

these the sea, stratification, coral; and lastly earthquakes and volcanoes.

Now this is just right. Physical Geography ought to contain the dynamics of geology, and not be a mere description of the physical condition of the globe. A description of the plateaus and primary mountain chains, and secondary mountain chains, and plains and new systems of all the countries in the world, and distribution of birds, beasts, and fishes, need to be what was called physical geography; and left the dynamical element, all idea of change and progress was almost entirely left out. All this descriptive constitutes geographical knowledge, but it is of the nature of information pure and simple, and has absolutely no value in education except as an exercise in memory, and as a basis for reasoning, supposing that this reasoning is ever expounded. But what Prof. Geikie gives us is the very life and soul of geological science, information on what the natural forces around us are doing, information as to what they are doing of the life kind elsewhere, and reasoning on the effect of these forces. It is a book which will at once rouse the curiosity of a child, and teach it as far as it goes in sound scientific method.

It is admirably adapted to be a reading book in elementary schools, and it is much to be hoped that it will be largely used. But for this purpose a cheaper edition ought to be published. J. W. W.

#### OUR BOOK SHELF

*Essential States of the Nervous System.* By R. H. Collyer, M.D. (H. Rowland)

It can only be with a feeling of regret that anyone can see so many pages, nearly 100, occupied with matter and experiments most of which had much better have been retained only among the conditions of the author's requirements, for by publishing them he lays himself open to the serious criticism of a non-appreciating scientific public. That Dr. Collyer was among the first to propose and employ anesthetics, we will not question, but he cannot expect to increase the number of his supporters by the publication of such a work as the above, if which his want of knowledge of the first principles of scientific method and physiological fact is revealed too clear. An instance or two will suffice to indicate the manner in which the subject is treated. Speaking of chloroform, he says:—"It is administered by the stomach. . . . It opens the arteries in immediate contact with the brain, through the eighth pair of nerves." This is very different from the explanation of the discoverer of that substance, and quite contrary to any explanation of value that has been since proposed. The physiological dogma on which the author bases many of his arguments is that "the lungs at every respiration send vital electricity to the brain, which has been first substituted to subserve the purposes of life." In a newspaper account of the relative chances of the Oxford and Cambridge crews for 1871, the author feels sufficient to justify the following valuable generalization:—"This endurance does not belong to mere size." We think these questions sufficient.

*The Structure, Pteridology, containing in a tabulated form, the chief characteristics of British plants.* By W. S. Hayward. (Hall and Dailly, 1872.)

Amos of ancient predictions, and not without its value. As a rule there is no class of scientific literature to be more curiously avoided than that which pretends to compass the whole of the elements of a science into a small portable volume; nowhere in the author's hand more egregiously required than in the compilation of text-books.

Mr. Hayward we do not suppose to have met with before as a botanical writer; this little book, however, evidences great care in its preparation, and the author is entitled not to claim for it too high a place. Its object is to "afford information to the lay, and also to refresh the memory of the more advanced botanist who, by examining on the spot any doubtful plant, may be served the trouble of carrying home specimens of illustration; it is not intended as a book for the study, nor as a treatise on the many essential and complete manuals of our leading botanists; but to be accepted for what it is, viz., 'A Botanist's Pocket-book.'" This purpose it may well serve; occupying not much over one page of this paper in time and space, it will be no great burden to the pocket of knapsack, and may frequently be usefully resorted to by a young botanist on the tramp, leaving more careful study still to be gotten home. A. W. R.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. He enters in letters of anonymous communications.]

##### Perceptions in the Lower Animals

An several persons were interested in Mr. Wallace's suggestion that animals had their perceptions of the colour of the objects which they have passed without them, yet, may perhaps think the following little fact worth giving. Many years ago I was on a small boat, and as soon as we came to a particular, the conditions pulled up for the fraction of a second. He did so when we came to a second point, and I then asked him the reason. He pointed to the off-hand wheel, and said that she had been long completely blind, and she would stop at every place on the road at which she had before stopped. He had found by experience that less time was wasted by pulling up the way than by trying to drive her past the place, for she was contented with a momentary stop. After this I watched her, and it was evident that she knew exactly when the conditions began to pull up the wheel frame, and why she stopped on the road, for she had it some time stopped at all. I think there can be little doubt that this sense recognized all these horses by her sense of smell. With respect to rats, no many have been recorded of their returning from a considerable distance to their homes, after having been carried away that up in baskets, that I can hardly believe them, though these stories are distributed by some persons. Now, as far as I have observed, rats do not possess a very acute sense of smell, and they seem to discover their way by sight and by hearing. This leads me to mention another thing here; I was a riding horse by railway from Kent to Yorkshire, to Fife, and then, in the late of Night. On the last day that I rode out west, my horse, when it passed large trees, was very unwilling to return to the left-hand side, and it several times in the distance. The fact was to make me aware of the fact, and I discovered the reason by means of a small dog and began to run in the roadway by a light horse, which was nearly in the direction of his home in Kent. I had ridden this horse daily for several years, and he had never before behaved in this manner. My impression was that he somehow knew the direction whence he had been brought. I should state that the last stage from Yorkshire to Fife was to almost the north, and along this road he had been ridden by my groom; but he never once showed any wish to return to this direction. I had purchased the horse several years before from a gentleman in my own neighbourhood, who had possessed him for a considerable time. Nevertheless it is possible, though the fact is possible, that the horse may have been born in the late of Night. Even if we were to estimate a sense of the points of the compass, of which there is no evidence, how can we account, for instance, for the parties which having congregated in numbers, only at one season of the year, on the shores of the Lake of Geneva, finding their way to that spot of land in the middle of the great Atlantic Ocean?

CHRISTIAN DOUGLAS

##### The Sense of Smell in Animals

The hypothesis put forward by Mr. Wallace in NATURE of the sense of smell, to explain the power possessed by some animals of