by the phrase "a force equal to the weight of 10 pounds," which is neither clumsy nor absurd.

(10) "Except for the parts criticized above, on the units of weight, mass, and force, the present treatise shows that the author has read with profit and discrimination the most recent treatises on dynamics." I have been under the impression that in my treatment of these units I had, in the main, followed the most recent treatises on dynamics. May I ask in which of them units are treated in what Prof. Greenhill considers the proper way?

I would like to say also that the elementary proofs of the chief properties of the common catenary, which are given by me, are, with slight modifications, those given in Prof. Goodeve's "Principles of Mechanics." My indebtedness to his book is acknowledged generally in the preface.

I fear my desire to be brief may have made me appear curt. Let me express, therefore, my appreciation of the trouble Prof. Greenhill has taken to form a just estimate of the merits of my book, and of the kindly way in which he has spoken of it.

J. G. MACGREGOR.

Dalhousie College, Halifax, N.S., March 1.

Coral Formations.

I AM glad to see the theory that the internal lagoons of coral atolls are excavated by the chemical action of sea-water and the removal of carbonate of lime in solution is now being brought to the test of figures.

Mr. J. G. Ross (NATURE, March 15, p. 462) calculates from his experiments that in this way a sheet of carbonate of calcium half an inch thick can be removed annually from the surface of a lagoon, but strangely adds, "In other words at the same rate it would require about a century to deepen the lagoon one fathom." According to this method of calculating, 144 years is "about a century."

These figures no doubt suit the theory of the formation of coral lagoons very well, but they appear to me quite destructive of the other and co-relative view that the platforms upon which atolls have been formed have been built up by the accretion of the dead shells of pelagic organisms showered down from the surface of the ocean together with the shells of those organisms which have lived on the bottom. I believe that at no place on the surface of the globe are such dead shells being supplied at a rate that would even balance this supposed rate of chemical destruction.

Yet if these figures be correct we shall have to reckon upon the removal from such platforms of more than half an inch annually in consequence of the quicker action which it is said takes place through greater pressure at greater depths.

If, therefore, we accept the dissolution theory of the origin of coral lagoons, it seems impossible to believe in the building up of platforms of calcium carbonate on volcanic or other peaks from varying and unknown depths to the levels necessary for the growth of reef corals. If, on the other hand, we believe that platforms are so built up, it appears equally destructive of the dissolution theory of the lagoons.

Dr. Darwin indicated this difficulty in his letter to me, published in NATURE, November 17, 1887, p. 54, but the figures we are now supplied with enable us to realize it much more vividly. T. MELLARD READE.

Park Corner, Blundellsands, March 16.

The Movements of Scree-Material.

I PERUSED with interest the abstract of a paper on the above, read by Mr. Davison at the meeting of the Geological Society on the 29th ult.

The phenomenon seems somewhat akin to the movements in the "Stone Rivers" of the Falkland Islands, though another reason has been suggested by Sir Wyville Thomson as the cause of their progress.

Might it not be possible for motion to be produced in loose materials, and in the molecules of certain coherent substances situated at a high angle of slope, by continual though imperceptible vibrations in the earth's crust?

Apart from the changes wrought by alternating temperature, might not the "downward creep" in the lead on the roof of Bristol Cathedral—as observed by Canon Moseley—be due to a "settling down" of the molecules by the constant vibrations of sounds transmitted through the structure, and having their origin within and without? CECIL CARUS-WILSON.

Bournemouth, March 15.

Were the Elephant and Mastodon contemporary in Europe?

MR. HOWORTH asks this question in NATURE for March 15 (p. 463). Perhaps this extract from a translation of a note from Prof. d'Ancona, of Florence, will satisfy Mr. Howorth: "The soil of the upper Val d'Arno is ascribed to formations of the Pliocene period." In it have been found "*Mastodon avernensis, Elephas meridionalis.*" Twenty-four other animal remains are identified, all differing from the remains of the bone-caves. In both places respectively these relics belong to contemporary animals.

9 Sinclair Road, W., March 15. H. P. MALET.

EXPERIMENTS IN MOUNTAIN BUILDING.[1]

THE primary object of these experiments was to explain on what mechanical principles the remarkable rock-structures recently discovered by the Geological Survey in the North-West Highlands might have been produced. In experimenting on the behaviour of strata when subjected to horizontal pressure, it has been usual to regard large rock-masses as practically plastic bodies, and to imitate in the laboratory the great flexures and plications of Nature by compressing layers of clay, cloth, and other plastic or flexible substances. It was, however, evident, as soon as the true structure of the North-West Highland area was unravelled, that the rocks had, to a very large extent, behaved like rigid bodies under the enormous lateral pressure to which they had once been subjected. Instead of following the usual method of using plastic materials, the author therefore set to work to devise strata sufficiently rigid to snap rather than bend and become folded on the application of lateral pressure. It is to this peculiarity in the character of the materials, rather than to any great novelty in the methods, that the interesting results obtained are mainly due.

The experiments were of three distinct kinds. The first series was designed to explain the behaviour of strata when thrust horizontally over an immovable surface, and thus to throw light on the phenomena of "thrust planes," such as are now known to occur abundantly in the North-West Highlands between Loch Eriboll and Skye (see NATURE, vol. xxxi. p. 33). To simulate natural strata, layers of damp sand, foundry loam, or in a few cases clay, with laminæ of dry stucco powder between, were employed. In a few minutes the anhydrous powder absorbed enough moisture from the damp beds to enable it to "set" into tolerably rigid sheets. The rock which had thus solidified *in situ*, was next compressed horizontally, by pushing in, by hand, or with the help of a screw, the movable end of the long box in which the strata were formed. One side of the box could be removed at pleasure, and at the end of each experiment it was lifted off, and the section inside revealed, so that it could be photographed or copied if desired.

Fig. 1, which is drawn to a scale of $\frac{1}{12}$ of the original, shows the character of the section produced after the end had been pressed in 20 inches. The central light-coloured band, bounded by stiff stucco laminæ, has undergone no folding, but has become heaped up by means of a series of slightly inclined reversed faults, along which the constant pressure from the right found relief. For this structure the author has proposed the name "wedge structure," as the advancing mass is really raised by being forced over a series of wedges of undisturbed rock.

After pushing the piled-up mass a certain distance

[1] Abstract of a Paper by Henry M. Cadell, B.Sc., F.R.S.E., H.M. Geological Survey of Scotland, read before the Royal Society of Edinburgh, February 20, 1888.