

day had been wet, so that the falls had a greater volume of water than usual. At that time the sun, as seen from the platform for viewing the falls, was ascending just above the ledge of the rock over which the water was precipitated, and on looking away from it an entire rainbow was visible, excepting that part which was caused by the shadow of the lower part of my body; in consequence of the spray being all round me, the proximity of the bow added brilliancy to the colours, which surpassed anything of the kind that could be seen in a rainbow. I took no measurements.

Can any of your correspondents give examples of bows being seen on a cloudless background? Some years ago I saw a rainbow in what seemed a cloudless sky, but the surprising fact that rain was lightly falling from this apparently cloudless sky shows that if there were not clouds there were drops of water-fall over a large area, and which formed a background. I am aware of Mr. Browning's authority for such a phenomenon.

Birkenhead

G. H. H.

Elephas Americanus in Canada

CAPTAIN HOWDEN, of Millbrook, Ontario, has lately discovered remains of this species in a field adjoining his residence. They were found in the humus quite near the surface, and with the exception of the molars have been very much broken by the plough. The locality is a deep basin, depressed 100 or 150 feet below the surrounding hills, which may have been the basin of a small lake or pond. The elevation is about 490 feet above Lake Ontario, and 125 feet above Rice Lake, on the northern slope of the drift-ridge which borders Lake Ontario on the north. The discovery is interesting as extending the range of this animal in Canada, eastward, along this drift-ridge. The remains heretofore discovered have been confined to the western peninsula, above the Silurian escarpment, or to positions so nearly adjacent that they may have been washed down from this upper region. The present discovery is at an elevation which precludes this, and seems to indicate the presence of the living animal in this region. Between the ridge and the present lake shore there are at least two ancient lake beaches, one about 100 feet above the present water level, the other a little over 200 feet. Neither of these would bring the waters of the lake up to the level of the escarpment; so that at the time of these higher lake levels, the elephant may have ranged over the western peninsula of Canada, and also eastward over the drift-hills which extend nearly to the lower end of Lake Ontario.

Victoria College, Cobourg, Oct. 4

N. BURWASH

Reason or Instinct?

CONSIDERATIONS on the nature of Instinct will ever engage the attention of the student of Nature, and certainly interest in the subject is not likely to flag at a time when psychological manifestations and relations are being more and more sought amongst the lower animals. Your correspondent of the 10th of October last touches on their power of enumeration, which, even in the case of the sagacious dog, appears to be very limited. Nevertheless, I have been assured by a reliable friend, now deceased, that his wiry terrier would, at his order, run round the table once, twice, or thrice, for a suitable reward.

The idea of alternation, and an example of memory, came under my own observation some time ago at the Grotto del Cani, near Naples, where I witnessed the somewhat unnecessary experiment of the deleterious effects of carbonic acid on the unfortunate dogs kept for that purpose. On walking to the cave, I remarked that one of the dogs gambolled round the guide, whilst the other followed at his heels with slouched tail and hanging ear. The guide assured me that each dog knew when it was his turn to be dropped into the heavy stratum of gas on the floor of the cave, from whence, after partial suffocation, he is thrown into the cool lake close by for resuscitation.

With reference to the *quasi*-reasoning in adaptation of means to an end, under exceptional circumstances, I adduce the following:—

Many caterpillars of *Pieris rapæ* have, during this autumn, fed below my windows. On searching for suitable positions for passing into chrysalides, some eight or ten individuals, in their direct march upwards, encountered the plate-glass panes of my windows; on these they appeared to be unable to stand. Accordingly, in every case they made silken ladders, some of them five feet long, each ladder being formed of a single continuous thread, woven in elegant loops from side to side. The method here adopted is similar in kind to that employed by the glacier climber, who cuts

foot-holes with his hatchet to enable him to mount the icy precipices which impede him.

In the case of the above caterpillars, however, reasoning seems to be but narrow, for one ladder was constructed parallel to the window-frame for nearly three feet, on which secure footing could be had by simply diverting the track two inches. Some of these insects have now passed into pupæ, and are curiously supported or slung by their well-known silken band across the thorax, under the drip-stone of the window. Such facts, though simple, should warn us against dogmatically fixing the points in the animal kingdom at which instinct ends and reason begins. Do they not overlap?

Weycombe, Haslemere

G. B. BUCKTON

Lunar Calendars

In a communication addressed to NATURE for 1871, Mr. S. M. Drach writes at p. 204. "The true mean conjunction derived from the 19-year cycle is called the Molad or Moon-birth," and I wish to ascertain how this so-called "mean conjunction" is arrived at.

I have before me the two new Almanacks published by Vallentine and by Abrahams, by which I find the "moon-birth" generally put down at about six hours after the time quoted in the "Nautical Almanack" for 1873. From facts that have reached me, I conclude that the data for these publications are derived from a skeleton almanack printed by German Jews at Altona, containing the necessary particulars for fifty and eighty years in advance; and no doubt correctly calculated for that locality. I ask whether the data there given are to be accepted by Jews in all countries, or whether they are at liberty to calculate the time of new moon for their own meridian?

I may take this opportunity to point out the following discrepancy:—

True New Moon, Thursday, Nov. 20, 1873, 3.36 A.M.
Moeled Kislev, Wednesday, Nov. 19, 1873, 1.14. 1 A.M.,
according to Vallentine, but marked P.M. in Abrahams. Both the latter must be in error, because in *advance* of true time.

MYOVS

Early Eclipses

In looking through some back numbers of NATURE, I came on a paper by Mr. Hind, in which he examines whether any great eclipse took place at the time of the Crucifixion of Christ. He says that "although a great total eclipse was visible at Jerusalem in A.D. 29, yet, in the year 33 no eclipse of importance took place."* Mr. Hind seems to have forgotten that in the opinion of most divines, Christ was born four years before the vulgar era, so that in the year 29 He would have been 33 years old. Remembering this point, it seems highly probable that the account of how "the sun was turned into darkness, and the moon into blood" may be a correct account, not only of the occurrence of an eclipse, but of an early observation of the now famous red prominences.

Cambridge

G.

Water-beetles

I HAVE to thank Mr. Buchanan White (NATURE, Sept. 12) for the statement that "many water-beetles are not only winged but use their wings." My error as to fact, however, has no effect on the argument of my letter (NATURE, Sept. 5), which was, that although it is probable the first insects emerged from the water with their wings formed, yet the existing aquatic insects throw no light on the origin of the class.

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, County Antrim

PHOSPHORESCENCE IN FISH

IN two recent numbers of NATURE, Nos. 153 and 154, and more particularly the former one, attention is drawn to the question of phosphoric phenomena connected with living fish; but while it has been proved beyond dispute that certain fish, *Cyclopterus lumpus*, for instance, do possess highly luminous properties, the two cases in point may, I think, be referred rather to the combined effects of the microscopic *Noctiluca*.

* I quote from memory, and therefore perhaps not quite in Mr. Hind's words.