A large part of the difficulty arises from the different points of view taken by the electrician and the physiologist respectively, the electrician being concerned chiefly with the surfaces of conductors, the physiologist being interested chiefly in the interiors of living tissues.

Thus the above expression, "region A," is electrically ambiguous, for it may mean (1) either the *surface* of the region A, or (2) the *interior* of the same: certainly physiologically (and it may be also electrically) these are two very different things.

Are we speaking of surfaces or interiors when we talk of tissues and their electromotive states? This seems to me the gist of the initial obscurity.

In Dr. Waller's terminology A is "zincative" to B; but the electrically-minded student wishes to distribute his + and − somehow. The electrician says A is "negative" to B, because he is thinking of the surface at A to which current has been coming from B, as he finds by the galvanometer; but the physiologist, conceiving of what is going on *inside* the excited portion of tissue A, says, or should say, "A is electropositive to B," because he finds that current in the tissue must have come from A to B. The ambiguity is bound up with not distinguishing the surface from the interior.

All doubt, it seems to me, is removed when we say, the region A is, as to its interior, electropositive to B, but as to its surface electronegative to B; as to its *interior*, A is a "*positive plate*," as to its *surface* a "negative pole." Both these ideas are necessarily connoted by "zincative," only implicitly, however; for teaching purposes they must be made also explicit.

"Negativity of action" is then intelligible when it is distinctly laid down that it is only the *surface* of the active region that is being considered, for if the interior of the active tissue is thought of, then positivity of action must be the term descriptive of the electrical state.

If, then, the qualifying term "internally" or "externally," as the case requires, be added, no loophole for confusion is left; thus, A is internally electropositive to B, externally electronegative to B; B is internally electronegative to A, externally electropositive to A; for "externally," "galvanometrically" may be used.

Personally I think the use of the term "negativity of action" is, especially if used in teaching, objectionable, because misleading and mysterious; "internal positivity of action" certainly seems to describe a real state; as terms, the one is but the converse of the other. I have, however, no more sympathy with those people who persist in finding "negativity of action" entirely meaningless than I have with those who will not understand "negative pressure" or negative quantities of any kind.

DAVID FRASER HARRIS.

Physiological Department, University, St. Andrews, October 31.

The Engineer's Unit of Force.

IN a review of some recent works on mechanics in your issue of October 19, the reviewer calls to account two of the authors whose books are reviewed for "implying that the unit of force in the engineer's system is a variable quantity."

Perhaps there may be others than the authors referred to and myself who would welcome more explicit enlightenment on the subject of the constancy of the engineer's unit of force.

D. J. CARNEGIE.

October 23.

THE engineer's unit of force is equal to the earth's present attraction on the standard pound mass at a specified place, viz., for this country, *London*. Its magnitude is such that it produces unit acceleration when acting on a mass of 32·182 . . lb., the engineer's unit of mass, sometimes called a slugg (sluggish). The formula $M=W/g$, where M is the mass in sluggs, is true for any latitude, g being the acceleration of gravity there, and W the weight of the mass in pounds force, as would, for instance, be registered at the place by a massless spring balance which had been graduated in London. If the pound-poundal system of units is an absolute dynamical one, so also is the pound-slugg-or engineer's system.

THE REVIEWER.

PROF. LANKESTER'S "EXTINCT ANIMALS."[1]

THOSE who, like the writer, had the good fortune to be present at the Royal Institution last Christmas and listened to Prof. Lankester's course of holiday lectures to young people will recall the fact that, although a goodly space was occupied by boys and girls from school, the theatre was elsewhere crammed with "grown-ups," who were quite as much interested and amused as the juvenile audience for whom these discourses were really designed.

It is, in fact, an open secret that quite elderly young people, as much as schoolboys and girls, enjoy their "ologies" when given to them in a form easy of digestion and with as few hard words as possible.

Before the memory of those pleasant afternoon discourses has faded from our minds comes a reprint of them in book form, with reproductions of more than 200 of the illustrations given in the text as we saw them on the screen.

Every boy and girl who heard those lectures will wish for a copy of this charming book, and those who did not will now read with delight the pictured story of extinct animals for themselves; nor will the "old boys" fail to take it up also.

Prof. Lankester explains that extinct animals are those which no longer exist in a living state. Animals, of course, die daily, and men too, but the lecturer tells us of extinct *kinds* of animals which no longer exist on the surface of the globe in a living state, although once they flourished and held their own.

He then informs his young friends of his own early experiences as a boy in visiting the British Museum and being fascinated by the huge head of an Ichthyosaurus from Lyme Regis with its large and bony-plated eyes, and its jaws, more than 3 feet in length, armed with powerful teeth.

Then the huge ground-sloth from South America attracted his wonder and admiration by its vast bulk, and he learnt that living upon the leaves of trees, but being too heavy to climb, it stood on the ground and pulled the trees down to it in order to feed on the young branches.

Their remains, often with the bones of the same individual lying in one spot, occur in the vast "pampas formation" and in the alluvial mud of the great rivers such as the La Plata. Here, too, one meets with the giant armadillo, and another strange creature, called the Toxodon, like a huge guinea-pig, nearly as big as a rhinoceros, with tremendous chisel-like teeth in front.

Prof. Lankester shows the thigh-bone of a giant reptile from North America more than 6 feet long (known as Atlantosaurus). What the size of the entire animal must have been we can best judge by paying a visit to the Cromwell Road Museum to see the skeleton of the Diplodocus lately set up there, which is 80 feet long and fully 14 feet high!

Passing rapidly over such forms as the ancient rhinoceros, the northern hippopotamus, the beaver, and great auk—once common in Britain, but now extinct—the author tells how zebras, quaggas, antelopes, and giraffes are being fast killed off in Africa by our sportsmen, whilst the dodo and "Steller's sea-cow" were eaten up long ago, like the giant tortoises, by our early voyagers, who victualled their ships with these rare animals.

The author next explains the causes which have brought about the migration of some animals and the extinction of others, and how changes of climate and

[1] "Extinct Animals." By E. Ray Lankester, M.A., LL.D., F.R.S. Pp. xxiv+332; with 218 illustrations. (London: Archibald Constable and Co., Ltd., 1905) Price 7*s*. 6*d*. net.

alterations of coast-lines have modified the existing lands so much that, as in our own islands, Great Britain and Ireland were, at no remote geological time, joined to France, and a continental, instead of an insular, climate prevailed here, with hotter summers and colder winters, suited to the mammoth and reindeer which roved quite freely from land to land.

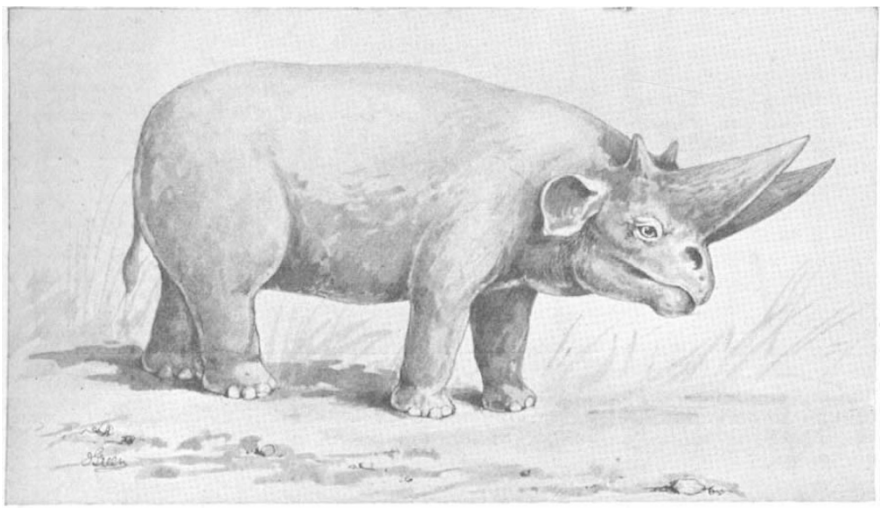

FIG. 1.—A drawing showing the probable appearance in life of Arsinöitherium (original); from the Upper Eocene of the Fayûm, Egypt. From Lankester's "Extinct Animals."

He explains what "fossils" are, and how the sedimentary deposits, in which extinct organisms occur, have been gradually laid down on the sea-floor or along coast-lines. From minor changes he illustrates those greater ones which took place long since involving whole continents, so that where London now is was formerly the sea with marine shells and fishes, aptly reminding one of Lord Tennyson's lines:—

"Oh Earth! what changes hast thou seen—
There where the great street roars
Was once the stillness of the central sea."

The story of the living and extinct elephants is well told, and we get the latest evidence of the progenitors of these very ancient prehistoric beasts, the result of Dr. Andrews's explorations and discoveries in the Fayûm, Egypt, which has carried their ancestry back to the Eocene Palæomastodon and Meritherium. Near to the elephants comes the wonderful Arsinöitherium, also from the Fayûm, with a pair of prodigious horns on the front of its skull, a form of animal which may possibly have had a short proboscis like the tapir (Fig. 1).

The birds and reptiles come in for due share of attention, and from their striking forms they add largely to the attractiveness of the illustrations. The comparison of the wings of Pterodactyle, bird and bat is most instructive, showing that reptiles, as well as mammals and birds, enjoyed the power of flight, as some also equally possess the power of swimming. Dimetrodon was undoubtedly a swimming reptile (see Fig. 2).

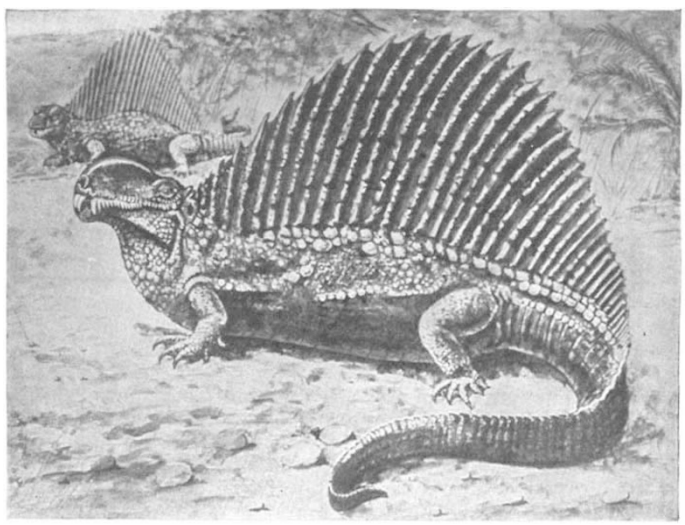

FIG. 2.—Probable appearance in life of the Theromorph Reptile, Dimetrodon, from the Permian of Texas. As big as a large dog. (It had a huge back-fin, evidently fitted for aquatic progression.) From Lankester's "Extinct Animals."

Fishes, Mollusca, scorpions and Crustacea, also "sea-lilies," are dealt with in these lectures, and, as might naturally be expected, these simpler forms of life made their appearance far earlier in geological times than the more highly organised creatures now living on our earth.

More surprising still is it to find that the marine king-crabs (Limulus) and the scorpions (the latter at first aquatic, and afterwards terrestrial air-breathers) which are met with in the Upper Silurian rocks in America, Scotland, and Sweden have survived all the Old World changes of land and sea, the king-crabs being still found living in the China and Indian seas and on the east coast of North America, and the scorpions have spread over the *dry lands* of North and South America, Africa, and other countries, and are so little changed in appearance—whole generations of other animals having appeared and disappeared entirely—that we might almost imagine they would go on for ever!

Although it would be quite impossible for the author or anyone else to describe so vast a number of groups of living and extinct organisms in one series of lectures and afterwards to present them in book form with more than 200 illustrations in a single volume of 350 pages, at least Prof. Lankester knows how to give, in an attractive form, a vast amount of information agreeably, and to excite the interest of the merest tyro (whether young or old) and awaken a desire in him or her to learn more. Fortunately the author is also director of the Natural History Museum, where he has abundant opportunities to add still more to our personal knowledge of extinct animals.

We give the book a hearty welcome, feeling sure that its perusal will draw many young recruits to the army of naturalists and many readers to its pages.