, gives the following proportions of the ingredients of this injection; viz. Senna-leaves, half an ounce; sulphate of soda, half an ounce; and wine of tartar emetic, four ounces. I am not able to reconcile the two statements.

fection of Hamech,* may be added to this draught.

Anodyne Injection.

In the evening a clyster is given consisting of six ounces of nut oil, and twelve ounces† of red wine; while a drachm and a half of theriaca,‡ to which is sometimes added a grain and a half of opium, is administered in the form of a bolus.

SECOND DAY.

Emetic.

In the morning six grains of tartar emetic dissolved in a tumblerful of warm water are given in two doses with the interval of an hour; and vomiting is promoted by copious draughts of warm water. In the course of the day, after the cessation of the vomiting, the following ptisan is administered:

* This is a formula of an ancient Arabian physician, containing thirty-two ingredients, compounded with great labor; confection of cassia or of senna may be substituted. *See* Brici Bauderoni Paraphrasin in Pharmacopœiam. Londini, 1639.

† Six ounces of red wine diluted with an equal part of water, would be of a proper strength, the ordinary wines of France being weaker than those found here.

‡ See note on page 21. For this obsolete preparation the opiate electuary of the Massachusetts pharmacopœia may be substituted in the dose of one or two scruples.

Sudorific Ptisan.

To three pints of water add an ounce of guaiacum and of sarsaparilla, and boil until it is reduced to a quart; to this add an ounce of sassafras and a half ounce of liquorice root, boil for a short time and strain through a cloth.

In the evening the anodyne injection and the bolus of theriaca* and opium are given as on the first day.

THIRD DAY.

Laxative Ptisan.

In the morning of the third day the following ptisan is given in four doses, with intervals of three quarters of an hour between each: to a quart of the sudorific ptisan of yesterday, prepared only with the guaiacum and sarsaparilla, add an ounce of senna-leaves, boil for five minutes and strain. Through the rest of the day, the simple sudorific ptisan of the second day is administered, and in the evening the anodyne injection and the bolus of theriaca and opium of the first day, are repeated.

* See note, ‡ page 87.

FOURTH DAY.

Cathartic Draught.

In the morning the following purgative drink is administered. Prepare a decoction of senna by boiling a quarter of an ounce of the leaves in a tumbler and a half of water, until it is reduced to a tumblerful, and strain. To this add half an ounce of Glauber's salt, a drachm of powdered jalap, and an ounce of syrup of buckthorn. Throughout the day is given the sudorific ptisan prescribed above; and in the evening the anodyne injection and the theriaca and opium, as on the first day.

FIFTH DAY.

In the morning the laxative ptisan of the third day; at 4 P. M. the cathartic injection; at 6, the anodyne injection of the first day; and at 8, the theriaca and opium.

SIXTH DAY.

The treatment of the fourth day is repeated. If, notwithstanding these means, the patient has no evacuation, the following boluses are given.

Purging Bolus.

Ten grains of scammony, ten grains of jalap, sixteen grains of gamboge, and a drachm and a half of confection of Hamech,* are mixed with syrup of buckthorn; this is divided into twelve boluses, one of which is given every two hours: in the intervals, the patient drinks the sudorific ptisan of guaiacum and sarsaparilla. It is rare that the disease continues after this treatment. If the drinks prescribed should be rejected by vomiting, tartar emetic should be administered in weak solution, prepared by dissolving a grain of it in a quart of water.

58. Professor Fouquier, one of the physicians of the "Charity Hospital," after having employed the method above detailed many times, has thought that it may be modified with advantage. He has renounced the use of the anodyne injection, of the theriaca, opium, and sudorific ptisan: persuaded that the severe pains which torture those laboring under this disease, would abate and cease in proportion as the openness of the bowels should be promoted, he has preferred the use of cathartics and emetico-cathartics, to that of emetics alone: and finally he has substituted ca-

* See note, * page 87.

thartics for drastic purges, and cream of tartar lemonade for the sudorific ptisan. The unvarying success obtained by this intelligent physician for five or six years, and in many hundreds of individuals attacked by the painters' colic, justifies the efficacy of his treatment, which is, besides, much more simple than the method of the 'Charity.' It is as follows:

On the first day the patient takes an emetico-cathartic, composed of three grains of tartar emetic and three drachms of Glauber's salt. Throughout the day he drinks cream of tartar lemonade prepared by dissolving a half ounce of cream of tartar [supertartrate of potash] in so much water as will be rendered agreeably acid by it. In the evening the cathartic injection [page 86] is given.

Second day; if the patient has as yet had no evacuations from his bowels, and still labors under efforts to vomit, the emetico-cathartic, lemonade and cathartic clyster of yesterday, are repeated. On the contrary, if he has had evacuations by stool, the treatment is limited to the administration of some mild cathartic, such as castor oil, from one to two ounces of which are given; and in the course of the day the patient drinks the tartaric lemonade.

On the following days an ounce or two of castor oil, and the cream of tartar drink are prescribed; and this treatment is continued until the cure is completed.

In case the patient should suffer acute pains, or be troubled by want of sleep, instead of having recourse to opium, he should take, five or six times in the day, a pill containing two grains of extract of henbane [hyoscyamus niger].

Anemone pulsatilla, Pasque flower. *A. nemorosa*, Wood anemone.

Bryonia diöica, White bryony.

Chelidonium majus, Great celandine.

Clematis vitalba, Wild traveller's joy; *C. Virginiana*, Virgin's bower;* *C. Viorna.** *C. crispa.*

Colchicum autumnale, Meadow saffron.

Convolvulus scammonia, Scammony.

Cucumis colocynthis, Colocynth, Coloquintida, Bitter apple.

Daphne gnidium, Spurge flax.

Daphne mezereon; Mezereon, Spurge olive, or, S. laurel.

Delphinium staphysagria, Stavesacre.

Euphorbia,* Spurge; *Euphorbia Ipecacuanha*, Ipecac spurge; *Eu. corollata*, Large-flowering spurge; and other species.

Fritillaria imperialis, Crown imperial.

Gamboge.

Gratiola officinalis,* Hedge hyssop.

Jatropha curcas, Barbadoes nut; Common physic nut.

Juniperus sabina, Savin.

Momordica elaterium; *Elaterium*, Wild cucumber.

Narcissus pseudo-narcissus, or *pratensis.*

Ranunculus,* Crowfoot; *R. bulbosus*, Buttercups; and most of the family.

Rhus radicans,* Poison ivy.

" *vernix*,* Poison dog-wood, Swamp sumach.

" *toxicodendron*,* Poison oak.

Ricinus; Palma Christi.

Sedum acre, Wall pepper; Stone crop.

* Those marked with an asterisk are found native in this country.

Effects of the Irritating Vegetable Poisons.

59. An acrid, pungent, and more or less bitter taste; burning heat, and great dryness in the tongue and mouth; painful constriction of the throat; nausea, and evacuations by vomiting and stool; efforts to vomit continuing after the stomach is entirely emptied; pains more or less acute in the stomach and bowels; strong, frequent, regular pulse; respiration disturbed and accelerated. Frequently the individual staggers in his walk; he appears intoxicated; the pupil of his eye is dilated; he falls into such a state of prostration that he seems to be dead; the pulse grows slow and feeble, and death comes on. Some of these poisons occasion convulsion of greater or less violence, stiffness of the limbs, and pains so acute as to force from the patient the most distressful cries. The poisonous properties of these plants differ very greatly in point of intensity; most of them, even, may by a prudent administration be rendered beneficial to the human system.

Treatment.

The treatment of persons poisoned by the irritating plants does not, in most cases, differ from that recommended under the article *Corrosive sublimate*, except that it is not necessary to administer the white of eggs; the same management, therefore, will be pursued as in § 17, and particular care must be had to avoid the administration of tartar emetic, vinegar and other irritating drinks, which would but increase the disorder.

Sometimes it happens that the poison swallowed does not occasion very great pain in the abdomen, but produces vomitings a great prostration of the strength, and a remarkable insensibility; in such a case, after having promoted vomiting by sugared water, copious draughts of coffee are given, which is prepared by pouring a quart of boiling water upon half a pound of ground coffee, letting it steep for half an hour, and straining through a fine cloth. If the patient cannot keep this on his stomach, it may be administered in form of injection or of frictions. Three or four grains of camphor mixed with the yolk of an egg are given from time to time. It is necessary to observe whether the abdomen does not become painful, in which case it is proper to apply twelve or fifteen leeches. When, instead of

great prostration, there is excitement, convulsion, delirium, etc., it is necessary, after having promoted vomiting by means of sugared water, to give the opiate draught, of which we have already spoken, or the decoction of poppy-heads, § 27.

Anemone; the root, young shoots, and some other parts of the Anemone Pulsatilla, are poisonous even when applied to the external surface; and some species are so acrid, that individuals have been poisoned and their eyes been inflamed, by reducing them to powder. The inhabitants of Kamschatka employ the anemone nemorosa to poison their arrows.

Bryonia diöica; the root of bryony, which is sometimes given as a cathartic, will in a strong dose inflame the stomach and bowels.

Chelidonium majus; the celandine is capable of exciting inflammation in those parts to which it is applied.

Clematis; many species of the clematis are poisonous, when eaten; applied to the skin, they produce excoriations. [*See Barton's Collections.*]

Colchicum autumnale [meadow saffron]; the seeds of colchicum are very dangerous poisons; and in some climates the bulbs may give rise to accidents*.

* The bulbous roots of this plant, as they are found in the druggists' shops in this country, possess about one third of the activity that resides in the seeds.

Cucumis colocynthis [colocynth, bitter cucumber]; coloquintida and all its preparations should be administered with caution, and never without medical advice: for they may be mischievous and even fatal, whether introduced into the stomach, given in form of injection, or applied to the skin.

Daphne gnidium; the spurge-flax, which is sometimes employed in surgery as an external irritant, has very strong caustic properties, and may produce death even when applied to the skin.

Daphne mezereum; spurge-laurel and its fruit deserve equally to be ranked among the vegetable poisons.

Delphinium staphysagria; stavesacre, which is often used for the destruction of vermin, is not dangerous when applied to the head in small quantities. But if it is applied in large quantity, or if by mistake it is swallowed, it excites a violent inflammation.

Euphorbia; most of this family of plants afford an acrid juice, which causes inflammation, when it is rubbed upon certain parts of the body.* Taken internally, whether by the mouth or in injection, they produce colic, vomiting, etc., which terminate in death, unless recourse is had to the treatment pointed out § 17. [*See Bige-*

low's Medical Botany, vol. iii. *and Barton's Collections.*]

Gamboge ; this gum-resin inflames the parts, with which it comes in contact, and consequently may occasion death, if swallowed in large doses.

Gratiola officinalis; it were desirable that the sick would, for their own interest, abstain from employing those quacks, who see nothing hopeless in any disease whatever, and fearlessly administer the hyssop in drinks and injections which inflame the bowels and conduct infallibly to death. Many instances of these effects and this termination might be cited from our own observation.

Jatropha curcas ; the Barbadoes nut is a powerful irritant and caustic, the internal use of which, accordingly, is very dangerous.

Juniperus sabina; the same remark may be repeated of the savin.

Momordica elaterium ; the juice of the fruit, which is used by physicians as a cathartic and hydragogue, taken in a large dose may prove fa-

* 'Most of the species of the extensive genus *Euphorbia* are violent emetics and cathartics. The lactescent juice, which they exude when wounded, is acrid and virulent, so as to blister and excoriate the skin when externally applied. Taken internally, in large doses, they produce the violent symptoms, which are common to other acrid narcotics.' *Bigelow's Mat. Med.* p. 177.

tal by producing an inflammation of the stomach and bowels.

Ranunculus; most species of this family are very acrid, and occasion inflammation, whether employed externally or internally.* [*See Bigelow's Medical Botany*, vol. iii. *and Barton's Collections.*]

Rhus; rhus radicans, or toxicodendron, and R. vernix, exhale a poisonous effluvium, particularly during the night and in the shade, which produces an inflammation and eruption on the skin of those who handle them or pass in their vicinity. It appears on the contrary, that in the day or in exposure to the sun, their influence is nearly destroyed. [*See Bigelow's Medical Botany*, vol. i. p. 96, *and* vol. iii. p. 19; *Barton's Collections*, *Part* 1, p. 23; *Horsfield's Experimental Dissertation; Phil.* 1798.

Ricinus communis; the seeds are very acrid, and produce inflammation in the stomach.

The history of many other irritating plants, of greater or less power, may be found in the general Treatise on Poisons; we have here limited

* 'The family of Ranunculus, with the exception of a very few species, is characterized by a violent acrimony, which resides in every part of their structure.' 'Before the introduction of cantharides, the roots of ranunculus were much used as rubefacients and blisters. *Bigelow's Mat. Med.* p. 312.

ourselves to the enumeration of the principal ones. [*See General Toxicology.*]

It may be useful to insert some of the plants native in America, which belong to this class of poisons, and which have not been mentioned by the author. [*Trans.*]

Arum triphyllum; Dragon-root; Indian turnip; Wake robin. Every part of this plant is exceedingly acrid, often acting as a caustic; its acrimony is such that when applied to the mouth or any secreting surface, it produces an inflammation of long continuance, and in its recent state cannot be administered internally with safety. The cuticle, however, generally resists its action, since the bruised root does not irritate the skin even after a long application. [*Bigelow's Medical Botany*, vol. i. p. 52. *Barton's Coll. Big. Materia Medica.*]

Dirca palustris; Moose wood; Leather wood. A considerable acrimony resides in the bark and root of this shrub, which, when exhibited internally, produce the effects proper to acrid poisons. The bark externally applied occasions inflammation and vesication of the skin. [*Bigelow's Med. Bot.* vol. ii. p. 154. *Barton's Coll.*]

Ictodes fætidus; Skunk cabbage; Dracontium fætidum. Lin. An acrid principle resides in the

root of this plant, which renders it necessary that its internal exhibition should be managed with caution. [*Big. Med. Bot.* vol. ii. p. 41.]

Juniperus Virginiana; Red cedar. This tree has acquired the name of *savin* in some parts of the country, and is nearly allied to the Juniperus Sabina of Europe in botanical characters and in sensible and medicinal properties. Its leaves produce the same effects as those of savin, whether in application to the surface, or in internal exhibition. [*Bigelow's Med. Botany*, vol. iii. p. 49.]

SECOND CLASS.

NARCOTIC OR STUPIFYING POISONS.

This class includes the following poisons:

Opium and morphia;

Hyoscyamus niger, et H. albus; Henbane; *

Hydrocyanic acid [Prussic acid] and the substances which contain it, such as the Laurocerasus, with its distilled water, oil and extract, and bitter almonds;

Lactuca virosa, strong scented wild lettuce;

Various species of the solanum; as the solanum nigrum, etc.;

Taxus baccata, Yew;

Ervum Lens, Lentil.

Effects of Narcotic Poisons.

60. When one of these poisons has been introduced into the stomach, or applied to wounds or sores, the following effects are observed: stupor, numbness, heaviness of head, propensity to sleep, which, slight at first, soon becomes

* Found native in this country.

irresistible; a sort of intoxication with a dull heavy look of the eyes; the pupil may be very much dilated, contracted, or in its natural state; furious or gay delirium; sometimes there are pain and convulsions of various degrees in different parts of the body; palsy in the limbs; pulse variable, but in general it is full and strong at the commencement of the affection; the respiration is often a little accelerated; vomiting, particularly when the poison has been applied to wounds, or given by injection; the convulsions and prostration soon increase, and death succeeds unless recourse is had to the proper means of relief.

Treatment.

[1]61. When the poison has been introduced into the stomach, the treatment should commence with the administration of four or five grains of tartar emetic dissolved in a tumblerful of water; if vomiting does not take place in fifteen minutes, twenty-four grains of sulphate of zinc [white vitriol] are dissolved in a tumbler of water and given in two doses with an interval of a quarter of

[1] This treatment is not applicable to persons poisoned by the Prussic acid.

an hour, when the first half does not operate. If these means fail, three or four grains of sulphate of copper [blue vitriol] dissolved in a tumbler of water, are given with the intention, as before, of expelling the poison upwards or downwards. The success of this remedy should be promoted by introducing the fingers into the throat, and tickling the fauces with the feathers of a quill. The emetic should not be dissolved in a large quantity of water, nor should drinks be given copiously for the purpose either of hastening the vomiting, or rendering it more gentle; so far from being useful, they will but aggravate the disease.

Our experience has proved that vinegar, lemon-juice, and other acids, so highly recommended by some physicians, are very hurtful when given previously to the expulsion of the poison by vomiting or by stool. If it is thought that the narcotic has had time to pass through the stomach and reach the bowels, it will be proper to administer the cathartic injection described page 86.

62. In case the patient has vomited freely, and all, or nearly all, the poison has been evacuated, the disease, though now less urgent, may be fatal if left to itself. It is proper then to administer every five minutes and alternately a cup of water acidulated with vinegar, lemon-juice, or

cream of tartar, and a cup of coffee prepared by pouring a quart of boiling water on half a pound of coffee, and straining through a cloth after ten minutes. The numbness is to be dissipated by assiduous friction of the legs and arms with a brush or a coarse towel. The diligent use of the coffee and acidulated water is to be continued until the patient is out of danger. Sometimes when the drowsiness is extreme, and the disease resembles an apoplectic attack, and no relief is obtained by the means indicated above, recourse is had to blood-letting in the arm, or what is preferable, in the jugular vein.

63. If the poisoning is occasioned by the application of the narcotic to a wound or sore, instead of losing time in attempts to excite vomiting, the patient should be put immediately upon the use of the coffee, acids, etc. § 62.

Opium. Opium, laudanum, paregoric, poppy-heads, so usefully employed in medicine, are more or less poisonous: opium especially is a very powerful poison. It may be recognised by the following characters: it is a solid, reddish brown on the outside, and somewhat shining within, opaque, flexible; of a peculiar heavy, nauseous smell; an acrid, bitter, warm taste; it is partially soluble in water, and from this solution ammonia throws down a precipitate which is composed principally of morphia.

Morphia. This is a vegetable alkali containing azote, to which opium owes most of its poisonous properties. It is solid, white, or nearly so, crystallisable and inodorous; at a high temperature it melts and becomes transparent, but resumes its opacity as soon as it begins to cool; it is very soluble in boiling alcohol, less so in cold alcohol, and almost insoluble in water; the alcoholic solution has a bitter taste, and restores their blue color to vegetable infusions which have been reddened by an acid: morphia acquires a blood-red color by the addition of a drop of nitric acid; the acids form with it soluble salts which may be made to afford precipitates by the addition of the infusion or the tincture of galls.

Henbane. The root of the hyoscyamus niger is sometimes confounded with the parsnip, and having been used for food, has occasioned the most serious accidents. The leaves, too, are poisonous. Tremors and the symptoms of intoxication have been known to arise in consequence merely of preparing a plaster containing a portion of this root. The other species of henbane are equally poisonous. [*See Bigelow's Medical Botany*, vol. i. p. 161.]

Prussic acid. The prussic or hydrocyanic acid is the most energetic of all known poisons; the application of a drop or two to the eye,

tongue, etc. of a strong dog, is sufficient to produce death in the space of one or two minutes. Happily the difficulty of obtaining this formidable poison renders it exceedingly rare, and little capable of serving as the instrument of crime. The Lauro-cerasus, cherry-tree laurel, water distilled from it repeatedly, its oil and extract, are also poisonous; it is the same with the bitter almonds, which are very strong scented and have a high degree of bitterness. The hydrocyanic, or prussic acid, may be recognised by its smell similar to that of bitter almonds, and by its property of furnishing a blue precipitate when it is poured into a solution of the sulphate of iron, and a few drops of the solution of potash are added.

Treatment.

64. When the acid has been taken in a concentrated state, death inevitably ensues. If the poisoning is occasioned by weak prussic acid, vomiting is to be promoted by the means prescribed § 61; the infusion of coffee, § 62, is to be administered, and three or four spoonfuls of oil of turpentine should be given in this infusion with intervals of half an hour.

Lactuca virosa and *solanum*. The wild lettuce is far from being so poisonous, as has been stated; the same is true of most species of the solanum.

THIRD CLASS.

ACRID NARCOTICS.

This class includes,

First; The mushrooms;

Second; The nux vomica, upas tieutè, false angustura, St. Ignatius's bean, upas antiar, ticuna, woorara, camphor, cocculus Indicus;

Third; Tobacco,* hemlock,* belladonna, stramonium,* foxglove, rose-bay or oleander, rue, darnel, manchineel, aconite, hellebore, and squill;

Fourth; The wines, alcohol, ether and all spirituous liquors capable of producing intoxication;

Fifth; The effluvia of flowers;

Sixth; Spurred rye.

We shall describe the effects of these poisons in the three following paragraphs.

SECTION I.

Of the Poisonous Mushrooms.

Most of the mushrooms, which are ordinarily eaten without danger, become poisonous in cer-

* Those marked with an asterisk are found in this country.

tain circumstances; while some are hurtful at all times. It is unnecessary to enumerate them particularly, as the marks, by which all poisonous mushrooms may be recognised, will be pointed out hereafter.

Effects of Poisonous Mushrooms.

65. The effects produced by these substances vary a little according to the species that may have occasioned them; but in general they may be reduced to the following: griping pains, efforts to vomit, evacuations upwards and downwards, heat in the bowels, languor, acute and almost continual pains, cramps, convulsive motions of some part of the body, insatiable thirst; pulse small, hard, tense, and frequent. In some circumstances a sort of intoxication manifests itself, a stupid delirium and drowsiness by which the patient is oppressed, until aroused by the pains and convulsions: sometimes, instead of being drowsy, the wretched individuals preserve all their intellectual faculties entire; and dreadful pains and convulsions, fainting, and cold sweats exhaust their powers, and at length bring on death. In general, the effects of mushrooms are not shown until five, seven, twelve, or twenty-four hours after they have been eaten.

Marks which should render Mushrooms suspected.

66. It is the more important to point out in a general manner the external characters of bad mushrooms, as most of those, which are eaten without inconvenience, may become dangerous when placed in certain circumstances. Unfortunately the marks, which we can point out, are not so precise as not to admit exceptions.

The mushrooms, which grow in cellars, in thick, shady, and damp woods, are generally bad; their surface is moist and more or less dirty, and their appearance revolting. Those whose smell is unpleasant, like that of radishes, are in general of bad quality. The same is true of those, whose taste, being at first sweetish, leaves a disagreeable, astringent, and styptic sensation in the mouth; and of those whose taste is very bitter and unpleasant, and whose smell is disgusting. It should however be remarked, that there are some eatable mushrooms having a smart, garlicky, or slightly acid taste. Those mushrooms should be rejected, which are filled with a milky juice, that ordinarily is acrid. According to M. Persoon, the color cannot be regarded as affording very certain characteristics; though this botanist thinks it to be established, that mushrooms

of good quality are white,[1] pale, of a clear and golden yellow, or of a claret and violet red ; this last tint is observed in the whole or only in a part of the vegetable ; but more particularly in the leaves.[2] Bad mushrooms, on the contrary, have a lemon-yellow or a blood-red color. The dark brown color of the top will not serve to distinguish the good from the bad, since it is common to both. The more white, compact, dry, and brittle is the substance of the mushroom, the less mischievous it is, provided it does not offer the unpleasant taste and smell, of which we have spoken.

Mushrooms are to be rejected which have done flowering, that is, which are fading and undergoing decomposition ; for then they lose their flavor, acquire a bad odor, and become dangerous. The presence of worms and snails upon mushrooms does not prove their good quality, as is commonly believed, for these animals are nourished quite as well upon species that are injurious to man. " Some precautions," says Persoon, " are to be observed in the method of gathering mushrooms.

[1] There is however a variety of white bulbous amanita, which is very poisonous.

[2] There are some poisonous species of agaric, the top of which is violet bordering upon purple ; but the leaves have not this color.

It is well, as far as may be possible, to collect them in dry weather, and especially after the fall of dew; to take them in their mature state, and even before the entire disappearance of the top; for when they are too ripe, their substance becomes flaccid, and putrefies, or worms are generated upon it. Instead of tearing them from the soil, it is better to cut off the footstalks near the ground; else this will insinuate itself into the pores and alveoli.

"After having chosen the healthy kinds, it is still necessary, before using them, to clear them of the leaves and tubes; the footstalk, which is ordinarily of a less delicate texture, is often cut off. As to the boleti, they ought to be cut, in order to see if they will change color and become blue, in which case it would be imprudent to eat them; then they are to be soaked in cold or lukewarm water, with just enough vinegar to whiten them; this water should be thrown away. It is said that by this management the most poisonous mushrooms may be eaten with safety. Their digestion is promoted, in the first place, by chewing them well, and by proper condiments, such as oil or butter, yolk of egg, salt, wine, and vinegar. They should not be kept long after their preparation, for they readily change, and acquire bad properties."

Treatment.

67. Experiments have proved that the most poisonous mushrooms, if cut up into little pieces and allowed to soak a long time in *vinegar*, *strong salt and water*, and *ether*, lose their poisonous properties: while the vinegar, the salted water, and the ether have dissolved all the active principles and become converted into powerful poisons. From this fact we may conclude, that in a case of poisoning by mushrooms, these liquids should *never be given until the mushroom has been evacuated either upwards or downwards;* in truth they would dissolve the poisonous part in the stomach, and thus render it more active and energetic.

As soon as the symptoms of poisoning are observed, three grains of tartar emetic are administered in a tumblerful of water; a quarter of an hour after, another glass of water, containing three grains of tartar emetic, three or four grains of *emetine* (for which a scruple of ipecacuanha, or Indian root, may be substituted), and an ounce of Glauber's salt, is given in three doses with intervals of twenty minutes. After vomiting is excited, the mushrooms, which may have reached the bowels, are to be evacuated by means of purga-

tives. A spoonful of castor oil is given every half hour; and an injection is administered, prepared by boiling two ounces of cassia [cassia fistula] and half a drachm of senna in a quart of water for fifteen minutes, and adding half an ounce of Epsom salt [sulphate of magnesia]. If an evacuation is not procured, the injection may be repeated three times. Finally, should these means fail to effect the discharge of the mushrooms, and should the disease be making progress, an ounce of tobacco must be boiled for fifteen minutes in a quart of water, and the strained liquid be given by injection; vomiting is almost always produced by the employment of this remedy.

After the poison is evacuated, the patient should take some spoonfuls of a potion composed of four ounces of the water of orange-flowers, quarter of an ounce of ether, and two ounces of simple syrup or of syrup of orange-peel.

If the disease continues to increase, and the patient suffers acute pain in the abdomen, sugared water is prescribed, or solution of gum, or flaxseed-tea, or decoction of marsh mallow [althæa officinalis]; cloths wet with these liquids are laid upon the painful parts, and a warm bath is given. If the pain does not yet abate, ten or twelve leeches are applied to the most sensible

parts of the belly, and the management is observed, which was pointed out in treating of the acrid poisons, page 95.

If it should happen that before any assistance can be rendered to the patient, he already has much fever, and swelling and pain in the belly, if the tongue is dry and the thirst extreme, and the heat of the skin, mouth, and throat burning, it will be necessary to abandon the irritating purgatives which we have recommended; and to draw blood from the arm, apply leeches to the belly, and employ fomentations and injections of flaxseed.

SECTION II.

Of the Nux vomica, Upas tieutè, St. Ignatius's Bean, False angustura, Strychnia, Brucea, Upas antiar, The American poisons, Camphor, and Cocculus indicus.

Effects of these Poisons.

68. Introduced into the stomach, or applied to wounds and sores, these poisons are rapidly absorbed, and produce an excitement of the brain or upper part of the spinal marrow; they occasion a general and convulsive stiffness; the head is thrown back, the chest expands with difficul-

ty, respiration ceases or is greatly impeded, and the patient dies of asphyxy, or suffocation: death takes place even in a few minutes, if a considerable quantity of the poison has been swallowed. None of these substances inflame the parts to which they are applied. The effects of some among them are not constant, but come in repeated fits, in the intervals of which the individual appears to be little affected.

Nux vomica. The vomic nut, which is frequently employed to destroy dogs and cats, is also poisonous to man, though the contrary has been asserted by some physicians. It should therefore be managed with caution. It owes its poisonous properties to the strychnia and brucea which it contains.

Upas tieutè. The bohon upas is the juice of a plant, a species of strychnos, native of Java, with which the savages poison their arrows, to render them fatal. It is difficult to form an idea of the rapidity, with which these poisoned arms occasion death.

St. Ignatius's bean. This fruit of the strychnos Ignatii, or Ignatia amara, is analogous to the nux vomica in its chemical composition. It owes its poisonous properties to its strychnia and brucea.

False angustura. This appears to be the bark of the strychnos colubrinum, and has occasioned fatal mistakes by being confounded with the angustura of the shops, the bark of the Bonplandia trifoliata. Its poisonous qualities are to be ascribed to the presence of the vegetable alkali, brucea.

Strychnine, or *strychnia.* Strychnia is a vegetable alkali containing azote, or nitrogen. It is a powder, without smell, of a very bitter taste, almost insoluble in water, soluble in alcohol, to which it communicates the common alkaline property of restoring their color to blue vegetable infusions that have been reddened by an acid; exposed to heat, it swells, is decomposed, and yields carbon. There are few poisonous substances possessing so much energy as strychnia has.

Brucine, or *brucea.* This is another vegetable azotic alkali, in the form of oblique prisms or foliated masses, of a white color resembling that of mother of pearl, inodorous, bitter, fusible, soluble in water, giving a green color to blue vegetable infusions, soluble in alcohol, becoming red by the addition of nitric acid; it is less poisonous than strychnia.

Upas antiar. This is the juice of the Antiaris toxicaria, a tree which grows in Java, and which is employed by the Indians to poison their ar-

rows: it is very active, when introduced into wounds.

Ticuna. The ticuna, or American poison, is an extract prepared by the Indians from the juice of certain plants, and particularly of the amyris toxifera. When it is dry it may be inhaled and applied to the eyes without danger; the vapor that rises when it is laid on burning coals, is not poisonous. It is very dangerous when it is applied to deep wounds, especially if the part of the arrow that contains it has been dipped in warm water.

Camphor. Camphor is a useful remedy in many cases, and few physicians think it to be poisonous; it is nevertheless proved that when dissolved in oil or any other fluid and given in considerable quantity, it may occasion severe accidents and even death.

Menispermum cocculus. Cocculus Indicus. The berries, and particularly the picratoxine which they contain, a vegetable alkali to which they owe their activity, are poisonous to man, to fishes, some birds, goats, crocodiles, etc.

Treatment.

69. When any one of these substances has been taken into the stomach, an emetic should be

given [*See* § 67], and the fauces irritated with the fingers or a quill, that vomiting may be produced: it next becomes necessary to counteract the asphyxy, which is the principal cause of death: for this purpose air is blown into the lungs, and the process followed which is described § 104. Some spoonfuls of a potion made of two ounces of water, two drachms of ether, two drachms of oil of turpentine, and half an ounce of sugar, should be administered internally every ten minutes.

70. When the poison has been applied to wounds, or introduced by means of arrows, these must first be extracted; the wound must be burnt with a red hot iron, and a ligature tied tightly around the limb above the wounded place; if the patient is a robust man, blood should be taken from his arm.

The potion recommended in the last paragraph, should be given; and asphyxy counteracted by inflating the lungs. [*See* § 104.] Salt and water, which is employed by the Indians, and is regarded as an antidote to these poisons, ought to be rejected from the treatment.

SECTION III.

Of Tobacco, Belladonna, Thorn-apple,* Fox-glove, Rosebay, Rue, Hemlock,* Darnel, Manchineel, Wolfsbane, Hellebore, and Spurred rye.*

Effects of these Poisons.

71. The poisons included in this section, when they are introduced into the stomach or applied to wounds, give rise to the following symptoms: agitation, pain, acute cries, a more or less gay sort of delirium, convulsive motions of the face, jaws, and limbs; the pupil of the eye is dilated; the pulse strong, frequent, and regular, or small, slow, and irregular; efforts to vomit, obstinate vomiting, discharges from the bowels, more or less acute pain in the abdomen. Sometimes, instead of great agitation, there is a kind of intoxication, great prostration, insensibility, a general trembling, and no desire to vomit.

Treatment.

72. If the individual poisoned has not vomited, tartar emetic should be given, as recommend-

* Those marked with an asterisk are found in this country.

ed § 61, in speaking of opium. If much time has passed since the swallowing of the poison, recourse must be had to the purgatives mentioned in the same paragraph. If, after evacuations have been procured upwards and downwards, the patient appears very drowsy and apoplectic, blood should be taken from the arm, or, better, from the jugular vein; then, as in the case of opium, vinegar and water is to be administered; this remedy, however, will be injurious, if given before the poison is expelled from the body. In this case twelve leeches should be applied to the belly, if the pain there is acute, and sugared water, decoction of marsh mallow, or flaxseed-tea should be given; in short the same treatment should be pursued, that was proposed in speaking of the acrid plants, § 59.

Tobacco. It is important that the effects of tobacco should be known, that the accidents it may occasion may be avoided. Intoxication and vomiting have been seen produced in children upon whose heads a liniment composed of powdered tobacco and butter had been applied. The same effects have taken place in consequence of having washed parts affected with the itch with water in which tobacco had been boiled. It is even said that an individual died in consequence of having taken into the nose too large a quantity

of snuff. The dangerous effects of this substance applied to wounds and sores, are known to all persons of careful observation. Introduced into the stomach, tobacco produces vomiting, purging, tremors, convulsions, and may even occasion death. [*See Bigelow's Med. Bot.* vol. ii. p. 171.]

Belladonna; Atropa belladonna. This is a very active poison; its fruit, when ripe, resembles a purple grape, for which it has been taken, and occasioned fatal effects. It may be distinguished by its small kidney-shaped seeds, while those of the grape are larger and pyramidal. This poison is one of those which most frequently occasion a gay delirium with an idiotic laugh.

*Thorn-apple.** The Datura stramonium is very poisonous; the most furious delirium, convulsions, palsy, tremors, and death have been seen to follow the drinking of water, in which its fruit or seeds had been boiled. [*See Bigelow's Med. Bot.* vol. i. p. 17.]

Foxglove. The powder of Digitalis purpurea, its watery and resinous extracts, and its tincture, are active poisons, even when applied to wounds and sores. These preparations excite copious

* This plant is also known in this country under the names of Apple of Peru, Devil's apple, Jamestown weed.

vomitings, which are soon followed by great prostration and by death, unless the aid is rendered that was indicated § 72.

Oleander, or *Rose bay.** It is well proved that this plant, introduced into the stomach or applied to wounds, is poisonous to man, horses, sheep, dogs, etc. It is even said that an individual has died in consequence of sleeping in a chamber in which were the flowers of the oleander. This poison produces vomiting, inflammation of the parts which it touches, and stupefaction.

Rue.† The Ruta graveolens, in large dose, occasions agitation, fever, soreness in the throat, and inflammation of the parts to which it is applied. Its essential oil is much more active.

Hemlock. The Conium maculatum is very poisonous in warm climates; and in more temperate ones, also, if gathered at its maturity. It may be easily recognised by its stalk, which is cylindrical and covered at its lower part with purplish brown or black spots.

The *Cicuta virosa* is still more active than the preceding.

Water hemlock, Fool's parsley; Œthusa cynapium is often mistaken for parsley; it may

* See Bigelow's Med. Bot. vol. i. p. 102. † Ibid.

be distinguished by the following characters: first, the upper surface of the leaves is blackish green and shining; secondly, they have no smell except when they are bruised; but when rubbed between the fingers, they emit a nauseous odor. The water hemlock is very poisonous, occasioning vomiting, intoxication or delirium, numbness in the limbs, etc.

Darnel; Lolium temulentum. Bread, in which darnel is mixed, occasions serious accidents; a universal or partial tremor, a kind of intoxication, almost constant ringing in the ears, great heaviness of the head accompanied often by pain in the forehead; there is great difficulty in swallowing and speaking; the respiration is embarrassed, the stomach is painful, and there are efforts to vomit. These symptoms are soon followed by drowsiness. Vinegar and water should be given, or lemonade, or the water of orange-flowers mixed with honey and vinegar.

Manchineel; Hippomane mancinella. The fruit of the manchineel yields a very poisonous juice, which inflames the bowels, and is employed by the savages to poison their arrows. Rain, which falls from the leaves and branches of this tree, raises blisters on the skin like boiling oil. Negroes have been known to have their hands and faces swollen and inflamed in consequence of split-

ting a branch of manchineel. It is even asserted (though this needs confirmation) that its shade produces a universal swelling of the body in those who repose in it.

Aconite; Aconitum; Monkshood, Wolfsbane. The root, the juice, and the leaves, when swallowed or applied to wounds, produce serious effects. The savages have employed the monkshood [aconitum cammarum] as a poison for their arrows.

White and *black hellebore;* Veratrum album, and Helleborus niger. The roots are very poisonous, whether introduced into the stomach, given by injection, applied to wounds, or even, sometimes, if rubbed upon the sound skin: they always occasion obstinate vomiting and great prostration.

It may be useful to insert some of the plants native in America, which belong to this class of poisons, and which have not been mentioned by the author. [*Trans.*]

Cicuta maculata; American hemlock, Snakeweed. This plant closely resembles, in its botanical character, the cicuta virosa; and many instances have occurred in various parts of the United States, of children who have died in consequence of eating its root, which they had dug

up by mistake for angelica, sweet flag root, etc. Its effects are vomiting, stupor, dilatation of the pupil, frothing at the mouth, great distress, convulsions and death. For the treatment see § 72. [*See Bigelow's Medical Botany*, vol. i. p. 125.]

Kalmia latifolia; Mountain laurel; also called Lambkill, Ivy, Calico bush, etc. According to Prof. Barton the leaves of this plant are fatal to sheep and other animals, and they are employed for the purpose of self-destruction by the Indians. Prof. Bigelow's experience proves that the leaves may be chewed, and may be taken in powder in a dose of ten or twenty grains without subsequent inconvenience; he is disposed to ascribe the noxious effects of the kalmia upon young grazing animals, to the indigestible nature of the resin, which is contained abundantly in the leaves. [*See Barton's Collections*, vol i, p. 18; *Bigelow's Med. Bot.* vol. i. p. 133.]

Lobelia inflata; Indian tobacco. Giddiness, pain in the head, tremors, nausea, and vomiting, are effects of chewing the leaves of this plant; when swallowed in undue quantity, they produce obstinate and painful vomiting, delirium, convulsions and death. [*See Bigelow's Med. Bot.* vol. i. p. 177.]

Sanguinaria Canadensis; Blood root; also called Turmeric, Puccoon, Red root, etc. The

root of this plant, when externally applied, is escharotic; taken internally it produces the effects of an acrid narcotic, irritating the fauces a considerable time after it is swallowed, and occasioning heartburn, nausea, faintness, and frequently vertigo and diminished vision, which are at length succeeded by vomiting. [*See Big. Med. Bot.* vol. i. p. 75; *and Barton's Coll.* vol. i. p. 27, and vol. ii. p. 41.]

Veratrum viride; American hellebore, Poke-root. The root of this plant has a bitter, acrid taste, which makes a durable impression on the mouth and fauces. Its poisonous effects have been known from an early period; they are those of an acrid emetic and powerful stimulant, followed by giddiness, impaired vision, prostration of strength, and diminution of the vital powers. Its action upon the system very closely resembles that of the veratrum album, the white hellebore of Europe. [*See Bigelow's Med. Bot.* vol. ii. p. 121.]

Intoxication. Wine, spirit of wine, spirituous liquors, ether, etc. taken in undue quantity occasion intoxication: the same effect may also be produced by breathing an atmosphere loaded with the vapors of spirit of wine, as, for example, of a place in which are many open vessels filled with this liquid. The symptoms of intoxi-

cation, so universally known, are almost always dissipated at the end of ten, twelve, or fifteen hours; but as it may happen otherwise, in which case a dangerous disease manifests itself, it may be useful to point out the means of counteracting it.

Three grains of tartar emetic dissolved in a tumblerful of water, should first be given; and vomiting should be promoted by draughts of warm water, and by irritating the fauces with the finger or a feather. After the patient has vomited, a spoonful of vinegar or lemon-juice in half a glass of water, should be given every ten minutes; a cathartic injection [see § 67] is to be administered, and the body must be rubbed with cloths dipped in vinegar. If, notwithstanding the employment of these means, the drowsiness continues or increases, and if the patient is robust, blood should be taken from the arm, or, what is better, by a dozen leeches from the neck.

Emanations of Flowers.

Those who are accustomed to live in rooms in which many flowers are kept, will find it difficult to believe that it would be impossible for some persons to remain a few minutes in these apartments without suffering unpleasant symptoms,

such as headach, nausea, faintness, convulsions, or asphyxy: experience, however, proves that such is the fact. The smell of the rose, the pink, and the honeysuckle, has sometimes occasioned the accidents that we have mentioned. The odor disengaged during the bruising of black hellebore and of colocynth, has been known to produce purging: and historians relate instances of great personages being poisoned by perfumed gloves, or by the fumes of torches composed of certain materials.

Treatment.

The individual must be conveyed out of the apartment in which the flowers are, and placed in a free air; vinegar should be applied to his nostrils, and he should drink sugared water. If he is in a state of asphyxy, he must be managed in the manner that will be described § 103. If convulsions are present, the antispasmodic potion described below should be administered. Take thirty drops of ether, twenty drops of laudanum, and four ounces of peppermint water or any other similar fluid; a spoonful to be given at a time.

Of Spurred Rye.

Characters. The grain of rye is subject to undergo a change which alters its form and composition, and renders it poisonous. It becomes covered with a violet bark, is bent and lengthened in the shape of a spur or horn; it is then called ergot, and the rye is said to be spurred. The grains of ergot are brittle, breaking short and making a noise like dry almonds. Reduced to powder, they have a disagreeable smell and an acrid taste like that of spoiled wheat. Bread containing spurred rye presents spots or points of a violet color; sometimes even the mass of dough has a tint of the same color.

Effects produced by a small quantity of Spurred Rye.

The following effects[1] are observed to succeed to the eating of bread, in which a small quantity of ergot is contained; the affection begins by a disagreeable sensation in the feet, a kind of pricking; severe pain in the stomach and desire

[1] These effects are copied from the description given by J. A. Srinc, who made his observations upon the epidemic which devastated Wirtemberg, A. D. 1736.

to vomit soon come on ; the hands and the head are affected ; the fingers are so forcibly contracted that the strongest man can hardly straighten them, and the joints appear dislocated. The sufferers utter acute cries, and are tortured by burning pains in the hands and feet. Heaviness of the head and apparent intoxication succeed to these pains ; the eyes become veiled by a thick mist to such a degree, sometimes, that the individuals are blinded or see objects double ; the mental faculties are deranged, mania, melancholy, or drowsiness manifest themselves, the intoxication increases, and the body is bent backward so as to form an arch ; the mouth is filled with a bloody, yellow, or greenish froth ; the tongue is often injured by the violence of the convulsions, and is sometimes so swollen as to interrupt the voice, embarrass the respiration, and produce a great salivation. These symptoms are followed by a voracious appetite, and it is rare that the patients have an aversion to food. Sometimes, though seldom, spots are observed on many parts of the body.

Effects produced by a large quantity of Spurred Rye.

When ergot has been taken in large quantity or for a very long time, the disorder commences

with a very acute pain and intolerable heat in the toes. The pain rises, gains possession of the foot, and mounts upwards on the leg. The foot soon becomes cold, pale, livid; the coldness rises upon the leg, which is very painful, while the foot has become insensible. These pains are more acute in the night than in the day. There is thirst, but the patient does not lose his appetite, and continues to perform his functions regularly. He cannot move nor support himself on his feet. Violet spots and blisters soon appear, gangrene displays itself in all its horrors and extends up to the knee. The leg falls off at the joint, and leaves to view a bright red wound which heals up readily unless the patient, being badly fed, living in cold and moisture, and sleeping in a bed infected with gangrenous matter, imbibes anew the putrid effluvia.

Treatment.

If the disorder is inconsiderable, if there is not much fever nor headach nor any convulsive movements, vinegar and water, or lemon-juice and water should be given.

If the pains, and the numbness and cold which follow them, announce the approach of the dry gangrene, an effort must be made to prevent it.

The patient should be laid in a warm and dry apartment and in a clean bed, the sheets of which should be changed frequently.

Many physicians recommend the exhibition of tartar emetic when the mouth is bitter, the tongue loaded, and the desire to vomit frequent. Experience, however, proves that this medicine increases the irritation, and may occasion a diarrhœa which is always to be dreaded. Nevertheless cases sometimes occur in which it is necessary to administer an emetic for the purpose of subduing the symptoms of which we have spoken, and ipecacuanha is to be preferred; three tumblerfuls of boiling water may be poured upon a drachm of ipecac, and after ten minutes the liquid may be strained; if the first tumblerful produces copious vomiting, the others need not to be given: the action of this emetic should be favored by draughts of warm water.

In case the patient should complain of numbness and coldness in the limbs, these should be bathed in a decoction of aromatic plants, such as lavender, rosemary, sage, etc. made a little stimulant by the addition of vinegar; on leaving the bath the foot and leg must be rubbed with the hand or a towel, and afterwards covered with folds of cloth soaked in an infusion of elder-flowers, to which has been added water of ammo-

nia [volatile alkali] in the proportion of forty or fifty drops to a pint. These compresses may also be soaked in the lie of ashes, or in the following decoction, three tumblers of which should be given to the patient internally every day. Boil for half an hour four ounces of cinchona bruised [Peruvian bark] in a quart of water; at the end of this time add half an ounce of sal ammoniac [muriate of ammonia], and half an ounce of chamomile-flowers; let it cool, and strain. A ptisan composed of an infusion of *leopard's bane* [arnica montana] or of *Virginia snakeroot* [aristolochia serpentaria], sweetened with the syrup of vinegar or with honey and vinegar [oxymel] may be given with success.

If the numbness and coldness continue, large blisters should be applied in the vicinity of the benumbed limbs; finally, if nothing can prevent the occurrence of gangrene, the following fomentation may be applied to the limbs many times in the day. Boil four ounces of burnt alum, three ounces of blue vitriol, and one ounce of common salt, in a quart of water, until it is reduced to a pint. If the gangrene has advanced so far that it becomes necessary to amputate the limb, it is proper to wait until nature has established a distinct line of separation between the dead and the living parts, which indicates the place where the operation should be performed.

Amputation ought not to be performed except when the gangrene has stopped in the middle of a limb which it has mutilated in such an irregular way, that after being healed, the sound portion would embarrass its motions ; or when the mortified parts do not separate themselves readily, but remain, and become offensive and infectious.

FOURTH CLASS.

SEPTIC OR PUTREFYING POISONS.

This class comprises the following poisons:

First, the viper, and all venomous animals, whose bite or sting is attended with more or less serious ill effects;

Second, animals which are injurious when eaten;

Third, malignant pustule, and canine madness.

SECTION I.

Of venomous Animals, whose Bite or Sting is attended with more or less serious ill Effects.

These animals are:

The viper, or asp [*vipera berus*];

Various serpents inhabiting tropical countries;

Rattle-snakes [*crotali*];

Many insects, as the scorpion, spiders, the tarantula, the bee, wasp, hornet, etc.

Effects produced by Vipers and Rattlesnakes.

73. When any part is bitten by one of these animals, an acute pain is felt in it, which soon spreads over the whole limb, and extends to the inside of the body: swelling takes place, at first firm and pale, afterwards red, livid, and, as it were, gangrenous; this increases and gradually spreads over the neighboring parts; faintness, vomiting, and convulsive movements supervene, and are sometimes followed by jaundice; the stomach is so sensible that it will not retain any thing; the pulse is frequent, small, tense, and irregular; respiration difficult; cold and copious sweats, and disturbance of the sense of sight and of the mental faculties. The blood, which at first flows from the wound, is often blackish; some time after a fetid humor issues from it; but when the swelling is great, the small vessels do not permit the blood to circulate, the skin which covers them grows cold, and the pulse can hardly be felt. When all the above symptoms have become more severe, inflammation and suppuration come on in the wounded parts; and when the abscess has acquired considerable size, the patient dies.

Fontana has asserted that the bite of the viper is never fatal to man; but this is not exactly true,

for the viper of Fontainebleau has often produced death.

External Treatment of the Bite of Vipers and Serpents.

74. A moderately tight ligature should first be placed immediately above the wound, and this ligature should not be of pack-thread nor of any thing so small as to irritate the skin; it should not be kept on for a long time, because it would increase the livid color, and favor the disposition to gangrene. The wound must be permitted to bleed, and must be squeezed gently to press out the poison. If it is possible, the part bitten should be soaked for some time in warm water, then squeezed gently and wrapped in wet linen cloths.

If the affection is severe, the swelling great, the pains very acute, etc., the ligature may be omitted, for its effect would be to retard the circulation of the blood; and care must be taken to avoid making incisions and numerous scarifications, which often increase the evils. The wound should be cauterized with the hot iron, potash, nitrate of silver, butter of antimony, etc.

Caustics.

75. *Hot Iron.* A piece of iron larger than the wound should be heated to whiteness, and this be burnt with it. The hotter may be the iron, the less will be the pain, and success the more certain.

Nitrate of Silver. The lunar caustic is bruised or reduced to powder, and applied over the whole surface of the wound; it is covered with lint and secured by a tight bandage; at the end of five or six hours the whole is removed.

Potash. This caustic is managed in the same way as the preceding.

Butter of Antimony. Next to the actual cautery or hot iron, this caustic is to be preferred to all; it is applied in the following way; make a brush by attaching some lint to a small piece of wood, or take a camels-hair pencil; dip this in the butter of antimony [chloride of antimony] and apply it over the whole surface of the wound: this operation should be repeated many times, care being taken to press most strongly on those parts which it is designed to cauterize to the greatest degree: a plug of lint is then put into the wound, lint is laid over it, and a bandage is applied.

Oil of Vitriol. This caustic is employed in the same manner as the preceding.

Ammoniacal Caustic. Half an ounce of purified tallow* and half an ounce of olive oil are heated gently in a flask having a large mouth; an ounce of volatile alkali is added gradually, and the mixture is stirred until it becomes solid. The salve thus made is spread upon a cloth one or two lines in thickness, and applied to the wound: it is covered with a bandage, and is allowed to remain on from twenty to thirty minutes.

Soap-boiler's Lie. It is necessary not only that the wound be washed with this lie, but also covered with lint impregnated with it; this is kept on by means of a bandage, and its application is renewed at the end of four or five hours.

Quicklime and Soap. A paste is made of an ounce of soft soap, and an equal quantity of powdered quicklime; this is applied in the same manner as the ammoniacal caustic.

Moxa. The moxa is a cylinder of cloth filled with cotton; this is placed upon the wound, the upper end is inflamed, and it is blown upon by the mouth or by bellows until it is entirely consumed.

* Tallow candle, for example.

Boiling Oil. The wound may be cauterized with boiling oil; but it is important to make the application through a funnel, the mouth of which is pressed firmly upon the parts surrounding the wound, so as to prevent the cauterization of the neighboring skin.

If, after the employment of one of these caustics, the symptoms do not diminish, the wound is enlarged with a bistoury, and cauterized again, more deeply.

Other external Treatment.

A mixture of one part volatile alkali and two parts olive oil, is applied to the swollen parts in the vicinity of the wound. When the principal symptoms are much diminished, the caustic is removed and replaced by a cloth soaked in olive oil, and the limb is rubbed from time to time with the same oil, to which are added a few drops of volatile alkali [water of ammonia]. Finally, in a short time the wound ceases to be dangerous, and ought to be healed with lint like simple wounds.

Internal Treatment.

76. The object of this treatment is to promote perspiration and sleep. Immediately after the

accident, and while the external treatment is proceeding, the patient should take a tumbler of the infusion of elder-flowers [sambucus nigra], containing six or eight drops of the volatile alkali [water of ammonia]; this draught should be repeated every two hours; a glass of Madeira or Sherry wine may also be administered; the patient should be well covered in bed, and if perspiration takes place, the access of cold must be carefully guarded against. Ipecacuanha [Indian root] or tartar emetic must be exhibited according to the directions § 61. If bilious vomitings occur, or if jaundice manifests itself, or if gangrene makes any progress, the patient should take the potion of cinchona described on page 134, in speaking of spurred rye. But if the severity of the disease diminishes, and the individual begins to be convalescent, no solid food should be given for some days, and he should be restricted to light soups and broths in small quantity.

77. If the bite occasions only a slight affection, if the swelling is inconsiderable, and there are no desires to vomit nor any swooning, it will be sufficient to separate the edges of the wound carefully, and to put in a drop or two of volatile alkali, and to cover it with a compress wet with the same alkali, which is to be kept on by a bandage: the limb should be gently rubbed with

warm oil, and wrapped in cloths soaked in the same.

78. Every two hours the patient should take a cup of elder-flower or chamomile tea, with the addition of five or six drops of volatile alkali.

Remedy which seems very efficacious.

Many parts of America produce a plant called *guaco* [*Eupatorium satureiæfolium* of Lamarck, *Mikania guaco* of Willdenow], which the Indians employ as an antidote to the venom of the numerous serpents that infest their country. They swallow one or two spoonfuls of the juice of this plant, and inoculate themselves with it in five or six places on the sides of the breast and between the fingers: after this they can handle the most venomous serpents without danger; and if by chance they are bitten, the disease disappears as soon as they have rubbed the wound with the leaves of the guaco.

Success of Arsenic in this Affection.

Repeated experiments and observations tend to prove that the following potion is very useful in the bites of which we are speaking.

Boil together one grain of white arsenic, one grain of potash, and three spoonfuls of water for a quarter of an hour: then allow the liquid to cool, and add an ounce and half of peppermint water, ten drops of tincture of opium, and a half ounce of lemon-juice. This potion is given all at once, and repeated every half hour for four successive hours, if the disorder is severe; a cathartic injection, similar to that described § 58, is administered, and the painful parts are rubbed with the following liniment;

Take	Oil of turpentine	half an ounce,
"	Volatile alkali .	half an ounce,
"	Olive oil . .	an ounce and a half.

Of the Scorpion.

79. The sting of the scorpions of Europe is not attended with much danger; but in tropical countries and during the warm weather of the summer, it may give rise to dangerous consequences. It produces a red spot about one third of an inch in diameter, which becomes larger and black in the centre; the black spot is the mark of the sting: the symptoms which follow, are pain, inflammation of greater or less severity, swelling, and sometimes pustules, shivering, fever, numbness, vomiting, hiccough, tremors, etc.

Treatment.

80. The remedies are to be administered internally, which were recommended for the bite of the viper, § 78. A bread and milk poultice, or one made of the meal of flaxseed and a decoction of the root of the marsh mallow [althæa officinalis] should be applied externally; in all cases, these poultices should be moistened with ten or twelve drops of volatile alkali [water of ammonia.]

Of the Bee, the Drone, the Wasp, the Tarantula, the Spider, etc.

81. In general in our climate, the sting of these insects only occasions some pain, a little swelling, and slight fever. It is sufficient to rub the part with a liniment prepared by shaking together in a phial two spoonfuls of sweet oil and one spoonful of volatile alkali. The drink may be given internally, which was mentioned § 78, in speaking of the viper.

If the insect has been feeding upon venomous plants, or bodies of animals dead by pestilential disorders or on any other infectious matter, or if it belongs to very warm climates, the symptoms may be much more severe, more or less similar to those arising from the bite of the viper (§ 73),

and may occasion death; in which case it becomes necessary to cauterize the wound, and to follow the treatment recommended under the article *Viper*.

82. When the injury has been inflicted by a bee, or a wasp, and a little tumor has arisen with a hard and white centre, it is necessary, besides giving the potions recommended in speaking of the viper, to endeavor to remove the sting with the point of a needle, or a small pair of tweezers: sometimes its extraction can be effected only by cutting with scissors all that is outside of the wound. The sting being withdrawn, the place should be washed with cold water or salt and water (which is still better), and the volatile liniment, mentioned § 75, be applied and covered by a compress soaked in salted water. The employment of this liniment is equally proper when the sting has not been extracted.

SECTION II.

Of Animals which may become deleterious, when eaten.

83. The dolphin, the conger eel, the scomber or king-fish, the clupæa thryssa,* some other

* This is a fish about a foot in length, allied to the herring, shad, etc. I am ignorant of its English name.

fishes, and muscles, may, under certain circumstances, occasion ill effects of greater or less severity: some of them have been known to produce death. While experience proves that these animals are sometimes poisonous, it has also demonstrated that they are far from being so always and to all persons. An individual who might be able to eat them with impunity in this climate, would be liable to suffer great inconvenience from their use in hot countries, especially in the summer. Muscles, which may be eaten almost universally without any evil consequences, will sometimes produce serious accidents.

Effects of Poisonous Fishes.

The dolphin has sometimes occasioned a violent headach, efforts to vomit, red spots upon the skin, an intolerable itching, and a stricture in the chest.

The conger eel has produced griping pains, vomiting, purging, swoons, convulsive motions and palsy of the limbs. The person poisoned complains of a coppery taste in the mouth, and of a sense of laceration in the fauces.

The clupæa thryssa has given rise to dreadful convulsions, inflammation of the stomach, and speedy death.

Effects of Muscles.

These have sometimes produced irregular shiverings, acute pain in the stomach and head, oppression and difficulty in breathing, general disquiet, redness and swelling of the face and eyelids, severe itching over every part of the body, an eruption of *wheals* similar to that produced by the stinging with nettles, which appears especially on the shoulder, convulsions, and sometimes a sudden coryza, which would lead one to think that the patient had a violent cold in the head. Finally, in some very rare cases, these symptoms have been followed by death.

Treatment.

84. An emetic should first be given: [*see* § 61.] If much time has elapsed since the fish was eaten, it is proper to administer a purge, and a cathartic injection; [*see* § 58.] Immediately after the operation of these remedies, the patient should take lumps of sugar with twenty or twenty-five drops of ether on them, and some spoonfuls of an antispasmodic draught composed of four ounces of peppermint water, an ounce of sugar, thirty drops of sulphuric ether, and twen-

ty drops of laudanum: the ordinary drink may be water, containing two spoonfuls of vinegar or the juice of a lemon in a tumbler. If the pain in the stomach remains, and is acute, and if any fever is present, it is proper to apply ten or twelve leeches to the belly.

SECTION III.

Of the malignant Pustule, the Carbuncle, etc.

85. Butchers, tanners, farriers, farmers, and shepherds, and all whose occupation leads them to handle the wool or the skin of animals who have died in consequence of a developement of a *putrefying* or *septic* virus within them, are liable to contract the *malignant pustule*, if they do not take care to wash immediately and diligently all the parts which have been touched by these corrupted matters. Water mixed with vinegar, ash-lie, and especially water with lime diffused in it, are the fluids proper to be used as washes.

The disease, which we have mentioned, is chiefly manifested in warm and moist seasons, in animals that live in low and marshy places, and that feed in pastures which after being wet have been rapidly dried by the sun, or on fodder that is covered with slime and loaded with putrid in-

sects. Under such circumstances these animals suffer a putrid fever, or other acute diseases; malignant boils appear upon their skin; their blood and flesh are, as it were, rotten, and they cannot be touched without communicating the carbuncle. It is proper, however, to observe, that, in certain circumstances, the malignant pustule is not contagious.

Symptoms of the Malignant Pustule.

86. Two varieties of the malignant pustule have been observed; viz., the *prominent*, and the *depressed*.

The prominent.[1] *First stage.* A troublesome, though slight itching, on a circumscribed spot, without redness, or heat, or tension of the skin: a smart, but transient, sense of pricking; little by little the cuticle is raised and forms a watery blister of the size of a grain of millet, which soon increases and becomes of a brownish color; the itching returns from time to time, and the patient scratches and breaks the blister which covers the focus of the disease; one or two drops of a reddish serum escape, and the itching ceases for some hours.

[1] The description of this variety has been given with the greatest exactness by Professor Chaussier, and by M. Enaux; and their account is here copied.

Second stage. A small, flat, circumscribed, hard, and moveable tumor is formed, ordinarily being of the figure and size of a lentil. The color of the skin is not yet altered; only in the centre and under the primitive blister it is, generally, livid and gangrenous; the itching becomes more severe and frequent, and is accompanied by a feeling of heát, smarting, and a biting pain; then the texture of the skin swells, and its surface appears tense and shining; the *rete mucosum* swells and forms around the central point a kind of ring more or less large and elevated, which is sometimes pale, sometimes red, or livid, sometimes orange or shaded with various colors; it is always superficial and covered with small insulated blisters, which soon unite together, and are full of a reddish serum.

The central tubercle, which forms the primitive tumor, changes its color, and becomes brownish, very hard, and insensible: it is now a gangrenous point which suddenly takes on a new increase. This stage, which ordinarily lasts some hours, at times proceeds very slowly and continues for many days.

Third stage. The disease is not limited by the thickness of the skin; it gradually penetrates the cellular tissue; and now its progress is rapid; the centre of the tumor becomes harder, deeper,

and entirely black ; the gangrenous point spreads by degrees, and the circle of blisters and vesicles which surrounds it, always announces and precedes the progress of the mortification. This circle is gradually enlarged ; sometimes it is raised above the level of the skin, and forms a kind of pad around the primitive nucleus of the disorder, which makes it appear sunken, and produces a second tumor that is firm, but is less hard than the first, and is still sensible. Sometimes a considerable swelling arises at the same time, which is often very widely spread ; this is elastic and shining, and produces a feeling of tightness and stiffness in the part: in the mean time the gangrene is advancing in the cellular texture. In a strong and robust patient, who has been regularly treated from the beginning of the disorder, this third stage continues four or five days: the progress of the disease is arrested, the swelling gradually loses that tension and emphysema, or puffiness, which characterized the irritation ; the circle of vesicles assumes a more lively color, and the character of healthy inflammation ; the patient feels a pleasant warmth and frequent pulsations pervading it ; the gangrene is stopped ; a red circle surrounds the swelling ; and a copious suppuration is established, which relieves the swollen cellular tissue, detaches the slough or

dead portion, and thus terminates the disease. But in persons of feeble health, the affection makes rapid progress, and soon becomes general.

Fourth stage. When the disease has attacked the mucous body, the skin, and the cellular tissue in succession, the pulse becomes concentrated, and more or less frequent and irregular; the skin is dry, the tongue parched and brown; the heat of the surface appears to be moderate, while the patient is consumed by an internal flame; he often asks for drink, and his thirst is unquenchable; the prostration of his powers is constant, and he is oppressed by weakness, desires to vomit, and by pains in the stomach, which are sometimes acute; in certain cases the respiration is short, and interrupted by sobs and sighs; the urine is in small quantity and thick, and deposites a brick dust sediment; sometimes, though rarely, diarrhœa, colliquative sweats, and hemorrhages supervene. When the disease draws nigh to its fatal termination, the mind is bewildered, and the patient falls into an obscure delirium; all the local symptoms are increased in intensity; the swelling becomes enormous, and while his body diffuses the most fetid smell, he perishes in a state of mortification.

Depressed variety. This begins with an itching of considerable severity, which continues for

some days. On the second day a small black point, similar to the central spot of a flea-bite, is produced. On the next day circumscribed and regular blisters, together with pain, heat, and a feeling of numbness in that part of the limb seated below the eruption, manifest themselves; the patient labors under faintness and desires to vomit; the pulse is concentrated, or small. The blisters proceed to burst, and a reddish, serous fluid issues from them; beneath, is seen a portion of skin which is black, as if it were charred, and which does not adhere strongly to the subjacent parts; there is not, in general, much tumefaction. On the fifth day, the distress and faintness become great and frequent; on the sixth day the patient is delirious, the local swelling and gangrene are strongly marked, and death at last brings relief. This variety of the malignant pustule is more dangerous than the preceding.

Treatment of the Malignant Pustule.

87. In the treatment of the malignant pustule, the object is to circumscribe within the narrowest limits possible that little tumor, the focus of gangrene, which has a strong tendency to propagate itself to the surrounding parts: for this purpose scarifications, and especially caustics, are

employed with the best success; internal remedies are not always necessary.

Scarifications. Scarifications, or little incisions made with a lancet or a bistoury, are not sufficient to the cure of the disease; but they are of service in favoring the action of other remedies. They should not be too superficial, nor too deep; they ought to penetrate all the mortified part, and not to pass beyond the dead flesh.

Caustics. The butter of antimony, oil of vitriol, lunar caustic, and the hot iron, are those among the caustic substances, which ought to be employed. But as the employment of them, as well as of scarifications, must be modified according to circumstances, we will detail the treatment that is appropriate to the different cases which may present themselves.

Case first. If the disease is still in its first stage [*see* page 150], the blister is cut and the fluid wiped away; a plug about as large as a pea, is then made by rolling a little lint between the fingers; this is impregnated with butter of antimony, oil of vitriol, etc., is laid upon the centre of the blister, and is kept there by covering it with dry lint and fixing it by means of sticking-plaster and a suitable bandage.

After five or six hours the dressings are removed, and a dry and hard eschar is found; upon this is laid a pledget of lint covered with a digestive ointment, the composition of which will be given in § 89. The next day the dressing is renewed with the same digestive, if there is no hardness, nor a circle of blisters, nor any acute pain; for it is evident that the caustic has arrested the progress of the disorder. This dressing is repeated every day until the eschar falls off; when this is separated, the sore is dressed with dry lint, which has previously been dipped in a weak solution of alum, in lime-water, etc.

Case second. If, after the application of the caustic, a hard swelling and a circle of blisters are formed around the eschar, recourse is had to *scarifications.* If the swelling becomes considerable, the eschar is opened with the point of a bistoury, and is divided into several parts; the knife is carried a little further into the dying flesh, care being taken not to cut that which is alive; some portions of the eschar are removed by the scissors, and the fluid resting beneath it is absorbed by lint; finally the bottom of the wound and all its edges are touched with a small brush of camel's hair or of ravelled linen, armed with some caustic fluid [*see* § 75]; small plugs of lint wet with the same caustic are laid in it,

and the whole is covered with dry lint, compresses, and a bandage. After some hours these are removed, and the wound is dressed with the digestive § 89. On the following days the sore is washed with a mixture of salt water and brandy, or with *Lanfranc's lotion* [*see* § 90] ; it is then dressed with the digestive ointment, and compresses wet with a resolvent decoction § 91 are applied. These dressings are renewed every twelve hours, until a line of demarcation is perceived between the living and the dead flesh: lastly, if necessary, the internal remedies are employed, of which we shall speak § 88.

Case third. If the disease has advanced to the stage in which the slough, which forms the centre of the tumor, is hard like leather, and the swelling very considerable, the whole infected nucleus should be divided, numerous incisions be made, and it may be proper to remove all the fragments of the eschar which can impede the action of the caustic ; this is to be applied in the manner already described. The first dressing consists in laying upon the eschar a pledget of lint covered with the stimulating digestive § 89, applying over this a piece of linen besmeared with the camphorated liniment § 92, and covering the limb with compresses wet with the antiputrid decoction § 93. These dressings

should be renewed every twelve hours, until the eschar is separated; then the sore becomes simple, and is to be dressed with lint either dry, or moistened with some healing fluid.

Case fourth. If the malignant pustule is in its fourth stage, and the eschar is dry and compact, and appearances announce that the surrounding parts are running into the moist gangrene, the treatment should commence with scarifications, made with great care lest a hemorrhage may be excited, which would exhaust the patient's strength: afterwards caustic is applied, and the hydrochloric [or muriatic] acid (which is employed in the same way as is the butter of antimony § 75), or the nitrate of silver, is to be preferred. This is applied to every point of the surface of the sore, and particularly to those which have been scarified, and which are most chiefly affected. Next a sort of poultice is applied, made of powdered Peruvian bark and spirit of camphor; and this is covered by a piece of soft cloth on which is spread the camphorated liniment § 92, and by compresses dipped in the antiputrid decoction § 93. This poultice ought to be renewed every six hours, until the healthy appearance of the flesh announces the separation of the eschar; at which time, it is to be changed for a dressing of a pledget of lint covered with stimulating

digestive § 89, or dipped in Lanfranc's lotion § 90. Should the eschar be soft and putrid, it will be better to omit the camphorated spirit, to continue the application of the bark, and to make the lotions with the antiputrid decoction; recourse must also be had to the internal treatment detailed below.

If the gangrene continues to advance, the scarifications and the cauterizations of the dead parts by the hydrochloric acid, are repeated, while the chief reliance is placed on the employment of internal remedies. If the eschar is detached, the sore becomes simple, and is to be dressed with lint.

Internal Treatment.

88. Regulation of diet, and draughts of vinegar and water, or of lemonade, are ordinarily sufficient in the first and second stages of the disease.

In the third stage, if the pulse is small and fluttering, and there is subsultus tendinum, and if the swelling is hard and compact, an opiate is administered, made of cinchona [Peruvian bark] and camphor [*see* § 94]; while, if the pulse is large, the swelling extensive, soft, puffy, and serous, and the eschar moist and soft, it is proper

to give the acidulated decoction of cinchona § 95. The patient must submit to the strictest regimen; he ought to take nothing but oatmeal-gruel, rice-water, barley-water, toast-water, etc.: old wine and good beer, diluted with equal quantities of water, and lemonade, are also useful.

Two grains of tartarized antimony in a tumbler of water should be administered, if the patient makes efforts to vomit, if his tongue is white, and covered with a thick, *soft*, and *moist* coat, and if the urine deposites a yellowish sediment; care must be had not to give the emetic if the tongue is *dry*, parched, and red, or covered with a *black* and *scaly crust*, and if the urine is crude, that is, of a light color and clear. Under these latter circumstances the desire to vomit is owing to irritation, and recourse should be had immediately to the antiputrid and acidulated decoction § 95.

PREPARATIONS EMPLOYED IN THE CURE OF THE MALIGNANT PUSTULE.

89. *Stimulating Digestive.*

Take of Honey clarified . . one ounce,
" Verdigris [subacetate of copper] in fine powder two drachms,
" Powdered myrrh . one drachm,
" The yolk of an egg.

These are intimately mixed in a copper mortar, and make an ointment which hardens the eschar and stimulates the flesh. It may be rendered more active by increasing the proportion of verdigris; and when the eschar is spongy and moist, two drachms of the spirit of turpentine are sometimes added.

90. *Lanfranc's Lotion.*

Take of White wine diluted with an equal quantity of water . eighteen ounces,
" Orpiment [yellow sulphuret of arsenic] two drachms,
" Verdigris . . . four drachms,
" Myrrh . . . . forty-eight grains,
" Aloes . . . . forty-eight grains.

The solid substances are reduced to powder in a mortar, and the wine is added little by little.

91. *Resolvent Decoction.*

Boil in a quart of water one or two handfuls of some one of the following substances; elder-flowers, chamomile-flowers; stalks and leaves of peppermint, spearmint, etc.; to this add half a pint of camphorated spirit [tincture of camphor],

and two ounces of common salt or of sulphate of potash.

92. *Camphorated Liniment.*

Take of Camphor . . . one ounce,
" The yolks of two eggs.
Beat them together in a mortar ; add two ounces of clarified honey, and mix them intimately.

93. *Antiputrid Decoction.*

Take of Cinchona . . one ounce,
" Tincture of camphor . four ounces,
" Common salt . . . half an ounce.
Boil the cinchona in a pint of water, and then add the two other substances.

94. *Opiate.*

Take of Cinchona, in fine powder, one ounce,
" Camphor . . . . one drachm,
" Syrup of lemon,
" The yolk of an egg.
Mix the camphor with the yolk, and add slowly the cinchona and enough of the syrup of lemon to reduce the whole to a soft solid ; divide the mass into eight parts, one of which is to be taken every three hours.

95. *Acidulated Decoction of Cinchona.*

Boil an ounce of bruised cinchona in a pint and half of water, until this is reduced to a pint; strain through a cloth; add two ounces of syrup of lemon and a few drops of sulphuric acid [oil of vitriol]; it is necessary to add the acid drop by drop, until the liquid is pleasantly sour. A tumblerful of this drink is given every three hours, and even more often if the symptoms of putridity are strongly marked.

SECTION IV.

Bite of Mad Animals.

96. It is completely demonstrated that man, the horse, mules, asses, cattle, hogs, and still oftener foxes, wolves, cats, and dogs, become *mad, without having been bitten.* Many causes may produce this dreadful disease; but it is observed most frequently in intemperate summers and severe winters.

Madness is almost always communicated by the bite of an animal affected with it; though it may be occasioned by the application of the saliva or froth of a mad animal to the lips or to a wound.

Signs of Madness in Dogs.

According to the observations of MM. Enaux and Chaussier, a dog, when first affected with madness, is ill, lazy, less lively than is usual; he shuns the light; lies in a corner; does not bark, but growls incessantly at strangers and without apparent cause; he rejects food and drink; and his gait is weak and shuffling like that of a person almost asleep. After two or three days, he flies in fear from every object, staggers in his walk, and frequently falls. His hair bristles, his eye is fierce, fixed, and bright; his head is kept low, the mouth is open and full of froth, the tongue hangs out; and his tail is held between his legs. He has a dread of water, and this fluid seems to aggravate his sufferings; from time to time he has an access of rage, and attempts to bite every object that presents itself, even his master: the light and bright colors increase his fury. At the end of thirty or forty hours he dies in convulsions.

It is evident that a dog ought to be killed, or at least securely confined, the first moment that signs of madness manifest themselves.

The carcase becomes putrid very speedily, and diffuses an infectious odor: it is important that it

should not be left in the open air, lest it may be eaten by hungry animals, which may thus be infected with the disease. It ought to be buried in a deep hole; and the walls within which he was confined, and the instruments employed in feeding him, should be washed with lime and water. Whoever touches the body should take care to wash his hands in vinegar.

Treatment of Madness.

97. A person bitten by a mad animal seldom suffers the symptoms of madness until the thirtieth or fortieth day. Succour, however, should be administered immediately after the accident.

First, the person should be stripped, and his clothes be put into water, in order to destroy all risk of communicating the disorder by the saliva of the dog.

Secondly, if the bite is *recent*, the wound should be allowed to bleed, and should be squeezed on all sides to promote the flow of blood; then it is to be washed with water, or, what is still better, salt and water, or soap-suds. If the bite is small or deep, it must be enlarged by a bistoury and pressed by the fingers; this operation is unnecessary if the cuticle only is raised. It is proper to observe that the wounds often appear

to be superficial, when the poison has penetrated deeply.

Thirdly, the wound must be washed; and, for the purpose of irritating it and increasing the flow of blood, it will be proper to use a very coarse towel, and sometimes, to apply a cupping-glass.

Fourthly, the wounds and even the scratches must be cauterized with some one of the caustics pointed out § 75; the butter of antimony, the hot iron, or oil of vitriol should be preferred to others. The cauterization should be deep and carefully made; if it is slight, it will not be sufficient to prevent the disease, and no danger is to be apprehended from cauterizing too much. When the wounds are numerous, it is necessary to cauterize them in succession, beginning with those on the head and face, and leaving the interval of a day between the several applications of the caustic.

Fifthly, six or seven hours after this operation, a large blistering plaster, the composition of which is given § 100, should be applied over the eschar. It should be removed twelve hours afterwards, and the raised cuticle be cut with the point of a knife; the surface is to be dressed twice a day with the leaf of a beet or cabbage besmeared with butter or the cooling cerate

§ 101, or with a cloth covered with bees-wax and oil.

Sixthly, when the eschar is detached, which takes place from the fifth to the eighth day, the sore should be brought to heal and skin over, if it is perceived that the cauterization has been carried deeper than the wound made by the teeth of the animal; should this not be the case, the caustic must be applied anew; and when the eschar falls, suppuration must be maintained for forty or fifty days, by putting into the sore a pea, or a bean, or, what is better, a small piece of orris-root or of gentian, and by dressing with the vesicating salve § 100.

Necessary Precautions.

98. If the wound is on the head, all the hair should be shorn off, in order that all the bitten parts may be seen and cauterized. If a swelling and inflammation of the scalp are produced by the cauterization, emollient and resolvent fomentations must be employed, and the sore be dressed simply.

Wounds of the lips, cheeks, and eyelids, ought to be cauterized very deeply, and suppuration be maintained for a long time. The application of caustic to the eyelids requires some care; they

ought to be raised and separated from the eye, and the edges of the bite be burned with the caustic laid on a small brush or pencil. If the froth of the saliva of the animal has touched the ball of the eye, it is necessary to pass the pencil armed with caustic lightly over it: the only inconvenience that will follow, will be a little inflammation, and a more or less considerable flow of tears; and to relieve these, the eye may be washed with water, in which flaxseed, or the root of mallow [althæa officinalis] or gum, has been boiled, and to which are added a few drops of laudanum. If the wound is in the mouth, this should be washed with vinegar and water, and afterwards cauterized with the hot iron; for liquid caustics will mix with the saliva, and thus be applied to sound parts of greater or less importance. When the bite is near an artery, and the pulsation of this may be seen, or may be felt by the finger laid upon the wound, the surface only must be touched lightly with the butter of antimony on a pencil; thus the artery may be avoided, and the danger of hemorrhage, which might otherwise attend the separation of the eschar, need not to be apprehended. But even this slight application of the caustic will be hazardous, if the artery, instead of being covered by some portion of muscle or of cellular tissue, is

laid bare; in this case, the only application which can be made, is that of powdered cantharides or of some acrid ointment.

If the wound is *not recent* and is entirely healed, and if it should be ascertained that the animal was mad, it is *necessary to open the wound without delay by means of a bistoury or pointed knife, to cauterize it, and excite it to suppuration.* [Enaux and Chaussier].

We are indebted to Doctor Marochetti for many important observations, which we take this occasion to communicate. "After the bite of a mad animal, one or more pustules of various size are seen to arise at the sides of the frenum or bridle of the tongue, and upon the lateral parts of the lower surface of that organ. The ordinary size of these pustules is about that of a lentil or of a millet-seed; touched with a probe, they give the sensation of a fluctuation: the time of their appearance cannot be exactly fixed; ordinarily they show themselves from the third to the ninth day after the bite, though sometimes they cannot be seen until the twentieth or even the thirty-fourth day. If the virus, which these pustules contain, is not destroyed within twenty-four hours, it is absorbed into the system, and the symptoms of madness burst forth. The lower part of the tongue of a man who has been bitten

should be carefully examined, therefore, and the examination be repeated many times in the day for six weeks : if in this time the pustules do not show themselves, we may be assured that the person has not been infected by the virus. If the pustules do appear, they must be opened and cauterized freely and completely ; for an insufficient burning is worse than useless. Nevertheless, it may happen that the pustules, of which we are treating, do not arise, either because the virus was completely destroyed when the bite was cauterized with the hot iron, or because the animal's poison was exhausted at the moment of his biting." [*Moniteur of August* 16, 1824.]

While we wait for experience to decide the exactness of these observations, we deem it proper to insist upon the necessity of cauterizing the wounds made by rabid animals, recommending at the same time and equally the cauterization of the sublingual pustules shortly after their appearance. There would be no inconvenience in making use, as of accessory means, of gargles made of a decoction of broom [genista], and of the tops of this plant administered in a ptisan or in powder, as has been recommended by M. Marochetti.

The Employment of Chlorine.

M. Brugnatelli has related many facts which tend to prove that *chlorine* [oxymuriatic acid] applied to the bites of rabid animals, prevents the occurrence of madness. Long before, Cluzel had announced that the same remedy, taken internally, had saved many persons who were bitten by a mad wolf. Until experience has fully decided on the worth of this remedy, it is of the highest importance to continue to cauterize the wounds, according to the preceding directions.

Internal Treatment of the Bite of Rabid Animals.

99. During the first days, perspiration is to be promoted by means of the drink mentioned § 76; when the wound is greatly inflamed or very painful, a decoction of mallow or of flaxseed, or Dover's powder, may be substituted. The patient should be bled if the pulse is hard and full. Tartarized antimony and purgatives are administered if the stomach is loaded, and the tongue covered with a yellow coat, and the mouth is clammy. Mild food, that is easy of digestion, and moderate exercise are to be prescribed. The regimen should be more strict if the patient is feverish.

PREPARATIONS EMPLOYED IN THE TREATMENT OF MADNESS.

100. *Blistering Plaster.*

Take of Yellow wax four ounces,
" Turpentine . six drachms,
" Olive oil . one ounce and a quarter.

Melt them together over a gentle fire; then withdraw the mass, and when it begins to cool, add
of Cantharides, finely powdered, three ounces,
" Mastich . . . . . two drachms.

In the place of this composite plaster, one of the following may be substituted; first, mix three drachms of *cantharides* with an ounce of *diachylon*, or lead plaster [emplastrum plumbi]: secondly, reduce six drachms of cantharides to fine powder, and incorporate it into a thick paste made of the soft of bread and vinegar; spread this on a piece of cloth.

Blistering Salve.

Mix of Cantharides finely powdered . . . . . half a drachm,
" Simple ointment, or basilicum . . . . one ounce.

101. *Cooling Cerate.*

Melt by a gentle fire,

Of White wax	one ounce,
" Olive oil	two ounces,
" Spermaceti	two ounces.

*Dover's Powder.**

Take of Sulphate of potash . . . four parts,
" Nitrate of potash . . . four parts.
Reduce them to fine powder, and expose to heat in a crucible until they are melted; pour the fluid into an iron mortar, and as soon as the mass is cooled, add of Opium in fine powder one part,
" Ipecacuanha . . one part,
" Liquorice root . . one part.
Reduce the whole to a fine powder. Every evening from twelve to twenty-four grains may be given in honey or molasses.

Treatment of Madness in Beasts.

The bite of a mad animal produces in cattle, sheep, and horses the same symptoms which it

* Its more simple preparation is as follows;

Take of Ipecacuanha, in powder } . . . each one part,
" Opium, }
" Sulphate of potash, . . . eight parts.
Reduce them to a fine powder.

does in man ; but these proceed with greater rapidity.

If the wound is in the tail or the ear, the part should be cut off, and the stump be cauterized with a hot iron ; afterwards it should be dressed with the digestive ointment described below.

If the bite has been suffered in a part which cannot be removed, the hair must be cut off, the wounds be washed, enlarged with a bistoury and deeply cauterized, and then dressed with the digestive ointment ; the sores should be stimulated from time to time with powder of cantharides, or with caustic potash, and not be allowed to heal for some weeks.

The animal ought to be kept separate from others ; and the person who dresses him should remember to wash his hands with soap, or vinegar and water. It is equally necessary after the death of the animal, to take care not to skin him, for fear of catching the disease.

Terebinthinate Digestive Ointment.

Mix of Turpentine . . . . . two ounces,
" Olive oil . . . . . two ounces,
" Two yolks of eggs.

When it is wished to promote suppuration, a half drachm of caustic potash in powder may be added.

ASPHYXIES.*

The following asphyxies will be treated of;

First, Asphyxy by the vapor of charcoal:

Second; Asphyxy by the vapor of limekilns, and of vats in which wine, or beer, or other liquid, is fermenting: Asphyxy of marshes and of coal-mines:

Third; Asphyxy of privies, sewers, and drains:

Fourth; Asphyxy by want of respirable air:

Fifth; Asphyxy by submersion, or drowning:

Sixth; Asphyxy by strangulation, or hanging:

Seventh; Asphyxy by cold:

Eighth; " by heat:

Ninth; Asphyxy of new-born children.

SECTION I.

Asphyxy by the Vapor of Charcoal.

102. *Symptoms.* Persons suffocated by the vapor of charcoal feel a great heaviness of the head,

* By "Asphyxy" is understood a suspension of the pulse and respiration; or "suspended animation." [α priv. $\sigma\phi\upsilon\xi\iota\varsigma$, the pulse.]

intolerable ringing in the ears, great disposition to sleep, a diminution of strength and its inevitable prostration. To these symptoms are added disorder of vision, severe headach, great difficulty of respiration, and violent pulsations of the heart, which are soon followed by the suspension of the respiration and circulation: the organs of sense do not perform their functions, the sensibility is destroyed, the prostration is extreme, and the want of motion is complete, so that the person seems dead: the limbs are sometimes flexible, sometimes stiff and twisted; the heat is natural; the face is sometimes red, or purple, and sometimes it is pale and livid: in some cases the excrement and urine are discharged involuntarily. It often happens that only a part of the symptoms above enumerated are to be observed.

103. *Treatment.* This commences by exposing the person suffocated freely to the open air, without fear of the cold, which can never injure him; he should be undressed and laid on his back, with his head and breast a little elevated in order to facilitate respiration.

Secondly; The placing of the patient in a warm bed, and the injecting of tobacco-smoke by the anus, are to be particularly avoided.

Thirdly; Vinegar diluted with water, or water and lemon-juice, should be administered, and at

the same time cold vinegar be sprinkled upon the body, particularly upon the breast and face; the body may be rubbed with the same liquid, or with spirit of camphor, or Cologne water, or any other spirituous liquid. At the end of three or four minutes, the parts that have been wetted, should be dried with hot towels; and two or three minutes after, the sprinklings and frictions with cold vinegar be re-commenced. These means ought to be persevered in for a long time.

Fourthly; The soles of the feet, the palms of the hands, and the whole extent of the backbone, ought to be rubbed with a hard brush.

Fifthly; An injection of cold water containing one third of its quantity of vinegar, should be administered; and after the lapse of some minutes, a second, consisting of cold water, two or three ounces of common salt, and an ounce of Epsom salt [sulphate of magnesia].

Sixthly; Sulphur-matches should be lighted and moved to and fro under the nose, in order to irritate its interior; or the volatile alkali, harts-horn, may be applied to the nostrils, taking care not to hold the bottle containing it too long under the nose. With the same view, a small roll of paper or the feathers of a quill, may be moved about gently within the nostrils.

Seventhly ; The lungs should be inflated with air by a process which will be described hereafter.

Eighthly ; If, notwithstanding the diligent employment of these means, the person suffocated continues oppressed with heavy sleep, if he preserves the heat of his body, if his face is red, the lips swollen, and the eyes projecting, blood should be drawn from the foot, or, what is still better, from the jugular vein. This is much preferable to tartar emetic, which has sometimes been employed, and which is more injurious than useful.

Ninthly ; When the patient is completely restored to life, he should be laid in a warm bed, placed in a chamber, the windows of which are open, and *all persons not necessarily enguged in rendering him service*, should be carefully excluded. Then he should take small quantities of some generous wine, as Sherry or Madeira ; or some spoonfuls of the antispasmodic draught, page 148.

Tenthly ; Emetics must not be employed, except when the person suffocated, having recovered his consciousness, feels a desire to vomit, or a heaviness at the stomach ; and even then it is infinitely better to have recourse to cathartic and irritating injections made with common salt and the sulphate of magnesia [Epsom salt].

Eleventhly; It is necessary to be very *prompt* in rendering the aid of which we have spoken, and *to persevere* in its application for a long time, even *when the individual seems to be dead.* We are sometimes obliged to continue the use of these means for five or six hours, before the patient is rescued from the state of apparent death in which he lay. Above all it is necessary to insist upon the inflation of the lungs.

Process of introducing Air into the Lungs.

104. The frequent necessity of inflating the lungs in cases of asphyxy, has given rise to the invention of many means of accomplishing that object; they will be described here, beginning with those which are to be preferred.

I. The operator presses down the base of the tongue with the fore-finger of the left hand, and introduces into the larynx the smaller extremity of the *laryngean tube*, invented by Prof. Chaussier, [1] taking care to make a light pressure in or-

[1] This is a conical tube, of silver or copper, seven or eight inches in length, and somewhat similar to a catheter. One end is large enough to receive the nose of a pair of bellows or the neck of a bladder, or it may be put into the mouth of the operator; the other end which is to enter the larynx, is smaller, flattened, and pierced by two oblong holes At the distance of about an inch and a quarter from this extremity, the instrument has a

der to fix the piece of agaric or leather upon the opening of the larynx; he then takes into his own mouth the larger end of the tube, and by suction draws up the phlegm and foreign matter that may be in the bronchia; lastly he adapts to this same end either a pair of bellows, or a bladder filled with air, or his mouth, and injects air little by little, and by jets, so as to imitate the natural breathing: at the same time, frictions should be sedulously made on the breast and abdomen with a piece of flannel.

II. If this instrument cannot be procured, the lungs may be inflated by introducing the nose of a pair of bellows into one nostril, and blowing while we keep the other nostril closed. It would be still better, if a catheter is at hand, to introduce it through the nose, and carry one end down as far as the larynx, and adapt the bellows to the other.

III. If it is found impossible to effect the inflation by the processes above described, the operator applies his mouth to that of the patient, whose nostrils are closed at the same time,

rounded curve, and here is placed transversely a small plate, or guard, pierced with many holes, which serve for the attachment of a little piece of soft and thick leather: by means of this, the orifice of the larynx may be exactly closed, and the air thrown in must necessarily pass into the lungs.

and blows in the air. M. Foderé thinks these last means of introducing air into the lungs to be preferable to all others. The use however of the laryngean tube is to be preferred, as it introduces purer air, in larger quantity, and with greater facility.

IV. Incisions into the windpipe, recommended by many, should be avoided in most cases: according to the excellent advice of M. Foderé, recourse should not be had to them, except when after repeated trials the air cannot be pushed into the bronchia either by the mouth, or nose; an event which sometimes happens, when the epiglottis is so closely applied to the larynx, that it is impossible to raise it by pulling the tongue forwards and pressing down its base.

SECTION II.

Asphyxy by Lime-kilns, by Wine-vats, and Beer-vats, etc. Asphyxy of Marshes and Coalmines.

105. The symptoms of these kinds of asphyxy, and the means of cure, are the same as those of which we have spoken, when treating of asphyxy by the vapor of charcoal. [*See* § 102 and 103].

SECTION III.

Asphyxy of Privies, Drains, and Sewers.

106. The asphyxy, which forms the subject of this article, is most frequently produced by the *hydrosulphuric acid gas* [sulphuretted hydrogen]; and this gas, even when largely diluted with air, is a very strong poison.

Symptoms. When the affection is slight, the patient feels a disquiet, desire to vomit, convulsive motions in all parts of the body, and especially in the muscles of the breast and jaws; the skin is cold; the respiration free, but irregular; the pulse oppressed.

107. When the disease is more severe, the suffocated person is deprived of consciousness, feeling, and motion; the body is cold, the lips and the face purple; a bloody froth issues from the mouth; the eyes are shut and dull, and the pupil dilated and immovable; the pulse is small and frequent, the beating of the heart is irregular and tumultuous; the respiration is short, difficult, and, as it were, convulsive: the limbs are relaxed. To this state succeeds sometimes a convulsive agitation, more or less severe.

In a still more severe state of the disease, the muscles are contracted for a short time, and these

contractions alternate with convulsive motions, in which the trunk of the body is bent backwards. The patient appears to suffer acute pain, and utters cries similar to the roars of a bull; the skin, the respiration, the pulsation of the heart, the face, lips, mouth, and eyes, are in the condition described § 107.

Treatment. First; The first succor to be rendered to persons suffocated in privies, etc., consists in exposure to the open air, sprinklings with cold vinegar and water, and frictions with a stiff brush. Under the head of "asphyxy by the vapor of charcoal," the method of applying this aid is detailed § 103.

Secondly; If chlorine [oxymuriatic acid gas] can be procured, it should be passed to and fro under the nose in a bottle; but care must be taken not to irritate the lungs by continuing its application too long. This remedy seems to be especially useful, when it is promptly applied.

Thirdly; If, as often happens, the patient has swallowed some of the water contained in the privy or vault, he must be made to vomit as soon as possible by giving him a glassful of sweet oil, or, what is still better, two grains of tartarized antimony [tartar emetic], or twenty-four grains of ipecacuanha, as is ordered in § 61.

Fourthly; When these remedies are ineffectual, and the heart beats irregularly and tumultuously, blood should be drawn from the arm in a quantity proportioned to the strength of the individual; and there needs to be no hesitation about letting blood again, some time after, if the first bleeding has produced a favorable effect.

Fifthly; The nervous disorder, the spasms, convulsions, etc. should be quieted by the cold bath, and the use of an antispasmodic draught § 84; after the bath, the patient should be laid in a warm bed, and the frictions over his backbone be continued.

Sixthly; Lastly, if, notwithstanding the diligent employment of these means, the patient should lie deprived of consciousness, of sensibility, and motion, sinapisms and blisters must be applied to the feet.

SECTION IV.

Asphyxy from want of Respirable Air.

108. When many persons have remained for a long time in an apartment, a theatre, or any other place, which is not ventilated, asphyxy is produced not only because all the air proper for respiration has been consumed, but also because,

during their respiration, carbonic acid gas [fixed air], which acts as a strong poison upon the system, is generated.

Symptoms. Persons in this situation labor under a copious and continual sweat, accompanied by an intolerable thirst, and followed by severe pain in the chest, difficulty of respiration, suffocation, and ardent fever; they lose their strength, and fall into a profound drowsiness, which quickly introduces death, if aid is not speedily rendered.

Treatment. The treatment of this kind of asphyxy is the same with that, which has been detailed § 103, in speaking of asphyxy by the vapor of charcoal.

SECTION V.

Asphyxy by Submersion or Drowning.

109. Since experience has fully proved that a person may lie under water for a longer or shorter time without loss of life, it becomes proper to administer aid to the drowned *as promptly as is possible, and in cases which seem to be desperate.* It is dangerous to lose a moment, and M. Portal advises to commence the treatment in the boat into which the individual is taken from

the water, on the shore, or in the nearest convenient place. To this place the patient should be conveyed on a hand barrow, or a carriage of some sort, laid upon straw or a mattress, on his right side, with his head uncovered and a little elevated. Should these means of conveyance not be ready, two men may lay him upon their arms, or set him upon their hands joined together.

Treatment. First; Suspending the drowned person by the feet, must be carefully avoided; this practice, which was formerly employed with the intention of evacuating the water that might be found in the stomach and breast, is useless and dangerous. Equal care should be taken not to shake the patient violently for the purpose of recalling him to life; this operation has often proved fatal.

Secondly; While an assistant cuts the wet clothes of the patient and strips him, he should be laid on his right side, in a bed that is low and moderately warm, and raised a little more towards the head than at the feet: his head should be inclined a little forwards, and the forehead supported on the hand of an attendant, while the mouth is opened and the fingers introduced in order to clear it of water, phlegm, or any other substance that may obstruct respiration.

Thirdly; Every part of the body should be examined for the purpose of ascertaining that the individual has not received any mortal wound, for in this case all aid would be unavailing; the means of restoring life, however, must not be abandoned until the existence of such an injury is most completely established.

Fourthly; Lighted sulphur-matches, or the volatile alkali [salt of hartshorn] may be moved to and fro under the nose, in order to stimulate the interior of that organ.

Fifthly; During the employment of these means, another assistant should be occupied in communicating warmth to the patient. *The body should be warmed slowly;* and for this purpose a bladder containing warm water is laid upon the pit of the stomach, and wool or hot bricks are applied to the soles of the feet, to the armpits and the groins; bags filled with hot ashes, or a heated flat-iron or warming-pan, are passed over the body; gentle pressure is made alternately on the breast and belly; the whole body is diligently rubbed with a dry brush, a piece of flannel, or the hand. Afterwards, the frictions may be made with flannel dipped in spirit of camphor, etc.

The utility of these last frictions in the asphyxy of which we are treating, is so well established by experience, that it is difficult to con-

ceive that M. Foderé has forbidden them, and given as a reason, that they produce cold instead of heat. It is true that liquids containing alcohol produce a sensation of cold, when they are left for some time on the surface of the body; but it is altogether different when they are employed under the form of frictions. Frictions are used as much for the purpose of warming the body as for that of producing an excitement of the skin: and when made with alcohol they fulfil this double indication better than dry frictions.

Sixthly; The lips and inside of the nose should be tickled with a feather or some other light substance.

Seventhly; The lungs should be inflated by one of the processes described § 104.

Eighthly; An injection should be administered, made of water containing four ounces of salt, or of water three parts and vinegar one part.

Ninthly; *Injections of tobacco, and the introduction of tobacco-smoke into the anus, must be strictly avoided;* these remedies, recommended by some authors, are useless, offer no advantage over those proposed here, and may aggravate the existing evils.

Tenthly; If the drowned person does not recover, little pieces of starch, of cork, or of paper, may be burned upon the pit of his stomach, the thighs and arms.

Eleventhly; If he begins to recover and is able to swallow, a spoonful of spirit of camphor or of Cologne water diluted with two parts of water, may be given every five minutes. *But care must be taken not to force the patient to drink, while he has much difficulty in swallowing.*

Twelfthly; If the individual, instead of being recalled to life by the diligent use of these means, remains without consciousness, with the face red, purple, or black, the eyes bright, and the limbs warm and flexible, blood should be taken from the foot, or, what is better, from the jugular vein; blood should also be drawn if the individual is of a plethoric constitution, or presents marks of contusion or fracture on the head. But blood-letting must be avoided, if the body is cold and the limbs are stiff.

Thirteenthly; If the drinks, which have been taken, give rise to efforts to vomit, if the tongue is foul and the mouth clammy, two or three grains of tartarized antimony should be administered, § 61, particularly if the accident happened soon after a meal. If, on the contrary, the remedies operate by stool, warm wine ought to be given.

Fourteenthly; The drowned person should not be abandoned, until it is made certain that he is dead. The means of distinguishing real death

from apparent death will be detailed hereafter. *Let it be remembered that often eight or ten hours are hardly sufficient for the recovery of the patient.*

SECTION VI.

Asphyxy by Strangulation or Hanging.

110. In the restoration of persons who have been hanged, the means must be employed, which were proposed in the last chapter as proper for the drowned. It is to be remarked, however, that,

First; It is not necessary to apply heat to the body, unless it has been suspended for a long time in the open air, or in a cold place:

Secondly; It is necessary to cut the cord, and untie the knot:

Thirdly; Letting blood in the foot and especially in the jugular vein, is much more necessary than in cases of drowning.

SECTION VII.

Asphyxy by Heat.

111. It sometimes happens that animation is suspended in consequence of remaining too long in a warm place. In this case it is necessary,

First; To carry the individual to a cool place:

Secondly; To take off his clothes, if it is not very cold; in which case, his clothes should be loosened and all strings or bandages cut, that might impede the circulation of the blood:

Thirdly; To administer a mixture of vinegar and water, or lemonade:

Fourthly; To give an injection of salt and water, § 103:

Fifthly; To apply six, eight, or ten leeches to the temples, if the disorder increases, or does not diminish:

Sixthly; To draw blood from the foot, or, what is better, to open the jugular vein, if the respiration and pulsation of the heart are completely suspended:

Seventhly; To follow the directions given in treating of asphyxy by the vapor of charcoal, § 103.

SECTION VIII.

Asphyxy by Cold.

112. When an individual is for a long time subjected to the action of cold, he feels a great and general drowsiness, a sort of intoxication; he quickly falls asleep, loses his consciousness,

and lies in a state of asphyxy and apparent death. Sometimes it happens that he recovers his health without aid; but more frequently the termination is fatal.

First; If he is at a considerable distance from a place where assistance may be rendered, he should be immediately conveyed thither, with his body wrapped in a blanket, and his head uncovered.

Secondly; He should be stripped and *plunged into snow*, with which also he should be rubbed gently, the frictions being directed from the trunk to the extremities: some minutes after, he may be rubbed with cloths dipped in iced water, the temperature of which may gradually be raised to tepid: in short, *the object should be to warm the body, not suddenly by exposure to the direct heat of a fire, but slowly and gradually.*

Thirdly; If snow or ice cannot be procured, the body should be immersed in a bath of cold water which is very slowly heated by the addition of water gradually changed from cold to tepid; the frictions should be continued as in the last paragraph, and water be sprinkled over the face.

Fourthly; The lips and inside of the nose should be irritated by a feather or some other light substance.

Fifthly; Air must be forced into the lungs by one of the processes already detailed § 104.

Sixthly; Volatile alkali or some other irritant mentioned on page 177, should be applied to the nose.

Seventhly; When the body begins to grow warm, and the limbs are no longer stiff, the patient should be laid in *a dry bed*, *not warmed*, and be rubbed with a dry brush.

Eighthly; The irritating injections directed on the 177th page, are to be administered.

Ninthly; As soon as the patient can swallow, he should drink vinegar and water, peppermint-water, beef-tea, or weak wine and water.

Tenthly; No solid food is to be allowed until some hours after the complete re-establishment of health.

Frozen Limbs.

113. Persons whose limbs are frozen or nearly frozen, should be treated in the same way as are those in whom animation is suspended by cold, except that it is necessary to immerse in the bath only those parts that are affected, to which also the frictions should be confined. Orange-flower water or peppermint water, containing six or eight drops of volatile alkali in each glass, may be administered internally.

Means of restoring Life to Infants born in a State of apparent Death.

114. Infants born without giving any signs of life, may be in a state either of asphyxy or apoplexy: the distinction between these two states is of the highest importance, since the treatment that is proper in one, would be injurious in the other.

SECTION IX.

Asphyxy of new-born Children.

Causes. The asphyxy of new-born infants may be owing to a laborious labor with considerable loss of blood, to the delicacy of the child, and to compression of the umbilical cord, whence it is much more frequent in cases of delivery by the feet.

Signs. The infant, who, according to an expression of Baudelocque, may be regarded as not having any blood, is pale, wan or purple; his flesh is flabby, the limbs flexible and without motion; the pulsations of his heart and of the umbilical cord are imperceptible; he does not breathe, and seems to be dead.

Treatment. However hopeless the condition of the child may seem to be, there should be no

delay in commencing the employment of the following means of restoring him to life: indeed, he ought not to be abandoned until the signs of putrefaction are very manifest.

First. The umbilical cord [navel-string] must be carefully kept uncut, especially if there is no considerable bleeding, if the placenta [afterbirth] has not begun to be detached, and if the cord shows any slight pulsation.

Secondly. The infant should be laid upon his side, with his head a little raised, and the face exposed to the air; the rest of the body should be wrapped in flannel or a woollen cloth. Care must be taken not to pull the cord.

Thirdly. The mouth and nostrils must be examined for the purpose of seeing if they contain any phlegm or clots of blood which may obstruct the passage of air into the lungs: in this case, the fingers, the feathers of a quill, or a brush made of lint, dipped in salt and water, should be introduced and gently moved about, always in one direction, so as to detach and remove whatever may prevent the entrance of the air.

Fourthly. Inflation of the lungs must be practised, as is directed § 104.

Fifthly. Frictions must be made on the back and soles of the feet with a soft brush; and on other parts of the body, with cloths dipped in

warm wine: the umbilical cord, breast, and belly may be pressed gently.

Sixthly. A small clyster made of tepid water and vinegar, or a few grains of salt, should be injected.

Seventhly. If these means are unavailing, and the infant does not begin to breathe, he should be immersed up to the armpits in a bath heated to 88 or 98 degrees.

Eighthly. Pinching the skin, suction of the breasts, and the application of cupping-glasses, may be employed prudently.

Ninthly. The use of powerful irritants, such as volatile alkali, the essence of vinegar, etc. must be avoided.

Tenthly. These means should be administered with great perseverance, intermitting them at times, and varying them in every way.

If the placenta, or afterbirth, is detached, and if the umbilical cord has ceased to beat, this may be cut, and the child removed to a distance from its mother, where the assistance can be rendered more conveniently.

Apoplexy of new-born Children.

115. *The Causes* which may produce apoplexy in new-born infants are a laborious labor, com-

pression of the head by the pelvis or the forceps, and compression of the neck by the umbilical cord, which may be twisted around it.

Signs. The infant does not give any sign of life; is in a profound stupor and without motion; the face is black, livid, and swollen; the skin is deeply colored, the breast loaded with blood. Sometimes a soft tumor, variable in size, and filled with blood or serous fluid, is observed on the head.

Treatment. First. The umbilical cord must be cut as soon as possible, and the flow of blood from it be promoted by rubbing the breast and belly with warm cloths, and holding the head raised.

Secondly. If the division of the cord has not produced a copious bleeding, one or two leeches should be applied behind the ears. Or should it be impossible to procure leeches, a vein of the head or of the neck must be opened by a lancet. If there is a swelling on the head, it should be laid open with a bistoury, and when it is reduced the flow of blood from it should be encouraged by the application of compresses dipped in warm water.

Thirdly. The infant should be immersed in a tepid bath, which may be made more exciting by the addition of some stimulant liquid, as wine,

brandy, vinegar, etc. While he is in the bath, his back should be rubbed with hot cloths.

Fourthly. The lungs must be inflated; [*see* § 104.]

Fifthly. The stimulants mentioned under the article Asphyxy, § 114, sect. 5 and 6, may also be employed in cases of apoplexy.

Signs of real Death, and Precautions, by Means of which the Confusion of the Living with the Dead may be avoided.

116. It has frequently happened that persons considered to be dead, have returned to life at the moment when they were about to be opened or buried, or after they had been laid in the coffin, or deposited in the tomb. And there is no doubt that many of them have died only in consequence of being buried with too much precipitation. This fatal mistake arises from the difficulty which attends the distinction of real death from apparent death; and therefore it is important carefully to examine the value of the signs or marks, which have been regarded as proper for the establishment of this distinction.

First. We think that the stiffness of the corpse is one of the most certain signs of death; but as this state of the body sometimes occurs during

life, it becomes important to establish the difference which exists between the rigidity of death and that which may take place in the living individual.

A. The body of a *frozen person* may be stiff, while he is not dead, and is capable of being restored to life. Besides that our judgment is assisted in this case by our knowledge that the body has been exposed to the action of great cold, this stiffness may be distinguished from the rigidity of a corpse by its being universal; for the skin, the breasts, the abdomen, and all the organs of the body, are as hard as the muscles, while in the stiffness of a corpse the muscles alone offer any great resistance. When the finger is pressed strongly upon the skin of a frozen man, a small hollow is produced, which disappears very slowly. If we change the position of a frozen limb, a slight noise is heard, which is made by the breaking of the little icicles contained in the part that is moved.

B. The rigidity, which has been denominated *convulsive*, and which sometimes presents itself in severe *nervous disorders*, may be easily distinguished. When a limb is made stiff by tetanus, convulsions, etc., the greatest difficulty exists in moving it; and when its position has been changed, it returns to it again, as soon as

the force is withdrawn. But in a corpse, the limb does not return to the position, from which it has been moved.

C. The stiffness observed in some cases of *syncope, or fainting*, needs not to be confounded with the stiffness of death. For in syncope, it takes place immediately after the commencement of the disorder, and the breast and belly retain their heat; while in a corpse, it is not observed until some time after death, and when the heat of the body is no longer sensible.

D. Persons in a state of *asphyxy* present a rigidity which may be easily distinguished. Suppose a person to have been in this state for ten or fifteen minutes, and his limbs to be stiff, this stiffness cannot be the result of death, since the bodies of those who die under asphyxy in the space of a few minutes, do not become stiff for many hours: for the rigidity of a corpse is slow in coming on, in proportion as the death has been sudden and quick. If the body of a person suffocated by impure air or by strangulation is cold, it is certain that more than twelve hours have passed since the first appearance of the asphyxy, for in these cases the heat is preserved for twelve hours at least; and there can be no doubt that the rigidity is the consequence of death, for it is impossible to live in a state of asphyxy more than twelve hours.

Secondly. If from a cause, which cannot always be foreseen, the individual, who is thought to be dead a long time, is cold and soft, while he ought to present a certain degree of rigidity, his interment should be deferred. Before coming to the decision that real death has taken place, one of the muscles of the arm or the thigh should be laid bare, and electrified by means of the Voltaic battery, or Galvanism. Should it give no sign of contraction, life is extinguished; if it does, the person is not dead, and all the means of restoring the action of the heart and lungs, must be applied, which have been directed § 103.

Thirdly. The most certain sign of death is the *well-marked putrefaction of the body.* But is it prudent to wait for the complete developement of this state, before proceeding to the interment? This practice is inadmissible because dangerous to the friends and the officials. It has been thought that the commencement of putrefaction is sufficient as a test, and that the body ought to be buried as soon as this mark begins to show itself. And this opinion certainly is correct; *but we deem it proper to inculcate, that it is not the province of every person to decide whether putrefaction has, or has not commenced; the physician alone is able to establish the fact.* We have frequently seen persons, who were believed to be

dead, who exhaled an offensive smell, had purple spots on the skin, and other marks of putrefaction, recover by the aid of appropriate remedies. Sometimes these appearances arise from the mortification and rotting of a limb.

Fourthly. A particular state of the face, of which Hippocrates has given the following description, has been regarded as a sign of real death: forehead wrinkled and dry; eyes sunk; nose pointed, surrounded by a purple or blackish circle; temples shrunk, hollow; ears drawn back; lips hanging down; cheeks sunk; chin wrinkled, hard; color of the skin leaden or purplish; hair of the nostrils and eyelashes covered with a yellowish white powder. Taken alone, this sign is of no value, for it is sometimes seen in persons for hours or days before their death, and on the other hand it is frequently wanting in those whose death has been sudden.

Fifthly. The softness, sinking, flaccidity and dimming of the eyes, have been considered by some celebrated physicians to be a certain sign of real death. If it is true that the eyes are generally darkened and sunk after death, it is equally true that this effect is not always to be observed, that it sometimes occurs during the life of the individual, and, consequently, that it is not sufficient, when taken alone, to establish the reality of death.

Sixthly. The absence of the circulation, and the impossibility of feeling the pulsations of the heart and arteries, have been considered to be infallible means of judging if the individual is dead; but it is fully proved that life may continue many hours while there is not any perceptible motion of these parts; it sometimes happens, even, that it is very difficult to determine whether the heart and pulse are beating, or are not, either because the pulsations are very feeble, or because the heart and arteries are misplaced. This sign, therefore, is among the least valuable.

Seventhly. It has been thought that the individual must be considered to be dead, *when he has ceased to breathe;* and in order to try the exercise of this function, resort has been had to various expedients; some present the flame of a candle or a little carded wool to the mouth and nostrils, and they judge that the person does not breathe if these are not agitated by the air; some draw the same conclusion, when a mirror placed before the mouth is not tarnished; and there are others who advise to place a tumbler full of water a little above the pit of the stomach (the patient being laid upon his back,) believing that, if the water is shaken, the respiration still continues. Experience has proved that none of these signs give sufficient evidence of death.

Eighthly. It has been thought that the individual is dead when he is cold, and that, if he still preserves his warmth, he is alive. This is the most worthless of all the signs, for drowned men, who may be restored to life, and many other living persons are ordinarily very cold, while those suffocated, etc. preserve their warmth long after death.

Ninthly. Cuts, burns, blisters, and cupping-glasses, which are sometimes employed as tests, must be considered as secondary means, since experience proves that in certain disorders the sensibility is so destroyed that the patients do not feel any pain from these, even many days after their application. These tests, therefore, can be regarded as valuable, only when they furnish positive results, that is, when the person believed to be dead feels the pain and expresses his sensation, and consequently gives some sign of life: in the contrary case, it is not safe to assert that the individual is dead.

CONCLUSION.

The result of the preceding remarks is,

First; That no one of the signs enumerated, taken alone, (except well-marked putrefaction)

is sufficient to justify the assertion that a person is dead :

Secondly ; That death must be regarded as real in an individual who presents all these signs.

OF BURNS.

Burns which are superficial and of small Extent.

117. The burned part should first be plunged into cold water containing extract of lead [liquid subacetate of lead] and quicklime; this mixture is prepared by diffusing a drachm of quicklime in a quart of water, and adding two spoonfuls of extract of lead. This liquid ought to be renewed as soon as it becomes warm, and the part affected should remain immersed in it for many hours in succession. When by this means the pain is almost quieted, the part is to be withdrawn from this local bath, and wrapped in compresses dipped in the same liquid, which must be kept wet. If extract of lead cannot be procured, lime-water, cold water, or, what is better, ice, may be employed.

If the form of the burned part renders it impossible to immerse it in the local bath, it should be wetted with the same liquid, by means of a sponge. Daily experience confirms the efficacy of the remedy which we recommend, and proves that i may be employed with the greatest suc-

cess a quarter or half of an hour after the accident happened, even when the blisters have arisen.

When the irritation is diminished, and the pain is removed, though not until some days have elapsed, the blisters ought to be opened; two or three holes may be made with the point of a pin in the lowest part of the blister, and the fluid allowed to flow out. Some inconvenience would result both from not opening the blisters and from opening them too soon; for in the first case the accumulation of the serous fluid might occasion ulcers, and in the second the air would irritate the surface of the wound too much and would increase the pain.

All the parts which have lost the cuticle, and those beneath the blisters, ought to be covered with soft linen or fine blotting paper, besmeared with simple cerate, or beeswax and oil; over these should be laid compresses dipped in extract of lead and water.

The cerate of subacetate of lead, or Goulard's cerate, may be substituted for the simple cerate, if the sensibility of the part is much diminished by the accident; otherwise it would be injurious by increasing the pain.

When the pain is so acute that the weight of the linen compresses is insupportable, a liniment

may be prepared by mixing equal parts of lime-water and olive oil, or linseed oil, and by means of a brush a thin layer of it may be applied to the parts which have lost their cuticle: suppuration soon comes on, and the wound must be dressed twice a day; the dressing should consist of linen with simple cerate; and holes should be made in them in order to give issue to the pus.

118. If, notwithstanding the employment of the extract of lead, inflammation arises in the burned part, it is necessary to cover it with a poultice prepared by boiling together the root of the marsh-mallow [althæa officinalis] and two or three poppy-heads, and adding as much of the soft of bread as will reduce it to a convenient consistence.

Superficial Burns of great Extent.

119. A burn, which is superficial and occupies a great extent of surface, is dangerous and may be fatal: the pain is intense, the inflammation great, and the fever is violent. It is necessary to let blood once or twice, to forbid all kinds of food, not excepting broth, and confine the patient to flaxseed-tea, decoction of marsh-mallow root, or sugar and water. Every half hour he should take a spoonful of the antispasmodic draught mentioned § 84.

Besides the internal remedies, all the burned parts must be covered with soft blotting paper besmeared with simple cerate, or with the cerate of lead, which is better if the patient can bear it: but if the pain is very severe, the emollients and relaxing applications must be employed, such as decoction of flaxseed, of the root of the marsh-mallow, etc.

If the burn has been made by gun-powder, the treatment must commence by picking out the grains of powder with the point of a needle.

Deep Burns.

120. If the burn is deep and severe, so that there are eschars, or sloughs, or parts, as it were, charred, and surrounded with an inflammatory circle more or less red, the emollient poultices mentioned § 118, and the simple cerate ought to be applied, and their application continued until the eschar has fallen. When any parts of this are loose and detached, they may be cut off with scissors.

The sore which is formed by the separation of the gangrenous parts, should be treated as a simple sore, and dressed once or twice a day with lint, all the ointments so much employed by the ancient surgeons being abandoned; towards the

last, when cicatrization or healing is almost effected, it is proper to surround the edges of the sore with simple cerate, or beeswax and oil, spread upon linen, by which means their softness is maintained, and the adhesion of the lint and the too great irritation of the sore which might impede its healing, are avoided.

APPENDIX.

MEDICO-LEGAL CONSIDERATIONS UPON POISONING.

§ I. Of Poisons;
§ II. Of Poisoning;
§ III. Of opening the Corpse;
§ IV. Of the Analysis;
§ V. Of the Report.

Treatment of the Effects of Lightning.

Prevention and Treatment of the Effects of drinking Cold Water.

Means of rendering Assistance to Persons Drowning.

MEDICO-LEGAL CONSIDERATIONS UPON POISONING.

Section I. *Of Poisons.*

Every substance which, being received into the stomach or applied to the surface of the body, tends to alter or destroy the powers of life, is called a poison. This definition does not include some substances which may, however, be deleterious in certain quantities or in certain conditions of the individual to whom they are administered. A poison may become a salutary remedy, if the person upon whom it is employed is in a state of disease, if the indication has been properly answered, and if the dose in which it is exhibited is adapted to the pathological condition of the patient. It will, on the contrary, act injuriously, if the person is in health, if the indication is badly fulfilled, and if the dose is too large.

The degree of activity with which a poison acts upon the entire system of the animal economy, is in direct proportion to the sensibility of the individual who is subjected to its influence. Thus large doses of corrosive sublimate given to hedge-hogs, dormice, monkeys, etc. only produce a temporary disturbance and derangement of the digestive organs, and the animals recover by degrees the perfect exercise of their functions.* Among the Laplanders, the pre-

* In a note upon Hyoscyamus niger, Medical Botany, vol. i, Prof. Bigelow gives the following case as having happened under his own

parations of arsenic and many acrid vegetable poisons hardly excite muscular contractions in the intestinal canal, and do not produce any organic derangement whatever. The Hungarians swallow cantharides in doses which would produce upon us the most fatal effects. Habit is capable of modifying the susceptibility which belongs to the human system; and without recurring to the example of the famous king of Pontus, we see the oriental nations making an immoderate use of opium, etc.

The conclusion to be drawn from these facts is, that the term *poison* is merely relative; that the action of poisonous substances bears specific relations to the sensibility that belongs to the different kinds of animals, and to the organs of each kind in particular; that the vitality is governed by laws which we cannot measure with precision, and that it is modified according to species, climate, etc.

The poisons which most frequently serve as instruments of crime, are few in number and easy of recognition: they may be divided into two classes, mineral and vegetable; in the first, are found arsenic and some mercurial preparations; opium and its different preparations are almost the only poisons that are included in the second class.

Accidents caused by other kinds of poison, are almost always attributable to mistake or inadvertence.

observation. "A large eagle, intended for a cabinet of natural history, was subjected to a variety of experiments, with a view to destroy him without injuring his plumage. A number of mineral poisons were successively given him without effect, even in large doses. At length a drachm of corrosive sublimate of mercury was enclosed in a small fish and given him to eat. After swallowing the whole of this, he continued, to appearance, perfectly well and free from inconvenience. The next day an equal quantity of arsenic was given him without any better success. So that in the end, the refractory bird was obliged to be put to death by mechanical means."

Section II. *Of Poisoning.*

Poisoning, which of all cases that occur in legal medicine is the most delicate, complicated, and difficultly proved, may be voluntary, when it is called suicide; or it may be the result of negligence or error; or it may be intentionally directed against the life of an individual, and in this case alone constitutes a crime in the eyes of the law.

The first case is generally the most dangerous, for the wretched suicide takes the poison in very great quantity, in order to abridge the duration of his sufferings.

The danger in the second case arises more from the quality than from the quantity of the poison; if this is a mineral, it may produce most severe and fatal effects; if it is drawn from the vegetable kingdom, death is rarely occasioned by it.

Poisoning of the third kind is ordinarily effected by small doses, and the criminal seeks for his instruments among the stronger mineral poisons; rarely among the vegetable, for these must be given in large quantity, and would be detected by their intolerable taste and smell.

The physician may be called upon in order to administer the aid of his art if the individual is still alive, or, if death has been produced by the poison, to collect and establish legal evidence of the fact.

In the discharge of these last offices, he must feel their weight and his own responsibility; the life and honor of families are deposited in his hands. It is he who must establish the fact of the crime; the verdict of the jury and the sentence of the judge must rest upon his Report. In a case so important, material, palpable, incontestable proofs are required by all; probabilities, presumptions, surmises,

must not be admitted : for while society calls for the punishment of the guilty, she equally demands a full and entire security for the innocent.

A man dies suddenly, after having suffered vomitings, and pains in the stomach and bowels; a suspicion that he was poisoned, arises on every side; the evil rumor is rapidly propagated; the most insignificant circumstances are brought together, compared, and malevolently commented upon; indignation is excited, and demands an object; imagination supplies it, while the belief is that proofs have revealed it. Such is the progress of the human mind; good is distrusted, and we yield our belief to evil with the greatest facility.

But the physician will not pronounce that poison has been given, until he has found it, and is able to point out its characters and name. He knows that there are many natural diseases, which may imitate the disorders occasioned by poison; that in the bilious fever, and still more in the cholera morbus, the gastric juice and the bile sometimes assume such a degree of causticity, that they produce on the alimentary canal all the effects of the most violent poison; and that often a perforation of the stomach is the consequence of these diseases when spontaneously developed. "We have often," says Prof. Chaussier, "seen these perforations of the stomach in corpses: we have had opportunities of observing the symptoms of them during life : we have witnessed their formation in the space of twelve, twenty-four, or at most forty-eight hours, in persons who apparently enjoyed the best health, or who had only suffered slight, transient, or chronic illness; in infants, adults, old men, and still more frequently in females in the flower of their age; and in none of these cases could the disorder be attributed to poison, nor to caustics, nor to external violence." The borders of these perforations are soft, ragged, sometimes edged with a black line more or less marked; in every other part

the stomach retains its form and ordinary consistence, and does not present any traces of congestion, nor of inflammation, except that the capillary net-work of its vascular membrane appears to be more than usually developed, especially in the vicinity of the perforation : the holes produced by the action of poisons have the appearance of being made by a punch; the edges are thick and hard, and the inflammation, of which they are the centre, is widely diffused. Morgagni, Boerhaave, Vanswieten, Portal, have recorded many observations of great changes in various textures of the body, discovered in individuals who had died of spontaneous diseases, or of gastritis, enteritis, malignant fevers, etc.

The physiologist knows that a thousand different causes may suspend or derange the action of the vital powers in a constitution so irritable and so complicated as is that of organized beings; and that in a case which appears to be very simple, there may be a complication of causes, and a succession of associated effects, which altogether pervert the ordinary progress of the malady, and are capable of deceiving the most experienced eye.

All the circumstances, therefore, which have preceded and accompanied the fact, must be carefully collected and compared. The physician who is consulted should consider the nature of the affection, the time and manner of its rise, its progress, intensity, and duration ; he should consider, also, the constitution, age, profession, and habits of the patient, the season of the year, and the character of the prevailing diseases.

The appearance of the exterior of the corpse must be carefully examined and every alteration be noticed, before proceeding to the opening of the body. This operation must be performed with all the precautions which its importance requires, and which will be detailed in the third paragraph,

according to the order and manner recommended by M. Chaussier.

However important may be the lesions which the examination of the different organs presents, and whatever may be the conclusions to which the previous considerations may lead, they cannot furnish complete proof; and all, acquainted with legal medicine, consent in the opinion, that, to decide with certainty, it is absolutely necessary to have found the poison. *Unicum certum signum dati veneni est notitia botanica inventi veneni vegetabilis, et analysis chemica inventi veneni mineralis.* Plenck. No correct conclusion as to the existence of the poison, says M. Portal, can be formed upon the symptoms which have preceded death, nor upon the alterations which are discovered by dissection; the poison must be detected in the stomach and intestines, and be recognised beyond the possibility of mistake, before the inference can justly be made that it has produced the inflammations and erosions discovered in these organs. Morgagni (*de Sed. et Caus. Morbor.*, lib. iv, epist. lix, art. 21.) expresses himself in the same manner; *sed res certa erit, ubi in ventriculo, aut proximis intestinis, venenum ipsum reperietur facilè agnoscendum.*

As chemical analysis is the most important part of medical jurisprudence, and furnishes the most positive results; as, in a case of poisoning, it serves as the foundation of the physician's report; and as its essential object is to establish the existence of the poison in the alimentary canal, or its application to the surface of the body, the greatest care must be observed in the execution of the different processes which are employed: the analysis must be severe and complete, and should result in the reduction of the metal, or the reproduction of the principal characters of the vegetable substance. In truth, the present methods of analysis are so exact, that by their rigorous employment we may discover a

thousandth part of a grain of a poisonous substance, whether mixed with liquids or solids, or even combined with the textures of the body: it would be criminal, therefore, to neglect the means which chemistry offers, and to submit the judgment to appearances which are often deceitful.

After the collection of the substances contained in the alimentary canal, and a careful study of their physical properties, their nature is determined by the execution of numerous chemical experiments, which may lead to conclusions, that alone can serve to guide the judgment of the magistrate.

The physician can almost always decide whether the poison is mineral or vegetable, by the nature of the symptoms which preceded death, and by the alterations revealed by the opening of the corpse; for greater certainty, a small part of the matter, which has been vomited, or found in the alimentary canal, may be subjected to evaporation and calcination; if it is a vegetable substance, it will give out the smell of burned sugar, and the smell of burned horn will announce that it belongs to the animal kingdom; while there will not be either of these odors, nor any residuum of charcoal, if the substance is mineral.

There are three ways of recognising the presence and nature of every metal: I. the general properties of the substance; II. reagents; III. its reproduction by the galvanic battery, or by heat. The first and the third only of these means are proper for the certain establishment of the truth; the second is often insufficient, almost always illusory; for when mixed with alimentary substances, or with the fluids of the stomach, poisons lose their property of forming with reagents precipitates similar to those which they form when pure. Besides, changes of color, and precipitates, which appear to be identical, may be produced by the same reagents in liquids which are very different in their nature.

If we take, for example, the experiments which are used to test the presence of corrosive sublimate [bichloride of mercury], we shall see how little dependence can be placed on the different colors of the precipitates obtained by the use of the most boasted reagents. Suppose that we have a quantity of water containing some drops of a solution of the sulphate or the muriate of iron; we may obtain in this liquid an orange yellow precipitate by lime-water; a black precipitate by the sulphuret of potash; a white precipitate by the ammoniacal solution of copper; and lastly, no change will be produced by the muriate of ammonia. Now as these same reagents produce the same results in a solution of corrosive sublimate, it is plain that these proofs are incomplete, and that something must be sought for beyond the first appearances and the changes of color effected in a liquid by the addition of reagents; it is necessary to examine with accuracy the qualities of the precipitate that is formed, and, however small may be its quantity, its nature can always be ascertained with precision; without this care, we may be led into the most fatal errors.

Without dwelling longer on this subject, enough has been said to impress upon physicians a sense of the necessity of extreme circumspection, and to convince those who may be called to act as judge or juror, that they ought not to rely upon appearances and presumptions.

Though the crime of poisoning is much more rarely effected by vegetable substances than by those which we have been considering, chemistry possesses means equally numerous and sure of discovering them, even when they are in exceedingly small quantity, as a quarter of a grain of the acetate of morphia dissolved in 13,200 times its volume of water.

The quantity of many of these poisons necessary to destroy life, is much greater than was at first announced after some insufficient and inaccurate experiments. Later

experiments prove, not only that traces of their presence in the stomach and alimentary canal, and of their action upon the brain, the heart, the lungs, and other organs, according to the kind of poison, may be discovered; but also, that the poisons themselves, or a more or less considerable portion of them, may be detected either in the stomach or the large intestines. Before pronouncing, therefore, that death has been occasioned by a vegetable poison, we should find the substance itself and demonstrate its existence by the immediate action of reagents, and by a careful examination of the precipitates which these may produce.

Some physicians have thought that the presence of a poison in a liquid might be tested by making a brute animal swallow a portion of it. Such trials are illusory and cannot lead to any positive result; nor can they serve to support an accurate comparison, since certain substances which man can employ with perfect safety, exert upon beasts the action of a violent poison, and vice-versa; the efforts that are made to force the animal to swallow, the violence employed to hold him, the ligature made on the œsophagus (itself an operation so painful that it may produce death), the mischievous qualities possessed by substances which, though not poisons, may be acrid and caustic, would not all these circumstances have an influence upon the result of the experiment!

There is a kind of poison which may, though very rarely, be employed to take away life; they are the gases; but it is impossible to prove the presence of these gases after death, unless the individual has been suffocated in an impure atmosphere, and the gas contained in this atmosphere can be submitted to chemical experiments.

Poisons may be employed in quantities so small as to occasion at first only slight inconvenience; but if their use is continued, they produce an almost uninterrupted state of

disquiet, of anxiety, and pains varying in severity, vomiting, mucous or bloody dejections, and bring on death after the lapse of a more or less considerable portion of time : they are then said to act as *slow poisons*. The physician, whose duty it may become to draw up a report upon a case of this nature, ought to examine the symptoms which have preceded death, for these always have a great analogy with those which are produced by the same poison employed in a quantity sufficient to occasion speedy and violent effects; he should also consider the epoch of their attack, and whether the individual has been in the practice of frequently taking purgatives or other irritating medicines. But he cannot pronounce that death was occasioned by poison, unless he finds the fatal substance itself.

It may happen that a vegetable or mineral poison has been introduced with criminal intentions into the stomach or rectum of a person already deceased. The physician must then examine the nature, situation, and extent of the lesions which the textures have undergone.

These poisons, inserted two or three hours after death, may produce the phenomena of inflammation ; after twenty-four hours, they are incapable of thus affecting the textures.

The inflammation produced by a vegetable substance, is so slight that it cannot be taken into consideration.

The introduction of a mineral poison during life, produces an ulceration, and an inflammation which is widely diffused and diminishes gradually in intensity according to its distance from the centre ; after death, the lesion and inflammation are not strongly marked. If the poison has been inserted into the rectum, this intestine is found to be scarcely altered beyond the part to which the substance was applied, so that a well-marked line of separation may be seen between the affected and the sound parts; and this is a phenomenon which is never observed in the other case.

Finally, it is necessary that the physician should be able to appreciate justly the appearances that may present themselves in a corpse, and to distinguish inflammation from congestion: the former arises during life, and is accompanied by swelling and softening of the affected part; the latter commences after death or a few minutes before, and is often observable in the stomach, especially at its most dependent portion, and in the parts on which the body has rested during the last days of life: Corvisart, Vicq-d'azir, Morgagni, and Chaussier, have recorded many examples of this condition.

Section III. *Of Opening the Body.*

After an attentive examination of the corpse, and a careful notice of the external alterations which it presents, the dissection is performed in the following manner:

In cases of poisoning it is always necessary to examine the state of the mouth, pharynx, and œsophagus; for this purpose the head is placed in such a position as to lengthen out and stretch as much as is possible, the anterior part of the neck; a longitudinal incision is made in the direction of the median line, commencing at the lower lip, which it completely divides, and extending to the top of the sternum; a second incision is made along the edge of the base of the lower jaw; this bone is detached from all its integuments, and the dissection is continued until it reaches the sides of the neck. The parts being thus laid bare, the lower jaw bone is sawed through at the median line, and its two portions are separated one from the other by the division of all the parts which adhere to its internal face. This dissection being continued reaches the isthmus of the fauces, the tongue and its appendages are pressed down, and the arches of the palate on each side are cut; the whole extent of the pha-

rynx is thus laid open, and by prolonging the incision downwards and sidewise the œsophagus is readily found, and may be followed in all its course over the dorsal vertebræ, after the thorax has been opened.

In order to open this cavity, the longitudinal incision is prolonged from the neck down to the extremity of the xiphoid cartilage of the sternum; two other transverse incisions are made on each side, one superior which follows the direction of the clavicle, the other inferior along the edge of the cartilages of the ribs and terminating at the anterior extremity of the fourth false rib: the two large flaps comprising all the muscles which cover the anterior face of the thorax, are detached and turned out over the sides: next, all the ribs, except the first and the two last, are divided by a saw from below upwards, the sternum is divided transversely, is raised and turned over upon the abdomen, where it is retained by the hand of an assistant. The thoracic viscera are then examined.

The abdomen is next to be opened, which is done by prolonging on each side the incision, which was terminated at the anterior extremity of the fourth false rib; it is carried to the crest of the ilium and thence, making a little curve above the groins, is continued to the pubes and there terminates. The section of the thorax comprising the sternum, is now raised, the attachments of the diaphragm are divided, then the whole muscular parietes of the abdomen, and the round ligament of the liver are separated, and this large flap is turned down over the feet of the subject.

After a careful examination of the external condition of the organs contained in this cavity, two strong and tight ligatures are made upon the superior part of the œsophagus, about an inch one from the other, and similar ligatures are put upon the rectum, and upon the ducts of the vessels and canals which lie at the concave face of the liver. A divis-

ion being now made by a knife between the two ligatures in the various parts where they were made, the œsophagus, stomach, and mass of intestines, are detached from their adhesions and carefully taken out, and laid upon a clean cloth many times folded. The surface of these parts is then again examined and washed with a sponge ; the œsophagus and stomach are opened through their whole extent ; the liquids and solids contained in them are received into vessels of glass or earth, and the internal membrane of the organs is examined with the greatest attention ; in the same way the different portions of the intestinal canal are opened, and the fluids which may be found there, are received into separate vessels ; finally it is proper to wash the cavity of these organs with distilled water for the purpose of removing all the soluble parts which adhere to their surface, and this liquid is kept in a vessel separate from the others, in order to proceed afterwards to its examination by the proper methods.

But if, as happens sometimes, the parietes of the stomach or the intestine are gangrenous, and perforated, and have permitted the fluids or solids, which were contained in them, to escape into the cavity of the abdomen, these substances must be collected with care, absorbed by a sponge, and squeezed out into a vessel ; ligatures are then to be made above and below the perforations, and the whole mass of intestines, as before, is to be taken out for further examination.

Section IV. *Of the Analysis.*

In this paragraph we shall point out the general precepts that are to be followed in the inquiries and experiments which are made in order to determine the nature of the substance, which has produced the symptoms of poisoning : these inquiries are of three kinds ; those which apply to

chemistry and natural history; those which investigate the symptoms; and those which are concerned about the morbid appearances. As the symptoms which announce the presence of a poison, and the alterations sustained by the textures of the body, have been sufficiently noticed elsewhere, we shall at present treat only of the analysis of the substances contained in the stomach and intestines, or discharged by vomiting and stool, or found in the chamber of the sick person. Chemistry furnishes the means of recognising all the mineral poisons, and a considerable number of vegetable poisons; while the recognition of other vegetable and animal poisons requires the aid of botany and zoology.

1. The physician appointed by a magistrate or any competent authority to investigate the fact of poison having been administered, ought to make his researches in the presence of a magistrate or officer delegated for this purpose. He should also take notes of the facts as they present themselves, which may serve as the materials of his report.

2. It is necessary that he should be certain of the nature and purity of the reagents which he employs; that the solutions of these reagents should be concentrated, and always made with distilled water; that liquid reagents should always be used drop by drop, and by means of a glass rod.

3. In order to establish the correctness of his conclusions, and prevent ulterior discussion, the physician should preserve in separate phials a portion of the liquids, which have been subjected to experiment; but as these may be mixed with putrescent animal substances, a certain quantity of very pure alcohol must be added to them, a portion of which should also be kept in a separate phial.

4. If the suspected substances appear to be too much diluted, it is proper to put them into a porcelain basin, and

concentrate them by a slow and gradual evaporation, in order to render more sensible the effect of the reagents.

5. The material examined should be employed in such a way as to furnish many experiments.

6. When the one or two first experiments have afforded some marks of the nature of the poison, it is proper, in order to make the demonstration more convincing, to prepare a liquid similar to that found in the stomach, and to make simultaneously comparative experiments upon each.

7. The mineral poisons contained in the suspected substances, may exist in different states: first, in the state of a solid, without having undergone the least decomposition; in which case, the different parts, ordinarily found at the bottom of the liquid, are collected, their physical characters, degree of solubility, etc. are examined, and they are lastly submitted to the various chemical experiments proper to ascertain their nature: secondly, in a fluid state, dissolved in a colored or colorless liquid, and not decomposed; in this case, the liquid is pressed through a fine and clean cloth, and a portion of it is submitted to the test of the various reagents, which we have proposed in the course of this work.

8. If results, which may afford a recognition of the poisonous substance, are not obtained by these means, the solution is poured into a retort, to which a receiver is adapted, and is gently heated. It is thus concentrated, and rendered more susceptible of the action of reagents: the volatile parts which may enter into its composition, as ammonia, the nitric and muriatic acids, are obtained in the receiver, and often by the action of cold a portion of the poison is deposited in the form of powder or crystals.

9. Finally, if no trace of the poison is yet found, or if the results obtained are not sufficient to establish the existence of the poison beyond a doubt, the solid substances are dri-

ed, and the liquid parts are evaporated to dryness; then a small portion is put into a glass tube with an equal quantity of charcoal and dry subcarbonate of potash, and is calcined; if arsenic or mercury makes a part of the poison that is sought, brilliant scales consisting of metallic arsenic, or mercurial globules, will be obtained on the sides of the tube.

If the appearance of metallic particles is not presented, it may be suspected that the basis of the poison is one of the following metals, antimony, tin, copper, bismuth, zinc, silver, lead, or gold; by heating the mixture to redness for fifteen minutes, one of the above metals will be found at the bottom of the crucible; it should be separated from the charcoal by washing with water, and again exposed to heat with pure nitric acid: antimony and tin are changed into white oxides by this acid; copper, bismuth, zinc, silver, and lead, are dissolved by it; and gold does not undergo any alteration.

10. The liquids, upon which the operations are to be performed, are almost always colored, and thus render less sensible the effects of reagents; the color may be discharged by pouring upon them a sufficient quantity of concentrated liquid chlorine; the reddish flakes which are formed, are allowed to deposit themselves, and the fluid is filtered. But previously to employing the chlorine, it is necessary to ascertain by means of proper reagents that the colored liquid does not contain nitrate of silver, nor a salt of antimony, for chlorine precipitates these salts.

11. If the researches and experiments have been fruitless of satisfactory results, it becomes necessary to make trials upon the textures of the alimentary canal.

12. Vegetable analysis cannot be reduced to general principles, which are simple and easy of execution; chemistry has not yet advanced sufficiently far to attain this end.

and we are limited to the means proper for recognising a few of the vegetable substances most generally employed.

Section V. *Of the Report.*

In cases of poisoning, the reports should always present three distinct parts: 1. The *protocol*, or *formula*, which contains the name and designations of the person to whom the investigation is committed; the authority which ordered the visit; the day and hour of the visit; the attitude, and external and apparent state, in which the subject was found; the objects which surround him; and to this is added a short exposition of the accidental or accessory circumstances.

2. The *description*, of the condition of the subject, and of the different alterations and lesions which may be discovered; the age, and the space of time which has elapsed since death, are indicated; mention is made of whatever may be found on the surface of the body; the state of the visceral cavities, and of the organs contained in them, and especially of the organs of digestion, is described.

3. The *conclusions* or direct consequences, which may and ought to be deduced from the description of the circumstances observed in the visit; and no conclusion should be presented, which is not drawn from the most certain facts and founded upon the most constant laws of nature and the principles of art.

We have contented ourselves with a brief exposition of these precepts, the detail of which will be found in technical works; and we conclude these general observations with repeating, what cannot be repeated too often, that the fact of poisoning is never certain, unless the poison has been found. Beyond this, all is conjecture; and simple suppositions and probabilities are not sufficient to decide the fate of the honors and lives of men.

TREATMENT OF THE EFFECTS OF LIGHTNING.

"When a person is struck by lightning, strip the body and throw buckets-full of water over it for ten or fifteen minutes; let continued frictions and inflations of the lungs be practised; let gentle shocks of electricity be made to pass through the chest, when a skilful person can be procured to apply it; and apply blisters to the breast."

[*Annual Report of the Royal Humane Society for* 1818].

PREVENTION OF THE FATAL EFFECTS OF DRINKING COLD WATER WHEN OVERHEATED BY EXERCISE.

"Avoid drinking while warm, or drink only a small quantity at once, and let it remain a short time in the mouth before swallowing it; or wash the hands and face, and rinse the mouth with cold water before drinking.

"If the disorder incident to drinking cold water has been produced, the first, and in most instances, the only remedy to be administered, is sixty drops of laudanum in spirit and water, or warm drink of any kind. If this should fail of giving relief, the same quantity may be given twenty minutes afterwards.

"When laudanum cannot be obtained, rum and water, or warm water, should be given. Vomits and bleeding should not be used without consulting a physician."

[*Annual Report of the Royal Humane Society for* 1818].

METHOD OF RENDERING ASSISTANCE TO PERSONS IN DANGER OF DROWNING.

"This appears attainable by the proper use of a man's hat and pocket handkerchief, which (being all the apparatus that is necessary) are to be used thus: spread the handkerchief on the ground, and place a hat with the brim upwards, on the middle of the handkerchief, and then tie the handkerchief round the hat as you would tie up a bundle, keeping the knots as near the centre of the opening as may be. Now by seizing the knots in one hand, and keeping the crown of the hat upwards, a person, without knowing how to swim, may fearlessly plunge into the water, with what may be necessary to save the life of a fellow creature.

"If a person should fall out of a boat, or the boat upset by going foul of a cable, etc., or should he fall off the quays, or indeed fall into any water in which he must wait some little time for assistance, and if he had the presence of mind to take off his hat, and hold it by the brim, placing his fingers within side the crown, and hold it so (top downwards), he would be able to keep his mouth well above water till assistance should reach him."

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