

swarming with life, myriads of fossil shells may be collected from the cliffs, whilst still further on, at Hordwell, we have beds showing that the land arose again, affording suitable conditions for the growth of luxuriant palms, and was the haunt of the alligator, turtle, and other reptiles, which are now confined to tropical countries.¹

CORRESPONDENCE.

THE OTOTARA SERIES, NEW ZEALAND.

SIR,—In the last received GEOLOGICAL MAGAZINE for August Capt. Hutton takes exception to my note appended to Mr. H. Woodward's paper on the "Fossil Crab of New Zealand."

One of his criticisms I admit to be correct. No distinct Saurian bones have been found on the West Coast. The error arose from an oversight in correcting the press, as the remark under letter *k* was (Saurian *beds*, Ammonites, etc.), by which I meant to indicate the horizon in the East Coast section of the same formation, as proved by associated fossils.

His other criticism relates to the presence of Secondary fossils in the Ototara group; but he evidently confounds this with his Oamaru formation, under which are included strata of both later and earlier date, while *localities* are excluded where Secondary fossils are found. Thus he places the Greensands of the Green Island Brown Coal in his Oamaru formation, although they contain *Belemnites*, *Ancylloceras Rostellaria*, and other Cretaceous forms. His Oamaru Cape beds I consider to be Miocene, while the Upper Marls at Amuri Bluff, which Capt. Hutton places in his Pareora or Miocene formation, are the calcareous Greensands that form the upper part of the Chalk formation, with *Inoceramus* and *Pleuronectes Zittelli*, the latter found ranging through the whole series; while from about the middle of the section the humerus of *Palæudyptes antarcticus* has lately been found by Mr. McKay, making the third locality for this fossil bird in New Zealand. Other cases of stratigraphical confusion might be stated, showing that we have not yet acquired sufficient data for classifying our later formations by per-centages of fossils to the exclusion of stratigraphical evidence.

GEOLOGICAL SURVEY OFFICE,
WELLINGTON, 10th Nov., 1876.

JAMES HECTOR.

MR. MILNE ON FLOATING ICE.

SIR,—I am sorry that Mr. Milne should think that I made an "unfair comparison" in testing the behaviour of the floating cone he had figured, by means of a tetrahedron. "Comparisons are" always "odious." What then must they be when they are "unfair"? And I am the last who would wish intentionally to make unfair ones. The truth is that I had not a cone, and so I took the solid nearest in its proportions to Mr. Milne's figure, and I submit that the tetrahedron was quite as like an iceberg as the cone!

¹ See also Report of Mr. Gardner's Lecture in the January Number of the *GEOL. MAG.* (p. 23), "On the Tropical Forests of Hampshire.

In Fig. 2 Mr. Milne has now shown us the highest cone which could float with its vertex upwards; and thereby proved that I was right in saying that a berg of the "shape" he had "figured" in his former paper "would not remain in that position, but must turn over."

Your readers will no doubt join with me in thanking Mr. Milne for his calculations, which I conceive may be thus summarized. If the

(1) Diameter of base of cone of ice is less than $\frac{2}{3}$ the height, it will float on its *side*.

(2) Diameter is greater than $\frac{2}{3}$ the height, it will float with its *vertex downwards*.

(3) Diameter is greater than *twice* the height, it *may* float with its *base downwards*.

(4) Or, since this case is included in (2), it *may* float with its *vertex downwards*.

However, when the diameter is only a little greater than twice the height, it would appear that the more stable position of the two would be with the vertex downwards. O. FISHER.

MODERN DENUDATION IN NORFOLK.

SIR.—The following facts concerning recent destruction of the Norfolk cliffs seem to be of sufficient interest to induce me to beg your insertion of them in your MAGAZINE.

On Tuesday, January 30th, we had a severe gale, which did much harm all along the coast. The coincidence of a spring-tide and a high wind from the W.N.W., brought the sea to a height it has not been known to reach for at least forty years. I have examined the coast from Hasborough to beyond Sherringham, and the damage done is marvellous. Probably the loss of land along the whole line of coast mentioned may be estimated at a yard. At the life-boat gap Bacton the amount that has gone is fifteen yards, and a strip of about that width is missing as far as the Walcot gap (three furlongs). At Bacton the cliffs are low, so the denudation is greater than in other parts.

Mundesley has had part of the life-boat gangway swept away, and some walls thrown down, besides the land lost.

At Cromer people are congratulating themselves on the small amount of damage done; it is said that £150 will cover it. During the gale it was thought that the jetty would be pulled up bodily by the upward force of the waves; but fortunately the planks gave way, and there are only about fifty missing. The gangway at the north end of the town has been swept away; but as it was only made of earth, that will not much matter.

The most serious loss is at Lower Sherringham. There Mr. Upscher has lost two acres; nearly all the sea-wall has been swept away: none of the gangways are left; a cottage and a shed have fallen into the sea; the inn on the cliffs has had the windows broken, and is in a very unsafe condition; and should another gale occur now, much of the village will go.