

ancient universities. Surely it is not asking too much of some of our most distinguished men of science that they will follow in Huxley's footsteps, and once more bring home to our schools and universities the responsibility they are incurring by their attitude towards science in the education of the well-to-do classes.

Eton, June 13.

M. D. HILL.

The Rainbow.

In "Poems by Two Brothers," written by the Tennysons, and published in 1827, is a poem called "Phrenology." The following lines occur:—

"Shall we, with Glasgow's learned Watt, maintain
That yon bright bow is not produced by rain?
Or deem the theory but ill surmised,
And call it light (as Brewster) polarised?"

Can any of your readers kindly tell me (1) what view was held by James Watt about the rainbow? (2) If Brewster was the first to point out that its light is polarised? Brewster states that he observed the fact in 1812. (3) Having regard to the date (1827), what were the most probable sources of information to which the writer of the poem was indebted?

Lord Tennyson kindly informs me that the poem was probably written by Charles Tennyson.

CHAS. T. WHITMELL.

Invermay, Hyde Park, Leeds, June 5.

The Mass of the α Particle.

Just too late to prevent the publication of my letter of last week, I perceived that the arguments contained in it are valueless. Rutherford's estimation of the number of α particles is based on the assumption that the charge on each of them is e , and cannot be used to prove that proposition. The numbers given only show that the heat energy radiated by radium is approximately equal to the kinetic energy of the α rays, as has been pointed out by Rutherford. I regret that this foolish mistake should have led me to trespass needlessly upon your valuable space.

NORMAN R. CAMPBELL.

Trinity College, Cambridge, June 14.

Animal Messmates.

WHILE searching for marine animals on January 14, I came across some large specimens of *Ciona intestinalis*, which I kept for some time in a large bottle. After a while I noticed a small worm emerging from the larger or exhalant siphon, which, on examination by a competent authority, proved to be a small example of the nemertine worm *Drepanophorus rubrostriatus* = *Amphiporus spectabilis*, Qtrf. Other worms of the same species afterwards emerged, about ten being observed altogether. The *Ciona* betrayed no apparent annoyance at the egress or return of the creatures, though it withdrew its siphons at the slightest touch of any foreign objects. This observation seems to be a new instance of "animal messmates," or at any rate of the use of an ascidian's test for purposes of shelter by an active creature.

This has been confirmed on several subsequent occasions by myself and others; in one instance, a small *Ciona*, from which not fewer, but possibly more, than fifteen worms issued, the creature was so transparent that the worms could be observed moving about in its interior.

FRANK S. WRIGHT.

Guernsey, June 10.

Decomposition of Radium Bromide.

WITH reference to Prof. Porter's note in NATURE of June 13 (p. 151) on the odour of bromine detected on opening a sealed tube of radium bromide, it appears that the minimum quantity of bromine that is detectable by smell is between the orders 10^{-8} to 10^{-10} grams per cubic centimetre of air. This result has been obtained by the progressive dilution of a definite volume of bromine vapour. It may be mentioned that the vapour of bromine is just detectable by its odour at the temperature of liquid air.

ALFRED C. G. EGERTON.

University College, London, June 17.

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THE DESTINY OF MAN.¹

THE present volume contains three essays reprinted from two recent addresses and one article by the author. They have been slightly modified and freely illustrated for the present purpose. The first essay, "Nature's Insurgent Son," was delivered as the Romanes lecture at Oxford in 1905. It traces the history of man and his rebellion against nature, shows that his inevitable destiny is to transform rebellion into conquest, points to the causes of delay and the special responsibility for their removal which belongs to our universities.

The second essay, "The Advance of Science," served as the presidential address to the British Association at York in 1906. It gives an account of man's campaign against nature during the last twenty-five years. It is triumphantly successful in the difficult feat of rendering supremely interesting a brief general account of advance in all the great departments of science.

The third essay, "The Sleeping Sickness," reprinted from the *Quarterly Review*, gives an account of this recent terrible scourge of tropical Africa, and the attempts which have been made to deal with it. This essay is the other side of the picture presented in the second. The latter told of splendid successes in the warfare with nature; the present essay gives a startling example of those haphazard, unintelligent methods which bring terrible disaster upon man.

In attempting to give some account of this arresting and important work in the brief limits of the allotted space, I have thought it best to confine my attention to the central argument founded on man's history, rebellion and destiny. This argument, developed in the first essay, appeals strongly to the imagination, and supplies a powerful motive force which has been wanting in the case of earlier appeals for reform.

"Man is held to be a part of Nature, a product of the definite and orderly evolution which is universal; a being resulting from and driven by the one great nexus which we call Nature. He stands alone, face to face with that relentless mechanism. It is his destiny to understand and to control it."

This statement of man's origin is rightly held to contain no implied degradation—rather the reverse. It is only a superficial and ignorant view which sees in evolution the dominion of "chance." "The conclusion that Man is a part of Nature . . . is in fact a specific assertion that he is the predestined outcome of an orderly—and to a large extent 'perceptible'—mechanism." It was of importance to urge this conclusion again, a conclusion set forth, as the author states, by Tyndall in his presidential address to the British Association at Belfast in 1874, and again stated and admirably illustrated by Huxley in 1887.² But the error refuted in 1874 and 1887 was still alive and vigorous in 1905, and there is reason to fear that even now it is not wholly extinct.

The emergence of man—perhaps in Lower Miocene times—is shown to be the grand example of an evolution also witnessed in other animals. In many of the early Tertiary Mammalia, as well as in the ancestors of man, it is probable that mechanical form and function had reached a climax. From this point the struggle was conducted and evolution proceeded on a higher plane, and led to progressive increase in the size and powers of the brain. The author suggests the convincing hypothesis³ that this sudden growth

¹ "The Kingdom of Man." By E. Ray Lankester, F.R.S. Pp. xii+191. (London: Archibald Constable and Co., Ltd., 1907.) Price 3s. 6d. net.

² "The Life and Letters of Charles Darwin." Edited by Francis Darwin. Vol. ii., Chapter v., Prof. Huxley on the reception of the "Origin of Species," pp. 100-201.

³ First published in "Cinquanteenaire de la Société de Biologie." Pp. 48-51. (Paris, 1877.)