A SYNOPSIS

OF

MEDICAL JURISPRUDENCE,

FROM

THE LATEST AND BEST AUTHORITIES

FORMING THE BASIS OF LECTURES ON THE SCIENCE,

BY

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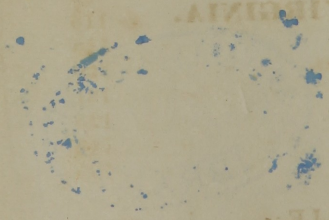

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FORENSIC MEDICINE.

WOUNDS.

Wounds, in medico legal phraseology, comprise injuries of every kind occasioned by mechanical violence, as bruises, contusions, incisions, fractures, luxations, &c.

The *chief* questions to be decided upon finding a dead and wounded body, are, 1, Was the wound inflicted during life? 2, Was it the cause of death? 3, Was it the result of homicide, suicide, or accident?

Classification of wounds—4 classes. 1, Those absolutely mortal. 2, Dangerous wounds. 3, Not mortal. And 4, Accidentally mortal.

Wounds absolutely mortal, and which generally occasion immediate death, are those of the brain, heart and large vessels connected with it, of the spinal marrow of the neck, and blows on the stomach. Wounds of the brain are less fatal than those of the heart, and these are not necessarily *immediately* fatal. Next in order of mortality are those that interfere with respiration, as extensive wounds of the diaphragm, and wounds of the lungs that lay open both sides of the thorax, thus impeding the dilatation of the lungs.

Dangerous wounds are those of the pharynx and sœophagus, the stomach and chylopoietic viscera, urinary bladder, of the large blood vessels of the liver, chest and abdomen not already mentioned. Severe contusions over any of the great cavities: division of the vessels of the extremities: compound fractures, and wounds of the tendons causing tetanus.

Wounds not mortal, or slight wounds, are injuries by which the skin and muscles are contused or divided, and

the tendons and aponeurosis, nerves and large blood vessels escape, such as incisions, simple fractures and luxations.

Wounds inflicted after death. Blows inflicted after death somewhat resemble *slight* blows inflicted before death, but the following results from blows before death never occur from blows after death.

1. Swelling from extravasations. 2. A yellow margin around the black spot. 3. Coagulated extravasated blood in the subjacent cellular tissue. But it may be doubted, whether clots may not form if the injury be inflicted very soon after death, and has the effect of lacerating a considerable vessel near loose cellular tissue. 4. In the instances in which the blood does not coagulate at all after death, contusions caused during life may be recogized by the extent of the effusion into the cellular tissue. Extensive effusions of blood in situations not depending and not near a large vein: a deep effusion distending the cellular tissue can hardly be produced on the dead body: incorporation of blood with the whole thickness of the true skin rendering it black instead of white, and increasing its firmness and resistance is characteristic as to time, and is perhaps one of the best signs of a contusion inflicted during life. No *precise* limits can be fixed as to the time when wounds inflicted after death will not resemble those produced during life: it appears to vary with the state of the blood, and the time which elapses before the body cools, and the joints stiffen. Three hours, however, may be stated as the *extreme* limit, and except on the trunk of the body the limit may be two hours.

The chief circumstances that influence the medico legal character of wounds are age, sex, constitutional peculiarities, previous injury or disease, and malum regimen.

Age. Adult age is most favorable to recovery from injuries, (particularly burns,) except fractures, from those, children soonest recover.

Sex. This is a circumstance of aggravation in the case of blows on the breast of the female, in consequence of its great sensibility in early life, and its proneness to cancer in later years. Blows on the abdomen of a pregnant female are always dangerous.

Constitutional peculiarities. They are of two kinds, 1. *Constitutional Infirmities.* And 2. Malformations. Of the 1. Great irritability of the nervous system predisposes to violent effects from slight causes. The scrofulous diathesis and venereal disease influence the result of wounds, and

predispose to violent effects from injuries of the joints. The hemorrhagic predisposition sometimes gives rise to large hemorrhages from the slightest scratch.

Of the 2d or Malformations. Transposition of the viscera, either congenital or accidental, may bring them within the range of injuries, or operations, that would not otherwise prove dangerous.

Previous injury or disease is sometimes urged in extenuation for the dangerous consequences of injuries. In such cases the three following inquiries should be made.

1. Was the new injury adequate to produce serious mischief in ordinary cases?

2. Whether did the injury or the previous disease, or accident cause death?

3. Did the alleged previous harm really exist, or was it the consequence of the injury?

Subsequent injury or disease may alter the medico legal character of wounds. It may happen that a disease unconnected with the effects of an injury, may invade a person who has been wounded and carry him off; as typhus fever in wounds of the head: and pleurisy in wounds of the chest.

Malum Regimen. Accidental or inevitable want of skilful treatment is not a valid plea; but if the omission was intentional or avoidable it takes off the responsibility to the inflicter in a great degree.

In persons found dead from wounds, it is necessary to inquire whether the wounds were the result of suicide, accident, or homicide. We must then ascertain, 1, The seat of the wounds. 2. Their direction. 3. The probable weapon used.

Wounds of the spinal marrow with a sharp pointed instrument: wounds inflicted behind with fire arms: and incised wounds, except those of the throat, cannot be supposed to be voluntarily inflicted. Yet instances have occurred where wounds and even amputations of the extremities and penis, and other incised wounds have been thus inflicted.

Wounds by fire arms in the mouth, are rarely done by another.

In relation to the direction of a wound, a stab from above downwards must generally be inflicted by a tall, upon a small person, if both be standing: and if upwards, by a short upon a taller person, if both be standing. It should be ascertained whether the right or left hand had been used: and as the former is that most commonly employed, the direction should correspond with it: but if the direction corresponds with the left

hand, it should be inquired whether the deceased were left handed.

In wounds by balls, it has been generally held that the entrance wound is smaller than the exit. But Professor Malle says from many experiments on the dead body, and frequent examinations of the wounded, living body, exactly the reverse obtains.* The entrance wound has its edges inverted and depressed: while the exit wound has ragged, everted and uneven edges, and the same obtains in flat bones.

Considerable discrepancy exists among writers on Medical Jurisprudence in relation to the size of the wound made by a ball, when compared with the ball. Some of them stating that the perforation, even in bones, is of the *same size* as the ball, others saying it is much *greater:* and a case has been published by Dr. Post of New York,† in which he says perforation made by a "rifle ball" through the parietal bone, was *smaller* than the ordinary rifle ball." Perhaps all this discrepancy may be reconciled by ascertaining that balls projected from the common musket, and all smooth bore guns, the rifle longitudinally grooved, and the rifle spirally grooved, make perforations different from each other. Professor Stoughton says:

"The motion of a musket ball (independently of its projectile course) on its own axis is at right angles with its direction. Hence, when a *musket* ball strikes the flesh, the hole made is smaller, to all appearance than the ball itself. The barrel of the American rifle, on the other hand, is grooved, not in a longitudinal direction, as the French and German rifles, but in a spiral manner. The ball is forced down so tightly that as it passes out, it is under the necessity of following the spiral groove. This imparts to it a motion on its axis, corresponding with the direction of its course. Hence the ragged hole, which our hunters know so well, is always much larger than the ball. Hence the rifle ball, at full momentum, does not, like the musket ball, remove a cylinder of muscle and bone, but its rotary motion, tears the flesh and shatters the bone. Hence too, unless the ball is nearly spent, it *never glances.*"

Dupuytren attempts to reconcile the discrepancy as follows: "When the gun has been discharged close to the wounded part, the opening by which the ball enters is

* Annalis d' Hygiene, April, 1840, and Hay's Journal, October, 1841, p. 505.

† Hay's Journal, April, 1841, p. 544.

smaller than that by which it makes its exit, but if at a distance, so that the ball is nearly spent, then the reverse will be observed. The canal in the former case will be conical." The hole made by a ball in clothes is always smaller than that in the skin.

Professor Lachese, in the Annalis d'Hygiene, vol. 15, p. 389, says: "In order that a discharge of powder shall penetrate into the cavities, and make an external wound, like that produced by shot making but one hole, the gun must be of great calibre, be heavily charged, and there must be less than six inches distance between its muzzle and the body wounded. And to produce with a gun loaded with shot, a single round aperture, the gun must be fired at ten or twelve inches distance at most. And in either the case of powder or shot, if the body is covered with clothing the distance must be less."

It is stated by John Hunter, and confirmed by other Surgeons, that a ball striking a bone at an angle sufficient to enable it to perforate it, will *not* have its *form altered.* This is contradicted by the case of Dr. Post, already cited: the ball was found, after passing through the parietal bone, "lying in the dura mater *considerably flattened*, and its diameter so much *increased* that it would have been impossible to have removed it by the same opening through which it had entered."

In wounds by fire arms collateral circumstances will throw some light. The wadding has sometimes led to detection, being torn from something in the possession of the inflictor. Also, if the fire arms and ball can be found, the size of the latter should be compared with the calibre of the former.

Detection of spots of blood. In cases of murder, it is sometimes important to distinguish stains of blood on the clothes, or on a deadly weapon, from those produced by some vegetable dye, or by rust. If the garment has *directly* received the blood, we shall find on the cloth remains of fibrin, as well as the serum and coloring matter of the blood. The best method of examining such is—

a. Take an oblong slip of the stained article, and suspend it vertically for some hours in a narrow jar of distilled water. The water will separate the albuminous part and coloring matter of the blood, which will subside to the bottom of the fluid. The fibrin will remain on the cloth, as a gelatinous body, and may be scraped off for examination. Dry the fibrin, and heat a portion of it in a tube, when it will give out the odour of burning animal matter, and ammonia will be disengaged, which becomes sensible to the sense of smell, or will affect test-paper introduced into the upper part of the tube.

b. Draw off the colorless fluid, by the pipette, from the colored portion in the bottom of the glass, and divide this latter into five portions. If the stain has arisen from blood, it will give the following indications: A weak solution of chlorine added to one part will first make it faintly greenish, next colorless, afterwards opalescent, and then whitish flakes will be deposited; to a second portion add a drop or two of ammonia, which will not change the color of blood; but if the color be produced by Brazil-wood, logwood, or the like, ammonia gives them a violet tint. Infusion of galls throws down a precipitate, without changing the color of the blood. A few drops of nitric acid throws down a grayish-white precipitate from blood.

If the blood has oozed through the first garment, and stained an exterior one, the stains may be treated as above, but the fibrin will probably be only found on the interior garment. If blood has incrusted a knife or other cutting instrument, by gently heating one part of the blade, the stain will scale off, leaving the metal uncorroded below; but a stain from the rust will not thus form a crust, nor will the surface be clean. These scales may be tested for ammonia in a heated tube. It would appear, however, that sometimes rust of iron gives slight traces of ammonia, probably from the action of moist air on the iron; but there is small danger of confounding this with the more decided indications of blood so treated; and, besides, the knife may be treated in the same manner as the slips of cloth, and the tests applied to the liquid. Stains of blood on wood are apt to sink into it, especially when it is soft, but it may be detected by a similar process, in many cases.

PERSONAL IDENTITY.

It is sometimes doubtful whether a child for whom an inheritance is claimed, be the same that he is pretended. Long absence of the proprietor of an estate has given rise to the same doubt. It thus may happen that the true heir would not be able to prove his right merely by failing to establish his identity: while on the other hand an impostor may succeed where he has no claim, merely by force of resemblance.

In criminal prosecutions it is important to know if an arrested person be the guilty one or not whom he may resemble; or where a prisoner, after conviction, makes his escape and is retaken, whether he is the same person who was convicted.

The degree of light necessary at night, to enable a person

to distinguish the features so that the individual may be afterwards identified. The flash of a pistol, or of lightning, or a coal of fire in firing a roof, are deemed suficient when the parties are near each other, say within 30 feet.

Resemblance is sometimes so strong, that persons innocent of crimes, have been accused for those who really committed them. Therefore extreme caution should be exercised in admitting testimony of identity.

In the case of a person claiming an estate after a long absence from it, the best plan is to question him in respect to *circumstances* which none but the real proprietor can know.

It sometimes becomes necessary to prove the identity of the dead, in doing which we should be very cautions how we assume any but indelible marks as means of recognition, because so complete an alteration takes place in the features and general appearance soon after death, as to deceive even the nearest relations.

PERSONS FOUND DEAD.

This whole subject may be arranged under two heads. 1. Sudden death from natural causes, and 2. Sudden death from violent causes: (comprehending under the latter every variety, whether the result of accident, or of criminal intention.)

1. In relation to respiration. The respiration may be so feeble as to be scarcely perceptible, and so continue for a long time, but it cannot be entirely suspended longer than a very few minutes without life becoming extinct forever. The *popular mode* of ascertaining its existence, such as placing down, or other light substances, near the nose or mouth, a vessel of water on the chest, or a mirror before the mouth or nose, is fallacious; for any agitation of the surrounding air will move the down or water; and exhalations from the body will cloud the mirror.

Physiological mode. Examine the chest, and see if the intercostal muscles move, or the ribs are elevated and the sternum pushed forward. When the diaphragm acts, the abdomen swells.

2. *The Circulation.* All evidences of the existence of the circulation may be absent and life still exist. Mode of ascertaining the existence of the circulation. Sometimes the pulsation of the artery at the wrist will cease upon extending the arm and throwing the palm of the hand upward, but may be felt on flexing the arm and turning the palm inward and

downward. Again the artery may not be felt unless we search for it between the thumb and first metacarple bone. The trial should be made at all parts where the arteries are superficial. We must be cautious not to mistake the pulsation of the arteries of our own fingers for those we are examining. Turn the body on the left side, and then place the hand in the region of the heart. If this fail, use the stethescope or the ear.

Temperature. For this see Survivorship.

Flexibility of the limbs before rigidity, is evidence of existing life; but flexibility *succeeding* rigidity, is a conclusive sign of death.

Rigidity of the muscles, commences first in the trunk and neck, then the upper extremities, and finally in the lower extremities and feet, and it subsides in the same way. The duration of rigidity is the greater, the later it occurs. Its energy and duration are the greater, the greater the muscular strength. In all animals, the moment when stiffness commences, is that in which the vital heat appears to be nearly extinct. The most unequivocal signs of death are three, viz: 1. Flexibility succeding to rigidity. 2. The muscles failing to obey the galvanic influence. And 3. Incipient putrefaction.

The following is the order in which the muscles after death cease to obey the galvanic influence: 1. The left ventricle. 2. The intestines and stomach. 3. Urinary bladder. 4. Right ventricle—this retains its contrastility under galvanism for one hour. 5. Œsophagus for half an hour longer. 6. Iris. 7. Muscles of animal life. 8. Auricles.

The changes that take place in bodies after death, may be divided into those that occur *before*, and those that *follow* the invasion of putrefaction. To the first belong diminution of temperature, rigidity, and lividity of depending parts.

The conditions of speedy putrefaction, are exposure to air, moisture and *moderate* heat. The presence of air is not indispensable, as it will take place in vacuo, but it promotes it.

Adipocire resembles fat or wax, and is a soft ductile matter similar to cheese: it is the result of putrefaction under peculiar circumstances; that is when bodies are heaped together in the earth: it is a soap with double acid and ammonial base, that is, it consists of magaric acid and oleic acid—of ammonia and very small quantities of lime and potash, and some salts, in scarcely appreciable quantities. It is only found when some fat and azortized substance are found together. The fatty substance furnishes the acids, and the azotized sub-

stance the ammonia. Three years inhumation, is necessary for the body to undergo the *complete* change in the earth; but it occurs sooner in water, yet is never perfect unless many bodies are buried together, those at the bottom undergoing it first. The gases must be confined by a covering of earth.

Death from natural causes. Natural death may take place in two ways. 1. Either as the slow and gradual termination of a lingering disease, or 2. Suddenly, as by apoplexy or concussion.

Natural causes of sudden death. 1. Apoplexy. 2. Ruptures of abscesses or blood vessels in the air passages. 3. Ossifications of the cardiac valves or arteries. 4. Ruptures of the heart. 5. Asphyxia.

Death from violent causes, of which we may enumerate seven: 1. Asphyxia. 2. Poisoning. 3. Wounds. 4. Burning. 5. Cold. 6. Hunger. And, 7. Lightning.

Asphyxia. This may be defined the suspension of the function of respiration, and consequently of the circulatory and cerebral functions. It may be produced primarily, either by an interruption of the mechanical or chemical phenomena of respiration. The mechanical phenomena are the motion of the parieties of the chest and diaphragm. The chemical phenomena are the absorption of oxygen, the disengagement of carbonic acid, and the conversion of venous into arterial blood. Whichsoever be first interrupted, the other soon follows.

Causes of Asphyxia. Those that interrupt the mechanical phenomena, are compression of the chest externally, or wounds of both sides admitting air, producing internal compression, and effusion of large quantities of fluid into the pleural sac. All these act mechanically. There are others that cause a cessation of the mechanical motion by their *physiological* action, as wounds dividing or compressing the nerves of the respiratory muscles, and causes extinguishing the nervous energy, as lightning.

The chemical phenomena however, are most frequently concerned in the production of asphyxia; and the causes are, 1. Drowning. 2. Hanging. 3. Strangulation. 4. Smothering. 5. The inhalation of noxious gases, and 6. Air deprived of oxygen.

The medico legal questions that are likely to arise in drowning are, 1. Whether the body was immersed before or after death. 2. Whether the individual has been immersed by accident; has drowned himself; or has been thrown in by others?

The most unequivocal signs of drowning are the existence, in the stomach of water of the same kind in which the body is found, and the elevation of the epiglottis, with *froth* or rather *lather* in the *upper* part of the trachea: for if water is found in the stomach, deglution must be the cause —and if lather, of this peculiar kind, is in the trachea, it must be the result of respiration upon the water and air. The peculiarity in this froth is that it does not adhere to the trachea by mucus, but is in immediate contact with the tube, and all the bubbles that appear in it have a watery envelope, and not a covering of mucus or other fluid; and on opening the trachea they generally disappear like soap bubbles: it exists longest at the bifurcation of the trachea, and in winter may be found 8 or 10 days after death; the nearer the mouth it is found the more conclusive it is.

The proofs that death occurred before immersion are, no turgescence of the vessels of the brain; no froth in the trachea; no water of the same kind in the stomach; marks of violence on the body; and a collapsed state of the lungs.

It being ascertained that immersion took place during life, we should next enquire whether it was the result of accident, of suicide, or of homicide. The locality may either prove that the individual fell in accidentally, or preclude the supposition. Indications of struggling, and many footsteps on the bank, excoriation of the ends of the fingers and sand under the nails may lead to the supposition of homicide. If it be suicide, ligatures about the person will probably be found.

In death by drowning it is of importance to the survivors to know when it occurred. The following are the best signs of the period when death took place: No change takes place in the exterior of the body before the fourth or fifth day, and frequently not so soon. At that time the skin in the *palms* of the hands begins to *whiten*, particularly the ball of the thumb, the fleshy parts of the palms and the lateral parts of the fingers. On the sixth or eighth day the skin on the back of the hand begins to whiten, at the same time that of the sole of the foot has acquired a similar tinge. The skin of the face is softened and of a more faded white than the rest of the body. On the fifteenth day the face is slightly swollen and red; a greenish spot begins to form on the sternum: the skin in the hands and the sole of the feet, except the top of the feet is white, and the skin of the hand is wrinkled. The subcutaneous cellular tissue of the thorax

is reddish, and the exterior of the cerebral mass, in the upper part of the organ, becomes green.

A most remarkable fact, and one that establishes a striking difference between the progress of putrefaction under water and when the body is exposed to the air, is that in the immersed body the *skin* in the middle of the abdomen, as well as that of the arms, forearms, thighs and legs is the *last* to putrify, but the *first* in the air.

In hanging, death is not generally by apoplexy, but mostly by asphyxia, for if the trachea be opened below the rope, death does not often take place. In the case of hanging, two questions present themselves to the medico legal inquirer: 1. Was the suspension before or after death? And 2. Was it an act of homicide, suicide or accident?

The evidences of suspension before death, are lividity and distortion of face; protrusion of the eyes; the mark of the cord around the neck forming a *livid depressed* circle, the centre of which to the *width* of the *ligature*, resembles dark colored *parchment*, and the *livid* color is *confined* to the *border* on each side; the fingers are bent; nails blue; hands nearly closed; swelling of the chest, shoulders and arms, and sometimes ecchymosis of these parts; penis semi-erect, and emission of semen. An exception is sometimes found in the color of the face: it is pale when death has been *very* early and from compression of the spinal marrow.

The second inquiry, or whether it is suicide or homicide, may be resolved by ascertaining—if the death has been by strangulation—that the track of the cord is low down and passes *horizontally* around the neck, while another and fainter impression (made by the subsequent suspension) exists at the upper part, taking an oblique course; and if the dress is torn it corroborates the suspicion of its being homicide. *Strangulation* differs from hanging in no suspension having taken place. In strangulation the rope mark is lower down and horizontal, whereas in hanging it is oblique. When the strangulation has been manual, instead of the circular mark around the neck, there are irregular livid patches corresponding to the fingers.

Smothering, leaves no sign by which it can be well diagnosed from asphyxia produced by other causes.

For death from the inhalation of noxious gases, poisons and wounds, see Toxicology, and wounds, death from.

Burning. Upon finding a dead body sufficiently burned to have occasioned death, the first inquiry is, whether the

body was burned before or after death. 2. Whether the combustion was ordinary or spontaneous.

Around a burn, inflicted before death, there is a blush of redness of *considerable* extent *removable* by pressure, disappearing in no long time, and not permanent after death. There is also a *narrow* line of *deep redness* separated from the burned part by a stripe of *dead whiteness*, bounded toward the white stripe by an abrupt line of demarcation, losing itself gradually in the redness, but unlike it, *not removable* by pressure. Blisters are generally, but not always, found, but when they do exist they are filled with serum. The only effects then of burns which appear immediately after the injury and *remain* in the dead body are, 1. A *narrow* line of redness near the burn *not removable* by pressure; and 2. Blisters filled with serum: the former is an *invariable* effect: but the latter is not always observable when death follows the burn in a few minutes. Blisters are also formed by burning after death, but they are always filled with air, and none of the other diagnostic signs of burning before death are present.

Was the burning spontaneous or ordinary combustion? The greatest number of the victims of spontaneous combustion are females, and in every case they have used ardent spirits intemperately. A remarkable characteristic of this species of combustion is, that water will not extinguish the flame; and another peculiarity is, that inflammable bodies in contact with the burning body are not ignited. The trunk of the body always suffers most, the head and extremities being seldom consumed. The combustion is more rapid than is the consumption of the body at the stake or on the pile.

There is no authentic account of spontaneous combustion of the living human body ever having occurred. The cases considered as such are merely *preternatural* combustibility of the body. In all the cases on record some *ignited* substance has been in contact with the body. In almost all the cases the subjects have been for a long time intemperate. Nevertheless the alkoholic impregnation does not appear to be a mere imbibition of spirituous fluid by the tissues, (for this does not in any great degree increase the combustibility of flesh) but some general change produced in them, to inflame from the mere contact with an ignited body.

If the subject of combustion has been a female advanced in years, and of intemperate habits: when the destruction has been rapidly effected, and nothing remains unconsumed

but portions of the head and extremities; when the room is filled with an offensive empyreumatic odour, and a moist and fœtid sooty matter is deposited upon the ashes which remain, and upon the walls and furniture: These circumstances, or the greater number of them occurring, remove all doubts respecting the preternatural combustibility of the body.

On the other hand, when the combustibility is of the ordinary kind, the combustion will generally be but partial, and not directed in preference to any particular part of the body. In such cases, also, it will be almost invariably found to have extended to adjacent combustible substances.

Lastly, when designedly produced, there will be evidence of the consumption of a large quantity of fuel.

Cold. Any thing that impairs the nervous energy, and consequently diminishes the power of generating heat, as narcotics, intoxication, predisposes to death by cold. In the case of persons found dead by cold, if the accident be recent, attempts may be made to restore life; the gradual application of heat, and artificial respiration should be tried until the signs of returning life are quite apparent, then the mildest internal stimulants should be very cautiously administered.

Starvation. Young persons sink under starvation sooner than the old. Men perish sooner than women: a person who is surrounded by damp air, or has access to water will survive longer than one deprived of them.

Post mortem appearances of death by hunger. General emaciation of the body together with an acrid fœtid odour; eyes open and red; tongue and throat dry; intestinal canal empty and inflamed; the blood thick and coagulated if no water has been used; otherwise there is neither inflammation nor coagulation of blood: gall bladder filled with bile, which by exudation tinges the neighboring organs; lungs shrivelled; organs healthy.

Lightning. When a person is stricken by lightning, Brodies' experiments prove that instantaneous extinction of vitality does not take place; but on the contrary the functions of the brain are those on which the electric shock exercises its principal influence—neither the irritability of the muscular system at large, nor that of the heart is primarily destroyed, but death takes place from a severe injury of the brain, and destruction of the functions. The surface of the body is sometimes vesicated, especially along the spine; the clothes are mostly torn; buttons and coins

about the person are melted; the limbs do not stiffen; and the blood is black and does not coagulate.

MENTAL ALIENATION.

The mind is that part of our being which thinks and wills, remembers and reasons. By means of the corporeal senses it holds intercourse with the things of the external world, and receives impressions from them. The brain is the organ of the mind. The mental faculties may be divided into intellectual and moral. The intellectual are memory, abstraction, imagination and reason or judgment. The moral are 1. The desires, the affections, and self love. 2. The will. 3. The moral principle or conscience, and 4. The moral relation of man to the Deity.

We adopt Esquirol's arrangement, somewhat modified by Ray. The various forms of mental derangement depend upon very different conditions of the brain, and may be divided into *two classes* according to their dependence upon *two distinct conditions* of this organ.

In the first class, there is deficient developement of the brain.

In the 2d class, there is disease of its structure after full developement.

In the 1st class we may arrange idiocy and imbecility, and mania and dementia may be arranged in the 2d class.

Mania and *Dementia* are distinguished from each other, by the contrast they present in the energy and tone of their manifestations. *Mania* is characterized by an exaltation of the faculties, and may be confined to the intellectual or moral powers, or it may involve them both, and these powers may be generally or partially deranged. *Dementia* depends on a more or less complete enfeeblement of the faculties, and may be consecutive to injuries of the brain, to mania or to some other disease: or it may be connected with the decay of old age.

Insanity.	Defective development of the faculties.	Idiocy.		1. Resulting from congenial defect. 2. Resulting from an obstacle to the developement of the faculties supervening in infancy.
		Imbecility		1. Resultig from congenital defect. 2. Resulting from an obstacle to the developement of the faculties supervening in infancy.
	Lesion of the faculties subsequent to their developement.	Mania.	Intellectual.	1. General. 2. Partial.
			Affective or moral.	1. General. 2. Partial.
		Dementia.		1. Consecutive to mania or injuries of the brain. 2. Senile, peculiar to old age.

Idiocy consists in a destitution more or less complete, of the reflective and moral faculties; the grades are various, ascending from the character of the brute to that of the manifestation of some of the higher moral powers.

The physical characters of congenital and incurable idiocy are very striking. Gall says the circumference of the head of the adult idiot, over the orbitar arch and most prominent part of the occiput, is from $13\frac{1}{3}$ to $14\frac{1}{2}$ inches. Containing a brain not larger than an infant at birth, or only $\frac{1}{4}$, $\frac{1}{5}$, or $\frac{1}{6}$ of the cerebral mass of the adult who is possessed of a full share of mental powers. The anterior superior part of the head is very diminutive, except in hydrocephalic cases, when it is very large in consequence of the water within. The forehead is low, angular and retreating. The features irregular: eyes unsteady and squinting, lips thick, mouth open and slavering, defective

teeth and spongy gums. Limbs crooked, feeble and limited in their motion. External senses imperfect or absent, particularly audition: speech, vision, taste and smell are very deficient. Locomotion is deficient or lost, and the power of grasping or holding is very weak or wanting.

DISEASES THAT GENERALLY ACCOMPANY IDIOCY.

Rickets, epilepsy, scrofula, paralysis, and a depraved or defective constitution. In the degree of idiocy now described, life is rarely prolonged beyond the 25th year.

In Idiocy of less degree, however, some one or more of the intellectual faculties—never the reflective—are more or less perfectly manifested. Among the powers possessed by such, are self-esteem, love of approbation, religious veneration, and benevolence. Instances of which are given by Rush, Combe, and Gall. The several propensities, cunning, and destructiveness, are sometimes inordinately active in the cases of the less degree of idiocy.

The cretenism of Alpine regions affords the best opportunities to study idiocy in all its grades, as it is there endemic. Its various degrees are divided into three classes. 1. *Simple cretenism.* In this life is merely automatic, the senses are wanting or extremely dull, and the attention is only aroused by the most urgent calls of nature. 2. *Semicretenism.* These notice what passes around them, remember simple events, and express their wants by language. They have no idea of numbers; they may, like parrots, be taught to repeat, but not to understand, certain passages. 3. Cretenism in the third degree. These have a strong memory of events, learn reading and writing, yet cannot be made to understand their use.—Music, drawing, painting, and some of the mechanic arts are learned in some degree by a few of them, but they are exceptions, and should teach us not to decide that the whole mind is sound, because one or two of its faculties are manifested in some degree of perfection.

Imbecility. In this, unlike idiocy, there is some manifestation of the reflective faculties, as well as of the perceptive and moral powers: but the reflective faculties are manifested in a much less degree than is common among persons of similar rank and opportunities. Great activity of the animal propensities is generally evinced. They possess memory, have the power of forming a few simple ideas and of expressing them by words, and have some

idea of the conveniences and properties of life. They acquire the ability to read, write, count, understand music, and their moral and intellectual powers exhibit a great variety of shades. They have the same tendency to the same physical imperfections, and diseases to which idiots are subject, though they have them in less degree.

Georget says that the imbecile, sometimes steal adroitly, and hence are erroneously considered very intelligent—they repeat the offence as soon as released from confinement, and are then thought to be obstinately perverse—they are violent and passionate, and the slightest motive is sufficient to plunge them into deeds of incendiarism or murder; and those of strong sexual propensities soon become guilty of outrages on female chastity. The propriety of this caution is manifested in the cases of Miss Baxter, 1st Beck 589. Portsmouth vs. Portsmouth, 1st Beck, 590. And Ingraham vs. Wyatt, 1st Beck, 563.

To form a proper estimate of the degree of mental impairment in the imbecile, it is necessary to scrutinize not only *one* act or trait of character alone, but *every* intellectual manifestation as it appears in the whole conduct, conversation and manners.

LEGAL CONSEQUENCES OF MENTAL DEFICIENCY.

Every sane human being is endowed with a mental constitution that adapts it to the world on which it acts, and by which it is acted upon; and the *principle* upon which all *legal responsibility* is founded, is on the *completeness* of this *adaptation*, or the existence of the elements of which this state of adaptation is composed. Thus, if *any* of the elements be wanting, the legal responsibility is lessened to the *extent* of this deficiency. The intellect must not only be sufficiently developed to acquaint the individual with the existence of external objects, (which is the province of the *perceptive faculties*,) but with some of their relations to himself—which requires the existence and exercise of the *reflective faculties;* but the several powers of the mental constitution must be sound enough, and sufficiently strong to furnish, each its specific incentives to pursue that course of conduct, which the intellect has already approved. In the *sane* mind the idea of crime is associated with injury and wrong: but in the *insane* there is no consciousness of wrong or intention of injury, but mere per-

sonal gratification, in taking the life of a human being, precisely as if it were an ox that was slain.

The insane has only a selfish object in view, and possesses not the restraining influence, of a moral nature, of the sound mind, such as the *natural* right of every one to the undisturbed possession of his own life, and the *injustice* of depriving him of it. And as the existence of the Deity is unknown to him, his duties and accountability to Him cannot restrain him. The law looks to the intention and not to the amount of injury committted. These views are well illustrated in the cases of Schmidts, Ray 101. Piere Joseph Delepine 104. Abraham Prescott 1st Beck 623. John Barclay, Ray 117. and Louis Lecouffee 118.

The following example will show that imbecility does not consist only in defect of intellectual power, or the faculties of reflection and perception, but also a deficiency of the moral powers to a great extent may constitute it when the intellectual are scarcely sensibly affected. E. S. Ray 123.

Dr. Rush says that he was consulted in three cases of this kind, and observes there is, in these cases, probably an original defective organization in those parts of the brain which are occupied by the moral faculties.

In relation to testamentary dispositions, they depend on a single arrangement, and one which the testator may have taken time to think on and mature; they do not require the same degree of intelligence as the administration of property, the contracting of marriage, &c. Therefore, if the imbecile has the capability of comprehending the nature and effect of a will, a will made by him will be declared valid if there be nothing on its face showing improper influence, &c. In relation to marriage a less degree of imbecility will invalidate the contract, as here the pecuniary interests and whole future comfort and happiness are involved; but even here if the imbecility is apparent, the other party cannot avail himself of it, yet upon proof of fraud or circumvention the courts will pronounce it null and void. Portsmouth vs. Portsmouth, 1 Beck 590, and Miss Bagster.

Mania is a pathological state of the brain, and in its various grades and forms it observes the same laws as diseases of other organs. The manifestation of the mental powers being one of the functions of the brain, every departure from the healthy state of the organ—from irritation up to inflammation—deranges its functions as it does those of all other organs; and this will be the

case whether the brain is primarily or sympathetically affected. When the diseased state amounts only to irritation, post mortem inspection will not reveal it, but when it reaches inflammation, or even congestion, it will be apparent on dissection. Therefore, it is not a legitimate inference, that, because dissection does not reveal structural lesion, disease of the parts has not existed. Irritation of the brain is then the first link in the chain, congestion the second, and inflammation or disorganization the third and last.

Cerebral irritation sufficient to produce insanity may exist for years before disorganization takes place, and the patient may die of other disease while irritation of this organ lasts: but when *death* is occasioned by the *insanity* we will always find lesions of structure. Mania is manifested by a well marked change of character, or a departure from the ordinary habits of *thinking*, *feeling* and *acting* without any *adequate* external cause. To ascertain when an individual is insane, we must compare what *he is* with what *he was;* compare him with *himself* when sane, and not with other sane persons. But striking peculiarities of character, amounting to eccentricities, though strong proof of *predisposition* to mania, are far from constituting the disease.

In investigating the nature of insanity, the first caution to be observed is not to confound *disorders* of mental functions with *natural qualities* which sometimes strongly resemble them. Many men, in the full enjoyment of health, are remarkable for peculiarities and idiosyncrasies of thought and feeling, which contrast strongly with the general tone and usages of society: but they are not on that account to be held insane: because the singularity for which they are distinguished is with them a natural quality, and not the product of disease: and, from the very unlikeness of their mainfestations to the modes of feeling and acting of other men, such persons are in common language, said to be eccentric. It is true that, on the principle already explained of excess in size of some organs over the rest, being favorable to the production of insanity, eccentricity involves, all other things being equal, a greater than usual susceptibility to mental derangement: but still it is not mere strangeness of conduct, or singularity of mind which constitutes its presence. *It is the prolonged departure, without an adequate external cause, from the state of feeling and modes of thinking usual to the individual, when*

in health, that is the true feature of disorder in mind: and the *degree* at which this disorder ought to be held as constituting insanity, is a question of another kind, in which we can scarcely hope for unanimity of sentiment and opinion. Let the disorder, however, be ascertained to be morbid in its nature, and the chief point is secured, viz: a firm basis for an accurate diagnosis: because it is impossible that such derangement can occur unless in consequence of, or in connexion with, a morbid condition of the organ of mind: and that the abstract mental states, which are justly held to indicate lunacy in one, may, in another, speaking relatively to health, be the strongest proofs of perfect soundness of mind. A brusque, rough manner, which is natural to one person, indicates nothing but mental health in him: but in another individual, who has always been remarkable for a defferential deportment, and habitual politeness, lays these qualities aside, and without provocation or other adequate cause, assumes the unpolished forwardness of the former, we may justly infer, that his mind is already deranged, or on the point of becoming so. Or, if a person who has been noted all his life, for prudence, steadiness, regularity and sobriety, suddenly becomes, without any adequate change in his external situation, rash, unsettled, and dissipated in his habits, or vice versa, every one recognizes at once these changes, accompanied as they then are by bodily symptoms, as evidences of the presence of disease affecting the mind, through the instrumentality of its organs. It is therefore, I repeat, not the abstract act or feeling which constitutes a *symptom: it is the departure from the natural and healthy character, temper and habits, that gives it this meaning:* and in judging of a man's sanity, it is consequently as essential to know what his habitual manifestations were, as what his present symptoms are.

For our purpose the mental faculties may be divided into intellectual and moral. The former are those mental powers that acquaint us with the existence and qualities of external objects, and the relation of cause and effect, and conduct to the knowledge of general truths. The latter are the sentiments, propensities and passions necessary to man as a social and accountable being.

Mania may affect the whole of the intellectual or moral faculties singly or conjointly: hence we have two classes of mania. 1. General Intellectual Mania, and 2. General Moral Mania. It may affect some *one* or *more* of either the

intellectual or moral faculties, which will furnish us with two sub-divisions: 1. Intellectual monomania, and 2. Moral monomania.

Intellectual Mania is characterized by certain hallucinations, in which the patient believes in the reality of facts or events that do not exist, and acts accordingly: or having adopted some notion not altogether unfounded, carries it to an absurd and extravagant length.

Maniacal hallucinations are made up of simple hallucinations and illusive sensations—the difference between the two is, that in illusion of the senses, the *morbid activity* of the perceptive faculties—which is a common element in the production of both—requires to be excited by *outward impressions;* while in simple hallucinations the excitement is produced by the *recollection* of past impressions; but to constitute them *maniacal* hallucinations, the reflective faculties, or reason, must be so diseased as to *believe* in their *reality*, and not to think them errors of perception.

General Intellectual Mania, is the impairment of one or more of the faculties of the mind, accompanied with, or inducing a defect in the comparing faculty or *reason*—and involving all or most of the faculties of the understanding. The affective or moral faculties are always more or less involved.

Intellectual Monomania. In this the patient imbibes some *single* notion, or *train of ideas*, contradictory to common sense and to his own experience, and which seems, and no doubt really is, dependent on errors of sensation. Although the perceptive faculties may be affected, the disease does not exist, unless the reflective powers are also deranged more or less in relation to *one* or *more* of the operations of the understanding, being in general, confined to one or two subjects and their connections. In the simplest forms the understanding is perfectly sound on all subjects but those connected with the hallucination, and indeed the individual may reason acutely on all other subjects. Sometimes the operations of the understanding, even on subjects connected with the insane belief, are not impaired in any appreciable degree. But Georget says when the disorder involves a longer train of morbid ideas though the patient may reason on many subjects unconnected with the particular illusion on which the insanity turns, the reflective faculties are more extensively deranged than is generally suspected. It is best detected by observing the individual in the domestic circle.

Moral Mania consists in a perversion of the natural feel-

ings, affections, inclinations, tempers, habits and moral dispositions, without any *notable* lesion of the intellect or knowing and reasoning faculty, and particularly without any maniacal hallucination. It may be divided into general or partial.

General Moral Mania exists when the *whole* of the moral powers present a scene of chaotic disturbance. Pritchard says there are many individuals living at large, and not entirely separated from society, who are affected in a certain degree by this modification of insanity. They are reputed persons of singular, wayward and eccentric character. An attentive observer may recognize something remarkable in their manner of existence, which induces him to entertain doubts of their entire sanity, and circumstances are sometimes discovered on inquiry which assist in determining his opinion. In many instances it is found that there is a hereditary tendency to madness in the family, or that several relatives of the person affected have labored under diseases of the brain. The individual himself is discovered in a former period of life to have sustained an attack of madness, of a decided character. His temper and dispositions are found on inquiry to have undergone a change : to be what they were not previously to a certain time : he has become an altered man ; and this difference has perhaps been noted from the period when he sustained some reverse of fortune, which deeply affected him, or since the loss of some beloved relative. In other instances the alteration in his character has ensued immediately on some severe shock which his bodily constitution has undergone. This has either been a disorder affecting the head, a slight attack of paralysis, a fit of epilepsy, or some fever or inflammatory disorder, which has produced a perceptible change in the habitual state of the constitution. In some cases the alteration in temper and habits has been gradual and imperceptible, and it seems only to have consisted in an exaltation or increase of peculiarities which were always more or less natural or habitual. Individals, laboring under this disorder, are capable of reasoning, or supporting an argument, on any subject within their sphere of knowledge, that may be presented to them, and they often display great ingenuity in giving reasons for their eccentric conduct, and in accounting for and justifying the state of moral feeling, under which they appear to exist. In one sense indeed. their intellectual faculties may be termed unsound, but it is the same sense in which persons under the influence of strong passions may be generally said to have their judgment

warped, and the sane or healthy exercise of their understandings impeded. They think and act under the influence of strongly excited feelings, and a person sane is under such circumstances proverbially liable to error both in judgment and conduct. Moral mania has a great tendency to pass into intellectual mania, which we have seen is no less strongly characterised by moral perversities than by hallucinations: and Esquirol and Georget actually describe it as belonging to the initiatory stage or incubation of intellectual mania. Heinroth, Hoffbauer, and Pinel, recognise this form of mania.—See the case of Earl Perrers, 1 Beck 600, and Metzer, Ray 177. One of the most common features of moral mania is a great perversion of the *social affections*, and particularly those of the domestic relation, which is well illustrated in the case of Frederick William of Prussia. Ray 183.

Partial moral mania, or moral monomania consists in a perversion of only one or two of the moral powers, the rest of the moral and intellectual constitution preserving its ordinary integrity. The moral monomaniac often manifests a propensity to steal. This propensity sometimes appears to have its origin in certain physiological changes in the body. Gall speaks of four examples of women when pregnant, being violently impelled to steal, though perfectly upright at other times. An inordinate propensity to lying is also no uncommon occurrence where the morals in other respects are irreproachable, and in cases where it cannot be traced to faults of education, evil example or innate depravity. Morbid activity of the sexual propensity is frequently an accompaniment of this form of mania, and is called erotic mania; several cases of which are related by Gall and Pinel. The horrible propensity of destructiveness is often met with, and is usually called homicidal insanity. A morbid propensity to incendiarism frequently manifests itself in this variety of insanity. In most cases where the propensity to destructiveness exists, some physical or moral disorder may be detected, many cases of which are related by Gall. A remarkable modification of the propensity to destructiveness sometimes occurs in females and appears to be produced by parturition, mensturation and lactation, and they often select their own offspring as their victims. Again, we meet with cases when the propensity to destroy is excited by moral influences acting as a peculiar physical predisposition, and followed by some physical disturbance. It is preceded, for some time by despondency and depression of spirits. Sometimes the moral homicide will urge a motive for the act, which is entirely ra-

tional and well founded, but totally *inadequate* to lead a *sane* mind to the perpetration of it. Sometimes the destructive propensity is excited by that perversion of the religious sentiments, called religious fanaticism; of which Pinel gives a very interesting case. It is sometimes, indeed frequently, excited by the apprehension of coming to want. In all these cases of homicidal insanity, an irresistible, motiveless impulse to destroy is manifested.

CONTRAST BETWEEN THE CRIMINAL AND MONOMANIACAL SUICIDE.

The *criminal* homicide is actuated by a motive of interest or of resentment *adequate* to the purpose, and the act is often accompanied by some other crime—he either denies or confesses his guilt—if the latter, he begs for mercy, or glories in his crime; if the former, curses his judges and protests against the justice of his sentence. He never sheds more blood than is necessary, in his opinion, for the accomplishment of his purpose. He deliberates, devises plans for the execution of his criminal intention—selects the appropriate time, place, and weapons to facilitate the act, and uses every means to elude discovery. He frequently has accomplices, and always vicious associates, and his history, if closely scrutinized, will be in perfect correspondence with the nature of his crime.

In the *monomaniacal* homicide, the act of destruction is often preceded by manifest physical disorder and mental depression; the murder appears the only thing in view, and is rarely accompanied by any other improper act. He testifies neither remorse, nor repentance, nor satisfaction, and frequently acknowledges the justice of his sentence. He sheds *more* blood than is necessary for the attainment of the object of the *criminal* homicide. He neither provides suitable weapons, selects secret places, nor appropriate times, but strikes his victim in the presence of spectators, and generally voluntarily surrenders himself to the constituted authorities. The few that fly, and persist in denying the act, always give some strong indication of insanity. In the rare cases, where they prepare the means deliberately, and select appropriate opportunities, still they make no attempt to conceal the murder. They never have accomplices, nor are their associates vicious; and their previous character affords a striking contrast to the destructive act, and offers some remakable peculiarities of conduct or character. Their victims are generally their own family or their best friends.

The destructive propensity seems often to be called into action by the presence of murderous weapons, suitable opportunities, disgust or some imaginary evil.

LEGAL CONSEQUENCES OF MANIA.

The *elements* of *moral* responsibility are, the original capacity, the healthy action, and the cultivation of the moral and intellectual faculties. The *measure* of moral responsibility being in proportion to the degree in which the moral and intellectual faculties are possessed.

Of all the elements of the mental constitution which renders man legally accountable as a *moral* being, and the absence of which annuls his responsibility, the *law* only allows decided non-developement of brain, or disease after developement.

LEGAL CONSEQUENCES OF INTELLECTUAL MANIA.

General intellectual mania annuls all responsibility : while intellectual monomania only renders the subject of it irresponsible for acts coming within the sphere of the faculties diseased. To render a marriage contract valid, it is not sufficient that the party is able to go through the marriage ceremony with propriety, as decided in the case 4, Pickering's Reports 32, and amply proved by John Nichol in the case of Browning vs. Reed, 2 Phillimore's Eccles. Reports 69, and in the case of Turner vs. Meyers, 1 Haggard Con. Rep. 414.

The intellectual monomaniac should be left in the possession of all civil rights that he is clearly capable of exercising, and no duties should be exacted of him involving the interests of others, and which may equally well be discharged by others. These views are sanctioned by many distinguished physicians and jurists, says Ray. Hoffbauer supports them to the fullest extent. Esquirol sanctions them. Georget admits them in application to civil cases. And Paris and Fonblanque have explicitly recognised their correctness. Evans in his translation of Pothier on obligations, expresses an opinion on the subject no less positive and precise, though they are not yet as distinctly received in courts as could be wished.

In relation to testamentary dispositions, Sir John Nichol says, in the case of Dew vs. Clarke, 3 Adams' Report, 79 : "if the will is the direct unqualified offspring of *the* morbid delusion concerning the person who is disinherited, it should be pronounced null and void in law." Ray 242. And the same principle is laid down in the case of Johnson vs. Mor-

ris' heirs, 1 Littel's Reports 371, and Esquirol relates a similar case.

Criminal, like civil acts, should be annulled only when the act comes within the range of the diseased operations of the mind: for the connection of the morbid delusion with the criminal act is generally very direct and not easily mistaken. If the connection be indirect, or remote, it ought to excite suspicion. Under Hale's decisions monomania has seldom been considered, by itself, sufficient to annul responsibility for crime, unless the principal delusion was of a religious character. But the practice of the American courts has been guided by more liberal doctrines, as is seen in the case of Lawrence at Washington in 1836, in which the court said, that a person is not responsible for whatever criminal act is committed under the influence of delusion. See also the case of Theodore Wilson, tried in Maine, Ray 257. The same principle had been previously recognised in England by Lord Kenyon in the case of Hadfield. Collison on Lunacy, 1, 488.

LEGAL CONSEQUENCES OF MORAL MANIA.

Nature has established a certain adaptation of the moral and intellectual faculties to each other, and one cannot be deranged without disturbing, in some degree, the other. Therefore, general moral mania furnishes good ground for invalidating *civil* acts. Culpability supposes, not only a clear perception of the consequences of criminal acts, but the liberty, unembarrassed by disease of the active powers which nature has given us, of pursuing that course which is the result of the free choice of the intellectual faculties. In the healthy state of the faculties the power of perceiving the good and the evil, is associated with the ability of obtaining the one and avoiding the other. An opposite condition should always annul responsibility or confer immunity.

In all cases of the *shadow* of a doubt the trial should be postponed, for insanity is sometimes so completely veiled from observation, as never to be suspected by the most intimate associates of the patient. In the case of Bretet, related by Georget, the existence of insanity, though of several years duration, was not recognized until after the death of the subject.—Ray 271.

The presence of mental alienation should be admitted in him who commits a homicide without positive interest.

without criminal motives, and without a reasonable passion.

Moral Monomania completely annuls all *moral* responsibility for acts committed under its influence. Yet these unfortunate beings should be placed where they cannot repeat the act, and can have judicious medical treatment.

DEMENTIA.

Dementia is characterised by an enfeeblement of the moral and intellectual faculties, which were originally sound and well developed, and is produced by old age and disease.

Symptoms. The most characteristic symptoms are forgetfulness of the past, indifference to the future, and childishness of disposition.

Idiocy and imbecility differ from dementia in being congenital, or nearly so, and they consist of a destitution of powers never possessed, and are incurable. The whole condition of dementia displays the existence, not of physical *imperfection*, but of physical *weakness* (many of the bodily powers being enfeebled also) and consequently it may be frequently relieved if not cured.

Dementia is distinguished from mania by the latter arising from an exaltation of vital action, and a corresponding increase of force and rapidity in the cerebral functions.

In dementia the moral habits and natural feelings, so far as they are manifested at all—unlike mania—lose none of their ordinary character. The temper may be more irritable, but the moral disposition evinces none of that perversity which characterises mania. Dementia is not only a decay of mental power, but a pathological state of the brain; the mind is not only feeble but deranged. The earliest symptoms of its approach is a forgetfulness of recent events, while a distinct recollection of former occurrences exists. Next, the patient forgets the intermediate ideas,—the connection between these he does remember, and that order and relation of them necessary to sound reasoning is destroyed.

Coincident with this state, an inability occurs to discern the qualities of form, size, weight and color, which is rather a defect of the *internal* perceptive organs than the *external* senses, which may be unimpaired, so that sound, light, touch, &c. &c., are well enough received. Dementia is not yet completely established, but it is in the next step, when a degree of incoherence of ideas, like those of sleep, takes place. At first it is not constant but soon becomes so, and all the moral and intellectual faculties are then involved in the de-

rangement. The thoughts succeed each other without connexion; the language is equally incoherent, and insulated words and phrases are repeated without any consciousness of their meaning. It seems, says Esquirol, as if they were listening to imaginary tales, which they repeat in obedience to an involuntary or automatic impulse excited by their old habits, or fortuitous associations with old impressions. The whole face is destitute of expression, and indicative of fatuity. The functions suffer but little: nervous affections, such as paralysis are not unfrequent complications of dementia. There are *two* forms of dementia. 1. Acute. And, 2. Chronic. The first is the result of a sequel of errors in regimen, of fevers, hemorrhages, metastasis, suppression of customary evacuations, and the depleting treatment of mania. The second may succeed mania, epilepsy, masturbation and drunkenness, but is generally that decay and derangement of the mind which occurs in old age: but there is not merely decay, as in old men but derangement too.

LEGAL CONSEQUENCES OF DEMENTIA.

In the last stages of dementia there can be no more question, in respect to the individual's legal relations, than exists in confirmed intellectual mania; it is only in the *transition* state, in that between its forming state and complete establishment, that any question can arise. In deciding upon the legal responsibility of dementia, the great point to be determined is, not whether the individual is apt to forget the names of people in whom he felt no particular interest, or the dates of events which concern him but little, but whether in conversation about his affairs, his friends and relations, he evinced sufficient knowledge of both, to be able to dispose of the former with a sound and untrammelled judgment.

FEBRILE DELIRIUM.

To the common observer delirium closely resembles mania. But in mania there is a recognition of persons and things, and a consciousness of all that is passing. The delirious can seldom distinguish one person or thing from another. In delirium there is an entire abolition of the reasoning power. In mania, however false and absurd the ideas may be, there are patches of coherence, and some logical sequence in the discourse. The maniac still reasons, though it be incorrectly. In mania the muscular power is

not necessarily or perceptibly diminished. Delirium is generally attended with much muscular debility. In mania the senses are not *necessarily* impaired; in delirium they are greatly affected. In mania the bodily functions are not necessarily disturbed. In delirium every function suffers. Mania exists alone and independent of every other disorder; whereas delirium is only a symptom of some other disorder.

LEGAL CONSEQUENCES OF DELIRIUM

If testamentary dispositions are made during the remission or intermission of the fever on which delirium depends, they are held valid. When delirium is the *habitual* state, and the lucid interval the *occasional* one, the mind *may* have sufficient capacity to make a will, but no other civil act should be held valid. The lucid intervals must be proved beyond a doubt, as in mania, but much *less* proof is necessary than in the latter.

The principle is sound that a person may be capable of testamentary acts, though incapable of doing other acts requiring much reflection and deliberation, and the existence of the testamentary capacity must then be established by the will itself. If it be in conformity to previous declarations made, and directions given, in a state of unquestionable mental soundness—if it be consistent one part with another, and no improper influence is proven, it will be held valid, even though the medical testimony cast doubt on the capacity of the testator. And on the other hand, if these conditions are absent, or are replaced by others of an opposite character, it will be as generally annulled, however plain and positive may be the evidence in favor the testator's capacity.

In the stage of delirium called coma, when the patient may be aroused to consciousness, but drops to sleep again as soon as they cease to excite him, he is deemed legally incapable of making testamentary dispositions.

And the same rule is applied to coma from concussion of the brain, when the reaction, though commenced, is not sufficiently established to continue the consciousness after the attempts to excite it have ceased.

DURABILITY AND CURABILIY OF MENTAL ALIENATION.

Of all the forms, mania is the only one, that admits of

cure, and the probability of its cure lessens as time elapses up to a certain period, perhaps three years, when the probability of cure is almost lost. Dr. Burrows says: "91 per cent. of *recent* cases are curable, and in the Connecticut Retreat, 96 per cent. have been cured. It would appear from the latest statistics of this country, taking the average of 12 months, 92 per cent. have been cured. The curability from one year to three, averages 40 per cent.; after this latter period the average does not reach 3 per cent.

Recovery from insanity generally takes place gradually, though occasionally the disease seems suddenly to disappear on the occurrence of certain moral and physical impressions, but in these cases it is probable that the disease was declining, and its termination was only hastened by these impressions. Intellectual monomania, is with more difficulty cured than general; and the latter is more easily cured when produced by some violent cause, than when induced gradually by any steadily continued cause.

A constitution unimpaired by excesses of any kind—a good moral and intellectual education, the absence of hereditary predispositions, and early medical and moral treatment, are circumstances that facilitate recovery.

Mania is very apt to relapse during convalescence, and recurrence is frequent after cure. The proportion of cases in which insanity is recurrent is estimated from one-tenth to one-sixth, by different authors. Recurrence is less apt to take place when the mind has regained its usual capability, than when left in a weak and irritable state, and the aptitude to recurrence diminishes with the length of the interval since recovery.

LUCID INTERVALS.

It is evident that the pathological state of the brain does not wholly disappear during the lucid interval that sometimes occurs in mania, but continues with a modified intensity. The same thing takes place in all diseases of periodicity, such as intermittent fever, and recurrent epilepsy, &c.

Lucid Interval, in the legal sense, says Dr. Aquesseau, is not a mere diminution, or a *remission* of the complaint, but a kind of temporary *cure*, an *intermission* so clearly marked, as in every respect to resemble the restoration to health. See Evans' Pothier's Obligations, appendix 579.

Lord Thurlow says it must be an interval in which the mind, having *thrown off* the disease, had *recovered* its *general habit*. Attorney General vs. Parnther 3d. Brown's Chan. cases 234. Now the weight of medical testimony goes to deny that any such state ever exists. Physicians admit only a *remission*, and not an *intermission* of the disease, an *abatement* of the severity of the disease and not a *cure*. Haslam, Ray, Fœderi, Georget, Reid, and Combe, all concur in this opinion.

The principle of law, which holds the civil responsibility of the insane to be unimpaired during the lucid interval, is however generally correct. It should be the duty of courts, however, to view the acts done at such times with the most watchful jealousy, because their minds, though left free from delusion are nevertheless weak and irritable, and they are easily induced, by the acts of unprincipled men to enter into transactions, the folly of which would have been obvious enough to them before they began to be insane. And in all cases, the proof of the lucid interval should come up to the requirements of the distinguished legal authorities already cited. Lord Thurlow says, that the evidence in support of the allegation of a lucid interval, after derangement at any period has been established, should be as strong and demonstrative of such a fact, as where the object of the proof is to establish derangement itself. The evidence in such a case, applying to stated intervals ought to go to the *state* and *habit* of the person, and not to the accidental interview of any individual, or to the degree of self-possession in any particular act. See Cartwright vs. Cartwright, Phillimore's Rep. 90.

In relation to testamentary dispositions, the state of the will goes *very far* to prove the existence or non-existence of the lucid interval, and consequently the validity of the act, as decided by Sir William Wynne. Yet the face of the will may not establish the fact of the existence of the lucid interval, it may only render it probable, and, in the *absence* of *all other* opposing testimony, may be considered sufficient to establish the validity of the act. For if there be opposing testimony, no medical man acquainted with insanity would admit the correctness of the decision; as all we know of insanity contradicts the idea of a lucid interval, of a few moments duration, being interposed between years of insanity, and as suddenly disappearing. It is not objected that such wills should be valid, but the *ground*

of their validity should be distinctly stated, and understood to be the *character* of the *act*—the face of the will—and not the *condition* of the testator's *mind*. Sir John Nichol, in the case of Groom and Thomas vs. Thomas and Thomas, 2 Haggard's Eccles. Reports 433, would not admit the face of the will, though nothing in it in any way negatived the idea of a rational mind, to be sufficient to establish the existence of a lucid interval. And a similar decision appears to have taken place in the case of White vs. Driver, 1st Phillimore, 84.

Although it is admitted that the *civil* responsibility with certain reservations, is unimpaired during the lucid intervals, it is not so with the *criminal* responsibilities: because the crimes generally committed in a lucid interval, are generally the result of the momentary excitement produced by sudden provocations—and these provocations produce a recurrence of the disease, by recalling or increasing the irritation on which the mania depends, and which state absolves from all the legal consequences of crime.

SIMULATED MANIA.

The method that is in madness, the constant and consistent reference to the predominant idea, which the practical observer detects amidst the greatest irregularity of conduct and language, is one of the most essential features in the disease, and what is very rarely successfully imitated, and indeed, is seldom attempted. So difficult is it to simulate insanity successfully, that Conolly affirms, that he can hardly conceive a case which would be proof against an efficient system of observation, and Georget, Haslam and Pritchard confirm it. Attention to the state of the pulse, (its frequency) is worthy of consideration. From many experiments made by Earle on the pulse of the insane and sane, the following conclusions may be derived.

1. The pulse of persons laboring under *acute* insanity is more rapid than those in whom the same disease has assumed its *chronic* form.

2. The pulse of the insane, whether the disease be acute or chronic, has a higher mean rapidity than that of the sane who are enjoying physical health.

3. The general law of diminution in the rapidity of the human pulse, coincident pari passu with advancing age, is abrogated in the insane.

4. The general law of diminution in the rapidity of the

pulse is nearly one quarter greater when they are under general, though not immoderate, muscular exercise, than when they are in the state of comparative rest.

The simulators overact the character they assume. The impostor is constantly guilty of some word or act grossly inconsistent with real insanity, and affording an easy clue to the truth of the case. The maniac has generally no difficulty in remembering friends and acquaintances, places, names, dates, events, and the occurrences of his life.

He perceives, with some exceptions, the ordinary relations of things, and is shrewd in his discrimination of character. His replies to questions, if they do evince some delusive or extravagant notions, generally have some relation to the subject. Whereas a simulator will pretend ignorance of all these things, particularly if such ignorance will at all conduce to the proof of his innocence.

The common error of the simulator is that nothing must be remembered correctly, and that the more incorrect and absurd the discourse, the better is the attempt at deception sustained. In monomania the subject of delusion, though it may frequently change, completely occupies the mind for a longer or shorter period, and the patient's discourse will always have some kind of relation to it. With the simulator, the hallucinations are not always changing: but he shapes his answer without any reference to the subject, and generally to some new insane idea. There is also a hesitation and premeditation in the succession of ideas, however incoherent, wholly different from the rapidity and abruptness with which the train of thought is changed in mania. When requested the simulator will generally repeat his disordered ideas correctly—whilst the maniac will as generally deviate or introduce ideas that had not before presented themselves.

In mania there is great perversion and even eradication of the parental, filial and conjugal feelings. Confidence is supplanted by suspicion: love by jealousy: grace and suavity of manner by fierce and hostile demeanor: and as the severity of the disease abates, the affections return. While the impostor generally evinces no settled diminution of his attachment to his family or his friends, but shows his ordinary fondness for his children or parents: or if he has suppressed all such displays, the first menace of injury elicits his regard and anxiety for them. In mania there is some insensibility to the proprieties of life: the virtuous and modest use obscene and profane language.

The wild eye, strange expression, and febrile action of the pulse, that generally exist in mania, cannot be imitated by the pretender. Mania usually approaches gradually —when assumed it is sudden in its invasion. Persons feigning mania lack the bold unflinching look of real maniacs—they never look the physician steadily in the face, nor allow him to fix their eye: and the accusation of imposture is followed by change of countenance In real mania the system becomes insensible or greatly resists the operation of opium: not so in the feigned.

Idiocy and imbecility are sometimes simulated. But the history of the individual, and his physical constitution furnish conclusive proof of imposture. In imbecility there is such a mixture of stupidity and shrewdness, that it cannot well be imitated. When a person replies to inquiries in such manner as to criminate himself, it may be safely concluded that the imbecility is genuine; and if the whole tenor of his replies be of an exculpatory character, he is generally an impostor.

Senile dementia is sometimes assumed by old persons —but they generally overdo the character and acts of the maniac.

In arriving at a final decision in cases of feigned mental alienation, the judgment is not to be determined by any single symptom however striking, but every pathological indication, every possible motive to action, in short the whole moral, intellectual, and physical history of the individual should be faithfully studied before we come to a definite conclusion.

Ample time should be demanded for this purpose and unless it be granted, the physician would be justified in declining altogether the duty assigned to him. Opportunities must be provided of observing the simulator, when, thinking himself not watched, he throws off the guise he has assumed and returns to his own proper character.— But we must not forget the perseverance and vigilance of these impostors, for they are apt to suspect that they are watched.

CONCEALED INSANITY.

To detect concealed insanity there are three classes of means. 1, The interrogatory. 2, Continued observations. And 3, The inquest.

1. Of the interrogatory. When we have possessed our-

selves of a full knowledge of his moral and intellectual character, his education and habits of life, the duration and nature of his mental delusion, and the state of his relations to others; and after observing the expression of his countenance, his demeanor and general appearance, we may proceed to a direct examination of his course. We should lull suspicion and allay distrust, and convince him that we take an interest in his welfare. We should then by gradual and imperceptible transitions arrive at the subject on which he is deranged, and the manner in which he treats the subject should be accurately noted, and if he is really insane he will probably avow it. While, if he is not, he will declare his disbelief in the notions imputed to him, and give various considerations in support of its truth.

In conversation we should introduce those who have interfered with him, particulaly if they be relations, and he will be very apt to indulge vindictive feelings against them.

If it be imbecility, or dementia, we must not confine our questions to their present condition or feelings, for here they may be able to answer clearly and rationally, when subjects requiring a little more reflection or exertion of memory, may be far beyond their comprehension. We must test every faculty separately, for one may be nearly extinct, while another is of ordinary strength. See the case of B, mentioned by Abercrombie and Combe, 244.— The interrogatory is generally sufficient except in moral mania. In this it mostly fails.

2. Continued observation. During observation we should induce them to write letters and describe their situation, when they will betray their insanity, even when they have failed to do so in conversation, by the union of discordant subjects, the relation of things which have not happened, and could not have happened, says Conolly, by a forgetfulness of common words in spelling, or of the arrangement of words well known, even when they have been well educated.

3. Inquest. The inquest consists in collecting information respecting the patient's condition before and after the presumed disease, and the causes suspected to have impaired his mind, from his papers and those most about him. Our witnesses should be required to give us *facts* and not *opinions*.

We should ascertain if madness be a disease of his fami-

ly: if he have already evinced eccentricity of character, moral or intellectual: or mental exaltation of any kind: if he have been exposed to the influence of powerful causes, such as chagrins, severe and repeated crosses, reverses of fortune, &c.; if without any motive he have manifested any change of his habits, tastes or affections: in short, we should enquire into all these circumstances which so frequently precede the developement of mania. If by these means we cannot ascertain that he is insane the probability is that he is not a proper subject of legal interference.

SUICIDE.

Suicides may be divided into two classes, founded on the different causes or circumstances by which they are actuated. The first includes those who have deliberately committed the act from the force of moral motives alone. The second, those who have been affected with some pathological condition of the brain, excited or not by moral motives. It must be acknowledged that the cases are rare where there exists a perturbation of mind, that would induce an individual to precipitate himself out of the world, when the excitement of the organic actions of the brain and nervous system, which accompanies it, has not transcended the limits of health, and passed into real pathological irritation. In the cases mentioned by Mrs. Trollop of the two youths that suffocated themselves; and in the case of suicidal clubs, the members of which bind themselves to die, by their own hands, within an appointed time: and in men also, who, with cultivated intellects and refined passions, entertain only the meanest conceptions of the great moral purposes of life, and are ready to terminate their existence the moment it ceases to impart its usual zest to sensual gratification. Suicide is obviously, not the effect of physical disease, but of moral depravity.—But when the suicide is the result of such slight causes as in the case of the girl 10 years old mentioned by Burrows; or of the boys, one of 11 the other of 12 years, given in the Medico Chirurgical Review, there must be a pathological state of the brain, as the moral causes are totally inadequate to excite the suicidal propensity.

In some of cases the suicide—like the maniacal homicide,—feels himself urged on by an impulse he cannot resist; deplores his sad condition, and begs his friends to pro-

fect him from himself. In other cases it is necessary for some influence to excite the propensity, as in the case of the physician of the Princess Charlotte, and in that of Sir Samuel Romily.

Among the features that ally the propensity to suicide with ordinary mania, is that of its hereditary disposition. Gall mentions seven cases of suicide in one family, Functions of the brain, Vol. 4, 213. Fabret says, in his treatise on hypochondria and suicide, that suicide is more disposed to be hereditary than any other kind of insanity. It is infectious or rather sympathetic, says Costel, and is somewhat epidemic.—Burrows on insanity, 438.

Dissections show the same pathological states as exist in mania, except in the rare cases that can be clearly traced to moral causes.

LEGAL CONSEQUENCES OF SUICIDE.

In relation to wills the general practice is, that if there is no evidence of insanity either in the individual's conduct or conversation, or on the face of the will itself, to decide in favor of its validity. In the case of Burrows vs. Burrows, 1st Haggard's Ecc. Rep. 109, it was held by Sir John Nichol, that when there is no evidence of insanity at the time of giving instructions for the will, the suicide three days afterwards did not invalidate the will by raising an inference of previous derangement. In the case of Brooks and others vs. Barret, Chief Justice Parker decided that suicide fifteen days after the date of the person's will, was not sufficient, in the absence of other evidence, to prove him insane, and thus invalidate the will.

When, however, the unreasonableness of the will itself raises a suspicion of the testator's sanity, the act of suicide within a short time will always be strongly confirmatory of it, and in connexion with attending circumstances, may in some instances turn suspicion into conviction.

SOMNAMBULISM.

This is a co-operation of the voluntary muscles with the thoughts, which occupy the mind during sleep, and a morbid condition of the system, involving, primarily or secondarily, the *brain*. During the continuance of this state the individual can apparently, see, hear, taste, smell, walk, write, paint, speak and perform his usual avocations, yet

remain so soundly asleep that it is impossible to awake him without using great violence. The eyes are generally, though not always closed. Somnambulists execute dangerous feats which they would not attempt if they were awake.

There is a form of this affection, called ecstasis or cataleptic somnambulism, from its being conjoined with a kind of catalepsy, in which the walking and active employments are replaced by what appears to be a deep sleep; the patient conversing with fluency and animation, and exercising the mental faculties with activity and acuteness. But in this and the former kind, the person generally loses all recollection of whatever transpires during the paroxysms, though it be revived in a subsequent paroxysm. Ectasis is very nearly allied to hysteria and epilepsy, both in its phenomena and its curability by medicine. The attacks of cataleptic somnambulism are invariably preceded by derangement of the general health, and in females by disturbance of the uterine functions especially. All cases of somnambulism have their recurrence prevented by the treatment which is most successful in those affections with which they are pathologically related. It is induced by whatever produces congestion of the brain, such as intemperance, eating and drinking, &c. It is evidently hereditary. The cataleptic form is chiefly confined to females and especially about their climacteric. Whilst the other forms are chiefly confined to males, childhood, and the early periods of manhood, but very rarely is it seen in old men.

In the somnambulist, either the perceptive organs are inordinately excited, and thus he is led to mistake inward for outward sensations: or the perceptions—if correct—are misapprehended by some obliquity of the reflective faculties: in some instances both of these events take place. He talks, moves and eats unconscious of his real condition, and of nearly all his external relations. Somnambulism is not very remote from mania, the difference consisting in some circumstances connected with the causes that give rise to the derangement of the faculties. In mania the pathological condition of the *brain* is continuous: in somnambulism it appears only *during* sleep, by which it appears greatly modified.

LEGAL CONSEQUENCES OF SOMNAMBULISM.

If it incapacitate a person from the proper performance

of the duties and engagements of his situation, it impairs the validity of contracts and other civil acts to which he is a party. It may annul contracts for service by rendering the individual troublesome, mischievous or dangerous. In relation to the marriage contract, if it be concealed, when its avowal would have prevented the other party from entering into the contract, it will annul it upon the ground of fraud.

As the somnambulist does not enjoy the free and rational exercise of his understanding, and is unconscious of his outward relations, during the paroxysms, none of his acts can be imputed to him as crimes. Hoffbauer places him on the same footing as the monomaniac, except that if he knows his infirmity, and he has not taken every possible means of preventing injurious consequences to others, he is then not excusable.

SIMULATED SOMNAMBULISM.

Somnambulism may be feigned by two classes of persons. 1. By those who have, at other times, really experienced its attacks, And 2. By those who have not at any time been under its influence. In the first class of simulators, a comparison of their acts and conversations with those when they experience a real paroxysm may furnish a clue to the real nature of the act imputed to them: for it is scarcely possible that, if feigning, they will not be caught tripping in some of their manœuvres. And in the second class, no doubt can remain of the genuineness of the attack, if the person performs feats which he would not dare to attempt when awake, unless, which would be hardly possible, he has systematically concealed his skill and abilities: and if the physical symptoms of somnambulism be present it will be a strong confirmation of its reality.— The converse of this proposition cannot be equally true. For the benefits of society it is but just that the burthen of proof should rest on the somnambulist, else somnambulism, from its easy imitation, and the individual being generally unobserved during the paroxysm, would soon become a favorite excuse for crime. If the criminal act be manifestly contrary to the known character and disposition of the accused, and especially, if it can be shown that he could have entertained no motive for injuring the other party, but little else beyond a straight story, and an air of sincerity ought to be required to establish the truth of his own assertions.

EFFECT OF INSANITY ON EVIDENCE.

According to Coke the insane are disqualified from appearing as witnesses in courts of justice, their incompetence being inferred from their mental unsoundness. But according to Hoffbauer, the less aggravated forms of imbecility do not disqualify a witness, though the higher degrees do have this effect.

In partial intellectual mania, the capacity of testifying under certain circumstances, and with certain reservations, is still preserved, though considerable knowledge of the case and extreme caution are requisite to measure the witnesses' credibility. They should be allowed to testify on all subjects neither directly nor indirectly connected with their derangement. In confirmation see the case of Jonathan Jones, Ray 406. Evans says of an insane person, it might for defect of other evidence merit to be considered, whether, in civil cases at least, the testimony of such a person might not be admissible upon points where his understanding did not appear to be subject to disturbance, &c. Pothier's obligations, append. 269. And agreeably to Georget, it is necessary to know the patient, the character of his madness, his customary relations to surrounding objects, before we can know what degree of confidence to place in his assertions. From the feebleness of memory in maniacs, the facts to which they are allowed to testify should be of recent occurrence. Where general mania exists, all competency to testify is lost, except during the lucid intervals, and then the testimony must be confined to facts that occurred previous to the insanity, or during a lucid interval, and then it ought to be restricted to simple facts easily perceived, and not extended to complicated details. In moral monomania the testimony ought to be admitted, except when the individual has the irresistible propensity for lying.

In general moral mania the whole of the moral powers are so deranged that their testimony is entitled to little weight, except when limited to facts in regard to which it can be shown their feelings are not interested.

The competence of an individual, under dementia, to testify, must be limited to things remote rather than recent, and his testimony must be confirmed by his recollection of other events that occurred at the same period, and of which he was witness, unless some good reason can be shown why he should forget the one and recollect the other.

DRUNKENNESS.

The first effect of alcoholic liquors is to excite the sentiment of self-satisfaction, and diffuse an unusual serenity over the mind. The vigor and activity of the intellectual and physical powers is increased. His thoughts flow with more facility and accuracy. He feels an exhileration of spirits, a sense of warmth and gaiety, and his imagination is crowded with delightful images. The sight and hearing are but slightly affected. There is yet no drunkenness. Soon however, the torrent of his ideas becomes more rapid and violent, and he can scarcely express them, and now he feels all the miserable short-lived pleasure of intoxication. As yet the brain is in tolerable order, and this rapid flow of ideas, without the ability to arrange them properly, is the first well marked symptom of intoxication. His ideas now succeed each other with constantly increasing force and rapidity; his sensations lose their ordinary delicacy, and his imagination gains as fast as the sensations lose. He now feels an irresistible propensity to talk nonsense, but is perfectly conscious that it is nonsense. From difficulty of hearing his voice becomes loud, and the organic activity of the brain is at its height. His imagination is now filled with false and ludicrous images; his vision becomes illusive, he confounds one thing, or person with another. He is very apt to imagine that he has offended some one, or that he has been offended, and thus a ludicrous anxiety to apologize, or he abuses or strikes his supposed offender. He now becomes the slave of his passions, and obeys their suggestions. His tongue soon stammers, and his voice gets thick. His legs falter, he falls from his seat, and is plunged into profound sleep, in which the manifestation of his physical and intellectual powers is completely extinguished. He is now dead drunk. Such is the ordinary fit of drunkenness, varying according to the temperament or habits of the individual and the attending circumstances.

Drunkenness frequently leads to that curious form of insanity called delirium tremens. It may be the immediate effect of an excess, or series of excesses in those who are not habitually intemperate, as well as in those who are: but it most commonly occurs in habitual drinkers, after a few days of total abstinence from spirituous liquors. It is also likely to occur in this latter class when laboring under other diseases or severe external injury, that give rise to

any degree of selfishness, tremors of the hand and tongue, delusion, and generally great apprehension of danger. One of the most common hallucinations is that of constantly seeing devils, snakes, vermin and all manner of unclean things around or about him, and people in the room about to do him some injury, and he often will either commit suicide, or murder some of his attendants to be freed from his fancied annoyance. More generally, however, he is tractable and not mischievous.

LEGAL CONSEQUENCES OF DRUNKENNESS.

According to Hoffbauer there are three degrees of drunkenness. In the 1st degree the ideas are unusually vivacious, the individual perfectly retains the consciousness of his external condition, and is in perfect possession of his senses, and his passions *can* be repressed. In the second, the use of the senses are still possessed, but they are greatly enfeebled, and the individual is entirely beside himself; memory and judgment have abandoned him. He is therefore not unlike the maniac, and can be responsible for his actions, only so far as he is for his drunkenness.

In the third degree the individual not only loses his reason, but his senses are so enfeebled that he is no longer conscious of his external relations.

In the first stage his legal relations are not at all affected. In the second and third stages, (so much is the soundness of his understanding and clearness of his perceptions impaired, and his passions excited,) he acts more or less ununconsciously, and his drunkenness is apparent to any one: all *civil* acts executed when in that condition are strongly exposed to the suspicion of *fraud*, and may be avoided on that *ground*.

In relation to *criminal* acts, Coke says, a drunkard who is "voluntarius demon hath no privilege thereby: whatever ill or hurt he doeth, his drunkenness doth aggravate it."

Drunkenness gives rise to certain pathological conditions of the brain affecting the operations of the mind—among which is delirium tremens, the presence of which, according to the decision of Judge Story, in the case of Drew, American Jur. 7 & 9, annuls responsibility for crime. He declares delirium tremens to be insanity, and says "*in general*, insanity is an excuse for any crime, because the party has not the *possession of his reason*, which includes

responsibility. An *exception* is where the crime is committed while the party is in a *fit* of intoxication and while *it lasts*, and not, as in the case of delirium tremens, a *remote consequence* superinduced by gross and habitual drunkenness. Had the act been committed while Drew was in *a fit of intoxication* it would have been *murder*.

The law looks to the *immediate* and not to the *remote cause;* to the *actual cause* which *remotely* produced *this state.*"

The case of Thurlow Wilson, who was tried in 1836 in Maine, for the murder of his wife while laboring under delirium tremens was decided on the same principles. The court, in charging the jury, observed that it was not material what species of insanity it was under which the prisoner had been suffering, if satisfied with the existence of insanity.

But this principle seems to have been lost sight of in the case of John Birdsale of Ohio, who was tried in 1829 for the murder of his wife, while laboring under delirium tremens. The court charged the jury to ascertain, whether the prisoner was capable of discriminating between right and wrong. They returned a verdict that he was capable, and brought in a verdict that he was guilty of murder.—Amer. Jur. No. 3, p. 10. But the Governor, probably not satisfied with the decision, on petition commuted the punishment to imprisonment.

In the case of Birdsale, the court said on an application for a new trial, that they were not called on to give an opinion whether delirium tremens would, *under any circumstances*, be an excuse for crime, but they felt no unwillingness to express their opinion, that if the *insanity* were the offspring of intemperance, and the prisoner *knew* that intoxication would produce *it*, he could not plead it as an excuse. Birdsale, it appears, did *know* that insanity would, in his case, be *likely* to be produced by intoxication, yet he had no reason to *know* or *believe*, that while in that state he would attempt the life of his wife or any other person. This whole opinion contrasts strongly with the principles laid down in the opinion of Justice Story.

Paris and Fonblanque say there are many persons who have been severely wounded, especially on the head, who well know that excess in drinking makes them mad; but if such persons wilfully deprive themselves of reason, they ought not to be excused one *crime* by the voluntary perpe-

tration of *another*. And Justice Story says, that if the crime is committed *during intoxication, and while the fit of intoxication lasts*, it does not annul responsibility. (And under this rule, McDonough was executed for the murder of his wife.—Ray 446. Georget 159.) He knew that during the *fit of intoxication* he was a madman. And in the case of Vatelot, we have an instance of conviction for homicide committed *voluntarily*, but *without premeditation*, and instead of being hung he was sentenced to hard labor. The only difference between his case and McDonough's was, that he did not from experience *know* that intoxication would make him mad.

But Allison, in the following opinion, seems to entertain more correct and humane sentiments on this subject. He says, "that if either the insanity supervenes from drinking without the person being aware that such an indulgence in *his* case leads to *such* a consequance ; or if it has arisen from the combination of drinking with a half crazy or infirm state of mind, or a previous wound or illness which rendered spirits fatal to his intellect to a degree unusual in other men, or which could not have been anticipated, it seems inhuman to visit him with the extreme punishment which was suitable to the other case. In such a case the proper course is to convict : but in consideration of the *infirmity proved*, recommend to Royal Mercy. Criminal law of Scotland, 654.

INTERDICTION.

In imbecility, where no disposition is shown to squander money on trifles, and they do not suffer their affairs to be grossly neglected, there can be no reasonable pretence for taking it entirely from under their control and enjoyment. Under a contrary state of conduct interdiction should take place.

General intellectual and moral mania are always a sufficient cause of interdiction : for the reflective faculties are too much deranged to discover the relations of property, or to provide the necessary arrangements for preserving and improving it.

In partial mania, Hoffbauer says, we should be governed by the nature of the predominant idea, not considering it a sufficient ground of interdiction, unless connected with the subject of property in a manner likely to lead to its wasteful and improvident management. Such too were the opinions of Rush and Conolly.

Mental derangement, says Toulhier, a celebrated French jurist, to be a sufficient reason for interdiction, should have reference to the ordinary affairs of civil life, and to the government of the person and property of the individual; a man who is merely visionary, or entertains speculative notions that are palpably false, should not be interdicted, if he manage his affairs well enough in other respects.

In dementia there is always a period when interdiction is required, whenever the patient has much property, or conflicting interests are involved in its disposition. It is difficult to decide when this period arrives, but as it will arrive with certainty, we need not require a positive proof of its existence, as in other cases of mental alienation, for if we interdict earlier than is absolutely necessary, we only anticipate a period that will certainly arrive.

INFANTICIDE.

Infanticide is properly divided into two varieties, 1. Fœticide, or the destruction of the fœtus in utero *before* it is *viable*. And 2. Infanticide proper, or the destruction of the child *during* or *after* parturition and *after* it is *viable*.

In every instance in which a reputed case of fœticide becomes the subject of legal investigation, the great points which present themselves are the following:

1. Has the fœtus in utero been actually destroyed?

2. Has this been brought about by *criminal means*, or by accidental and natural causes?

The English law, as laid down by Blackstone, considers life not to commence before the infant is able to stir in its mother's womb, and by a recent law the procuring of abortion *after quickening* is punished with death, while the same crime *before* quickening, is only viewed as felony. This is contrary to reason or physiology which admits the embryo to possess vitality from the very moment of conception.

Has the fœtus been actually destroyed? The proofs to establish this have been drawn from two sources, viz:— from an examination of the reputed mother: and an examination of the fœtus, for which, see signs of delivery, &c. &c.

Of the criminal means resorted to for destroying the fœtus. These may be divided into general and local.— To the first belong emetics, cathartics, diuretics, emena-

gogues, &c. &c. The second embraces all kinds of violence directly applied.

Emenagogues that have been used to procure abortion. Oil of juniper, Canthirades, Savine, Mercury, Seneca snake root, Ergot, and actea racemosa.

Local means. Blows or other injuries on the loins or abdomen, the introduction of instruments into the uterus. All of the means mentioned will produce abortion, but their operation is *uncertain*, with the exception of instruments.

The evidence of infanticide proper may be divided 1st into that which has reference to the child, and 2d into that which relates to the mother.

There are four material points which require investigation.

1. Was the child born living or dead ?
2. What was the cause of its death ?
3. Has the suspected mother been recently delivered ?
4. Do the phenomena presented by the supposed mother and child confirm the suspected relationship ?

As a *general* rule the viability of the child does not occur earlier than the *end* of the 6th month. Dr. Francis's case of a child born at 23 weeks, and being alive at 7 years, is perhaps, the only *well authenticated case* to the contrary.

Phenomena which the fœtus presents from the 4th to the 9th month.

1. PROPORTIONAL LENGTH OF ITS PARTS.

In an adult a line drawn from the top of the head to the heel, has its centre at the upper edge of the pubis.

In a mature child it is at the umbilicus or a litile above it. At the *end* of 8 months it is about an inch higher. At the *end* of 7 months it is about half way between the latter point and the ensiform cartilage. At the *end* of 6 months it is just at the end of the sternum.

2. WEIGHT OF THE FŒTUS.

The average weight of a fœtus at four months is from 5 to 7 ounces. At five months one pound. At six months two pounds. At seven months three pounds to four. At eight months from four to five pounds. At nine months seven pounds. Most frequent range from five to eight pounds.

3. LENGTH OF THE FŒTUS.

The length at the full period is less liable to variation than the weight.

The average length of a fœtus at four months is from five to six inches. At five months, nine and a half inches. At six months, twelve inches. At seven months, fourteen inches. At eight months, sixteen inches. At nine months nineteen inches. The *extremes* are sixteen and twenty-three inches at nine months.

4. STATE OF THE SKIN, &c.

At the end of the fourth month the skin is rosy and moderately dense. The pupillary membrane is very visible. The meconium is a little colored and occupying the commencement of the small intestines. The brain exhibits the interlobular furrow. The bones of the sacrum are beginning to ossify. The kidneys are voluminous, consisting of from fifteen to twenty lobes. The supra renal capsules are as large as the kidneys.

At the end of the fifth month, the scalp is covered with short silvery thinly scattered hair. The skin is of a deep red, but is not yet covered with sabaceous matter. The adipose tissue is but little developed. Nails scarcely perceptible. Ossification of the first sternal bone, and of the pubis and calcis has commenced. Volume of the lungs small. Heart large, the ventricles little distinguishable from the auricles. Liver very large and near the umbilicus, and consisting of two equal lobes. The gall bladder contains a little, almost colorless, serous fluid. The spleen is but little developed and lies close to the stomach. The meconium is in small quantity and only occupies the cœcum and a small portion of the colon. In the male the testicles are situated beneath the kidneys and near the lumbar vertebra. In the female the ovaries are small, elongated, soft, very distinguishable from, and in a similar situation to the testicles in the male. The brain on the surface is smooth, but several deep furrows, and convolutions are now visible on the inner aspect of the hemispheres where they are applied to the falx cerebri.

At the end of the sixth month all the external parts are distinct. The skin is very fine, of a deep red, approaching a purple color, particularly in the palms of the hands and soles of the feet, the face, lips, ears, and heart. The sto-

mach is filled with mucus, and a part of the large intestines with meconium. The colon begins to exhibit its sacculated character. The testicles are still in the abdomen under the peritoneum. The bladder hard, pyriform, and above the pubis, has but a small cavity. About this period two points of ossification are formed in the second cervical vertebra: near the seventh month the superior point which answers to the odontoid process, is larger than the inferior which relates to the body of the bone. The posterior lobes of the cerebrum now cover the corpora quadrigemina and almost the whole cerebellum. The three cornua of the ventricles are quite distinct. The choroid plexus is very voluminous. The lamina of the septum lucidum are joined so as to form the fifth ventricle. The corpus callosum extends farther backward, but does not yet cover the thalami and third ventricle.

At the end of the seventh month the skin is dense and fibrous, and is covered with sebaceous matter unequally thick on different parts of the body. The pupillary membrane has disappeared. The hair is longer and of a deeper hue. The nails are firmer, but do not extend to the ends to the fingers. The bile is yellowish and bitter. The meconium occupies a considerable part of the large intestines. The valvulæ conniventes begin to appear. The testicles and ovaries are nearer the pelvis. The posterior lobes of the cerebrum now cover and extend beyond the cerebellum, and several furrows and convolutions are observable on the surface. The corpus callosum covers the thalami, and consists of transverse fibres passing from one hemisphere to the other. The corpora quadrigemina are divided by a transverse line or furrow rendering them complete and distinct, the two superior, or nates, being somewhat longer than the two inferior, or testes, and their parietes so thick that the iter a tertio ad quartum ventriculum may be considered perfect.

At eight months the skin is covered with fine short hair, and is denser and whiter. The nails are firmer and more elongated. The sebaceous covering is more general. Oftentimes the breasts are projecting and milky fluid may be expressed from them. In the male the testicles are generally engaged in the abdominal ring. About this period the transverse processes have begun to ossify in the first lumbar vertebra. The structure and configuration of the interior parts of the brain, already completely formed, have only to be augmented in volume, the surface to be further developed. The

two hemispheres of the crebrum extend backward considerably beyond the cerebellum. The hemispheres on each side are traversed with furrows, into which the folds of the pia mater enter, but those furrows or the convolutions which they produce, are no where so marked as on the anterior and middle lobes.

At the end of nine months ossification is more complete. The descending ramus of the pubis and the ascending ramus of the ischium are consolidated. Ossification has commenced in the first cervical vertebra, and also in the coccyx. The body of the fourth lumbra vertebra, which is the most voluminous, is three lines in depth and six in breadth. The lateral portions of the six superior dorsal vertebra begin to unite so as to form a ring posteriorily to the bodies of these bones. The bones of the cranium although movable are in contact at the margins. Generally the testicles have passed the abdominal ring, or even descended into the scrotum. The nails are thicker and firmer, and are prolonged to the extremities of the fingers. Capuron states that the grey matter is now visible in the brain, but Tiedeman states that at no period is it possible to distinguish between the cortical and meduallary substance in the fœtus.

Of all the phenomena now mentioned, the progress of ossification, the developement of the brain, and the relation of the umbilicus to the centre of the body, are most to be depended on to indicate the age of the fœtus.

The great advantage to be attained by investigating the fœtal anatomy is to enable us to decide on the viability of the child.

5. APPEARANCE OF THE LUNGS.

Colour. The colour of the fœtal lungs is dark red, inclining to the brownish red of the liver, or the bluish red of the thymus gland: but in those parts of the lung in which respiration has had an influence, it is pale red or scarlet, unless they are gorged with blood, in which case it may be brownish or bluish red. Artificial respiration in a dead child changes the colour of the lungs to a pale or greyish red tint. In children who have breathed imperfectly, or only for a short time, the lungs on the anterior surface are of a pale red, on the posterior surface dark red, whilst in different parts of the lungs patches of scarlet red are visible. In children who have breathed perfectly and lived a longer time, the lungs are pale red with numerous patches and stripes of scarlet red:

posteriorly they present a dark red colour, owing to the subsidence of the blood.

Consistence. The lungs in the fœtal state, compact, become from respiration looser and expanded. They are vesicular on their surface, and air bubbles or froth may be squeezed out of them. These are circumstances to be determined by the touch and sight, and result from their mechanical distension by the air. Three sources have been enumerated besides natural breathing, from which air found in the lungs may be derived, namely, artificial inflation, putrefaction, and emphysema. The two latter produce vesicles which are *superficial*, *large* and *irregular*, and which may be pressed out so that the fœtal lung will sink, which can never happen when the lungs have been distended by natural breathing or insufflation.

A general presumption only can be drawn from the consistence of the lungs. If they are soft and have a regularly vesicular appearance, respiration, either natural or artificial, must have taken place, and a reference to the other tests of independent life will show which of the two has happened.

Specific Gravity. The fœtal lung before respiration will sink in water, but after respiration it will float, and these facts form the foundation of the *hydrostatic* test. The objections to the hydrostatic test are that the lungs lose their specific gravity after death by putrefaction, emphysema and artificial inflation. In the first two cases the air may be pressed out by wringing the lungs with a cloth so that they will float, but not so if natural respiration or artificial inflation have taken place. But the child may live several hours, certainly four, after birth without respiring, and frequently it may live several days with such partial respiration, as not to altar the specific gravity of the lungs sufficiently to make them float.—But in the latter of these cases if they are sliced, the inflated portions will float. In the former of these cases we have no means of ascertaining, if the child die before respiration, that it was born alive. We have therefore to rely on injuries inflicted on it.

In the case of artificial respiration the lungs will float, and our only means of ascertaining whether the child was living or dead is to compare the weight of the lungs with that of the body, which constitutes the *static* test of Ploquet, (which at best is fallacious,) and we will find that the weight of the lungs remains as in dead children.

It is scarcely probable that a mother who would practice artificial inflation to resucitate her child could fail to produce

satisfactory proof of her innocence. And in the case where the inflation was maliciously done by another, she would be likely to have testimony to exculpate her. Either of which considerations greatly diminishes the force of this objection to the hydrostatic test.

But if the lungs be congested, although well inflated by natural respiration, they will sink; yet if the superabundant blood be squeezed out of them they will float.

Another objection to the hydrostatic test is offered by vaginal and uterine respiration, and yet the child may lose its life in parturition and the lungs float. The correct objection to oppose to this is the rarity of such a conjunction of circumstances as is indispensable for this occurrence: and *full expansion* of the lungs, if present, would render such a plea more than doubtful.

THE STATIC TEST.

The static test is the difference between the weight of the lungs before and after natural respiration. The average weight of the lungs before respiration may be stated in round numbers to be 600 grains, and after *full* respiration 1000, agreeably to the tables of Bernt, which have hitherto been relied on, but the recent tables of Dr. Guy of London, made upon a much greater number of cases, give the following results. The mean weight of the lungs, before respiration, is 896 grains—after respiration *less* than one hour, 934 grains, after respiration twelve hours, 956 grains, after respiration one day, 1018 grains. Edinburg Med. and Surg. Journal, July, 1841, p. 46.

PLOUQUET'S MODIFICATION OF THE STATIC TEST.

This consists in the relative weight of the lungs, before and after natural respiration, to the whole body. Plouqet's conclusions were, that the lungs before respiration compared to the body was 1 to 70, and after respiration 1 to 35. But the elaborate tabular statements of Dr. Guy prove that the mean weight of the lungs to the body before respiration is only as 1 to 56, and after respiration for less than one hour 1 to 56—for twelve hours 1 to 53—for one day 1 to 39, for less than one day and more than 12 hours, 1 to 48. The only conclusion then to which we can come, is that the static test, or Ploquet's modification of it, is utterly useless for all practical

purposes, and ought not to be relied on in medico legal inquiries.

Size of the Lungs. Healthy lungs before respiration occupy the posterior part of the thorax merely touching the pericardium with their anterior borders. The posterior half only of the diaphragm is covered with them: the edges are *sharp*, the margins of the right, middle and left upper lobes forming small pointed, tongue-shaped elongations. If however the child have lived but a short time after birth, and breathed only imperfectly, the lungs are found to occupy the lateral parts of the thorax also: the anterior borders and the tongue-shaped elongations of the right, middle and left upper lobes are become round either partially or altogether. After complete and full respiration the lungs entirely fill the lateral cavities of the thorax: their anterior borders cover the sides of the pericardium, and their concave surface the whole arch of the diaphragm: their borders are every where *rounded*, and the tongue-shaped prolongations of the right, middle and left upper lobes are short and obtuse.

Ductus Arteriosus. In the fœtus the ductus arteriosus proceeds from that part of the trunk of the pulmonary artery where it divides into two great branches, and running parallel with the arch of the aota and in contact with it, joins it at a very acute angle. It is about half an inch long, cylindrical, equal in diameter to the trunk of the pulmonary artery, almost three times the diameter of its two branches, each of which is about the size of a crow quill. If the child have breathed a few moments only the aortal aperture of the duct assumes an oval form: if a little longer, it loses its cylindrical form and assumes the shape of a cone, the apex being generally at the aortal end, but sometimes at the other extremity: the diameter is diminished so as to be smaller than the trunk, but about equal to that of the two branches of the pulmonary artery, the latter, owing to the establishment of the pulmonary circulation, having already increased in diameter. If the child has lived for some time and breathed perfectly, the duct resumes its complete cylindrical form but has become shorter, and is not thicker than a crow quill, whilst the two pulmonary branches are thicker than a goose quill.

Death *during partruition* may be divided into innocent and criminal.

Causes of innocent death. 1. Difficult labor with premature loss of the liquor amnii.

2. Partial separation of the Placenta.

3. Premature expulsion of the cord.

4. Presentation of the feet, and head retained after delivery of the body.

5. Bad presentations, and consequently protracted labor.

6. Encircling the neck with the cord.

If it occur from premature loss of the liquor amnii, death will be occasioned by continued pressure, and all the signs of *apoplexy*, from such a cause, will exist.

If it occur from the separation of the placenta the child dies from hemorrhage, and we tell it from the case of death from neglecting to tie the cord by both mother and child being anemic, and also by the absence of the signs of respiration.

If it resulted from premature expulsion of the cord the death is by asphyxia, and no sign of injury would be present nor would there exist any proof of respiration.

If it be caused by retention of the *head* after the expulsion of the body, it would take place by apoplexy or asphyxia, according as the death resulted from pressure on the head or on the cord, and the corresponding signs of apoplexy would be present, and those of respiration absent and vice versa, except in the very rare instance of vaginal respiration.

In retention of the *body* from any cause, after the expulsion of the head, death results from asphyxia either by compression of the cord, or inability to expand the thorax. In the former case there would be no evidence of injury nor signs of respiration: in the latter the signs of injury would be absent, and the evidences of partial respiration, tumour of the vertex and other signs of severe labor would be present.

In the case of encircling the neck with the cord, death will be by apoplexy if respiration has not taken place, otherwise it will be by asphyxia: and if any signs of injury be left, and it has passed round but once, there will be a spiral mark; if twice, there will be both a spiral and circular mark: the epidermis will not be puckered, nor the cartilages of the trachea injured: the cord should be examined to ascertain that it is long enough to pass around at all. Its strength also ought to be ascertained, for sometimes, from tenuity or disease it ruptures before it could produce dangerous compression, it however in general is sufficiently strong to produce death by compression in *an adult*. Dr. Negrier says the medium resistance of a non-varicose cord is fourteen pounds four ounces, Troy, its maximum twenty-five pounds three ounces, and a force applied to a cord, equal to twelve pounds, would

strangle an adult in five minutes, and a much less force would strangle a child.

The long bones are sometimes fractured by the action of the uterus during gestation.

CAUSES OF CRIMINAL DEATH DURING PARTURITION.

They are 1. Puncture of the brain, heart, rectum, or spinal cord.

2. Torsion of the neck or compression of the head.

3. Detruncation, and 4. Strangling and suffocation.

When puncture is suspected examine the fontanelles, heart, rectum and neck well: the puncture is generally effected with a long needle, and the external wound is very small, if any puncture is found trace it by dissection. In case of strangling before respiration the death would be by apoplexy, and its signs would be manifest. After respiration it would be by asphyxia, and if the death proceed from suffocation the form will be asphyxia.

Torsion of the neck would be discovered by the marks of violence presented by the ligaments of the vertebra and neighboring muscles, and it is highly probable that the marks of the pressure of the fingers would be visible.

The cause of death *after* parturition are natural and criminal, and the latter may be divided into those which are fatal by omission, and by commission.

Natural causes. 1. Immaturity, disease, malformation, neglect of the usual and necessary attentions. 2. Injuries from severe labor or from sudden expulsion. 3. Sudden and simultaneous expulsion of the placenta and child, and probable hemorrhage. 4. Prevented respiration from envelopement in the membranes. 5. Suffocation in the discharges.

Criminal causes by omission, are 1 The neglect of the removing the child from under the bed clothes, and from the state of supination: 2. the want of suitable warmth: 3. neglect of nourishment: 4. and the neglect of ligature of the umbilical cord.

We have no means of detecting the first. Death from want of suitable warmth, which is almost always conjoined with public exposure, is proved by the evidence of respiration and circulation: by sanguineous congestion in the large vessels with comparative absence of blood in the superficial ones: by the location of the body: and most conclusively by the

cadaveric congestion or lividities which are met with in depending parts of the body.

Death from want of nourishment is difficult to ascertain, but the means is to discover how long the child has lived, and the appearance of the cord will establish this.

Changes which the cord undergoes after birth. Immediately after birth, at furthest in a few hours, *flabbiness* in the cord *commences* and is *complete* in a day, or at most in two days. *Dessication commences* at about the end of the first day, and is complete in four or five days, when *separation* from the abdomen takes place. Dessication will not take place in a still born child, in such the cord remains soft and flexible and then becomes putrid. The thickness or thinness of the cord will vary the period of dissication and separation. There is no suppuration or inflammation unless the cord is thick. A consideration of these circumstances will indicate the age of a child approximately within the first four or five days after birth.

The cord being without a ligature is a suspicious circumstance, especially if it has been cut. But the ligature may take place after death for the purpose of deception, yet if the child has bled to death its anœmic condition will indicate it. If upon dissection we can obtain three ounces of blood the child has not died from hemorrhage.

DEATH, AFTER PARTURITION, BY COMMISSION.

1. Division of the frænum linguæ producing a swallowing of the tongue and consequent suffocation. 2. stoppage of the ærial passages. 3. asphyxia by strangulation, or by deleterious gases, or by plunging into privies. 4. torrefaction. 5. drowning. 6. wounds and bruises. 7. crushing of the head. 8. punctures per rectum or in the region of the heart.

Strangulation is the most common way in which infanticide is accomplished, and it may be detected by marks of violence about the neck internally if not externally.

Wounds inflicted *immediately* after death resemble those produced before. If wounds are inflicted from three to twenty-four hours after death, if they be incised, the lips will be pale without swelling or retraction, and there will be no clot of blood hanging to the surface: if they be contused there will be tumefaction or infiltration of blood into the cellular tissue, or the blood will only form a clot without adhesion to the divided surfaces.

Torrefaction. When burning takes place before death a

line of redness circumscribes the burn not removable by pressure, and there will be blisters filled with serum; whereas burning ten minutes after death will produce no redness but it will blisters, they however are dry and filled with air.

If death be occasioned by drowning we shall find some of the water, in which the child is immersed, in the stomach, which cannot enter the stomach except by the act of deglution, but it may enter the bronchi of a dead child. See drowning.

HAS THE SUSPECTED MOTHER BEEN RECENTLY DELIVERED.

The first inquiry to be made is for the proofs of pregnancy having existed. The proofs of recent delivery are tumefied, distended, painful breasts, yielding on pressure or suction a a milky fluid. Abdomen soft, its skin wrinkled, and red or white lines passing in different directions chiefly towards the umbilicus, a separation of the linea alba towards the same point, the uterine tumour distinctly felt above the pubis.—There is a discharge from the vagina either of red, greenish, or light color, and of a peculiar odor. The genital organs are more or less tumefied and enlarged, fourchette sometimes lacerated. Os uteri soft and relaxed so as readily to admit the fingers, and the lochial discharges from it.

But to find these signs, examination must be made before the fourteenth day: they begin to disappear before the fourth or fifth day, and gradually subside so that in fourteen days they are mostly lost.

Possible fallacies. Sudden cessation of dropsies, discharges of unbroken hydatids, moles, and long retained and greatly accumulated menstrual fluids.

Do the phenomena presented by the supposed mother and child establish the suspected relationship?

Moral evidence is generally relied on to establish this. The medical testimony is restricted here to the state of preservation or decomposition of the child. Putrefaction proceeds most rapidly when the atmosphere is humid and still, and the heat ranges from 60° to 80° of F.

It proceeds most rapidly in parts of the body which have been injured. Bodies plunged into privies do not begin to putrefy so soon as when exposed to the air, but having begun, proceed more rapidly. Decomposition of the child is retarded two or three weeks by immersion in water.

LEGITIMACY OF OFFSPRING.

Impossibility of access by the husband during the period in which the child may have been begotten will bastardize the child. But if there be a *possibility* of access, although the husband and wife both swear to its not having taken place, the law considers the child legitimate according to the decision of Lord Hale, in Lomax vs. Holmden, confirmed by Lord Ellenborough in 1807, and previously by Sir William Wynne in the case of Newport. But in 1813 Lord Ellenborough seems to have reversed his case, "there is no *proof of physical impossibility* of Lord Banbury being the father. But in the absence of *such evidence* the question may be decided on the ground of a moral impossibility, which the conduct of the parties in this case establishes." And in this opinion he was sustained by the House of Lords.

It appears then that the law formerly stood thus:

Presumption of legitimacy may be rebutted by *physical* evidence *proving* the contrary. And that since the Banbury peerage case it stands thus.

Presumption of legitimacy may be rebutted by *physical* evidence *proving*, or by *moral* evidence rendering *probable* the contrary.

Thus under the Banbury peerage case, Phillips says the jury may not only take into consideration proofs tending to shew the *physical impossibility* of the child in wedlock being legitimate: but they may decide the question of paternity by attending to the relative situation of the parties, their habits of life, the evidence of conduct, and of declarations connected with conduct, and to every inducement which reason suggests for determining upon the probabilities of the case.

The facts to be investigated in reference to questions of legitimacy, are 3. 1. The natural period of gestation in women. 2. Premature births. And 3. The possibility of protracted gestation.

Period of Gestation. The *natural* period of gestation is nine calendar, or ten lunar months, two hundred and eighty days, or forty weeks. And this is the *natural* period recognized in law, as acknowledged by Lord Coke upon Littleton 123.

Premature Births. There are two distinct points of view under which we must consider this subject. We must inquire, first, what is the earliest period of gestation at which the condition of viability may be expected to exist:

and secondly, what are the evidences of the maturity of a child.

In relation to the first inquiry, it is admitted that the viability of the child exists at the completion of the seventh month of utero gestation, it sometimes occurs at six months, and Dr. Francis has furnished a case of a child born at five months and three weeks, which was alive and well at seven years: but seven months is the commonly received period with medical Jurists.

In relation to the second inquiry it is ascertained that the following are the evidences of maturity mostly to be relied on. Hair covering the head; solidity of the cranial bones and their close approximation along the sutures; nails firm and reaching to the extremities of the fingers; full developement of the lower extremities; the centre of the line, from the summit of the head to the heel, falling at the umbilicus or a little above; sucking readily and eagerly; and the length being from nineteen to twenty-one inches. For greater minuteness see Infanticide.

It must not be forgotten that some women always anticipate, by a month or two, the natural period of gestation, going only seven or eight months; and although these children may be viable, they never furnish as complete signs of maturity as a nine months' child.

Protracted Gestation. Gestation protracted beyond the natural period has analogy as well as direct and absolute evidence in its favor. A mare, whose term of gestation is eleven months, if covered by a Jack will go eleven months—but an ass, whose term is only ten months, if covered by a horse will go eleven months with foal. There is a difference of one-tenth in the hatching of a clutch of eggs laid and hatched by the same hen. The result of Earl Spenser's observations for many years, communicated to the English Agricultural Society, is the following: it consists of observations made on seven hundred and sixty-four cases in cows, whose term of gestation is considered about the same as that of women, that is two hundred and eighty days; but the Earl's cases would appear to establish two hundred and eighty-four or two hundred and eighty-five days as the period of gestation in the cow. The shortest period of gestation in a cow when a live calf was produced was two hundred and thirty days, and the longest three hundred and thirteen days; but no calf proved viable that was produced at an earlier period than two hundred and forty-two days. Any calf produced at an earlier period than two hundred and sixty days he considers premature, and any pe-

riod of gestation beyond three hundred days must be considered irregular, of which he gives seven cases. Of the cases that did not exceeed two hundred and eighty-six days there were of males two hundred and thirty-four, and of females two hundred and thirty three ; but of those that exceeded two hundred and eighty-six days there were of males one hundred and fifty two, and of females only ninety. In the whole number of calves, viz. seven hundred and eighty-seven, there were of free martins 11. It would therefore appear, that in the case of protracted gestation in the cow, the probability of the calf being a male is as one hundred and fifty-two to ninety, or as seven and a half to forty-two and a half.

Tessier's experiments, conducted with great care through a period of 40 years, on cows, sows, and sheep, confirm those of Earl Spenser as regards protracted gestation.

The highest authorities in the medical profession concur in the belief that gestation in women may be protracted from three to four weeks *beyond* two hundred and eighty days. And the laws of different countries recognize the possibility of protracted gestation. Thus the Code Napoleon extends gestation to three hundred days, within which time legitimacy *shall not* even be *legally questioned*, and a child born after three hundred days, is not declared illegitimate, though its legitimacy may be questioned at law. The Prussian law extends it to three hundred and two days. And although the English law assigns no precise limits, their decisions are in favor of protracted gestation. Some of them have extended the term to three weeks beyond two hundred and eighty days. Such was the decision in the case of Aslop vs. Stacy and also in that of Foster vs. Cooke, 1 Burrow's Chancery Cases 349, and more recently by the House of Lords in the Gardiner peerage case, when judgment was pronounced by their chancellor Lord Eldon, Le Marchant's reports 335.

The Scotch law says a child born after the tenth month is a bastard, and it would appear by the following decision that calendar and not lunar months are meant, viz: Lord Gillies, in the case of Sandy vs. Sandy in the court of Sessions, vol. 2, 406, says "that the lapse of nine calendar months and twenty-nine days, is not sufficient to overturn the presumption of the child's legitimacy.

IMPOTENCE AND STERILITY.

Impotence consists in the incapacity of sexual intercourse: and sterility consists in the inability of procreation, the

power of copulation still existing. Impotence may exist in either sex, but is most common in the male: and sterility may be found in either sex, but is oftener met with in the female.

There are three classes of causes of impotence and sterility. 1. Organic. 2. Functional. 3. Moral.

1. Of impotence and sterility in the male from organic causes. It may be occasioned 1. By deficiency of the organs of generation. 2. By malformation of these organs. And 3. By diseases of them or of neighboring parts.

While ever the penis is long enough to enter the vagina, and the urethra is in a state to conduct the semen into this canal, procreation is possible, and consequently impotence does not exist. Absence of the testicles by *castration*, except for a few hours after the operation, produces sterility.

Congenital absence of the testicle is extremely rare, though their absence from the *scrotum* is often met with. When the testicles have been removed by castration, if not in very early life, we can see the cicatrix. In congenital absence we must rely on the history of the patient, and his general appearance, to ascertain whether they are really absent from the person or only from the scrotum. If the absence from the person be congenital, or if they have been removed in childhood, the character of the male is obliterated, and that of the female assumed.

The activity and vigor, the well developed muscular system, the strong deep voice, the hair on the chin and the breast will always be absent. Yet Marc furnishes an exception in the case of a man in Paris, who had all those marks of effeminacy, yet was married and had many children. The retention of the testicles is supposed slightly to *impair*, but not to *destroy* the procreative power, upon the principle of physical imperfection, or deficient developement of the organ. Although the removal of the testicles destroys permanently the procreative *power*, it does not produce the total extinction of the *desire*, nor the power of copulation, as may be seen in the castrated horse, the ox, &c. And it is well known that eunuchs, who are castrated and have not the penis amputated, exercise the power of copulation. Monorchides are neither impotent nor sterile unless the testicle is very small and extenuated. In such a case, if a sufficient length of time has been passed in unfruitful matrimony, such a developement must be considered a strong probability.

Malformation of the male organs of generation, that

confers *impotence*, does not so often consist in diminutive as excessive size. Genital organs, though originally deficient in size, even after puberty, are capable of considerable developement, as in Wilson's example. Error loci of the urethra is the most common cause of impotence. It sometimes opens in the perineum; again it opens in the dorsnm penis constituting epispadias, but most frequently in the under surface producing hypospadias. Yet with the aid of a syringe the man may make coitus fruitful, and although the law would probably decide this to be impotence, it is questionable whether the decision would be just. Adhesion of the prepuce to the glans, so as nearly to close the orifice of the urethra, may produce impotence. A malformation of the vessicula seminalis, or of the excretory ducts of the testicles may produce impotence, when either of them open into cul de sacs.

Organic diseases may be divided into those affecting the penis and those affecting the testicles.

Diseases of the penis, may arise from excess or defect of muscular power or nervous energy, the former inducing priapism, the latter paralysis. Priapism produces so vigorous an erection as to compress the urethra so that semen cannot pass along it. And defect of energy in the vessels, nerves or muscles of the genital organs sometimes prevents the influx of blood to the corpora cavernosa in quantity, sufficient to produce erection, and constitutes a species of paralysis of motion, which is curable by local stimulants. Either of these states may produce impotence. Strictures in the urethra so great that the finest bougie can be passed with difficulty may produce impotence. The opening of the seminal ducts may be closed by scirrhus disease of the prostrate gland, neck of the bladder, veru montanum, or the duct itself, all of which produce impotence. Diseases of both testicles, but it must pervade *every part* of them, for a small portion only of the gland remaining sound may be still capable of secreting semen in sufficient quantity for impregnation—thus scirrhus, cancer, scrofula, and atrophy may produce impotence. Disease of the neighboring parts, as great obesity, scrotal hernia, and hydrocele may prevent venereal congress, and in rare cases they may obliterate the vessels by compression, all of which may produce impotence.

Functional Causes. The procreative power is conferred at about fifteen, and continues in vigor to sixty or sixty-five years. Instances of precocity are on record by Ryan

in which it existed at the fourth year, and one of its protraction, in the case of Parr, probably to one hundred and fifty years, and certainly to one hundred and twenty. Impotence is produced by too great indulgence of libidinous desires, by masturbation, excessive use of ardent spirits, narcotics, excessive evacuations, strict and protracted chastity as in monastic institutions.—Injury of the cerebellum.

Moral Causes. Strong and violent mental emotions, such as too ardent desire, fear of not being loved or apprehension of incapability, shame, timidity, surprise, jealousy, hatred, disgust, any thing by which the mind is forcibly arrested.

IMPOTENCE AND STERILITY IN THE FEMALE.

Impotence in the female consists in a mal-formation which prevents copulation—it chiefly exists in the vagina, and consists of a partial or complete occlusion or contraction of it. Sterility depends on mal-formation, absence, or functional derangement in the uterus, ovaria and Fallopian tubes, or disease of them, and is much more common than impotence.

From what has been said in commenting upon the different causes of impotence, we may deduce the following principles:

1. To declare either sex impotent, it is necessary that certain physical causes be permanent mal-formations and not accidental lesions, and be evident to our senses, which *art* cannot remove, and which present the faculty of exercising a fecundating coition.

2. Those causes when rigorously examined, are few in number.

The moral causes of impotence ought not to be taken into consideration, as they would serve for an excuse for an individual accused of impotence.

DOUBTFUL SEX, OR HERMAPHRODITES.

Complete Hermaphrodism exists in vegetables but not in the human family: that is, no individual has ever existed in the human family, capable of both begetting and conceiving. The cases that have been mistaken for such, may be divided into four classes. 1. Mal-formations of the urinary and genital organs of the male. 2. Mal-formations of the female generative organs. 3. Males with

such a deficiency in their organs that they have not the character and general properties of the male, and may be called neuters. 4. Where there exists a real mixture of the organs of both sexes, but not so complete as to constitute the double organ.

The penis of the male answers to the clitoris of the female: the testes to the ovaria; the scrotum to the labia; and the prostrate to the uterus: and the mal-formation of these parts is the cause of their being mistaken for each other; but no monster has been ever found having a penis and clitoris, a testis and ovarium on the same side, nor testes and ovaria, nor a prostrate gland and a uterus.

The case of Rudolphi mentioned by Beck, would appear to be an exception, but being solitary it wants additional support.

The English common law, which is binding in this country, is thus laid down by Blackstone and Coke. "A monster having deformity in any part of its body, yet if it have human shape, may inherit. And every heir is either a male or female, or an hermaphrodite, that is both male and female."

SIGNS OF PREGNANCY.

There are involved in pregnancy, considered as a medico-legal question, fame, virtue, honor, succession of property, the rights of legitimacy, the judicious treatment of disease, and in criminal cases, the destruction and preservation of the unborn child.

By the law of England, and the practice of the courts of this country, a *criminal* condemned to death, though pregnant, cannot claim delay of execution unless she be *quick* with child. But in a recent decision in England, a different signification is given to the phraseology "quick with child," in civil, to that given to it in criminal cases. By the decisions of the English courts prior to 1810, a child in utero could not inherit property left to it by will as *alive* at a certain time, nor could it be murdered, nor an execution for murder be arrested, unless gestation has progressed so far as to quickening; but in the case of Hall vs. Hancock, 15 Pickering 225, it was decided that a child, in *civil* cases, is considered as being *alive* from the time of its conception, or nine calendar months previous to its birth. And in the case of Regina vs. Wycherly, 8 Carrington and Payne's Reports, 262, decided by Baron Gurney, a new

definition of the term is introduced by a slight alteration in the phraseology. The judge said, "*quick with child*, is when the child has quickened."

In France if a woman prove herself to be *pregnant* the execution is delayed.

Constitutional Signs. Suppression of the menses, irritability of the nervous system, erratic pains, partiularly of the face and teeth, œdema, peculiarity in the urine termed kisteine, and Kluges vaginal mark.

Sympathetic Affections. Tingling pain in the breasts, areola, increased size and secretion of milk, irritability of stomach, capricious appetite, vomiting and salivation.

Uterus. Increase of size so as to rise out of the pelvis, the existence of a fœtus ascertained by internal examination, by ballottement. and auscultation, changes in the os and cervix uteri affecting their form and consistence.

Suppression of the menses taken alone is a very equivocal sign of pregnancy. Supposed pregnancy *before* menstruation is not true. The error has occurred from the circumstance that some women discharge for the first two or three periods of menstruation a colorless fluid, which has all the properties of menstruous fluid, except its red color, which is the least important. But pregnancy may take place after an *apparent* cessation of the menses. A discharge resembling the menstruous fluid, and having all its essential properties, in rare instances continues throughout gestation, (but most frequently only during two or three months) and to the seventh month; but this is a vicarious discharge furnished by the vagina. The menses though secreted may be retained by occlusion of the vagina or uterus, accumulate and give rise to the suspicion of pregnancy. It is most frequently retained by an imperforate or scarcely pervious hymen.

Kisteine exists in the urine from the first month of pregnancy, and is considered an infallible sign of this state. When the urine stands from three to five days it become covered with an opaque, whitish, opalescent, granular pellicle, somewhat resembling what rises in soup when it has been allowed to cool. Something resembling this takes place in the urine of patients laboring under catarrh of the bladder, and phthisis pulmonalis, but there is this difference, it does not appear so soon after the urine is passed as the kisteine, continues longer, and is converted into mould; whereas the kisteine, after continuing on the surface for

some days, is evidently precipitated, and soon disapears altogether.

Kluges vaginal mark,—this consists of a violet or bluish streak in the vagina extending from the os externum to the os uteri; Parent-Duchatalet found it in each of 4500 cases which he examined. But others have not been able to detect it.

Nausea and Vomiting early in the morning, and commencing in four to six weeks after the suppression of the menses, and unaccompanied by any other signs of bad health, the vomiting recurring daily until the period of quickening. It is generally moderate, but sometimes becomes so inordinate as to endanger life by inanition.

Salivation—this is sometimes as profuse as salivation by mercury, but is generally moderate, consisting only of an increased flow of saliva.

Affections of the Mammæ. In one or two months after impregnation there is an uneasy throbbing and fulness, accompanied with tingling pains felt about the centre of the breasts, and in the nipples. The breasts grow sensibly larger, more firm, the rosy circle around the nipple becomes altered in color and structure, constituting the areola, which occurs as early as the *second* month, and is accompanied by a moist and soft state of the integuments, and sometimes a secretion from the glandular follicles sufficient to stain the woman's inner dress, as well as their enlargement and prominence from the one-sixteenth to the one-eighth of an inch above the surrounding integuments, and in number not less than twelve to twenty. These appearances are more to be relied on than even the areola.

At all times in the virgin female breast, there is around the nipple a circle of a deeper rose tint than the surrounding parts, at the end of the second month of pregnancy this color becomes deeper, being tinged with a yellowish or brownish hue; by the fourth month the color has become nearly mahogany in dark complexions, but not quite so dark in the fair; it now forms a circle around the nipple of from one to one and a half inches in diameter, increasing in size with pregnancy, sometimes to the extent of three inches. In the centre of this circle, the nipple is seen partaking more or less of this color, and has become turgid and prominent. The absence of the areola, and prominence of the glandular follicles is not a conclusive proof of the non-existence of pregnancy; but their presence, and the mahogany color of the areola are good evidence of this state.

As the areola continues for sometime after abortion, we must be careful not to be imposed on by a woman in this state—and the same caution is necessary in nursing women in whom it exists for a long time after delivery. We may be also greatly embarrassed in our decision by a woman who has been pregnant before, and is submitted to our inspection in a second or subsequent pregnancy.

Milk in the breasts is a sign not at all conclusive, for the sucking the virgin breast, even as young as eight years, by an infant, will produce a secretion of milk, and the milk in the breasts of nurses may continue for years after they have ceased to nurse, indeed it has been secreted in large quantities by the breasts of men, and the other symptoms of pregnancy, up to this period, exist, it may be considered a conclusive sign.

Quickening, or the first motions of the child of which the mother is sensible, takes place from the twelfth to the sixteenth week, counting from two weeks from the last menstruation, but sometimes not until the end of gestation, and in very rare cases the woman is not sensible of it at all.

We may excite the motion of the fœtus by pressing the fingers backwards towards the spine, or by applying the palm of the one hand to the side of the woman while we smartly tap the other side with the fingers of the other hand contracted to a cone, or apply the open hand, rendered cold by immersing it in cold water, suddenly to the bare abdomen. There are two species of motion of the fœtus in utero; one of the living, and the other of the dead fœtus, between which we may easily discriminate, the one being the result of muscular motion, the other the impusle communicated to the dead fœtus by percussion.

State of the os uteri and cervix. Before impregnation it projects into the vagina from one fourth to one half an inch, it is firm and about the size of a man's thumb, mouth closed, and the lips and the depression between them can be ascertained. After impregnation it first projects further into the vagina, is more rounded, the sulcus appears deeper, it afterwards becomes more elevated, and inclines backward from the fundus falling forwards, and the finger is now admitted to a considerable depth within the lips and into the cervix.

Size of the uterus. The fundus first begins to develope, then the body, and lastly the cervix, the latter does not take place until the end of the sixth month. At the fourth

month the fundus must be found just above the pubis. During the fifth month half way between the pubis and the umbilicus. At the sixth month it rises to the umbilicus, which from being heretofore depressed, is now brought upon a level with the surrounding integuments. At the seventh month it is half way between the umbilicus and sternum. At the eighth month it has reached the ensiform cartilage, and the umbilicus is now pouting.

From the middle to the end of the ninth month the fundus descends about two inches, and at this time the mouth is at, or not more than an inch below, the sacro vertebral angle, there are now no remains of the cervix, and the lips are obliterated, presenting a thin, soft and relaxed orifice, that will admit the finger with which the membranes may be felt.

Ballottement. To perform this operation, the woman should be standing, or she may be placed on her back with her shoulders elevated, two fingers are firmly pressed internally against the anterior part of the cervix and as high up as practicable, the other hand must be applied externally to the fundus, pressing gently downwards, the fingers which are against the cervix should be now impressed against it with a quick and slightly jerking motion upwards, when something will be found to have bounded away from the fingers, upon which it will in three or four seconds be felt to drop again with a gentle pat. This is equally applicable to the dead as the living fœtus, and though we generally succeed in feeling the fœtus, we sometimes fail. The time to institute this mode of examination is from the fourth to the sixth month, and we should never fail to empty the bladder and rectum previously to attempting it.

Auscultation, or applying the ear or stethoscope to the uterine region to hear the sounds of pregnancy.

There are two sounds, the Placental and the fœtal. The placental sound cannot be heard before the *fourth* month, it is a cooing sound like that made by blowing over the mouth of an empty vial, accompanied by a rushing noise, and it is synchronous with the beats of the maternal heart. It is always heard at the same part, but sometimes intermits for hours. It is most frequently found over the *right* Fallopian tube.

The sounds of the fœtal heart are nearly double the mother's pulse. It can seldom be heard sooner than the *fifth month.* It is a delicate feeble sound, like a watch heard tick-

ing through a pillow, and is most frequently found half way between the umbilicus and spine of the ilium, oftener in the left than the right side, but is subject to change, particularly from the sixth to the eighth month. When the fœtus is dead, neither it nor the placental sound is of any value. No other sound can be mistaken for the fœtal heart, but not so of the placental murmur, for a large vascular tumor of the uterus, an enlarged spleen, or pressing the stethoscope firmly on the iliac arteries will reveal a singular sound. This species of examination requires more skill and care than the exploration of the chest. In using the instrument we should make considerable pressure to bring the child and instrument as nearly in contact as possible. Auscultation, like ballottement, rarely fails to reveal the presence of the fœtus after the fourth month, if it is living.

Substances expelled from the uterus giving the suspicion of pregnancy. There are four varieties, viz: 1. an early ovum, 2. a mole, 3. uterine hydatids, and 4. the membrane of dysmenorrhea.

An early ovum is not discoverable in the *first* month, after this period it may be told by immersion in water for a day or two, and then examing the mass under water with blunt instruments, and the examination must be continued, at different times, from three to seven days, before we can satify ourselves; and then we ascertain the existence of the decidua and chorion.

Moles are solid fleshy masses; it is a disputed point whether they are the altered remains of a blighted ovum, or a substance sui generis formed by the uterus itself; but no medical jurist ought to take any thing expelled from the uterus as proof of conception unless there is positive proof of its being an ovum. The best authorities agree, that if moles are carefully dissected, some remains of the fœtus or its appendages will always be found.

Uterine Hydatids. Whether these are the products of disease of the uterus or of conception has been, and still is, a fruitful source of controversy. The weight of authority however is in favor of their proceeding from conception, and among others Mad. Bovin has come to this conclusion, after, perhaps the amplest opportunities for observation of any one who has written on this subject. An objection however to this view has been found in the existence of hydatids in the brain and elsewhere ; but they are totally different from those of the uterus, and always spring from *serous* surfaces, they have never been found in *mucus* membranes; and hydatids are

not found in the uterus until the ovum is deposited there whose membranes are serous.

Dysmenorrheal membrane. The existence of this membrane has been considered proof of pregnancy, as it is supposed to be the decidua: but it differs from this membrane in being destitute of the *foramana* for the nutrient vessels with which this membrance is perforated, it is less firm, and the absence of the transparent *membranes* of the ovum within it shows that it is not the decidua.

Age of the individual. The usual limits at which women begin to conceive in this wide spread country, may be stated to be 18 years, and they cease at 45 or 50. The extremes are 12 to 60 years.

Prolapsed uterus will not necessarily prevent conception. *Conception* without the knowledge of the woman often occurs, and conception may take place without even the consciousness of sexual intercourse, as is proved in the apparently dead or cataleptic virgin and the Friar.

Sexual intercourse without consciousness on the part of the female may take place during hysteria, asphyxia, catalepsy, drunkenness, very deep sleep, and under the influence of narcotics in those accustomed to it, but not in the virgin, except in the case of catalepsy, the last degree of drunkenness, asphyxia and the use of narcotics to the extent of producing complete narcotism.

Hymen, its presence or absence. Although the presence of the hymen may be considered presumptive evidence of virginity, still pregnancy may take place without its rupture.

But its absence is no proof of sexual intercourse, as disease may remove it, the rough treatment of infants by their nurses may lacerate it, or it may never have existed, or in so defective a state as not to be detected.

EXAMINATION OF THE UTERUS AND ITS APPENDAGES AFTER DEATH.

If the uterus be of virgin size,—that is in length from twenty-six to twenty-eight lines, laterally from seventeen to twenty lines, and antero posteriorly from nine to eleven lines, the parietes of the body four lines in thickness, of the neck from two to three lines—we may be satisfied that impregnation has not taken place. And if it is enlarged beyond these dimensions, unless we discover the ovum or some of its appendages, we are not authorised to conclude that the woman

was pregnant, as the enlargement may have arisen from polypus, or other distending causes besides pregnancy.

Corpus luteum. This body presents the appearance in form of the cornea projecting from the globe of the eye, or the segment of a smaller circle superimposed upon a larger. In color it is reddish yellow, and bears on some parts of its body a distinct cicatrix. If we divide it into two sections by a longitudinal cut, we expose an oval body, whose greater axis is one half or five eighths of an inch, and its less from three eighths to one half an inch, its thickness being less, this is the corpus luteum. Its texture is glandular, resembling a section of the kidney. Its color is like the size of blood. In its centre there is either a cavity or radiated white cicatrix, according to the period of examination. If made within the first three or four months after conception we find a cavity about the size of a grain of wheat, this cavity is surrounded by a strong white cyst: after this period, and until the disappearance of the corpus luteum, we find the radiated white cicatrix, distinguishing this body from any other that might be confounded with it. The corpus luteum is vascular, and may be injected from the spermatic arteries.

It disappears in about five months after delivery at *full term.* The presence of a corpus luteum does not prove that a woman has given birth to a child, nor does it show that she has been impregnated, as was once supposed, it only proves that she has menstruated. The cicatrix on the surface of the ovarium where an ovum has been liberated does not remain for life, but disappears at indefinite periods, and during its existence cannot be told from cicatrices produced by abscesses, &c.

SIGNS OF DELIVERY.

Delivery may be concealed with the hope of saving shame, or still more criminally with the intention of destroying offspring: and when infanticide is charged, the law requires proof of delivery and finding of the child, Or again, delivery may be feigned for the purpose of obtaining marriage with a paramour; to gratify the wishes of a husband: or to wrest property from the lawful heir.

After the expiration of ten days, no traces of delivery, to be relied on as conclusive, are evident: and it is extremely difficult after a week or over four or five days.

The signs furnished by the genital organs are very much dependent on the maturity of the ovum. Under two months no enlargement of parts can be satisfactorily ascertained to

exist after two days. In these as in all cases of immaturity, we must examine the mass discharged and if we detect any vestiges of an ovum it is conclusive.

Cracks of the abdomen, and silvery lines in the mammæ, are only to be relied on to prove that a woman has become a mother when corroborated by other signs, because any thing distending the abdomen greatly, will produce the cracks; and it has happened that the silvery lines of the breast have been occasioned by inflammation succeeding the application of leeches to those parts.

Signs furnished by the countenance, &c. The general appearance of having just recovered from recent indisposition: face paler than usual, eyes depressed and surrounded by a dark circle, pulse somewhat accelerated, skin moist and warm.

Mammæ. About the third or fourth day after delivery, sometimes sooner, the breasts become full, tense, sometimes knotty, contain a lactiform fluid, nipples turgid, areola dark.

Abdomen, relaxed and rugous, streaks or cracks running from the groins and pubis towards the umbilicus; the uterus is felt through its parietes contracted and about the size of a child's head at term, and the fundus about three or four inches above the pubis, and the organ inclines towards one or the other side. Internal examination presents a relaxed and dilated vagina: open and relaxed os uteri, and so dilated as readily to admit two or three fingers: margins flabby and sometimes fissured; the locha flowing.

Laceration of the Fourchette is common, and it sometimes occurs in the perineum also.

None of those signs however taken *individually* can be conclusive of delivery; to render them conclusive they must be taken collectively; and when they *all* exist the case is a very strong one.

Delivery without consciousness, when the patient is comatose, delirious, deranged, under the full influence of opiates or ardent spirits, is not uncommon: and that delivery may take place after the death of the mother, has been abundantly proved, showing that the uterus alone is competent to effect delivery. It has also occurred during natural sleep: and a case is published in Hay's Journal, April 1842, taken from the London Lancet, occurring in a married lady, in which a first child was born in the presence of the accoucher, without the consciousness of the mother, who was awake and conscious of all things else, even to the discharge of the liquor amnii.

Examination internally after death. If the examination be made *immediately*, and the woman have died of hemor-

rhage, the uterus will be found a flattened flabby body ten or twelve inches long, the os uteri so dilated that the hand will readily pass into it: the interior containing large coagula: the internal surface covered with the soft fleecy remains of the decidua, and if the organ be immersed in water, the decidua as flocculent processes adhering to the uterus in great numbers. The place of the attachment of the placenta is distinguished by having less of the flocculi. But if the woman survive for several days, and the examination *then be* made, the uterus will be found to vary much—in *two* days it will be found to have contracted to six or seven inches by four—the external surface will be vascular, parietes when cut being about one to one and a half inches thick, firm and displaying the orifices of very large vessels. At the end of a *week* the uterus will be five or six inches long, less vascular, and diminished about one third in thickness, density increased orifice, of vessels less, color of organ paler.

A first delivery is always more easily detected than a subsequent one.

RAPE.

By the law of England rape is the carnal knowledge of a woman against her will, and death is the penalty.

All classes of women are equally protected by it. It includes and protects the virgin, the married woman and even the prostitute, because she may at the very moment have determined to reform her former habits.

Sir Matthew Hale says, that if the female be *under ten years* old the act is *felony*, and death the penalty, although the child consent. But if *above ten and under twelve* and she consent, it is no rape, but only a *misdemeanor*, and punishable by imprisonment.

The French code extends the term to fifteen years, and punishes the crime committed on a girl of *that age* with her consent, with hard labor for a limited period.

In the different States of this Union the decision of Lord Hale governs as to the age, &c., which constitutes the crime, but the penalty varies in the different States, from imprisonment for a limited time and for life, to whipping, fining, selling, castration and death.

Since Hale's decision, and as late as 1828, a law was passed in England in conformity to his decision.

It is necessary that the accusation be made early, particularly if a medical examination be necessary, as a

few days may efface all evidences of injury: though the law prescribes no time. Yet public opinion requires an early declaration of the crime, and an accuser, who has postponed her complaint for any unreasonable length of time, is listened to with great caution by a jury.

PHYSICAL SIGNS OF VIOLATION.

Absence of the evidences of virginity, marks of violence on the arms, breast and the lower extremities: tumefaction or laceration of the pudenda, with effusion of blood and bruises on the other parts of the body: but those signs, or many of them do not apply to married women, nor to those in the habit of sexual intercourse.

Hymen. This is a membranous or membrano—carneous structure, which is situated at the entrance of the vagina, and never more than one-fourth of an inch within it, and serves to form a boundary between that passage and the external genitals. It is formed by duplicatures of the lining membrane of the vagina, and is usually of a crescentic form, leaving an opening into the vagina at its upper part. This opening serves as an outlet to the menses, and in the average of adult subjects is large enough to admit the adult finger sufficiently high up into the vagina, to effect an examination of the os uteri without injury to the hymen. The shape however varies; in some cases it is more or less circular, presenting through its centre a round aperture of three or four lines in diameter. At other times only a part or exclusive portion of the orificial extremity of the vagina, sometimes the superior, at other times the inferior portion of it, is seen to be veiled over with this structure. In some rare cases the hymen is an imperforate circular membrane attached to the edge of the orifice of the vagina in every part, so as to close the canal completely—again it is of this form except that it is finely cribriform.

Another form of it is, when there are two crescental portions attached to the more carneous structure of the external orifice *laterally*. The structural tissue of the hymen, seems in some measure to vary in different instances. In most fœtal subjects it seems to be distinctly membranous, whilst in some others it partakes also of a carneous character. It is generally, though not always ruptured in copulation. It is sometimes so slender as to be ruptured by the least force in childhood. At others it is so firm as to resist

the intromission of the penis, as in Haighton's remarkable case. It is sometimes congenitally absent or so little developed as not to be seen. Viewed alone, its existence or absence can neither be considered a test of virginity nor proof of a rape.

During menstruation or profuse leucorrhea, the hymen becomes so relaxed as to admit the penis without rupture.

Carunculæ Myrtiformis. There are generally four of those myrtleberry-like bodies. Velpeau says the two, occupying the lower and upper part of the entrance of the vagina belong to the middle columns of this canal, and are no part of the remains of a ruptured hymen, while the two former exist originally and independently of the hymen, but the latter have no existence unless the hymen has been ruptured.

SIGNS OF DEFLORATION.

In investigating the charge of defloration, it is necessary to take into consideration the age, strength and state of mind of both parties concerned. The sexual organs of *each* should be examined as *early* as possible, for in a woman who has arrived at puberty, the signs of defloration are soon effaced: in children they remain longer. In a virgin, if the examination is made early, the genitals are found lacerated, tumefied and bloody, or inflamed and painful to the touch: the hymen generally ruptured, and sometimes the presence of semen can be detected: besides these we find the other marks of violence heretofore mentioned. In children the local injury is greater and more evident. But in married women, even a very early examination will fail to afford much assistance, from the previously dilated state of the parts: yet the marks of violence on the person, and the discovery of semen will be strong evidence.

The injury, apparently done to the genitals of children, should not be too readily taken as signs of rape, as they are subject to a disease presenting the same appearances as defloration, and is generally fatal, several cases of which are reported by Mr. Ward of the Manchester Infirmary.

The venereal disease, if occurring in the female from three to eight days after the rape is alleged to have taken place, and especially if the man has the disease if now examined, is strong presumptive evidence. But female chil-

dren, up to the age of puberty, are subject to a purulent disease of the genitals, especially during dentition, and when worms are present in great numbers in the rectum, that may readily be mistaken for gonorrhea, which shows the necessity of examining the man. Indeed we should never fail to examine both parties for another reason, that is, to discover whether impotence may not exist.

It is sometimes very difficult to detect gonorrhea where attempts are made by men to conceal it, for if urination takes place just before the inspection, the matter will be washed out, and all traces of a discharge be lost, and if the disease have existed for some time, the unassisted eye can discover no traces of inflammation about the meatus. But when the urine has been retained some hours, the discharge may be discovered. And if a lens is used, on everting the lips of the urethra it is seen either florid, with punctuated redness, and a semi-abraded appearance, as if the epithelium were partially removed, or the veins of the mucus membrane will be found enlarged and tortuous.

A woman may wound herself as proof of a rape as in a case mentioned by Fœderi.

The chief point necessary to be proved in an accusation for rape, is the act of coition, and considerable difference exists as to what legally constitutes it.

By the English law of 1828, penetration alone, without emission, is declared to be sufficient to constitute rape. But the law previous to 1828 required proof of both penetration and emission, and this law governs the decisions of the courts of many of the different States.

Emission is generally unknown to *married* women in their lawful intercourse, and in the case of virgins it is not at all likely, that they would be sensible of emission having taken place, particularly when we take into consideration the state of fright, pain and weakness, into which they are necessarily thrown by the attempt to violate them. In the case of children, it is manifestly impossible that evidence of emission can be obtained. And if emission be necessary to constitute the crime, Eunuchs would always escape. But as the accusation of rape is easily made, and with difficulty rebutted, the proof required ought to be strong. We do not mean to say that a married woman, or a virgin, after or before puberty, will not be able to discover that there is a fluid within or about her genitals after her connexion with a man, which did not exist there before the coitus—but how is she to know that it did not

proceed from her own organs, for of the moment of its deposit we cannot believe she can be conscious.

A girl who is sensible of the obligations of an oath, and the consequences *hereafter* of telling a lie, is a good witness whatever be her age. Assertion, on a death bed of the commission of a rape, is good evidence, if the woman is *proved* to be really *conscious* of her danger.

Rape, though not impossible, is extremely difficult to commit if a woman can preserve her presence of mind; yet by long continued perseverance she may be overcome, and the man may succeed.

Rape is *possible* without the consciousness of the woman, during the last degree of intoxication, narcotism, or in a fit, *in a virgin*, but not during natural sleep: but yet it is *possible* but not *probable* during a *sound* natural sleep in a *married woman.*

A man being ignorantly admitted by a married woman to her bed as her husband, and having connexion with her, with her consent while the imposition lasts, is guilty of a rape. Also in a case of forcible abduction, and *compulsory* marriage, if violation *forcibly* takes place, it constitutes rape.

In Regina vs. Jordon, it was decided that a boy under 14 years of age cannot be convicted of feloniously committing a rape on a girl under 10 years, though the surgeon swore that the boy had arrived at the full state of puberty, and it was also decided that it is not necessary for the hymen to be ruptured to make out the charge of penetration. The part of this decision that relates to penetration has been confirmed by a more recent decision, in the case of Regina vs. Hughes, by eleven or twelve judges, 9 Carrington and Paine's Nisi Prius reports, 118 and 752.

DEATH BY LATENT DISEASES.

The objects to be considered in our inquiries on this subject, are 1. What diseases are apt to put on a latent character and occasion sudden death. 2. by what means may it be proved, in special cases, that they have really been the occasion of death.

DISEASES THAT ARE APT TO OCCUR IN A LATENT FORM.

Of the head. Sanguinous apoplexy, inflammation of

disease. Thus it is not unusual for death to take place the membranes of the brain, and of its substance. Clots of blood have been found in the brain, and cysts which formerly contained clots, proving plainly that clots may exist without producing apoplexy, and therefore their existence, without other evidence, should not be considered proof of apoplexy. Inflammation of the membranes of the brain may even run on to suppuration, or to extensive effusion, without any equivocal sign of its existence being manifested, though it is rare for this disease to be latent.

Inflammation of the substance of the brain very often assumes a latent form, particularly the form termed softening of the brain, which runs on to death without its existence being at all manifested until a few hours before death, and it not unfrequently proves suddenly fatal during a state of apparent perfect health.

Of the chest. These run an obscure or completely latent course much more frequently than those of the head, and among them the most remarkable are pleurisy, peripneumony, organic diseases of the heart and of the great vessels within the chest; of all of which organic diseases those of the heart are most frequent. Indeed sudden death from this affection is much more common than from any other latent disease.

Of the abdomen. Of these there are several which run a latent course for a very long time: but there are but few which will remain latent to the last, like many of the diseases mentioned under the preceding heads. Ulceration of the membranes of the stomach and intestines ending in perforation—the same disease terminating in the rupture of the gall bladder and biliary ducts. Diseases of the liver and kidneys; of the coats of the large abdominal vessels and perforation or rupture of them: extra uterine conceptions: worms in the intestines accumulating so as to produce epilepsy, or other convulsions.

Of the spine. Caries of some part of the vertebral column. In one variety of it, which terminates in dislocation of the processus dentatus of the second vertebra of the neck, instant death may occur, when no suspicion exists of the presence of any disease in the actual seat of the mischief.

Although all these diseases may occasion death, still we ought to require some other evidence, besides their existence in a latent state, before we decide that the death is natural: that is we should not terminate our inquiries with the dis-

covery of a latent disease. We should always recollect that latent diseases are apt of themselves to prove suddenly fatal under the operation of either slight violence, or of the circumstances accessary to violence, such as passion, fright, struggling, &c.

The evidences of the connexion of the morbid appearances with the fatal event are,

1. Those marked appearances which indicate that the disease has brought into action one of the proximate causes of death—that derangements of structure, or function, have been incompatible with the continuance of the circulation or respiration—as rupture and hemorrhage in aortal aneurism, &c.

2. Certain peculiarities in the morbid appearances which are known, by experience, seldom or never to occur except death immediately follows—but why we do not know—an example of which is furnished by a recent perforation of the stomach, or the rupture of the gall bladder.

3. Another description of evidence, by which death may be presumptively connected with morbid appearances found in the body where the cause of death is obscure, is derived from the occurrence of symptoms immediately before death, which correspond with the appearances discovered.

Thus when an individual dies under symptoms of sudden dyspnea, and an extensive chronic pleurisy or peripneumony is found in the dead body, death is clearly to be referred to the latent disease. Yet regard must be had to the particular species of violent death, which may happen to be suspected, as symptoms antecedent to death are common both to the *natural* and *violent* cause.

4. Before inferring death to have arisen from a latent disease of which traces are found, it is further necessary to determine by as many proofs, as the nature of the case will supply, that violence is *improbable* if not *impossible*, and in particular, that the circumstances will not bear out the suspicion of the particular kind of violent death which is imputed.

5. Additional information, throwing light on the question of sudden death from latent disease, is derived from attending to the collateral conditions under which latent diseases are usually observed to prove suddenly fatal.

These conditions are at least three in number.

1. Many cases of latent disease have their symptoms first developed, or even prove suddenly fatal, during the additional constitutional disturbance occasioned by a fatal

suddenly in the early stage of convalescence from other diseases.

2. A second still more common circumstance which concurs with sudden death from latent disease is some unusual or violent exertion.

The general result of the observation now made is, that any circumstance which produces either sudden violent excitement, or sudden violent depression of the circulation may cause instant or speedy death, where extensive derangement has accumulated silently in any of the important organs of the body.

SURVIVORSHIP.

It is of the utmost importance, as regards inheritance, to ascertain which of a number of persons killed by the same accident died first, or survived longest, for the survivor having succeeded although but for an instant, to the property of the other, gives his or her heirs a claim to the inheritance, and the following classes of persons are especially interested. 1. Father or mother and child. 2. Brother and sister. 3. Husband and wife. 4. Joint tenants. And 5. Testator and legatee.

By the civil law of England, when father or mother and child perish together, it is held, if the child be of the age of puberty it shall be considered the survivor, but if it be under puberty that it died first.

Age generally. The very young, and the far advanced in age, die sooner than adults, and those in the middle stages of life.

Sex. The male survives longer than the female. The following cases, Satterthwait vs. Powell from 1st Curtis's Eccles. Reports, occurring in 1819, would appear to controvert this position. A husband and wife perished in the same vessel, and there was no proof which died first, the Court, Sir Herbert Jenner says, "the parties in this case must be presumed to have died at the same time," though the counsel urged the ordinary presumption of law as above stated. But in the case of Robert Mundy, of Ireland, who with his wife was drowned in a vessel in 1837, the Court decided "that the wife died first, there being nothing to show that she was the survivor."

Temperament. By temperament is meant those individual differences which consist in such disproportion of parts, as regards volume and activity, as to modify sensibly the whole

organism, but without interfering with the health. The law recognizes only four temperaments, viz:

1. The phlegmatic, lymphatic or pituitous, in which the colorless fluids are supposed to be too abundant for the solids: the secreting system predominating over the absorbent. Its characteristics are soft flesh, pale skin, fair hair, weak, slow, and soft pulse, figure rounded but inexpressive, the vital actions more or less languid, the memory treacherous, inattentive and vacillating, with aversion to mental and corporeal action.

2. Melancholic. In this the vital functions are feeble and irregularly performed, the skin assumes a deeper hue, the countenance is sullen and sad, the bowels torpid and all the exertions are tardy: the pulse is hard and habitually contracted, the imagination is gloomy and the temper suspicious.

3. The Sanguineous. In this the circulating system seems to be predominant. Its characteristics are strong, frequent, and regular pulse, ruddy complexion, animated countenance, firm flesh, light hair, fair skin, blue eyes, great nervous susceptibility, quick conception, ready memory, lively imagination, addiction to the pleasures of the table and amorousness.

The diseases of this temperament are chiefly seated in the circulating system, as fevers, inflammations, and hemorrhages.

4. The bilious or choleric. This is presumed to be produced by the predominance of the liver and biliary organs in general. The pulse is strong, hard and frequent, the subcataneons veins are prominent, the skin is of a dark brown color inclining to yellow, hair dark, body moderately fleshy, muscles firm and well marked, passions violent and easily excited, temper abrupt and impetuous, great firmness and inflexibility of character, boldness in the conception of projects, and untiring perseverance in their fulfilment.

The nervous temperament, the most important, is not recognized in the legal enumeration, and in fact is rather a secondary than a primary temperament.

The phlegmatic die first, then the melancholic, next the sanguineous, and lastly the bilious.

Habit and variety of constitution. Here we comprehend the relative proportions of the principal organs of the body, and its conditions of obesity and leanness.

He whose head and chest are disproportioned, that is the former being greatly too large, and the latter very contracted, dies sooner than he whose chest and head are well proportioned.

The fat die sooner than the lean, except in cases of drowning, the very fat may be specifically lighter than water, and therefore float when the lean will sink.

Disease. The diseased die soooner, when violence of any kind is inflicted, than the sound : and of the sick those laboring under typhoid fever die sooner than those having inflammatory affections ; and among chronic diseases scurvy is placed in the first rank, and after those such as affect the functions of respiration, circulation, and those of the brain and spinal marrow.

Moral condition. In danger the timid die sooner than the courageous: this fact however is lessened in value by the circumstance that a particular idiosyncrasy sometimes exists, by which persons die from a slight injury producing lock jaw, &c.—and also the nervous agitation spoken of by Dr. Burton, who witnessed so many cases of it at Waterloo and New Orleans.

Mode of life has the effect of accustoming the naturally timid so much to danger, as to prevent their being alarmed when they meet it, and this greatly modifies the value of the above fact.

DEGREE OF EXPOSURE TO DANGER.

Those receiving wounds of the heart and brain die first, next wounds of the lungs, great arteries and abdominal viscera.

The young preserve their heat and flexibility after death longer than the old, provided they have died of the same disease. A body being found cold and stiff may be considered to have died before one that is flexible and warm, but not without reference to the disease of which it died—for asphyxia, and apoplexy retard cooling and rigidity, while hemorrhage accelerates them. And there is more marked difference in the cooling of internal parts than the surface of the body, for it has been found that the temperature under the heart in three hours and a half after death was 113° of F. in a case of death by acute rheumatism, and 98° in acute dysentery. Davy's Tables, Hay's Journal of Med. and Phys. Sciences, April 1841, p. 524, and a case of early cadaveric stiffening in Med. Exam. No. 25, 1841, p. 403.

Drowning. Those who possess the art of swimming survive longer than those who are destitute of it. Presence of mind and courage are in favor of survivorship ; but the value of these advantages may be lost by mortal blows on vital

parts. When a day or two has elapsed after death, the sinking or swimming of a body is of value, as the body that swims before any evidence of the disengagement of gas has taken place, has died before one that sinks, provided no disengagement of gas has taken place in the latter.

Suffocation. If death be occasioned by sulphureted hydrogen, or carbonic acid gas, or any gas positively deleterious to life, it may be supposed that all die at the same time. But if death occur from deficiency of oxygen only, then those in whom the function of respiration is most vigorous, who stand in most need of a full supply of vital air, are they who suffer most quickly from its deprivation. Thus in this case adults suffer and die sooner than infants: for young animals have been found by Edwards to live much longer in the same quantity of atmospheric air than adults: and men die before women. Attention however should always be paid to the locality in which the bodies are found, as evidence of attempts to escape would prove survivorship: and attention should be given to the appearance of the body to detect wounds which may have deprived the individual of motion, or have been the cause of death.

Hunger and thirst. The young die sooner than the old, males sooner than females, the lean sooner than the fat, those who have no access to wine, cordial, or water, or other fluids, sooner than those who have. In cases of hunger those of feeble intellect die sooner than those of vigorous intellect, and consequent presence of mind.

Excess of heat. The young and weak survive longer than adults and the strong. A degree of heat of 260° of F. has been endured for eight minutes, and 325° for 5 minutes. Dry heat is much better borne than moist.

Cold. The adult survives longer in low temperatures than the child: the male longer than the female: the sanguine and the bilious temperament longer than the phlegmatic and melancholic. But we must take into consideration the state of health and disease: the relative powers by which one may resist sleep and keep longer in motion than another: the relative amount of clothing: the opportunity of obtaining food, cordials, &c.: but the intemperate use of ardent spirits is more unfriendly to survivorship than their moderate and oft repeated use at short intervals.

LIFE INSURANCE,

Is the assurance that a particular sum shall be paid in the

case that a certain person named is alive at a certain time, or dies within a particular period; or which is to be paid within a particular period after the death of an individual named, at whatsoever time that death may occur.

The assurer is the party who promises to pay this sum, and the premium of insurance is the sum he obtains as his recompense for the sum he is to pay.

The policy of insurance is the document by which the party is obliged for the assured sum. The policy is absolute when the assured sum is to be paid on the death of the insured party, and contingent when depending on circumstances of contingency, as the existence or previous death of some other person or persons.

The premium of insurance is in some cases a sum paid down all at once, but more generally a certain sum is paid down at the time of assurance, and a further sum annually thereafter while the policy exists.

The declaration contains the name, age, state of health heretofore and at present: his place and period of birth; and his residence at present. Falsehood either intentional or accidental, or the suppression of facts necessary to be known, invalidates the policy.

To confirm the statements in the declaration, references are given to one or more persons, one of whom should be the physician of the party to be insured, who in addition to stating his present, former and general health, must say whether he is predisposed to hereditary or acquired disease, and whether his habits are sober. Life assurance officers have generally a stationary medical officer. Life and death mainly depend on the prosperity of the circumstances which generally surround us. We therefore judge of the probable mortality of any locality by the poverty and wealth: ignorance or knowladge: misfortune or success of its inhabitants.

Where want and misery exist, there the mother is most likely to die in labor, and still-births will be most frequent; deaths during infancy will be more numerous: epidemics will rage more violently: recovery from disease will be more tedious and the fatal termination of it more frequent: and death will usually occur at an earlier period of life.

FEIGNED DISEASES.

All persons who feign disease may be divided into four classes. 1st. Malitia men liable to be drafted. 2. Soldiers, and seamen in the navy. 3d. Slaves. The 4th class may

be divided into three orders. 1st. Offenders against penal law. 2d. Persons who have received slight injuries, which they exaggerate to extort undue compensation. And 3. Mendicants, to excite compassion and obtain alms.

Diseases feigned. Of the abdomen, ascites, tympanites, solid abdominal tumors. The two former are assumed by pushing the abdomen forward while standing, elevating the spine while lying, and by short expirations, injection of air or water into the cavity of the peritoneum, and by swallowing of air. The latter by pads.

Mode of Detection. Examine the uncovered abdomen and particularly the groin, where they frequently throw in the injection, and set a watch over them. In the rare case of swallowing air we have no certain means of detection.

Abstinence. Long fasting is itself suspicious, and the appearance of the person does not correspond with inanition. *Mode of Detection.* Set a watch over the individual.

Blindness, Is produced by the application of belladonna to the eye. The forms assumed are amaurosis, and palsy of the lids. Mode of detection. Open the lids of the eye and expose it to a strong light, and the pupil and lid will contract. Cut off the supply of belladonna.

Nyctalopia. In this the patient is unable to see distinctly in the full light of day, but distinguishes objects readily in obscurity. This is with difficulty detected as it is intermittent, and the appearance of the eye is natural. Mode of detection. The best means is to place the suspected person on duty with one who is free from it, which will remove the motive, and prevent persistence in the deception.

Cachexia Africana. Symptoms, pain at the stomach, breathlessness, inordinate pulsations of the heart and large vessels on motion, bloated appearance, nails and palms become white, lips, gums, and tongue pallid, anasarca and death follow. This is rather produced than feigned, and is a consequence of eating dirt, &c. Mode of detection. Examine the fœces, give an emetic and inspect what is thrown off, and it will be found to be clay or other dirt.

Catalepsy, or feigned insensibility. Mode of detection. Electricity, cautery, or dropping hot water on the back, if it is real they will be serviceable remedies, and if feigned they will discover it.

Disease of the heart and pulselessness. Caused by ligatures on the neck or arms. The internal use of white hel-

iebore will produce it. Mode of detection. Examine closely for ligatures and set a watch over the patient.

Contractions of the extremities. Mode of detection. Apply a tourniquet above the joint at which the contraction exists, and if it is voluntary it will prevent it.

Deafness. It is generally alleged to come on suddenly, which is unnatural and should excite suspicion. Mode of detection. Stratagem, such as relating interesting incidents and watching the countenance, which will change if the disease is assumed. Give the individual a large dose of laudanum, and while sleeping profoundly, fire off a pistol near him, if an impostor it will make him start up.

Deaf dumbness. Mode of detection. Watch closely, and if the individual has ever talked, and can now move his tongue he is an impostor.

Diarrhœa and dysentery. The evacuations in these diseases are frequently imitated by mixing foreign substances with the stools—and the excrements of those laboring under these diseases are frequently procured. Mode of detection. A close stool and a guard.

Diseases of the external ear. Impostors frequently induce those diseases by the use of cantharides, and other irritants, and to impart the odour of purulent discharges, they mix rancid fish oil, and other offensive matters with the discharge. Mode of detection. A guard, or solitary confinement where the irritants cannot be procured.

Emaciation and debility. This is rather produced than feigned.

The means employed are abstinence, the excessive use of ardent spirits, tartar emetic, and bandaging. Mode of detection. Due examination, a guard, and cutting off the supply.

Epilepsy. Mode of detection. In the feigned the contractions of the different parts of the body do not occur simultaneously. If the hands are opened, as soon as the extending force ceases to act, they will immediately close again. Admission of light to the eye will cause the iris to contract. The foaming is produced by holding soap under the tongue. They neglect to assume the soporose state of true epilepsy. Snuff blown up the nostrils will produce sneezing in the feigned but not in the true. Propose to pour boiling water on the legs to recover the individual, and actually commence pouring cold water from a tea kettle, and the impostor will try to avoid it.

Excretion of calculi from the anus, bladder and vagina.

Mode of detection. Chemical examination will prove them not to be of animal origin, but common sand or gravel.

Fever. This is imitated by scrubbing the body with a hard brush, by severe exercise just before examination, by shaking, coloring the tongue with brick dust, brown soap, tobacco juice, chalk and pipe clay. Mode of detection. Remain some hours with the patient, observe him closely, and wash his tongue well.

Fractures. Mode of detection. Upon placing the individual on a bed on his back with a view of examining the comparative length of the limbs, it will be found that he voluntarily contracts the muscles of the limb he complains of.

Hæmatamesis. This is produced by swallowing blood and then vomiting. Mode of detection. By the incompatibility of the symptoms, and a guard over the patient.

Hæmaturia. Produced by eating beets, prickly pear, indian fig, swallowing madder, injecting blood into the bladder, and often by mixing foreign bodies with the urine after it is excreted. Mode of detection. Close examination of the urine, and placing a guard over the patient. If there is blood in the urine heat will coagulate it.

Hæmoptisis. This is imitated by procuring blood from the gums, throat or finger, or by artificially tingeing the sputa. Mode of detection, by the incompatibility of the symptoms, and the use of the stethoscope.

Hæmorrhoids. Produced by filling small bladders with blood, and introducing them within the anus. Mode of detection. Close inspection, and traction of the hæmorrhoidal tumor.

Hepatitis. Mode of detection. Observe the general appearance and countenance of the patient, and they will be found at variance with the complaint. Inspection of the bare body will show there is no enlargement in the right side.

Hernia and hydrocele. Hernia in rare cases is imitated by elevating and retaining the testicle in the groin, the deception is however detected by its hardness, and the absence of the testicle from the scrotum. Artificial hydrocele is produced by injecting water into the scrotum, and the other disease is imitated by injecting air. Mode of detection. When water has been injected the wound may be discovered, and the history of the case will hardly correspond with that of true hydrocele. When air is used the elasticity and percussion will detect it.

Hydrocephalus Externus. To imitate this affection both water and air are injected under the scalp. Mode of detection. Where water is used close inspection may detect the wound, and the absence of the other symptoms of the disease will detect it. Where air is used we have the additional means of percussion.

Incontinence of Fæces. Mode of detection. If upon the introduction of the finger into the anus the sphincter contracts upon it, give the individual a dose of opium and solid food, and if solid fæces pass he is a simulator.

Incontinence of urine. Mode of detection. Give a large dose of laudanum at bed time, and see how long the urine is retained during sleep. Unexpectedly introduce the catheter to ascertain the quantity of urine in the bladder. In true incontinence the urine will not accumulate in the bladder.

Jaundice. This is imitated by staining or painting the body with curcuma, tincture of rhubarb, &c. and muriatic acid is taken to produce clay colored stools. Mode of detection. Examine the conjuctiva, and it will be found of its natural color, for they always fail to stain it.

Mania. Mode of detection. Close scrutiny will discover the absence of mania, and the ability to bear fasting, cold and the want of sleep will be absent.

Opthalmia. Produced by applying to the eye corrosive sublimate, powdered allum, snuff, salt, lime, tobacco, and extraction of the eye lashes. Mode of detection. Its rapid progress, and, in soldiers, its always being the right eye. Place him under guard, and make it an invariable rule that no soldier shall be exempt from duty upon the loss of either eye.

Pain. Mode of detection. Catechise the patient seriously and evince an interest for him, then associate some anomalous symptoms with the pain complained of, and he will probably admit the existence of its symptom.

Palsy. Mode of detection. Electricity, and tickling the ear with a feather during sleep.

Phthisis pulmonalis. Mode of detection. The absence of the proper order of occurrence of the symptoms and auscultation.

Polypus of the nose. Imitated by introducing into the nostrils the testes of cocks or the kidnies of rabbits. Mode of detection. Close examination and traction.

Rheumatism. Mode of detection. By the absence of night pyrexia and slight perspiration, anorexia, heat of part,

delicate appearance of the patient and no change of disease in damp weather.

Short Sight. Mode of detection. By the use of concave glasses accurately adjusted to the deficiency, if he can read a book at a short distance without them, and cannot at a corresponding distance with them, he is an impostor. If this fail put the individual on some duty not requiring long sight, but disagreeable, and the motive of feigning will be removed, and the defect will disappear with it.

Barbadoes or swelled leg. Produced by placing ligatures around the leg, and suffering it to hang over the edge of the bed. Mode of detection. Close inspection, wrap the limb in sealed bandages, or lock it up in a wooden box.

Ulcers. Produced by vessicants, caustics, and thrusting needles even through sealed bandages. Mode of detection. Sealed bandages and locking up he limb in a wooden box.

Wounds fictitious. Sometimes feigned by soldiers to avoid military duty, and by officers to have their names gazetted. Mode of detection. Close scrutiny is generally sufficient.

Wounds factitious, mutilation. Inflicted for the purpose of escaping disagreeable duty, to procure a discharge from service, or to obtain a pension. Mode of detection. If the wound be so situated that the individual could not have inflicted it himself, or if it be of greater extent than necessary to accomplish the object of an impostor, it is probably accidental. But if these circumstances are reversed, and if the mode in which it is said to have been inflicted, is ill calculated to produce such effect, it should be regarded as voluntarily inflicted. The examination of collateral circumstances will greatly aid in the detection.

TOXICOLOGY.

No branch of Medical Jurisprudence has been so thoroughly investigated as that of poisons.

A poison may be defined a substance capable of impairing, or extinguishing the vital functions, in a great majority of cases.

This limitation is necsssary, because some of the most deadly substances, in small doses, may be taken, not only with impunity, but with salutary effects; and habit renders doses of them innocuous, which would destroy an individual unaccustomed to their use. Thus the Turks, Persians, and

some other eastern nations, use opium in quantities that would kill persons unaccustomed to the use of the drug. Habit had rendered the Turk, mentioned by Hobhouse, so insensible to the action of corrosive sublimate that he often took as much as a drachm for a dose.

Poisons may be divided into 1. Irritants: 2. Narcotics: 3. Narcotico acrids: 4. Septics. The first class, or irritants, inflame, and sometimes corrode the surfaces to which they are applied. Some of them also have another effect on their absorption, producing a *specific* action on the heart, or some other vital *organ*. Some of them are chemical agents of great activity: others are derived from the vegetable kingdom.

The second class, or narcotics, produce a species of intoxication, drowsiness and stupor, paralysis or convulsions. Opium, and the plants yielding prussic acid, are the chief poisons of this class.

The third class or narcotico acrids, includes mushroom poison, strychnia, camphor, belladonna, digitalis, &c.

The fourth, or septic class, consists of animal poisons, such as bites of snakes, stings of insects, bites of rabid animals, and the pestilential carbuncle.

Poisons are derived from the inorganic or organized kingdoms of nature. The first may be metallic, earthy, alkaline, simple chemical substances, and gaseous bodies: the second vegetable and animal poisons.

The morbid consequences of every variety of poisons are obviously two-fold:—local or those produced in the part of the body to which it is applied:—and remote, or those which are observed to ensue either in some distant organ, or throughout the system generally. The local action is either to corrode, inflame, or paralyse the part with which it comes in contact. These effects are rarely fatal, unless the organ is essential to life, and its functions are suspended or very materially deranged. Then death must be traced to their remote effects on tissues at a distance from the first point of local contact. Poisons produce deleterious effects sometimes by their operation on the brain through the nerves; but frequently through the medium of the blood: and in the former case by a reflex action on different, but particular organs of the body: and in the latter they may be carried to the brain, and then act, as in the former case, by a reflex action; but most generally they produce no effect until they are brought by the blood into direct contact with the tissue on which they act. Thus we find nitrate of potash, injected into the jugular vein, will

pass through the heart and not arrest its action until it arrives at the capillaries of the coronary arteries, which in the horse is found to require just sixteen seconds, and twenty-five seconds is found sufficient for the whole round of the circulation in this animal.

The following is the time, according to Blake, required for the blood to pass from the jugular vein to the capillary terminations of the coronary arteries—and also the time that elapses between the introduction of a poison into the jugular vein, and the first symptoms of its action.

The blood reaches the capillaries		First symptoms of poisoning	
in the Horse in	16 seconds		16 seconds
Dog "	11 to 12 "		12 "
Fowl "	6 "		6½ "
Rabbit "	4 "		4½ "

Conclusively proving, 1st. that a constant ratio exists between the time required for a poison to act and the rapidity of the circulation. 2d. that in those animals a sufficient interval always elapses between the introduction of a poison into the vascular system, and the symptoms of its action, to allow of the blood, with which the poison has been mixed, reaching the capillaries of the tissue on which the poison exerts its deleterious effects: and 3d. it may be added according to Blake's experiments, that with those poisons which act on the nervous system, the closer the part of the vascular system, at which, a poison is introduced, is to the nervous centres, the more rapid is its action: and also, that the contact of a poison with a large surface of the body, does not give rise to general symptoms, as long as its diffusion through the body is prevented. Blake is further of opinion that poisons only act when applied directly to the tissues they affect.

That poisons are absorbed is evident, for they are found after death in the blood. It is found that different poisons act differently on different tissues, some being powerfully acted on while others appear not to obey their influence in the least. Tobacco and the upas antiar exert their power principally upon the heart, quickly depressing and then arresting its action. But in Brodie's experiments on the decapitated dog, tobacco increased the action of the heart, which would show that the remote action of poisons, or at least this one, is through the brain. Poisons are greatly modified in their action by the nature of the structure to which they are applied. Their energy is proportioned to the absorbing power of the tissue to which they are applied.

They are also modified by habit and idiosyncrasies: by quantity and the mode of exhibition; some have their power greatly increased by being dissolved, &c.: and others have their poisonous qualities entirely destroyed by forcing them into chemical combination with a substance of a different character, upon which principle, the efficacy of most of the antidotes are founded.

The first thing to be done when a poison is swallowed, except in a few instances, is to give an emetic, and to use the stomach pump. A good substitute for the stomach pump is to take the long flexible tube belonging to the stomach pump, and introduce it into the stomach, then with a small funnel fill the stomach with water, next depress the upper or external end below the level of the stomach, and make, with the mouth, gentle suction, the tube, acting as a syphon, will very promptly and fully empty the stomach, and this may be repeated as often as is thought necessary to evacuate the poison, provided it be soluble in water. But when the poison is insoluble in water, or when we fear we have not removed all of it we must use the appropriate antidotes.

Antidotes are of two kinds. 1. Chemical. 2. Physiological. Of the chemical we have muriate of soda as an antidote for nitrate of silver. Sulphate of soda for muriate of barytes, &c. Of the latter, or physiological, amonia or chlorine for prussic acid; Tartar emetic for the specific effects of mercury: the salts of mercury for the preparations of lead.

When the poison is applied to the extremeties, a cupping glass, or tying or compressing the principal vein has been found sufficient, and then by opening the vein the blood may flow out: it is also found that if the ligature, or compression, is slackened so as to let the poison and blood pass guttatim into the system, it will prove innoxious.

PROOF OF POISONING.

In this investigation the 1st inquiry should be as to the symptoms previous to death.

2d. The morbid appearance visible after death.

3d. The result of researches to detect poisons in the food, or whatever has been swallowed, or ejected from the stomach and intestines, or what may be found in the stomach or intestinal tract after death.

4th. The presence or the absence of the evidence of suicide or homicide. Symptoms are fallible, nor are the post mortem appearances to be entirely relied on. The most conclusive

evidence is the detection of the poison in medicine, drink or food taken by the individual, or its discovery in matters passed by the stomach or intestines, or found in some part of the alimentary canal.

Chemistry often fails to detect a poison when it is absorbed, or when the article is from the animal or vegetable kingdoms, and is decomposed by the action of the stomach. In all other cases chemical tests are adequate to detect the poison if it is in appreciable quantities in the alimentary canal, and sometimes even after its absorption, as in the case of prussic acid and alcohol, the latter of which has been recently detected in the brain.

IRRITANT POISONS.

Symptoms and morbid appearances.

There is either a complete and immediate destruction of the parts with which the poison is placed in contact—when the powerful escharotics are used—or such a degree of irritation as leads to inflammation succeeded by increased vascularity, effusion of coagulated lymph, and occasionally of blood, ulceration and softening, and sometimes preternatural thickening of the mucus membrane, and gangrene or slough. These appearances occur in some part or other of the alimentary canal, but mostly in having burning pain in the epigastrium, then vomiting of the contents of the stomach, next mucus alone or streaked with blood, and, after violent efforts, blood is thrown up: tenderness of the epigastrium, sometimes pain in the intestines, diarrhea and tensemus. If the poison be escharotic or acrid the fauces and throat are irritated or corroded: pulse rapid and feeble, countenance flushed or deadly pale, excessive prostration and cold clammy sweat.

Diagnosis from *bilious* cholera. The pain and burning of the throat precede the vomiting in poisoning, but succeed it in cholera; which in the former soon becomes sanguinolent, whereas it is mostly bilious in the latter. Irritant poisons destroy life in a few hours, cholera rarely does in less than two or three days.

From acute idiopathic Gastritis, the pain and burning of the throat precede that of the stomach in poisoning, but not in gastritis.

Vegetable irritants or acrids generally vomit, by which most of the poison is removed, unless the quantity be small, when they produce diarrhea, abdominal pain, first remittent, but as the inflammation is established it becomes more con-

stant, tension and tenderness of the abdomen, great debility, and sometimes, though rarely, giddiness and delirium.

The morbid appearances of vegetable irritants are inflammation, redness, ulceration of the stomach and large intestines. The substances do not enter the vascular system, are direct local irritants, and when externally applied their action is generally confined to the place of application. Treatment, we must remove the substance from the stomach and treat the inflammation upon general principles.

NARCOTIC POISONS.

The narcotics do not, as the irritants do, corrode or inflame the part to which they are applied, but they produce death as suddenly and certainly, yet leave no trace of their action behind them. The symptoms produced by the narcotic poisons are such as indicate a derangement of the nervous system. These are pain of the head, vertigo, partial or complete blindness, stupor, sometimes amounting to insensibility, paralysis, a convulsive action of the muscles under the control of the will, and previous to death profound coma. But they act most promptly and powerfully when introduced into the current of the circulation, and the general opinion is that they enter the circulatory system, and are by means of it conveyed to the brain or spinal marrow, upon which their powers are thus brought to act, though some refer their action to the sympathy which subsists between the centre of the nervous system and those expansions of it on which the morbific impressions are made. But whatever difference of opinion exists as to the medium through which the influence of narcotics is propagated to the brain, all physiologists seem to admit that their operation is most powerful and rapid, when they are made to pass into the blood.

Their effects resemble apoplexy, epilepsy, asphyxia, inflammation and hypertrophy of the brain, and affections of the spinal marrow. They differ from apoplexy in the absence of its premonitory symptoms. Apoplexy attacks the old and corpulent, and the paroxysm is sudden. Whereas the narcotics, except prussic acid, are slow and increasing in their effects. The narcotised may be temporarily roused to consciousness, but the apoplectic cannot. Narcotics destroy life in a few hours, rarely exceeding twelve hours; apoplexy frequently lasts twenty-four or more. But, like prussic acid, apoplexy sometimes destroys life very suddenly—a clot of blood being found in the brain is a pretty sure sign in such

cases, that the disease has been apoplexy—for it rarely occurs in poisoning.

The diagnosis from epilepsy is pretty much the same as from apoplexy. It commences suddenly, narcotism is gradual in its invasion—the epileptic paroxysm, when fatal, is of longer duration than narcotism, and the first epileptic fit rarely proves fatal. Inflammation of the brain leaves abscesses, inflammation and softening, none of these occur in narcotism. Inflammation of the spinal chord offers all the appearances of inflammation.

NARCOTICO-ACRIDS

Are those poisons which both produce a local irritation, and exert an influence on the nervous system—but the symptoms of irritation are often absent, and so are those of narcotism.

It is not necessary to detail the symptoms and morbid appearances which characterise the narcotico-acrids generally, as those produced, both by narcotics and acrids have already been fully given.

METALLIC POISONS.

Of these, arsenic, quicksilver, copper, lead, antimony, zinc, tin, bismuth, chrome, silver, gold, are the most important.

1. *Arsenic* is poisonous in all its combinations. Its most usual preparations administered as poisons are, the blackish oxide or fly powder, the white oxide or arsenious acid, the sulphurets, and the combinations of arsenious and arsenic acids with alkalies. All are very deadly, even in small doses, whether swallowed, introduced into the anus or the vagina, applied to the abraded surface, or even when extensively applied to the whole skin.

Of these white arsenic, or arsenious acid is the chief. It is obtained in roasting ores of various metals, and is purified by distillation. It forms a translucent mass when recently distilled, but becomes opaque by keeping. The opaque is more soluble than the translucent variety. Water at the boiling point, takes up one-ninth of its weight of the first, and one-tenth of the second; but, as the solutions cool, they deposite small crystals, and not more than about one-thirty-fourth part of the weight of the water remains in solution: so that each fluid-ounce of the liquid will not contain more than 14 grains of this substance.—But even this solubility is greatly diminished by the pre-

sence of most animal fluids, especially of serum or milk; and even by many vegetable infusions, such as tea, and other astringents. White arsenic is nearly tasteless when first applied to the tongue; it is easily volatilized; and if the process be slowly performed, it may be obtained in octahedral crystals. According to Berzelius, it consists of M 100 + O 31.90. It combines with alkalies into uncrystallizable compounds, which are much more soluble than arsenious acid.

Arsenic combines with more oxygen to form arsenic acid. It consists of 100 M + 53.18 oxygen. It unites with the alkalies: the arseniates of potassa and soda are not crystallizable, though that of ammonia is so; but the biarseniates of potassa and soda readily form crystals.

These alkaline compounds are all highly poisonous; but only one, the arsenate of potassa, is likely to fall under the cognizance of the toxicologist. This last is used in medicine, and is well known under the name of *Fowler's solution.* Arsenic combines with sulphur in five definite proportions; only three of these are important.

Realger, the *Hyperarsenious sulphide* of Berzelius, is found native, and is largely manufactured for the purposes of the dyer, by fusing together and arsenious acid; its color is aurora-red; it consists of M 100 + S 42.85. *Orpiment*, or *Arnenious sulphide* occurs native, but is made largely by precipitating solutions of white arsenic in hydrocholoric acid by sulphuretted hydrogen; it consists of M 100 + S 64.27. A less pure orpiment is found in the shops, which is formed by sublimating a mixture of sulphur and arsenious acid. It often contains between its layers small crystals of the latter. Another precipitated sulphuret, the arsenical sulphide of Berzelius, is formed by precipitating arsenious acid by sulphuretted hydrogen; it consists of M 100 + S. 51.69. A supersulphuret may be obtained by adding alcohol to a sulph-arseniate of potassa or soda. The liquid obtained on evaporation deposites brilliant yellow scales, which consists of M 100 + S 385.20. A sub-sulphuret is formed by boiling realgar with caustic potassa; its color is deep brown; its composition is M 100 + S 3.56.

White arsenic unites with the oxides of various metals; but only two are toxicologically important, the arsenites of copper and of silver; both of which form delicate tests of arsenic, when thrown down by the ammoniaco-sulphate of copper and ammoniaco-nitrate of silver.

The symptoms of poisoning by arsenic commence usually within an hour after the administration ; and are, nausea, vomiting, great heat and pain in the stomach, purging, intense thirst, severe spasms in the limbs and pulse ; sometimes convulsions precede death. In a few cases the symptoms of an irritant poison are wanting, and the arsenic appears to be fatal by immediately inducing paralysis of the heart.

White arsenic would probably be fatal in a dose of 5 to 10 grains ; but in most instances of poisoning by this substance, it is given in much larger doses. Half that quantity administered in solution, has been fatal to an adult.

The fauces, gullet, and stomach, are often found marked by inflamed patches of a deep venaceous color, produced by blood effused under the coats of these organs. Sometimes the villous coat appears corroded or thickened, but the stomach is seldom perforated. When the villous coat has suffered erosion, the poison has generally been given in the solid form, and grains of it may often be picked off the surface of the stomach for analysis. The inflammation seldom reaches the jejunum ; but though the greatest portion of the small intestines and the colon escape, marks of irritation are often observed about the rectum, especially if the purging has been violent. Inflammation of the stomach also occurs in cases where the poison has been injected into the bowels, applied to a wound, or to the lungs in the state of vapour. In no form is the poison more deadly than when received into the lungs as arseiniuretted hydrogen. This proved fatal to Gehlen the celebrated chemist, and to Beard, a young British lecturer on chemistry. Persons have been poisoned by enemata containing arsenic ; there are instances of speedy death following its introduction into the vagina, and the symptoms are nearly the same as when arsenic is swallowed. The bodies of those who perish from arsenic, have been found long uncorrupted ; and the stomach and intestines are usually undecayed, even after being buried for many months. A seaman's body was found, very little changed, except the head and neck, after he had been for more than five months in the grave, and the stomach and bowels seemed as fresh as those parts are usually seen in a dissecting room. In this case the stomach contained much arsenic. At Bristol, a stomach imbued with this poison was examined, and could be tied and handled, after being fourteen months buried. In Archives Generales de Medecine, is reported a case that oc-

curred in France, in which Ozanam and Idt detected arsenic, after the body had lain buried in a dry sandy soil for seven years.

Various antidotes have been proposed, such as charcoal and magnesia; but the only substance that seems to deserve any reputation, is the recently prepared *hydrated peroxide of iron*, promptly administered in large doses. Magnesia and charcoal seem only to act mechanically; for at the temperature of the human body, they do not affect arsenious acid. Oxides of iron were first proposed by Napier; but his conclusions were said not to be correct. Yet, more lately, Drs. Brunsen and Berthold of Gottingen have shown that the hydrated peroxide, as precipitated by ammonia, is really a powerful means of obviating the poisonous effects of arsenious acid. This has been since confirmed by Souberian, Miquel and Orfila. This antidote is best prepared by mixing, with a solution of common sulphate of iron, rather more nitric acid than there is sulphuric acid in the sulphate, and boiling the mixture as long as red fumes are given out; then precipitating by ammonia, and slightly washing the precipitate; which should be taken in a moist state for use.

As this remedy acts most promptly when recently prepared, a most convenient and ready method of obtaining it is with the peroxide of iron, from the muriated tincture of iron, by a solution of carbonate of soda—the muriate of soda thus formed, may throw off by emesis the insoluble compound of the arsenite of iron.

This will precipitate the whole arsenic from a solution of arsenious acid, especially if recently prepared, and if it contain a little ammonia. This last ingredient seems to enter into the combination; for I always obtained it from the arsenite of iron so thrown down. Arsenite of iron is decomposed by free acids; the hydrochloric acid in the stomach may thus act, if some alkaline matter be not also present and therefore it may be advisable to administer a little magnesia along with the peroxide of iron.

The means of detection, when the arsenic is solid, are easy. Introducing it—with charcoal powder if it be white arsenic, or with black flux, if it be opiment—into a small tube, and applying gradually the heat of a spirit lamp, will afford a blackish shining metallic crust, the interior surface of which is crystalline. A portion of this, exposed to heat, exhales as a white smoke, and gives out an alliaceous odour. Another portion, slowly heated in a tube open at

both ends, is converted into minute tetrahedral crystals. When it exists in solution in the contents of the stomach, we have to clarify the liquid, and to apply tests; of which the most approved are a stream of sulphuretted hydrogen, which throws down a lively yellow precipitate; the ammoniaco-nitrate of silver which gives a yellow precipitate, that soon fades to a brown; ammoniaco-sulphate of copper, which gives a green precipitate. Either of these precipitates heated with a black or soda flux, in a glass tube, will afford the crust already described. Lime water throws down a copious white precipitate. This is the process employed by Rose, of Berlin, and is very delicate; but the color is not characteristic, and it might be confounded with the tartrate or phosphate of lime unless the precipitate be reduced by boracic acid and the application of heat. The ammoniaco-nitrate of silver, and ammoniaco-sulphate of copper, require the liquid to be neutral before their application; and animal and vegetable matter greatly impede, or absolutely prevent, the formation of the metallic crust. The precipitation of the arsenic by sulphuretted hydrogen, is a very convenient test, because the product is bulky and colored. Before it is used, however, the contents of the stomach, or suspected liquid, should be first acidulated with acetic acid, then filtered. This will separate the greatest part of the organic matters, and if the liquid be nearly colorless and clear, we may at once pass the stream of gas through it. These indications leave no doubt of the presence of arsenic; and from the 1-200 to 1-300 of a grain may be converted into a sensible metallic crust.

The only other metal which gives a yellow precipitate with sulphuretted hydrogen is cadmium; but this metal is very rare, and is very likely to be found in the human stomach in appreciable quantity. Should it be, sulphuret of cadmium is not volatile; it becomes red when heated, and again yellow when cold; characters sufficient to distinguish it from sulphuret of arsenic. But we have still a more decided test in the reduction of arsenic to the metallic state, the odour of the metal when heated, and its easy conversion into arsenious acid, by heat and contact with air. In no instance should we depend merely on the color of precipitates, which may be altered by several adventitious circumstances; but reduction to the metallic state should always be attempted in judicial examinations.

Other modes of detecting arsenic have been proposed. Jager, Fischer, and Torosovitz, have proposed to separate

arsenic from the contents of the stomach by means of galvanism. In 1833, Trail made use of the following contrivance. He acidulated the suspected fluid with diluted sulphuric acid, and introduced into it a slip of zinc, round one end of which was some gold leaf; a galvanic action commences, and after some hours, metallic arsenic is deposited on the metals as a dark stain; on drying the metals, and introducing them into a tube, the application of heat affords the alliaceous odour. In Marsh's elegant apparatus, arseniuretted hydrogen is formed: the suspected liquid is introduced into a syphon tube, one end of which is shut by a stop-cock with a capillary bore. The fluid is acidulated with sulphuric acid, and a piece of pure zinc is introduced before the stop-cock is fixed to the short leg of the syphon, the nascent hydrogen decomposes the salt of arsenic in the liquid, unites with the metal to form arseniureted hydrogen, which gradually fills the short limb of the syphon; on opening the cock, this gas is ignited, and over its flame is suspended a piece of porcelain, on which a black crust of arsenic condenses, with a strong odour of garlic. Antimonial salts thus treated, give a similar crust, but without this smell; the crust of antimony is not so easily raised as arsenic in white vapour, and does not again condense in a crystalline form. It is necessary, however, that the materials and apparatus be absolutely free from arsenic, except what may be in the suspected liquid. I also find that, after using the apparatus several times with arsenical solutions, so much arsenic is deposited on the inside of the stop-cock, that it will afford indications of that metal with distilled water, pure acid, and pure zinc, for more than twenty trials. I found it absolutely necessary, therefore, to heat the stop-cock, before I could get free of the whole of the arsenic. This is a very important fact, and shows the precaution we should employ in applying this test to suspected cases of poisoning.

Reinsch's method is the most delicate and convenient of all others. In order to ascertain the delicacy of this test, he took a solution of one part of arsenious acid to 1000 of pure hydrochloric acid diluted with water. A portion of this solution (to which one third of pure hydrochloric acid, was added) containing 1-100,000th part of arsenic, was acted upon when a plate of metallic copper was immersed in it as soon as it was heated; at first the precipitate on the copper plate had the appearance of iron, but after long boiling, it became black with a metallic lustre. With a so-

lution containing 1-200,000th part, the copper was distinctly covered with arsenic after 15 minutes boiling. The limit appears to be between 1-250,000th and 1-300,000th parts, and is therefore considered greater than that of any other reagents, and is not likely to be mistaken for other substances.

If arsenious acid be dissolved in water, and a slip of copper immersed, no action takes place, although the solution be brought to the boiling point, but if a few drops of hydrochloric acid be poured upon the copper—or considerably more into the solution—the arsenic is immediately precipitated. A quantative estimate of arsenic may, by this method, be made, as on boiling the solution, nearly the whole of the arsenic is separated from the copper, and the quantity of arsenic may be calculated from the loss of weight sustained by the copper. The arsenic obtained may either be tested further by Marsh's apparatus, or it may be heated in an open glass tube, by clipping off a small piece of the copper plate and inserting it into the tube, when the arsenical ring will be first formed, and by increasing the heat brilliant crystals of arsenious acid will be found, which may be dissolved in a weak alkaline solution, and tested by the usual reagents, or the slip of copper may be heated in a glass tube with hydrogen gas, when metallic arsenic will be sublimated. The great advantage of this method over the usual method of forming the attache on glass or porcelain is, that it cannot be mistaken, as the attache of arsenic can, for antimony, for if an antimonial solution be used the precipitate of antimony on the copper will be of a beautiful violet color. Take 1-50th of a grain of arsenic, place it on a surface of gold, moisten with a drop of muriatic acid, then touch it with a narrow strip of sheet zinc, and after a few seconds a distinct metallic film or deposite will form upon the part of the gold which has thus been brought into contact with the wire.

2. *Mercury or Quicksilver.* Mercury is fluid until the temperature falls to −40° which is its melting point. When solid, its sp. gr. = 15,612; at tem. 50°, it is 13,345; it boils at 662° F. This metal in its pure state has been supposed innocent; but when in a state of vapour readily enters the system through the lungs, and then may be fatal. When applied in its ordinary state to the skin, it is inert; when swallowed, it is seemingly quite inactive, unless it become oxidized in the stomach or bowels, and then it is capable of producing all the effect of mercurial poison.

The most usual mercurial poisons are corrosive sublimate or bichloride of mercury, its oxides, and subsalts. The long-continued use of calomel is capable also of acting as a poison; but almost the only mercurial poison criminally administered, is corrosive sublimate, though from its detestable taste it cannot be given by the mouth as a secret poison.

Corrosive sublimate may be known from its taste, its solubility, and becoming yellowish from mixture with fixed caustic alkalis and lime water. These characters distinguish it from calomel, which is blackened by all the alkalis, and is highly insoluble and tasteless. Ammonia does not change the color of corrosive sublimate. Hydriodate of potass precipitates it of a rich crimson, and protomuriate of tin of a slate gray. A very weak solution becomes first whitish, from a stream of sulphurretted hydrogen, and then blackish. These characters sufficiently discriminate this active poison.

The usual indications are a most disagreeable styptic taste, then burning of the throat, violent vomiting, great distress in the stomach and bowels, violent colic and severe purging, blood mingled with the matter brought up by vomiting, or ejected by stool. The symptoms often simulate dysentery; the face at first is often flushed, the eyes sparkling; soon the powers of life sink, the voice is lost; cold clammy sweats bedew the surface; perception of external objects is lost, and convulsions close the scene.— When the substance is given in small doses, or if the mercurial be a milder preparation, after dysenteric symptoms ptyalism supervenes; the person may sink from the violence of that affection, the fauces may become ulcerated, and gangrene may ensue. If ptyalism follow the administration of a single large dose of a mercurial, it is always to be regarded as a formidable symptom. When the person survives, he may suffer from mercurial palsy.

Ptyalism may arise spontaneously, or from the exhibition of various remedies, such as nitric acid, preparations of copper, antimony, digitalis. In these cases it appears that the chief diagnostic is the absence of the peculiar fœtor of the breath, which is constant in the mercurial ptyalism. Mercurial ptyalism occasionally has intermissions, or considerable intervals, extending from a few days to six or seven months. The importance of this fact, in a medico-legal sense, is illustrated by the trial of Mary Butterfield for the murder of Mr. Scawen.

The effect of mercurial poisons are indicated after death

by the following appearances. The fauces are generally more affected than from arsenic, and the inflammatory appearances are more diffused over the alimentary canal. Destruction of the coats of the stomach is often observed, either the consequence of the escharotic power of corrosive sublimate, or of ulceration. Peritoneal inflammation is not uncommon; and irritation of the urinary organs, perceived during life, is marked by inflammatory indications found after death.

We possess in whites of eggs, milk, and gluten of wheat, antidotes of considerable power against the poison of corrosive sublimate, provided they be given soon after the poison. The first is the most powerful. The secondary symptoms must be met by antiphlogistic remedies and venæsection. The albumen of eggs was first proposed as an antidote for corrosive sublimate by Orfila, who published several cases of its efficacy; and a remarkable one is given by Dr. Lendrick; but Dr. S. Wright has lately shown that unless the albumen be fresh, and unless it be in due quantity, it does not act as an antidote. He shows, also that its efficacy is much increased by giving with it some vegetable infusion containing tannin. Taddei, of Florence, proposed vegetable gluten as an antidote for corrosive sublimate, which he rubbed up with eight times its weight of soap. This last ingredient probably aids the effect of the gluten in decomposing the bichloride; but this remedy is found to be less effectual than the albumen of the egg.

Mercurial poisons are easily detected when we obtain them in substance, but not so readily when mingled with the contents of the stomach. Corrosive sublimate is decomposed by several animal substances, and therefore we are not likely to detect it unchanged in the contents of the stomach. It is there usually converted into calomel, either in whole or in part. When held in solution it is easily detected by Sylvester's method, *i. e.* by dropping a little of the suspected liquid, slightly acidulated, on a gold plate, or a gilt card, and touching the gold surface, through the liquid, with a piece of zinc or iron wire. Trail employs a similar method to separate the mercury from its solution. He wraps a gold leaf round a slip of zinc, and immerses it in the suspected liquid, slightly acidulated; the mercury is precipitated; and scraping off the gold and tarnished surface of the zinc, he introduces them into a small tube, when the spirit lamp is sufficient to produce a ring of brilliant metallic globules.

In all probability the mercurial will not be found in the stomach in a soluble state. The probable contents of the human stomach, many vegetable, most animal fluids, and even the contact of animal tissues, are capable of decomposing the bichloride, and converting it into protochloride. Hence, though the poison administered be corrosive sublimate, none of that salt may exist in the stomach after death, and all the mercurial there may be in an insoluble state, intimately mingled with the contents of the stomach. Sometimes it exists in the clots of blood found in the stomach, or adherent to the eschars there produced by the poison. In such cases, the clot or eschar should be removed, and boiled with caustic potassa, when the animal matter will be dissolved, and the mercurial will be found as a grayish powder at the bottom of the vessel. It may be separated by decantation, or the pipuette, washed, dried, and will afford metallic globules when heated in a tube.

When the quantity is very minute, we may use the process of Devergie. In this case we have to form the contents of the stomach into a pulp, to boil it with a little hydrochloric acid, to reduce it to the consistence of thin gruel by successive additions of distilled water, and to pass a stream of chlorine through the mass, when the mercurial present will be converted into bichloride, which may be separated by filtration ; drive off the excess of chlorine by boiling the liquid, and then either precipitate the mercury, by introducing into the liquid a cylinder of pure tin, according to Devergie's method, or by combination of zinc and gold leaf. The tarnished surface of the metals in either case is to be scraped, and the powder so obtained introduced into the tube and heated, as already described. If precipitation by a liquid re-agent be preferred, there is none superior to the addition of protochloride of tin to the liquor obtained by the above process, which will precipitate any mercurial present as a protoxide, or in the metallic state ; and when washed, the precipitate will afford bright globules by heating it in a tube. The solid mercurials are easily reduced to the metallic state. Red precipitate is reduced by merely heating it in a tube. The sulphurets and chlorides, as well as the sulphates and nitrates of mercury, when mixed with carbonate of soda, and treated in the same way, afford metallic mercury. The cyanide of mercury, when thus heated, affords *cyanogen*, which burns with a rose-colored flame.

When we have much corrosive sublimate to operate on

we may also try it by lime water, which throws it down of a deep yellow; by alkalis, which form with it an orange precipitate; by protochloride of tin, which gives a slate-gray powder; and by hydriodate of potassa, which forms a splendid scarlet precipitate.

If a plate of copper be immersed in a solution of corrosive sublimate, acidulated with hydrochloric acid, and heat applied, the mercury will be precipitated on the copper slip with the peculiar mercurial appearance resembled only by silver, it may be scraped off, introduced into a tube, and subjected to the treatment already directed.

By the latest experiments of Lassaigne, it would appear that in the action of albumen on metallic salts, *this principle unites directly with those compounds without producing any decomposition.* It forms compounds with them, which are insoluable in water, when these bodies are in *certain* proportions, but susceptible of solution when the albumen, or the metallic salt is in *excess.* And these compounds he denominates albuminates.

From these results it is to be apprehended, that the value of albumen, as a *chemical* antidote, will be somewhat impaired. Still its use ought not by any means to be omitted, but it should be administered as early as possible and in large quantities, and then an emetic be given to throw off the compound before solution occurs.

2. *Copper.* The poisonous effects of the salts of copper have long been known; but though little likely to be used as secret poisons, they sometimes produce death from being accidentally mingled with food, as in the use of culinary utensils of copper. The principal danger arises from cooking acescent or oleaginous food in such vessels, especially if that food be permitted to cool in them. The principal preparations of copper are the oxides, called *copper mineral green* and verditer; verdigris, which is a mixture of two acetates; the binacetate; carbonate, which generally forms on the surface of copper exposed to acid vapour and atmospheric air; sulphate of copper, or blue vitriol; and nitrate of copper. Of these, the salts most likely to be found in the human stomach are verdigris and blue vitriol. The symptoms are those of other irritant poisons, to which is added spasmodic rigidity of the limbs, in some cases amounting almost to tetanus. Salts of copper may produce salivation, and also jaundice. The morbid appearances are not very characteristic. The principal authors who have treated of this species of poisoning, are Falconer, Percival, Wildber, Eller, Proust, Orfila, Henri, and Deyeux.

Albumen of eggs appears an antidote of some power against the salts of copper: and therefore after evacuating the stomach, the whites of raw eggs should be administered. This remedy was proposed by Orfila, who found it very effectual in saving dogs from the effects of this poison. He also found ferro-prussiate of potassa very effectual. Duval stated that sugar was a useful antidote. This was denied by Orfila, but seems rendered probable by the experiments of Postel. Metallic iron has been proposed also as an antidote, by Milne Edwards and Dumas. Inflammation should be obviated by antiphlogistic means.

Carbonate of soda produces carbonate of copper which is inert. This is greatly preferable to albumen, for if we give more albumen than is necessary to exactly neutralise the copper, we render it soluble and thus make it again poisonous. Sugar as hot as can be swallowed is of service. Orfila says that it is more certain than albumen.

The poison of copper may be sought for by boiling the contents of the stomach with acetic acid ; this will dissolve every preparation of copper, and enable us to separate them from animal and vegetable matter by the filter. We may, if necessary, concentrate the solution by evaporation; and if the addition of ammonia give the solution a blue color, we may be satisfied that it contains copper. A stream of sulphuretted hydrogen throws down a brown precipitate from the solution of copper: and if the quantity of copper be considerable, a piece of bright polished iron will become coated with a film of copper.

Lead.—The poison of lead is of considerable consequence, although never used as a secret instrument of revenge. Its oxides and salts all appear to be deleterious, but those from which accidents have most commonly happened are litharge, white lead, and sugar of lead. Guytonde Morveau showed that some of the oxides of lead are sparingly soluble in pure water; and more lately, Bonsdorf states, that all of them are soluble in 7000 times their weight of distilled water. Those often find their way into the stomach from little suspected sources, and produce a species of poisoning with their very peculiar symptoms. Leaden pipes and cisterns are acted on by water, especially by soft rain water; and the carbonate of lead thus formed being soluble in an excess of carbonic acid, is liable to enter the human system with food. Curious instances of the production of lead colic, from the impregnation of water flowing over the surface of the metal, occurred at Haerlem, Amsterdam, and Turnbridge. In leaden cis-

terns, brilliant hard crystals of hydrated of oxide of lead have been occasionally found. I once saw them half an inch in length in a cistern in my own house. Captain Yorke analyzed the crystals, and states, as his opinion, that the lead is dissolved in the form of oxide; and Dr. Christison found that they contain some carbonate.

This poison is often introduced into the system by the use of wines which have been *dulcified* by lead. The low wines of France and Germany, when they become sour, are often thus rendered marketable; and the lead colic is by no means an unfrequent disease in both countries.—There is an admirable essay by Fourcroy, "Sur les Vins Lithargyries." Acescent articles of diet act on leaden vessels; and, when aided by heat, on the plumbifferous glazes of our earthenware.

It is well known that *new rum* is very apt to produce the lead colic, and that many of our soldiers perish from this cause, in our transatlantic colonies. The lead is derived from the leaden worm of the stills, and I have always found the rum, as received in glass bottles from the still, impregnated with lead; but, when it is kept in oak casks, the tannin of the oak is slowly dissolved by the spirit, and precipitates the lead in a very insoluble compound, by which the spirit becomes as wholesome as any other spirituous liquor. This circumstance renders *old rum* in great demand for the use of our navy and army. But an equally wholesome spirit might be easily obtained, by directly mixing the new rum with a decoction of oak-bark, or nut-galls, by which the lead will speedily be precipitated; and when *racked off*, the spirit will be free from lead.—The danger might be also obviated by using tin tubes for still-worms, as enjoined a century ago by the State of Massachusetts.

The use of lead glazes for earthenware, is another cause of lead colic but little suspected. The glaze of the coarser kind of earthenware is readily acted on by ascescent food. Instances of lead colic, from this source, are not unfrequent in Spain, where much use is made of coarse earthenware for culinary purposes. These are the most general sources of this poison; but persons engaged in work where white lead is largely used, smelters of lead ores, painters, and potters are liable to the same deleterious symptom. The symptoms produced are obstinate constipation, severe tormina, with the symptoms commonly known by the name of *painter's colic, colic of Poitou, and of Devonshire.* After

these have subsisted for some time, the person begins to have paralysis of the limbs, first of one or both arms; in general, the extensor muscles suffer before the flexors, and the palsy may then become general in that limb, or extend to other parts. The proportions of lead, when given in large doses, appear to act as irritant poisons.

Orfila found that animals poisoned by sugar of lead had a preternatural whiteness of the villous coat of the stomach, if they perished speedily; but if their death were protracted, the inner coat of the stomach was reddened. The stomach has often been found corrugated after death.

John Hunter observed in those who died of the lead palsy, that the muscles were unusually dry, and had a cream-white colour, and appeared opaque and tough, with the fibres remarkably distinct.

Frequent ablution of the surface is the best prophylactic for those much exposed to the powder of the preparations of lead; and when lead has been introduced into the system with the food, the best means of obviating the return of the evil is by rigidly excluding lead from all culinary and economic purposes. Hard water is less liable to act on lead than soft water; and hence the impropriety of lead cisterns for rain water. Mercury seems to have a beneficial effect in lead colic, especially when conjoined with opium; but this remedy has sometimes been employed too indiscriminately.

When a patient is suffering from the recent administration of lead, the best antidote is certainly a solution of phosphate of soda; and the next in efficacy is sulphate of soda, or of magnesia.

Lead is easily detected. To whatever articles it is suspected to enter add vinegar, and boil; filter the solution, and all the lead will be in the clear liquor. If in large quantity, it may be detected by the sweetish astringent taste of the liquid; part of which may be tried by the addition of a solution of sulphurretted hydrogen, or of hydrosulphuret of ammonia, which instantly darken the most dilute solution of lead; another portion may be tried by bichromate of potassa, which throws down solutions of lead of a brilliant yellow; a similar colour is formed with them and hydriodate of potassa.

Sulphate of soda is recommended by Dr. Thompson as a very minute and unequivocal test. It will produce a white precipitate in water, containing 100.000th of its weight of

lead. The precipitate is a fine dense powder, which speedily falls to the bottom, and is not dissolved by nitric acid: no other precipitate can be confounded with it, except sulphate of barytes, and there is no chance of the presence of barytes in solution in water.

The reduction of the sulphuret may be accomplished by putting it into a small hole scraped into a piece of charcoal, and applying the flame of a blow pipe. The metal almost immediately appears. If any doubt exist as to its nature, the charcoal may be withdrawn, and the flame again applied, when two beautiful concentric circles of red and yellow remain, being the yellow and red oxide of lead.

Insoluble matters may be evaporated to dryness, and burnt in a crucible: but generally speaking nitric acid will dissolve the lead from most sf its compounds that are insoluble in water.

5. *Antimony* is rarely a poison; because its most active and best known preparations are violently emetic, and thus counteract its effects. Its sulphurets are not very active preparations. The union of oxygen with antimony forms three definite compounds, two of which are considered as acids, but they are rarely objects of research to the toxicologist. The triple salt, tartrate of antimony and potassa or emetic tartar, is a very active preparation; but its powers as an emetic have sometimes counteracted its effects as a poison. It, however, lately caused the death of two persons in England, Thomas Combes, a man of twenty-four years of age, at Folkestone, in 1837, and of Ruth Winter, a child of two years, in 1838. In the first instance, three drachms were swallowed instead of a cure for ague; in the last, it was a dose intended for the father, and given by mistake to the child.

Chloride of antimony, or butter of antimony, is a most acrid substance; but its very corrosive properties, and its instant decomposition by water, render it very unlikely to be internally administered.

Emetic tartar when given to the lower animals, if vomiting be prevented by tying the gullet, causes inflammation of the lungs and stomach; and this would probably be its effects on man. The lungs appeared a mixture of orange-red and violet-blue, and they were gorged with blood, which prevented the usual crepitus. It was also fatal when applied to a wound. In a man killed by emetic tartar, the stomach was violet-coloured, thickened, and covered with tough mucus, and the intestines empty.

The best antidote for this poison is decoction of Peruvian bark, especially the yellow bark.

The detection is not difficult; sulphuretted dydrogen throws down a rich orange-red precipitate. When the antimony is mixed with animal and vegetable matter, first a little muriatic acid to precipitate the contaminating substances, and then tartaric acid to dissolve any antimonial present. This will afford by filtration a clear liquid for the application of the tests. The sulphuret is best reduced by Dr. Turner's process; *i. e.* passing a stream of hydrogen over it when heated to redness in a tube.

A slip of copper introduced into a solution of any of the poisonous preparations of antimony, to which hydrochloric acid is added, when heat is applied will be covered with a beautiful violet precipitate of a metallic lustre. With a solution containing 1-200,000th part of antimony, the precipitation is so thin, that the copper shines through, but has still a violet hue.

6. *Zinc* in solution may be detected by a stream of sulphuretted hydrogen, affording a whitish precipitate. This will detect all the soluble salts of zinc, as it is the only metal of which the precipitate by sulphuretted hydrogen is permanently whitish. The only salt of zinc, likely to become an object to the toxicologist is the sulphate, or *white vitriol.* Orfila gives several where an over-dose produced severe symptoms; and Mertzdorff has published a fatal case. In general its very speedy emetic effect would probably prevent its most alarming symptoms.

7. *The oxides and sulphates of Tin* are substances of very little activity; but the chloride or muriate of tin is a very acrid poison. Orfila showed that it was fatal to dogs, when 20 or 30 grains are introduced into their stomachs, producing symptoms of great irritation, and prostration of strength; after death the stomach was highly inflamed, and appeared as if tanned. The muriate of tin affords a precipitate of a rich purple, the powder of Cassius, with deuto-muriate of gold; and when strong, coagulates milk completely.

8. *The Salts of Bismuth* are all acrid, especially the nitrate; but as the salt is easily decomposed, it is not likely to act as a poison. The sub-nitrate is, however, used in medicine, and is possessed of considerable power as an irritant. Orfila found that a drachm of it, retained in the stomach of a dog, killed it in thirty-six hours, with marks of high inflammation of that organ. A country apotheca-

ry gave a patient of mine *twelve drachm doses*, instead of a drachm divided into twelve doses; the man took 1*dr.* the first day, 3*drs.* on the second, and 2*drs.* on the third day, when I was called, and found him suffering extreme pain in his abdomen and throat. He had vomited on the previous evening; his pulse was small, he felt very feeble, and had much anxiety about the præcordia. I gave castor oil, milk porridge, and carbonate of potassa. The man was several days very poorly, but finally recovered. There is a fatal case recorded, in which the dose was two drachms. It caused inflammation of the primæ viæ, gangrene, salivation, and death on the ninth day. In this case the whole alimentary canal, from the fauces to the anus was inflamed, and there were spots of gangrene seen in the œsophagus and stomach. Though the urine was suppressed, the kidneys appeared healthy, as was the brain. Sub-nitrate of bismuth may be detected by calcining in a moderate heat the contents of the stomach, and adding diluted nitric acid to form a solution, from which water throws down a white precipitate.

9. *The Salts of Nickel* and the acids are all acrid, and are poisonous to the lower animals.

10. *The Salts of Cobalt* are no less so.

11. *Chromate of Potassa* produces deep fistulous sores on the hands of the dyers who use it; and even when applied to wounds in the dog, Gmelin found that it produced a lingering death in six days, with paralysis of the limbs, dyspnœa, and inflammation of the mucus membrane of the air passages.

The salts into which chromic acid enters are easily detected by acetate of lead, with which they form a brilliant yellow precipitate, which does not afford iodine, like iodides of lead, to sulphuric acid and heat.

12. The only *Salt of Silver* interesting to the toxicologist is the nitrate. It is a deadly poison. Even $\frac{1}{3}$ of a grain injected into the jugular vein killed a dog in $4\frac{1}{2}$ hours, with violent tetanic spasms. It is readily decomposed in the stomach, so that small doses of it do not thus destroy life. In divided doses it produces a singular discolouration of the skin, which is permanent through life.

The soluble salts of silver are thrown down by alkaline and earthly muriates; and the precipitate is easily fusible into horn-silver. A plate of copper becomes silvered by immersion in the solution of silver.

It is best to acidulate the solution with muriatic acid and

apply heat. Antidotes, the muriate of soda is the best and most cenvenient.

13. *Gold* dissolved in nitro-muriatic acid is a very poisonous salt: 2 grains will kill a dog in two or three days. Injected into a vein, ½ grain will kill him in four minutes, after vertigo, dyspnœa, and piercing cries. The precipitate from this salt by ammonia, the *aurum fulminans*, was once used in medicine, but it is a dangerous remedy; 6 or 8 grains will destroy life. It excites in man tormina, vomiting, diarrhœa, and sometimes profuse salivation, before it proves fatal. Gold may be detected by solution in nitro-muriatic acid; which solution affords the purple powder of Cassius with muriate of tin; and the neutral solutions of gold instantly gild silver or copper immersed in them.

Antidotes, the sulphate of iron from its property of decomposing this salt—muriate of gold—and throwing down the gold in its metallic state is the best antidote.

EARTHY ALKALINE POISONS.

1. *Baryta.* Both the carbonate and pure baryta are very poisonous, as are the soluble salts of this earth. The symptoms are at first those of irritant poisons: the senses then become blunted, the respiration feeble, and convulsions close the scene. The narcotism produced by barytic salts is more invariable than that arising from any of the metallic poisons. Cattle are said to have been poisoned by licking the carbonate of baryta, in those districts where it is found, and a woman and her child are stated to have once perished at Anglezark in Lancashire, from swallowing, by mistake, about 1 drachm of the powder. An ounce of the muriate killed a man in an hour. He took it instead of sulphate of soda; it instantly produced intense pain, vomiting, deafness, and convulsions. The stomach is found inflamed, and the brain shows congestive apoplexy.

The antidotes are any of the alkaline sulphates; which instantly form with all the poisonous salts of baryta, insoluble, inert compounds. Sulphuric acid, or sulphates, are also the tests of this earth; but it might be confounded with strontia, the salts of which do not seem poisonous, except in so far as they are acrid. The best distinction is obtained by procuring a muriate of the suspected salt, and dissolving it in alcohol.—The muriate of baryta imparts a

yellow colour to the flame of spirit; the muriate of strontia, a fine red.

2. *Lime* is only poisonous as an acrid. The antidotes for it are phosphates of soda or potassa, and water impregnated with carbonic acid. The detection of the salts of lime is easy. Its properties when pure are alkaline; it forms with sulphuric acid a substance of little solubility; but phosphoric and oxalic acids precipitate it from all its soluble combinations.

3. *Potassa and Soda.* The pure alkalis and their proto-carbonates are poisonous. Several fatal accidents have happened from them. They act as strong irritant poisons, producing intense heat and pain in the abdomen, then cold sweats, tremors, and convulsive twitchings in the limbs; the stools are tinged with blood, and membranous flakes are mixed with the egesta. A lad at Dumfermline perished in twelve hours from a doss of 3 ounces of a strong solution of proto-carbonate of potassa; and I have the stomach of a youth, who died in Edinburgh, from swallowing one ounce of it, by mistake for epsom salts. It was fatal in ten hours. The villous coat of the stomach appears patched with dark stains of ecchymosis.

When a person recovers from the primary symptoms, he may die from the consequences of injury to the primæ viæ. A case is described by Sir C. Bell, where the person many years after, died of stricture in the œsophagus, brought on by swallowing soap-maker's ley. The action of potassa and its carbonate on the animal economy have been ably investigated by Orfila and Bretonneau. When the person lives some time, general peritoneal inflammation is observed after death. The best remedies are large quantities of mild oil. The tests of the alkalis are obtained from their combinations with different acids, and the manner in which they colour the flame of the blow-pipe.

Nitrate and chlorate of potassa are irritant poisons, producing dangerous inflammation of the stomach and bowels.

Nitre is a poison of some activity, but it requires a considerable dose to destroy life. Two fatal cases are recorded: one died from one ounce of the salt in three hours; the other, after taking 1½ ounce of the salt, lived two days and a half. I was called to a servant girl who had taken, by mistake, as much as 1½ ounce of nitre. Her stomach was full of tea at the time, she vomited soon, and was convalescent next day. The usual symptoms of poisoning by nitre are nausea, extreme sense of chillness, pain in the

stomach, *tinnitus aurium*, great debility, and occasionally tetanic spasms. The secondary symptoms, are inflammatory, and often require bleeding.

When nitrate or chlorate of potassa can be had in the solid form, the first may be known hy its ready deflagration with charcoal in a crucible; the second by putting a drop of sulphuric acid on a mixture of the salt with sugar, which it instantly ignites.

4. *Ammonia and its Salts.* They all act rapidly as irritant poisons, and have besides, a violent effect on the nervous system, especially on the nerves of the spinal cord. This last effect is principally produced by pure ammonia and its carbonate. Convulsions have been caused by the too long continued inhalation of the vapour of ammonia; and it has several times proved fatal to man, terminating in severe bronchitis. Such a case occurred in Edinburgh, which caused death in forty-eight hours. For this species of poisoning, muriatic acid vapour is the best remedy. On the reception of carbonate of ammonia in the stomach, we should administer diluted vinegar instantly.

The hydrochlorate of ammonia appears also to act as a poison of considerable energy.

We detect the presence of ammoniacal vapour by the smell, and by a rod dipped in the hydrochloric acid, which gives rise to white fumes of hydrochlorate of ammonia.

5. *Alkaline Sulphurets* are all poisonous, chiefly from the readiness with which they give out a large quantity of sulphuretted hydrogen gas; which is poisonous when inhaled, and when injected in quantity into the alimentary canal. The villous coat of the stomach, in case of poisoning by alkaline sulphurets, resembles in colour the skin of a toad, and the muscular coat is coagested with blood. The alkaline sulphurets act as narcotico acrid poisons. Their presence is ascertained by a weak acid, and exposing a piece of paper, dipped in sugar of lead, to the fumes.

ACID POISONS.

The three mineral acids are only poisonous from their corrosive qualities, by destroying rapidly the tissues to which they are applied.

1. *Sulphuric Acid*, when strong, decomposes and blackens animal matters by evolving their carbon. It disorganizes the fauces, gullet, and stomach; when not speedily fatal, it lays the foundation of stricture of the gullet, and the patient

is long harassed by dysuria and constipation. Sulphuric acid has frequently been swallowed by mistake, and thus has often proved fatal. A fatal case occurred in the Edinburgh Infirmary in 1840. The parliamentary report on poisons shows, that twenty-five cases of poisoning by this acid occurred in South Britain within two years; of these, two were cases of determined suicide, three of real insanity: the rest were accidental. It is a capital felony to throw sulphuric acid maliciously in the face.

2. *Nitric Acid* destroys the animal tissues, and gives them a yellowish hue, especially in the fauces, and when applied to the skin.

The work of Tartar contains fifty-six cases of poisoning by nitric acid; thirty-one arose from accidental mistakes; twenty-four were suicide; twenty-seven died; twenty-nine recovered, of whom twenty-one were cases of complete recovery, and eight of imperfect recovery.

3. *Muriatic Acid* destroys the tissuse also, but often renders the fauces whitish and sometimes as if the surface were of ivory. In the "Medical Gazette" for 1839, is a case of poisoning by muriatic acid, which was fatal within twenty-four hours, with terrible agony. The mucous surface of the œsophagus was destroyed. The stomach was lined with yellow lymph, and below this it appeared blackened, as if charred. No acid could be detected in the stomach or its contents, but stains of muriatic acid were found on the clothes of the deceased.

The symptoms produced by these three acids are similar, and the best remedies are the same for all, viz. the copious use of mixtures of chalk or magnesia with milk.

The three acids destroy the clothes, corroding them when strong, and when diluted, staining them of a reddish-brown. This circumstance becomes of importance in cases of maliciously throwing acid on any person, when no part of the acid liquid had been preserved. The stained portion of clothes, soaked in distilled water, will give out the acid. If sulphuric acid be present, it is best detected by nitrate of baryta, which gives a white precipitate, insoluble in pure nitric acid. Muriatic acid is detected by the addition of nitrate of silver, which throws down insoluble muriate of silver. Nitric acid is best recognised by its effect in destroying the colour of sulphuret of indigo, when heated with it in a tube.

4. *Oxalic Acid* is a most deadly poison. It differs from other acids derived from the vegetable kingdom in not containing hydrogen; being, like the mineral acids, a binary

compound. Its taste is so intensely sour that it cannot be employed as a secret poison; but it has been swallowed by mistake for sulphate of magnesia, so as to prove fatal. Its alkaline salts are almost equally poisonous, especially the binoxalate of potassa, or *salt of sorrel*, and they are speedily fatal when applied to wounds. Oxalic acid renders the tongue red and inflamed, and it corrodes the stomach; burning pain in the primæ viæ speedily comes on; cold clammy sweats, a faint and fluttering pulse succeed, and palsy of the heart soon appears; proving that this substance is not only an acrid but a true narcotic. Unfortunately, its effects are so violent that there can be little done by art to save the patient. Instant evacuations of the stomach, and the exhibition of chalk or magnesia mixtures, are the best means to be employed. Even when the person survives the immediate effects, he often dies of the inflammation or the corrosion of the alimentary canal. The best method of detecting oxalic acid is to precipitate portions of it by solutions of lime and magnesia. The precipitate by the first is not decomposible by an acid; sulphate of copper gives a precipitate with oxalic acid, insoluble in a little muriatic acid; and the precipitate with nitrate of silver when dried deflagrates by a gentle heat. When the oxalic acid is much mixed with animal and vegetable matters in the stomach, or when chalk or magnesia are administered as antidotes, the acid is more difficult of detection. It will require more boiling, with carbonate of potassa, filtering, acidulation with nitric acid, again filtering, precipitating by acetate of lead, and separating the oxalic acid by a stream of sulphuretted hydrogen, which precipitates the lead.

SIMPLE SUBSTANCES WITH POISONOUS QUALITIES.

1. *Phosphorus*, even in very small quantities, is poisonous: two grains have proved fatal to a man. In that case there were sugillations on the belly and thighs, the scrotum was bluish and phosphorescent, the chest contained much fluid dark blood, and the muscular coat of the stomach appeared inflamed with dark spots about the cardiac and pyloric orifices. Evacuation of the stomach, and the administration of mucilaginous, but not oleaginous substances, are the means we should employ to give relief in such cases. When the patient lives for some time, it will be difficult to detect the poison, unless the morbid appearances above noted may be considered as characteristic. Solid phosphorus is easily detected by its inflammability. In a fatal case of poisoning by

three grains of phosphorus, published by Fontanelle, minute particles of solid phosphorus were discharged by stool, which shone in the dark, and burnt small holes in the sheets on the bed.

2. *Iodine, and Hydriodate of Pottassa*, are active substances, which, if given in excess, are apt to produce irritation of the system; vomiting, excessive langour, a feeble pulse, pains in the stomach, and cramps in the limbs; bilious vomiting and purging have followed large doses of iodine. It stimulates the liver, causes absorption of indolent glandular tumours; and it is said, that its long continued use has caused the disappearance of the testes and the mammæ.

In dogs poisoned by it, the stomach was found inflamed, with numerous ulcerated points on its villous coat. No antidote is known. Its detection is easy. Boiled solutions of starch are delicate tests of the presence of iodine, or of hydriodic acid, by the intense blue color produced. If hydriodate of potassa be present the color is evolved on adding to the starch a drop or two of the sulphuric acid.

2. *Bromine* is more poisonous than the last substance, but it is so rare, that it is unnecessary to describe its effects or mode of detection.

GASEOUS POISONS.

Of these some are fatal from the *irritation* they produce, A; others are *narcotic*, B.

A.

8. *Chlorine* This gas, if incautiously inhaled destroys life, by the *irritation* it produces. It causes violent constriction of the epiglottis and severe pain in the chest, even when diluted. It disinfects air contaminated by animal emanations. Its solution in water kills dogs; and when injected into a vein, it speedily destroys life. It is most certainly detected by its smell.

Antidotes. The inhalation of ammonia, or of sulphuric ether, or if nothing else be accessible, inhaling warm water from a tea pot or other vessel. A mixture of albumen and water, or milk may be given.

2. *Hydrochloric Gas or Muriatic Acid Gas* is still more irritating and destructive. It is largely emitted in the manufacture of soda from salt, and is then most hostile to vegetation; 1-36000th of it contaminating the atmosphere so as to de-

stroy plants, as I found in experiments made several years ago.

3. *Sulphurous Acid Gas* is also most suffocating; is, even when much diluted, very destructive to vegetation; and has, as emanating from burning sulphur, sometimes been employed to commit infanticide. It renders the lungs very livid.

4. *Nitric Oxide, and Nitrous Acid Vapour*, are poisonous irritant gases, that cannot be respired, unless largely diluted. The attempt to respire the former nearly proved fatal to Davy. The fumes of the latter have accidentally proved fatal to individuals, producing sensations in the throat and chest, an expectoration of a yellowish matter, and alvine dejections of a bright yellow colour. Before death the body becomes livid, the breathing laborious. Vapour of ammonia cautiously inhaled may relieve from the effects of this gas, of hydrochloric, and of sulphurous acid gases; but we have no means of detecting any of these poisonous gases, in the small quantity they ever can exist in the human chest, except by the sense of smell.

5. *Ammonia* is not only irritating when received into the lungs, but is, as we have already said, narcotico-acrid.

B.

6. *Nitrous Oxide*, the exhilarating gas of Davy, is narcotic, yet can scarcely be considered as poisonous, since it may be inhaled several times a-day without injury; but it seems to have a tendency to cause cerebral congestion.

7. *Sulphuretted Hydrogen* is one of the most poisonous of gases, destroying life when injected into the intestines, or into the cellular tissue, when received into the lungs, or even when extensively applied to the surface of the body. It is largely given out in the corruption of some kinds of animal matter. Many serious accidents from this gas have happened in clearing out the Parisian *fosses d'aisance*. The symptoms are instantaneous asphyxia, with discharges of bloody froth from the mouth, and convulsive movements of the limbs; motion and sensibility soon cease, the lips become livid, the eyes close, and lose their lustre, the surface becomes cold, the action of the heart is tumultuous, then feeble, and before death, complete tetanus often comes on. Even when the gas does not kill, it produces severe tormina, nausea and drowsiness. The body of one killed by it quickly becomes putrid; the skin is livid, and soon meteorized; the brain tender, and of a greenish hue. The proper treatment of persons suffering from this gas is to carry them into pure air, to dash cold water

and vinegar over the body, to rub the surface diligently with warm flannels, but to admit air freely to the surface while the palms and soles are to be strongly brushed. Lavements of cold water and vinegar should be first used, and then lavements containing common salt; when the heart beats violently blood should be abstracted. Impregnating the air of the apartment with a moderate quantity of chlorine gas will also be useful in such cases; or injecting weak solutions of it into the stomach and bowels. Chlorine instantly decomposes sulphuretted hydrogen.

This gas is well known by its smell resembling that of rotten eggs. Solutions of sugar of lead are very delicate tests of its presence even in minute quantity.

8. *Carburetted Hydrogen*, of various quantities, is given out by stagnant waters. It is one of the results of combustion, and is abundantly produced in coal mines, where it is the formidable *fire damp*. When the atmosphere is much contaminated with it, it oppresses the breathing, and produces headache and giddiness. When mixed in the proportions of about 1-12th, with the atmosphere of the mines, it will explode on the approach of a flame; yet in such an atmosphere persons will continue to work for some time with impunity; but even if there be no risk of explosion, the narcotic effects of the gas begin to be perceived on those long exposed to it.

In the early experiments of Davy, inhaling this gas produced very alarming effects, which prove its narcotic qualities; but Nysten found that it is not very active when injected into the blood vessels, probably from the ease with which it is absorbed by the blood. The treatment in cases of poisoning by this gas, should consist in removing the person into pure air, and cautiously administering a mixture of chlorine with common air. Two cases of death from coal-gas which is another species of carburetted hydrogen, occurred in Leeds in 1838. The gas escaped during the night and suffocated two women.

9. *Carbonic Oxide*, mixed with other gases, is given out by burning fuel, especially if moist, and burning slowly. It scarcely becomes an object to the toxicologist in its pure state. It is inflammable, rather lighter than atmospheric air, and has a disagreeable smell. It may be respired when diluted; but produces temporary intoxication, and when injected into the veins gives the blood a brown colour.

Carbonic Acid. This gas is well known to be heavier than atmospheric air, to be totally irrespirable when pure, and to be speedily fatal to animals plunged in it. It is always

present in the air in minute quantity; but is largely given out by the burning of all sorts of fuel, is produced in every species of fermentation, is formed in the respiration of all animals, and under certain circumstances, it is given out by plants, particularly in the dark. From these sources, the air in confined situations, may become impregnated with it, in a proportion inconsistent with the safety of man. Numerous instances of its fatal effects have been observed in the neighborhood of large fires in breweries in crowded apartments; and in rooms where many plants are growing, it is unhealthy to sleep.

Two men perished by this gas in 1839, from having fallen asleep near a lime kiln in the neighborhood of Kendal. Some years ago I was called to two individuals who had imprudently entered a vat in a brewery from which the fermented beer had recently been drawn off. The face of the one was livid and bloated; that of the other was placid, the lips red, and he appeared as if in tranquil sleep. The eyes of both were brilliant and prominent; the bodies long retained their heat; but all means to restore animation were ineffectual though continued for some hours. Fatal accidents have often happened in the confined cabins of small vessels at Leith, Glasgow and Liverpool, from burning fuel in ill constructed fire-places, and closing the hatches. The fatal catastrophe which occurred in *St. Martin's watch-house* in London in 1743, and the more memorable one in the *Black Hole* of Calcutta, in 1756, are striking instances of the danger of breathing an atmosphere contaminated with carbonic acid, the product of respiration.

When a confined atmosphere is much mixed with it, uneasy respiration is speedily felt, and the person may escape the danger by seeking the open air; but at other times drowsiness or stupor comes on, before any warning is given, and the individual loses the power of attempting his escape. When the gas is undiluted, it is almost immediately fatal to animals immersed in it; and even if the animal be made to respire pure air, while the whole body, except the head, is immersed in carbonic acid, life will be extinguished.

After death from this gas, the features generally remain placid, the eyes open and brilliant, the body long retains its heat and flexibility. When the person has not been exposed long enough to extinguish life, the breathing may be stertorous and oppressive, the face flushed, the pulse feeble, the eyes prominent and wildly rolling about, the tongue swollen and the saliva flowing out of the mouth.

The proper treatment consists in removing the patient into the open air, or into a well-ventilated room; the surface should be sprinkled with vinegar and water, and every few minutes rubbed dry with hot towels. If the valve bellows be at hand, the foul air should be first drawn from the lungs, and its place immediately supplied by fresh air thrown in by the same machine. This alternation may be two or three times repeated, and then we should imitate natural respiration as much as possible, throwing in air by the bellows, and aiding the expulsion of the air by gentle pressure on the chest. Brushing the soles of the feet and palms of the hands with stiff brushes, stimulating the nose by a feather, or by ammonia, are useful auxiliaries. When animation is restored, it is time enough to put the patient to bed.

VEGETABLE POISONS.

These include most of the narcotic and narcotico-acrid poisons of Orfila. Narcotism begins with a sense of fulness in the head, then succeed a sort of intoxication, dizziness, headache, loss of voluntary motion, almost amounting to paralysis, sometimes convulsions, and finally stupor and coma. These symptoms may not all be present; for each poison has its peculiar modification of the general symptoms.

The poisonous qualities of most vegetable substances reside in certain *alkaloids*, the bases of which appear to be carbon and hydrogen, with a small quantity of nitrogen. They have all been discovered since 1815, and many of them act with extreme energy on the human frame. A few plants owe their poisonous qualities to their containing *hydrocyanic acid:* but the greatest number act by their peculiar *alkaloids.*

The *post-mortem* examinations of those who perish by narcotic poisons, do not generally throw much light on their mode of destroying life; and there are some diseases that bear considerable resemblance to narcotism. Thus, *Apoplexy* chiefly differs in there having usually been some warning before the fatal attack, and in coming on during a meal. Norcotism is generally perceived from half an hour to one hour, or more, after taking the poison. Narcotism is more gradual than apoplexy, and at first the person may be roused from his stupor. Apoplectics generally survive for a day, or often much longer. *Epilepsy* may generally be distinguished by the history of the case, by the abruptness of the attack, by the person being instantly rendered insensible, and by its

rarely proving fatal on the first attack. One species of fatal *syncope* is more difficult to be distinguished from narcotism; and if it has not been witnessed, we do not know how it can be recognised after death.

1. *Opium.*—The deadly effects of this substance have been long known; and it was supposed to be a proximate vegetable principle, simple in its nature and peculiar in its effects. The best opium in the market comes to us from the East, and is generally termed *Turkey opium.* The quantity raised in India is immense, but until lately it was not an article of exportation. In 1838, India exported to China 4,500,000 lbs. of this drug, and about one-half of it was raised in Malwah, on the Malabar coast, from whence ten years before, not a single pound was exported. A considerable quantity is produced in Egypt, since it fell under the dominion of the enterprising *Mehemmed Ali.* Some very fine opium is produced in Great Britan; and in Germany, of late years, the cultivation of a *purple* variety of the poppy, is stated by Biltz of Esfurth, to yield a much larger quantity of morphia than the best Turkey opium. Modern chemistry has shown that opium, like many other active vegetable substances, owes its qualities to an *alkaloid,* which may be separated, by chemical processes, from many other ingredients. The first of these alkaloids was detected in opium about 1812; and the care with which this important drug has been since examined has shown it to be an exceedingly compound substance, consisting of not less than thirteen, or perhaps of fourteen different vegetable principles, of which six are crystallisable.

These ingredients, according to the masterly analysis of Pelletier, and the subsequent discovery of Robiquet, are,

Crystallizable.	1. Morphia.	Alkaline.	7. Brown Extract.	Amorphous.
	2. Narcotica.		8. Caoutchouc.	
	3. Codeia.		9. Resin.	
	4. Narceia.		10. Concrete Oil.	
	5. Meconia.		11. Gum.	
	6. Meconic acid.		12. Bassorine.	
			13. Lignine.	
			14. Acetic acid?	

This last ingredient is always found in opium.

All these may be separated by the process employed for obtaining morphia, or its salts. The codeine exists in a quantity not exceeding one per cent; the narceine and me-

conine in still more minute quantities, so that few chemists have ever seen them.

Of these, in a toxicological point of view, the most important are *Morphia* and *Meconic acid.* These two ingredients appear to exist in combination in opium: and when magnesia is added to a watery solution of opium, an insoluble meconate of magnesia is formed, from which the morphia, sparingly soluble in water, is taken up by alcohol; or, if we add muriate of lime to the liquid, instead of magnesia, we obtain meconate of lime, as an insoluble precipitate, and a soluble muriate of morphia; which last when purified by several nice chemical manipulations, is obtained in minute white silky crystals. This is the valuable part of opium to the medical practitioner, as it is powerfully hypnotic, and is less liable to cause headache, nausea, and itching of the skin, than crude opium.

Morphia, like the other ingredients of opium, exists in very variable quantities in opium of different qualities. The best Turkey opium usually yields from 6.25 to 7.80 per cent. of purified hydrochlorate of morphia.

The amorphous ingredients may be considered asim pediments to the purification of the morphia.

Morphia is very insoluble in watery fluids, and it is usually united to acetic or hydrochloric acid, to render it soluble. The hydrochlorate retains its colour and its properties better than the acetate.

The Lancashire *Black Drop* is an impure acetate of morphia, of variable strength, and therefore should not be prescribed. *Batley's Sedative* has no valuable quality which does not exist in muriate of morphia. It is acidulous, but seemingly without spirit, and contains much less meconic acid than laudanum.

Codeia or *Codeine*, has slight alkaline properties. It is not at all hypnotic. Soon after its discovery, I took five grains in tea, which produced no tendency to sleep, but gave rise to intense itching of the skin, that lasted about two hours; and the same effect was afterwards felt by Dr. W. Gregory, and several of his pupils. It is probably to this substance that the irritative effects of opium on the skin are owing.

When either this substance or opium is administered in an over-dose, the symptoms are drowsiness and insensibility, but this state is often preceded by a slight excitement: the face assumes a ghastly hue, the jaw falls, the eyelids remain half open, the pupils are strongly contracted; stupor and

complete coma succeed; convulsions are rare in adults, but often are seen in infants. Opium produces its fatal effect, however introduced into the system; and even when applied to a raw surface, has destroyed life. Morphia is stronger than opium, in the proportion of one to six.

Orfila has published two cases of poisoning by the salts of morphia. A case of the same kind occurred at Montrose in 1834, in which ten grains of the muriate of morphine proved fatal in ten hours. Two other cases occurred in 1837, one in the county of Stafford, and the other in the county of Lancaster. In these cases the acetate was administered in an over-dose by mistake. No less than one hundred and ninety-eight persons were poisoned in England and Wales, in the years 1837 and 1838, by opiates.

The principal morbid appearances are great turgescence of the vessels of the brain, and sometimes serous effusion between its membranes, or in its ventricles; but sometimes no morbid appearance can be detected in the head; the lungs are gorged with blood, the stomach rarely appears inflamed, the blood is found fluid in the heart, and the body runs rapidly to decay.

Evacuation by the stomach-pump, or by emetics, is the remedy chiefly to be trusted; and after the patient is roused, we must prevent him from falling asleep while any tendency to stupor is perceived. Compelling the person to walk about, pouring water occasionally into his ears, shaking him, and applying hot water to his legs so as to excite pain, are the means usually had recourse to. Artificial respiration appears to have saved one person who was found comatose. No antidote is known.

The best tests of crude opium are those which show the presence of morphia and meconic acid. The contents of the stomach, in a case of the poisoning with opium, may have the smell of that drug. The whole should be emptied into a clean mortar, and reduced to a thin pulp by the addition of distilled water; acidulate the whole with acetic acid, strain and filter, then reduce the liquor to the consistence of syrup by a gentle heat; add alcohol, gradually, boil, and filter when cold. The spirituous solution will contain all the morphia. Again, evaporate to the consistence of syrup, and add magnesia; this will throw down meconate of magnesia and the morphia in the form of a grayish powder, which may be freed from much of its coloring matter by washing it with cold water, and then with cold proof spirit. The morphia may now be separated from the meconate of magnesia by hot

strong alcohol: concentrate the last solution, which will have a bitter taste, and on adding a drop of nitric acid, it will strike an orange yellow colour, soon passing to golden yellow; and will give a duck-blue with permuriate of iron.

The meconate should be decomposed by hydrochlorate of baryta, which throws down an insoluble meconate of baryta; from which the addition of very diluted sulphuric acid separates the meconic acid. This acid has a silky lustre in the state of crystals, and affords with permuriate of iron a very intense red. There is only one source of fallacy in operating with meconic acid from the human stomach, which must be guarded against,—namely, that the sulpho-cyanates of the alkalis precipitate permuriate of iron of a red colour; and some of the secretions, as the saliva, contain a sulpho cyanate. If the solution of morphia be strong, there is no danger of mistake; because of the intensity of the colour produced. Professor Forbes has also shown, that the two solutions affect the prismatic spectrum in a different manner; though perhaps this test is less applicable to medico-legal cases, where the quantity of opium is generally very minute.—When the meconate of iron is introduced into Dr. Brewster's *Analyzing Prism*, so placed that a ray of light may successively pass through a thicker and thicker column of the fluid, the absorption of the coloured rays of the spectrum takes place from the green rays towards the red, or least refrangible end of the spectrum; but when sulpho-cyanate of iron is similarly treated, the absorption commences with the red rays, and proceeds towards the green.

In recovering a person narcotised by opium, after the preliminary means have been adopted, place the feet in very warm water, and pass a sponge dipped in the same, and as hot as the hand can bear it, over the shoulders, chest and back. Let this be immediately followed by a dash of cold water over the face, or by passing a sponge dipped in it over the chest. Electricity may by small and repeated shocks be used.

2. *Hydrocyanic acid* or *Prussic acid* forms the poisonous ingredient in an important class of vegetables. It is yielded by the kernels of the *bitter almond*, and of several other species of that genus; by the leaves of the cherry-laurel, or *Prunus lauro cerasus;* by the *Prunus padus;* and probably contained in the seeds of the *Pomaceæ*, and in all vegetable productions having the odour of bitter almonds. The acid, when concentrated, is the most deadly of all poisons; producing almost instant death, whether swallowed or introduced by a wound.

This acid may be obtained in its most concentrated form, by passing a stream of sulphuretted hydrogen over bicyanide of mercury gently heated in a tube. The product must be condensed in a receiver, kept cool by ice or snow and salt. This strong acid is extremely volatile, and its vapour in pouring it from one vessel to another, should be carefully avoided. It is very liable to decomposition in this strong state; and is used in medicine much diluted with water, or with alcohol. The German acid varies in strengh from 1 to 10 per cent. of pure acid; but Keller's hydrocyanic acid contains 25, and Robiquet's no less than 50 per cent. The medical acid of the London and Dublin Colleges contains 2 per cent. The medicinal acid of the London and Dublin Colleges contains 2 per cent.; that of the Edinburgh College has a strength of 3.3 per cent.

Even the diluted hydrocyanic acid of the apothecary's shop is fatal in a very moderate dose; and the essential oil of bitter almonds is not less so. An infusion of the leaves of cherry-laurel is a very deadly poison; bitter almonds have sometimes proved fatal; and the same effect has followed on eating the blossoms of the common peach, *Prunus persica*, in a salad. When the preparation is concentrated, the death is very speedy; the breathing immediately becomes laborious; convulsive movements of the limbs come on, and in dogs it ends in violent tetanus. After death the eyes are glistening, the pupils dilated, the muscles of the spinal column stiff, the countenance pale, and often composed, the abdomen drawn in; the veins of the brain are found to be loaded with black blood, and the blood in the heart and great vessels are generally fluid.—In some instances the blood and cavities of the body have exhaled a strong odour of prussic acid; and the blood is said occasionally to have exhibited a bluish tint when the strong acid has been administered. The bile has often been observed to be of a dark blue hue in such cases.

The essential oil of the bitter almond is very poisonous: yet it is employed to flavour liqueurs, and other articles of diet, by persons little aware of its activity; and children are said to have been poisoned by eating *macaroons*, a sort of sweet-cake, flavored by this oil. Three persons were poisoned in England by this oil in 1837 and 1838.

The distilled water of cherry-laurel, is a very deadly poison. It was by this liquid that Sir Theodosius Boughton was destroyed in 1780. Harriet Ricketts, aged fifteen,

in 1838, was poisoned by a decoction of these leaves, supposed to have been administered to cause abortion. This case occurred in Essex. The medicinal prussic acid has repeatedly destroyed life. No less than thirty persons committed suicide by this acid in England and Wales in the years 1837 and 1838.

No remedy can be of service in poisoning by this substance, unless instantly administered: but ammonia appears to have a great power in alleviating the symptoms when the quantity of hydrocyanic acid has not been very great. Ammonia diluted with water should be introduced into the stomach; its fumes sufficiently diluted with air allowed to enter the lungs, taking care not to excoriate the air-passages by the too free use of ammonia. Another very powerful antidote is chlorine. It is most advantageous to employ the vapour of water containing about one-fourth part of its volume of chlorine gas. This may be inspired without risk; it has saved the lower animals, when the poison had been administered for five minutes before its application, even after the convulsive stage had passed, and that of insensibility had supervened. In Orfila's experiments, in ten minutes after inspiring diluted chlorine in this manner, the recovery of the animals was certain. Herbst, of Gottingen states, that dashing cold water on the surface of the body, is a powerful antidote in such cases; it is most successful *before* the convulsive stage, but is useful during the spasms.

The tests of hydrocyanic acid are certain when we can obtain it in quantity; but we must look for it in the body, the smell is its best criterion. The stomach and the blood will sometimes have its peculiar odour for more than three days after death; and if the body has been buried within twenty-four hours, the odour will occasionally be cognizable till the eighth day. When we can obtain a little of the liquid acid, nitrate of silver is a very delicate test. A white precipitate is formed, which when dried and heated in a tube, gives off *cyanogene*, a gas that burns with a rose-coloured flame. If we add to the suspected liquid sulphate of copper, a rich emerald green solution is formed: and if to another portion of the liquor we previously add a drop or two of potassa, the test will throw down a greenish salt, which is partially dissolved by hydrochloric acid, leaving behind a cyanide of copper, which yields cyanogen like the precipitate of silver. This test will detect prussic acid in 20,000 times its weight of water.

But it may be necessary to eliminate the acid from the contents of the stomach; the method of Lassaigne and Leuret seems well suited for this purpose. If alkaline, neutralize the liquid, after filtration, by sulphuric acid; introduce it into a large retort, and distil with a water-bath heat, until one-eighth of the whole has passed over. This fluid will contain any hydrocyanic acid which may be present.

3. *Substances yielding Strychnia.* The vegetable substances yielding this new alkaloid all act in nearly the same manner, and are very poisonous. The alkaloid was first obtained from the *Strychnos nux vomica* and *S. Ignatii.* One nearly similar in its properties is said to be found in the bark of *Brucea antidysenterica*, to which the name of Brucia has been given. This substance is likewise found in nux vomica united to strychnia. Both are highly poisonous, producing convulsions and tetanus; both are intensely bitter. Strychnia is used in paralysis, with advantage, in doses of from one-eighth to one-fourth of a grain. Now that it is an officinal preparation, it may be employed as a poison; and there is too sure a substitute, in malicious hands, in the seeds of the two plants from which strychnia was first obtained. A dose of fifteen grains of the powder of nux vomica has been fatal.

In the Parliamentary Report there are three cases of poisoning by nux vomica in powder, and two by strychnia. Three were accidental, but two were suicides. Mr. Ollier has published an interesting case of death from three drachms of the powder of nux vomica.

The symptoms from this powder, and from a much smaller dose of strychnia, are similar. Spasms speedily ensue with anxiety and agitation, the limbs become stiff, the face and hands livid, from the impossibility of respiration, produced by the fixation of the muscles of the chest. These severe affections come on in paroxysms: the intervals exhibit nausea, a feeble pulse, and profuse perspiration; the repetition of the fits destroys life; and the victim seldom lives above an hour.

The best remedies, after evacuation of the stomach, appear to be simple substances chlorine and iodine, as we are assured by Donne of Paris.

Where the death has been rapid, there are little or no marks of inflammation to be seen in the stomach; but when it has been lingering, the stomach and intestines show traces of violent inflammation; their color is violet, and incipient gangrene has been observed in some

cases; serous effusion has been found in the head, the blood has remained fluid, and the body often retains, after death the rigidity of the tetanus in which the sufferer died; but in dogs, poisoned by it, the limbs are sometimes relaxed after death.

The powder of S. Ignatii is stronger than that of nux vomica: both adhere obstinately to the villous coat of the stomach, and will generally be found there after death.—They may be distinguished by their intensely bitter taste, by becoming orange-red when nitric acid is added; a hue which soon passes to golden-yellow.

The celebrated Javan poison is prepared from the Antiaris toxicaria and Strychnos tieute, plants belonging to the natural order of Apocyneæ: another plant of the same order, Cerbera tanghin, is so deadly, that a single seed, it is said, will destroy twenty persons.

The *wourali* or *wourara* poison of South America is said to be derived from a *Strychnos*. M. Schomburgh informs us, that the Indians prepare this poison chiefly from a plant, which he has named *Strychnos toxicaria*, a new species of that genus; but the effects of the wourali, especially upon birds, would seem to indicate some other poison also in the composition. Waterton and Hillhouse assert, that the juice of ants, and fangs of poisonous snakes are added to the wourali poison during its inspissation at a slow heat. The natives of Guyana kill animals by blowing, from a long slender tube, a little spiculum of wood, dipped in wourali poison. The effect is very deadly, even to large animals. It is fatal to animals in very minute quantity when inserted under the skin.

The bark of a tree, said to have been brought from South America, has proved poisonous when administered instead of the true Angustura bark, *Galipea officinalis*, or *Bonplandia trifoliata*. But it is now found that the so called *False Angustura bark* is the bark of the Strychnos nux vomica, and was imported from the East Indies.

When we suspect any substance containing strychnia to be in the stomach, digest its contents with alcohol, and concentrate this tincture, which will be intensely bitter; precipitate by ammonia, and this precipitate when a drop or two of nitric acid is added, will become orange-red if any strychnia be present.

Hyoscyamus niger. The whole plant is narcotic, especially the roots, which have several times caused fatal effects, by being eaten instead of parsnips. The symptoms are active delirium, in which persons have danced and reeled

about until stupor supervened. A family of six persons were affected in this manner; one of them died on the morning after eating the roots of the plant. In persons fully under this stupor, stimuli cease to rouse, and the eye is insensible to light, or even to being touched. Emetics are the remedies; but we have no particular tests of this poison.

Antidote. Lemon juice plentifully taken.

Besides Hyoscyamus, other *Solanæ* are narcotic. This is especially the case with *Solanum nigrum* and *S. mammosum.* Both owe their activity to an alkaloid, *Solania* which is capable of exciting vomiting, hurried respiration, and stupor.

5. *Lactuca virosa* is a poisonous plant, with a juice that is highly narcotic, and has the smell of opium. This juice, when inspissated, forms the *lactucarium* of the shops, which was at first derived from the *Lacuca sativa*, but is obtained in greater quantity, and of precisely the same quality, from *L. virosa.* Stupor and coma follow an over-dose of lactucarium.

Tobacco is a well-known narcotic, of which the detection will be difficult, except by the smell. The oil of tobacco is combined with *nicotine*, and is a poison of great energy. It produces speedy coma; but in the lower animals does not appear to paralyze the heart, as decoctions of the plant are found to do. Those who chew sometimes swallow the juice; but habit renders it less dangerous than to those unaccustomed to this narcotic. Smoking at first causes dizziness and nausea. Persons are said to have died of excess from smoking tobacco; and a person is stated to have died in Germany from excessive snuffing. The infusion of tobacco, thrown up the anus, speedily evacuates the bowels; but an infusion of an ounce or two has been fatal in a few minutes. Externally applied, tobacco is a powerful remedy against local rheumatic pains.

7. *Atroppa Belladonna*, or Deadly Nightshade, is a strong narcotic poison. All the plant is poisonous, especially the leaves and the fruit. The symptoms produced are delirium, dilated pupils, and loss of vision. Sometimes it causes hysterical bursts of laughter, the lips, tongue, and throat are parched, there is a great sense of sinking, with tremulous movements of the hands; but convulsions are rare. Many instances of poisoning have happened from eating the berries and the young shoots. In England, in 1837, two persons were poisoned by this plant. One ate the berries, and another the root, which is more poisonous than the

fruit. 180 French soldiers were poisoned by eating the berries, in 1813, near Dresden. The body is found, after this species of poisoning, to decay rapidly; and the seeds and skins of the berries are often found in the stomach, as they are not easily digested. The active principle is an alkaloid *Atropia.*

Antidote. Lemon juice.

8. *Datura Stramonium* is another poison sometimes employed on the Continent to facilitate robbery or rape; and in this country it has been administered by mistake. I have known two instances of poisoning by the extract of Stramonium, taken by mistake for extract of sarsaparilla. In both, there was confusion of ideas, flushed face, delirium, incessant talking, and intense headache, but without vomiting. Both recovered. It owes its activity to an alkaloid *Daturia,* which abounds also in *D. tatula.* The extract of stramonium produces dryness of the fauces, intoxication, and active delirium, with cerebal congestion.

Various *Umbelliferous plants* are poisonous; such as *Conium maculatum, Æthusa cynapium,* and *Cicuta virosa.* The roots and leaves contain a poisonous juice, and the symptoms are those of narcotics, with some degree of irritation.

2. Many authors have spoken of the *Œnantha crocata* as very poisonous; but Dr. Christison gave it largely to dogs without killing them. A striking instance of its poisonous qualities occurred in Radnorshire, in 1834. Seven cows were killed by eating the root of this plant; and it proved nearly fatal to the dairy maid, who had eaten a small piece of the same root. In Orfila's experiments, it generally killed dogs, by inducing delirium and convulsions.

10. The *Æthusa cynapium* has been mistaken for parsley; it produces dizziness, vomiting, difficulty of swallowing, and numbness of the extremities, with colic and a livid face.

11. *Cicuta virosa,* according to Linnæus has proved very fatal to cattle in the neighborhood of Torneau, which in the spring greedily crop the young shoots. It has proved fatal to man, first irritating the fauces, and then producing furious delirium, cold extremities, dyspnœa, trismus and death.

12. *Conium maculatum* owes its activity to an oily alkaline principle, *Conia;* which smells strongly like mice, and becomes, though a clear liquid when cold, opaque on being heated gently. In the French armies, accidents often happen, from the soldiers mistaking the leaves for those of parsley. An interesting detail of this sort of poisoning occurred to Orfila, when with the French armies at Torrequemada in Spain, in the year 1812.

13. Several of the *Ranunculaceæ* are acrid and narcotic, as the *Rananculus sceleratus*, *R. flammula*, *R. bulbosus*, *R. lingua*, and *R. acris*, and *R. arvensis ;* but we have no mode of detecting their poison. *R. sceleratus*, *R. flammula*, and *R. lingua*, are among the most poisonous of this genus. They appear to act merely as acrid poisons, inflamming highly the fauces and stomach ; and many of the genus are capable of vesicating the skin.

14. *Caltha palustris*, another plant of this genus, has nearly similar effects.

15. *Aconitum napellus* produces delirium and stupor, with burning in the throat, vomiting, and purging. It owes its poisonous qualities to an alkaloid, *Aconitia*, which has lately been introduced into the materia medica, to allay arthritic and obstinate rheumatic pains. The dose is one tenth of a grain. It is also used externally. Several instances of accidental poisoning from this plant have occurred in England, when the shoots have been mistaken for other vegetables. Two such occurred in February, 1837 ; and two others, which also occurred in that year, are mentioned in the Parliamentary Report.

16. *Helleborus niger* is a narcotico-acrid poison of great activity. This is the celebrated Melampodium of our older pharmacopœias, once much used as a cathartic in mania and melancholia. In larger doses, the plant has proved fatal, producing delirium and violent convulsions. A drachm of the extract was fatal in sixteen hours, according to Morgagni.

17. *Anemone pulsatilla*, or Windflower, is an acrid poison of considerable energy, vesicating the skin, and inflaming the intestines when swallowed. Bulliard states, that a poultice of this plant, applied to the leg, produced inflammation, ending in gangrene. *A. nemorosa* is still more violent. *A. pratensis*, and indeed the whole tribe, are highly acrid.

18. *Clematis vitalba*, or Virgin's Bower, and *C. flammula*, inflame and ulcerate the skin. With the first, beggars form factitious ulcers on their legs, to excite commiseration, and extort charity. *C. Integrifolio* is a highly acrid plant, which is said to have destroyed a vast number of Prince Eugene's horses in Hungary.

Sedum acre, Stone-crop, has pretty strong acrid qualities, and destroys dogs within a few hours.

20. *Fritillaria imperialis* has but moderate irritant properties.

21. *Cyclamen Europæum* was considered as an acrid poison by Boerhaave ; and Bulliard states, that it causes

bloody stools, vertigo, convulsions, and death, in the human subject.

22. *Plumbago Europæ*, according to Sauvages, is a violent acrid: and when prepared as a yellow dye, causes headaches to the workmen.

23. *Asclepias gigantea*, and *A. vincetoxicum*, according to Orfila, killed dogs in a day or two, with symptoms of inflammation of the stomach.

24. The same qualities belong to Hydrocotyle vulgaris, Pastinaca, sativa, P. arenosa, Sælanthus quadragonus, and Phytolacca decandra.

25. *Cynanchum.* Various species of this genus act very violently on the animal economy, especially C. erectum and C. viminale.

26. *Delphinium staphisagria*, Stravesacre. The seeds of this ranunculaceous plant are peculiarly acrid, and yielded to Lassaigne and Fennelle *Delphinia*, a fusible alkaloid, six grains of which will kill a dog in two or three hours, but when dissolved in an acid, in a few minutes. The symptoms are giddiness, rigidity, and convulsions. The powder of the seeds either swallowed, or applied to a wound, kill, but less quickly.

27. *Chelidonium majus*, Greater Celandine. A native papaveraceous plant, which when swallowed, inflames the stomach, and has slight narcotic qualities.

28. *Ruta graveolens*, Rue. The bruised leaves inflame the skin strongly. The root will cause abortion, with danger of high inflammation, preceeded by dizziness, jactitation of the limbs, and sometimes salivation. The oil is still more violent.

29. *Cytisis laburnum.* The seeds of this leguminous tree, I have found to be narcotico acrid. Two cases of poisoning by them, attended with foaming at the mouth, and insensibility, have fallen within my observation; one occurred in 1813, in a boy, who was brought to my house in Liverpool, in a state of insensibility; the other occurred in Edinburgh, in 1833; and was attended by Dr. Omond. Both were recovered by emetics and ammonia. Since that period, Chevallier and Lassaigne have discovered in the seeds *Cytisine*, a new alkaloid, of a bitter taste, not crystallizable. Eight grains produce vomiting and convulsions.

30. *Ervum ervilia* and *Lathyrus cicera*, are two other legumes, natives of France, that are frequently mingled with wheat and rye, in bad seasons, in such quantity, as to produce giddiness, trembling, and a species of palsy, in those who feed on the grain.

31. *Piscidia eythrina*, Dog-wood tree, is a West Indian and South American legume, possessed of active narcotic qualities. The seeds are used to stupify fish. The juice of the leaves is employed by the natives to poison their arrows. They are intensely acrid, producing burning pain in the primæ viæ, spasms, and hurried respiration.

32. *Digitalis purpurea*, Foxglove is the only one of the Scrophularinea much used in medicine. It has a tendency to accumulate in the system, when small doses are long continued. Besides its effects on the pulse, in large doses, it produces vomiting, giddiness, prostration of strength, pulsation in the head, and profuse perspiration: sometimes salivation, diarrhœa, and convulsions, have preceded death. A man was killed in 1826, in London, by a decoction administered by an empiric; coma supervened, and he died in twenty-two hours. *Digitalis purpurea* owes its activity to *Digitalia*, an alkaloid which may be obtained from it. The chief characteristic of digitalis is its extraordinary power in reducing the force and frequency of the pulse; on which account it is used in medicine, but it is poisonous even in small doses.

33. *Menispermum* vel *Anamirta cocculus*. The seeds are imported from India. They contain a gray kernel, which affords about 1-100th of *picrotoxia*, an alkaloid of an intensely bitter taste; 10 grains will kill a dog in half an hour. The seed have been used to stupify fish, and, it is alleged, to adulterate beer and porter. Wepfer and Orfila found that the powder of the seeds causes in dogs speedy death, by destroying the irritability of the heart. It is dangerous to mix them with any article of food. Several men suffered from this poison in 1829, near Liverpool: each had a single glass of rum strongly impregnated with Coccullus Indicus; one died that evening, the rest recovered. The symptoms are vomiting, tormina, and finally deep stupor.

34. *Arum maculatum*, Wake-robin. A dangerous acrid is contained in its leaves. Orfila gives the cases of three children poisoned by its leaves; they had incapability of swallowing and convulsions. Dogs are killed by it, without any peculiar symptom, except slight inflammation of the alimentary canal. The leaves are very acrid, and soon cause vomiting; but the tubers of the root, especially when boiled, are nutritive, and the large amylaceous tubers of some of the American species of arum, are prepared as food by the aborigines.

35. *Juniperus sabina*, Savine, contains, in its leaves, an acrid oil, in such quantity, that ½ ounce of their powder will

destroy a dog in eighteen hours; and even when applied to a wound, will kill the animal in two days. The poison is absorbed, for in either way the rectum is inflamed. They yield an essential oil in which the acrid qualities reside. The powder and the oil are deobstruent, and have been administered to cause criminal abortion; but they often also destroy the female. In a case of this sort which I examined, the stomach was highly inflamed and corroded in one point; the rectum and uterus were intensely red, and I found the powder adherent to the stomach. Another fatal case occurred in Somersetshire in 1837. This person was also pregnant. In several instances the female dies without aborting.

36. *Veratrum album*, White Hellebore, has been long known to be poisonous, and Pelletier detected in it the alkaloid named *veratria*. An alkaloid very similar, if not identically the same, was obtained by Couerbe from Veiatrum sabadilla. He supposed it to be a peculiar alkaloid; but it is not improbably a compound of veratria with water.

The powder of white hellebore root is poisonous to every species of animal. It excites violent inflammation of the primæ viæ, and injected into a vein, in the smallest quantity, it produces tetanus. Eight persons were poisoned by this powder, accidentally mixed with bread; their fauces were swelled and painful, their bowels drawn into a knot; they recovered, but suffered severely. Sometimes blindness, dysuria, dilated pupils, and stertorous breathing, have been observed.

37. *Colchicum autumnale*, Meadow Saffron. This plant owes its activity to an alkaloid, so similar to Veratria, that they were confounded till lately; but it is now considered distinct, and is termed Colchicia. The root of the plant was once employed as a very drastic purgative; but it was in disuse until the preparation sold as the *Eau Medecinal d'Husson*, a celebrated remedy for gout, reintroduced the plant into the meteria medica. The wine or tincture of the root has been used, but that of the seeds is preferable, as more uniform in its strength. The preparation is poisonous in large doses, and produces symptoms very like those from the hellebore. Two persons, in 1838, were killed in Kent, by taking it instead of another remedy; and in Surrey, a gentleman died from an over-dose given during a fit of gout.

38. *Bryonia alba*, Bryony, was once in the list of materia medica, but from its excessive drastic effects, and its uncertainty, it has been long exploded. Two cases that occurred in France, are mentioned by Orfila, in which an infusion of the root was fatal in a few hours.

39. *Euphorbia.* All the genus have a milky juice, which forms *Euphorbium*, a purely irritant poison. This substance contains two resins, one of which seems alkaline, the other acid; both are poisonous, but the last is most active and has been termed *Euphorbiine.* In Brande's Journal* a fatal case is recorded, where the stomach was gangrened, and tore with the slightest touch.

40. *Hippomane.* The three species of this genus found in the West Indies yield a milky juice, which is one of the most active acrids known, especially that of *Hippomane mancinnella* the machineel of our colonies, and *H. spinosa* the *Zombi* apple of St. Domingo. It is said that rain falling off the leaves of H. macinella will vesicate the skin. The exhalations from it are alleged to be fatal to those who sleep beneath its shade. This is doubted by Sir J. E. Smith, and denied by Ricord.

The juice seems to act as a very violent but simple irritant.

41. *Jatropha.* This genus contains some very active poisons. The seeds of the *Jatropha curcas,* or physic-nut, when chewed, are first bland, then speedily acrid and burning. They are emetic and cathartic, causing violent tormina, inflammation, and erosion of the coats of the stomach. The inflammation often extends to the peritoneum. Similar effects are produced by the *J. multifida* and *J. gossypifolia.* This is chiefly owing to an acrid oil, which appears to be alkaline, and combined with an acid, both of which are confined to the plummula and dissepiments. The cotyledons contain a bland oil, but the volatile oil and acid are deadly poisons.

42. *Jatropha manihot,* or Bitter cassava, has amylaceous roots, the fresh juice of which has been long known to be very poisonous. Some of this juice which I obtained fresh from the West Indies, was distilled by Dr. Christison and by me, and yielded largely hydrocyanic acid, as was first pointed out by Messrs. Henri, and Coutron Charlard. The poisonous quality is entirely destroyed by heat, and the amylaceous matter forms the farhina or cassava of South America and the West Indies. Farhina is also obtained from the sweet cassava, which most regard as a different species under the name of *J. Janipha.* The juice of this contains no prussic acid. The leaves of the bitter cassava are longer and narrower than those of the sweet cassava.

43. *Ricinus Communis,* Castor-oil plant.—When heat is

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employed in pressing the seeds of this plant, the oil obtained is much more drastic and disagreeable than when it is cold-drawn. This is owing to the rind and embryo of the seed, giving out, when heated, an acrid oil, which is not contained either in the cotyledons or is in them diluted by a larger quantity of milder oil. The seeds when swallowed act with great violence, and have sometimes proved fatal. In 1837, a girl of eighteen years of age perished in Liverpool, from eating a few of the seeds of the plant.

44. *Croton tiglium*, an Indian plant, produces still more drastic seeds, which were once used in the materia medica. Of late years, the oil of the seeds has been employed with advantage; but, is so powerful that a single drop is a sufficient dose. I had a patient, a very delicate lady, who usually took three drops for a dose without inconvenience. In one of the Parisian hospitals, in the year 1839, a dose of two drachms and a half, had been ordered to be rubbed on the abdomen, was by mistake, swallowed. The patient died in four hours, after severe pain in the primæ viæ, laborious respiration, and general *cyanosis*, as in the worst cases of malignant cholera.

45. *Oil of Capsicum.*—Thoughtless persons sometimes administer *acrid peppers*, by way of a joke, to unsuspecting individuals. This is not always safe. A man in Sussex, died in 1838, from a dose of a mixture of cyanne pepper and its essential oil in spirits and water, given as a remedy for ague.

Among the *Cucurbitaceæ* are some acrid poisons.

46. *Cucumis colocynthis*, which is employed in medicine, contains in the medullary part of the fruit, a substance extractable by water, which is an acrid poison. Orfila gives several instances of fatal effects from over doses of this substance, which in one case, produced purging, colic, great abdominal tenderness, retention of urine, and priapism. A woman died in London, in 1828, from a tea-spoonful and a half of the powder of colocynth. Yet the substance, in moderate doses, is a valuable medicine, especially in combination with other purgatives. The morbid appearances produced by it are inflammation of the stomach, of the peritoneum, and, in one instance, effusion into the abdominal cavity, a consequence of the inflammation.

47. *Momordica elaterium.*—The substance called *Elaterium*, is procured by the spontaneous inspissation of the juice which exudes, without pressure, from the fruit of this plant. Even in doses of one-tenth of a grain it is violently

purgative; and Orfila found that it speedily destroyed dogs when introduced into the stomach, or into the cellular tissue of the limbs. In the last instance it caused inflammation in the rectum; but the limb was tumefied and infiltrated with sanguinolent serum. Dr. Mories discovered in the juice an alkaloid to which he gave the name *Elaterine*.

48. *Scilla maritima*, though by Orfila reckoned among poisons, is not seemingly an acrid one; it kills dogs when introduced into the stomach, or applied to a wound, but without inflaming the primæ viæ.

49. *Daphne mezereon*.—Both the root and berries are narcotico-acrid poisons. A child perished in this city, in 1838, by eating a few of the red berries of this plant.—Linneus states, that twelve berries, given for ague, destroyed a girl in Sweden, and that six berries will poison a wolfe.

50. *Daphne gnidium*, *Daphne thymalœa*, and D. *laureola* are also poisonous.

51. *Rhus toxicodendron*. The leaves of this plant, and those of *R. vernix*, are acrid poisons of great energy, causing, when swallowed even in a small quantity, inflammation of the stomach. Sphacelus is said to have followed the application of the recent leaves to the skin; and if they touch the face, enormous tumefaction of the head will take place. The dried leaves are used in palsy in doses of one-half of a grain, or of one grain two or three times a day.

52. *Gamboge*, is the gummi resinous exudation of the *Garcinia gambogioides*, and *Hebradendron gambogioides*, the last a Ceylon plant, first described by Professor Graham. It is an active poison; one drachm has proved fatal to man; and it is the active ingredient in certain quack pills, for selling which, verdicts of manslaughter have lately been obtained against six individuals at different times.

53. *Ipomœa jalapa*. The root of this valuable medicinal plant, in an over-dose, must be considered as poison. Cadet de Gassicourt found, that when the powder is rubbed on the abdomen of a dog, it proved fatal by purging, in three days from the commencement of that effect. The active qualities reside in a resin, of which 12 grains will kill a dog.

54. *Convolvulus* scammonea produces a gum-resin which, though used in medicine, may be considered as an acrid poison. It produces violent diarrhœa in dogs.

55. *Gartiola officinalis* belongs to the same natural family as Digitalis. It acts as an acrid on the stomach, and

will kill a dog in twenty-five hours. Serious accidents, according to Bouchner, have happened from this plant.

56. *Lobelia Inflata* possesses strong narcotico-acrid qualities. A quack in America poisoned a man by administering three doses of the powder. It is emetic, and caused in this fatal case severe pain in the abdomen, convulsions, and delirium. *L. syphilitica* is less violent; but *L. longiflora* has often poisoned horses in Spain.

57. *Tanacetum vulgare.* Tansey contains an essential oil which has strong narcotico acrid qualities. Half an ounce taken by mistake, proved fatal to a lady in New York.

58. *Ledum palestre* has slight narcotico-acrid properties. It is said to be occasionally mingled in the north of Europe with malt liquor, to increase its intoxicating qualities.

59. *Nerium oleander.*—Morgagni gives a fatal case from the juice of this plant. It appeared to act as a narcotic, and death ensued in nine hours. The extract produces vertigo, debility, and convulsions in the lower animals.

60. *Apocynum androsœmifolium*, and several other plants of this genus, particularly *A. cannabinum* and *A. venetum*, afford a milky juice, which inflames and ulcerates the skin, and seems to be an irritant poison.

61. *Cerbera ahouai*, is a Brazilian plant, of which the juice is a deadly poison. The seeds are used to poison fish. The wood gives out a powerful sort of alliaceous odour when burnt. It is a narcotico-acrid.

62. *Cerbera manahs.* The seeds are violently emetico-purgative, and are believed by the inhabitants of India to be poisonous.

63. *Coriaria myrtifolia.* The berries according to Sauvages, produced violent convulsions and death in a child, within half an hour.

64. *Narcissus pseudo-narcissus*, Daffodil, has some narcotico-acrid powers. Half an ounce of the extract killed a dog in six hours.

65. *Anagallis arvensis* is slightly narcotic; and so is *Mercurialis perennis.*

66. *Spigelia marilandica* is mentioned by Beck as among the poisonous plants of America. It has evidently narcotic qualities, and is said to have caused the death of children in convulsions.

67. *Symplocarpus fœtida.* Skunk Cabbage, is a violent narcotic mentioned by Bigelow. Of the same character is *Sanguinaria Canadensis* of Bigelow.

68. *Poisonous Fungi.* Several of this natural order are poisonous, especially those belonging to the general *Amanita*, *Agaricus* and *Hypophyllum*. The poisonous qualities appear to depend on two principles; one of which is volatile, and disappears on boiling, drying, or macerating in a weak acid. To this principle, Le Tellier ascribes the irritant quality of poisonous mushrooms. The other is not volatile, is soluble in water, unites with some acids into crystallizable compounds, and appears to be an alkaloid now termed *Fungia;* on this the narcotic properties of these plants depend. The time in which the symptoms occur, after the fungi have been eaten, is very various; often not until twelve or even twenty-four hours. The sufferers are often relieved by vomiting; but if not, the surface becomes livid and cold, violent colic ensues, and death is preceded by delirium and deep coma. The corpse is livid all over, the blood fluid, and sanguine discharges are apt to flow from the mouth, nose and eyes. Several French soldiers were poisoned in Napoleon's Russian campaign, from mistaking *Amanita muscaria* for *A.* Cœsaria. The stomachs of those who died were inflamed and gangrened. Many cases of this species of poisoning have occurred in these islands. A family of three persons perished in Cambridgeshire from mushroom poison in 1837; and one individual in Lancashire in the same year. About the same time, three persons of this city were poisoned by eating *Agaricus procerus*, gathered on Arthur's Seat; but they recovered, after furious delirium, oppressed breathing, feeble pulse, cold surface, and dilated pupils.

69. *Secale cornutum.*—The *ergot of rye* produces, when eaten in bread, many of the symptoms of mushroom poison. De Candolle ascribes this disease of grain to a fungus of the genus *Sclerotium;* and it has been found to yield a principle resembling Fungia. The tendency of this substance to produce dry gangrene, is generally admitted by German and French writers. There is a learned dissertation on it by Dr. Wiggers, in which its fungoid origin, and its peculiar action in promoting the expulsive efforts of the gravid uterus, seem to be established.

In an excellent dissertation on this subject, by Doctor S. Wright, he did not find that it produced gangrene in dogs: nor did it rouse the action of the gravid uterus in the lower animals, except in a single instance; but he proved that it is an active poison, producing paralysis and coma when injected into the veins, inducing emaciation, and depres-

sion of the whole nervous powers, with loss of sight, and diminished animal heat. He found that its activity resides in an oil, which may be conveniently used as a medicine to restore action of the uterus in tedious labours, to check hemorrhage and diarrhœa, and as a local application to check bleeding from wounds. The dose is from 20 to 50 drops.

70. *Alcohol* and *Ether* may be here considered, as being derived by art from vegetable matter. They are well known narcotics, producing at first intoxication, and afterwards stupor and cerebral congestion. They are also irritants, the stomachs of persons killed by them being often inflamed. When the immoderate use of spirit does not produce death, it may give rise to delirium tremens. The smell of spirit is often perceived in the cavities of the chest, brain and abdomen of those who have died from drinking. The stomach pump and milk are the best remedies.

71. Nitro-picric, or Carbazotic Acid, a substance obtained by cautious additions of indigo to warm nitric acid, has considerable narcotico-acrid qualities, as was proved by Rapp of Tiibingen on the lower animals. Ten grains introduced into the stomach will kill a dog in an hour and a half. The symptoms are, tremors, contortion of the eyes, convulsions, and complete stupor. The stomach is dyed of an intense yellow; and this colour extends to all the tissues and coats of the vessels, but does not pervade the brain or spinal cord.

Another acid, nearly similar, the *Nitro ainlic*, is obtained from the same materials, in different proportions.

72. *Camphor*, a concrete essential oil, has pretty strong narcotic qualities. There are two kinds, of camphor known in commerce: the common, produced by distillation from the stem and roots of Laurus camphora; the other found in the interstices of a large forest tree, *Dryabalanops camphora*. This last sort in China bears seventy times the price of the common sort. Camphor, from Mr. Alexander's experiments, has considerable energy; and in fatal cases from an over-dose, the stomach has been found inflamed. It is best detected by its peculiar odour.

ANIMAL AND SEPTIC POISON.

1. *Cantharides*—An acrid poison is contained in the body of the Cantharis vesicatoria. It is found to reside in a whitish matter resembling spermaceti in colour and consistence, which is united to three other marked principles. The first is a green oil, soluble in spirit, but not in water; the second a blackish matter soluble in water, but not in spirit; third a yellow viscid matter, soluble both in water and spirit. The last is united in the insect with Cantharidine, and renders it soluble in water, which is not when pure.

The symptoms of poisoning by cantharides are, intense burning heat in the primæ viæ, painful deglution, pain in the stomach and bowels, bloody vomiting, painful micturition and priapism, intense desire to void urine, and distressing pain in the whole urinary organs; frightful convulsions and tetanic spasms usher in the fatal termination. When the flies have been swallowed in substance, the fragments of their green *elytra* are found adhering to the villous coat of the stomach: and these have been observed even after the body has been buried for months. There is no antidote for this poison. Evacuants and mucilages are the best remedies. Oil given by the mouth increase the evil, by dissolving the cantharidine; but oil thrown into the bladder is useful in allaying the irritation.

2. *Fish Poison*—This singular subject is little understood, except that, in certain seas, and in certain seasons, fishes at other times wholesome, prove deadly poisons. This is chiefly the case with the yellow-billed sprat, the baracuta, the gray snapper, and gray labrus of the West Indies; with several species of Diodon and Tetrodon, and with Aplodactylus punctatus of the Southern Ocean.

The fishes in which poisonous qualities have been chiefly observed (in the West Indies) are:

1. Clupea thryssa—Yellow-billed Sprat.
2. Esox baracuta—Barracuta.
3. Sparus venenosus—Gray Snapper.
4. ——— chrysopus—Porgee.
5. Scorpæna Scrofa—Poisoned Grooper.
6. Labrus griseus—Gray Labrus.
7. Anguilla Conger—Conger Eel.
8. Scomber regalis—Kingfish.
9. ——— pelamys—Bonito.
10. ——— carangus—Green-Backed Cavallo.

11. ——— hipos—Horse-eye Macherel.
12. Balistes monocerous—Unicorn fish.
13. Coryphæna hippurus—Coryphene, or Dolphin.
14. Didon obicularis—Globe Diodon.
15. Tetrodon lævigatus—Smooth Tetrodon.
16. —— sceleratus—Poisonous Tretodon.
17. ——— ?—A small Tetrodon.
(In the Southern and Indian Ocean.)
18. Tetrodon ocellatus—Canton poison-fish.
19. Aplodactylus punctatus—Spotted Toad-fish.

Some West Indian Crustacea are also sometimes poisonous, as Cancer ruricola, or land-crab. But the fish-poison is the most virulent, and most frequently met with. The fishes are more poisonous on certain stations than on others. Thus, they are particularly so to the leeward of Gaudaloupe, Antigua, Santa Cruz, and St. Christopher.

The rapidity and fatality of the poison has been described by Chisholm, Ferguson, and Thomas. The symptoms are, irritation in the throat, tingling of the surface, burning heat in the stomach and bowels, colic, nausea, spasms, giddiness, coma and death. It is said that persons have died while masticating a portion of the fish, ere any of it were swallowed. The juice of the sugar-cane, and various sweet liqueurs, are said to be useful in the slighter cases.

Fishes in this country are sometimes poisonous; and mussels have occasionally, with us produced death, with less rapidity, but with symptoms of the same kind.

Mussels, with us, are more frequently poisonous than fishes. *Musseling* is not unfrequent; and feeding on the common mussel, *Mytilus edulis*, is sometimes fatal. Dr. Combe describes the effects on thirty persons poisoned by this food at Leith in 1827, two of whom died. They strongly resembled the symptoms of some kinds of fish-poison in the West Indies, or those of Vancouver's seamen in *Poison Cove*, on W. coast of North America. Oysters, too, in this country, have been occasionally observed to have poisonous qualities.—The *Helix pomatia* has been found poisonous in France.

The cause of the poisonous quality of fish, is, with some probability, attributed to their having fed on acrid mollusca. The small fish, such as *Clupea thryssa*, are more frequently poisonous than the larger species; which are believed to become poisonous from having fed on that sprat, a favorite food of many other fish. No difference in their

appearance distinguishes the poisonous from the wholesome fish of the same species.

4. Flesh of birds is occasionally poisonous; as happens to the *phasianidæ* of North America, when they have fed on the buds of the *Kalmia latifolia*. Several persons were dangerously ill at Philadelphia, and one died, soon after eating the flesh of *Tetrao cupido* in 1792. It is said that the flesh of hares which have fed on *Rhodrodendron chrysanthemum* and *ferrugineum* has poisoned those who fed on it.

4. The honey of bees, in like manner, is poisonous, when they have fed on the sugar of the *Rhododendron* and *kalmia* as is described by Xenophon, Hallas, and Dr. Benj. Smith Barton. In the former case, the honey produced a species of madness, in the latter case, the symptoms are similar to what occurred to the soldiers of Xenophon. Xenophon states, that on the arrival of the *Ten Thousand* near Trebison, the soldiers found many beehives, but those that ate of the honey became as if intoxicated, or as overthrown in a flight. They all recovered on the following day. The poisonous honey of Heraclea, in Pontus, is also mentioned by Aetius. Pallas states, that, in the country of the *Abassines* "the famous maddening honey is produced;" and he ascribes this quality to the bees feeding on the flowers of *Rhododendron ponticum* and *Aralea pontica*. Dr. Barton describes the very poisonous honey of New Jersey in the American Philosophical Transactions. It appears to derive its narcotico-acrid qualities from the bees feeding on the flowers of the *Kalmia latifolia*, and congenerous plants.

5. *Animals have a poison generated in them by disease*, which is capable of infecting those who eat, or even touch their flesh. The best known instances of this are in the *pestis bovilla* or *murrain* among domestic animals, by which their flesh and juices become deadly poison to other animals. This appears somewhat analogous to the accidents that happen in dissection.

The *Malignant pustule*, arising from eating the flesh, or even having the juice of animals affected by murrain applied to the human skin, is a most formidable disease. A good account of it is contained in the treatise of Enaux and Chaussier, and the instances they give of its fatality are very striking. Persons have died of it in three or four days. There is another description of the disease in the Inaugural Dissertation of Davy la Chevrie. These authors

describe the two varieties of malignant postule, the *Prominent* and the *Depressed;* the last of which ends more quickly in gangrene, preceded by *phyctenæ*, filled with a brownish sanies.

See also a paper upon poisonous milk and the flesh of the same animal by Dr. Graaf of Indiana. It is stated by Liebeg in his organic chemistry, page 350, that several hundred cases of death have occurred from the eating of bad sausages, principally at Wirtemburg; he terms this species of poisoning and death eremacausis, and thus describes it. The death, which is the consequence of poisoning by putrefied sausages, succeeds very lingering and remarkable symptoms. There is a gradual wasting of muscular fibre, and of all the constituents of the body similarly composed: the patient becomes much emaciated, dries to a complete mummy and finally dies. The carcase is stiff, as if frozen, and is not subject to putrefaction. During the progress of the disease the saliva becomes viscous and acquires an offensive smell.

6. *The bites of rabid Animals* belongs to the same class of poisons. The bite, for instance, of a rabid dog, will destroy other animals: after some time they become delirious, then paralytic, and die rabid. In man, similar symptoms occur, to which is superadded hydrophobia;—a symptom never observed by Mr. Youatt in any animal except *man.*

Rabies appears to be primarily derived from the bites of rabid animals of the genus *Canis;* but by their bite it may be communicated to the cat, the horse, the ox, the sheep, the pig, and to man. The poison is only communicable through the saliva: the saliva of a rabid ox was found by Youatt to produce rabies in a dog innoculated with it.

The most usual morbid appearances in man are marks of inflammation about the medulla oblongata, the cervical nerves, and upper part of the par vagum. This accounts for the oppression and laborious respiration. There is always some degree of inflammation about the epiglottis, and upper part of the trachea. The stomach also has patches of inflammation, both in man and in the lower animals. The cicatrices of the wounds in fatal cases are observed to have inflamed anew, and to have a brown gelatinous fluid under them. Excision of the wound, or destruction of the part by caustic, is the best prophylactic; *Belladonna*, *Scutellaria lateriflora*, and the leaves of *Buxus sempervirens*, which are narcotic, seem to have some preventive power, according to

the same authority; and excessive bleeding seems to have arrested or cured the disease in India. Doses of two grains of the leaves of *Atropa belladonna* were used by Brera, and have been highly extolled in Prussia, where the disease, especially in the vicinity of the Silesian forests, is frequent. Wolves are subject to the disease, and have often extensively communicated it to man. Youatt, who has had much experience of the disease among the lower animals, recommends for dogs, a mixture of leaves of belladonna and scutellaria, in the proportion of two grains of the first to 40 of the latter, for a dose, twice a-day. He says that this has prevented rabies in dogs bitten by rabid animals. He has operated, he states, on more than 400 persons bitten by rabid dogs, and never lost one patient by the disease, to whose wounds he had used lunar caustic; yet, in most of these cases, he did not see the patient until 24 hours, many not a week, and two not for a fortnight, after they were bitten. Excision of the wound is said even to have caused the commencing symptoms of the disease to disappear. After excision, the cupping glass should be aplied; or where excision is impracticable, enlarging the wound, and abstracting the blood freely by the cupping-glass, as recommended long ago by Celsus should be employed :—"Utique autem si rabiosus canis fuit, cucurbitula vires ejus extrahendum." The constitutional effects of mercury will also cure it.

7. *Bites of Snakes.* Poisonous snakes are provided with two or more teeth placed on a movable bone, situate on each side of the upper jaw, and corresponding to the superior maxillary bones of other animals. These teeth or fangs are hollow, and have their roots connected with a duct that conveys the poison from a bag placed under the principal muscles that close the jaws; so that when the animal bites, the poison is squeezed from the bag, and is instilled, through the hollow of the fangs, into the wound. The symptoms, in general, are in proportion to the quantity of the poison, compared to the size of the animal bitten; the smallest animals suffer most. The general symptoms are, pain in the part wounded, trembling, weakened respiration and circulation, and coma. The most poisonous snakes are the rattle-snake of America, and the cobra de capello of India; the viper of this country and of France sometimes produces fatal accidents. Excision of the part, sucking, or cupping the wound, are to be tried; and both ammonia and arsenic, given internally, appear to have considerable power in curing the bites even of the most deadly snakes.

Various plants are said to have considerable power as antidotes; among these Eupatorium mikania or Guaco, Aristolochia anguicida, Cissamppelos pareira Fevillea cordifolia, and Eupatorium aya.pana, are the most generally considered as efficacious. In one plant, the American aborigines place great faith, according to Silliman, not only as an antidote, but to protect them against the rattle-snake, to which the smell of the leaves, or some of its sensible qualities, appears to be very intolerable: this is the white ash, Fraxinus Americana.

8. In the male Ornithorynchus paradoxus, we find, on the posterior extremity, a spur, perforated by a minute tube, like the fangs of a snake, and connected with a poison gland and duct; an apparatus capable of inflicting a dangerous wound.

The stings and bites of Arachnidœ and Insecta, are poisons of a similar kind.

9. The Scorpion has in the last joint of its tail, a poison gland connected by means of a duct, with the hollow sting. The animal, when running about, always carries this joint bended, so as not to wound itself. When seized it strikes with the tail, which is long enough to reach beyond its head; and when it seizes large insects, it wounds them with its sting, before bringing them to its mouth. Bontius states, that the sting of the large Indian Scorpions renders persons raving mad. The scorpions of Africa are large, and their sting is greatly dreaded. There are three distinct species of scorpions in Europe, the stings of which produce violent pain and erysipelatious inflammation, and swelling in the wounded limb, but are not fatal to the larger animals. I have two species of a large size from Singapore; the Scorpio Americanus, the smallest of all, is quite a different species from all the scorpions of the old world, and has lived with me, in England, for several months.

The most judicious treatment of such wounds, is to extract the poison by the cupping-glass, to apply ammonia and water externally, or to bathe the part with *Eau de Luce*, and to administer the same remedies internally.

10. *Scolopendra morsitans.* I am unable to find any specific difference between the large scolopendra of India, South America, and the West Indies. An enormous scolopendra came alive in a ship from Jamaica to Liverpool; it could extend its body to more than a foot in length, and could take coniderable leaps. I caught a large scolopendra in Andalusia, in Spain, entirely like those of Demerara in size,

and the number of its feet. It was found at a great distance from the sea and human habitations; so that probably, the *S. mossitans* is common in every quarter of the globe.

The poison of the sclopendra is secreted near the root of its strong horizontal pincers, and is conveyed through these tubular fangs to the wound. The bite of S. morsitans gives rise to severe pain, and inflammation, and is much dreaded in our tropical colonies. The smaller species of our island are incapable of injuring a texture so tough as the human skin.

11. The *spider* has fangs very similar to those of the scolopendra, which are very fatal to flies; but the very large spiders of hot climates, particularly the *Mygale avicularia* of the West Indies and India, are capable of inflicting very troublesome wounds. A curious instance of the virulence of the poisonous bite of a single spider, is given in the American Journal of the Medical sciences for 1839. A gentleman received a bite in a water closet, was immediately in agony; his head and neck became swelled and livid, he had general spasms, with great dyspnœa, and violent vomiting. He was freely bled by Dr. Hulse and got laudanum, camphor, and ammonia. The species of spider is not mentioned, but it is stated to have been large, brown and hairy. The bite of the Tarantula of Naples is now known not to be formidable: and Serrao has disabused the medical world on the pretended cures of Tarantism by dancing.

12. *Argas Persicus.* This animal, familiarly described by travellers as the *poisonous bug* of Meeaneh and Tu Derwar is not Cimex or even an Insect; it belongs to the order of the *Archnidæ* having eight legs, and is furnished with a sucker, by which it attacks persons who lodge in the old mud houses in the villages of Persia, infested by it. My friend, Dr. Charles Bell, on going to Persia, was requested by me to enquire into the truth of the alleged poisonous qualities of this animal; and he confirms the accounts of Morier and other travellers, as to the severe febrile state produced by the bite. He sent me several of the animals, among which Mr. M'Leay, our eminent entomologist, recognised the Argus Persicus, and a nondescript of the same genus. The bite produces low fever, from which the persons slowly recover. It has some resemblance to typhus. The Persians affirm that the bites are often mortal.

13. The wounds inflicted by the *Bee* and the *Wasp* are produced by a very complex apparatus, consisting of two barbed darts moving parallel to each other in a horny sheath.

The poison is secreted in the last abdominal ring of these insects. The sting is moved by a complex system of muscles, which are described by Swammerdam. The sting is found in the queen and the laborers (neuters, or imperfect females,) not in the males. When it penetrates so tough a substance as the human skin, it is often left behind, and increases the irritation of the wound; but the chief cause of that irritation is an extremely acrid poison, which flows in a groove between the darts, on the compression of the poison bag connecting the glands with the sting. All know the pain occasioned by the sting of the bee; but it is not so generally known that this poison may prove fatal to man, or even to larger animals. Amoreux thinks it is only when they are attacked by a swarm that this poison proves fatal; but he states instances where a single sting from *Apis terrestris* or the Humble Bee, produced inflammatory tumours, and which, like carbuncle, required deep incisions to arrest their progress. Orfila quotes a case where a man of thirty years of age lost his life, in 1765, from the sting of a bee over his eye-brow. Our celebrated traveller Mungo Park, in his last journey, lost several of his baggage asses, by the stings of a swarm of bees; and the horse of a traveller in America, was killed in ten minutes, by an attack of the bees of two hives which he had overturned.

14. The bites of several blood sucking insects are apparently poisonous, such as those of the *Termes, bellicosus, Formica hamata, F. Cephalotes*, the *Ichneumon, Tabanus, Œstrus*, and *Culex*. The common gnat, or musquito, *Culex pipiens*, has a very complex apparatus beneath the neck, which conceals several minute darts; and during the operation of sucking, an irritating liquid appears to be infused into the wound.

A DEFINITION.

OF

TECHNICAL TERMS USED IN THE SYNOPSIS.

Anorexia, absence of appetite.
Abdominal ring, an opening in the abdominal muscles through which the testicles pass out of the abdomen to the scrotum, and which is afterwards occupied by the spermatic cord.
Atrophy, a morbid and progressive diminution.
Anæmia, privation of blood.
Abdomen, the part of the trunk between the sternum and pelvis.
Amaurosis, diminution or loss of sight without any perceptible alteration in the organization of the eye.
Anasarca, dropsy of the cellular membrane.
Auscultation, listening to sounds in any of the great cavities of the body.
Anus, the fundament through which the excrement is expelled.
Ascites, a collection of serous fluid in the abdomen.
Adipose tissue, that which contains the fat.
Auricles of the heart, the two cavities that receive the blood from every part of the body.

Cervical, relating to the neck, particularly the back part.
Catalepsy, a disease in which there is a sudden suspension of the action of the senses and of volition, the limbs and trunk preserving the position given to them.
Conjunctiva, the membrane that unites the ball of the eye with the lids.
Calculi, concretions that form in different parts of the body, particularly in the urinary bladder.
Clitoris, a small, round body, situated at the upper part and in advance of the orifice of the vagina.
Corpora Cavernosa, a kind of cylindrical sac forming nearly two thirds of the penis.
Cerebellum, the little brain.
Corpus luteum, a body as large as the end of the finger, of a yel-

lowish color, perceived in the ovarium after impregnation.

Corpus Callosum, a white medullary band connecting the two hemispheres of the brain.

Cornua of the ventricles, triangular prolongations of the ventricles of the brain.

Calcis os, the bone forming the heel.

Cul de sac, a shut sac.

Choroid plexus, two membranous and vascular duplicatures of the pia mater, situate in the lateral ventricles of the brain.

Cœcum, the blind gut, so called from being perforated at one end only.

Chorion, the exterior of the two membranes that surround the child in the womb.

Cerebrum, the anterior and superior portion of the brain.

Catheter, an instrument introduced into the bladder to draw off the urine.

Cervix uteri, the neck of the womb.

Colon, that portion of the intestines extending from the cœcum to the rectum,

Coccyx, a small bone suspended at the point of the sacrum.

Cortical or Cineritious substance of the brain, the gray portion observed at the exterior of the cerebrum and cerebellum.

Corpora Quadrigemina, four medullary tubercles of the brain called nates and testes.

Cranium, the skull or bones surrounding the brain.

Decidua, the outermost membrane of the child in the womb.

Diarrhœa, frequent liquid discharges from the bowels.

Dorsal, relating to the back.

Dysentery, the bloody flux.

Dysmenorrhœa, painful menstruation.

Dyspnœa, difficulty of breathing.

Emphysema, distention by air.

Ensiform cartilage, the sword-like cartilage that terminates the breast bone.

Epilepsy, fits characterized by loss of sensation and consciousness, and attended with convulsive motions of the muscles.

Epispadias, a preternatural opening of the urethra on the top of the penis.

Epithelium, the thin epidermis that covers the lips, nipples, &c.

Fallopian tube, the passage for the ovum from the ovarium to the womb.

Falx cerebri, the greatest process of the outer membrane of the brain.

Fæces, the excrements in the intestines.

Fœticide, the destruction of the child in the womb.

Fœtus, the unborn child.
Fontanelle, a natural opening in the cranium of the infant.
Fourchette, the posterior commissure of the external female generative organs.
Frænum linguæ, the bridle of the tongue.
Fundus uteri, the base of the womb.

Glans penis, the extremity of the penis.

Hæmatemesis, vomiting of blood.
Hæmaturia, voiding blood by the urinary passages.
Hæmoptysis, spitting of blood.
Hæmorrhoids, piles,
Hepatitis, inflammation of the liver.
Hernia, a rupture, the escape of the intestine from the abdomen.
Hydatid, a cyst containing water.
Hydrocele, dropsy of the scrotum.
Hydrocephalus externus, external dropsy of the head.
Hypospadias, a malformation of the penis in which the urethra opens underneath.
Hysteria, a nervous disease attended with alternate fits of coughing and crying.

Ilium, the haunch bone.
Inanition, exhaustion for want of food.
Incontinence, inability to retrain.
Iris, the coloured part of the eye.
Ischium, the part of the bone on which we sit.
Iter a tertio ad quartem ventriculum, the aqueduct of Silvius, a part of the brain.
Jaundice, a disease of the biliary apparatus in which the eyes and skin become yellow.
Iliac arteries, two large arteries in the abdomen opposite the loins.

Liquor Amnii, the fluid that envelopes the child in the womb.
Lochia, a serous and sanguinous discharge following delivery.
Lumbar, belonging or having reference to the loins.

Mania, insanity, mental derangement.
Meconium, the first excrement passed by the infant.
Medullary, relating to nervous matter.
Moles, a fleshy mass discharged from the uterus.
Monorchides, persons having but one testicle.

Nates of the cerebum, a part of the brain.
Nyctalopia, the faculty of seeing in the dark, and the loss of it in the day.

Odontoid process, a process of the second vertebra of the neck.
Opthalmia, inflammatton of the eye.
Ovaria or *ovaries*, the organs in which the ova are formed.
Ovum, ova, the egg or eggs, which when fecundated become the rudiments of the child.
Os uteri, mouth of the womb.

Paralysis, palsy.
Pathology, the branch of medicine whose object is the knowledge of diseases.
Pelvis, the bony cavity below the abdomen.
Perineum, the part between the fundament and the organs of generation.
Peripneumony, inflammation of the substance of the lungs.
Peritonium, the membrane lining the cavity of the abdomen.
Phthisis Pulmonalis, consumption of the lungs.
Pia Mater, the interior membrane of the brain.
Placenta, the after birth, the mass that follows the child in delivery.
Pleurisy, inflammaion of the pleura, or membrane covering the lungs.
Polypus, a tumor that forms on mucus surfaces.
Prepuce, the foreskin that covers the glans penis.
Processus dentatus, see odontoid process.
Prostate, a gland situate before the neck of the bladder.
Pubis, the birth bone, or that above the organs of generation.
Pupillary membrane, a membrane that covers the pupil of the eye of the child before the seventh month.
Pyrexia, fever.

Sacro-vertebral angle, angle formed by the sacrum and vertebra.
Sacrum, the posterior bone forming the pelvis.
Scrofula, a peculiar disease of the lymphatic glands, particularly those of the neck.
Scrotum, the bag containing the testicles.
Sebaceous matter, a fluid like suet secreted by the glands of the skin.
Septum lucidum, the soft portion of medullary matter which separates the two lateral ventricles of the brain from each other.
Size of the blood, the fibrine or that forming the buffy coat.
Somnambulism, walking while asleep.
Spermatic arteries, two large arteries distributed chiefly to the testicles of the male and the ovaria of the female.
Sputa, the matter ejected from the mouth in spitting.
Sternum, the breast bone.
Stethescope, an instrument for exploring the chest by aiding the organ of hearing.
Supra renal capsules, two flat triangular bodies covering the upper part of the kidneys.

Sutures, the membranous spaces connecting the bones of the infant's head.
Synchronous, at the same time.
Sphincter, annular muscles that close certain natural orifices.

Testes of the cerebrum, the inferior tubercles of the brain.
Thalami, the places at which nerves originate.
Thymus Gland, a glandular body situated under the upper part of the breast bone.
Tournaquet, an instrument to surround an extremity to prevent the flow of blood in surgical operations.
Trachea, the wind pipe.
Tympanites, distention of the abdomen with wind.

Umbilicus, the navel.
Urethra, the passage for the urine from the bladder.
Uterus, the womb.

Vagina, the passage from the external generative organs of the female to the womb.
Vaginal, relating to the vagina.
Valvulæ conniventes, transverse folds of the inner membrane of the small intestines.
Vascular, relating to vessels, especially to blood vessels.
Ventricles of the brain, large cavities in the brain.
Vertebra the spine, or spinal column.
Vertex, the top or highest part of the head.
Vessicants, blisters.
Vessiculæ seminalis, the reservoirs that contain the sperm or the semen.
Viable, ability to continue alive.

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