

careful servant, and the salt put into it. However, after a few weeks the salt became so strongly impregnated with the odour of rancid grease that it was not fit to be used, and I threw it away. The pot was washed a second time with scrupulous care: it seemed to me quite pure and free from odour; a new supply of salt was put into it, and now for the second time the salt has begun to smell intolerably rancid. The interest of this is twofold. First, it shows how large an amount of impurity is able to penetrate glazed porcelain, as photographers know to their cost; and secondly, it proves the possibility of concentrating odour. An imperceptible discharge from the porcelain was accumulated and stored in the salt until, when the lid was removed, it was found to be overpoweringly strong. The scent may therefore be said to have been *magnified* by these means, as much as a sound is magnified by an ear-trumpet, or a visible object by a lens.

F. G.

The Twelfth Movement of the Earth.

UNDER the above heading a short article appears in the *Bulletin de la Soc. Astronom. de France*, October 1898, p. 449, which on account of its interest and of its brevity, as well as its geological significance, is well worth citation, although the matter of it has already been brought before the public by other *Journals* and *Proceedings* of learned bodies.

"The planet which we inhabit has been known by astronomers to be subject to eleven different movements.

- (1) Its diurnal rotation around its axis in 23h. 56m.
- (2) Its annual revolution round the sun in 356½ days.
- (3) The precession of the equinoxes in 25765 years.
- (4) The monthly movement of the earth about the centre of gravity of the earth-moon couple.
- (5) The nutation caused by the attraction of the moon in 18½ years.
- (6) The secular variation of the obliquity of the ecliptic.
- (7) The secular variation of the eccentricity of the terrestrial orbit.
- (8) The displacement of the line of apsides in 21000 years.
- (9) The perturbations caused by the constantly changing attractions of the planets.
- (10) The displacement of the centre of gravity of the solar system round which the earth annually turns, which centre depends on the variable position of the planets.
- (11) The general translation of the solar system in the direction of the constellation Hercules.

A twelfth movement, that of the terrestrial pole to the extent of 15m. to 17m. per year, which gives rise to a slight variation of latitudes for all countries, is at present the object of assiduous verifications in a certain number of observatories.

Mr. Albrecht has traced out the path followed by the pole about its mean position from month to month, according to the observations of latitude made since January 1, 1890, to June 1, 1897. This slight displacement is due more especially (surtout) to a variation of equilibrium produced by the movements of the atmosphere of the ocean."

It appears singular that this movement of the pole (and consequent variation of latitude) thus clearly determined to be taking place, has not led to any appreciations as to its possible and probable significance in geology. Amongst the many causes advanced to account for the derangements of land and ocean, and consequent changes of climate at various geological periods, has been a supposed displacement of the axis of the earth, which astronomers have been unwilling to admit as having taken place to any notable extent, and which up to the present it was not possible to prove as having really ever existed. Sir Arch. Geikie, in his "Text-book of Geology" (1885), p. 15, discusses the question sufficiently fully, and arrives at the conclusion (p. 17): "Under the most favourable conditions, therefore, the possible amount of deviation of the pole from its first position would appear to have been too small to have seriously influenced the climates of the globe within geological history."

Secular contraction is admitted as a consequence of the slow cooling of the earth, but the rate at which it acts, or its estimation as a force, is hardly attainable. That it may be, and is frequently a cause of earthquake action is admitted. Hence, considering it as a force acting at all parts of the earth's surface with greater or less energy, it is presumable that it is maximum in certain places, and may be so at points in the vicinity of the equator. Its energy may, indeed, here in places, have reached the point, from time to time, of balancing the centrifugal force

proper to these places; and in this case it is evident that the ground in such places might be considered as being in unstable equilibrium, and liable to elevation or depression on the occurrence of very slight differences between the two forces in question arising from one cause or another. Now, under such conditions of equilibrium, it is just possible that a very slight variation of intensity of the centrifugal force at the place considered, could give rise to a derangement of the earth's surface such as would be attributed to an earthquake. This variation in the intensity of the centrifugal force might be the result of the movement of the polar axis, and possibly of a very slight movement such as recently observed. But if it be admitted that this movement is continuous, and if it be supposed that it may have been much more intense and much more frequent in former times, it is evident that it may have been a potent agent in bringing about alterations in the relative distribution of land and water in the zone of the equator, and it is reasonable to examine the actual state of this zone for some evidence of such former movements of the polar axis. Now, the equatorial zone lying between 10° to 15° north and south of the equator, is markedly characterised by the predominance of the ocean surface. The equatorial line only traversing land in Africa and South America, Borneo and Sumatra over a total length of about 90°, the remaining 276° of its extent lying on the Pacific, Atlantic and Indian Oceans. The localities where it traverses the land surface are remarkable in respect to their level as regards the sea. Thus the African part of the belt covers a large extent of the watershed valley of the Congo River, and the Victoria Nyanza basin. In a quite recent article in the *Scientific American Supplement* (Sept. 24, 1898, p. 19008), the basin of the Congo "has (it is said) been compared by geologists to the dried up bed of an interior sea." In South America the southern portion of the zone represents the watershed valley of the Amazon, that is, a low-lying tract of land. The course of the zone where it traverses the Indian Ocean and the islands of Borneo, Sumatra, and Celebes, is over one of the most disturbed portions of the earth's surface, that is, where alterations of level, with accompanying seismic and volcanic phenomena, have been frequent and almost continuous. Furthermore, one of the results of a change in the position of the polar axis and variations of the intensities of the centrifugal force on the equatorial zone would be, that for points diametrically opposed, the decrease of centrifugal force at one point would necessarily imply an increase of the force at the opposite point, so that if subsidence took place in the one, elevation should be the result in the other, so that wherever the equator traverses land (representing elevation) it should be found traversing ocean (or low land) at the opposite end of the diameter corresponding to this elevated land surface. This practically holds good, since to the African belt is antipodal, a certain extent of the Pacific, while to the South American belt corresponds diametrically the portion of the Indian Ocean occupied by the islands of Sumatra, Borneo and the Celebes, so markedly characterised by the evidences of former and present seismic and volcanic actions. There is, therefore, some probability that in the present arrangement of land and water in the equatorial zone, there may be the traces of former changes of the polar axis. It is well to bear in mind, as regards these small movements of the axis frequently recurring, if not continuously, and giving rise consequently to small but repeated changes in the relative intensities of secular contraction and centrifugal force, that they may really be most potent agents of change, and that therefore, however small, they acquire great significance if found to be recurrent and tending to repeat themselves at more or less regular intervals, and intervals much shorter than those usually assigned to geological phenomena.

J. P. O'REILLY.

The Geminid Meteors.

WILL you allow me to supplement the observations of the Geminids recorded in the first paragraph of your "Astronomical Column" in NATURE of December 19, p. 157, by mentioning some of my own? They may be interesting as showing the continuance of the shower, as I was unable to begin to keep watch until 12h. 30m. on the 12th. Twenty-seven meteors which appeared in the south and south-east were charted between that hour and 14h. 45m., when clouds finally covered that part of the sky. Of these, sixteen were from one or other of three radiants in Gemini, the most brilliant occurring at 12h. 42m. (= 1st magnitude), at 13h. 35m. (= magnitude 1½), at 14h. 16m. (= 1st magnitude), and at 14h. 23½m. (= Jupiter in bright-

ness). It will be seen, therefore, that with regard to frequency of meteors this later portion of the shower was not to be compared with that witnessed before midnight. Twelve meteors, including one of the first magnitude and two even brighter, were mapped between 11h. 30m. and 13h. on the night of the 9th; four of these were Geminids.

W. E. BESLEY.

70 Vincent Square, S.W., December 16.

Slug following a Closed Trail.

My attention was drawn a few days ago to a brown slug, about $2\frac{1}{2}$ inches long, which had made for itself a closed iridescent track on the concrete flooring of a conservatory. I could not find at what point it had got on to the curve, which ran at one end into a damp part of the concrete, but, in four hours from the time I first saw the slug, it had made three complete circuits and two-thirds of a fourth, always keeping the whole of its body on the trail. The latter, of a uniform breadth of $\frac{3}{16}$ inch, varied considerably in curvature, but nowhere presented any very sharp corners, and measured, roughly, forty inches round. Though the rate of progression was sufficiently slow, the slug rested on the track for seven hours, after which, thinking it dead, I touched it and found it had not quite dried up. Indeed, without elongating its body, it began to move and laboriously shifted its position by about an inch. There it remained (the time being then 10 p.m.), waiting, perhaps, for the influence of a more humid atmosphere, for morning found it moist and healthy, breakfasting more than a yard from the near and damp end of the track, which it must have reached by completing the fourth circuit, as there was no trail other than the closed one alluded to. If slugs are in the habit of following old trails, it does not appear that the present specimen had any previous experience of a re-entrant path, but that it depended solely on ocular intelligence of the path in advance.

VINCENT DANIEL.

151 Crwys Road, Cardiff, December 13.

Animals Feeding on Poisonous Plants as Food.

APROPOS of the various instances quoted of animals feeding on poisonous plants, it may be of interest to mention that in this part of India (the North-west Provinces), goats frequently eat, without any ill effect, the leaves and green stems of the "Akaúá" or "Madar" (*Asclepias* or *Calotropis gigantea*), the milky juice of which is an acrid poison for human beings, and is frequently used as such in infanticide cases.

CHAS. A. SILBERRAD.

Muttra, India, November 18.

THE FUMIGATION OF TREES.¹

THE San José Scale was first discovered by Prof. J. H. Comstock, near San José, California, in 1879, and was named by him *Aspidiotus perniciosus*. It has been found in various parts of the world, and its original habitat has not yet been ascertained with certainty, but is conjectured to be Japan. In 1893 it was

¹ "Report on the San José Scale in Maryland, and Remedies for its Suppression and Control." By W. G. Johnson, A.M., Entomologist. (Bulletin No. 57 of the Maryland Agricultural Experiment Station, College Park, MD., August 1898.)

first discovered in the Eastern States, having been introduced about six years before with some infested plum-trees from California, in the attempt to obtain an improved plum which should be proof against the attacks of the plum-weevil; but this laudable object proved the means of introducing a much worse pest into the Eastern States. According to the pamphlet before us, it has now been introduced into no less than thirty-three States, besides Canada and British Columbia, chiefly from the centre of infection in New Jersey. The State of Maryland is badly infested, large orchards of plum, pear, peach, cherry, &c.,

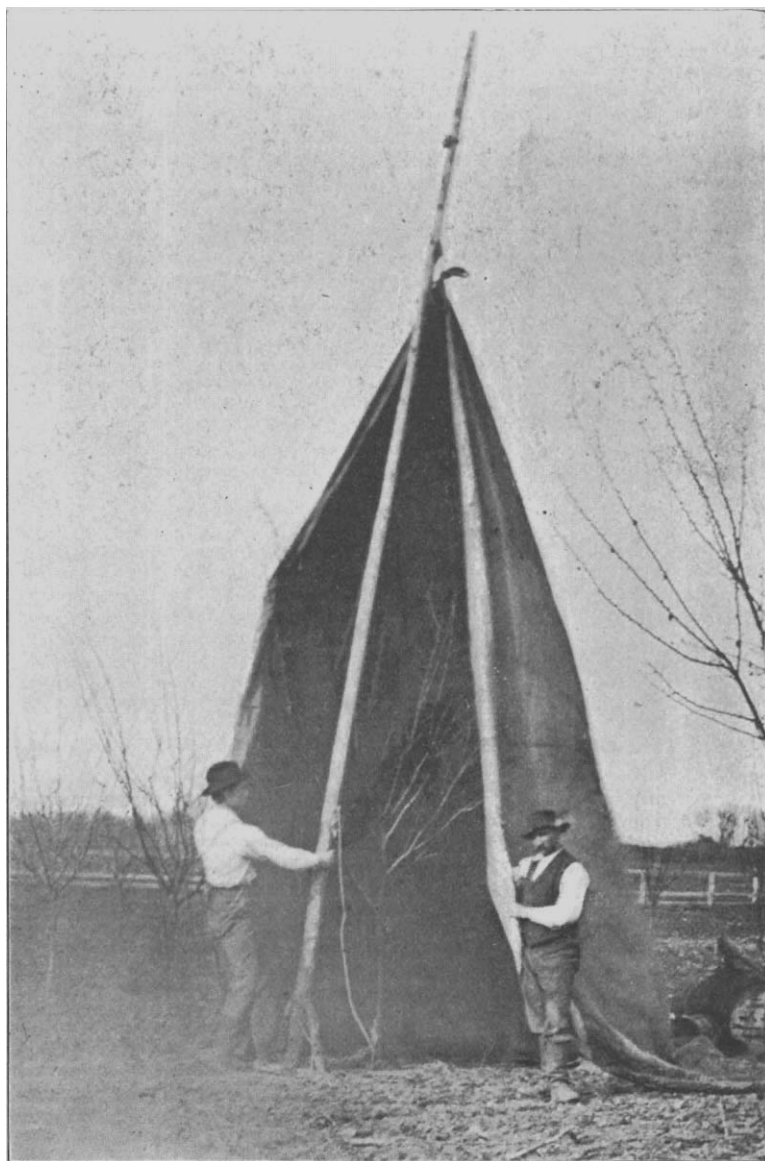


FIG. 1.—Placing a tent in position over a plum-tree.

having been almost entirely destroyed by it in some localities. The insect attacks trees and plants in a similar manner to other *Coccidae*, attacking a great variety of plants, and spreading over leaves, trunk, branches, and fruit indiscriminately. The effects of various remedies are discussed by Prof. Johnson, spraying with whale-oil soap, and fumigating with hydrocyanic acid gas, appearing to be the most satisfactory and efficacious remedies.