be found useful especially in accidental and suppurating wounds. It prevents the dressings from adhering to the wound and permits of their easy and almost painless removal. The appearance of infection in a wound demands the establishment of free drainage and the use of antiseptic irrigation. The application of a hot, moist antiseptic dressing will often prove beneficial.

Asepsis of Special Operations.—In abdominal operations, in which contamination of the cavity by pus, feces, bile, or urine may be feared, it is essential that the general peritoneum be protected by the interposition of gauze pads or sponges to take up such material. These sponges or pads are removed after the field has been cleansed and the danger of further contamination is passed. Following this, the general cavity is to be flushed thoroughly and a complete toilet made. Similar steps are necessary in opening a cerebral abscess which is likely to be followed by a general inflammation of the meninges. Some minor surgical procedures demand aseptic precautions, such as aspiration and injection of cavities, saline infusion — hypodermic injections — and the use of catheters and sounds for urethra, bladder, and ureters. Aspirators and syringes should be so constructed as to be easily sterilized. A hypodermic syringe is now on the market which is made entirely of metal and can be boiled. Overlach's syringe with rubber piston, glass barrel, and metal mountings can also be sterilized by boiling. The needles should be boiled in soda solution before they are used. The fluid to be injected into the tissues should be boiled, unless it is itself germicidal. Fountain syringes made of rubber or glass can be boiled and are frequently used for making saline injections into the blood and tissues. They must be freshly sterilized before they are used. It is essential that the skin should also be sterilized in such procedures. It is claimed by Cazeneuve and others that the urine from healthy kidneys in a healthy bladder is always sterile. Decomposition of the urine and inflammation of the bladder occur only as the result of the presence of micro-organisms, which as a rule enter from without. The entrance of septic germs does not always produce an inflammation of the bladder, as they are rapidly expelled with the urine. Any obstruction to outflow will favor their retention and growth, and the development of inflammation in the ureters and kidneys as well. Every effort must be made, therefore, to prevent infection of this tract. Catheters are made of soft rubber, metal, silk, or linen sealed by gum. The metal and soft rubber are best. They should be sterilized by boiling for five minutes, and then anointed with sterilized glycerin or oil before they are introduced. Sounds and other instruments should be treated in the same way. If such procedure would injure the instrument, dependence must be placed on a strong carbolic solution. Brisk friction for one minute with a wet towel followed by similar treatment with a dry cloth will make the solid instruments sterile (Schimmelbusch). A virulent urethritis contraindicates catherization, and before any instrument is passed, the urethra should be cleansed by the evacuation of the urine or by flushing the canal with water or normal salt solution. Constant watchfulness in all surgical procedures, both large and small, is absolutely essential for the prevention of septic contamination. This watchfulness can be cultivated to a very high degree so that it becomes more or less a matter of habit. When this occurs, however, there enters the danger of carelessness. Therefore it is well to remember that our technique is always open to improvement and that the danger lies in indifference and a lack of care.

J. Garland Sherrill.

ASEPTOL is the trade name of a solution of sozolic acid, of the strength of thirty-three per cent. Sozolic acid, $C_6H_4(HSO_2)OH$, is formed when carbolic acid is dissolved in concentrated sulphuric acid, in chemically equivalent parts. It is a syrupy, reddish-brown fluid, miscible in all proportions in water, alcohol, and glycerin. It is less poisonous than carbolic acid and has a more agreeable odor. Specific gravity, 1.168. It possesses antiseptic properties and is used externally for the same purpose as carbolic acid. It is devoid of caustic properties, is less irritating, and is not so powerful an antiseptic, being estimated to possess about one-third its germicidal power. A solution of ten per cent. may be generally employed as an antiseptic wash. In diphtheria it is recommended as a local application. It may be given internally, but the official salt, sulphocarbolate of sodium, is to be preferred.

Beaumont Small.

ASH BARK.—The bark of various species of *Fraxinus* L. (fam. *Oleaceæ*). The commonly used species are the *F. excelsior* L. of Europe and the *F. Americana* L., or White Ash, of America, the inner root bark of which has been employed. The fluorescent glucoside *fraxin*, very common in the genus, seems to be less important therapeutically than the volatile oil and amaroid, which are present with a considerable amount of resin. Its composition would indicate its utility as a stimulant to nutrition. Its empirical use in the treatment of dysmenorrhœa and metritis is, however, not explained. The dose is 1 to 4 gm. (gr. xv. to lx.), and it is advised to be given in the form of a wine.

H. H. Rusby.

ASH, PRICKLY.—Xanthoxylum. "The bark of *Xanthoxylum Americanum* Miller and of *Xanthoxylum Clava-Herculis* L. (fam. *Rutaceæ*)" (U. S. P.). Prickly ash derives its name from its armature of thorn-like prickles and its superficial resemblance, when in flower, to the true ash (*Fraxinus*), to which it is not related. The genus *Xanthoxylum* L., as recognized by Bentham and Hooker, contains nearly one hundred species, distributed widely in both temperate and tropical regions of both hemispheres. In most of these regions, one or more species are used as ours is, and many of them are employed also in fish poisoning. Of the two species named above, the former is the northern, the latter the Southern prickly ash. The latter is regarded by Dr. Engler as representing a distinct genus, *Fagara* L., and is called by him *F. Caroliniana* (Lam.) Engler. This view is apparently correct.

The fruits of both the northern and southern species have composition and properties generally similar to those of the bark, and are used similarly, but in rather smaller doses. The Cuban species, to which the name *X. Clava-Herculis* L. has also been applied, is a distinct species (*X. Caribæum* Lam.). Northern prickly ash is a large shrub, rarely attaining to the dimensions of a very small tree. Its spines are not borne upon corky protuberances. Southern prickly ash becomes a small tree, and its spines, at least upon the older portions, are elevated upon large conical corky excrescences. The bark of the former is in small quills or pieces of them, very thin (rarely exceeding one twentieth of an inch in thickness), brown or purple with light gray patches, very rarely entirely gray, and usually with minute black spots resembling fly specks. Its inner surface is smooth and whitish, becoming yellow, and with a greenish tinge. It has a sharp, brittle fracture, exhibiting an outer green and an inner yellowish-white layer. The southern bark is even thinner in quills of the same size, though the older pieces become twice as thick, and it is more uniformly gray. The spine characters assist in the differentiation. Both barks have a very bitter and pungent, afterward acrid taste.

Composition.—As to their general nature the constituents agree in the two barks, though the compounds are different. There are two resins, one very acrid. The oil is also very acrid. The bitter taste is due to a distinct substance, *xanthoxylin*. A small amount of tannin is also present.

Properties.—The action of prickly ash is that of an aromatic bitter, but it has other characteristic properties. Its locally stimulating powers are very marked. Externally it is an active counterirritant and relieves neuralgia and rheumatism. It excites profuse secretion in the mouth and stomach, and apparently in the intestine.

It stimulates the heart quite strongly, apparently reflexly. It promotes excretion as well as secretion and is an excellent diaphoretic, diuretic, and expectorant. This eliminative power makes it of service in the treatment of rheumatic and syphilitic conditions. It was one of the most extensively used of aboriginal drugs, and has always been a favorite in domestic practice, and it is unfortunate that it has been displaced professionally by less worthy articles. The official preparation is the fluid extract, the dose of which is 1. to 4.0 c.c. (fl ʒ ¼ to 1). The root of *X. Senegaleuse* DC. is similarly used under the name of *artar root*. It contains the alkaloid *artarine*.

H. H. Rusby.

ASHEVILLE, N. C.—Asheville is situated in Western North Carolina upon a hilly table land, at an elevation of 2,350 feet, in the culmination of the Alleghany Mountains, between the diverging ranges of the Great Smoky Mountains and the Blue Ridge.

Completely surrounding this plateau of some thirty miles in width, with the Blue Ridge to the south, east, and northeast, and the Smoky Mountains to the west and northwest, are the projecting spurs and peaks of these ranges with an elevation double and almost treble that of Asheville. The meteorological conditions of the plateau—the temperature, the purity of the air, and the amount of precipitation—are peculiarly influenced by these high mountain chains. The rain clouds, especially those approaching from a southerly direction, are saturated at a higher temperature than they meet on approaching and passing over these mountain ranges, and on that account they precipitate their moisture before reaching the plateau. In consequence there is a difference of from fifteen to twenty inches of annual rainfall, and from ten to twelve degrees in relative humidity, between places situated immediately in the surrounding mountains and the Asheville plateau.

In the winter season the temperature is moderated by the prevailing air currents from the south, but as they come as a rule from a northerly direction in the summer, the summer months are cool and pleasant.

Preferring not to make use of tabulated meteorological statistics which are difficult to decipher, and to be complete would occupy my entire available space, I may say that Asheville is practically an all-year resort, having, in the parlance of climatologists, a medium elevation, and offering favorable conditions for out-of-door life at all seasons of the year.

The Winter Months.—January and February present, however, periods of cold weather, lasting for a few days, and exceptionally for a week, and several of such "cold spells" are observed during these months.

Such a cold spell is as a rule initiated with a considerable wind movement from the north, during which the temperature falls rapidly to 10° F. or to zero, and temperatures below zero have been observed during several of the twelve winters during which the writer has had charge of the local weather bureau. As already stated, these cold spells do not last, the wind subsides after from twenty-four to thirty-six hours, and then the temperature rises. The days are bright, and during the hours of sunshine invalids can be out of doors, when properly clothed, without suffering from cold.

The humidity averages between 50 and 55 per cent. in the two winter months, and the dry atmosphere and large amount of sunshine have a stimulating and exhilarating effect upon all cases which are otherwise in a condition to profit from climatic treatment. The amount of ozone in the air reaches its greatest proportion in these months, and 70 per cent., of a scale from 0 to 100, has frequently been recorded.

In some years the winters have been very mild, but frosts occur in the spring months as late as the latter part of April. Snow rarely falls, and when it does, it melts away under the sun upon the same day or within a day or two thereafter. The average snowfall is less than two inches.

The *spring season* has its beginning between February 20th and March 10th, during which the vegetation begins to spring up, and the trees to leaf out. The days are comfortable, and while not hot, temperatures up to 75° F., during the hours from 10 A.M. to 3 P.M., are quite common.

Thunder storms occur with the advent of such warmer weather, and are attended with brisk showers, especially upon the environing high mountain ranges, where one can often see such storms in progress while the plateau enjoys bright sunshine.

The relative humidity during the spring months averages between 60 and 65 per cent.

One of the features of the spring is the beautiful and varied flora of this region, and the azalea, laurel, and rhododendron, as well as the smaller flowers of the mountains, are the delight of all visitors.

The Summer.—In some years past June has been as warm as any of the summer months, and the highest maximum temperature may fall in this month or in July or August. The highest temperature recorded in the past twelve years was 91.3° F., but 90° F. is frequently reached during the summer of every year.

Usually there are cool breezes during the day, and unless one is exposed to the direct rays of the sun, there is no discomfort on account of heat. When the sun goes down the air cools rapidly, and the nights are always comfortable and bed covers are necessary, at least after midnight.

The rainfall during the summer months is, as a rule, greater than in the winter, and heavy rains of short duration occur more frequently. I have known an inch of rain to fall in the course of an hour or two, but the excellent natural drainage carries the water off quite rapidly, and the streets become dry in a few hours.

The average rainfall for the summer is four inches per month, and the average humidity varies between 70 and 75 per cent.

The Autumn.—With but few exceptions, in the twelve years of my experience, the fall weather has been continuously pleasant and enjoyable until January, when, as stated above, colder weather usually sets in. With frosts in October the foliage of the great variety of trees and shrubs begins to turn, assuming every possible shade and hue from the green of the pine, to yellow, crimson, red, purple, and brown, and this change goes on until December or even later, when the leaves begin to fall. Visitors never tire in their admiration of this ever-varied play of colors in the closely adjacent forests, and thousands of boxes of leaves and branches of myrtle, mistletoe, holly, and galax are mailed from Asheville during the fall and winter months to distant friends and relatives.

The fall months are always delightful, the temperature declining in average and maxima gradually; and after October 1st artificial heat is frequently required in houses in the early morning and evening.

The total annual rainfall is forty inches, and is nearly equally distributed over all the months, with a slight increase in summer. There is no distinctly rainy season or month, and no distinctly dry season for any part of the year.

Having given the essential information as to the climate, I may now consider other subjects which are of interest and about which inquiries are frequently made the by distant physicians and intending visitors.

The city has a permanent population of fifteen thousand and a floating population of several thousand more, the latter consisting of people who are in search of health and pleasure. The railway station is situated in the valley near the confluence of the French Broad and the Swananoah Rivers, at a distance of a mile from the centre of the city, which is located on a bluff about three hundred and fifty feet above the river valley. The streets from the depot and in the central parts, as well as some of the residence streets, are well paved with brick, and brick pavement and macadam extend to Biltmore, a distance of two miles, to the Vanderbilt estate. Electric trolley lines connect the different parts of the city with the de-

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 Swanannoah, 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 3:30 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.—$C_4H_8N_2O_3,H_2O$. 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. *Liliaceæ*), 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 Robiques.

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 (*a*, privative, *σφύξις*, a pulse).—Diminution or suspension of the phenomena of hæmatosis 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 apnœa, suffocation, syncope, shock, dyspnœa, 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 hæmatosis, of the pulse, of the temperature, and of sensibility and motion.

Varieties.—Several conditions resemble or complicate but do not constitute asphyxia. *Apnœa*, 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. *Apnœa* occurs when the blood is shut off from the air passages; *asphyxia*, when the air is shut off from the blood. Apnœa 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 hæmatosis continues, in real asphyxia hæmatosis 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 *digiti 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 propathia 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 apsychical 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 dyspnœa 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 dyspnœa 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