

because it has been already done is so great, and the consequent material loss to the nation so serious, that the time cannot be far distant when the Governments of this and other countries will have no choice, but yield to the demands made for a moderate annual grant towards defraying the expenses incurred in preparing and publishing these indispensable aids to all workers in science.

OUR BOOK SHELF

Berly's Electrical Directory. Third Edition. (London and New York, 1884.)

THIS work consists of three separate directories, separately paged, but bound up together; the first, of 228 pages, relates to British trades and professions connected with electricity; the second, of 273 pages, is devoted to similar matters from America; whilst the third is Continental. Of the last, 71 pages are French and Belgian, 12 German, and 3 relate to other countries, chiefly Russia. This arrangement, though convenient probably to the compilers, strikes us as being bad for many purposes. The American and French sections are particularly full of information. The British section opens with remarks on the progress made in electrical business during the past year, after which come various tables and formulæ. These are by no means satisfactory. In the formulæ for dimensions of units, many of the numbers which should have been printed as powers are given as simple multipliers. Though the table begins with C.G.S. units, and professes to describe those accepted by the British Association and the International Congress of 1881, the ohm is given as equal to 10^7 absolute units and the volt as 10^5 , whereas the figures should respectively be 10^9 and 10^8 . All this is very misleading. So also is the following statement:—"Calling gravitation the natural unit of force, the absolute unit of force will be $\frac{1}{9 \cdot 81}$ th part of it." This statement ushers in the following definition:—"Unit of Mechanical Effect is the unit of force carried up through one centimetre, or $\frac{1}{9 \cdot 81}$ raised one centimetre."

Is it possible that this chapter on formulæ has been translated literally from the pages of some French writer who was in the habit of using a mixed metre-gramme-second system instead of either the centimetre-gramme-second or the metre-kilogramme-second system? With the exception of the scientific part, the editing appears to have been carefully and soundly done, and the commercial information is very extensive.

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. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

"The Unity of Nature"

It was, I think, in the course of last year, or of the year preceding, that I ventured to remonstrate against the use sometimes made of your columns by Mr. G. J. Romanes for the purpose of inculcating his personal beliefs, and disbeliefs, on subjects which lie outside the boundaries of physical science.

The observations made by him in your paper of March 20 upon the book I have lately published ("Unity of Nature") show that in that remonstrance I committed an offence which Mr. Romanes has not forgotten or forgiven. Nevertheless I must repeat it; and this time I have the advantage of his own confession, that "the pages of a scientific journal are not suited

to an examination" of those parts of my book which he has nevertheless denounced in your pages with unusual violence of language. If your pages are not suited to such an examination, neither can they be suited to comments which nothing but that examination could justify. The tone of these comments is a very clear proof of the necessity of our all keeping within the marches when we meet on neutral ground. Scientific facts and scientific hypotheses constitute that neutral ground. On the other hand, the bearing of these facts and of these hypotheses on questions of philosophy and of religion constitutes a separate region in which, if we meet at all, it must be outside the pages of a purely scientific journal. In that separate region it has always been my endeavour to argue without personal passion and without contumely towards opponents. I should be ashamed in any argument to display the animus which has in this case dictated the language of Mr. Romanes on subjects which, by his own confession, he has no right to drag into your pages. He may hold that the highest aim of the human intellect is to prove the mindlessness of nature. My book deals, and was intended to deal, with this philosophy; and I did not expect Mr. Romanes to like it. How much he dislikes it is remarkable. But he will find no passage in it which descends to the level of some of his comments.

Having dismissed, as irrelevant in your columns, the criticisms of Mr. Romanes on the "Unity of Nature" which have no connection with science, I now turn to some of those which have this connection, and are at least perfectly legitimate in their character.

Mr. Romanes is quite right when he says that I object to the "*newer philosophy*" which makes experience the source of instinct. In my view this theory is, in the strictest meaning of the word, nonsense, because experience is obviously a "synthesis of intuitions," and not the source of them. It is a plain fact that instinctive movements and instinctive sensations are the conditions precedent—the sole materials—of experience. Experience is nothing but the memory in living creatures of their own previous action on external things, and of the reaction of external things upon themselves. It is the combined consciousness of both which builds up what we call experience. But in every step of this process, whether of action, or of reaction, or of the combined memory of each, not one instinct only, but several instincts are concerned. Experience therefore is the result of instinct, and not the converse.

With this argument Mr. Romanes does not even attempt to deal.

He does, however, attempt to deal with my contention that instinct is always strictly correlated with organic structure, and that special instincts are always connected with "organs already fitted for and appropriate to the purpose." He says that my own case of the dipper ought to have taught me better; "for," he adds, "the dipper belongs to a non-aquatic family of birds, and therefore has no organs specially adapted to its aquatic instincts."

This argument, as an argument, is a *non sequitur*; and as a statement of fact is altogether erroneous. It is quite true that the dipper has not webbed feet. But it is not true that webbed feet are at all necessary for aquatic habits of a particular kind; nor is it true that the dipper is wanting in other peculiarities of structure which are most specially adapted to its peculiar aquatic habits and instincts. There are many birds which swim excellently well without webbed feet, as, for example, all the Gallinules, and some of the Tringidæ. The dipper does not need webbed feet, because it neither swims nor dives in deep water; and because on the other hand it positively needs feet free from web for grasping stones under rapid streams, as well as for grasping rock-surfaces in the places of its nidification. On the other hand, the structure of its wings, and above all the structure and texture of its feathers, are all specially modified and adapted to its aquatic habits.

It is for Mr. Romanes to prove, if he can, that the dipper once had an ancestor which began to dive in water, whilst as yet its wings had not a shape and a texture adapted to the purpose, and whilst its plumage was still pervious to water, and so was liable to be drenched and sodden.

Mr. Romanes protests against my suggestion that rudimentary organs may, sometimes at least, be the beginnings of a structure destined for future use, and not the relics of a structure whose use has been in the past. Yet in the same paper he himself suggests that the dipper may be on the way to having webbed feet, and only wants them now because it has "not yet had time to de-