

arranged that when the bob is swinging, and in the position of maximum amplitude nearest the lens, the shadow of a portion of the wire immediately above the bob, thrown on a screen some 32 feet distant, is clear and distinct, and coincides with a vertical black line thrown on the white screen.

The bob is drawn back towards the lamp about eight inches, by a loop of thread, and when we wish to experiment the thread is then burned in the usual manner.

When the pendulum completes its first oscillation, the shadow falls exactly on the black line traced on the screen. In about five minutes the shadow has moved to the left of the line, and in ten minutes conspicuously so. In this time the maximum amplitude has decreased so little that the image on the screen is still distinct and clear when the pendulum is in a position nearest the lens.

W. R. WESTROPP ROBERTS.

Trinity College, Dublin.

Snake Cannibalism.

HAVE read with interest the numerous accounts of snake cannibalism which have lately appeared in NATURE. During my residence in South Africa, I have come across several instances of a similar nature. A few weeks ago I received a large roughals (*Sefodon hamachate*) which had swallowed another one of the same kind and of nearly its own length. As the swallowed individual was too long to disappear completely before the front portion of its body was digested, its tail was sticking out of the mouth of the swallower by about six inches. I have dissected two yellow cobras (*Naja haji*), each of which had swallowed a puff adder (*Vipera aritans*) more than three feet long. This case is very interesting, as the puff adder has much larger fangs than the yellow cobra, and in a fight the latter would probably succumb. To mention only one more case, I received, some years ago, the skins of a cross-marked schaapsticker (*Psammophis crucifer*) and a spotted schaapsticker (*Psammophylax rhombatus*), the former of which had swallowed the latter. In all cases which have come under my personal observation the swallowed snakes had entered head first, and thus probably they were simply drawn in after having caught hold of the same prey as the swallowers. In conclusion, I may mention that cases similar to the above are frequently described in the South African newspapers.

J. SCHÖNLAND.

Grahamstown, South Africa, March 1.

American Fresh-water Sponges in Ireland.

A SHORT time ago, Dr. R. F. Schaff, Dublin, sent me a small collection of Irish Spongillidæ. The examination of the material resulted in the discovery of two or three American species, obtained from the West of Ireland, viz. *Heteromeyenia ryderi*, Potts, *Tubella pennsylvanica*, Potts, and (?) *Ephydatia crateriformis*, Potts, the first of these three species having been identified by Dr. W. Welner, Berlin. All these species are new to Europe, and as they were found in a small collection taken more or less at random, it is probable that if the fresh-water fauna of the West of Ireland were thoroughly investigated, a great many more American species would be discovered.

Details will be published in the May number of the *Irish Naturalist*.

R. HANITSCH.

University College, Liverpool, March 13.

Peripatus in the West Indian Islands.

WEST INDIAN records show that occasionally single specimens of various species of Peripatus have been found in the different islands. During the past week, Mr. Lunt, my assistant, found a single specimen, and a further search being organised, resulted in the capture, by two collectors, of fifty specimens. These, it is believed, belong to two different species, and a goodly number of the specimens have been sent for determination to the British Museum.

Either the animals are more numerous than usual, or the previous search for them has not been a very careful one, as the whole of our specimens were found within the precincts of the Gardens.

J. H. HART.

Royal Botanic Gardens, Trinidad, March 6.

Planetary Photography.

I UNDERSTAND that in photographing a planet, such as Mars, only a short exposure can be allowed, because there is no way of compensating the planet's axial rotation. But, while following the planet with the equatorial, would it not be possible to compensate this axial movement by slowly sliding the plate, so that certain features of the planet should fall always on the same parts of the plate? If this is so, an exposure of some length might be available for the more central portions of the disc, those portions for which, during the interval, no serious alteration due to foreshortening comes into play.

Cardiff, March 23.

C. T. WHITMELL.

Cleaning Tobacco Pipes.

I HAVE discovered a new method for cleaning pipes which have become foul. A shallow cork, through which a hole is bored large enough to enable it to fit tightly on to the nozzle of a soda-water syphon, is fitted into the bowl. The nozzle is inserted, the mouth-piece directed into a vessel, about a wine-glassful of soda-water forced through, and the pipe is clean!

This is not a scientific discovery, but it may be of use to those scientific men who are smokers. Rubber stoppers answer better than corks.

CECIL CARUS-WILSON.

THE HABITS OF LIMPETS.

SOME observations made by the present writer at the Scottish Marine Station during July 1884, were published in NATURE for January 1, 1885. These observations confirmed the statements previously made by various naturalists, from Aristotle onwards, that the common limpet (*Patella vulgata*) settles down on some eligible spot (its "scar") between tide-marks, and makes a home, to which it returns after having been out to feed. The conclusion was drawn from various data that this "locality sense" is independent of smell, sight, and touch so far as the head-tentacles are concerned. Prof. Lloyd Morgan, in a letter to NATURE ("Homing of Limpets," December 6, 1894), has shown that the limpet possesses an even greater power of "homing" than previous observers have suspected, and he believes that the head-tentacles are the sense-organs concerned.

Since 1884, I have made further notes, and aided by a grant from the Research Grants Committee of the Royal Society, to whom my best thanks are due, have pursued the subject with some care during the past year. The results, apart from those connected with histology, here follow.

The limpets observed live on a reef, which extends several hundred yards seawards (practically west) from the front of Aberystwyth College. The rocks are Silurian grits and imperfect slates, alternating in a very regular way, striking north and south, and tilted at high angles. At low tide the *Laminaria* zone is well exposed, and for some yards above this the rocks are somewhat bare, except that they are thickly encrusted with small *balani*. Nearer the land various brown seaweeds (mostly *Fucus serratus*, *F. vesiculosus*, and *Ozothallia nodosa*) thickly cover the reef, except towards high-water-mark, where they become scanty. Throughout this area limpets of all sizes abound, being specially numerous, however, on the barnacle-encrusted rocks above mentioned. Groups of them were here marked with enamel paint, and watched. A number of observations were also made on the small limpet, which lives on *Laminaria*, and has its shell marked by three diverging blue streaks (*Helcion pellucidum* = *Patella pellucida*).

Food and Feeding.—As before, the chief food noticed consisted of the minute algæ coating the *balani* and rock-surfaces. Specimens were also found feeding on the calcareous seaweeds *Corallina* and *Melobesia*, on *Fucus*, and on *Laminaria*. It was suggested in the previous notes that the great length of the radula is perhaps

correlated with the large amount of wear and tear entailed by the constant "scraping" of barnacles, &c. This appears to be confirmed by comparison with *Helcion*, in which *Laminaria* constitutes the chief, if not the only, food, and in which the radula is relatively somewhat shorter.

At Granton, in July, the larger limpets appeared to feed most frequently; but at Aberystwyth, during the colder months, the small individuals are far more active. Sheltered corners and warm days afford the best chance of watching the movements. Though limpets undoubtedly regain their scars, or secure places, as the tide advances, I am inclined to think they must also often feed when covered by the water, for (1) the finest specimens are found low down, and their time for feeding when uncovered is limited; (2) I have seen a small limpet feed on *Corallina* in a tide-pool.

The scraping sound heard on the rocks during warm weather is not entirely due to feeding limpets. *Purpura lapillus* is also busy at work "sawing out" *balani* from their shells.

Locality Sense.—I still think, *pace* Prof. Lloyd Morgan, that the head-tentacles are not indispensable to homing, though it must be admitted that they may commonly help in the process. One limpet observed homing by me, certainly seemed to be "feeling" its way along by means of these organs, which were extended and waved about and applied to the rock from time to time, not by the extreme tip only, but also laterally for about $\frac{1}{5}$ of an inch from this. This individual was No. 2 of a small group living among the barnacles, and kept under observation from November 26 till the present time. The dimensions of these limpets are as follows:—No. 1, $\frac{3}{4}$ " \times $\frac{3}{8}$ "; No. 2, ditto; No. 3, $\frac{4}{5}$ " \times $\frac{3}{8}$ "; No. 4, $\frac{7}{10}$ " \times $\frac{3}{8}$ "; No. 5, $\frac{1}{2}$ " \times $\frac{7}{15}$ ". On November 28, at 3.15 p.m., I found No. 2 feeding $1\frac{1}{2}$ " from its scar. About half of each tentacle was excised (*i.e.* the part previously noticed "feeling"), and the animal was replaced where found. On November 29, at 2.55 p.m., it was found back on its scar. A similar operation was performed on No. 5, found feeding $2\frac{1}{4}$ " from its scar, on December 12, at 3.15 p.m. On my next visit, at 2.55 p.m. on December 14, the animal was found to have regained its scar, which, by-the-by, is permanently submerged, being in a small tide-pool. It is true the tentacles were not entirely removed, as was the case with the two Granton limpets which homed after excision. It now appears to me probable that the *mantle-tentacles* may help in homing. These are small conical structures lodged in pits in the mantle edge (Harvey Gibson, *Trans. R.S. Edin.* 1885), and capable of retraction and extension. About 100 of them are present. In submerged limpets I have seen these tentacles protruded for about $\frac{1}{8}$ " beyond the margin of the shell, and executing active "feeling" movements. These were particularly noticeable in an individual which, having regained its scar wrong end on, was shuffling round into the right position. When the front end of the limpet came to point in the right direction, one side of the shell was lowered, and the mantle-tentacles on that side were withdrawn; the same events then happened on the other side. These tentacles appeared to be of two kinds, longer and shorter, the latter being two or three times as numerous. Prof. Herdman first suggested to me that the mantle-tentacles might have to do with the locality-sense, and it at any rate appears probable that they are concerned with accurate adjustment on the scar. It is worth noting that very small limpets home as well as large ones, *e.g.* No. 5 above, and much smaller ones which have fallen under my notice. Prof. Lloyd Morgan's observations, so far as they refer to knowledge of local surroundings which limpets possess, are confirmed by an experiment made on No. 1. On December 16, at 4.5 p.m., this animal was busy scraping barnacles 3" west of its

scar. It was removed and placed 10 inches from home, near the top of a nearly vertical barnacled surface (on which it had been seen feeding at 3.15 p.m., November 28), which rises north of its scar. The next visit was deferred till December 26, 12.25 p.m., when the limpet was at home.

The homing faculty is not confined to *Patella*, but is also possessed by *Helcion pellucidum*. This fact is new, so far as I am aware. The animal in question eats out a sheltered home in the bulb, or more rarely in the stalk of *Laminaria*, and wanders out from this along the thallus, rasping a "track" as it goes. I found, for example, one individual at the end of an "eaten road" 3 inches long, and at the other end a very snug dwelling-place drilled out in the side of the stalk. *Helcion* mostly feeds under water. Like *Patella*, it possesses mantle- as well as head-tentacles.

The object of homing appears to be protection from the assaults of the incoming or outgoing tide. There is no danger when the animals are completely covered or uncovered. In many cases the barnacles would otherwise completely cover the rock, and afford very insecure foothold. Once washed loose, a limpet presents a very large surface liable to injury, unlike its neighbour *Purpura lapillus*, which, withdrawn into its thick operculated shell, can stand a good deal of knocking about. The force with which limpets adhere is illustrated by the fact that the five small limpets to which allusion has been made were quite uninjured by the terrible gale and high sea of December 21 and 22, to which they were fully exposed. The much thinner shell of *Helcion* is explained by the sheltered position of its home. The depressed conical shape of a limpet-shell is probably better fitted than any other to resist the waves, but this statement is made under correction.

Formation of, and Adhesion to, Scars.—An examination of the 'tween-tide rocks at Aberystwyth would readily convince the most sceptical as to the power which *Patella* possesses of excavating depressed scars. Limpets are able to adhere very tightly to a smooth surface which is much smaller than the foot, and by examination of such cases, and of specimens allowed to fix themselves to a piece of plate-glass, I have come to the conclusion that fixation is neither due to secretion of a glutinous substance, nor to the formation of a vacuum under the foot. It appears, in fact, to be a case of "adhesion," like that between two smooth glass surfaces brought very close together. The muscular foot is, so to speak, rolled out on the rock, with which it is thus brought into close contact. Prof. Michael Foster suggested to me the possibility of this method of explanation, which is most probably the correct one.

J. R. AINSWORTH DAVIS.

TERRESTRIAL HELIUM (?).

WE have received the following statement from Prof. Ramsay:—

"I have been trying for clues to compounds of argon. Mr. Miers, of the British Museum, called my attention to Hillebrand's paper on Cleveite, a rare Norwegian mineral, which Hillebrand said gave off 2 per cent. of nitrogen on warming with weak sulphuric acid. Cleveite consists chiefly of uranate of lead, with rare earths. My idea was, if the so-called nitrogen turned out to be argon, to try if uranium could be induced to combine with argon.

"The gas, on sparking with oxygen in presence of soda loses a trace of nitrogen, probably introduced during its extraction; the residue consists of a mixture of Argon and Helium! The brilliant yellow line, of which Mr Crookes makes the wave-length 587.49, is identical with the Helium line. I am collecting the gas, and shall shortly publish regarding its properties."