

accept the Greek MSS. attributed to Zozimus, Pelagius, Olympiodorus, Democritus, Mary the Jewess, and Synesius, as exact evidences of date or knowledge. In regard to more modern matters we regret to find no account of Robert Hooke's important theory of combustion. We are glad to observe that M. Hoefler does not echo the Wurtzian aphorism: "La chimie est une science Française, elle fut instituée par Lavoisier d'immortelle memoire." More liberally our author says, "Tout en suivant chacun une route différente, trois chimistes ont fondé, vers la fin du dix-huitième siècle, la chimie moderne: Priestley, Scheele, et Lavoisier, un Anglais, un Suédois, et un Français."

We should be glad to see in our own country the history of matter and of motion studied side by side with the history of languages and of numbers. Prof. Kopp lectures on the History of Chemistry in the University of Heidelberg, and no doubt his example is followed in other of the German universities. M. Hoefler's work is in many ways suitable for use as a text-book; it is cheap, it is anything but dull, and whatever the errors of arrangement may be, it contains a great deal of information.

G. F. RODWELL

OUR BOOK SHELF

An Essay on the Physiology of the Eye. By S. H. Salom. (Published by the Author.)

THAT the study of formal logic is not in itself conducive to sound reasoning will be acknowledged by many, but it is seldom that the truth of the statement is so fully illustrated as in the short work before us. The author has studied the writings of Hamilton, Mill, Bain, and others, and with a creditable enthusiasm endeavours to employ the new powers he thinks he has thereby acquired, in developing a hypothesis of his own to account for the phenomenon of vision more satisfactorily than those already accepted. An outline of the arrangement, which is partly disguised at first sight by the many technicalities and circumlocutions employed, will be almost, if not quite, sufficient for most of our readers. Commencing with a notion broached by Erasmus Darwin, that visual perception ensues from retinal motion derived through the motile force of light, the author hopes, "by turning the light of modern histological discovery on Darwin's theory of involuntary animal action, to succeed in convincing associational psychologists that this theory must henceforth be included in the creed of *a posteriori* thinkers." With this as a basis, the doctrine promulgated may be thus summarised. The eyeball being in a constant state of reflex action on account of the light acting dynamically on the retina, the motion thus produced exerts in the muscles surrounding the eye feelings of muscularity similar to those excited when we voluntarily determine ocular direction, and consequently without any voluntary effort, we are constantly aware of visual space properties. To prove this novel hypothesis the structure of the retina has to be fully entered into, and in a most ingenious manner solid fact is distorted to satisfy unsubstantial theory. Taking a single example of the reasoning employed, we find that it is necessary for the theory that the fovea centralis of the retina should be elastic; that it is so is evident from the following considerations:—"In the copious index of that exhaustive anatomical work, 'Quain's Anatomy,' under the heading 'yellow,' we find, in addition to 'yellow spot,' four substances *only*, namely—

Yellow cartilage,
 ,, fibres of areolar tissue,
 ,, ligaments of the vertebræ,
 ,, tissue.

And on referring to the pages of the book in which these subjects are treated, we discover that *they have the common property of being elastic.*" From this on one of Newton's rules for philosophising "we are bound to frame the following physiological induction,—*all yellow anatomical substance is elastic.*" We can hardly think that the author is not attempting to fool us.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

Atoms and Ether

ATTEMPTS to dispense, in physics, with the ideas of direct attraction and repulsion, however interesting, lead generally to a *petitio principii*, and I fear Prof. Challis's view, to which attention is called in NATURE of August 7, cannot be received as an exception.

For an ether of which the density can be varied is a substance that can be compressed and expanded, and what idea is in our minds when we speak of compression and expansion in a really continuous substance? Continuity implies space, and space that is full. Can space be more than full? When we say that a fluid is compressible and elastic, do we mean anything else than that it is made of parts which can be pushed closer together, and which, being so pushed, will push each other back? But this is repulsion and action at a distance. We do not alter the fact by calling the substance ether, and relieving it from the influence of gravitation.

Is a continuous substance, which is capable of compression, conceivable? I think not; or if it is, the conception is at once more difficult and more opposed to sensible experience than that of attraction and repulsion.

The substance of a bar of iron is not continuous. If I draw one end of it towards me, why does the other end follow? What can be the relation between the movement of my end of the bar and the ethereal vibrations which must propel the other end and all intermediate parts in the same direction?

Liverpool, Aug. 9

ALBERT J. MOTT

Instinct

Sense of Direction

THE perusal of the correspondence published in the February and March numbers of NATURE now to hand, and also your article on "Perception and Instinct in the Lower Animals," in the number of March 20, has induced a belief in my mind, that I may perhaps be able to contribute some evidence bearing upon the question at issue; and also that it may have some value from having been obtained from a field of observation not generally accessible, and from the fact that cattle and horses in Australia are subject to very different conditions to those obtaining in England.

I may commence by stating that the question, whether animals have or have not a peculiar power of finding their way from place to place, suggested itself to my mind very shortly after I first went into the Australian bush, now more than twenty years ago. It was not long before I satisfied myself that in many horses this faculty was strongly developed, but yet unequally in different individuals. I afterwards ascertained that it also existed in cattle.

Not only did I find that horses had extensive memories for places, being enabled to recollect a track they had followed some time previously, but also to remember the way from one place to another where no track existed. I found that not only had horses this exact memory, but that they possessed another gift which at first appeared to me inexplicable. This was, that when ridden through the bush, many horses would never, for a moment, as it were, lose the recollection of home, but "bear away" in its direction. I remarked this not only in a district with which the horse might be acquainted from grazing in it, but also when travelling and absent for the day from my camp, and from the other horse or horses, the "mates" of the one I rode.