

LETTERS TO THE EDITOR.

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Tidal Migrations of Limpets.

WHILE spending a few days, in March of this year, at the village of Matadona, situated on the south-east coast of British New Guinea, facing the China Straits and nearly opposite to the large island of Rogeia, I had the opportunity of making some observations on the habits of a species of limpets.

On the beach near Matadona there is a sort of rugged platform formed by massive eruptive rocks, extending seawards and presenting in some places a more or less vertical frontage, of some three feet in height, to the sea.

The rocky platform, covered at high tide, is quite exposed at low tide, the sea receding a considerable distance away from it.

Great numbers of limpets live on the sub-vertical front of the rocks, while the numerous small holes and crevices, with which it is riddled, are occupied by Chitons, several of which are often crowded together in a very limited space.

Several species of *Patella* inhabit these rocks at various points, but as a rule they occur as isolated individuals. One species, however, occurs in large herds of a hundred or so individuals, and it is to this gregarious *Patella* that the following notes refer.

At low tide these limpets are attached to the seaward face of the rock, quite at its base, adjoining the sand of the beach, and it may then be observed that the zone of limpets, as a general rule, occupies a lower level than that of the Chitons.

It may also be noted that many of the limpet shells are themselves coated with Nullipores and other marine plants.

I have several times observed, at the time of flood-tide, that at the approach of the surf, when the latter gets so close as to spray the rocks, the limpets commence to crawl slowly up the face of the rock, and as the tide rises higher so they climb higher, always keeping above the level of the surf.

It can often be observed that they progress in the form of a triangle, the leader at the apex.

From the time the procession commences until they reach the summit of the rocks, out of the reach of the violence of the surf, the slow movement is practically continuous, the whole company of limpets being found on close inspection to be in motion, and producing a unique effect.

The Chitons, sheltered in their nooks and crannies, undertake no such migration; so that, in general, the zone of limpets is above that of the Chitons at high tide.

When the ebb-tide sets in, the limpets start on their return journey; but I have not actually assisted at the downward procession. Between the tides they are stationary, but they produce no scar on the rocks, so that there can be no question as to their "homing" on the same spot.

On returning to the rocks on one occasion, after a stiff southerly breeze, I found the sand banked up to the depth of some two feet against the face of the rocks, approximately up to the level of the zone of Chitons, some of the latter being actually buried beneath the surface of the sand. Others again of the lower lying Chitons had shifted their positions in consequence of the inroad of sand.

None of the limpets were thus buried, and they occupied their usual relative position at the base of the available face of rock. The zones of limpets and Chitons then nearly coincided.

This tidal migration of limpets is interesting in comparison with the periodical phenomena in the lives of other marine organisms; while the elevation of the limpet zone through the formation of a sandbank, may perhaps suggest stratigraphical reflections.

ARTHUR WILLEY.

Sydney, April 22.

Butterflies and Hybernation.

IN connection with Mr. Pidgeon's communication, under the above heading, in NATURE of April 2, respecting the probable wintering of a tortoiseshell butterfly in a bath-room, I may state that the hybernation of butterflies is of well-established occurrence in at least certain portions of South Africa, where one species in particular, namely, *Precis sesamus*,

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Trimen, assembles in numbers at the end of the summer season for the purpose. This very distinct dingy blue and red insect is plentifully distributed in East Griqualand and Natal, especially affecting the road-cuttings between Ixopo and the Ingeli-Zuurberg mountain chain. As remarked in Mr. Roland Trimen's monograph on South African butterflies, it likes shady places under a roadside bank or rocks in a cutting; and Colonel Bowker—an enthusiastic and renowned South African lepidopterist—is quoted as having seen them congregated under rocks and in holes of dry banks, as many as twenty-nine being captured by placing the net over them. Their dark bronzy green under-colouring renders them, when thus massed, almost inconspicuous in association with withered fern, grass, &c., and it is only by startling them that one very often becomes aware of their presence. I particularly call to mind, while on one of my botanical rambles in the Lower Umzimkulu district of East Griqualand in 1885, accompanied by a younger son of Mr. Donald Strachan, unexpectedly flushing at least fifty of these butterflies in the cold frosty season of July, in a secluded glen of the Vubugas rivulet. Upon a little searching among the scrub and bush we discovered a boulder, under which there must have been as many again, if not more. These we roused out with branchlets, some being more torpid than others; but, as we retired from the spot, they all flitted back to their trysting-place. This was at the severest time of the season, and I never doubted, after having observed the massing of this butterfly at all times during the winter, that it emerged safe and strong in the ensuing spring. A description and coloured figure are given in Mr. Trimen's work, vol. i. p. 231, pl. iv. f. 3.

Cape Town, May 20.

W. TYSON.

Becquerel's Colour Photographs.

I SEE that the photographs in colour, taken by Becquerel's plan, are said to be mainly due to interference. My own observations do not confirm this statement. A photograph of the spectrum in colours can be readily taken on silver chloride on a glass plate, and be examined both by reflected and transmitted light. The colours in the two cases are identical, which is contrary to the "interference" explanation.

W. DE W. ABNEY.

Bolton Gardens South, S.W.

Cannizzaro Memorial.

SINCE my return from Italy, I have been so frequently asked by friends and admirers of Prof. Cannizzaro what form it is proposed to give to this memorial, that I wish, through your valuable medium, to make it known that it is intended to present the Professor with a medal commemorative of the occasion, and to devote the balance of the sums subscribed to the creation of a Cannizzaro prize or medal to perpetuate his memory, the details of which will be left in his hands.

LUDWIG MOND.

Röntgen Ray Experiments.

IT has been generally noticed that when focus tubes become much blackened, presumably by volatilisation and deposition upon the glass of the platinum of the anode, they cease to be effective owing to the apparent increase in their internal resistance. This is generally attributed to increase in the vacuum due to the occlusion of the residual gas by the platinum black. This may in part be the true explanation, but another is to be found in a curious phenomenon discovered by Prof. Crookes, and described in his 1891 presidential address to the Institution of Electrical Engineers. He says: "It appears that the greater the phosphorescing power of the substance surrounding the poles, so much easier does the induction spark pass. Surround the poles with Bohemian glass or Ytria—two phosphorescent non-conductors of electricity—and the induction spark passes easily; immediately I surround the terminals with a non-phosphorescent conductor" [a film of deposited silver] "the current refuses to pass." Very possibly the deposited platinum in an old or overworked focus tube has a similar effect to the silver in Prof. Crookes' experiment. I have recently had experience with a tube of special form which was much blackened,