

taken as the necessary basis on which to build up the complete picture of such region as the sphere of human activity." A book constructed on these lines claims attention at the outset; and when, as is the case with the volume before us, the pages give evidence that the author is thoroughly familiar with all the geographical facts pertaining to the region with which he deals, we have the factors which combine to make a work useful as an educational instrument, valuable for reference, and interesting to geographical readers. It is, indeed, not too much to say that no book now in existence contains within such a small compass so much accurate information on the African continent as is given in Mr. Heawood's little volume. The book should be widely used in schools, and for this purpose the summary of the geography of Africa will be found very serviceable. To every one who wishes to possess a concise statement of the physical features, native inhabitants, history, and political development of Africa, the volume can be confidently recommended.

Crags and Craters: Rambles in the Island of Réunion.

By W. D. Oliver, M.A. With illustrations and a map. Pp. xiv + 213. (London: Longmans, Green, and Co., 1896.)

If we were going to Réunion (Bourbon), or had lately come back from it, we should be very glad to fall in with such a book as this. It gives an account of the experiences of an energetic man who spent six months on the island, and went about wherever curiosity led him. There is a good map and several photographs. The only illustration that is not a photograph is wretchedly bad. Our author writes easily and clearly, and has evidently taken pains to collect plenty of detailed information. Here the reader finds geography, history, statistics, scenery, manners and customs of the people—almost everything that can be desired, except natural history. What a pity that Mr. Oliver did not inquire beforehand what the naturalist wants to know about Réunion! Prof. Newton, of Cambridge, would have put him in the way of doing some really good work. A little fresh information about the extinct, or nearly extinct, birds, and the gigantic land-tortoises (if there are any in Réunion) would have greatly enriched the book. In spite of this deficiency, "Crags and Craters" is a valuable contribution. The schoolmaster in search of graphic details about the islands of the Indian Ocean would find much good stuff here.

L. C. M.

Everybody's Guide to Photography. By "Operator." Pp. 162. (London: Saxon and Co.)

AMATEUR photographers are now so very numerous, that this book should find a large number of readers. There are hints on the choice of a photographic outfit, and simple directions on all the operations concerned in the production of good negatives and prints. Instructions are also given how to make enlargements and lantern slides, and on the use of orthochromatic plates, the production of stereoscopic photographs, flash-light photography, and Röntgen ray pictures.

Is Natural Selection the Creator of Species? By Duncan Graham. Pp. xviii + 303. (London: Digby, Long, and Co.)

ACCORDING to the author of this book, evolution by natural selection is a snare and a delusion. Wherefore, he comes forward to sweep away the whole fabric of evolution, and to show "that the condition of the earth and its inhabitants cannot be explained by the action of physical forces, independent of support and direction from an intelligent power." His qualifications for this task may be judged from the avowal that, although he has studied the nature and habits of animals and plants for many years, he has never discovered evidence that conclusively indicated evolution.

NO. 1425, VOL. 55]

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.]

The Force of a Ton.

THE hydraulic forging presses at the Armstrong works, which I had the privilege of visiting a short time ago, bore the inscriptions—2000 tons—5000 tons; meaning thereby the thrust exerted by the ram; and Dr. Lodge's opinion that the word *weight* should be supplied was rejected by the engineers, as the addition of the word *weight* would imply that the presses weighed 2000 or 5000 tons.

It is quietly assumed by Dr. Lodge and his followers that the word *weight* is never used except to denote the force with which a body is attracted by the Earth; as if we should never translate *weight* by *pondus*, *un poids*, *gewicht*, but always by *grave*, *un grave*, *schwere*; as in Galileo's memoir "De motu gravium naturaliter accelerato." To support this assumption the Act of Parliament on *Weights and Measures* is always quoted in a garbled form, with a view of making out that the standard Pound Weight is really not the lump of platinum specified in the Act, but the pressure on the bottom of the box in which it is preserved; probably with the mental reservation of the Mikado, "this is the careless way in which the Act is drafted; we will have it altered next time."

Thus the weight of the standard pound weight should, in Dr. Lodge's language, be given as 32.1912 pounds, when at rest in the box at Westminster, and when it is high-water at London Bridge, but changing suddenly to about 32.2382 pounds when tossed in the air. What the thrust of 5000 tons would become when expressed in pounds, funals, or even tons, it is fearful to contemplate, as well as the pressure of the water in the press or modern steam pressures in pounds on the square foot.

If this controversial question is studied historically, it will be found that Prof. Perry is quite right in maintaining that the quantity denoted by *m* in Dynamics, and called the *mass*, is measured in units of *inertia*; the unit of inertia being that quantity of matter which receives unit acceleration from the unit force.

In all continental treatises, and in our own engineering works, the quantity *w/g* is replaced by the letter *m* and called the *mass*; this defines the unit mass as that quantity of matter which will receive the unit of acceleration from the gravitation unit of force.

Dr. Lodge changes to the absolute unit of force, and now replaces *m* by *w*; so that if the mass of a body is *m* pounds, it must weigh *m* lb.; and if moving with velocity *v* f/s, its kinetic energy is $mv^2/2$ foot-pounds, or $mv^2/2g$ foot-pounds; we have now come back to the engineer's measurement, except that his *w* has, for some mysterious reason, become *m*, and a different *m* to his *w/g*.

I agree with Mr. C. S. Jackson, to a certain extent in opposition to Prof. Perry, in the opinion that the substitution of *m* for *w/g* had better be abandoned; or, as a compromise, the letter *m* may replace *w*; because a body whose mass is *m* or *w* pounds must weigh *m* or *w* lb. in the balance; in ordinary language, its weight is *m* or *w* lb.

It is the old mediæval discussion of Nominalism and Realism over again; does the thing alter when we call it by a different name? If a steamer loads 1000 tons of coal, are we no longer to say that this coal weighs 1000 tons; or that 1000 tons weight has been placed on board? Are we to be compelled to say that the coal masses 1000 tons; and that it is 1000 tons mass?

In a redetermination of the volume of the gallon, Mr. H. J. Chaney has found that a cubic inch of distilled water, freed from air, and weighed against brass weights in air, when the temperature is 62° F. and the height of the barometer is 30 inches, is equilibrated by 252.286 grains; and this makes the volume of the gallon 277.463 cubic inches, according to the Act of Parliament (*Phil. Trans.*, 1892). Mr. Chaney calls this 252.286 grains the *mass* of a cubic inch of water; but if the same weighing is carried out in *vacuo*, according to another clause of the Act, an extra 0.266 grain must be added to maintain equilibrium; what are we now to call this 252.552 grains, with respect to a cubic inch of water?