Self-Defense among Plants.

One of the means of self-defense among plants, says Dr. Francis Darwin, in a recent lecture, is the presence of poisonous alkaloids. Thus ruminants will not eat such plants as nightshade (*belladonna*); monkshood (*aconite*), hellebore, thorn apple (*stramonium*), pæony, veratrum, and hemlock (*conium*). Many plants are protected by their poisonous milky juices, as the spurges (*euphorbiæ*), poppy, celandine, and others. In the *strychnos nux vomica*, the poisonous alkaloid strychniais contained in the seeds, its whole object being to prevent them and the young plants contained in them from being injured, the fleshy parts of the fruit being quite harmless and eaten by the natives. This eatable part surrounding the seeds entices birds to swallow them, that they may be distributed after and by passing through the animals' bodies. Bitter almonds are comparatively safe from the attacks of mice, whereas sweet almonds are much injured by them. In addition to an almost endless series of poisonous plants, there are those which contain essential oils having a pungent aromatic odor or taste. Thus the fennel, anise, caraway, and others have otherwise unprotected seeds, which are safe from the attack of birds on this account. In Brazil the lime alone of all the orange tribe is distasteful to the leaf-cutting ants, probably owing to an oil similar to that which gives the strong taste and odor to orange peel; and this fact has decided the fate of the tree, for it is the only species of the tribe which has been able to establish itself beyond the limit of cultivation, the orange, citron, etc., growing only where protected by man. Turpentine in fir leaves serves as a protection against cattle. The aromatic flavor of mint is a defense against browsing animals, and as it is frequented by a large number of insects it affords an analogy to the nettles and thorns, which are resorted to by butterflies and birds to rear their young. Flowers are usually more acrid than the plants which bear them, and are thus protected from destruction by browsing animals and other foes, by being uneatable. Caterpillars will die of hunger rather than eat the flowers of the plants whose leaves form their natural food.

Crickets Stop a Train.

One cricket would stand a poor show trying to stop a railroad train, but millions of them can do it. The western bound railroad train, No. 6, met an army of crickets at Clarke's Station, about 15 miles west of Reno, says the *Gazette*, and was detained two hours and a half trying to get through. To make the passage the train men were finally forced to take brooms and sweep the insects off the rails. The crickets covered the track for about three miles, and when the driving wheels of the engine would strike them they would whirl around without going forward an inch.

THE ELEPHANT SHREW.

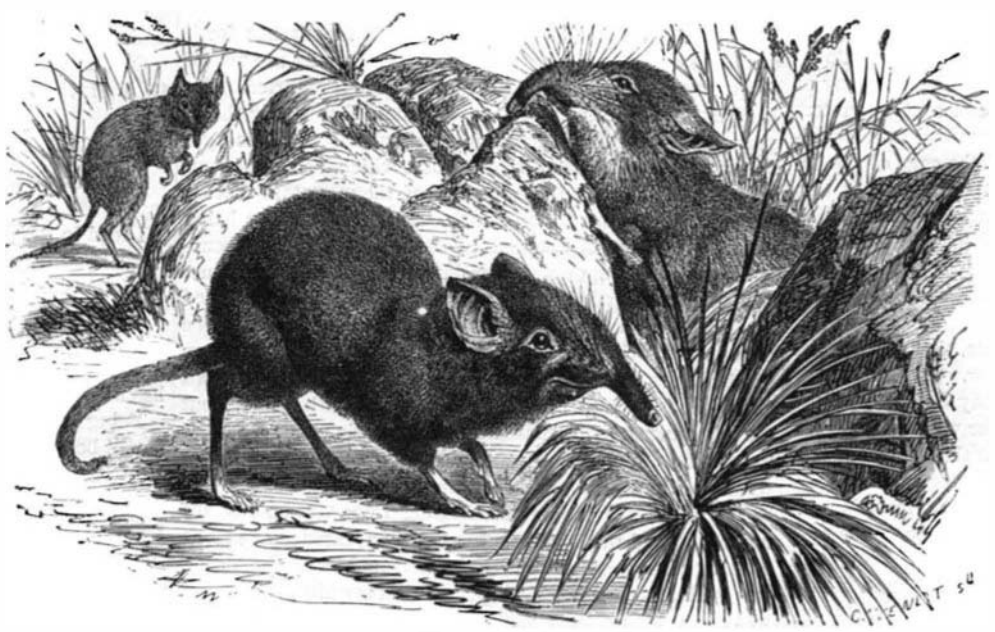
Several species of elephant shrews are known to exist, all of which, with one exception, are inhabitants of Southern Africa. The solitary exception, *Macroscelides Roretti*, is found in Algeria.

The peculiarly long nose of the elephant shrew is perforated at its extremity by the nostrils, which are rather obliquely placed, and is supposed to aid the animal in its search after the insects and other creatures on which it feeds. The eyes are rather large in proportion to the size of the animal.

The tail is long and slender, much resembling the same organ in the common mouse, and in some specimens, probably males, is furnished at the base with glandular follicles, or little sacs. The legs are nearly of equal size, but the hinder limbs are much longer than the fore legs, on account of the very great length of the feet, which are capable of affording support to the creature as it sits in an upright position. As might be presumed from the great length of the hinder limbs, the elephant shrew is possessed of great locomotive powers, and when alarmed can skim over the ground with such celerity that its form becomes quite obscured by the rapidity of its movement through the air. Its food consists of insects, which it captures in open day.

Although the elephant shrew is a diurnal animal, seeking its prey in broad daylight, its habitation is made below the surface of the ground, and consists of a deep and tortuous burrow, the entrance to which is a perpendicularly sunk shaft of some little depth. To this place of refuge the creature always flies when alarmed, and as it is so exceedingly swift in its movements, it is not readily captured or intercepted.

The color of the fur is a dark and rather cloudy brown, which is warmed with a reddish tinge upon the sides and flanks, and fades on the abdomen and inner portions of the limbs into a grayish-white. The generic name, Macroscelides, is of Greek origin, in allusion to the great length of its hinder limbs, and signifies "long legged." It is but a small animal, as the length of the head and body is not quite four inches in measurement, and the tail is about three inches and a quarter.



ELEPHANT SHREW.—(*Macroscelides Proboscidens.*)

The colors of the adult are quite variable, and are generally obliterated in cabinet specimens; shades of gray, brown, and greenish brown predominate, the head of the male being pale and having three longitudinal fuscous stripes, and the middle thighs having annulate shades of the same color. The front legs of the male and the shanks of the others are almost always green. The colors of the female are more uniform, generally grayish, with paler specks and moultings on the head and along the back; but occasionally pale green predominates. Structurally the male is at once distinguished by his shorter, more slender body; his longer legs and feelers; his narrower and less dilated front thighs; his swollen middle thighs, and by the greater stoutness of the spines near the ends of the middle and hind thighs, these and the other distinguishing sexual characters being less obvious in the earlier stages of growth.

THE THICK-THIGHED WALKING STICK.

BY PROF. C. V. RILEY.

During the past few years the forests in parts of New York have been very seriously injured by the insect herewith treated of, and which has hitherto been considered quite harmless by writers on entomology. An account of it will appear in my forthcoming report to the Department of Agriculture, from which I condense some facts in advance.

Owing to its curious, slender, long-legged, slow-moving characteristics it has been popularly dubbed the "Walking Stick," "Stick Bug," "Specter," while in some localities it is known as "Prairie Alligator," "Devil Horse," and other odd cognomens, generally indicative of its appearance, and of a superstition which is quite prevalent, but most unfounded, that it is poisonous and can sting or bite.

THE THICK-THIGHED WALKING STICK.—(*Diapheromera femorata*, Say.)

a, eggs, vetral view; *b*. do., side view, enlarged; *c*, do., in various positions, showing young hatching; *d*, *d*, male, back and side views; *e*, female, side view—natural size (after Riley).

The popular name above employed will serve to distinguish it from another tolerably common species, the two-striped walking stick (*Anisomorpha buprestoides*, Stoll).

As already stated, this insect has until within a few years always been considered harmless. In 1872, however, while lecturing at Cornell University, I noticed that it was unusually abundant around Ithaca, and it was there reported as doing considerable injury to rose bushes; and the following letters from correspondents will show how very destructive the species may become:

"Inclosed find specimens, male and female, of an insect which is proving to be a scourge. About the middle of June I discovered, mostly on standing grass, this same insect, only very much smaller, of a light pea-green color, but not in sufficient numbers to be thought of as a pest. I noticed about August 15th, in the reservation of young timber, mostly white oak and hickory, a few trees having the appearance of being burned just enough to kill the leaves. On closer investigation I found many of these insects devouring the leaves. Later I judged at least 25 acres were completely stripped of foliage, as much so as if fire had run through the wood and killed every tree. They seemed to have no choice as to what variety of timber they attacked. There were many in my peach orchard and lawn. On single trees far removed from my timber lot they were as thick as could well be, in many places in heaps. Fences adjoining the timber were fairly covered with them. They have been known for years in this vicinity, but were heretofore always considered harmless. From present appearances they are greatly to be feared as a scourge, consequently anything relating to them will be read with great interest. I hear from them in Florida, but not in such numbers as here."—G. C. Snow, Yates Co., N. Y., in New York *Weekly Tribune*, Nov. 11, 1874.

"About forty years ago my father set out a grove of locust trees for fencing purposes at the foot of a rocky wooded hill. The trees throve, and for years have furnished the farm with posts and stakes. When they were young we began to notice on them, now and then, the insects known as 'Walking Sticks,' and some fifteen years ago they began to increase rapidly, appearing in summer on the locusts, to which at first they seemed to confine themselves, entirely stripping them of their leaves, and have done so every second year since.

"The locusts have nearly all succumbed to the repeated attacks of the repulsive looking pests, which have for some time extended their operations to the adjoining native trees, most kinds of which they feed upon ravenously.

"I have never by observation been able to discover when or where the eggs are deposited, nor can I find more than a description of the insect in any book within my reach. Will you throw a little light on the subject, and can you suggest any method of destroying these pestiferous walking sticks?"—R. E. R., Ferresburg, Vt., in *Rural New Yorker*, November 7, 1874.

"In June last we gave an account of a remarkable visitation of myriads of the insect known as the walking stick (*Spectrum fermoratum*) in Yates County, N. Y., and asked for information as to the appearance elsewhere. The following, from Mr. E. H. Conklin, Cumberland County, Pa., is the first response, which we hope may call out others. Mr. C. says: 'This insect, though not at all common and seldom numerous, has made its annual appearance in our peach orchards for forty years, and only once in this time have they been so numerous as to be injurious. In this instance, which was about ten years ago, these insects denuded a row of locust trees that formed a shelter on the northwest side of a peach orchard. For half a dozen rods from this locust row the peach trees were also stripped of their leaves. Previous to this time we never saw them on any other tree except the peach. As to color, some are light green and others brown, amongst male and female. The female has a much heavier body than the male.'"—*American Agriculturist*, August, 1877.

A further account of great injury to oak timber by this insect on Mr. Snow's farm was given in the *American Agriculturist* for June, 1877, and when applications were made through the editor of said journal for more definite information and for some practical recommendation, so little was any one able to comply with such a request. I deemed the matter of sufficient interest and importance to warrant further investigation. A couple of visits to Esperange farm enabled me to clear up the insect's natural history, and suggested, as the sequel will show, a simple and feasible means of preventing its injuries. Mr. Snow has about 50 acres of woodland, consisting of fine young trees, mostly the second growth of hickory and of different species of oak. In 1874 the trees on about 25 acres were totally defoliated. In 1875 the insects appeared in fewer numbers. In 1876 they were even more numerous than in 1874, and covered a large area. In 1877 again they attracted less attention, while last summer I found that Mr. Snow's accounts were by no means exaggerated. By the middle of August the bulk of the pests were going through their last moult, and by the end of autumn they had stripped most of the trees, showing, however, a decided preference for the black, red, and rock chestnut oaks, to the white oaks and hickories, which they affect but little till after the first mentioned trees are stripped. The underbrush was also very effectually cleaned of its foliage, and the insects hung from and clung to the bare twigs and branches in great clusters. They settle freely to roost on the witch-hazel, but do not defoliate it until the other trees mentioned are pretty bare. Sumac and thorn are also little affected, while peach and apple, in an adjoining orchard, were untouched. Whenever they have entirely stripped the trees and shrubs they move in bodies to fresh pastures, crowding upon one another and covering the ground, the fence rails, and everything about them, so that it is impossible for a person to enter the woods without being covered by them. The timber affected can be recognized by its seared and leafless appearance from a great distance, and upon entering the woods the ear is greeted by a peculiar

seething noise, resulting from the motion of the innumerable jaws at work on the leaves. Their depredations first begin to attract attention soon after wheat harvest, and are most noticeable in September. The injury to the trees done in 1874 and 1876 was manifest in the death of most of the black oaks, and, according to Mr. Snow's observations, trees die in three years after the first attack.

The unexampled multiplication and destructiveness of this insect at Esperange farm is but one of the many illustrations of the fact long since patent to all close students of economic entomology, that species normally harmless may suddenly become very injurious.

The winter habits of the species have not before been published. The eggs, which were first briefly described by me in 1874,* are 2·8 mm. long, oval in shape, slightly compressed at the sides, and of a polished black color, with a ventral whitish stripe. They look not unlike some plump diminutive leguminose seed. They are simply dropped loosely upon the ground from whatever height the females may happen to be, and, during the latter part of autumn, when the insects are common, one hears a constant pattering, not unlike drops of rain, that results from the abundant dropping of these eggs, which in places lie so thick among and under the dead leaves that they may be scraped up in great quantities.

From general observation of specimens kept in confinement it would appear that each female is capable of laying upward of a hundred. The eggs remain on the ground all through the winter, and hatch for the most part during the month of May. Some of them, however, continue hatching much later, so that all through the summer, and even into the fall, young individuals appear. The young walking sticks measure at birth 4·5 mm., and with their feelers and legs outstretched nearly double that length. They are invariably, during early life, of a uniform pale yellowish green color, and as they have a habit in their earlier days of keeping near the ground, this, coupled with a great readiness to drop whenever disturbed, serves to protect them from observation. They may for these reasons occur in great numbers in the early part of the season without being suspected. The exact number of moults that the insect passes through has not been carefully studied, but it changes very little in appearance from birth to maturity, except so far as color is concerned. With age the green color gives way to various shades of gray and brown. In this way we find great correspondence with its surroundings. While the vegetation is green the specters are green also. When the foliage turns in autumn they change color correspondingly, and when the foliage is stripped they so closely resemble, in both appearance and color, the twigs upon which they rest—the habit of stretching out the front legs and feelers greatly enhancing the resemblance—that when they are few in numbers it is difficult to recognize them. A few green specimens, more particularly of the males, may always be found, even among the mature individuals.

In contemplating these singular creatures and their wonderful resemblances to the oak vegetation upon which they occur, one cannot help noticing still further resemblances. They are born with the bursting of the buds in the spring; they drop their eggs as the trees drop their seeds, and they commence to fall and perish with the leaves, the later ones persisting, like the last leaves, till the frost cuts them off.

As will have been already noticed, Mr. Snow has found from his own observations that the insects were injuriously abundant every other year, and I have been interested in endeavoring to find an explanation of this fact. The increase of the insect's natural enemies whenever they become excessively abundant, and the consequent decrease of the plant feeder the following year, undoubtedly have something to do with it; but there is also good evidence that a great many of the eggs remain on the ground for two consecutive winters before hatching. Messrs. T. W. Bringham and L. Trouvellot have both found from experience that the eggs of this insect for the most part hatch only after the interval of two years,† and an examination made of a large number which I have myself kept the present winter shows that while some have proceeded far into embryonic development, others show no development whatever, thus corroborating the experience of these gentlemen.

We may very justly conclude, therefore, that the species will only be injurious every alternate year.

While the specters are young they may be destroyed by sprinkling the underbrush in the timber with Paris green water whenever the timber is inclosed, so that domestic animals can be kept away from the poisoned vegetation.

The most satisfactory means of averting the insect's injuries, however, will be found in the destruction of the eggs during winter. This may be done either by digging and turning them under, or by burning over the dead leaves among which they lie.

Ichneumon Flies.

It is an interesting fact that not a single ichneumon fly is known to attack our locust, nor has one ever been found to attack any of the different locusts or grasshoppers that occur in the country. We have sought diligently for evidence of the occurrence in locusts of any of these essentially parasitic insects. By ichneumon flies we intend not those of the genus *Ichneumon* alone, but any belonging to the great family *Ichneumonidæ*. They are known to attack plant-feeding species of all orders except the half winged bugs (*Heteroptera*) and the straight winged insects (*Orthoptera*), to which last the locust belongs. Westwood, St. Fargeau, Brullé, and other authors who have paid especial attention to these ichneumon flies, all concur in excepting the orthoptera from their attacks.

Von Motschulsky speaks of having found a species (*Proctotrupes brevipennis*, Latr.) of an allied family near Italian locusts, and infers, without proof whatever, its possible parasitism thereon; but of the latest and most reliable European authorities—Gerstaecker and Köppen—the former states explicitly that no ichneumon is known to attack the European locust; while the latter knows of none, and refers only to rumors of the occurrence of bee-like insects that sting the locust, and which rumors doubtless have reference to digger-wasps or tachina flies. Again, Mr. Thomas Bath,* in treating of the injuries of locusts in Australia, one species of which (given as *Ordipoda musica*, Fabr.) in size and general appearance is not unlike our *Spretus*, figures an ichneumon fly (given as *Bracon capitata*) stinging a locust, and certain maggots, supposed to be the larvæ of the same, taken from a locust. But the former is imaginary, unreal, and evidently not from actual observation, while the latter are the larvæ not of an ichneumon, but of some dipterous (doubtless *Tachina*) fly.

Coming to our own country: Mr. Brous, in 1876, sent us two ichneumons—a *Campoplex* and *Ephialtes notanda*, Cresson—noticed flying about locusts, but without evidence of their stinging these; and Prof. Aughey has sent us a female *Lampronota brunnea*, Cresson, which he believes to have bred from winged specimens of *Spretus* in August, 1874. But his notes lack in absolute certainty, and he himself, on that account, refrained from referring to the supposed fact; while the long ovipositor and well known habit of some species of the genus of preying on wood boring coleopterous larvæ, to reach which the ovipositor is admirably adapted, strengthen the uncertainty and render further corroborative evidence necessary before we can say that any ichneumon fly actually preys on the Rocky Mountain locust. Reports from farmers of ichneumon flies attacking locusts are not uncommon, because this term is often erroneously applied to any parasite, and especially to the tachina flies and the anthomyia egg parasite, already treated of. Some writers have even sought to justify its application to this last species on the ground that the term ichneumon means an egg feeder, unaware of the fact that it has a definite meaning in entomology, and that while originally applied by Aristotle to an Egyptian animal (*Hespestes ichneumon*, L.) that hunts for and feeds on crocodile eggs, it was also applied, both by Pliny and Aristotle, to a wasp that hunts spiders and caterpillars, for which reason Linnæus appropriately used it to designate the parasitic family we have been considering.—*First Report U. S. Entomological Commission.*

Mount Hood Smoking.

In its issue for May 26, the *Bee*, of Portland, Oregon, says that on the previous day a cloud of smoke hung upon the south side of Mount Hood, far above the snow line and climbing almost to the summit.

"The smoke cloud changed form and movement constantly, apparently pouring out of the south side of the mountain from half to one quarter of a mile below the summit. Those who have ascended the mountain locate the site of an old crater on the southwest side, some distance below the summit. They have to cross this locality to make the ascent, and always find sulphurous fumes issuing from the crevices, and the rocks heated by internal fires.

"There is no doubt that Mount Hood at times sends forth eruptions of smoke, though such manifestations are not of frequent occurrence, or at least are not often reported. We have lived within view of the mountain for nearly thirty years, and have only once before, about fifteen years ago, seen unmistakable emission of smoke, which lasted about an hour, and came from the same part of the mountain that we observed it on May 25, and each time the fact of its being smoke was not to be doubted. Fifteen years ago the phenomenon occurred upon a winter day, when the sky was blue, without a speck of cloud to fleck it, and the smoke streamed northward from the mountain in a dense black cloud. We have seen the time when excitement was created some years ago by the rumor that Mount Hood was smoking. A crowd gathered on a high roof and observed it with glasses, but the phenomenon was caused by atmospheric conditions that drew mists and fogs from the lower gorges, and made them wreath around the summit. The difference between this light colored, enveloping mist, rising from the base of the mountain, and the black, sulphurous appearance of smoke pouring directly out of the side of it from among the snows, was evident to any practical eye. Yesterday morning the sky was clear, with a slight haze and a few light, fleecy clouds hanging above the Cascade range at intervals, but the whole base and summit of Mount Hood were clear of them, while the unmistakable wreath of sulphur smoke hung just below the very summit, remaining there for over two hours, contorted by the movement of the winds. Toward noon fleecy clouds enveloped the mountain, and for a while the difference between cloud and smoke was distinctly visible, but afterward the outlines of the snowy peak were obscured, and when they were plain again, at 2 o'clock P. M., there was no smoke to be seen."

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although only approximate, they will enable the ordinary observer to find the planets.

M. M

POSITION OF PLANETS FOR JULY, 1879.

Mercury.

On July 1 Mercury rises at 5h. 37m. A.M., and sets at 8h. 36m. P.M.

On July 31 Mercury rises at 7h. 19m. A.M., and sets at 8h. 16m. P.M.

Mercury can be seen after sunset all through the month of July. In the early part of the month it keeps nearly the path of the sun; later it should be looked for south of the point of sunset. Mercury may be seen east of the crescent moon July 20. It is at its greatest elongation east of the sun on July 27.

Venus.

Venus rises at 8h. 17m. A.M. on July 1, and sets at 10h. 5m. P.M.

On July 31 Venus rises at 8h. 49m. A.M., and sets at 9h. P.M.

On July 8 Venus passes near to the planet Uranus, but moves rapidly toward the east. Venus will be at its greatest elongation on July 16, and near the crescent moon on July 22.

Mars.

The three bright planets, Mars, Saturn, and Jupiter, can all be seen at a late hour in the evenings of July. Mars and Saturn rise nearly at the same time for several mornings in the first week of July, but Mars moves quickly eastward and northward, and separates from Saturn.

On July 1 Mars rises at 10m. after midnight, and sets at 38m. after noon.

On July 31 Mars rises at 10h. 57m. P.M., and sets at 16m. after noon of the next day.

Jupiter.

On July 1 Jupiter rises at 10h. 46m. P.M., and sets at 9h. 49m. A.M. of the next day.

Jupiter is near the moon on the 8th.

On July 31 Jupiter rises at 8h. 45m. P.M., and sets 7h. 44m. A.M. of the next day.

At this time Jupiter rises as Venus sets.

On July 31 Jupiter, Saturn, and Mars can be seen to rise before midnight. Jupiter will be known by its size and brilliancy, Saturn by its white light, and Mars by its ruddy glow.

Saturn.

On July 1 Saturn rises at 0h. 10m. A.M., and sets at 36m. after noon.

On July 31 Saturn rises at 10h. 10m. P.M., and sets at 10h. 37m. of the next day.

Saturn and Mars are in close proximity on the 1st, but Mars will be seen to move east of Saturn and northward.

Uranus.

Uranus may perhaps be found with an ordinary glass by its nearness to Venus. On July 8 Uranus has the same right ascension as Venus, but is 15 minutes of arc south of Venus. On the 9th Venus has moved eastward and toward the south, and Uranus is left west of Venus and in higher northern declination.

On July 1 Uranus sets at 10h. 18m. P.M., a few minutes after Venus.

On July 31 Uranus sets at 8h. 24m. P.M.

Neptune.

On July 1 Neptune rises at 1h. 12m. A.M, and sets at 2h. 52m. P.M.

On July 31 Neptune rises at 11h. 11m. P.M., and sets near 1h. P.M. the next day.

The Manufacture of Phosphorescent Substances.

A correspondent who resides in Paris sends us the following:

I read in the SCIENTIFIC AMERICAN a notice in which you mention some phosphorescent powders that you found on luminous clock dials. Having ascertained by analysis that this phosphorescent matter is nothing but sulphide of calcium, you say there must be something or other in the mode of manufacture of this substance to give it such a brilliancy as has never been obtained before.

Being in situation to know much about this subject I think it will be agreeable to you if I give you some details on this question.

The phosphorescent matter of the luminous dials is prepared in Paris; the maker is M. André, 39 Rue Lacépède. Twenty years ago, being famulus in Mr. E. Becquerel's laboratory, he was taught by him how to prepare phosphorescent sulphides, and then began to make them for the chief instrument makers in Paris.

The first products obtained had but little intensity; but gradually M. André became more and more skillful in his work, and three years ago he was able to produce the substance you have seen on the dials. Such a wonderful result was obtained only by carefully studying the mode of manufacture, and depending only on a few tricks of hand. This I can affirm, but I cannot give you the details of the manipulation, which are kept secret.

M. André does not make only the blue violet powder used for dials; this color has been chosen for that because it keeps luminous a longer time. But the results are almost as good with yellow, yellow-green, green, and orange powders.

* New York *Weekly Tribune*, November 11, 1874.
† Proc. Bost. Soc. Nat. Hist., Vol. XI., pp. 88 and 89.

* Notes on observations made during the late "Locust Plague:" Report of the Secretary for Agriculture, Melbourne, 1873.

Alleged Discovery of Ancient American Carvings.

The *Pioneer Press* (St. Paul, Minn.), announces the discovery of a remarkable cave on the farm of David Samuels, 10 miles from La Crosse. The cave is 30 feet long, 13 feet wide, and about 8 feet high. Above the quarry sand, which has evidently drifted in and covered the floor to the depth of three to six feet, upon the walls, are very rude carvings representing men, animals, arms, and implements, and some appear to be hieroglyphics. One picture represents men, with bows and arrows, shooting animals, three buffaloes and one rabbit. Another represents three animals, which, if large, must have been like the hippopotamus; another appears to represent a mastodon; on another picture a moose is quite plainly delineated. There are eight representations that are canoes, much carved, or hammocks, which they more resemble. One sketch of a man is very plain; the figure wears a kind of chaplet or crown, and was probably chief of his tribe or clan. There are many fragments of pictures, where the rock had decomposed. The rock is a coarse, soft, white sandstone. On one side of the cave is a space about 2 feet high and 2½ feet in length, made into the wall. Above are the upper fragments of pictures, and below are lower fragments, showing that they were made when the rock was entire. From the depth to which decompositions reached in this dry and dark cavern, the inscription must be quite ancient. If the carving mentioned really represents the mastodon, the work must have been done by mound builders.

The accumulated sand needs to be removed to get a full view, and possibly human remains may be found. The entrance to the cave had evidently been covered by a landslide, there being left open only a small hole, where traps have long been set for coons. The large number of these animals that were caught led to the belief that the space inhabited by them must be large, and investigation led to the discovery of the cave. It is stated that over the entrance, since the landslide, a poplar tree, 18 inches in diameter, has grown, which shows that the cave has not been occupied by human beings for more than a century.

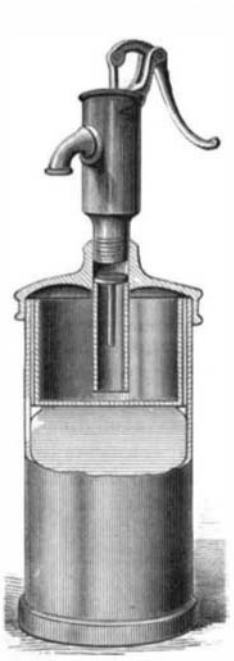
If the above statements are true, this may prove to be a rich find for our antiquarians.

NEW DEVICE FOR SEPARATING CREAM FROM MILK.

A novel device for separating cream from milk is shown in the accompanying engraving. It consists of a can for containing milk, to which is fitted a pan for containing water. The can is provided with an airtight cover, from which a tube projects nearly to the bottom of the water pan. In the top of this tube there is a valve, and a pump is attached to the cover immediately above the tube.

The can is filled with milk nearly to the lugs that support the water pan, and the latter is filled with water and placed in the can. The cover is then put on and fastened, and the pump is applied.

By removing the water from the pan a vacuum is created in the can which is said to greatly facilitate the raising of the cream. This device was recently patented by Mr. S. L. Plumb, of Portage, Wis.



Apparatus for Raising Cream.

The New Austrian Explosive.

The new explosive for military use, recently introduced in Austria, appears to have remarkable properties. It consists of Nobel's explosive gelatine (formed by dissolving gun cotton in nitro-glycerine), with camphor added in varying proportions (nominally 4 per cent). An interesting account of experiments made at the works of Zamky with this explosive is now appearing in the *Revue d'Artillerie*. From experiments on iron plates it appears that, weight for weight, it is 25 per cent stronger than the best Kieselguhr dynamite. The freezing of the charge and the priming cartridge does not diminish the inflammability and shattering force. The explosive is not sensibly altered by being under current water forty-eight hours. Fired at, in the soft state, with a rifle at twenty-five meters distance, it resists the shock; but not if frozen and placed against iron (or against wood, if frozen and containing only 1 per cent camphor). Its superiority, for military purposes, to ordinary explosive gelatine and other explosives is very marked. This new explosive is known as blasting gelatine.

Phosphorescent Powders.

A recent English patent is to obtain and to utilize at night time the light taken or absorbed during the day time from direct or indirect sunlight, or from an artificial light, either by employing phosphorescent powders simply after exposure, or by augmenting their brilliancy by means of electricity. The composition and manufacture of the luminous products and their applications without the use of electricity, is thus described: 100 parts by weight of a carbonate of lime and phosphate of lime, produced by the calcination of sea shells, and especially those of the genus Tridacna and the cuttle fish bone, are to be intimately mixed with 100 parts by weight of lime rendered chemically pure by calcination, and add 25 parts by weight of calcined sea salt; from 25 to 50 per cent of the whole mass of sulphur, which incorporate therewith by the process of sublimation; and from 3 to 7 per cent of coloring matter in the form of powder composed of mono-sulphure of calcium, barium, strontium, uranium, magnesium, aluminum, or other minerals or substance producing the same physical appearances, *i. e.*, which, after having been impregnated with light, becomes luminous in the dark. After having mixed these five ingredients intimately the composition obtained is ready for use according to different methods of application. In certain cases, and more specially for augmenting the intensity and the duration of the luminous effect of the composition, the patentees add a sixth ingredient in the form of phosphorus reduced into powder, which is obtained from seaweed by the well known process of calcination. As to proportion, it is found that the phosphorus contained in a quantity of sea weed, representing 25 per cent of the weight of the composition formed by the five above named ingredients, gives very good results.

The phosphorescent powder thus obtained and reduced into paste by the addition of a sufficient quantity of varnish, such as copal, may serve with advantage for illuminating a great number of objects, *e. g.*, buoys, sea compasses, barometers, street plates, sign boards, and other similar objects, by arranging it in more or less thick coatings upon a plate of metal, wood, glass, or other material, covered by a transparent glass; this powder may also be employed for theatrical scenery or pictures, artificial flowers, and other similar articles by the application of one or more coatings of the powder incorporated in the varnish, or else by varnishing previously these objects and by sprinkling the dry powder upon the varnish still damp, and in this case the covering piece made of glass or other transparent material may be suppressed.

These powders are also employed for manufacturing solid objects generally made of cellulose, paper paste, papier-mache, artificial ivory, sometimes called coralline, and other materials of a similar nature, by sprinkling the surface of these objects, or only certain parts of the surface (still damp or moist) which are usually exposed to light, and by compression in moulds or otherwise in order to incorporate definitely the phosphorescent powders into the surfaces. The amount of powder applied should not exceed the thickness of a thin sheet of cardboard; it may be employed either for coating the whole surface or certain fractions thereof, so as to produce various designs, inscriptions, or effects. For this application various powders are also applied, which contain different coloring matters, so as to produce effects of various colors.

The dry phosphorescent powders are also converted into translucent flexible sheets of unlimited length, thickness, and width, by mixing them with about 80 per cent of their weight of ether and collodion in equal parts in a close vessel, and rolling the product into sheets, with which any object may be covered which is intended to be luminous in the dark.

The phosphorescent powders may also be intimately mixed with stearine, paraffine, rectified glue, isinglass, liquid silex, or other transparent solid matter, in the proportion of from 20 to 30 per cent of the former with from 50 to 80 per cent of either of these substances, and this mass is then reduced into sheets of variable length, width, and thickness, according to their intended applications. A luminous glass is also manufactured by means of the above mentioned phosphorescent powders by mixing the same in glass in a fused state in the proportions of from 5 to 20 per cent of the mass of glass. After the composition has been puddled or mixed it is converted into different articles, according to the ordinary processes; or after the manufacture of an object still warm and plastic made of ordinary glass it is sprinkled with the powders, which latter are then incorporated into the surface of the article by pressure exerted in the mould, or in any other suitable way.

It has been observed after various trials that the passage of an electric current through the different compositions augments their luminous properties or brilliancy to a great extent; this peculiarity is intended to be utilized in various applications too numerous to describe; but of which buoys form a good example. The current of electricity is furnished by plates of zinc and copper mounted on the buoy itself, when the latter is used at sea, but in rivers and fresh water inlets the battery will be carried in the interior of the buoy. To secure the full effect from 10 to 20 per cent of fine zinc, copper, or antimony dust is added to the phosphorescent powder above described. The patentees, Peiffer, MacCarty, and De Sagan, have devised a special form of buoy, which they claim is their invention, in company with the various applications above described.

AN INVENTOR VICTORIOUS.

Under the above heading the Cincinnati *Commercial* of June 10th says:

The suit of John L. Lewis against the Swift Iron and Steel Works of Newport, to restrain them from operating a style of rolls patented by the plaintiff, was decided yesterday in the United States Court. The decree of the court orders that Swift & Co. be for ever restrained from using any of the 14 sets of iron rollers now at the mill in Newport, Ky., and from making or using any roller of like form. It is further ordered that this case be referred to the Master to inquire and report as well the profits realized by Swift & Co. by the use of the rollers, as the damage which Lewis has sustained, and for this purpose the two parties are to bring proof as to how long Swift & Co. have used each set of rolls, with the provision that in the absence of any proof it will be assumed that they have been in use for five years from the beginning of this suit; and as to what royalty Lewis has been receiving for the license and whether the royalty be different according to the size of the rolls. The proof is required to be furnished by the 10th of July, and the case submitted to the court on the 30th of the same month.

This patent for angle iron rolls was granted to John L. Lewis, of Pittsburg, Pa., through the SCIENTIFIC AMERICAN Agency of Munn & Co., and the case between the patentee and the Swift Iron and Steel Works of Newport, Ky., was carried on for a period of more than five years. The letters patent were the object of attack by able patent lawyers, and the case drew considerable attention among iron manufacturers, West and Southwest. It is rarely, perhaps, that a specification is subjected to the test so long continued as was the Lewis patent, but it stood the test well.

Industrial Art in New York.

Hitherto there has been no museum in this city which has given any special attention to the applications of industry to art and art to industry. This want the trustees of the Metropolitan Museum have determined to supply, and have devoted a portion of the new art building, in Central Park, to collections illustrating industrial art. They propose to begin with the applications of metals. Valuable gifts have already been received, others are promised, and more are earnestly solicited. Professor Thomas Egleston, of the School of Mines, Columbia College, has been authorized to receive such donations. Communications relating to the matter may be sent to him or to the Director of the Museum, Gen. Di Cesnola. The department is an important and useful one, and it is to be hoped that contributions will be liberal.

Disastrous Earthquake in Sicily.

The region about Mount Etna was shaken by a violent earthquake June 18. Five villages near Aci Reale, a few miles northeast of Catania, were almost wholly destroyed, with serious loss of life. The eruption of Etna had subsided materially.

IMPROVED ANCHOR.

The engraving represents an improved anchor recently patented by Messrs. Spedden & Stafford, of Astoria, Oregon. It consists in a single fluke pivoted in a frame and provided with cam-shaped tripping arms at its base. The frame or shank serves both as a shank and stock, and it has no projecting arms to entangle the cable or chains so as to foul it, and its action is rendered positive by the action of the trip arms.

A Novel Anchor.

Solution for Electro-Plating with Copper.

The following recipe is for a solution for electro-coppering iron, lead, zinc, pewter, etc.: Weigh out, sulphate of copper, one drachm; tartaric acid, two drachms; caustic potash (in sticks), two drachms. Dissolve the sulphate of copper in about half a tumblerful of water. Also dissolve a small quantity of washing soda (about 2 drachms) in warm water, and add the soda solution to the copper solution. Just enough should be added to throw down all the copper in the form of a green precipitate—basic carbonate of copper. This precipitate has now to be separated from the fluid, which is a solution of sulphate of soda. The quickest way to effect the separation is by filtration, in which a piece of blotting paper, folded twice and adjusted within a funnel, may replace the usual filter paper. The *Electrician* says that if time be no object, the precipitate may be allowed to subside, and the clear solution afterward poured off. In either case the precipitate should be washed with clear water in order to remove the last portions of the soda solution. Now dissolve the tartaric acid in a small quantity of warm water; get the moist copper precipitate into a tumbler, and pour the tartaric acid solution upon it. Effervescence will take place. Wait until all the gas—carbonic acid—is evolved; then put the sticks of caustic potash into the tumbler, and add sufficient water to make up at least half a tumblerful—one gill—of solution. The potash dissolves the copper precipitate, the fluid becoming of a beautiful blue color, without any sediment.

Ancient Intercourse with China.

The Chinese Ambassador, Li-Fang-pao, at Berlin, says that from the Chinese inscription on one of the vases found by Dr. Schliemann on Trojan soil, it is proved that there was traffic between China and European boundaries about twelve hundred years before Christ. The gauze linen found by Dr. Schliemann in the vase was made in China. Li-Fang-pao contends that the Hyperboreans were Chinamen.