New and Stale Bread.

The nature of the difference between new and stale bread is far from being known. It is only lately that the celebrated French chemist, Boussingault, instituted an inquiry into it, from which it results that the difference is not the consequence of desiccation, but solely of the cooling of the bread. If we take fresh bread into the cellar or into any place where it cannot dry, the inner part of the loaf, it is true, is found to be crummy, but the crust has become soft and is no longer brittle. If stale bread is taken back into the oven again, it assumes all the qualities of fresh baked bread, although in the hot oven it must undoubtedly have lost part of its moisture. M. Boussingault has made a fresh loaf of bread the subject of minute investigation, and the results are anything but uninteresting.

He took a round loaf, one foot in diameter and six inches thick, and plunged a thermometer into it three inches deep immediately on being taken out of the oven. When the thermometer was taken out it was found to indicate 78° Réaumur (207·50 Fah.). This might well appear surprising, seeing that the oven was heated to 240° R. But we must consider that in the inside of the loaf, on account of the water with which the dough has been mixed, the temperature cannot rise above boiling heat, that is, 80° R. (212° Fah.), as long as the bread has not lost all its water and become perfectly dry; but it takes a long time to come to that on account of the protective thick crust. The loaf was then taken into a room heated to 150° R., the temperature of the air. At this time it weighed 7½ lbs. In twelve hours the temperature of the loaf sank to 19°, in 24 hours to 15°, and in 36 hours to 14°. In the first 48 hours it had only lost 2 ounces in weight, which, in a loaf of such a size and weight, must be considered an insignificant loss. When after 6 days the loaf was again put into the oven, and the thermometer indicated that its temperature had again risen to 55° R., it was cut and found to be as fresh and to possess the same qualities as if had been taken out of the oven for the first time; but it had lost now not merely 2 ounces, but 12 ounces in weight. M. Boussingault now made separate experiments with slices of the loaf, and also with the crumb, all of which showed precisely the same results, so that it may be considered fully established that stale is distinguished from new bread less by containing a smaller quantity of water than by a peculiarly altered molecular condition, which begins to manifest itself in the process of cooling, which continues to develop itself more and more, and lasts as long as the temperature remains essentially unchanged, but is annulled the moment the temperature has reached a certain height. The molecular condition is the form and the union of the smallest parts dependent upon it; it decidedly indicates a mechanical relation which undergoes changes in consequence of chemical processes. It is this mechanical relation also which makes the difference dietetically between new and stale bread. New bread, in its smallest parts, is so soft, clammy, flexible, and glutinous (in consequence of the starch, during the process of fermenting and baking, being changed into mucilaginous dextrine), that by mastication it is with greater difficulty separated and reduced to small pieces, and in its smallest parts is less under the influence of the saliva and digestive juices. It consequently forms itself into hard balls by careless and hasty mastication and deglutition, becomes coated over by saliva and slime, and in this state enters the stomach. The gastric juice being unable to penetrate such hard masses, and being scarcely able even to act upon the surface of them, they frequently remain in the stomach unchanged, and, like foreign bodies, irritate and incommode it, inducing every species of suffering—oppression of the stomach, pain in the chest, disturbed circulation of the blood, congestions and pains in the head, irritation of the brain and inflammation, apoplectic attacks, cramp, and delirium.—*The Miller.*

Leather from Sheep Stomachs.

Among the recent patents is one issued to Edward Tivet, of Philadelphia, for a process of treating sheep stomachs, by which means a light and serviceable leather is produced particularly adapted for purses, bags, and other similar articles, as the leather produced by it is in the form of sacks or pouches.

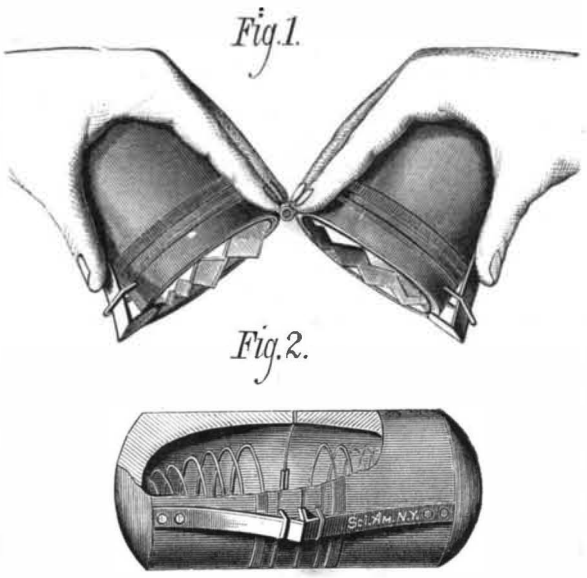
The following is the process: Take the stomach proper of the sheep, in the state in which it comes from the animal, the gut and ligaments being previously or subsequently severed, and empty it, and, while it is yet fresh, remove by a dull scraper the softest or least adherent layers of the external covering or serous surface, thus leaving the firmest part of the peritoneal or serous surface adhering to the muscular or middle membranes. The stomach is now turned inside out and brushed, so as to remove the mucous surface, thus leaving only the muscular tunic or middle membranes, covered on the outside by the portion of the serous membrane that remains, the result whereof is a thin white integument, presenting on the inside a multitude of *papillæ*, intimately adhering to it, which integument is to be treated so as to be preserved and its pliability retained. This may be accomplished by any known process of tawing or tanning, some glycerine being used for keeping the pelt in a suitable state of moisture. Among these processes the following may be mentioned. For tawing about ten pounds of the prepared integuments, form a paste of one half pound of alum dissolved in one half gallon of water, one and a half pound of best wheat flour, the yelks of one dozen eggs, and five ounces of pure concentrated glycerine, more or less, all well mixed together.

The integuments are placed in the paste, and permitted to remain therein for about one day, after which they are wrung out and hung up to partially dry, are then stretched to shape, and a small quantity of linseed oil rubbed over the muscular surface of the integuments, which are then permitted to dry to the full extent.

If desired, dye stuff may be advantageously applied to the integuments prior to the treatment with the paste.

A NOVEL EGG OPENER.

For almost every operation in the shop or household there are devices which not only save labor, but accomplish results more satisfactorily. The simple device shown in the accompanying engraving is one of those useful things that



EGG OPENER.

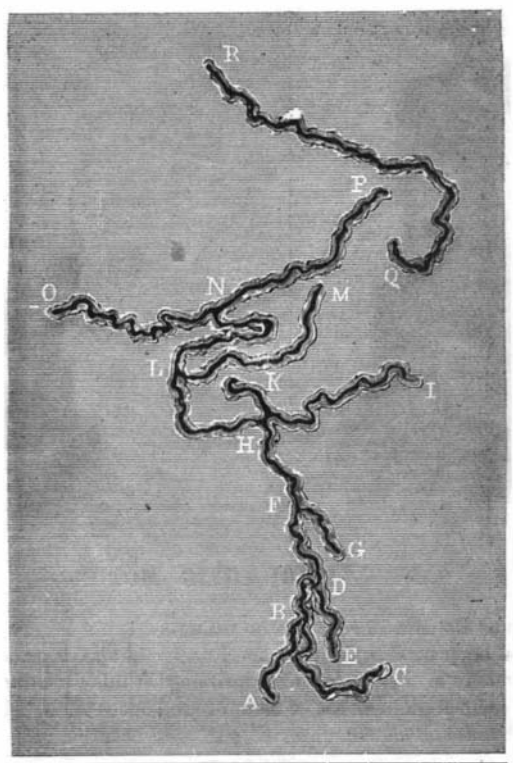
eventually finds its way into almost every house. It consists of two cups hinged together at one side, and each having at the opposite side a flat spring, the end of which is bent inward. Each cup contains a conical spiral spring for holding the egg in a central position when the device is shut.

The egg is inclosed in the cups, when the two flat springs are pressed inward so as to break the shell, after which, and while the springs are still pressed, the cups are opened, separating the shell and discharging the contents thereof. Upon releasing the flat springs the shell is thrown out by the spiral springs.

This device was recently patented by Mr. G. W. H. Kry, of Brooklyn (E. D.), N. Y.

ARTIFICIAL BALL LIGHTING.

The mica plate condensers which enter into the construction of Planté's rheostatic machine (*Comptes Rendus*, vol. lxxxv.) are sometimes pierced, when the plates of mica are too thin, under the action of a current from 800 secondary couples, the same as the glass of a Leyden jar too strongly



PATH OF ELECTRIC SPARK OVER A SHEET OF MICA.

charged by an electric machine. This accident has given M. Planté the occasion to observe a very curious fact, which consists in the slow and progressive movement of the electric spark. One of these condensers being placed upon an isolated metallic plate, in connection with one of the poles of the secondary battery, and the upper armature being touched with the other pole, a spark bursts forth upon some point of the surface of the too thin condenser, forming a fissure in advance of it. This spark then begins to move in the form of a very brilliantly luminous little globule, accompanied by a peculiar rustling sound, and slowly traces, on the tin foil of the condenser, a deep sinuous and irregular furrow. The annexed engraving gives a faithful representation of a part of the surface of a condenser on which the phenomenon has taken place. The spark appears at first at A, soon ramifies to B, then to C, then disappears to immediately reappear at the point, B, with such rapidity, and in such an inappreciable interval of time, that it seems to have made a leap. It directs itself afterward toward D, where it forms a new ramification, which ends at E, reappears at D, continues its course toward F, and so on. Sometimes (as in the present case) the spark shows itself anew further off at a point, Q, detached from the principal furrow, to end afterward at R, and the phenomenon only ceases when the sheet of mica no longer presents a portion thin enough to be traversed. In other cases, the spark remains for some time stationary around the same point; at other times, again, one of the branches elongates out of all proportion, and describes over the whole surface figures analogous to those on a geographical map. It should be understood that a tube of water is interposed in the circuit of the secondary battery, for the purpose of avoiding too intense calorific effects, and the deflagration of the whole condenser. During the progress of the phenomena, it cannot be foreseen through what points the spark will pass, and nothing is more strange than the movement of this dazzling little globule, which is seen slowly making its way and choosing the points toward which it is to direct itself according to the greater or less resistance of the different points of the isolating plate. The condenser is found to be cut through in the pathway of the spark, and the melted tin forms a double row of beads along the edges of the consumed mica. It is a sort of Voltaic arch produced successively at the expense of the material of the condenser, as in the electric candles of M. Jablochkoff; but the mica here contributes more to the brilliancy of the globule than does the incandescence of the metal, producing (like quartz and the silicates) electrosilicic light. This experiment may throw a new light on the phenomena of "ball lightning." It confirms the opinion already expressed on this subject by M. Du Moncel, in 1857, as well as certain views since proposed by M. Planté, and based on other experiments. It results from what has been said that, at the point where lightning of this kind manifests itself, there must very likely be formed the elements of a condenser, in which a powerfully electrified column of moist air plays the part of upper armature, the soil that of the lower armature, and the layer of interposed air that of the isolating plate. Here the spark is doubtless a globule of matter in fusion, of a different nature from that which constitutes the balls of lightning. But M. Planté has already shown, too, that there may be obtained, with dynamic electricity at a high tension, globular electric flames formed solely of the elements of the air and gases from the vapor of water, rarefied and incandescent; and that these globules naturally followed the movements impressed on the electrode under the conductive surface.

It only remains to show now that, were luminous electric globules formed of another matter, they might move spontaneously and slowly, even when the electrode remains immovable.

The experiment just described puts this fact in evidence, and appears to be of a nature to explain particularly the slow and capricious movement of ball lightning.

New Sources of Rubber.

The director of Kew Gardens (Eng.) has given much attention to the matter of extending the sources whence this valuable product is obtained. In his annual report he states that though a large proportion of the young plants of the Para rubber (*Hevea Braziliensis*) brought to Kew failed to thrive, seeds and plants of the Ceara rubber have been obtained, and a considerable stock successfully raised. Para rubber plants have been transmitted to Calcutta for distribution to Assam and Burmah, where, it seems, they are now doing well. Favorable reports have also been received from Singapore, where it is said that, judging from the progress the plants have made, the climate is evidently suited for their growth. The same may be said of Ceylon, whence the superintendent of the government gardens reports that cuttings of *Hevea* strike readily, as well as those of *Castilloa* and the Ceara plant.

In Jamaica, also, the plants of *Hevea* are doing well. The propagation of the Central American rubber plant (*Castilloa elastica*) is still being proceeded with at Kew, and during the past year plants of this species were sent to Liberia, Mauritius, Singapore, and Ceylon. The Ceara rubber, owing to its totally different habit from that of the other two species, will, it is thought, prove to be best fitted for cultivation in Bengal and the drier parts of India.

Regarding new sources of India rubber, reference is made to a creeping Burmese plant, the *Chavannesia esculenta*, which was first noticed so long back as 1860, and again made the subject of a pamphlet published in India in 1874. The plant is there stated to be one "for whose extermination in the teak tracts an annual budget provision is made." From Fiji samples of rubber were received at Kew, which were reported as "a strong, elastic, pure rubber, of the same character as the higher grades of African rubber." This rubber would seem to be the produce of a plant closely allied to *Tabernæmontana pacifica* or from *Alstonia plumosa*, both of which appear to yield caoutchouc in Fiji, and both of which belong to the same natural order Apocynaceæ. Regarding the rubber producing plants of the east and west coasts of Africa, which are referred to as species of *Landolphia*, also belonging to the same natural family as the pre-

ceding, the director reports that, "being climbing plants which ascend lofty trees, they could not be grown like other rubber producing trees in independent plantations. But they would doubtless flourish in the jungles of any tropical country."

Natural History Notes.

The Spontaneous Movements of Plants.—In a memoir recently read by the eminent scientist, M. Paul Bert, before the Academy of Sciences, the author gave his views in regard to the causes of heliotropism and the periodical movements of leaves and flowers. It is known that there exists at the base of these organs a cushion-like swelling. From the different experiments made by him, especially with the sensitive plant, M. Bert believes that he is in a position to assert that the periodical movement of these plant organs is due to a solution of glucose, which, under the influence of light, fills the cavity of these dilatations. The increase of weight resulting therefrom destroys the equilibrium of the organ, and causes it to present as much surface as possible to the light, and consequently to evaporation.

Ants, and the Larva of a Butterfly.—The behavior of ants towards aphides, from which they obtain supplies of a sweet secretion agreeable to their taste, has long been known. It is now announced that ants have a way of cherishing the larva of the azure blue butterfly (*Lycæna pseudargiolus*) for the tasteful liquid that it exudes. In a recent issue of the *Canadian Entomologist*, the well known lepidopterist, Mr. W. H. Edwards, records some observations of this kind, from which we gain the following facts: The ants, when discovered on a stem, will invariably be on or near the larva. They run over the body, caressing it with their antennæ, plainly with the object of inducing the larva to emit a drop of the fluid on the eleventh segment. Most of this caressing is done about the anterior segments, and while the ants are so employed, the tubes of the twelfth segment are almost certainly expanded to their full extent, and so remain, with no retracting or throbbing, until the ants come tumbling along in great excitement, and put either food or antennæ directly on or close by the tubes, when these are instantly withdrawn. The ants pay no heed to the tubes, do not put their mouths to them or to the openings from which they spring, nor do they manipulate that segment. They seek for nothing and expect nothing from it. But they do at once turn to the eleventh, caress the back of the segment, put their mouths to the opening, and exhibit an eager desire and expectancy. By holding the glass steady on the eleventh, a movement of the back of this segment will soon be apparent, and suddenly there protrudes a dull green, fleshy, mammilloid organ, from the top of which comes a tiny drop of clear green fluid. This the ants drink greedily, two or three of them perhaps standing about it, and they lick off the last trace of it, stroking the segment meantime. As the drop disappears this organ sinks in at the apex and disappears, and is so withdrawn. The ants then run about seeking other larvæ on the same stem, but presently they all return, and the caressings go on as before. The intervals between the appearance of the globule varies with the condition of the larva. If exhausted by the long continued soliciting, some minutes would elapse, and the tubes meanwhile remain concealed; but a fresh larva required little or no urging, and one globule followed another rapidly, sometimes even without a retracting of the organ. Mr. Edwards states that he has counted six emissions in 76 seconds. The larva did not always await the approach to the eleventh segment, but gave out the drop unsought and as soon as it was aware of the ant's presence. Now and then the drop was preceded by a bubble several times larger than itself.

The Humming of Insects.—In a memoir on this subject recently presented to the French Academy by M. M. J. Pérez, the author states that among hymenoptera and diptera, humming is due to two distinct causes: one, the vibrations of which the articulation of the wings is the seat, and which constitutes the true hum; the other, the friction of the wings against the air, an effect which more or less modifies the former. Among the powerful winged lepidoptera, such as the sphinxes, the sweet and mellow hum of these insects is due only to the rustling of the wings by the air. This sound, always grave, is the only one produced; it is not accompanied by basilary beatings, on account of a peculiar organization, and especially on account of the presence of scales. Among the Libellulæ, the base of whose wings is provided with soft and fleshy parts, there does not exist true humming, but a simple noise due to the rustling of the organs of flight.

Mexican Grasses.—The botanist Fournier finds in Mexico 638 varieties of grasses, of which 376 occur in no other country. Of the remainder, 82 are common to the United States, 30 to Europe, and the rest to the West Indies, South and Central America.

Wasps under Chloroform.—A correspondent of *Nature* makes the following curious statement: A few days ago a friend informed me that she had often placed a bee under chloroform, and that the victims, when they found they must die, invariably brought their stings to their mouths and sucked the little drop of poison into their mouths. She offered to show me the experiment, and endeavored to catch a bee, but, failing to do so, caught a wasp, an insect upon which she had not previously experimented in this way, and we both eagerly watched to see if the wasp would behave as the bees had done under the influence of the narcotic. The wasp, being put under an inverted tumbler along with a piece of paper saturated with chloroform, in a very few minutes fell on its back, and almost immediately afterwards curled up the tail, with the sting protruded, and a drop of clear fluid on the end of it. The sting was brought to the mouth, and the drop of fluid disappeared. The wasp then became motionless. After a few seconds the tumbler was removed and the air allowed to play freely on the insect, but no sign of life appeared, except once a slight twitch of the wing. To test whether the wasp was really dead it was placed in a butterfly cage and left out of doors all night. Next morning the insect had disappeared. Is this peculiarity of wasps and bees, when subjected to the action of anæsthetics, well known? Is the poison a narcotic itself, and taken by the insect to dull its pains when death seems inevitable? The revival of the wasp appears to show that neither the chloroform nor the poison of its own sting is deadly to the insect.

The Chewstick of Jamaica.—The "chewstick," though not indigenous to Jamaica, is perhaps better known there than in other islands, where varieties of it are known. It is named by botanists *Gouania Domingensis*, and is a very beautiful thick bushy vine, with a profusion of foliage, climbing upon the trees growing in its neighborhood, and with a stem varying in thickness from that of a pencil to that of a cane. The stem is very fibrous, and when these fibers are detached at the end of a section of the stem by chewing, it becomes a rude but most perfect tooth brush, giving out in the mouth when rubbed over the teeth a saponaceous froth of a pleasant aromatic bitter taste, which remains in the mouth for some time, and which not only serves the purpose of a tonic when used in this way, but also whitens the teeth and hardens the gums; on this account it is very popular in Jamaica as a dentifrice among all classes, and has attracted a good deal of favor in foreign countries. It possesses also another peculiar property. If a quantity of the bruised vine be steeped in water, beer, or any kind of watery infusion, there is communicated to it a warm, bitter aromatic taste, and if the fluid so treated be poured out from one glass to another, it will be found to have acquired all the appearances of beer (minus its alcoholic flavor) in a high state of fermentation. On the latter account the chewstick plant ought to be very useful to brewers, since stale or immature beer would be improved by its use, giving to such fluids a warm, aromatic bitter taste, more agreeable than that given by hops, though certainly it does not possess the narcotic principle which makes hops so indispensable to the brewer and others.

A Case of Natural Selection.—Mr. S. F. Clarke describes a very interesting case of "survival of the fittest," in the *American Naturalist*. Having procured some of the gelatinous egg masses of one of our native salamanders, he placed them in large glass jars, where they rapidly developed. After their gills and balancers had developed, the animals emerged from the eggs and entered on their active aquatic life. The author not being able to discover the proper kind of food, began to watch the animals closely, and found that they were eating off each other's gills. Closer examination showed that, among the many, were a few individuals which, although from the same parent and subjected to the same conditions while in the egg, were yet endowed with greater vigor than most of their fellows. These few stronger ones ate off the gills of many of the weaker, and at the same time were enabled to protect their own gills from mutilation. These favorable conditions, the large supply of food and the better aeration of the blood, soon began to show their influence upon the growth of the favored individuals. Within a week or ten days from the time of emergence from the egg, these favored few were fifty per cent larger than their weaker fellows born on the same day. Their mouths had by this time so increased in size that, no longer satisfied with nibbling off the gills of their brethren, they now began to swallow them bodily. Soon they were ten or twelve times as great in length and bulk as their victims.

Mimetic Coloring in Tadpoles.—Miss S. P. Monks communicates to the *American Naturalist* an interesting instance of imitative coloration in some tadpoles caught in a weedy pool in Cold Spring, N. Y. The largest tadpoles were an inch and three quarters long, bodies half an inch long, and widest part of tail half an inch; the hind legs visible, but very small. They were greenish above with black markings, and had minute golden spots about the eyes and along the sides; beneath silvery white. Their tails were orange red for more than two thirds their length, the color deepening toward the end and along the margin. The largest tadpoles were more brightly and distinctly colored. In the same pool there grew a plant (*Ludwigia palustris*), the lower and submerged leaves of which were exactly the same color as that of the tails of the tadpoles. The brightest leaves were mostly full of holes. The tails of the tadpoles also resembled the leaves in shape and width. The color resemblance was so striking that a friend, who was not on the lookout for analogies, pointed out a leaf as a tadpole in the vessel in which both were placed. Some of the animals which the author had kept in a soup plate for several days became very much paler, and their spots grew almost invisible. These tadpoles were a good example of how early batrachia begin to adapt themselves to their color surroundings.

Double Flowers.—Professor Morren, in support of his well known theory of the incompatibility of truly variegated leaves and double flowers, points out that in the *Camellia* and *Kerria japonica* normal flowers are only known to occur on variegated stocks. In a *Hibiscus*, which unites these peculiarities, the flower buds fall without opening: in a variegated and double wall flower many of the branches revert and are quite green.

The Hearing of Insects.—Mr. Alfred Simson, writing to *Nature*, states that there is a wasp in South America which seems to present undoubted evidence of a faculty to hear, or it may be to feel, and distinguish certain vibrations of sound. This wasp is a common one on the Guayaquil river. It is a large, slender, black species, much feared on account of the virulence of its sting, which not unfrequently produces fever. The writer states that he himself, although little susceptible to the bites of mosquitoes or flies, the stings of scorpions, etc., when once stung on the finger by a "cubo" (as this insect is called in Ecuador), had his whole hand and forearm swollen from the effects of it for a couple of days. A common spot chosen by the cubo for its nest is high up on a palm stem at the river side, and the natives are well aware of the danger of uttering any loud cry when in its proximity. The writer had frequently experimented by giving a shrill whistle—something particularly abhorrent to the wasp—from a safe distance, with the invariable result of all these insects flying in confusion from the nest in manifest anger. It is said that there is a wasp in New Granada in whose proximity it is unsafe to speak, but possibly this may be an exaggerated account of the cubo. Still it would certainly be a dangerous experiment to speak loud when very close to a cubo's nest, even on the Guayas, and a shrill voice would be sure to irritate the creature.

A New Cave Discovery in Kentucky.

Another wonderful cave has recently been discovered near Glasgow Junction, Ky. It has already been explored for a distance of twenty-three miles in one direction, called the long route, and sixteen miles in another direction, called the short route. The avenues are very wide; a span of horses can easily be driven through for a distance of eleven miles. Three rivers, wide and very deep, are encountered on the long route. One of them is navigable for fourteen miles, until the passages become too narrow to admit a boat. This forms the third or river route, which has to be explored in a boat.

The cave is wonderful beyond description, and far surpasses in grandeur the Mammoth or any cave ever before discovered. Several mummified remains have been discovered in one of the large rooms. They were reposing in stone coffins, rudely constructed, and from appearances may have been in this cave for centuries. They present every appearance of the Egyptian mummies.

Great excitement prevails over this very important discovery. Mr. Edwin Mortimore, of Chestnut street, Louisville, Ky., purchased three of the mummies, and has them now in his possession. Major George M. Proctor, of Glasgow Junction, Ky., purchased the remainder of the mummies from the owner of the cave, Thomas Kelley. The latter is, or rather was a few days ago, a very poor man, struggling to make a payment on a farm of twenty-four acres, upon which, by mere accident, the entrance to this wonderful cave was discovered. He obtained about $400 for the mummies, and is now offered $10,000 cash for the cave.

The entrance to the cave is within the town limits, and is only about two minutes' walk from the depot, which makes it very valuable indeed, as visitors will not be compelled to travel five miles in a stage coach, as they do if desirous of visiting the Mammoth Cave, which is five miles from this town. In fact all the celebrated caves of Kentucky are in this immediate vicinity. The surface is very much broken, full of great elevations and depressions, with everything to indicate that there were volcanic eruptions or violent upheavals of the earth at some period.

The newly discovered cave has been named the Grand Crystal Cave, and is as beautiful as its name implies. Ladders and bridges are being constructed, and Mr. J. R. Puckett, a capitalist of the town, announces his intention of having a small steamboat constructed expressly for the purpose of navigating its wonderful rivers.—*Cincinnati Commercial.*

Longevity of the Horse.

At Rochester, in this county, there died on the 12th of September the oldest horse on record for a number of years. He was the property of the famous Daniel D. Bell, of legal as well as gold mine notoriety. He was known by the name of "Gumbo," and in his day was a noted stallion. Many citizens of Kingston and of Ulster county remember the animal as a splendid horse when they were boys. At the time of his death he had attained the ripe age of forty-five years and six months. He retained a remarkable vitality to the last, and for three quarters of an hour before his demise he stood upon his legs, proud and majestic, as in his younger days. He had long been the property of Bell, who had driven him many thousands of miles in his lifetime, he having owned him a period of twenty-seven years and a half, since he was eighteen years old. If anybody can beat this, let him speak out.—*Rondout* (N. Y.) *Courier.*

To make Corks Air-tight and Water-tight.

A German chemical journal commends the use of paraffine as the best method of making porous corks gas-tight and water-tight. Allow the corks to remain for about five minutes beneath the surface of melted paraffine in a suitable vessel, the corks being held down either by a perforated lid, wire screen, or similar device. Corks thus prepared, the writer says, can be easily cut and bored, have a perfectly smooth exterior, may be introduced and removed from the neck of a flask with ease, and make a perfect seal.

New Inventions.

An improved Device for Attaching and Supporting the Ends of a Spring Bed Bottom, and for adjusting the tension of each separate spring, has recently been patented by Mr. Hiram Pitcher, of Fond du Lac, Wis.

Mr. John S. Henshaw, of Goshen, Ky., has recently patented an improved Gate, which is so constructed that it may be opened and closed by a person in a vehicle or upon horseback, with as much facility as when on foot. It can be used as any ordinary gate in case of any mishap to the self-opening arrangement, and will fasten itself securely when shut, and retain its place when opened.

Mr. James W. T. Cadett, of Surrey County, England, has patented an improved Pneumatic Arrangement for facilitating the uncapping or exposing and capping or shutting the lenses of photographic apparatus. The apparatus has a box, which contains a bellows, acted on by a spring, and provided with a pipe opening into the pneumatic tubing. On a spindle acted by the said bellows is secured a shutter, which projects beyond the box. By pressing an air bulb in communication with the tubing, the bellows is actuated, and the shutter or cap is moved, so as to uncap or expose the lens, as required.

Mr. Freeman F. Reynolds, of Villa Rica, Ga., has patented an improved Washing Machine, having several novel features. It is constructed so as to wash the clothes quickly and thoroughly, and without injury.

An improved Saddle Stirrup has been patented by Mr. John M. Freeman, of Parkersburg, Ind. This invention consists in connecting the loop of the stirrup strap to the stirrup by a pin on one end of a swinging plate, which plate is pivoted at the inside of the stirrup in such position that it will be moved by the foot of the rider when the foot is bent, as it would be in case of accident.

Mr. Mercer Hemmingway, of Owensborough, Ky., has patented an improved Medical Compound for the prevention and cure of hog cholera.

Mr. Cornelius Young, of Sandy Hill, N. Y., has devised an improved Roll Suction Box for Paper Making Machines, which consists in the combination of the troughs with the rubber rollers and the sides of the suction box to form water seals for the said rollers, and in the combination of the hard rubber pulleys or wheels with the adjustable partitions of the suction box, and with the cross strips and the rubber rollers to assist in carrying the wire cloth.

A novel Drill Tooth Attachment has been patented by Mr. Silas Frank, of Hagerstown, Md. This is an improvement in the class of seeding machines whose boots or drill teeth are pivoted to the drag bars and have a spring attachment, which allows them to yield or assume an oblique position whenever the point of the tooth encounters an unyielding obstacle.

A National Law Governing Adulteration Needed.

We are glad to see that the subject of adulterating articles of food and drugs is attracting the attention of our newspapers as well as that of the public. The New York *Grocer* and the *Grocer and Country Merchant*, of San Francisco, have both opened their columns to the evils of adulteration, and the former journal calls for national legislation on the subject, and suggests that the time is a favorable one to direct public attention to its importance, to prevent or regulate the adulteration of foods and drugs, and providing the necessary machinery for its enforcement. The most advanced and enlightened nations have found it necessary to enact such laws, and have succeeded in enforcing them to a very satisfactory extent. In this country individual States have attempted to legislate upon the subject, and have in almost every instance failed to accomplish good results. On the contrary, they have only succeeded in making discriminations against their own citizens that have, or might have, accrued to the benefit of those of other States. If a sugar refiner in New York city is permitted to use adulterants with impunity, while one in Jersey City is prohibited from doing so, simply because he is in a different State, the discrimination might be disastrous to sugar refining in New Jersey. A law to be practical must be national. The power to enact such a law is as clearly contained in the clause of the Constitution "to regulate commerce between the States," as is that to govern transportation. The necessity for its exercise, we think, is manifest to all who have given attention to the subject. On every side may be found adulterated food products and drugs. Only within the last month the adulteration of sugars and sirups has attracted unusual attention. The extent to which milk is adulterated is one of the most flagrant impositions upon the consuming public. Coffees and spices have long been favorite articles for the adulterator's art. Even the product of the busy bee is now sophisticated to such an extent as to multiply the yield to such proportions as would exhaust the honey of the entire vegetable world and utterly appal this most industrious of all insects. There is some hope in a more conscientious public opinion, but there is no power so quick to develop that public opinion as the strong arm of the law. We would not follow fully the English or Canadian laws, but a modification of them might be made to suit our requirements. We believe the sooner we come to adopt such a law the sooner will this flood tide of adulterated trash be stayed. It is a fallacy to say that the people demand these cheap and nasty goods. It is a mistake to suppose that a poor man wants poor things to eat or adulterated drugs to use, and it is a libel on the people to say so.

THE NATIONAL ACADEMY OF SCIENCES.

The fall meeting of the National Academy of Sciences was in session in the chapel of Columbia College, this city, during the four days ending November 8. This, unlike the spring meeting, which is always held at Washington, was devoted almost exclusively to scientific work; the exceptions falling on the morning sessions of the first and second days, when at government request, the claims of the three rival exploring parties in the Western Territories were under investigation, in order to determine the best methods of securing the thorough economical survey of those regions. The session was secret, and the results will not be made public until the report of the association has been submitted to the authorities at Washington. Professor O. C. Marsh, vice president, occupied the chair, made vacant by the death of Professor Henry.

The first paper was read by Dr. Henry Draper, on "The Solar Eclipse of July 27, 1878," the results of which have already been laid before our readers. The next paper, on "The Early Types of Insects," was read by Professor Samuel H. Scudder; a technical review of the course of development in the insect world, arriving at the conclusion that the laws of succession of the insect tribes are similar to those long known to hold in other groups of the animal kingdom, and that the facts obtained by observation are in the main such as the theory of descent demands. Professor Charles S. Peirce followed with an address "On the Acceleration of Gravity at Initial Stations."

The second day Professor William P. Trowbridge discussed the inapplicability of the old theory of the turbine water wheel to the newer constructions instituted by Boyden and Francis. While the newer constructions of these inventors had gone into use, the old methods were still described by Weisbach, Rankine, and others, and with these the student was alone familiar. Professor Trowbridge described the three classes of turbine wheels, and deduced formulas applicable to these classes by which the maximum of efficiency and velocity could be gained. He characterized the plan of the wheel obtained by Francis, and now in general use, as one of those happy intuitions by which practical scientific men, in this country especially, have accomplished such remarkable results.

General Henry L. Abbot described his method of securing instantaneous photographs of torpedo explosions, and discussed the value of photography in the study of instantaneous phenomena. Professor Alexander Agassiz followed with an account of the embryology of the gar pike, his observations leading him to the belief that this fish does not differ in its development from bony fishes generally, as naturalists had been led to think. He also described the arrangement of his Zoological Marine Laboratory at Newport, R. I. Thus far it has been more successful than his father's more ambitious attempt at Penikese Island. Professor Stephen Alexander, of Princeton, closed the day's proceedings with a proposed demonstration of the eleventh axiom of Euclid.

The third day's scientific work began with another mathematical paper by Benjamin Alvord, Paymaster General, U. S. A., on the "Intersection of Circles and the Intersection of Spheres." Of more general interest were the observations of Mr. George Davidson, Astronomer in charge of the United States Survey of the Pacific Coast, on "Instruments of Precision at the Paris Exhibition." These observations were made under difficulties, since, both at the manufactories and at the Exhibition, no careful examination of work was permitted him. In summing up his conclusions, Mr. Davidson said that while he saw much of deep interest at the Exhibition, there was no single instrument that he would recommend for imitation. "What he principally learned was what not to copy, and he was convinced that we do not need to go to Europe for such instruments. Our own observers and mechanicians working in harmony are thoroughly competent to lead in the scientific race, for both appreciate the fundamental ideas of simplicity—fewness of parts, harmony of proportion in the accuracy of division and level, adequacy of optical power, and mathematical precision in the bearing of the moving parts."

In the afternoon, Prof. O. N. Rood, of Columbia, described his attempts to obtain a quantitative analysis of white light. In the subsequent discussion, Professor Peirce said that the observations of Professor Rood opened up a new branch of physics, and promised wonderful developments. Heretofore the science dealt only with rude methods of comparison. In this branch there was a departure to new and delicate methods—some, in fact, being among the most delicate known to physical science.

Professor Alexander gave a recapitulation of some of his views on the origin of the forms and present state of many of the clusters of stars, and several of the nebulæ, the source of solar heat, and the drift of the stars. Prof. J. S. Newberry discussed several mooted points in geology; and Prof. E. D. Cope, "The Character of the Theramorphous Reptiles." For the fourth day's work—in progress as this goes to press—the programme announces papers by Professors Cope, Alexander, and Guyot.

How to Get Pure Teas.

A delegation of Baltimore tea merchants lately had an interview with the Chinese embassy at Washington, chiefly with reference to the introduction of pure teas from China, to supplant in American markets those which are colored or adulterated. The Minister said through his interpreter that the various brands of tea sold in America and Europe are unknown to and not used by the tea consumer in China. They are specially prepared by the Chinese tea exporters for the foreign market. They are colored by the use of chemicals; and the process, together with the peculiar methods of fixing up tea for foreign markets, not only renders the plant less palatable and beneficial, but more expensive. The adulteration and coloring of teas for the foreign market, he said, are wholly in consequence of the demand which has existed for such teas; and the Minister expressed the opinion that if Boards of Trade in New York and China would make known the fact that pure teas are not only better but cheaper, it would benefit both producer and consumer. There is, he said, really only one kind of tea plant, and from this both the green and black teas are produced. The equivalents for the two terms "green" and "black" do not signify to the Chinese the color of the tea, as in America, but have reference to the period of gathering, "green" indicating to them, as in "green corn," not a color, but a state of immaturity.

Yung Wing, who has traveled extensively in the tea districts of China, said, in answer to an inquiry, that he saw no reason, except the want of Chinese labor, why tea could not be profitably grown in America, but that it is wholly a question of labor. Chinamen are employed even in Japan to superintend the work of culture and preparation, and would be a necessary part of the same work here. Expert Chinamen would, however, not come to America as long as the present outcry against them is maintained on the Pacific coast.

New Mechanical Inventions.

An improvement in Valves has been patented by Mr. John Patterson, of Salem, Mass. The object of this invention is to furnish an improved valve for attachment to water and steam pipes, so constructed as to prevent leakage. It consists in two or more valves formed or secured to a common valve stem and fitted to valve seats in a globe or shell.

An improved Machine for Paring Peaches, which is simple, convenient, and effective, has recently been patented by Mr. William S. Plummer, of East Portland, Oregon.

Mr. Willis L. Barnes, of Charlestown, Ind., has invented an improved Ballot Box, which is so constructed that the mechanism can be operated only when a ballot has been placed upon the receiving fingers, and, when operated, will deposit the ballot in the box, close the box, register the ballot, and sound an alarm.

Mr. Elon A. Marsh, of Battle Creek, Mich., has patented an improved Lathe for Turning Regular Forms, the novel feature of which consists in a cylindrical bed, and a head stock, tail stock, and rest adapted to the bed.

A Machine for Skivring or Chamfering the Edges of Leather, particularly counters for boots and shoes, has been patented by Mr. Morton M. Clough, of Marlborough, Mass. The invention consists in an adjustable elastic bed, carrying a stationary knife, against which the leather is forced by a feed roller above the bed.

An improvement in Cotton Gins has been patented by Mr. James B. Hull, of Live Oak, Fla. This invention relates to a novel construction of cotton gin specially applicable to ginning sea island cotton having a long fiber. The chief features of novelty consist in the construction and arrangement of a guard plate with respect to the brush, the roller, and the chute, for separating the dust brushed off the roller from the lint.

An improvement in Keys for Musical String Instruments has been patented by Mr. Ferdinand Z. Nicolier, of New York City. This is an improved key for musical string instruments, which facilitates the tuning of the strings and retains them at any desired tension. The invention consists of an inclosing sleeve, secured permanently to the finger board, and having a recessed key spindle, with strong steel springs placed sidewise, so as to bear on the inner surface of the sleeve and produce the retention of the key in fixed position.

Messrs. Louis Prenot and George Marchal, of New York City, have patented an improved Machine for Forming Wooden Heels for Boots and Shoes, which is so constructed as to form the heels rapidly and accurately. It is quite simple in construction.

An improved Machine for Granulating or Cutting Grain, such as oats, wheat, barley, corn, etc., has been patented by Messrs. William Eberhard and Robert Turner, of Akron, Ohio. It is simple in construction, convenient, and effective, doing its work rapidly and well.

An improvement in Combing Machines has been patented by Messrs. Thomas H. Rushton and James MacQueen, of Bolton, England. This patent covers improvements upon the combing machines for which letters patent were granted in England to Josué Heilmann, on the 25th day of February, 1846, No. 11,103. It consists in improved machinery for imparting the requisite advancing and retrograde motions to the detaching and piecing rollers; also in a novel form of nipping apparatus.

An improvement in Sewing Machines has been patented by Mr. Louis Evans, of Pittsburg, Pa., of that class which have a double pointed shuttle, and are adapted to sew either backward or forward by a simple reversal of the machine. It consists in the peculiar construction and arrangement of the feed devices, the shuttle, and other parts, which cannot be properly described without an engraving.

An improvement in Treadle Powers, designed to utilize the full effective force of the body in a treadle movement, has been patented by Mr. Isaac M. Rhodes, of Hancock, Mich.