before the committee now investigating the subject.

— The Abbe Laflamme, of the University Laval at Quebec, has lately read an essay on the physical geography of the Saguenay, before the society of geography in that city. He first describes the actual geographic form of the district, and then discusses its geological history, even from Archaean times, with special reference to the formation of the old limestones that lie in basins on the crystalline rocks as an early chapter, and to the glacial invasion as a later one. The present discharge of Lake St. John is recognized as post-glacial; the old outlet being more or less obstructed by drift, and in part occupied by Lake Kenogami. The deep gorge of the lower Saguenay is attributed to ordinary erosive action through lŏng geological periods, and the cañon of the Colorado is called recent in comparison with it.

— The programme for the first half of the course of weekly lectures at the national museum is as follows: Saturday, March 6, Mr. William Hallock, The geysers of the Yellowstone; Friday, March 12. Prof. William Harkness, How the solar system is measured; Saturday, March 20, Prof. T. C. Mendenhall, The nature of sound; Saturday, March 27, Prof. F. W. Clarke, The chemistry of coal; Saturday, April 3, Dr. C. Hart Merriam, The migration of birds.

— The bill now before congress, providing that from and after March 4, 1892, the metric system shall be exclusively employed in the several departments of the government, was favored by the Boston society of civil engineers, at their meeting the past week.

— An account of a singular habit in the cicada is related and illustrated by J. S. Newberry in the *School of mines quarterly*. In Rahway, N.J., a house had been built and a cellar dug in an orchard some time before the appearance of a brood of cicadas. The unused cellar was opened about the time of their advent, and the bottom was found to be thickly set with mud-cones or tubes from six to eight inches high and an inch or more in diameter, each of which had been formed by the pupa of a cicada that had emerged from the earth beneath the cellar. Finding a dark chamber, and apparently desiring to work up to daylight, the cicadas had taken the moist clay and of this formed pellets, with which the tubes were built up, apparently with the purpose of bridging over the vacancy, and thus reaching the surface. The tops of all were closed; but, on breaking some of them, the pupae were seen, both in the hole in the ground and in the cone. After the cellar was opened, and light admitted, they stopped building, and made holes in the tops of the cones for exit. The author further remarks that in these facts there is evidence of the exercise of intelligence in the cicada, and a judicious adaptation of means to an end in circumstances that, it would seem, must have been without precedent in the experience of that or any preceding generation, and therefore for which no education of ancestors could have given a preparation. It is possible that the pupa of the cicada is sometimes embarrassed, in its ascent to the surface by water, by too wet or too dry sand or mud; but it is hardly possible to imagine circumstances where the construction of a tunnel would be necessary. There seems to be no adequate explanation of the phenomena that will bring them within the scope of the theory according to which all our organs and faculties are the result of formative influences progressively developed through a long line of ancestors.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Bishop's ring during solar eclipses.

THE persistent visibility of Bishop's ring — the dusky reddish ring around the sun — gives interest to the following extract from Langley's 'Report on the Mount Whitney expedition,' which recounts observations made at his camp, at an elevation of about twelve thousand feet, on Aug. 19, 1881. "The sky to-day, as always, is of the most deep violet-blue, such as we never, under any circumstances, see near the sea-level. . . . Carrying a screen in the hand between the eye and the sun, till the eye is shaded from the direct rays, it can follow this blue up to the edge of the solar disk without finding in it any loss of the deep violet or any milkiness as it approaches the limb. . . . It had been part of my object to make an effort to see the solar corona by directly cutting off the sun's light by a very distant cliff. . . . On the south of the camp was a range of cliffs running nearly east and west, and whose perpendicular wall rose from one thousand to two thousand feet. I found that I could choose a position on the north of the cliff, along whose edge the sun was moving horizontally; so that the shadow was fixed as regards the observer, and so sharp, that, though I must have been over a quarter of a mile from the portion of the cliff casting it, I could, without moving my place, and by only a slight motion of the head, put the eye in or out of view of the sun's north limb. The rocks were, in these circumstances, lined with a brilliant silver edge, due to diffraction. This I had anticipated, but now I saw, what could not be seen by screening the sun with a near object, that the sky really did not maintain the same violet-blue up to the sun, but that a fine coma was seen about it of about 4° diameter, nearly uniform, though it was sensibly brighter through the diameter of 1½°. Upon bringing to bear upon it an excellent portable telescope, magnifying about thirty times, I found it was composed of motes in the sunbeam, be-

tween the diffracting edge and the observer's eye" (Signal service, professional paper, xv. p. 41).

So explicit a description as this from a well-practised observer confirms the testimony of European specialists in sky colors, and leaves no question whatever that Bishop's ring did not then encircle the sun. And yet, in the summer of 1884, it was so strongly colored as to attract attention from the guides in the Alps, and to call for special description from more scientific mountain climbers. It was generally visible on clear days in the winter of 1884–85, and on many favorable occasions through the following summer. During this winter, it has seemed to me to be generally less distinct than a year ago; but the most brilliant display that I ever recorded was shortly after noon on the 2d of last November, when the sun was hidden by a rather heavy sheet of cirro-stratus cloud, while the western sky was clear. The glaring and brassy central area was then enclosed by a ring of strong reddish-gold color, fifteen to twenty degrees from the sun; next came the delicate rosy or purplish pink, and at last the ordinary blue of the sky. The colors were wonderfully vivid.

Many if not most observers of the ring attribute it to diffraction on particles of some sort derived from the eruption of Krakatoa; and, while this hypothesis has much to recommend it, it cannot be denied that the continued visibility of the ring puts a severe strain on it. It is not to be wondered at that the cosmic origin of the colors has its advocates, and hence a method of determining the altitude at which the diffracting particles float is of especial value.

Dr. Zenker of Berlin has a pertinent article on the question in a recent number of the *Meteorologische zeitschrift* (Berlin, ii. 1885, 400–406), in which he discusses the effect that the altitude of the diffracting layer of dust will have on the visibility of the ring during total solar eclipses. And as a total solar eclipse, visible in South America and on the Lesser Antilles, will occur about half-past seven in the morning of the 29th of next August, we would request especial attention to this matter from astronomers who may go down to observe it. Dr. Zenker gives directions for observations on or near the central line of the moon's shadow, and shows how they may lead to the desired determination: for it is evident, that, if the diffracting dust were all within a few miles of the earth's surface, the colors of the ring would fade away in a few seconds after the disappearance of the sun; while, if the dust lie far outside of the atmosphere, some portion of the ring might remain visible during the whole eclipse. This question will deserve a share of the watchfulness generally given to the solar corona and infra-mercurial planets. W. M. D.

A trap-door spider at work.

A trap door spider, Cteniza Californica, which came from California in September, was put in a box with earth, and soon made a nest with a perfect door. She was found one morning occupying a hole three-quarters of an inch in diameter and deep enough to completely hide her, around which the ground had been cleared and smoothed, so that it was somewhat lower than the general level. Unfortunately, as this part of the work was done during the night, she accomplished it unobserved. She probably cleared the ground, however, as she had done on a former occasion, when she was seen to walk slowly sideways, with all the feet on one side held together, turning slightly at the same time, and sweeping all rubbish and coarser bits of earth before her. In digging the hole, she threw the earth to a distance, as was shown by numerous little irregular lumps of earth scattered over some moss at the farther side of the box. Later the spider was seen to dispose of more in the same manner, but it was done so quickly that the exact motion could not be distinguished.

During the day she busied herself in the burrow, apparently treading against the sides, in order to make a compact wall. At night she rested, and nothing more was done until the following evening, when she commenced to build a straight ridge or rim of earth at one side of the hole. She brought up as much earth as could be carried under the mandibles, and placed it on top of this rim. When it had been secured by several strokes of the fangs, the spider turned, and rubbed the spinnerets over the spot, and afterwards all along the edge. The spinnerets were applied directly to the surface, and were used not only to produce the silk, but also to smooth and model the edge.

This process was repeated until the rim was about a quarter of an inch in height, when the spider left it, and commenced a similar one on the opposite edge of the hole. Here she worked, as before, until she had made a ridge about half as high as the other, when she returned to the first, and during the next hour added to them both alternately. At the end of that time, she brought up the first load of earth which was not used in building, and deposited it as far away as she could reach, without leaving the burrow. As she withdrew, she turned, and attached a line of web to the edge of the second rim, by which it was pulled over the opening after she had disappeared from sight. Henceforth it was necessary to lift and turn back this rim (or flap, as it might now be called, to distinguish it from the true door) whenever she came up, unless, as sometimes happened, she had neglected to pull it down.

In the mean time, the first rim, which was to become the true door, had been gradually enlarged; but another hour elapsed before any attempt was made to pull it down. The spider then fastened a line to the upper edge, by which, after a long and steady pull from below, the structure was dragged over the opening, which it only half covered. It was immediately raised, and carefully re-adjusted in an upright position. After another half-hour, devoted to adding more earth to the two rims alternately, the first was again drawn down; but, being still too small, it was once more returned to the old position, and the work of enlargement continued. As nothing but persistence in this course seemed necessary to complete the door, the spider was allowed to work the rest of the night without supervision.

In the morning the spider had vanished. The entrance of the nest was closed, and the depression around it filled, so that its position was perfectly concealed. Naturally, it was supposed that the door was finished; but the next night proved this conclusion to be erroneous. When the spider was visited at three A.M., the door covered only three-quarters of the opening, and she was still employed in adding earth to the edge. During the day the entrance had evidently been closed by the true door and the flap, used together as a double or folding door, one side being much larger than the other. The flap, no longer