TREATMENT OF DOMESTIC ANIMALS POISONED BY EATING WILD PLANTS.

As a rule animals have an instinctive repugnance to eat of any plant or vegetable which is injurious to their well-being. But accidents of this character occur not infrequently at this time of the year. The farmer in the majority of cases takes no steps to eradicate harmful plants from his fields and hedgerows. Aconite, digitalis, savin, hemlock, hellebore, etc., affect animals much in the same way as they affect man.

The symptoms usually presented in cases of poisoning of animals through eating injurious plants may be either an irritative state of the digestive organs, as is generally shown when animals have eaten of such acrid plants as are found in the Ranunculus order; a constipated and comatose condition as the result of such poison as large quantities of oak shoots, acorns, etc.; or there may be evidence of brain and spinal affection as the result of absorption of nerve poisons, and shown either as a delirious excited condition or may be a paralytic state.

In the absence of absolute knowledge of the cause of the disease, treatment should be directed to combat and alleviate the condition shown from a purely common sense point of view; and as it is not possible in our larger domestic animals to evacuate the contents of the stomach by emetics, it follows that efforts to get rid of the offending material must be by means of medicines. In the case of an irritant of the alimentary canal having been absorbed, increased action of the bowels occurs, amounting in many cases to diarrhœa or even dysentery, with often a filthy condition of the fæces, irritation of the bladder, and frequently a frothy, filthy discharge from the mouth and nostrils. The irritated organs must in such cases be soothed by demulcent non-irritating medicines, chief of which would be the administration of such as linseed or castor oil, either of which may be given to the horse or cow in doses of 5 to 10 oz. every three or four hours, and to pigs, sheep, etc., in proportionately smaller doses, following this up by the exhibition of demulcent drinks, as oatmeal gruel, starch, milk, etc., but withholding all solid food until the urgent symptoms have passed off, and then along with carefully selected food we may give stimulants, such as the alcoholic or ammoniacal, or, better, both combined; perhaps the best of which would be the spt. am. aromat. or a cheap substitute in doses of from 4 to 6 oz., well diluted, for the larger animals and 1 to 2 oz. for the smaller.

In cases of the second class, where the symptoms point to a constipated and probably lethargic condition, the plants causing which will be familiar to most chemists, it is essential to get rid of the offending material as quickly as possible, for which purpose a purgative should be administered—the best to horses being aloes in solution, in doses of 8 to 12 dr., and to the cow either Epson or Glauber salts, followed in both cases, if the bowels do not respond in from eighteen to twenty-four hours, by repeated doses of linseed oil, in quantities of 8 to 16 oz.; and here, again, stimulants, as before, will be absolutely necessary.

In the third class, where obviously the brain or spinal cord is affected, the plants causing which may be defined as nerve poisons, no general rule can be laid down, but the treatment must in all cases follow the individual symptoms. If the poison is a nerve stimulant, such as nux vomica or allied plants, nerve sedatives are required. If a depressant, as hyoscyamus or ergot, stimulants and nerve tonics are indicated. It may be taken as a rule that, where the dose is not known of any medicament, if we multiply the full human dose ten to fifteen times, we can arrive at a fair dose for the larger animals, and three to four times for the smaller ones; and in every case a dose of physic (laxative) will be useful.

It should be noted that, if nerve stimulants are required, nux vomica should never be prescribed in any form for the dog, its action in these animals being so uncertain as to constitute a positive danger even in infinitesimal doses.

LECTURE APPARATUS FOR THE STUDY OF CONDUCTIVITY.

THE teaching of physics, in order to be practical and fruitful, requires before all things else, the use of simple and inexpensive apparatus, without which the professor is obliged to confine himself to theoretical instruction. In this order of ideas, we make known the apparatus for the study of conductivity devised by Mr. Armand Leyritz, preparator of physical and natural sciences at the Arago School, and which the committee on scientific material for lyceums and colleges has recently adopted.

The inventor has especially endeavored to facilitate the demonstration of the professor by removing doubt from the minds of his pupils as to the results of experiments that they do not habitually see or that they see to a disadvantage.

As we know, in order to demonstrate the conductivity of bodies for heat, the classical apparatus of Ingenhouz is employed in lecture courses. With this apparatus students have never been able to witness the fusion of wax upon the rods of different solids, and the curve of conductivity has been seen with difficulty, even by the professor. Mr. Leyritz replaces the rectangular box of Ingenhouz by a brass cylinder (Fig. 1) carrying at its upper part a funnel through which the boiling water is introduced. This funnel is closed by means of a stopper that permits of closing the cylinder hermetically and of thus preventing any loss of heat. The rods of the different solids, 16 centimeters in length, instead of being fastened by unequal thicknesses of solder to one of the faces, enter the cylinder to the extent of half their length, by means of small brass sheaths, as far as to the opposite side. Each of these rods carries six equidistant grooves or channels designed to receive, upon their point, small ovoid masses of very fusible modeling wax, made by means of a special mould in the form of pincers. These masses are all of the same form, weight and bulk. The cylinder being full of boiling water and closed, we see the masses of wax bend over in succession, in following the grooves upon which they are placed, and then fall, in measure as the heat is propagated in the rods. There comes a moment in which we can very well ascertain the curve of conductivity by means of the masses that remain upright, and which we find, in a manner, materially traced.

In order to show the disengagement of heat produced by chemical combinations, Mr. Leyritz has devised an arrangement that permits of performing the experiment in a simple and striking manner. The apparatus (Fig. 2) consists of a glass vessel whose cover is provided with an aperture through which the liquid

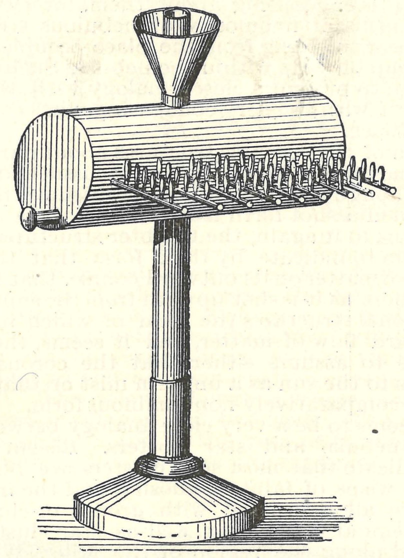


FIG. 1.—APPARATUS FOR STUDYING THE CONDUCTIVITY OF SOLIDS.

inside can be agitated so as to effect a perfect mixing of it. This cover allows of the passage, with hard friction, of a funnel tube, of a small test tube drawn out at its upper extremity, and of an alcohol thermometer 0·5 meter in length, which is so arranged that the column of liquid and the graduation are visible to the entire class without its sensitiveness being interfered with.

The receptacle is half filled with water, and then, after a little sulphuric ether has been introduced into the test tube, in operating as in the filling of a thermometer, sulphuric acid is poured in through the funnel tube, with the usual precautions. The tempera-

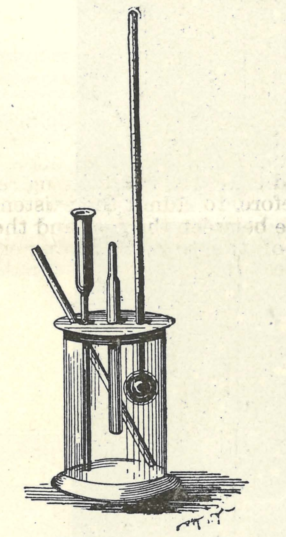


FIG. 2.—APPARATUS FOR DEMONSTRATING THE DISENGAGEMENT OF HEAT PRODUCED BY CHEMICAL COMBINATIONS.

ture immediately rises—a fact that is shown by the thermometer. Toward 35° the ether boils in the vessel and the vapors of it can be lighted at the pointed extremity of the tube.

Another apparatus (Fig. 3) is designed to show the conductivity of gases for heat. An inverted test glass, whose base is mounted in a brass sheath provided with apertures, is traversed at its upper part by a fine platinum wire extending to a certain distance on each side. The free extremities of this wire are held by clamps carried by two metallic pillars, into which is passed an electric current, such that the wire reddens completely in

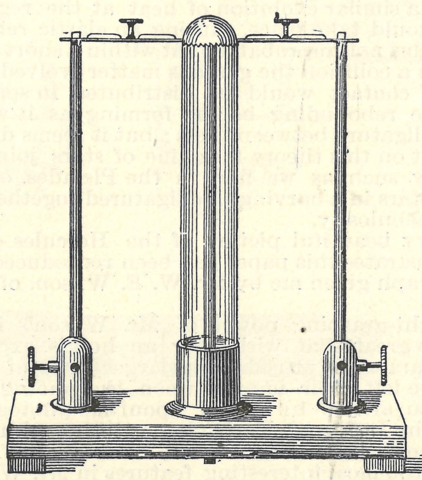


FIG. 3.—APPARATUS FOR DEMONSTRATING THE CONDUCTIVITY OF GASES FOR HEAT.

the air. By means of a tube bent at right angles, a current of carbonic acid is made to reach the top of the test glass.

The wire continues to redden throughout its entire length.

Finally, the test glass is filled with hydrogen (an operation that is attended with no danger), and the interior portion of the wire is extinguished. The experiment is performed in an elegant, very visible and very demonstrative manner.—Le Genie Civil.

BIRD'S EYE MAPLE.*

By W. J. BEAL, Agricultural College, Michigan.

THE wood of some trees of sugar maple, on removing the bark, is found to be irregularly covered with conical pits, which are more or less rounded at the bottom. In many instances these pits are irregular in outline; some are longest up and down the tree, and not infrequently two or more are partially united. The pits generally, though not always, have a depth equal to the greatest diameter. The largest pits are about a quarter of an inch in diameter, and vary in size to the smallest, which can barely be seen with the unaided eye. If the wood be split parallel with the bark, the side of the stick so removed toward the heart of the log will contain more or less conical projections, such as come from the pits left in the counterpart of the block.

On removing the bark, numerous small cones are displayed on it, such as descended and just filled the pits in the outer wood. By examining many radial sections, one will frequently find instances where the "bird's eye" is just beginning, usually very small. From this beginning the pits usually grow larger and broader as we successively come to the older wood.

Sometimes a pit runs of even size for many years; sometimes it abruptly disappears as we view the wood from that which is younger to that which is older, and sometimes it becomes so broad that for an inch or more it will be filled with bark. There may be some interruptions where the bark disappears to reappear after a few years. I have not been able to find any trees showing "bird's eye" until they had acquired a diameter of about three inches or more, and then the marks were very small. Such young trees have all been rather crooked and knotty, with irregular swellings on the trunk, compressed in some places. A smooth, straight, thrifty, healthy looking maple seldom shows the "bird's eye" to any extent. The "bird's eye" marks may be abundant and well marked on one side, or, perhaps, half or two-thirds of the circumference of the tree, and not be present on the rest of the tree. They may be well shown all around the lower part of a tree and partially disappear after a few feet above. "Bird's eye" is rarely found on the limbs of a tree, and seldom shown on the trunk above the lower limbs.

Mixed with the "bird's eye," or more or less independent of it, will often be found "blisters" and wanes and curls of all conceivable shapes. When such wood is split open, parallel with the bark, it often presents the appearance of folds of rich satin.

Where "bird's eye" maple is cut for market, most of the maple trees of the forest show somewhere the peculiarity to a greater or less extent, but, to be very valuable, this peculiarity should be abundant and extend clear around the trunk, and should extend far enough up the trunk to furnish logs of sufficient length to pay for marketing. These logs should be destitute, or nearly so, of deep pits containing bark or black streaks or shakes, and the thicker the sap wood the better, as the dark colored or heart wood is not salable.

At Vanderbilt, in Otsego County, Michigan, Mr. John Berry says the best trees are found on the richest land with clay subsoil, where, perhaps, one tree in twenty-five is marketable, while on thinner soil the trees are not so nice and the proportion of marketable trees may be one in forty.

They are shipped to Grand Rapids, New York, or to England, or to some other place, where they are cut into veneers.

No one can for certain pick out a good tree without peeling or cutting off pieces of bark here and there in several places on the tree. They often cut a pole to lean against the trunk to enable them to make examinations at a height of ten or fifteen feet. Many of the logs are finally cut in lengths of two to eight feet, thoroughly steamed, placed in a secure position to be turned over and over against a long knife, which cuts the veneer, which is the sixteenth of an inch or more in thickness. This is dried and glued onto boards or other cheap veneer and polished.

I have found several other species of trees showing the "bird's eye" to a greater or less extent, usually only affecting the tree in a slight degree, not sufficiently to be used as veneer. Notably among these is the wood of the beech and more rarely the wood of the hickory, white ash, black cherry, American elm, Norway pine, red maple and probably many other species. In some cases which I have seen the depressions, instead of being circular, are narrow and lengthened, sometimes half an inch or more. In some specimens of sugar maple and beech these long, narrow depressions run up and down the tree; while in some observed in sugar maple they extend transversely around the tree across the grain.

Occasionally the wood of sugar maple, beech, white ash, and sometimes other species is regularly curly, with the hollows and crests of the wanes well seen by splitting the stick in radial section. These wanes vary in length from three-eighths of an inch to a foot or more from the crest of one wane to the crest of another. In white ash and sugar maple and beech and rarely in black walnut and other species the wanes occur irregularly on the wood, parallel with the bark. Such wood is often used as a veneer, and in case of white ash it is spoken of as "calico ash."

Instead of small pits in the wood, as seen after removing the bark of "bird's eye" maple, the wood of several kinds of trees occasionally contains more or less protuberances or cones, while in the bark there is a corresponding pit. These have been seen on the red maple, sugar maple, hickory, and American elm. In some cases they appear to have come from adventitious buds.

What causes "bird's eye" in maple, beech or other wood?

The Indians of Northern Michigan have always attributed it to damage done the trees by the pecking of birds. I can find nothing in fact to warrant such an opinion. Occasionally maples are pecked by wood-

* Read before the American Association, Toronto, 1889.

peckers, but such places do not become pits in the wood, as is the case with "bird's eye."

In case of the beech, larvæ of insects are sometimes found in the inner bark extending to the cambium, which they injure more or less. Sometimes the insect kills a small spot of the cambium, and a black spot on the wood and bark is the consequence. This spot is sometimes enlarged in succeeding years by the action of more insects and probably by the presence of fungi. In some instances the insect seems to merely check the growth of the cambium in the spot where it grows, and a pit appears in the wood at this place. In other cases "bird's eye" beech seems to start without the aid of any insect.

I have found no insects in the bark of the sugar maple which cause the "bird's eye," yet when fresh living specimens are examined in the summer, the cambium at the bottom of the pits appears to be more or less injured, showing minute spots of a yellowish brown color, possibly started by some kind of bacteria.

WHAT IS A STAR CLUSTER?*

By A. C. RANYARD.

ACCORDING to the generally received nebular hypothesis, our sun and the luminous stars have been formed by the condensation of nebulous masses. Kant, Sir William Herschel, La Place, and the other earlier exponents of the nebular hypothesis who lived before the great principle of the conservation of energy had been propounded, assumed that the nebular masses must, when originally distributed in space, have been intensely heated to a far higher temperature than the luminous stars which were evolved from them.

The great difficulty of conceiving of a hot nucleus remaining after ages of radiation into space from the vast surface of a nebular mass does not seem to have occurred to these earlier theorists, or, if it occurred to them, the difficulty was swept on one side by assuming a still higher temperature for the parent nebulous mass. But when the mechanical equivalence of heat with other forms of energy was demonstrated, it became evident that the heat of the condensed nucleus might be derived from the motion of the nebulous particles colliding with one another during condensation. Thus a method of accounting for the great heat and light of the stars was offered, and the popularity of the nebular hypothesis was greatly enhanced.

It seemed reasonable to suppose that we should find large and small nebulous masses in all stages of condensation. The large and irregular nebulæ were pointed to as nebulous masses which were in the earliest stages of condensation. Nebulous stars were supposed to be in an intermediate stage, and ordinary stars were in a still later stage, approaching a condition in which they would cease to shine as incandescent bodies. But if the ordinary assumptions of the nebular hypothesis were true, the earlier stages of condensation would occupy a much longer period than the final stages, and we might expect to find a much greater number of oblate nebulous spheroids (such as the hypothesis of La Place assumes) than of stars in the later stages of condensation before their incandescent condition had passed away. It could hardly be urged that the stars and nebulous condensing masses were all so far removed from us that they all equally appeared as stellar points of light; for incandescent spherical masses, comparable in diameter with the orbit of Neptune, or even with the orbits of Saturn or Jupiter, would in our larger telescopes present very recognizable disks if they were situated at distances from us ten or fifteen times as great as the space which separates us from our nearest stellar neighbors.

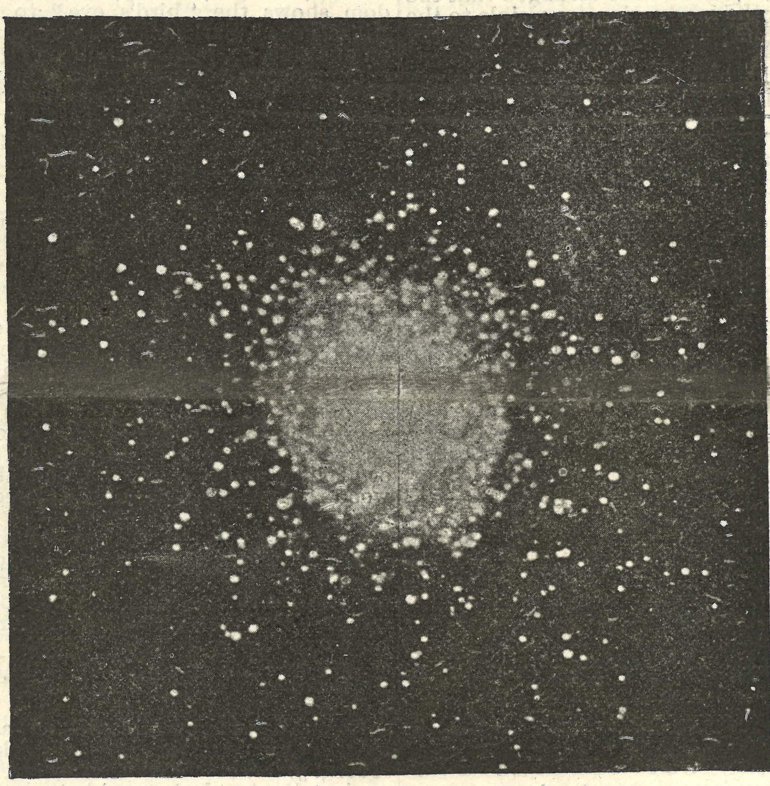
While there are millions on millions of stellar points of light to be observed in the heavens, the number of spherical nebulous masses revealed by the telescope is comparatively few, a fact which may be reconciled with the nebular hypothesis by assuming that the condensing masses only commence to be incandescent when they have shrunk to diameters of a few million miles, and that in the earlier stages of incandescence the nebulous matter is cold and dark, or only glows at a faint red heat, which is not sufficiently bright to render the nebulous mass visible at a distance.

There are also a few nebulous rings and spirals which shine with a faint nebulosity in the heavens, and a great many nebulæ of very irregular form generally surrounding stars or associated with groups of stars, in a manner which would seem to indicate that the nebulous matter had issued from the stars rather than that it is condensing about them, for frequently there are arms of nebulosity or nebulous structures which appear to spring from the place occupied by a star or group of stars within the nebula. Such nebulæ would seem to present a closer analogy with the solar corona than with the fiery condensing mists conceived of by La Place.

The form of the coronal structures about our sun indicates that the coronal matter has issued from the sun, and though we may, no doubt, assume that the matter which is shot forth from the sun, as a general rule, returns to it again, the brighter structures of the corona seem to indicate by their form that they are composed of matter on its outward course, that is, in its hot condition, as it is shot upward from the sun. There are no coronal structures the form of which indicates a downward flow of matter, and it seems, therefore, reasonable to assume either that the coronal matter returns to the sun as a uniform mist or that it returns in a comparatively non-luminous form.

There seems to be a very close analogy between the irregular nebulæ and star clusters. Recent photographs indicate that most star clusters are nebulous, or contain wisps of faint nebulosity, and the irregular nebulæ are all associated with groups or clusters of stars. Irregular nebulæ, as well as star clusters, are distributed along the region of the Milky Way, and seem in some way to be associated with it, while the smaller and regular nebulæ have a tendency to cluster in the poles of the Milky Way.

If the nebulous matter of the large and irregular nebulæ has been shot forth from stars, it seems to follow that the nebulous matter of star clusters has had its origin in the stars of the cluster, rather than that the stars of the cluster have condensed from the nebulous matter.



UNTOUCHED ETCHED BLOCK MADE FROM A PHOTOGRAPH OF THE HERCULES CLUSTER TAKEN BY MR. W. E. WILSON ON AUGUST 5, 1894.

Prof. George Darwin pointed out some four or five years ago that if two solid bodies were to collide with planetary velocities, such a rapid evolution of gas would take place, by reason of the heat developed at the region of contact, that the bodies would rebound from one another almost as if they were perfectly elastic bodies. If the moving bodies were liquid or gaseous, no doubt a similar evolution of heat at the region of contact would take place, causing an elastic rebound, and it seems not improbable that within a short period after such a collision the gaseous matter evolved at the region of contact would be distributed in space between the rebounding bodies, forming as it were a nebulous ligature between them; but it seems difficult to account on this theory for a line of stars joined by nebulosity such as we find in the Pleiades, or for a series of stars in a curving line ligatured together by a band of nebulosity.

The very beautiful picture of the Hercules cluster which illustrates this paper has been reproduced from a photograph given me by Mr. W. E. Wilson, of Daromona.

The light-grasping power of Mr. Wilson's instrument is so great that, with only an hour's exposure, smaller stars and a considerably larger area of nebulosity have left their imprint upon the photographic plate than are to be traced upon the photographs made at the Lick and Paris observatories with exposures three times as long.

One of the most interesting features in Mr. Wilson's photographs is that many of the stars in the outer parts of the cluster are distinctly seen upon the photographs to be united by ligatures of nebulosity. It has been very difficult to reproduce these nebulous ligatures in the etched blocks or in the collotype plate. They are, perhaps, most marked and easily recognizable in the upper right hand quadrant. But there is no doubt about their existence, and in the silver prints and platinotype prints made from Mr. Wilson's original enlargements they are very clearly shown. Mr. Wilson himself has no doubt as to their actual existence; that is, he believes that they are not due to any optical or photographic defect.

It will be remembered that in the enlargements from the Henry photographs similar nebulous ligatures between stars were observable, joining them up into branching streams radiating outward from the central regions of the cluster. We therefore appear to have corroborative evidence in these photographs by Mr. Wilson, proving that in both the inner and outer parts of the cluster the stars are physically connected with one another in streams which seem to be radially arranged with respect to the center of the cluster, and that these streams of stars linked together by nebulosity are intimately associated with streams or patches of the light-absorbing material which gives rise to the dark lanes or patches.

* Abstracts from an article in Knowledge.

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