

there is scarcely any posterior area, the two rows of marginal denticles being placed close to each other and alternating. As the spine increases in length, the ridges begin to drop off behind, so that in examples of from three to four inches in length, like Agassiz's type,¹ only the tip is ridged all round, while three ridges, one median and two lateral, persist beyond the other along the front, whence the name *Tristychius*. Along with this change in sculpture, the two posterior rows of denticles diverge from each other, and a well-marked area is formed between them as in *Ctenacanthus*.

In still larger spines the sulcated tips become entirely worn off, leaving only the three anterior ridges, which in turn also finally disappear in examples which have been subjected to any considerable amount of wearing. A somewhat short, gently-curved, bluntly-pointed spine now confronts us, destitute of ridges or sulci, and with the surface covered only by very close and delicate striæ. Such spines are indistinguishable from Agassiz's description and figure of *Ptychacanthus sublævis*,² of which the original seems unfortunately to be lost, for although Agassiz states that it belonged to Professor Jameson, I have never been able to find it in the Edinburgh Museum.

Ptychacanthus sublævis then represents to my mind nothing but an adult *Tristychius arcuatus*, with the point broken off, and the general surface a little worn, and this view is, I consider, not only corroborated, but proved by a series of specimens of undoubted *Tristychius* in the Edinburgh Museum.

NOTICES OF MEMOIRS.

I.—*AMBLYPRISTIS CHEOPS*, NOV. GEN. ET. SP., AUS DEM EOCAEN AEGYPTENS. By Prof. Dr. W. DAMES. Sitzungs. Ges. naturf. Fr. Berlin, 1888, No. 6.

THIS paper forms an interesting contribution to our knowledge of the fossil vertebrate fauna of Birket-el-Qurūn, in Fajum, for which we are already indebted to Dr. Dames (Sitzungs. königl. Akad. Wiss. Berlin, 1883, pt. i.). The evidence of the new Saw-fish (*Amblypristis Cheops*) consists in some detached rostral teeth, differing from those of the existing *Pristis* in their shortness and great relative breadth. One example is figured; and Dr. Hilgendorf adds a brief note on the structure of the rostral teeth of the living genus, as compared with the fossil.

II.—ON SOME DEVONIAN CRUSTACEA. By Rev. G. F. WHIDBORNE, M.A., F.G.S.³

BESIDE species of Crustaceans already described from Woulborough and Lummaton, several new species are found there, as the following: *Phacops batracheus*, which differs from *P. fecundus*, Barr., in the rearward position of the eye and more overhanging glabella; *Proetus batillus*, which has a flatter glabella than *P.*

¹ Poiss. Foss. tome iii. tab. 1a, fig. 9-11.

² Op. cit. tome iii. tab. 5, fig. 1-3.

³ Revised abstract of paper read at the British Association.

bohemicus, Barr., more anterior eyes, and longer cheek spines; *P. subfrontalis*, which approaches *P. frontalis*, Barr., but has a much squarer glabella; *P. audax*, which is like *P. granulatus*, Goldf., but has tuberculated cheeks; *Cyphaspis ocellata*, like *C. ceratophthalmus*, Sandb., but with long sharp cheek spines; *Lichas devonianus*, having a wider head than *L. Haueri*, Barr., larger eyes surrounded by tubercles, and a more arched neck; *Acidaspis Robertsii*, with narrower cheeks than *A. lacerata*, Barr.; *A. Hughesii*, with a bilobed tail surrounded by a flat border bearing aciculate spines; *Bronteus delicatus*, having its glabella marked with transverse lines, and smaller spots than in *B. flabellifer*, Goldf.; *B. pardalios*, which is more coarsely tuberculated than *B. granulatus*, Goldf.; *Entomis peregrina*, distinguishable from *E. tuberosa*, Jones, by the indistinctness of its nodule; and *Bactropus decoratus*, dissimilar from *B. longipes*, Barr., in being much smaller and more coarsely striated.

The *Cheirurus* of these beds is not *Ch. articulatus*, Münt., but a new species, *C. Pengellii*, differing from it in the shorter front lobe of its glabella. The true *B. flabellifer*, Goldf., occurs, not at Woulborough, but at Chircombe Bridge, where it is accompanied by *Dechenella setosa*, n.sp., differing from *D. Verneuli*, Barr., in having nineteen segments on the tail.

III.—ON SOME DEVONIAN CEPHALOPODS AND GASTEROPODS. BY
Rev. G. F. WHIDBORNE, M.A., F.G.S.

THE following new species occur at Woulborough or Lummaton, or in the case of some of the Gasteropods at Chudleigh: *Goniatites obliquus*, a large shell with open umbilicus, flat sloping sides and narrow flat back; *G. psittacinus*, a small tumid shell with closed umbilicus, rounded whorls, slightly curved sutures; *G. nuciformis*, with minute umbilicus and much broader back than the preceding; *G. aratus*, a flatter shell with small umbilicus, and marked with four angulated sulci; *G. pentangularis*, with open spire, inner whorls ribbed, and section of whorls pentagonal; *G. Hughesii*, large and flat with closed umbilicus, evenly rounded back and minutely striated surface; *Cyrtoceras Leei*, a large curved conoidal form with more irregular and dilate lamellæ than *C. fimbriatum*, Ph.; *C. pulcherrimum*, unlike *C. reticulatum*, Ph., in having tubercles on the shoulder instead of ribs; *C. Vicarii*, having a broader section, and much fewer tubercles than the last; *C. præclarum*, more involute and elliptical than the last, with wider mouth and oblique ridges crossed by distant striæ; *C. majesticum*, large and smooth, with oval mouth, narrow chambers and imperfect spire; *Hercoceras inornatum*, differing from *H. subtuberculatum*, Sandb., in being smooth; *Orthoceras hastatum*, more conical and with fewer annulæ than *O. tubicinella*, Ph.; *O. Vicarii*, differing from *O. pulchellum*, F. A. Röm., in being round and not oval in section; *O. comatum*, which is *O. tubicinella*, Sandb., not Ph.; *Phragmoceras vasiforme*, which is rather less convex than *Ph. subpyriforme*, Mü.; *Ph. unguatum*, small and more arched than *C. cornucopia*, Sandb.; *Ph. Marri*, conical and transversely flattened, approaching *G. Conradi*, Barr.; *B. mundus*,

with broad grooved keel, and very transverse kidney-shaped mouth; *Euomphalus fenestralis*, with a depressed spire and three ridges cancelled by numerous rings; *Pleurotomaria perversa*, a large sinistral shell, unlike *Pl. expansa*, Ph., in having spiral striæ, a deeper suture, whorls more convex; *Pl. victrix*, which has an elevated spire, angulated whorls, central sinus band, and a few spiral striæ; *Pl. Chudleighensis*, separated from the preceding in having its spiral ridges crenulated, and the sinus band much higher; *Littorina devonaic*, having the general shape of *Purpura lapillus*, with eight spiral rows of tubercles which are largest near the suture; *Monodonta archon*, very large and trochiform, with flat base and sides, linear suture and oblique growth-lines; *Phorus philosophus*, with a low spire, wide umbilicus and convex whorls bearing fragments of broken shells; *Macrocheilus tumescens*, a much more globular form than *M. subcostatus*, Schlot.; *Turbo Pengellii*, unlike *T. subangulosus*, d'A. and de V., in its wider flatness above the shoulder; *Loxonema scalaroides*, very elongate, with its convex whorls crossed by discontinuous varices; *H. duplisulcata*, differing from *H. tenuisulcata* in possessing a series of subsidiary striæ; *Acroculia columbina*, a wide depressed form with fine waving longitudinal markings; *Metoptoma cordata*, like *M. pileus*, Ph., but with loftier umbo and more angulated mouth; and *Chiton papilio*, which comes midway between *Ch. corrugatus*, Sandb., and *Ch. sagittalis*, Sandb.

The above are accompanied by *Orthoceras Oceani*, d'Orb. (= *O. cinctum*, Ph.), *O. tenuistriatus*, Mü., *O. subfusiforme*, d'A. and de V., *O. regularis*, Mü., *O. subarmularis*, Mü., *B. lineatus*, Goldf. (= *B. striatus*, Ph.), *P. bifida*, Sandb. (= *B. Woodwardii*, Ph.), *Eu. serpula*, de Kon., *Eu. planorbis*, d'A. and de V., *Eu. lavis*, d'A. and de V., *Eu. rota*, Sandb., *Eu. decussatus*, Sandb., *Eu. germanus*, Ph. sp., *Eu. cate-nulatus* (= *Eu. serpens*, Ph., Pal. Foss. fig. 172, f. and g. only), *Pl. D'Orbigniana*, d'A. and de V., *Pl. subclathrata*, Sandb., *Pl. Lonsdalii*, d'A. and de V., *Pl. delphinuloides*, Schlot., *Pl. calculiformis*, Sandb., *Pl. trochoides* (= *Pl. monilifera*, Ph. Pal. Foss.), *Pl. distinguenda* (= *Pl. aspera*, Ph. Pal. Foss.), *N. deformis*, Sow., *N. piligera*, Sandb., *T. multispira*, Sandb.? *L. purpura*, d'A. and de V., *L. subcostata*, d'A. and de V., *Scalaria antiqua*, Mü., *M. subcostatus*, Schlot. (= *M. arcuatus*, Ph., and *M. elongatus*, Ph.), *Scoliostoma texatum*, Ph. sp., *Sc. gracile*, Sandb., *Holopella tenuicostata*, Sandb., *H. tenuisulcata*, Sandb., *H. piligera*, Sandb., *Acroculia multiplicata*, Giebel, and *A. proæva*, Eichw.

IV.—NOTE ON GRAPTOLITES FROM DEASE RIVER, B.C.¹ By Prof. CHARLES LAPWORTH, LL.D., F.R.S., F.G.S.

IN June, 1887, a small collection of Graptolites was obtained by Dr. G. M. Dawson on Dease River, in the extreme northern and inland portion of British Columbia, about lat. 59° 45', long. 129°. These fossils were derived from certain dark-coloured, carbonaceous and often calcareous shales, which in association with quartzites and

¹ Reprinted from the "Canadian Record of Science."

other rocks, characterize a considerable area on the lower part of the Dease, as well as on the Lizard River, above the confluence. The collection referred to was transmitted by Mr. J. F. Whiteaves to Prof. Lapworth, whose special studies on Graptolites are well known. It is believed that the following preliminary note by Prof. Lapworth will be of interest, as the occurrence of Graptolites on the Dease River extends very far to the north-westward of our previous knowledge of the occurrence of these forms in North America. In 1886 a similar small collection was obtained by Mr. R. G. McConnell near the line of the Canadian Pacific Railway, in the Kicking Horse (Wapta) Pass. This and the new locality here described are the only ones which have yet been found to yield Graptolites in the entire western portion of the Dominion.

Prof. Lapworth, under date December 13th, writes as follows:—

I have, to-day, gone over the specimens of Graptolites, collected by Dr. Dawson, from the rocks of the Dease River, British Columbia. I find that they are identical with those examined by me from the rocks of the Kicking Horse Pass, some time last year. The species I notice in the Dease River collection are :

<p><i>Diplograptus euglyphus</i>, Lapworth. <i>Climacograptus</i> comp. <i>antiquus</i>, Lapw. <i>Cryptograptus tricornis</i>, Carruthers.</p>		<p><i>Glossograptus ciliatus</i>, Emmons. <i>Didymograptus</i> comp. <i>sagittarius</i>, Hall. New form allied to <i>Cenograptus</i>.</p>
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These Graptolite-bearing rocks are clearly of about Middle Ordovician age. They contain forms I would refer to the second or Black River Trenton period: i.e. they are newer than the Point Lévis series, and older than the Hudson and Utica groups. The association of forms is such as we find in Britain and Western Europe, in the passage-beds between the Llandeilo and Caradoc Limestones. The rocks in Canada and New York, with which these Dease River beds may be best compared, are the Marsouin beds of the St. Lawrence Valley, and the Norman's Kill beds of New York. The Dease River beds may perhaps be a little older than these.

Mr. C. White described some Graptolites from beds in the mountain region of the West, several years ago, which may belong to the same horizon as the Dease River zones, though they have a somewhat more recent aspect.

The specific identification of the Dease River fossils, I regard as provisional. While the species correspond broadly with those found in their eastern equivalents, they have certain peculiarities which may, after further study, or on the discovery of better and more perfect specimens, lead to their separation as distinct species or varieties.

It is exceedingly interesting to find Graptolites in a region so far removed from the Atlantic basin, and also to note that the typical association of Llandeilo-Bala genera and species is still retained practically unmodified.—G. M. D.