tricity, motion. There is another law which Science cannot disregard. Life, whether vegetable or animal, does not necessarily become "extinguished as the flame." It becomes latent in the seed. It is there ready to resume its normal law of growth whenever the proper conditions are presented. It would be in accordance with strict deduction, from observed facts in the vegetable, to expect that the animal also, when planted, would return to its renewed form. This expectation is constantly disappointed as to the lower animals and generally as to man. But another series of facts must be also weighed by Science. A large part of our race has always expected a continued existence; and this expectation has been confirmed by human testimony to the rising from the dead of a certain Man who also raised others from the dead; and after thus proving his right to know, He declared that all others would eventually be raised to life again, having been planted (as it were) in the ground. Science must of necessity inquire: 1. Whether the facts of this resurrection and this assertion of a competent witness are duly proved according to the rules of evidence. 2. Whether the statement that growth may be resumed, after cessation for a great length of time, accords with this law of latency as found in plants. Science cannot concern with this as a matter of faith; but it cannot disregard facts duly proved by credible and competent witnesses. Taking up the subject in this line of hard logic, we believe it is to be shown beyond reasonable doubt that the destiny of man is not to melt into the "infinite azure," nor "to be extinguished as the flame," but to live again and to participate again in the affairs of this world. The mode of his return to life and the manner in which he will participate in the future world's affairs are not subjects for discussion here. A belief in the resurrection of a material and organized body leads one very far from the orthodoxy of the churches; but it brings the ascertained facts of Science and the literal words of Scripture into an harmony that does not seem to have been suspected by the scientists or the doctrinaires. E. X.

Lunar Acceleration.

To the Editor of the Scientific American:

There are good reasons why astronomers do not accept the theory of the above named phenomenon, published by your correspondent, Mr. John Hepburn, on page 260 of your current volume.

It has not yet been demonstrated that the sun's orbit is anything like a circle or an ellipse; but there is every reason to believe that his orbit is of a more complicated character, that it is without any period, and is not confined to any one plane. It is believed, also, that his motion is comparatively so slow that the change of direction of his course in 25,800 years amounts only to a small fraction of a degree. Unless your correspondent can prove the fallacy of our fundamental theories of dynamics, he dare not maintain that the sun is rotating in a circular orbit without a central body whose attraction is many times greater than the resultant of all attractions from the rest of the so called fixed stars. Without the sun's orbit be in the ecliptic, and of a circular or elliptic form, it is as absurd to speak of a retrograde motion as it is to speak of an above and below, of a before and behind, of a right or left hand side of the Universe.

There is no doubt but the travel of the terrestrial poles and the precession of the equinoxes have a common cause. If we depict the travel of either pole, as observed on a stellar globe, we find that for any one time both poles occupy directly opposite positions, and that the phenomenon can be produced by no other motion than a gyration of the earth's axis, of which the precession of the equinoxes is a necessary sequence. This being an established fact, I am unable to see what the alleged retrograde motion of the sun has to do with the explanation.

The period for a complete revolution of the recession of the eclipses is somewhat less than 19 years, and that of the precession of the equinoxes about 25,800 years, which is apparently not quite the same rate, as your correspondent states. Evidently the two phenomena have not a common cause, though they are results of the same principle, and have long ago been satisfactorily explained and experimentally demonstrated by the gyroscope.

Your correspondent subsequently takes refuge in a hypothetical and rather exorbitant increase of the motion of the sun, which no astronomer can take for granted on this ground only. Next he confounds increased with increasing motion. A rotation that makes 31° for 30°, 62° for 60°, and 93° for 90° is simply increased, not accelerated, as it would be if it would make 31° for 30°, 64° for 60°, 99° for 90°, according to the laws of accelerated motion. Lastly, he commits the mistake of referring the angle he found to the diurnal, instead of the annual, rotation of the earth. If he makes his calculations in accordance with the laws of dynamics, he will find no agreement whatever between his theory and the observations of astronomers.

I am afraid that the question is still open.

Philadelphia, Pa. HUGO BILGRAM.

The Potato Bug.

To the Editor of the Scientific American:

Several paragraphs in relation to the potato fly (*cantharis vittata*) have appeared in the SCIENTIFIC AMERICAN, and are now going the rounds of the press. It is strange that an insect well known to the medical profession for the last nineteen years, and which but twenty years ago amounted, in extensive districts of this country, to almost a scourge, should now have become so great a stranger. Under the head of "Potato Flies," the United States Dispensatory says (I quote from the ninth edition, page 171):

"Within the limits of the United States are several species of *cantharis*, which have been employed as substitutes for the *c. vesicatoria*, and found to be equally efficient. Of these, only the *c. vittata* has been adopted as officinal. * * * The potato fly is rather smaller than the *c. vesicatoria*, which it resembles in shape. Its length is about six lines. The head is of a light red color, with dark spots upon the top; the feelers are black; the elytra or wing cases are black, with a yellow longitudinal stripe in the center, and with a yellow margin; the thorax is also black, with three yellow lines; and the abdomen and legs, which have the same color, are covered with a cinereous down. It inhabits chiefly the potato plant, and makes its appearance about the end of July or the beginning of August, in some seasons in great abundance. It is found on the plant in the morning and evening, but during the heat of the day descends into the soil. The insects are collected by shaking them from the plant into hot water, and are afterwards carefully dried in the sun. They are natives of the Middle and Southern States. * * If the potato fly has been found more speedy in its effects than the *cantharis* of Spain, the result is, perhaps, attributable to the greater freshness of the former. It may be applied to the same purposes, treated in the same manner, and given in the same doses as the foreign insect."

Black River Falls, Wis. E. S. WICKLIN.

Aniline Black Dyes.

To the Editor of the Scientific American:

Of late years the importance of aniline black to calico printers and dyers has steadily increased, and I think it may be of some interest to your readers, among whom you must have many printers of fabrics, to know something of the best methods of printing it and the *rationale* of the process.

Aniline black is produced upon cloth by the application of a mixture of a salt of aniline with a chlorate (usually chlorate of potassa) and generally a little sulphide of copper. Now the great causes of trouble in the process are the following:

I. Injury to the doctors (scrapers) and rollers by crystals of chlorate of potash.

II. Weakening of the cloth by the action of the acid.

III. The great difficulty of getting a steam color.

The first of these difficulties is avoided by the French printers by using chlorate of baryta instead of potassa, and in England by the use (in some works) of chlorate of soda, a very much more soluble chlorate than that of potassa, and one which can be procured perhaps as cheaply. The two last difficulties are insurmountable or nearly so, and it has been proposed to use an acetate of aniline instead of the chlorhydrate; but I have found by experiment that acetanilide is formed, which gives no black color with oxidizers.

By carefully aging in very damp rooms, the second difficulty may be surmounted; but the third, the production of a sufficiently cheap aniline black to steam without tendering the cloth is not yet a solved question. M. B. C. G.

Boston, Mass.

Cribbing in Horses.

To the Editor of the Scientific American:

Noticing an article and illustration in your valuable paper sometime ago, on the subject of cribbing in horses, I send the following plan of eradicating the habit:

Cribbing is caused in the first place by some foreign substance being pressed between the teeth, or by the front teeth growing too close together, thus causing pain. The horse, to avoid this, instinctively pulls at any hard substance, thus spreading the points of the teeth, and by that means affording temporary relief. To remedy this fault, it is only necessary to saw between the teeth with a very thin saw; this relieves the teeth of all side pressure, and effectually ends the trouble. The gulping of wind and the gurgling in the throat are effects that will cease with the removal of the cause.

Elmira, Ohio D. COOK.

Improvement in Gas Retorts.

To the Editor of the Scientific American:

I have a wrinkle to impart to those of the gas fraternity who use clay retorts. It is well known that clay retorts, when first fired up, are very open and porous, causing considerable loss in the yield of gas; and the same thing happens when they become coated with carbon on the inside and have been recently burned out. If those who use such retorts will, when they are new, coat them (both in and outside) with a solution of silicate of soda, of the consistence of ordinary sirup, the difficulty will be entirely removed. It is hardly necessary to add that the coating should be done before setting, and allowed to dry thoroughly.

Frankfort, Ky. M. L. JONES.

[For the Scientific American.]

CRUCIBLES.

The excellence of a crucible depends on the ready expansion and contraction of the ingredients of which it is made. The best crucibles are composed of the following compositions, which are of two kinds, namely, with and without plumbago.

WITHOUT PLUMBAGO.

Three parts by measure of the Stourbridge best crucible clay, two parts cement, consisting of old used-up fire bricks, and one part hard coke. These ingredients must be ground and sifted through a one eighth inch mesh sieve; the sieve must not be finer, otherwise the pot will crack. This composition must be mixed with sufficient clean cold water, trodden with the bare foot to the consistency of stiff dough, and allowed to stand for three or four days well covered with damp cloths, to admit of its sweating and the particles of clay becoming thoroughly matured. It is then ready for use, and must be blocked by hand on a machine. Dr. Ure, in his "Arts and Manufactures," gives drawings and methods of working the machine.

Owing to the coarseness of this composition, the pot cannot well be thrown on the potter's wheel; and in no instance an it be made by pressing.

The crucible must not be burnt in a kiln, but merely highly and thoroughly dried before being placed in the furnace for use. For brass and copper melting, it will stand one good hard day's work; but care must be taken to replace the pot again in the furnace after the metal has been poured. If the pot be not allowed to go cold, it will last for several days. It will, with the greatest safety, stand one melting of wrought iron. The cost, when made on the steel manufacturer's own premises, is about forty cents per pot, each pot holding from 100 to 120 pounds of metal.

HESSIAN CRUCIBLES.

Good Hessian crucibles are composed of two parts of the best German crucible clay and five parts pure fine quartz sand. This composition must be sifted through a one eighth inch mesh sieve; it is then tempered and trodden with the bare foot, as before described. When ready for use, it is pressed into different sizes of crucibles, which, when thoroughly dry, are placed in the kiln or furnace and burnt hard.

ANOTHER COMPOSITION.

Two parts best Stourbridge crucible clay, three parts cement; sift through a one eighth inch sieve. Temper as before described and block by hand on the machine. When thoroughly dry, it is placed in the kiln and burnt hard. These crucibles are principally used for melting gold and silver, and also for dry analysis.

The best and most perfect fire clay for crucible making is nearly always found in the pavement of coal. Some of the Pittsburgh fire clays, and those found to exist in the pavements of some of the Pennsylvania coal mines, are excellent fire clays. But the various compositions cannot be described, as they are as numerous as the different kinds of clays.

WITH PLUMBAGO.

The Birmingham soft tough pot consists of two parts of the best Stourbridge crucible clay, three parts plumbago, and one part cement, consisting of old used-up crucibles ground and sifted through a one eighth inch mesh sieve.

ANOTHER COMPOSITION.

Four parts of the best Stourbridge crucible clay, three parts plumbago, two parts hard coke, and one part cement, consisting of old pots ground and sifted as before. Where old pots cannot be had, the above composition must be burnt hard, ground, and sifted. The scales or chippings of the insides of gas retorts are far superior to the best common hard coke. But where scales and chippings cannot be had, hard coke is the best substitute. All the ingredients of this composition must be sifted through a one eighth inch sieve (but not finer), tempered, and made as before described. When thoroughly dry, it is placed in the kiln and annealed, but not burnt hard. This composition makes a pot (for melting the hardest metal) which cannot be melted at any pitch of heat, nor can it be cracked with the most sudden heating and cooling. It is regularly known to stand fourteen and sixteen meltings of iron, even wrought iron. I have often made it to stand more than that.

Any steel manufacturer can make the pot on his own premises at a cost of $1 20 or thereabouts, the pot holding from 100 to 120 pounds of metal. J. D.

Houston, Texas.

Utilization of Silk Rags.

According to *Les Mondes*, one of the wealthiest English velvet manufacturers, Mr. Lister, worked his way to success by years of patient labor in search of a way to utilize silk rags. He began by buying up all such waste at less than a cent a pound; and up to the year 1864, he had expended the immense sum of $1,312,500 in fruitless efforts to find a process. Nothing daunted, Mr. Lister continued his experiments; and within the past ten years, he has discovered a way of making the refuse into fine velvet. He carries on this industry at Manningham, Eng., in an establishment which employs not merely 4,000 workmen, but 283 travelers in all parts of the globe, whose sole business is to buy the silk waste. The factory is said to have cost nearly $3,000,000.

The practice of patenting imitations of articles of standard excellence is growing in favor at the Patent Office. A patent lately granted is for producing an imitation of Russian sheet iron. This is done by hammering the sheet between anvils and hammers that have indented surfaces, so as to give the sheet a mottled appearance. Another patent is for an imitation Swiss window shade, in which the lace work is imitated by stencils.

JOHN LAIRD, M. P.—The death of Mr. John Laird of Birkenhead, Eng., occurred on the morning of Thursday, October 29. He was the son of William Laird, of Greenock, Scotland, and was educated the Royal Institution, Liverpool. He was well known as an enterprizing and successful ship builder. We shall probably publish a portrait of him next week.

SULPHATE OF COPPER OPTICS.—If we receive the solar light reflected by a large crystal of sulphate of copper upon a sheet of platinum or tin plate, placed at a small distance from the crystal, the sheet assumes the color of metallic copper upon the part which receives the reflected light.