LETTERS TO THE EDITOR.

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British Marine Zoology.

PROF. MACBRIDE's letter in NATURE of September 15 does not require a detailed answer, as some of his statements are merely matters of opinion; but there are a few points on which I should like to comment.

(1) Prof. MacBride says we are unable to support properly one biological station, and that he does not see how we "could be expected to support two"—the second being evidently that proposed by Mr. Pace. But why does he try to ignore the three or four other existing stations? They are all supported; some of them, so far as regards students and researchers, are very well supported indeed.

(2) When he refers to some biological station as an "expensive toy," which in his experience its local friends "soon tire of supporting," one would like to ask of what station he is writing? The statement does not seem to apply to any of those mentioned.

(3) It is difficult for one who has followed the work of the U.S. Bureau of Fisheries Laboratory at Wood's Hole to understand Prof. MacBride's words in regard to it. He says it is "devoted entirely to economic work." A moment's thought of the scientific researches issued from that laboratory by Sumner and others shows the inadequacy of such a description.

(4) As to the Canadian stations, again I think Prof. MacBride does but scant justice to praiseworthy efforts. The western station at Nanaimo was visited last September by a party of biologists from the British Association, who were, to say the least, more appreciative than Prof. MacBride.

But the main thing I want to say is that Prof. MacBride, both in his original article and in his reply to my criticism, has, it seems to me, a false ideal. Expensive equipment, large funds, increased support—these are his keynote; and not a word is said as to a rich and varied fauna, physical features affording natural facilities for research and sympathetic personal service—the factors in the case that give character and tradition to a biological station.

W. A. HERDMAN.

It would be interesting to know what biological stations Prof. MacBride had in mind when writing the letter which appeared in NATURE of September 15.

Prof. MacBride states that it would be better to concentrate scientific support on one station than to have it spread over a number of stations poorly provided with funds and with staff, and, *ipso facto*, incapable of really first-class work. Surely there is more than one station in Great Britain which is capable of affording opportunities of first-class work, and I venture to think that the number of workers attending some of the smaller stations is ample proof of their usefulness.

The case cited by Prof. MacBride, of Chicago students travelling 1000 miles to Wood's Hole, will, I am afraid, not help many of our Liverpool students to attend vacation courses other than those held now at Port Erin, and Chicago students would have to travel nearly 1000 miles in any case to reach the sea.

There is, to my mind, a great advantage in having biological stations near to our universities, so that it is possible to reach them quickly and frequently. Such stations would serve the departments of zoology, botany, physiology, and biochemistry, and the staff of these departments would feel more at home there than at some station which was only visited at odd times, and in the control of which they would not be so immediately concerned. As a result there would be more encouragement for students to work at these laboratories, and little time lost in preparation.

With regard to the economic side of the controversy, one might quote from a paper by the director of the Fisheries Laboratory at Wood's Hole:—"But the life of the sea is an interrelated whole. Hence the futility of endeavouring,

even on economic grounds, to restrict our investigations to food fishes or other animals of obvious commercial importance."

WM. J. DAKIN.

Port Erin Biological Station, September 19.

THERE are one or two matters alluded to in Prof. Herdman's and Mr. Dakin's letters on which I should like to say a word or two.

(1) I had no desire to ignore existing biological stations other than Plymouth, but, until Mr. Pace's circular appeared, I think I am correct in saying that the Marine Biological Association was alone in making its appeal for support to all the zoologists in the United Kingdom. The other stations depend on local support.

(2) The curiosity of Mr. Dakin and Prof. Herdman as to the particular station which "local friends tired of supporting" is, I think, uncalled for. Prof. Herdman's unrivalled acquaintance with biological institutions in this country surely includes acquaintance with a station which has been closed.

(3) I held up the station at Wood's Hole as an example of a laboratory devoted to purely scientific ends, and supported solely by professional biologists. That valuable scientific work of general interest occasionally issues from the laboratory of the U.S. Bureau of Fisheries, which was founded and is maintained for research on economic lines, is totally irrelevant.

(4) As to my want of appreciation of "praiseworthy efforts" in Canada, is Prof. Herdman aware that every cent of expense in connection with all three stations in Canada is borne by the Federal Government, which also pays the travelling expenses of workers?

Finally, in regard to "ideals," I would in all modesty oppose my experience to that of Prof. Herdman. For the last twenty years I have been engaged in zoological research. On a good many occasions I have visited small biological stations, but the only stations where I have been able to bring research to a successful issue are those of Naples and Plymouth, which in the matter of boats and apparatus are thoroughly equipped, and which in the matter of "sympathetic personal service" are very near perfection. A biological station where senior students can handle living animals is one thing, and one where advanced research can be done is another. In Plymouth we possess a station of the second kind, certainly, to say the least, better equipped than any other in the kingdom. It will be a thousand pities if it has to curtail its usefulness for lack of support. It was this strong feeling of the absolute necessity of a well-equipped laboratory which led me in 1906, after several summers of futile attempts to utilise the small movable laboratory, to make the motion at the meeting of the Biological Board in Ottawa which resulted in the building of the permanent station at St. Andrews, New Brunswick.

E. W. MACBRIDE.

The Spotted Kudu.

In the *Times* of September 23 and the *Field* of September 24 (vol. cxvi, p. 607) I have given preliminary notices of the skull and skin of a hitherto unknown kudu shot by Mr. Ivor Buxton to the west of the Arusi plateau of Gallaland, in the Sahatu Mountains, and south-east of Lake Zwi, at an estimated height of 9000 feet above sea-level. As the owner has promised to present the specimen to the British Museum, I take this opportunity of making it the type of a new species.

The specimen is an adult bull, its full age being indicated by the worn condition of the cheek-teeth. The head, neck, and body are covered with coarse dark-brown hair, much more like that of a Kashmir stag or a mule-deer than that of either of the striped kudus, and the fronts of the legs are dark greyish-brown, and the remainder grey. The throat and chest lack the abundant fringe of long hair characteristic of the typical kudu, but are marked by two broad patches of white, one above the other, while the body-skin shows large white spots on the flanks and hindquarters, but no kudu-like stripes. The face has the usual tragelaphine white markings. The horns are of the kudu-type, but with a much more outward direction, and are greatly inferior in length to those of the typical species, their tips being worn to a

yellow straw-colour, as in the nyala and situtunga. They have also a more distinct back ridge than in other kudu horns, and thereby again approximate to those of the two last-named species; while the bony cores have no ridge corresponding to that on the sheaths. The skull has a transverse diameter of $4\frac{1}{2}$ inches across the orbits, and a contour length of $15\frac{1}{2}$ inches, the corresponding dimensions in a skull of the typical species with horns of the same length being $5\frac{1}{2}$ inches and $14\frac{1}{2}$ inches.

The spotted kudu, as I have called the new species, is in great degree intermediate between other kudus and the situtunga and nyala. It agrees approximately in size with the typical kudu, but in horn-characters is to a certain extent intermediate between that species and the situtunga or nyala. In the presence of a white patch on the throat and a second on the chest it resembles the lesser kudu and situtunga, as it also does in the absence of a neck frill; but in its long, coarse, dark, and white-spotted coat it comes much nearer male situtungas and nyalas than to either of the striped kudus. The ears are rather narrower and more pointed than in the typical kudu.

I propose to name the species *Strepsiceros buxtoni*, reserving for future consideration the question whether this species does not render it advisable to merge the genus *Strepsiceros* in *Tragelaphus*. If that course were adopted, the typical kudu would become *Tragelaphus strepsiceros*, the lesser kudu *T. imberbis*, and the spotted kudu *T. buxtoni*.
R. LYDEKKER.

The Habits of Worms.

So little is known about the habits of worms that it seems desirable to place on record any new observation calculated to throw light on the subject. On September 17 I received from Mr. Edwards, curator of the Worcester Museum, a small tube containing about half a score of living worms. The letter which accompanied the tube informed me that the worms were found in a lavatory basin. It was assumed that they had found their way up through the waste-pipe, as none had been found when the plug was fixed in the bottom of the basin. The worms were taken in the morning when the plug was not inserted, and when the water had been very slowly dripping all night. They were found singly, but when placed in a tube coiled themselves into a ball, and were difficult to separate. Each worm was about three-quarters of an inch in length, possessed of red blood, and having five to eight setæ in each bundle. These features, together with the shape of the brain and spermathecae, show the species to be *Pachydriulus subterraneus*, Vejvodsky. It was first described in 1889, and on April 8, 1892, I received it from the late Dr. Plowright, of King's Lynn. This was the first British record; but it has since been found by Mr. Southern and myself in various parts of the British Isles. It was obtained by Prof. Vejvodsky from the underground waters of Lille and Prague, and has more than once been sent to me by irate persons who complained that it had been found in their drinking water.

Pachydriulus (*Lumbricillus*) belongs to the large and important order of enchytraeids, some of the species of which are parasitic upon plants, while others feed on decaying leaves and vegetable matter, and yet others live in the water. As I am preparing a monograph of British annelids for the Ray Society, I am exceedingly anxious to obtain information and materials for making the work complete, and shall be grateful if observers will submit specimens of annelids of all kinds for identification, together with observations of their habits.

HILDERIC FRIEND.

Swadlincote, Burton-on-Trent.

Erasmus Darwin on Flying Machines.

PROF. MELDOLA's reference to Erasmus Darwin's prophecy of flying machines (p. 370) omits the most remarkable proof, as it seems to me, of his insight into the future. The verses which he quotes are from Canto I., lines 289-96, of the "Botanic Garden"; on line 254

there is a note in which occurs the following passage (the italics are mine):—

"As the specific levity of air is too great for the support of great burthens by balloons, there seems no probable method of flying conveniently but by the power of steam, or some other explosive material, which another half-century may probably discover."

University College, London.

ARTHUR PLATT.

CAUSAL GEOLOGY.¹

IN science there can be no orthodoxy, and consequently there are no heresies. Prof. Schwarz's book will be read and circulated, instead of being burnt as a danger to established modes of thought. It will bring, in consequence, a freshness to those who have repeated, year after year, the same explanations of phenomena in their courses of instruction. They will feel much like the humdrum banker, who thinks that he really understands his business, until his son takes him one evening to the theatre, and he meets for the first time with the ideal villains of finance. The planetesimal hypothesis of Chamberlin is held by the present author to enable "one to build up a system of geology without an appeal to the unknown and the unknowable" (p. v). "Unknowable" is a rash word; but there is a good deal more of the unknown than of the known in the explanations of earth-structure put forward by Prof. Schwarz. We remember a paper of his, in which the former boundaries of continents and oceans were ingeniously deduced from a rock-fragment discovered in a southern isle. The present work includes speculations of a similar order of magnitude, but the underlying facts are marshalled more strategically, and far bigger battalions are brought into the field.

The planetesimal hypothesis, as developed by Prof. Schwarz, leads him to the conception of a cold earth, steadily growing in bulk by the accretion of meteoritic, or, as he prefers to write it, meteoric matter. The phenomena of the surface cannot, then, be caused by shrinkage of the interior, nor can volcanic action be ascribed to general internal heat. Earth-movements (p. 189) are said to develop sufficient heat to vaporise water in the crustal layers affected by them; all this water has crept down by capillary action from the surface, and may form outbursts of steam, shattering the sedimentary rocks around the orifice. If the heat generated is sufficient to melt the sediments, the product, with the water in it, appears as an ordinary upwelling of lava.

From the author's point of view, all gneisses and granites are derived from sediments by metamorphism in dissolving waters, or by actual melting (pp. 40, 221, &c.). The ultrabasic vents of Kimberley and Pretoria, so well known as the diamond-pipes, contain "meteoric matter of the centrosphere" (p. 198), since here faulting was sufficiently profound to melt up the ferriferous masses that underlie the ordinary crust. The faulting is accounted for by the transference of sedimentary matter from one part of the surface to another, the overlaid rocks flowing away under the pressure; and we are given to understand that melting, with production of granite domes, or of lava ready to arise in fissures, takes place where water is present, and where the pressure is most intense, instead of where pressure is relieved. A fine instance of revivalism in geology appears on p. 227, where Prof. Schwarz, rejecting Darwin's observations in South Africa, and *lit par lit* injection generally, urges that "thin laminæ of granite substance bedded in between metamorphosed sediments" may result

¹ "Causal Geology." By Prof. E. H. L. Schwarz. Pp. viii+243. (London: Blackie and Son, Ltd., 1910.) Price 7s. 6d. net.