

A. antennina, L., stems clustered, usually simple; hydrothecæ separated by 2 joints. 6 to 9 in. high. Gen. distr. deep w.

A. ramosa, Lamk., stems single, usually branched; hydrothecæ separated by 1 joint only. 6 to 9 in. high. Gen. distr. deep w.

Now there are *no* nematophores along the stem, but only on the pinnæ; *A. ramosa* may sometimes grow up unbranched, but I for one never saw it so, and *A. antennina* is always simple, save by the rarest individual abnormality; the dimensions are quite inaccurate, for we have *A. antennina* here of all sizes up to 24 inches high. The distribution given is too vague. In the report of the B.A. Committee, which Prof. Herdman goes by, deep water is defined as that below 100 fathoms; but these two are not deep-water species, either in that or any other common use of the phrase. The authorities are very loosely given. *A. antennina*, L., should be (L.), and if the bracketed authority, *i.e.* the original user of the specific name, is to be the one quoted, then for *A. ramosa*, I think Lamk. should give place to (Lamx.). And why is the authority for the genus left out altogether?

Moreover, even if these definitions were verbally accurate so far as they go, they would only suffice to exclude one another, with no reference to other non-British species. They are rather definitions of groups of species or sub-genera, than of these two particular forms. It would not matter very much, perhaps, in this case, where other species are not likely to turn up upon our coasts; but such definitions, drawn with reference only to known British forms, would soon lead to hopeless confusion in the case of less-known groups.

D'ARCY W. THOMPSON.

Dundee, January 11.

On an Abnormality in the Veins of the Rabbit.

AMONGST a number of rabbits dissected in my laboratory last term, one specimen exhibited a peculiarity in the venous system which is especially interesting in connection with Hochstetter's and Macalister's accounts of the development of the veins. Unfortunately the specimen had been too far dissected before the abnormality was noticed to follow out every detail.

The blood from the hinder extremities, urinogenital organs, and abdominal walls, passed into a large vessel having the position and relations of a postcaval posteriorly. Instead, however, of passing through the dorsal border of the liver to penetrate the diaphragm, it was seen at the anterior part of the abdomen to correspond to the azygos, receiving the superior intercostal veins, and opening into the right precaval. This vessel evidently, then, corresponded to the persistent right posterior cardinal. The portal system was apparently normal, and the hepatic veins opened into a postcaval, which extended through the diaphragm to the heart in the usual manner.

Thus the independently-formed section of the postcaval (*Leberabschnitt*) had taken on no connection with the part developed from the cardinals (*Urnierenabschnitt*), but had remained as a separate vein, bringing back the blood from the alimentary organs (and ? diaphragm) only.

I have not thought it necessary to do more than mention these facts, as the whole question has recently been fully discussed by Dr. A. Robinson ("Abnormalities of the Venous System and their relation to the Development of Veins," "Studies in Anatomy from the Anatomical Department of the Owens College," vol. i. p. 197, Manchester, 1891). The above case, however, supports the view that the renal veins are direct tributaries of the right cardinal, and not of the postcaval; while the reverse conclusion is derived from Dr. Robinson's observations.

W. N. PARKER.

University College, Cardiff, January 14.

Difficulties of Pliocene Geology.

YOU were good enough to print a letter from me a week or two ago, in which I called attention to some of the difficulties in explaining the distribution of the so-called Pliocene beds. I should like to prosecute the subject a little further.

The geographical distribution of the mastodon is assuredly one of the greatest paradoxes in natural science.

As is well known, it occurs both in North and South America, and on both sides of the Rocky Mountains and the Andes. It has not occurred, however, so far as I know, north of the great lakes in the east, nor of Oregon in the west, nor has it ever been reported from Alaska, where mammoth remains are so abundant. I do not know any evidence that it has been found anywhere in

Asia, north of the Himalayas, neither in China, nor Manchuria, nor Mongolia, nor Turkestan, nor in Siberia; nor has it occurred in European Russia, except close to the Black Sea, nor in Poland, nor in Scandinavia, nor in North Germany.

In the Old World its zone of distribution extended from India to the Pyrenees, including the Mediterranean borders, the valleys of the Danube, and the Middle Rhine, Eastern England, and perhaps Iceland, whence some teeth are said to have been sent to the royal collection at Copenhagen. This distribution of a very highly specialized beast is certainly most extraordinary. Granted that the mastodons of Western Europe and those of America are slightly different, the difference is so slight that, as Falconer says, Cuvier treated them as the same species, and they cannot have been very long isolated. Yet how are we to explain the facts, and do justice to the widespread view that the ocean areas are very old?

It seems to me as clear as anything can be that when the mastodon was distributed over Western Europe and America, there must have been a land communication between the two areas, and I cannot see how, with the facts before us, we can escape the conclusion that this connection must have been across either the Atlantic or the Pacific, not in high but in low latitudes, perhaps across both.

The mastodon is not the only animal which points the same lesson. The machairodus, a very highly specialized feline, has been found both in the Old and the New World, but did not inhabit the great palæarctic province of Europasia, east of the Rhine, nor America north of the great lakes. The American jaguar, a mere variety of the Old World leopard, is another animal with the same abnormal distribution, so are the American and the Old World tapirs.

Now this connection between the Old and the New World cannot, so far as we can judge, have been in high latitudes, for the forms in question have not occurred in high latitudes. If the connection had been across the Northern Pacific, we should have had some remains of these animals in Japan, where more than one fossil elephant has occurred; or in the Sandwich islands, which are, to all appearances, a very old land-surface.

The connection must, therefore, if it was across the Pacific, have been across its more equatorial part. It seems similarly to follow from the absence of these animals in the high latitudes of America and Europe, save the doubtful case of Iceland, that in the case of the Atlantic also the land-bridge must have been further south, and perhaps where the Atlantic islands still remain. One more inference. If there was a penannular or circular belt of land about the earth in the tropical or sub-tropical zone over which these beasts could travel, it would possibly account for the tertiary climate of high latitudes having been a warm one, as we know it was. A zone of land in the tropics would act as a furnace, whose heat would be widely distributed by the ocean currents in contact with it.

The views here urged, it will be said, are like those of the advocates of a Miocene Atlantis. They are in essence very different, and meant to explain a very different phenomenon, namely the aberrant and abnormal distribution of the mastodon and its companions. The mention of the Miocene Atlantis, however, suggests another and more critical difficulty in explaining the Pliocene beds, but this must be postponed to another letter.

HENRY H. HOWORTH.

The Athenæum Club, January 13.

Earthquake Shocks.

A SERIES of slight earthquake shocks have lately occurred in this district, *viz.* January 3, 2.15 p.m. at Severn Junction (E. J. L.); January 4, 11 a.m., Itton Court, Chepstow (a heavy plant stag in a greenhouse was seen to move four times by Mr. J. Curr and the Rev. N. S. Barthropp); January 5, between 2 and 3 p.m., and again on the 6th (a little earlier), Llanthony Monastery, (a rumbling noise on the Black Mountains near the monastery, Mr. P. E. Hill); January 14, 6.55 p.m., a shock lasting more than a second, Bigswear House, Coleford, Mr. J. V. Newbery (Mr. Newbery has had experience of earthquakes, from a long residence in Japan).

E. J. LOWE.

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The Weather of Summer.

I REGRET to find that, in making a quotation at the end of my letter last week (p. 246), I erred in supposing Mr. Symons to be the writer. I beg to apologize for the slip. A. B. M.