

pot and with Biltmore, and also extend to other suburbs, giving ample facilities and good service for all purposes. The business part of the city is well and substantially built, and the business establishments compare favorably with those of even larger cities either North or South.

Apart from its mercantile business, Asheville is practically a town of hotels and boarding-houses, and the available accommodations are ample in kind and good in quality according to the rates charged. As to the latter it must not be forgotten that provisions and fuel are more expensive than in thickly populated centres, which are nearer to their sources of supply and have low rates of transportation.

The rates in the cheaper boarding-houses vary from \$4 to \$8 per week, but most of these do not offer accommodations suitable for invalids. The better houses charge from \$10 to \$15 per week and give good accommodations. A few of them refuse invalids altogether, catering to well people and pleasure-seekers only.

There are several good commercial hotels in the centre of the city, with daily rates of from \$2 to \$3. These are suitable for a brief stay when one first arrives; but invalids should be advised to avoid such hotels for permanent quarters on account of the want of facilities for out-of-door life. The more fashionable hotels are the Battery Park and the Kenilworth Inn. The former is open all the year, and, though centrally located, it has large grounds and abundant piazza room, and is otherwise first class in all its appointments. It is the popular hotel in Asheville with the wealthier class of visitors.

The Kenilworth Inn is open only during the winter season, from the middle of January to May. It is situated near Biltmore, about two miles from the city. This is also one of the finest equipped modern hotels of the South.

A special institution for tuberculous patients was established over twenty years ago by Dr. J. W. Gleitsmann, now of New York. After it had been conducted for several years and had shown excellent clinical results, it was closed in 1883. The Winyah Sanitarium for tuberculous patients was established in 1888 and has been in successful operation since. New, modern, and perfectly appointed buildings and cottages were erected during 1899, and were opened for patients last January, and cottages with an aggregate of sixty private rooms for patients are in progress of construction, to be completed in the fall of 1900. With their occupation the old buildings will be abandoned. This institution is situated in a small wooded park of seventeen acres, in the outskirts of the city, and the electric car line passes through its grounds. The admissions are limited to such patients only as have a reasonable prospect for improvement and recovery, and, as far as there is room, accompanying friends can also obtain accommodations.

While there is no city hospital receiving all patients free, the Mission hospital has limited facilities for caring for the city poor, as well as for those who can afford to pay for private rooms. It admits no contagious diseases. Although small it is well equipped with modern appliances and is under the care of a staff of local physicians. The water supply of the city is from the headwaters of the Swananoah, and is perfectly pure, as shown by competent analysis and bacteriological examination.

The city, except in some of the negro quarters, is well sewered. Under the diligent labors of a competent board of health, the general sanitary conditions of Asheville have been much improved, and they are now as good as those of other progressive cities. Expectoration in public places and upon sidewalks is forbidden under fine; and the prospect for an ordinance requiring meat inspection, the testing of dairy cows for tuberculosis, as well as the disinfection of rooms previously occupied by tuberculous patients is good, and will probably be a law before these pages go into print. The mortality of the city is very low, especially among the white population; malaria is unknown, and phthisis among the natives is rare.

Asheville has a system of good graded schools, a military academy for boys, and several colleges for girls,

and these private institutions are of a high standard and well conducted. Students from localities in which the climate is unfavorable to delicate and rapidly growing youths, and invalided parents who come to Asheville for permanent homes with their children, are offered excellent educational advantages.

Asheville has also a good public library. The principal religious denominations are all represented and their church edifices would be creditable to a larger city.

Cottages and larger houses, furnished and unfurnished, are plentiful for rent, the prices varying from \$10 per month upward.

Many inquiries are constantly being received by the writer from invalids as to opportunities for employment. Most of the invalids who arrive here in quest of employment are physically unfitted for labor of any kind, and it is a great mistake to send to this or any other health resort phthisical patients who must depend upon their own exertions to make their way.

Sources for amusement and recreation are chiefly limited to driving, horseback riding, and walking amid the beautiful scenery of this region. Golf links, said to be among the finest in the country, baseball grounds, an opera house, and the gayeties of the fashionable hotels furnish their part in season.

Carriage hire and riding horses may be obtained in Asheville at very reasonable rates.

Asheville is on the Southern Railway, about half way between Salisbury, N. C., and Knoxville, Tenn. Through sleepers leave New York City over the Pennsylvania Railway via Washington at 4:30 P.M. and arrive at Asheville at 8:30 P.M. the next day.

Through sleeping accommodations exist also from Nashville, Tenn., and Cincinnati, Ohio, the trains leaving these cities at 8 P.M. and arriving at Asheville the following day in time for dinner.

There is also direct connection from New Orleans via Montgomery, Birmingham, and Atlanta; and the Southern Railway gives an excellent service over all its lines, taking special pains with its Asheville patronage.

Karl von Ruck.

ASPARAGIN.— $C_8H_{12}N_2O_8, H_2O$. A crystalline principle, obtained from *asparagus officinalis*. It also is very widely distributed in nature, having been found in almonds, licorice root, belladonna leaves, potatoes, lily of the valley, marshmallow, and many other plants.

It is neither an alkaloid nor a glucoside, but an organic principle derived from malic acid. When decomposed by strong acid, it is converted into ammonia and aspartic acid. It occurs in hard, brilliant, colorless crystals, with a faintly saline, cooling taste, soluble in water, one part in twelve.

The use of asparagus is being revived, and this principle is recommended as the best means of obtaining its therapeutic properties. It is administered in doses of one grain to one grain and a half three times a day.

Asparagus has long been supposed to possess therapeutic properties, but it has not received much attention. The roots and shoots are official in the French Codex, and at many European watering-places it occupies an important position in the articles of diet in lithiasis and in the treatment of gouty patients. It increases the flow of urine and imparts a peculiar strong odor. It may cause vesical irritation, and should be used with caution when the renal tissue is diseased. In cardiac dropsy it is recommended, as its action is said to resemble that of convallaria.

Beaumont Small.

ASPARAGUS.—The common garden asparagus, *A. officinalis* Linn. (Fam. *Liliaceae*), will hardly be made more familiar by description. It is a native of Europe, and cultivated everywhere. Both the underground portion and stems are official in France.

"Asparagus root," as the rhizome is improperly called, contains resin, glucose, dextrin, bitter extractive, and other simple constituents, but no asparagin. The

fresh sprouts have, in addition, the interesting compound *asparagin*, discovered in 1805 by Vauquelin and Robiquet.

As a medicine asparagus is of little use. Its property of modifying the odor of the urine is known to every one, and is caused by methyl mercaptan, a decomposition product of protein. It may increase the quantity of urine excreted, but does not do so always. It appears to make it slightly irritating, and to prompt to more frequent micturition. In large doses, it has been compared, in its effects upon the heart, to digitalis, but is rarely now used with this in mind. (See *Asparagin*.)

W. P. Bolles.

ASPERMIA. See *Sterility in the Male*.

ASPHYXIA (α , privative, $\sigma\phi\upsilon\chi\epsilon\iota\varsigma$, a pulse).—Diminution or suspension of the phenomena of hæmotosis and of the respiratory function from hindrance to the entrance of air into the lungs.

Turned from its primitive sense, the word in medical technology, and even in common language, has now quite a different meaning, experiments having shown that the physiological fact, qualified summarily under the name asphyxia, may be the consequence of several pathological states, or of distinct functional troubles. Broadly speaking, there will be asphyxia when any obstacle whatever hinders air from penetrating the pulmonary vesicles, or when the fluid that penetrates them is of any other nature than the medium in which the animal is destined to live. Consequently the name asphyxia is applied generically to all accidental conditions in which life is threatened by any interception of the respiration which impairs the quality of the blood, but does not diminish its quantity.

Many writers, objecting to the term, advise its abolishment from medicine, and seemingly with good reason, since asphyxia may be confounded with apnea, suffocation, syncope, shock, dyspnea, and other disorders of respiration, and with suspended animation from various causes. On the other hand, it is preferable to retain this name rather than coin a new one, which in its turn may be inadequate to explain phenomena that may be subsequently revealed by science. Under the title are grouped many accidents or diseases that have no other relations between themselves than a gradual lowering of the hæmotosis, of the pulse, of the temperature, and of sensibility and motion.

VARIETIES.—Several conditions resemble or complicate but do not constitute asphyxia. *Apnea*, or syncope of the lesser circulation, is physiologically opposite to asphyxia, since the stoppage of respiration is owing to the saturation of the blood with oxygen. *Apnea* occurs when the blood is shut off from the air passages; *asphyxia*, when the air is shut off from the blood. *Apnea* is *breathlessness*; *asphyxia*, difficulty of taking in breath. Poisoning by toxic vapors, the fumes of sulphuric acid, chloroform, mephitic gases in general, and more especially the gas produced by burning charcoal, do not occasion asphyxia, but a true poisoning, resembling narcotic poisoning, in which the oxygenation of the blood has no recognized part. Of the toxic gases, the disastrous inhalation of which is erroneously attributed to asphyxia, an exception must be made in favor of oxide of carbon. This gas acts by paralyzing the blood globules, and by obstructing the gaseous exchanges of which they are the agents. Between poisoning by the inhalation of toxic vapors and asphyxia there is this capital difference: in the pretended asphyxias the hæmotosis continues, in real asphyxia hæmotosis ceases. Asphyxiation by lightning and by vacuum, being of no practical interest, cannot be touched upon; and the complex state in which phenomena analogous to asphyxia are thought to occur in the fœtus, from impeded circulation of the placenta, does not appear to call for special mention in connection with our subject. *Infantile asphyxia*, or the apparent death of the new-born, is a distinct morbid condition brought on by a cerebral congestion, or by a syncopal

state, and will be studied elsewhere. The term *local asphyxia* is rather a bold innovation that has been applied to symmetrical angio-neurotic gangrene of the extremities, as seen in Raynaud's disease and in the aborted form known as *digitis mortui*. Its supposed cause is privation of oxygen, but in reality it is due to embolic arrest of circulation in the parts affected, resulting from prothrombin or from lesion of the cord or its envelopes. *Secondary asphyxia* may occur after drowning or other cause of asphyxia. The individual having recovered from the primary effects of the asphyxia, dies suddenly, without apparent cause, after a lapse of a few minutes or several days. Such cases are explained as the secondary results of the arrested interstitial nutrition that took place during the period while breathing was temporarily arrested.

PHENOMENA.—Interruption or suspension of the respiratory phenomena may be influenced by diverse circumstances. It is a matter of common experience that nervous impulses from without act upon the respiratory centre in various ways. Cold water dashed on the skin affects the breathing, and of all the psychical nerve centres, the one that controls respiratory events is, perhaps, most frequently and deeply affected by the action of the will and the emotions. When pulmonary absorption ceases, that is to say, when oxygen is diminished, and carbon dioxide is stored up in the blood and in the tissues, the rhythm and character of the respiration become changed by the venous blood mixture affecting the inhibitory nerves of the heart and the medulla oblongata, labored respiration follows, and this in turn gives place to dyspnea and unconsciousness, which merge into asphyxia, and a fatal termination ensues unless some restorative event occurs.

Many of the modifications that occur in asphyxia have been noted in physiological experiments. The blood of an asphyxiated animal resists slow combustion and putrefaction; when the venous blood enters the deep tissues of the organs suppression of the urinary and other excretions follows; the glycogenic function of the liver is interfered with, and, if the asphyxiation be sufficiently slow, the temperature is lowered. An excess of carbon dioxide in the blood excites powerful respiratory movements; while hyperoxygenation, or saturation of the blood with oxygen, checks the respiratory movements. Hearts of frogs, plunged in carbon dioxide, stop beating in about ten minutes, but continue to contract during more than three hours in air, and at least an hour in nitrogen gas. Hearts of new-born rats placed in tepid water, saturated with carbon dioxide, and others in ordinary water of the same temperature, show that those placed in the carbonized water beat much quicker than the others. It is demonstrated that the contractile power of the heart is preserved much longer in oxygen than in carbon dioxide. There is also a loss of muscular contractility, notably in the muscles that control defecation and micturition, and in females near the full term of pregnancy the fœtus is expelled. The pupils, at first contracted then dilated to the maximum, offer in the fibres of the iris a phenomenon of the same order; the expansion in this instance being consequent upon the irritation of the centre in the medulla governing the action of the pupil. In the diminished respiration from deficiency of oxygen lies the true cause of dyspnea and asphyxia. No animal can maintain the respiratory process in an atmosphere devoid of oxygen, or in one that does not contain at least ten per cent. of this gas, and such quadrupeds as whales, hippopotami, and seals or the pygopodous birds would drown in the same manner as a dog if kept submerged long enough. It is mainly by virtue of the arterial plexus, known as the *retia mirabilia*, which stores up a supplementary supply of oxygenated blood, that these animals are enabled to remain so long submerged and resist asphyxiation.

Absence of the respiratory murmur in the chest, and abundance of mucous râles in the bronchi, always accompany asphyxia. Diminution of sensibility also comes on gradually, and, following an ascending and

centripetal march, appears last in the cornea. Progressive anaesthesia measures the degree of asphyxia, and absolute general insensibility indicates complete arrest of life beginning at the lungs. After all other movements have ceased the heart continues to beat, and finally stops in a state of diastole.

ETIOLOGY.—Asphyxia is one of the most frequent of the immediate causes of death. It may result from any of the causes that hinder respiration. These causes may arise from circumstances inherent to the individual, or they may be exterior to him. Asphyxia being brought about by the circulation of non-oxygenated blood in the lungs and the respiratory centre in the medulla oblongata, may be produced by any cause that tends to oxygen starvation and the accumulation of carbon dioxide in the blood. Arrest of the thoracic movements and hindrance of hæmatisis may sometimes be produced by any of the causes of thoracic spasm: by hemorrhage at the base of the brain or in the medulla oblongata, or by poisoning by curare; by the slow and gradual feebleness which precedes and leads to fatal disease; by the introduction of air into the blood, and by the action of cold or of heat.

Mechanical obstacles to respiration often bring on cyanosis and anaesthesia, resulting in arrested hæmatisis. Special instances occur in the case of arrest of respiration by a foreign body in the larynx, or by a polypus, by œdema of the glottis, by an abscess of the pharynx or of the tonsils, by a goitre compressing the trachea, by an accumulation of mucus in the trachea in capillary bronchitis, by an extensive pneumonia, by a considerable hydrothorax, by strangulation, by intestinal pneumatisis compressing the diaphragm into the thoracic cavity; by pressure on the chest, not capable of being overcome by respiratory efforts, such as the falling in of earth, being crushed in a crowd, or by the accident of overlying that often happens to young children, and by changes in the pressure of the air breathed, no matter whether this be a gradual diminution, a sudden diminution, or an increase. Asphyxia may also result from traumatic cause, as in injury to the spinal cord or the base of the brain, a double wound of the chest admitting air, an opening of the diaphragm permitting the passage of the abdominal organs into the thorax, and from hemorrhage.

In the foregoing instances the air surrounding the individual does not present any alteration, the inspiratory efforts produce still some effect, but this effect is insufficient to preserve life.

Submersion in any liquid medium whatever causes asphyxia, and it may be caused by being surrounded by a medium devoid of oxygen and improper to support sufficient hæmatisis, as hydrogen, nitrogen, and the protoxide of nitrogen, gases not toxic, properly speaking, but considered irrespirable.

The three typical modes of asphyxia, the most important practically and the best studied in theory, occur in *strangulation*, *submersion*, and *confinement*.

In occlusion of the air passages from mechanical impediment, such as garotting, throttling, or by a noose or ligature, death results essentially from asphyxia. In some cases of hanging death may occur from asphyxia in combination with coma, the conjoint causes of occlusion of the air passages and disturbance of the cerebral circulation giving rise to the condition known as neuro-paralysis. It is observed in a general manner that all kinds of death caused by the privation of respirable air have among themselves the greatest resemblance. Whatever be the obstacle that intercepts the connection of the lungs with the atmosphere, the apparent differences are only secondary, and the essential symptoms are identical, because all act in suppressing the functions of the blood and hæmatisis. In fact, the phenomena of asphyxia are constant, and related to disturbances in the respiration, innervation, and circulation, which vary according as the asphyxia is the result of submersion or of the absence of oxygen in the surrounding medium, according as it is immediate or slow. The fatal result of asphyxia is owing to the introductory arrest of the pul-

monary circulation, the capillaries of the lungs being incapable of conveying venous blood. The stagnation of the blood in the lungs is followed by paresis of the respiratory centre and stoppage of the heart.

It is doubtful whether life be ever recalled in any case after stoppage of the heart following on asphyxia, yet the facts of suspended animation prevent the formulation of precise statements in this regard. Pigeons apparently dead from the effects of chloral hydrate recover, and fish frozen for a considerable time can be resuscitated by immersion in cold water. The writer has seen frozen terrapins resuscitated in the same manner. A striking difference is observed in dogs submitted to experiment. They recover after they have been deprived of air for three minutes and fifty seconds or even four minutes, but they die if they are submerged in water for a period of two minutes. They recover after two minutes and fifteen seconds if chloroformed before submersion. Dr. B. W. Richardson reports a case of recovery in a child with croup who was completely asphyxiated for eleven minutes, and cases of recovery from hanging are known in which the time was much longer.

Asphyxia, though not always the *mode of death* in those submerged, is commonly present in a certain number of cases. The resistance of new-born animals to this mode of asphyxiation is especially noted in the greater time required to drown a new-born pup than an adult dog. One minute and a half usually suffices to drown a dog, while a new-born pup often requires as much as fifty minutes. This great difference is owing to the less active change of tissues, and the smaller consumption of oxygen in the young animal. The more active the vital combustion, and the greater the demand upon the general store of oxygen in the blood, the quicker the young animal perishes when the respiration is obstructed.

Accidents owing to the absence of respirable air, or to confinement in places where the air is not renewed, are of common occurrence. Asphyxia from this cause is less prompt than that by strangulation. The phenomena connect and follow one another. Efforts to hold the respiratory function in abeyance are soon followed by head troubles, with nausea, loss of consciousness, diminution of the pulse, and insensibility of the skin. The more energetic the subject the more intense are the effects of asphyxia.

Although no warm-blooded animal can live in any medium not containing a sufficient mixture of oxygen, yet animals may become habituated to deteriorated air, and in certain conditions of suspended animation they may live for a certain length of time with impunity in a vacuum, and even in a medium charged with carbon dioxide. Rats and mice live in air containing but one, and even 0.5 per cent. of oxygen, and carnivora and birds resist death in an atmosphere in which the proportion of oxygen is so small as barely to support the combustion of a candle. There is also a tendency in the new-born to resist asphyxia from confined air. Young sparrows without feathers have been known to live twenty-four hours in a space where the adult sparrow died in two hours. Marmots in a state of hibernation live under an exhausted receiver, but die when awakened. Cold-blooded animals resist longer the privation of atmospheric air, as can be fully seen in the case of frogs.

It is sufficiently demonstrated that death in confined air is due, as is death in nitrogen, to simple privation of oxygen. Death from asphyxia may also occur in atmospheres which are still rich in oxygen, but in which the proportion of carbon dioxide is too high, as in caves, cellars, and the like.

The important facts relating to the cadaveric lesions, the treatment, and the medico-legal questions likely to arise in connection with asphyxia, will be found in the following article.

Irving C. Rosse.

ASPHYXIA, MEDICO-LEGAL RELATIONS OF.—*What is asphyxia?* Nothing is more difficult than to express in a definition all that any medical or legal

term may mean. No proof of this assertion is required by the reader who sees how differently authors define the meaning of such terms, and how constantly the simplest definitions are varied, qualified, and amplified by the authors themselves.

Nor can the derivation of the word itself determine its present technical meaning, for it has long since acquired a meaning distinct from the meaning derived from the Greek, *a*, privative, and the verb, *σπίζειν*, to pulsate, without pulse, as all death is that.

The definition accepted by lexicographers is best stated in the Century Dictionary, as follows: Asphyxia, the extreme condition caused by lack of oxygen and excess of carbon dioxide in the blood, brought about by a sufficient interference with respiration, as in choking, drowning, or paralysis of the muscles of respiration.

In its medico-legal sense, asphyxia is the cessation of the heart's action which arises from interrupted respiration, caused either by expelling the air from the body or by preventing the entrance of pure air into the body. When air is eliminated from the body, or pure air prevented from entering the body, the action of the lungs is paralyzed, and the blood, no longer aerated, loses its vital qualities and circulating powers. The combination of these conditions causes death. Death so resulting is called death from asphyxia, and the condition produced by this combination is asphyxia.

While asphyxia in a certain measure produces general effects which are practically similar in character, yet, as above indicated, it is not always caused by similar agencies, nor does asphyxia always present symptoms entirely uniform. On the contrary, there are found in cases of asphyxia produced by different agencies strikingly different physical symptoms, both external and internal. For sake of illustration: in the cases of asphyxia resulting from suffocation, there is rarely any positive disarrangement of the vascular system of the brain, and ecchymoses are comparatively slight, and often unapparent to the untrained eye; while in the cases of asphyxia resulting from strangulation, the vascular system of the brain presents strong evidence of death by strangulation, the condition of hyperæmia being marked, and ecchymoses are, as a rule, much more pronounced in number and in extent, so much so as to challenge the observation of the unprofessional witness.

There have been almost as many divisions and subdivisions of asphyxia as there have been treatises devoted to the subject. However, for the purposes of this article, asphyxia may be divided as follows:

1. Asphyxia from the want of respirable air, and from the inhalation of noxious gases.
2. Asphyxia from suffocation.
3. Asphyxia from strangulation other than from hanging.
4. Asphyxia from strangulation from hanging.
5. Asphyxia from drowning.

In this article, however, asphyxia from drowning will not be discussed, as a separate article upon this branch of the subject will be found elsewhere in this work (see *Drowning*).

How Asphyxia May be Proven.—Without trenching too much upon that branch of medical jurisprudence which treats of the introduction of expert testimony, it is not amiss briefly to sketch the principles applicable to the admissibility of expert testimony in reference to asphyxia.

In such cases, in the administration of justice, it frequently becomes necessary to determine the nature and cause of physical injury and death. These questions arise in tribunals vested with the power to try civil causes and also in tribunals vested with the power to try criminal cases.

The judgment of human courts is fallible enough at all events, but it is evident that no judgment can be approximately just unless founded upon a true statement of facts. Recognizing this axiomatic truth, the administrators of the law recognize the further principle that in determining the nature and cause of physical injuries

and death, they must look for help from that profession the members of which have devoted their time and talent to the study of the human body, its nature, and its infirmities.

The rules that are prescribed by the courts in securing the help of medical experts constitutes a large part of medical jurisprudence.

In questions arising from injuries and deaths from asphyxia, the courts exercise the function above mentioned, and summon to their aid medical experts.

The questions upon which these experts are to shed light are necessarily these: Was asphyxia the cause of the injuries or the death of the person; and second, if so, by what means was asphyxia effected?

These opinions, given by the medical witnesses, constitute expert evidence.

The law recognizes the value of such evidence (in many cases it is the only method of arriving at a just conclusion), but both the law and the science of medicine recognize the dangers of relying upon expert evidence alone, and usually it has its greatest weight when supported by collateral evidence.

The Lay Witness.—However, the law does not rely alone upon expert evidence, in arriving at the facts in a case of death supposed to have been caused by asphyxia; if it did, oftentimes justice would miscarry. Indeed, in the majority of cases it is necessary to have witnesses both lay and expert.

The physical facts, including the surroundings, the position of the body, its appearance after death, etc., are facts which may all frequently be proven as well by one of the commonality of men as by the skillful scientist. To illustrate: Should the subject of investigation be whether or not the deceased died from strangulation, lay witnesses would be permitted to testify as to the position in which the body was found, the marks of violence upon it, the prints of fingers or marks of hands, the discoloration of the skin, the protrusion of the tongue, etc. But they will rarely, if ever, be permitted to give opinion as to whether or not the deceased was strangled to death.

In a great number of cases, the lay witness is very valuable and sometimes is indispensable. He is indispensable when no physician viewed the body after death. In such a case, without lay testimony, the expert opinion is necessarily useless, having no physical facts upon which to base an opinion.

Nevertheless, the legal profession recognizes the danger of determining the cause of death from asphyxia, when the physical facts upon which the expert opinion is based are derived entirely from lay witnesses. The justness of this can be readily appreciated when it is considered how easily the lay witness might fail to discover some physical sign which would readily appear to the medical expert, and have the effect of compelling a radically different opinion as to the cause of death.

The Expert Witness.—The testimony given by the expert witness is twofold: first, it is purely opinion evidence, based upon hypothetical questions. When such evidence is permitted to be given, the hypothesis submitted to the expert must be made up of facts testified to by other witnesses.

The opinion, therefore, of the witness can have no weight with the court, unless the facts upon which it is based are accepted by the court as the true facts of the case.

But the expert witness is not confined to purely hypothetical questions where he has made a personal examination of the body. And in a case of asphyxia, the expert, having examined the body, will be permitted to testify that in his opinion death was or was not caused by asphyxia, and by what means he believes asphyxia was effected.

Upon cross examination it may be elicited as to how carefully his examination was made, and the witness can be compelled to give in detail his reasons for his conclusions.

The student will readily conclude that in preparing to testify as to whether or not a death was caused by as-