its details are already familiar, the picturesque clearness with which they are presented will make their knowledge more real and more complete. The standard of excellence maintained in the lectures makes distinction difficult and invidious, or we would distinguish the lectures on Newton and those on tides as models of what such popular scientific expositions should be. The book is copiously, and, on the whole, well illustrated, but some of the illustrations—notably those of clusters and nebulae—are very familiar and somewhat out of date. A curious mistake occurs on page 291, where a well-known drawing of a comet appears as an “old drawing of the Andromeda nebula.” The illustration on page 326, showing the paths of Uranus and Neptune and their relative positions from 1781 to 1840, and professing “to illustrate the direction of their mutual perturbing forces,” is partly misleading; but in introducing this Dr. Lodge has erred in good company, for the diagram, originally due to Dr. Houghton, appears in many of our recent astronomical text-books. A. T.

Electric Lighting and Power Distribution. Part I. By W. Perren Maycock, M.I.E.E. (London: Whittaker and Co., 1892.)

THIS cheap and useful little text-book has been written for the author's junior students, as he is of opinion that no trustworthy elementary work on the subject is to be obtained. The scope of the work has been limited to the syllabus of the ordinary grade examination of the City and Guilds of London Institute. We find, however, much information on subjects not usually found in other manuals. The book is freely illustrated, and the descriptions are clear.

It is very important for the junior student to understand clearly what is meant by a line of force, and to grasp the fact that lines of force are only *assumed* to exist, because, by such an assumption it is possible to explain many, otherwise inexplicable, phenomena. On page 47 we find the following statement:—“The power which any magnet possesses, of picking up pieces of iron, and of acting upon another magnet, depends upon the existence of lines of magnetic force.” This quotation is vague; a junior student might easily imagine that the lines of force really existed, whereas they are purely assumptions, to elucidate the phenomena of magnetic attraction. The illustrations of simple bar magnets, solenoids, and electro-magnets, in which the lines of force are delineated, should have the assumed directions of the lines of force clearly shown by arrow-heads. This might be done with advantage in Figs. 17 to 20.

Chapter IV. deals with induction of currents, electro-magnetic induction, Faraday's Law, and concludes with a clear description of magneto-motive force, magnetic resistance, magnetizing force, induction and permeability. These latter are very difficult for a junior student to understand thoroughly, and the author should have devoted more space to the discussion of these important points in dynamo construction. One particularly good feature in this text-book is the large number of questions arranged at the end of each chapter. These are well suited to test the knowledge of a student. Chapter V. deals generally with electrical testing, measuring instruments used in installations, and meters for measuring the current, such as Teague's, Elihu Thomson's, and the Wright-Ferranti. Chapter VI. concludes the book, describing the principle of the dynamo, different types of machines, and the construction of the various parts.

Taken as a whole this book attempts too much. The matter described has suffered considerably by condensation, a serious thing where junior students are concerned. Most of the illustrations are good; some are indistinct, and Fig. 98 is decidedly wrong, showing the brushes set for one direction of rotation, and the arrow indicating the reverse.

On the other hand the sequence of matter is good, and a student should learn much from the work. The author takes great pains to describe clearly the many units involved, particularly the applications of Ohm's law. The book would last much longer in the hands of the average student if the present paper binding were replaced by something stronger.

The Naturalist on the River Amazons. By Henry Walter Bates, F.R.S. With a memoir of the author by Edward Clodd. Reprint of the Unabridged Edition. With Map and Numerous Illustrations. (London: John Murray, 1892.)

THIS work is so well known, and has long held so high a place among scientific books of travel, that it is unnecessary to do more than note the appearance of a new edition. It is clearly printed on good paper, and the illustrations are well reproduced. The introductory memoir by Mr. Clodd is a most welcome record of the main facts of Mr. Bates's career. The materials for this interesting sketch were enriched by letters placed at the author's disposal by Sir Joseph Hooker and Mr. Francis Darwin. An excellent portrait of Mr. Bates is included in the volume.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

A Proposed Handbook of the British Marine Fauna.

SUCH a handbook as Prof. Herdman suggests is so much wanted that many naturalists must from time to time have felt tempted to essay it. But the difficulties are very formidable. Prof. Herdman seems to contemplate the preparation of such a work mainly as a labour of compilation. But the groups where compilation would nearly suffice are just those where the handbook is least required. On the other hand, such a group as the Amphipoda, in spite of Canon Norman and Mr. Stebbing's many papers, is still in great need of revision; it was only the other day that Canon Norman opened our eyes to our rich fauna of Mysidae, before which time no search among published records would have told us anything worth the having; we are in just the same position as to our British Cumacea, until Canon Norman again reveals the treasures of his cabinet; our Pycnogonids are almost as little known. In every one of these groups, and in many others like them, the preparation of a hand-list would need the experience of a specialist, just as much as the Tunicata would require Prof. Herdman's own special knowledge. The area to be embraced is another difficulty. Prof. Herdman proposes to take the British area as defined by “Canon Norman's” B.A. Committee in 1887, on which he himself served. But the committee's report was repudiated by Canon Norman himself, who afterwards suggested a wider “British area,” whose boundaries I fancied had since been recognized as more suitable by everybody. However the British area be defined, there will long remain a difficulty in the numerous forms not yet recorded from within it, but which are likely, or certain, to turn up when sought for. Such things as the parasitic and other Crustacea described of late years by Giard and his pupils from Wimereux form a case in point. I am inclined to think that to make in the first instance a hand-list of the whole fauna of the North Atlantic basin would be not a bit more difficult, but in some respects easier, than to restrict the list to the British area alone. That it would be incomparably more useful is certain. It would make a book not more than three times (perhaps little more than twice) as big as Carus's “Fauna Mediterranea.” And it would be a very important step towards that new *systema naturæ* of which the Germans are already beginning to talk, and which it is high time were begun.

But Prof. Herdman both asks discussion of his plan, and also invites criticism on his execution of it. Take his very first illustrative genus, which he tabulates as follows:—

ANTENNULARIA.—Stems simple or branched; pinnae verticillate; nematophores along the stems; gonotheca axillary, unilateral.

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.

Shirenewton Hall, Chepstow.

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.