

firmed by the occurrence of the Archæocyathinæ, which are likewise associated with similar Cambrian Trilobites in New York and Canada. In Dr. Woodward's paper the relationship of the *Archæocyathus* forms was not recognized, but they were supposed to be Corals.

Mr. Etheridge further describes some peculiar microscopic tubuli, referring them doubtfully to *Girvanella*. Similar forms have been noticed by Dr. Bornemann in the Cambrian strata of Sardinia.

This paper is an important contribution to Australian geology, as it definitely proves the existence in that continent of a well-marked horizon of Cambrian rocks closely corresponding to the Lower Cambrian of the Northern Hemisphere.

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## CORRESPONDENCE.

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### WIND WAVES AND TIDAL CURRENTS.

SIR,—Mr. T. Mellard Reade, in putting before the readers of the *GEOLOGICAL MAGAZINE* his views on the origin of the Lower Trias (*GEOLOGICAL MAGAZINE*, Feb. April, and June, 1890) drew from Mr. Arthur R. Hunt, F.L.S., a letter on "Tidal Action," in which the latter denies the power of tidal currents to do the work invoked by Mr. Reade in his theory of the *marine* origin of the pebbles of the Bunter.

Mr. Hunt writes (*GEOLOGICAL MAGAZINE*, April, 1890, p. 191) as follows: "It may be well to point out one line of evidence which seems to have been overlooked by the supporters of the tidal theory, *i.e.* the zoological." He gives the English Channel as an excellent test case, and remarks, that "if unchecked tidal currents are anywhere resistless, they should be so here. Do these tidal currents disturb the gravel, or sand, or even the mud on the Channel bottom? The marine fauna of the district answers this question with an emphatic negative." And again, "The presence of this Molluscan fauna in these very exposed localities is good proof that unchecked tidal currents sweeping over a fairly level sea-bottom are incapable by their own unassisted efforts of raising the sand."

Now without entering into the discussion of the main question raised by Mr. Reade, I beg to offer the following observations on the line of evidence suggested by Mr. Hunt, *viz.* the power of wind waves and tidal currents to disturb the sand or mud of the sea-bottom. To this end, I quote the *practical* experience of a well-known French marine zoologist, M. Hermann Fol, of the zoological laboratory at Nice, who in his yacht "Amphiaster," was, last year, entrusted with a mission by the French Minister of Public Instruction, to explore, from a zoological point of view, the littoral of Corsica and Tunis.

M. Fol is in the frequent habit of donning the diver's dress and descending to depths of from 30 to 100 feet and upwards in search of marine organisms. Quoting from a recent paper (*Rev. Sci.* June 7th, 1890) M. Fol says, "When there is a swell on the water, the task of the diver becomes very difficult. He is constantly tossed

about in spite of himself and an irresistible force makes him oscillate like a pendulum.

This see-saw motion of the water, which is the counterpart of the swell on the surface, is felt nearly as much at 30 mètres (99 feet) as at 10 mètres of depth.

It cannot be attributed to the surf, due to the vicinity of the coast, since the fishermen who use trawl or drag net upon extensive banks, situated quite out at sea, know that after a storm, these banks at 50 ms. (164 feet) *and more, below the level of the sea, are completely swept clear of their usual inhabitants.*"

If, then, the movement of the water, as described by M. Fol, is felt at such depths in the Mediterranean Sea, how much more powerful must be the storms or currents of the English Channel to disturb gravel or sand, or temporarily displace the marine fauna? The fact that Molluscs still exist in an area swept by occasional storms and open to currents generated by tidal waves seems scarcely to warrant Mr. Hunt's assumption that tidal action has no influence whatever on the sea-bottom.

MARK STIRRUP.

BOWDON, CHESHIRE.

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## OBITUARY.

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### WILLIAM KITCHEN PARKER, F.R.S.

BORN JUNE 23, 1823; DIED JULY 3, 1890.

THE late and deeply lamented Professor William Kitchen Parker, F.R.S., F.L.S., F.R.M.S., etc., was born June 23, 1823, and died suddenly July 3, 1890. He was a Biologist in the widest sense of the term, having systematically studied all grades of living organisms in both the Vegetable and the Animal World. His life throughout, from boyhood onward, was largely devoted to the study of the bony structure of Vertebrates, but botanical research in early days, and a wide examination of rhizopodal organisms, were rival pursuits, until his energies, well and bravely continued through ill-health, were more especially given to the elucidation of embryonic morphology, or the developmental growth of the skull and other parts of the Vertebrate skeleton. The results of this long-continued and enlightened study gave him a world-wide reputation; and his lines of research in this pursuit, grounded on the work already done by Rathke, Gegenbauer, and Huxley, have led to a great advancement in Biology, both for professors and students.

Geologists are indebted to Professor W. K. Parker's knowledge of Osteology for thoughtful notes on the Archæopteryx (*GEOL. MAG.* 1864, pp. 55–57), and on Fossil Birds from the Zebbug Cave in Malta (*Proceed. Zool. Soc.* 1865, and *Trans. Zool. Soc.* 1869); and his perfect acquaintance with Rhizopoda was shown in the treatment of several series of fossil Foraminifera, in joint papers with others. His rhizopodal studies were taking shape in 1856 (and probably before), when, examining fresh marine material from Bognor, and much larger supplies from Sponge-sands, and from among East-