Nearctic regions of Mr. Sclater and Mr. Wallace, I should certainly not have suggested to Prof. Heilprin a new name for that combination. Anyone looking to the passage (Proc. Zool. Soc., 1868, pp. 314, 315) in which Prof. Huxley defined his "Arctogæa"—a name to which, let me say, I have not the least objection—will see that it signifies that part of the world which is not "Notogæa," and therefore includes the Ethiopian and Indian regions of Mr. Sclater, whereas my "Holarctic" region expressly excludes them, and is therefore a very different thing from "Arctogæa" in its true sense.

ALFRED NEWTON.

Magdalene College, Cambridge, June 12.

Force and Determinism.

IN your issue of March 12 (vol. xliii. p. 491), Dr. Oliver J. Lodge characterizes as "perfectly correct" the statement "that, although expenditure of energy is needed to increase the speed of matter, none is needed to alter its direction." I have looked in vain for some notice of this apparently strange doctrine in your subsequent issues, with the exception that Prof. C. Lloyd Morgan (April 16, p. 558) objects that the direction of motion cannot be changed by purely metaphysical means, or will-power. But passing over this rather important and interesting point with only the observation that Sir John Herschel thought differently—thought, in fact, that "without the power to make some material disposition, to originate some movement, or to change, at least temporarily, the amount of dynamical force appropriate to one or more material molecules, the mechanical results of human or animal volition are inconceivable" (*Fortnightly Review*, July 1, 1865, vol. i. p. 439)—I desire to call a moment's attention to the first statement alluded to.

Dr. Lodge admits that "expenditure of energy is needed to increase the speed of matter." But, as a matter of fact, is it not very difficult, if not indeed practically impossible, to change the direction of a moving body without affecting its speed? "A force at right angles to motion does no work," says Dr. Lodge. Let us examine this statement for a moment. Let a body be moving in the direction a to b with a speed sufficient to traverse the distance in one unit of time. Then let a force be applied to

the body at a , at right angles to the direction of its motion, sufficient, if acting alone, to carry the body to d in the same unit of time. By the composition of forces, the body, at the end of the unit of time, would, therefore, be found at c . But the distance ac is greater than ab ; and as, by the interposition of a force at right angles to its motion, the body has thus traversed a greater distance in the same time, has not its speed, as a matter of fact, been increased? and is not this increase of speed actual work? and does not this work require actual energy to perform it?

EVAN MCLENNAN.

Brooklyn, Iowa, U.S.A., June 9.

I AM glad to see my statement called in question, and hoped that it would have aroused more antagonism than has yet been expressed; because I do believe that it has important psychological or metaphysical consequences, and should therefore either be repudiated by physicists or after due discussion be accepted by non-physicists.

With regard to the special objection raised by Mr. McLennan, it may be sufficient to remark that, in his diagram, ac is the line of motion, ad the direction of the force, and that ab is not at right angles to ac . His difficulty seems to be the one that some people always feel with regard to the use of infinitesimals in general. He must remember that his diagram will not apply

to the case of curvilinear motion unless the impulses contemplated are momentary and infinitesimal.

OLIVER J. LODGE.

The Scorpions at the Zoo.

YOUR contributor of the notice, published in NATURE on June 18 (p. 163), on the contents of the Insect-house at the Zoo, who laments the unfortunate circumstance that the scorpions there in captivity remain unnamed, may be glad to learn that these creatures may be easily identified, and, with a little dexterity, fearlessly handled.

During a recent visit to this house, the keeper obligingly showed me the two Egyptian scorpions, one of which—the black individual with the thick tail—was easily recognizable as *Prionurus crassicauda*, Oliv., a tolerably common North African and Syrian form.

To the other, however, I could not so readily assign a name; partly owing to its partial concealment, and partly to the fact that critical inspection is required to distinguish between the species of the genus to which it belongs. It appeared, nevertheless, to be a specimen of *Buthus eupeus*, Linn., the commonest of all the Mediterranean scorpions. But my attempt to verify this point by closer examination was immediately frustrated by the keeper; who, evidently thinking that I was qualifying for incarceration in Bedlam, hastily interposed when I stretched out my hand to pick up the noxious animal.

The third scorpion I did not see; but doubtless it is a specimen of one of the species of *Euscorpis*. This, too, can be easily named, no doubt; but it will be necessary to handle the specimen in order to be certain on the point.

I would warn your contributor not to be too sanguine of the permanence of the amicable relations that appear at present to be established between these three Arthropods. If the supply of dead mice runs short, there will, of a surety, soon remain nothing but a few fragments of *Euscorpis*. Such thoroughgoing cannibals are not likely to be squeamish, when a member of another genus is before them.

In conclusion, some of your readers may be interested to know that the spider referred to as *Lycosa portosantana*—which, by the way, should be styled *Tarantula maderiana*—is a very near ally of the famous and historical Tarantula of Italy; and that the hairy Brazilian monster, the so-called Mygale, who squats under a broken flower-pot in the next cage, has no more claim to the title Tarantula than any other Arachnoid with a formidable aspect.

R. I. POCKOCK.

Natural History Museum, June 18.

Cetaceans in African Lakes.

WITH reference to Mr. Sclater's inquiry (NATURE, June 11, p. 124) as to the occurrence of porpoises in the Victoria Nyanza, the following extract from Bernier, who wrote about 230 years ago, will probably prove of interest.

I may add that in another passage Bernier gives further information regarding the sources of the Nile.

It would seem from the passage quoted that the occurrence of a Cetacean in the Abyssinian sources of the Nile was probably known to early travellers, and, like the occurrence of diamonds in other parts of Africa, cannot be regarded as a new discovery.

Science and Art Museum, Dublin, June 22. V. BALL.

An Armenian named Murat and a Mogul who came as ambassadors from the Christian King of Ethiopia (*i.e.* Abyssinia) to Aurangzeb shortly after his accession to the Mogul Empire, in 1659, told the French physician Bernier, who then resided at the Mogul's court, "that the Nile had its origin in the country of *Agaua*, that it issued out of the earth by two springs bubbling up near to one another, which did form a little lake of about 30 or 40 paces long; that, coming out of this lake, it did make a considerable river; and from space to space it received small rivers increasing it. They added that it went on circling and making as 'were a great isle, and that afterwards it tumbled down from steep rocks into a great lake in which there were divers fruitful isles, store of crocodiles, and (*which would be remarkable enough if true*) abundance of sea calves, that have no other vent, &c., than that by which they take in their food, this lake being in the country of Dambea, three small days' journey from Gundar and four or five days' journey from the source of the Nile, &c., &c." ("The History of the Empire of the Mogul," English translation of 1684, p. 44).