

can be heard; it will not at all depend on the amount of the slip at the centre of the area, *i.e.* it will be independent of the *intensity* of the shock.

I shall endeavour to show, in a later paper, that this theory of the origin of earthquake-sounds accounts satisfactorily for all their phenomena, so far as they are known to us. For the present, it will be sufficient to point out that it explains (1) the fact that the sound-area is not concentric with the disturbed area, and the sound-focus is nearer the surface than the rest of the seismic focus; and (2) the fact that, in great earthquakes, the sounds are only heard within a comparatively small area immediately surrounding the epicentrum.

*Authorities.*—"Accrington Gazette," Feb. 16; "Accrington Times," Feb. 16; "Altrincham Division Advertiser," Feb. 15; "Blackpool Times," Feb. 13; "Bolton Chronicle," Feb. 16; "Bradford Observer Budget," Feb. 16; "Burnley Express," Feb. 16; "Bury Guardian," Feb. 16; "Chorley Standard," Feb. 16; "Craven Herald" (Skipton), Feb. 16; "Darwen Post," Feb. 16; "Halifax Courier," Feb. 16; "Heywood Advertiser," Feb. 15; "Huddersfield Chronicle," Feb. 16; "Lancaster Guardian," Feb. 16; "Leeds Mercury," Feb. 12; "Leigh Chronicle," Feb. 15; "Liverpool Mercury," Feb. 12; "Macclesfield Chronicle," Feb. 15; "Macclesfield Courier," Feb. 16; "Manchester Examiner," Feb. 12; "Manchester Guardian," Feb. 12, 13; "Middleton Guardian," Feb. 16; "Northwich and Knutsford Chronicle," Feb. 16; "Oldham Standard," Feb. 16; "Preston Guardian," Feb. 16; "Rochdale Observer," Feb. 13, 16; "Wigan Observer," Feb. 13.

Nature, vol. 39, p. 376; T. R. H. Clunn, The earthquake in Lancashire, Nature, vol. 39, p. 390; J. Knowles, The earthquake shock of February 10th, 1889, Manchester Geol. Soc. Trans., vol. xx. pp. 155-157.

For other information I am indebted to the kindness of the following gentlemen: the Secretaries of the Geological Societies of Liverpool and Manchester, Mr. W. C. Carlisle (Stonyhurst Observatory), Mr. B. Hainsworth (Rossall), Mr. G. Hartnup (Liverpool Observatory, Bidstow) Prof. E. Hull, F.R.S., and Mr. Isaac Roberts, F.R.S. (Maghull).

(To be continued.)

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## NOTICES OF MEMOIRS.

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ON THE YOUNG OF *BACULITES COMPRESSUS*, Say. By AMOS P. BROWN.  
(Proc. Acad. Nat. Sci. Philadelphia.)

AT the meeting of the Academy of Natural Sciences of Philadelphia on March 10th, Mr. Amos P. Brown described the young of *Baculites compressus*, Say, recently discovered by him in some Cretaceous marl from the vicinity of Deadwood, South Dakota. Associated with them in the same material were several species of *Baculites*, *Scaphites*, and *Inoceramus*. The young *Baculites* varied in length from 1 to 3 cm., with a diameter of 0.4 to 2 mm.

The shell originates in a spiral consisting of from two to two and one-half slightly overlapping whorls, and ranging in diameter from 0·8 to 1 mm.; thence it extends in a straight line, tangent to the spiral, or sometimes slightly reflexed. The straight portion of the shell rapidly increases in diameter from 0·38 to 0·40 mm. at the spiral, to about 1·5 to 2 mm. at 2 cm. length. Some of the specimens were entire, and showed that the body-chamber occupied about one-half the length of the shell. The siphuncle is eccentric, and was found to lie near the outer margin of the spiral.

The species was determined from an examination of the suture-line which was traced from the simple form of the very young shell, through forms of gradually increasing complexity, up to the typical suture of the adult of *Baculites compressus*, Say.

That this spiral portion should have hitherto escaped observation can be easily accounted for by its small size and fragile character. In all probability it was broken off long before the shell had attained adult size, and is therefore to be met with only in shells which were preserved in their immature condition.

The description is given in the Proceedings of the Academy, 1891, part i. pp. 159–160, and is accompanied by figures of the young *Baculites*, and of a series of their suture-lines showing the gradual development from a comparatively simple form to the typical suture of the adult of *Baculites compressus*, Say.

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## R E V I E W S.

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### I.—PROFESSOR OSBORN ON THE MOLARS OF THE PERISSODACTYLA.

MANY of our readers are probably acquainted more or less fully with Professor H. F. Osborn's elaborate and interesting researches into the nature of the primitive plan on which the molar teeth of mammals are constructed, summaries of which have appeared from time to time in several English scientific journals. The result of these researches was to show that this primitive type of tooth was of the so-called 'tritubercular' form. It may not be out of place to remind our readers that such a tritubercular tooth in the upper jaw is composed of an inner tubercle, or *protocone*, and of two outer tubercles respectively designated *paracone* and *metacone*. By the addition of a second inner tubercle—the *hypocone*—and of two intermediate ones, known as the *protoconule* and *metaconule*, such a tritubercular molar becomes converted into the sextubercular one occurring in many Ungulates.

Professor Osborn has recently been engaged in investigating how the more complex molars of the specialized Perissodactyles have been evolved from this sextubercular type; the results of this investigation being published in a memoir issued under the auspices of the Museum of Harvard College.<sup>1</sup> Since these results are of considerable morphological importance, and are especially interesting to palæontologists, a short *resumé* of them may be acceptable to our

<sup>1</sup> Bull. Mus. Comp. Zool. Harvard Coll. vol. xx. pp. 87, *et seq.* (1890).