coincides with a suggestion of Lyell's, that "they have been the result of intense pressure, so moderated as to be just sufficient to overcome the resistance opposed to it; and that this motion has been as insensible as the unfolding of the petals of a flower."¹

Professor A. Favre of Geneva gives in "*La Nature*" illustrations of experiments² in which layers of plastic clay were laid upon a sheet of caoutchouc, stretched one-third more than its length; on being allowed to resume its normal dimensions, the bands of clay were diminished to that extent, and became greatly contorted. The experiments were conceived for the purpose of illustrating the method of formation of the great inequalities on the earth's surface, such as mountains, etc., by means of lateral thrust or crushing, which are considered by him to be due to the cooling of the earth. They do not appear at all applicable in explaining the cause of eminences and depressions in the contour of the land; they more nearly represent those foldings and contortions of strata which have been universally attributed, since the time of Sir James Hall, to lateral pressure; but it is too much to conceive that from any contraction, whether by loss of heat or otherwise, extensive areas have been compressed into a third less than their original dimensions; as this is a condition of by no means infrequent occurrence in geological formations, the cause of the compression and consequent foldings of strata must be searched for in other directions.

(*To be continued.*)

VIII.—ON A CÆLUROID DINOSAUR FROM THE WEALDEN.

By R. LYDEKKER, B.A., F.G.S., etc.

IN going through the remains of *Chelonina* preserved in the British Museum I came across two vertebræ from the Wealden of the Isle of Wight, which had been inadvertently included in that series. These specimens (B.M. No. R. 901) formed part of the collection of the late Rev. Mr. Fox, and clearly indicate a small Dinosaur allied to the genus *Cœlurus*.

Both specimens belong to the cervical region, and are precisely similar; but whereas one is almost entire, the other has lost nearly the whole of the neural arch. The former specimen is represented of two-thirds the natural size in the accompanying woodcut; from which it will be seen that it is practically entire, with the exception of the loss of the greater part of the ribs (see p. 120).

The chief characters of this specimen may be summarized as follows. The vertebra is considerably elongated, with a markedly opisthocœlous centrum, of which the terminal faces are oblique. The arch is comparatively low, with only a slight ridge to represent the neural spine. The ribs were ankylosed to the arch and centrum, and (from the contour of the basal portion) were evidently much bowed outwards. The sides of the centrum exhibit a pneu-

¹ Quart. Journ. Geol. Soc. vol. vi. p. lxiii.

² They are copied in "*Nature*," vol. xix. December 5, 1878, p. 103. The Rev. Osmond Fisher has reproduced one in "*Physics of the Earth's Crust*," p. 128, but does not coincide with the deduction Prof. Favre draws from the experiments.

matic foramen, and a fracture across the centrum of the imperfect specimen shows that the inner structure was completely honey-combed. The length of the centrum is 1·74 inches.

Anterior and left lateral aspects of a cervical vertebra of *Calamospondylus Fori*; from the Wealden of the Isle of Wight, $\frac{2}{3}$ nat. size; *pr.3*. prezygapophysis; *pt.3*. postzygapophysis; *r*. rib (restored); *f*. pneumatic foramen; *s*. neural spine.

These features show that the reptile to which these vertebræ belonged was closely allied to the genus *Cœlurus*, Marsh;¹ and it remains to indicate in what manner the two forms differ. Now, in the American *C. fragilis*, and also in *C. Daviesi*² of the English Wealden, the cervicals were longer than the present specimen, and while the anterior ones were opisthocœlous, the others were amphicœlous.³ Again, the vertebræ of *Cœlurus* have the arch placed more forwardly on the centrum, so that the prezygapophyses project more in advance of the terminal ball of the latter; while the free posterior border of the rib is extended backwards to join the postzygapophysis, and thus forms a kind of penthouse over the side of the centrum. This penthouse seems, moreover, to cause a flattening of the lateral and upper surface of the arch, which is quite wanting in the present specimens; while the ridge representing the neural spine is much more elongated antero-posteriorly in *Cœlurus*.

Other minor differences can be seen by comparing the woodcut with the figures given by Prof. Marsh; but the above features are sufficient to indicate that the present form cannot be included in *Cœlurus*, if we use generic terms in the sense in which they have been generally accepted in the Theropoda, but that it clearly indicates a member of the same family.

Now, putting aside the specimen on which the genus *Thecospondylus* was based as being too imperfect to admit at present of any interpretation of its affinity;⁴ the only other genus which appears to have been hitherto referred to the *Cœluridæ* is *Tanystropheus* of the Trias, which Prof. Cope considers to be allied to *Cœlurus*. In the absence of figures of the American forms referred by Prof. Cope to *Tanystropheus*, an exact comparison cannot be instituted between

¹ Amer. Journ. Sci. ser. 3, vol. xxi. p. 341, pl. x. (1881).

² See Lydekker, Cat. Foss. Rept. and Amphib. Brit. Mus. pt. i. p. 156 (1888).

³ In the definition of the *Cœluridæ* on p. 155 of the work last cited, the words in anterior region are omitted before the word opisthocœlous.

⁴ Prof. Seeley has proposed to refer *Cœlurus Daviesi* to this genus.

its cervicals and the present specimens; but a marked distinction is evident by the amphicœlous character of the former. There is, however, in the Wealden the genus *Aristosuchus*, which appears to be allied in some respects to *Cœlurus*, and of which the type may be taken to be the sacrum.¹ Now the present specimens are much too large for that sacrum, and therefore clearly indicate a distinct species; while if the dorsal vertebra² referred to *Aristosuchus* be rightly associated, we have evidence not only of the generic, but also of the family distinction of the present form from the latter.

Seeing, therefore, that we have evidence of the generic distinction of this form from *Cœlurus* and *Tanystrophæus*, and also of its certain specific and probable generic distinction from *Aristosuchus*, I have ventured provisionally to regard it as the type of a new genus and species under the name of *Calamospondylus Fozi*. This genus being characterized by the opisthocœlous character of such of the cervical vertebræ as are known, and by the much shorter length of these vertebræ as compared with those of *Cœlurus*.

IX.—NOTE ON THE DECIDUOUS SEPTA OF *ASCOCERAS MURCHISONI*, BARRANDE.

By ARTHUR H. FOORD, F.G.S.

AN interesting paper has lately been contributed to this MAGAZINE (December, 1888, p. 532), by Dr. Gustav Lindström, of Stockholm, in which he announced his discovery of the earlier, or *Nautilus*-stage, as he termed it, in several specimens of *Ascoceras* from the Silurian of the Island of Gothland. I find, however, in looking over the supplementary volume of the Syst. Sil. du centre de la Bohême,³ that Dr. Lindström's discovery has been anticipated by M. Barrande, who observed and described two of the normal chambers (*Nautilus*-stage, of Lindström) attached to a specimen of *Ascoceras Murchisoni* from the Silurian strata (Étage E) of Karlstein in Bohemia. I give here a translation of Barrande's description, together with exact copies of the figures accompanying it, and the explanations of the same. A copy of Dr. Lindström's figure is also added for comparison with Barrande's.

"We have always assumed, especially in the original description of the genus *Ascoceras*,⁴ that there existed below the body-chamber a series of deciduous air-chambers which became successively detached from the shell by normal truncation. This supposition is confirmed by the specimen which we figure on plate 491. It is quite apparent that fig. 3 on this plate [see p. 122. Fig. 1] represents a specimen which is distinguished from all those before figured upon our plate 95, by the relative length of the septate part which remains attached to the body-chamber. This septate part, when examined,

¹ Lydekker, *op. cit.* p. 158. R. 178.

² *Ibid.* R. 178, a.

³ Vol. ii pt. i. 1877, Supplém. et Série tardive, p. 98, plate cccxcxi. figs. 3-7.

⁴ *Ascoceras* prototype des Nautilides, Bull. Soc. géol. de France, tome xii. p. 157, 1855.