

morphology, *i.e.* their genetic relationships as expressed by their structure. In working out these relationships, as every morphologist knows, it is essential to have due regard to structure as a whole, collecting and weighing the evidence afforded by all the various organ systems of the body. The group name Dipnoi, or Amphibia, or Reptilia, or Aves, or Mammalia, connotes in each case a particular assemblage of structural characteristics relating to the entire structure of the body.

Now it is particularly desirable to bear in mind that when an extinct animal is allocated to one of the larger classificatory groups, this is done as a rule on no more sure basis than a knowledge—often a very imperfect knowledge—of the inorganic portions of its skeletal system, and consequently such allocation is, as regards the probability of its being correct, on a totally different footing from the assignment of a modern animal to its taxonomic group after full consideration of its whole structure. It is quite impossible for any one to say whether a palæozoic creature now included in the group Dipnoi or Crossopterygii would, or would not, have this inclusion justified were we acquainted with its general structure apart from the skeleton. The same consideration indicates to us how vain were the old controversies as to whether the ancestor of the group Mammalia was an amphibian or a reptile. Even had we before us the undoubted skeleton of that ancestor in perfect condition, we should still require to know about its soft parts—its skin, its heart, its main blood vessels, its brain, its urinogenital organs, its embryonic membranes, and so on—before we should be justified in concluding definitely in which, if either, of the two groups named it should really be included.

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#### Some Interesting Tracks of Alpha Particles in Gases.

SELECTED photographs taken from about ten thousand exposures show a number of types of alpha ray tracks, some of which have been described before and some have not. Fig. 1 gives a track in which

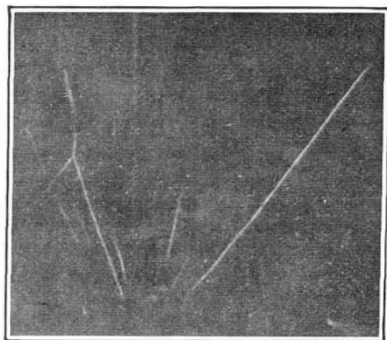


FIG. 1.

it is apparent that the alpha particle hits the nucleus of an oxygen or nitrogen atom. The nucleus is projected forward at a very high speed, while the alpha particle is reflected backward at a sharp angle. In Fig. 2 the track is an almost straight line with a branch which goes off at an angle of about  $8^\circ$ . In some instances the branch is at an angle as great as  $50^\circ$  with the straight track. An example

of this is given in Fig. 3, though in the plane of the photograph the angle is only  $40^\circ$ . In some instances another type of track is given, in which one of the

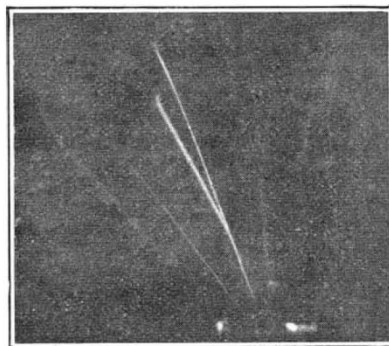


FIG. 2.

branches is very short, the other very long. It is not unlikely that some of the longest tracks are due to hydrogen nuclei. A discussion of the tracks will be published very soon in one of the physical journals. All the photographs were taken by the Shimizu-

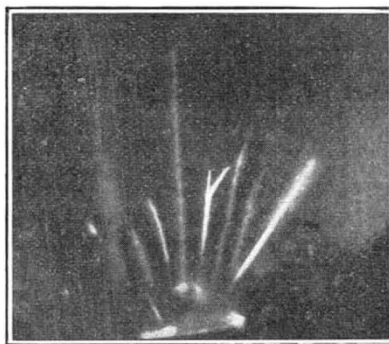


FIG. 3.

Wilson method, by means of which many more photographs showing views at right angles will soon be taken.

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#### The Age and Area Hypothesis.

IN a paper by the late Prof. D. P. Penhallow, of McGill University, Montreal, entitled "A Review of Canadian Botany from the First Settlement of New France to the Nineteenth Century, Part I." (Proceedings and Transactions of the Royal Society of Canada for 1887, volume 5, section 4, pp. 45-61, 1888), the following passage occurs:

"But Michaux appears to have attached a much wider importance to his prospective work, and to have regarded it more from a scientific point of view, since he had already conceived the idea that the distribution of the trees of America should be studied, and that it would be possible to ascertain their original centres of distribution through careful observation of their dimensions and predominance in different parts of the country. It was the elaboration of this idea that largely led him in so many directions, and over so wide a range of territory" (D. P. Penhallow, Proc. and Trans. Roy. Soc. Can., 1887, 5, sect. 4, pp. 55-56, 1888).