

type of the diphtheria bacillus, he must be a bold man who ventures to say off-hand that this bacillus is or is not a diphtheria bacillus." Yet the same difficulty does not exist in diagnosing cholera or diphtheria.

I do not suppose that recognition-marks are wanting in many groups of higher animals, even higher invertebrates. The freshwater bivalves can hardly be supposed to present them, and hence their separation into species becomes exceedingly difficult. But it appears that recognition-marks need not be in colour or markings, but may be, and often are, in odour or voice, which are not observable in dead specimens. Thus the nocturnal lepidoptera, the species of which are often perplexingly similar, undoubtedly many of them emit subtle odours—too subtle usually for us to appreciate. So also, some species of birds are known, which are almost exactly alike in the preserved skins, but are readily distinguished in life by the song or voice.

T. D. A. COCKERELL.

Mesilla, New Mexico, U.S.A., February 7.

### The Force of a Ton.

Your readers will notice that Prof. Greenhill (p. 365) uses symbols as mere numbers, and that, so long as he does this, it can be of no possible interest or importance whether he writes  $m$  pounds or  $w$  pounds, or  $n$  or  $a$  or  $b$  or  $z$  pounds.

If he intends anything definite by his hint that "Dr. Lodge can testify to the treacherousness of  $g$ ," will he kindly give a reference? Perhaps he is thinking of NATURE, 1891, vol. xliii. p. 513.

It is a little surprising that the label "5000 tons-weight" on a hydraulic press capable of exerting that thrust, should be considered liable to mislead a practical man into supposing that the piece of metal itself was so extremely heavy; but, though the addition of the syllable "weight" in that connection would have been both cumbersome and needless, and I should never have thought of suggesting it, I cannot see that it makes the slightest difference to his argument either way. Nor, I am almost glad to say, do I appreciate any of his other difficulties; especially not the difficulty said to be caused by "tossing standard weights in the air!" It reads like the popular method of studying geology "upon the Stanislaw." Why do they then weigh more? Is it because they come down with a bang?

Prof. Greenhill is very persistent about this question of a force-unit; but his justification lies in the fact that he is really tilting against the whole idea of *absolute measure*—that truly practical and most useful conception which this century owes to Gauss and Weber and to Thomson and Tait. All new ideas must pass through their era of attack, and should emerge the better for the process. The idea of absolute measure is still not finally and restfully settled down in the minds of all physicists; it is still too much mixed up with the comparatively trivial question of the particular kind of unit that shall be most commonly employed for numerical specification. Prof. Greenhill is doing indirect service to the better method by his resolute insistence on conservative traditions.

I rather regret Prof. Fitzgerald's letter (p. 389), because, although containing many statements which are manifestly true, it tends to confuse the issues.

Does he really maintain that the English words mass and massive should never be used in an accurate physical sense? Is he prepared to object to the expressions "quantity of heat" and "quantity of electricity" as well as to "quantity of matter"; or does he think that whereas those other quantities may be measured in various recognised ways, the quantity called "matter" cannot be legitimately measured by any of its inalienable properties? Does he hold that the conservation of matter, as ascertained by the constancy of its inertia and of its weight under various conditions, is a wholly metaphysical and confusing idea?

How would he wish us to express the gravitational attraction between two masses,  $\gamma mm^1/r^2$ ; the  $m$ 's do not stand for inertia there? The physical factor  $g$ , which turns mass into weight without necessarily altering the numerical specification in any way, may be regarded as an abbreviation for  $\gamma E/R^2$ , with a correction for the shape of the earth and an allowance for centrifugal force, and is not a thing to be lightly ignored or introduced

for the sake of some entirely imaginary convenience about units; not even for the sake of complicating mechanics, after all these years, by trying to express mass in something else than mere grammes or pounds or tons. Let the British student say so many pounds when he interprets  $m$ , and let him say so many *pounds-weight* when he interprets  $mg$ , and there is no difficulty whatever.

Lastly, does Prof. Fitzgerald seriously propose to introduce a new and impractical inertia unit, based upon the intensity of gravity near London, for general scientific purposes, or only for engineering-students' consumption; and, if the latter, does he hope thereby to heal the supposed breach between science and practice?

O. J. L.

### Immunity from Snake-Bite.

THAT a relative immunity is acquired after a certain number of bee stings, as mentioned by Mr. R. C. T. EVANS (NATURE, February 18, p. 367), is, I believe, admitted by most bee-masters. But from the few inquiries I have been able to make, the degree of immunity varies very much in different individuals, though when acquired it would seem to be permanent, or at least long-lasting.

A certain degree of immunity is acquired also by most persons against the stings of those varieties of insects which in Norway are commonly called *Myg*, and in East Anglia, to the great indignation of those who really suffer from them, *Gnat*. The reaction of different individuals to the stings of these mosquito-like insects is very different in degree, but on the whole the resident suffers less than a new comer. A curious fact is that in many susceptible persons there is a distinct periodicity in the phenomena which follow a sting. The immediate result is a small flattened wheal, 3 to 4 mm. in diameter, of a pale colour, but surrounded by a zone of pink injection. This is attended by itching, but both wheal and itching have gone in less than an hour. About twenty-four hours later the part begins to itch again, and in a few minutes a hard, rounded, deep-red papule, about 10 mm. in diameter, appears, and is quickly surrounded by an area of oedematous skin. The formation is intense, and in the affected area, while ordinary tactile sensations are dulled, those for temperature and painful sensations are exaggerated. In two or three hours the itching diminishes, and the oedema disappears, leaving a small red papule which itches little, if at all. After another interval of twenty-four hours, or more often rather less, all the phenomena recur, but with diminished intensity; a third, a fourth, and even a fifth recurrence usually takes place, but on each succeeding occasion the itching and swelling are less severe. After the periodic exacerbations have ceased, a small indolent papule persists for weeks, sometimes for months. This periodicity is not observed in all persons, and is certainly most marked in those who suffer most severely. In the same individual the reaction is very much greater after some bites than after others.

Whether the "mosquito" injects a toxin, or whether it is merely in some instances the carrier of a pathogenic microbe, might be worth ascertaining.

DAWSON WILLIAMS.

February 19.

### Copper and Oysters.

IN my previous letter (p. 366) I had not gone into details, but Prof. Herdman's remarks on it induce me to do so.

The oysters referred to were brought to me by Mr. G. I. Wells, F.I.C., who had already examined some of them, and found copper to be present in such quantity that it could be readily dissolved out, direct from the oyster, with cold dilute nitric acid.

These observations I fully confirmed. The oysters were, no doubt, very exceptional ones, and they were believed to have caused diarrhoea in persons eating them. Most of them were free from colour, and from these no copper could be detected by direct treatment with dilute nitric acid; whilst from the coloured ones, sufficient could be obtained to easily prove the presence of that metal.

Some of the oysters were dark green, and others a bright sky-blue, the colour being in patches, and in one oyster almost entirely concentrated in the large muscle for closing the shell.

Assay Office, Chester, February 23.

W. F. LOWE.