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TRILOBITE REMAINS COLLECTED IN THE FLORENTINE VALLEY, WEST TASMANIA, BY MR. T. STEPHENS, M.A.

By R. ETHERIDGE, JUNR., Curator.

(Plate x.)

Mr. T. Stephens, M.A., late Chief Inspector of Schools for Tasmania, recently presented to the Trustees some fragmentary fossils, chiefly Trilobite remains, from a new locality in that island. He informed me by letter that "the locality is the Florentine Valley. The river of that name is a tributary of the Derwent, the course of which is entirely through Permo-Carboniferous formations, but the Florentine itself runs through the eastern fringe of the Silurian country of West Tasmania, with its ancient limestones, conglomerates, quartzites, etc., the true relative position of which is still a matter of conjecture. While accompanying an exploring party last year towards the River Gordon, I noticed shales and sandstone likely to yield fossils, and you see the result."

The matrix is a yellow, slightly micaceous, somewhat fissile mudstone, and the organic remains are all preserved either as casts, or external impressions; in no instance is there any preservation of test. The remains are those of Trilobites and Mollusca, all fragmentary and badly preserved.

Amongst the former are a peculiar pygidium and an indistinct cephalon that seem to be referable to the genus *Dikelocephalus*. The pygidium is broad oval in outline, with a narrow tapering axis, consisting of seven segments and a terminal appendage, which does not reach the ventral border. The side lobes are flattened and each bears seven or eight pleural segments, which gradually curve downwards, more and more towards the posterior, until the last one is practically parallel to the axis, and the two above it nearly so. The ventral margin supports two caudal spines, lateral in position, opposite the outward terminations of the second pleural segments. The length of these spines cannot be accurately defined, but I believe them to have been short. Beneath the outer preserved layer is a wide and imbricately striate limb.

The resemblance of this pygidium to that of *Dikelocephalus minnesotensis*, D. D. Owen,¹ is very strong, but if the pleural

¹ D. D. Owen—Report Geol. Survey Wisconsin, Iowa and Minnesota, 1852, p. 574, atlas, pl. i., f. 1 and 2; Whitfield—Geol. Wisconsin, Survey of 1873-79, iv., 1882, pl. iii., f. 1.

segments in our fossil are in no way misplaced by distortion, they are decidedly more parallel to the axis than in the illustrations of the above species quoted below. A similar likeness may be noticed between the Tasmanian fossil and the British *D. furca*, Salter,² even to the short caudal spines. In *Dikelocephalus* the caudal margin is not always produced into spines, although in possessing these organs our fossil resembles the already described form from Tasmania *D. tasmanicus*, Eth. fil.,³ but the characters of the axis and pleural segments are quite different in the two tails.

In passing, the close affinity borne by Mr. Stephens' fossil to a pygidium of a Norwegian Trilobite described by Angelin⁴ as *Centropleura? dicræura* may be noted; the resemblance is even stronger than to *D. minnesotensis*. *Centropleura* was reduced to a synonym of *Dikelocephalus* by Salter,⁵ and this step was acknowledged by Zittel,⁶ but to whatever genus Angelin's species may ultimately be referred (in all probability to *Dikelocephalus*), there also will be the genus of the Tasmanian pygidium under discussion.

Another genus possessing a very similarly segmented pygidium is *Neseuretus*, Hicks,⁷ from the Menevian beds of St. David's in South Wales. In this fossil, however, the caudal margin is entire, and not produced into spines. It is also worthy of remark that Mr. R. Etheridge has suggested⁸ the transference of all Salter's British *Dikelocephali* to *Neseuretus*.

It is unfortunate that we do not possess the perfect cephalon of this Trilobite. There is one crushed head amongst the specimens, which, so far as it can be deciphered, has the appearance of that of *Dikelocephalus*. There are traces of a wide frontal border, with a small central mucro; certainly one, if not two, continuous furrows at the base of the crushed glabella, and traces of the ocular lobes, but the eyes are not preserved.

Poor as the material is, I feel sure in my own mind that we have here a second Tasmanian species of *Dikelocephalus*, and propose for it the name of *D. florentinensis*.⁹

Four other pygidiums are visible on some of the shale fragments differing very widely from that just described. They vary in outline from semi-circular (one specimen) to deltoid-triangular

² Salter—Mem. Geol. Surv. Gt. Brit., iii., 2nd Edit., 1881, pl. vi., f. 4, pl. viii., f. 10.

³ Etheridge Junr.—Proc. Roy. Soc. Tas. for 1882 (1883), p. 155, pl. i., f. 4.

⁴ Angelin—Pal. Scandinavica, 1878, p. 88, pl. xli., f. 9.

⁵ Salter—Mem. Geol. Surv. Gt. Brit., iii., 2nd Edit., 1881, p. 497.

⁶ Zittel—Handb. Pal., i. Abth., ii. Bd., 1881-85, p. 596.

⁷ Hicks—Quart. Journ. Geol. Soc., 1873, xxix., p. 44.

⁸ Etheridge—Foss. Brit. Islands, i., 1888, p. 51.

⁹ In allusion to the locality.

(three specimens), with a narrow and long axis extending to the inner limb margin, and consisting of at least nine segments. The lateral lobes are broad and apparently flat, with indistinct traces of pleural segmentation, and the limb is broad and continuous with numerous imbricating striæ. The probability is that the single tail displays the true outline, whilst the three deltoid-triangular pygidiums are distorted. Were it not for the uncertainty of the pleural segments these tails might represent an Asaphid of the *Basilicus tyrannus*, Murchison, group. On the other hand, the segmentation of the axis removes the specimens from the genus *Isotelus*. We may also dismiss *Ogygia* from consideration, and all Asaphids with a short axis in the pygidium. Could it be shown that the deltoid-triangular outline of the three specimens was a true feature in contra-distinction to the semi-circular outline of the single example, then a reference might be made, perhaps, to *Stygina* (e. g. *S. murchisonia*, Murchison), as this particular outline and condition of parts is sometimes met with in that genus—or even to *Megalaspis*, Angelin. I think, however, that all four are one species, and in consequence this line of argument is inadmissible.

In his paper on the St. David's fossils already quoted, Dr. H. Hicks described a *Niobe* from the Tremadoc beds of that neighbourhood as *N. menapiensis*,¹⁰ in which the normal form of the pygidium is broadly semi-circular, and the distorted outline deltoid-triangular, as surmised in the present case. This particular species of *Niobe* has a more highly segmented pygidium than the typical British *N. homfrayi*, Salter, but not more so than some of the Scandinavian species described by Angelin.

If my surmise be correct that the deltoid-triangular pygidiums represent distorted tails of a *Niobe*, then in the fourth, or single pygidium, we see the more or less correct outline, and this will accord with the perfect condition of the caudal portion of *N. menapiensis*, Hicks. The only other satisfactory alternative would be to regard the three specimens as referable to *Megalaspis*, but under the circumstances, I do not think this tenable. One may even go a step further and suggest that the pygidiums from the Caroline Creek beds referred by me to *Asaphus*,¹¹ may really be referable to *Niobe* also.

The other organic remains from the Florentine Valley are in an unsatisfactory state of preservation. They comprise two impressions of a small Univalve, a *Tentaculites*, and numerous casts and external impressions of an *Orthis*. The small shell has

¹⁰ Hicks—Quart. Journ. Geol. Soc., xxix., 1873, p. 46, pl. iv., f. 7-9.

¹¹ Etheridge Junr.—Proc. Roy. Soc. Tas. for 1882 (1883), pl. ii., f. 5-6.

the appearance of a *Bellerophon*, with for its size a large body whorl, and a deep telescopic umbilicus, but there is no evidence of a keel, and in its present state is indeterminable. The *Tentaculites* is also an impression, with close concentric sculpture.

The remains of the *Orthis* are plentiful, but always in the condition of casts or impressions. I have not been able to satisfactorily determine it, but I believe it is related to that form referred by Salter¹² and Davidson¹³ to *O. lenticularis*, Wahl., of the Upper Lingula Flags. It is larger than the latter, and although more highly costate, the costæ still vary greatly in number. At the same time the outline closely resembles that of *O. lenticularis*, there is the same rather triangular sinus in the dorsal valve, bounded by prominent ribs, and this contains other well defined costæ; secondary ribs are also present between the primary. Our specimens are not allied to the Arenig *O. menapica*, Hicks, or the Menevian *O. hicksi*, Salter. The condition of preservation renders it most difficult to determine the species accurately, especially in so variable a genus as *Orthis*, and it is even possible that more than one form is present.

With regard to the important question of the age of the Florentine Valley mudstones, I shall confine my remarks simply to the Trilobite remains. In North America *Dikelocephalus* appears to be both an Upper Cambrian and a Lower Silurian (Quebec Group) genus,¹⁴ but typically the former; in Britain it is essentially Upper Cambrian (Lingula Flags and Tremadoc).¹⁵ *Neseuretus*, according to Hicks is an Upper Cambrian (Tremadoc) form, and *Niobe* is both an Upper Cambrian and Lower Silurian (Arenig) genus.¹⁶

Without expressing a decided opinion on the subject, there is the possibility that in these Florentine Valley beds we have another Tasmanian Cambrian locality, Upper Cambrian in fact, or at the least an horizon *very* low in the Silurian.

¹² Salter—Mem. Geol. Surv. Gt. Brit., iii., 2nd Edit., 1881, p. 544.

¹³ Davidson—Geol. Mag., v., 1868, p. 314, pl. xvi., f. 20-22; Mon. Brit. Sil. Brach., pt. 3, p. 230, pl. xxxiii., f. 22-28.

¹⁴ Miller—N. American Geol. and Pal., 1889, p.p. 543-44; Vogdes—Bib. Pal. Crustacea (*Bull. U.S. Geol. Survey, No. 63*), 1890, p.p. 112-114.

¹⁵ Etheridge—Foss. Brit. Islands, i., 1888, p. 51.

¹⁶ Etheridge—Foss. Brit. Islands, i., 1888, p. 59.

EXPLANATION OF PLATE X.

NIobe? *sp. ind.*

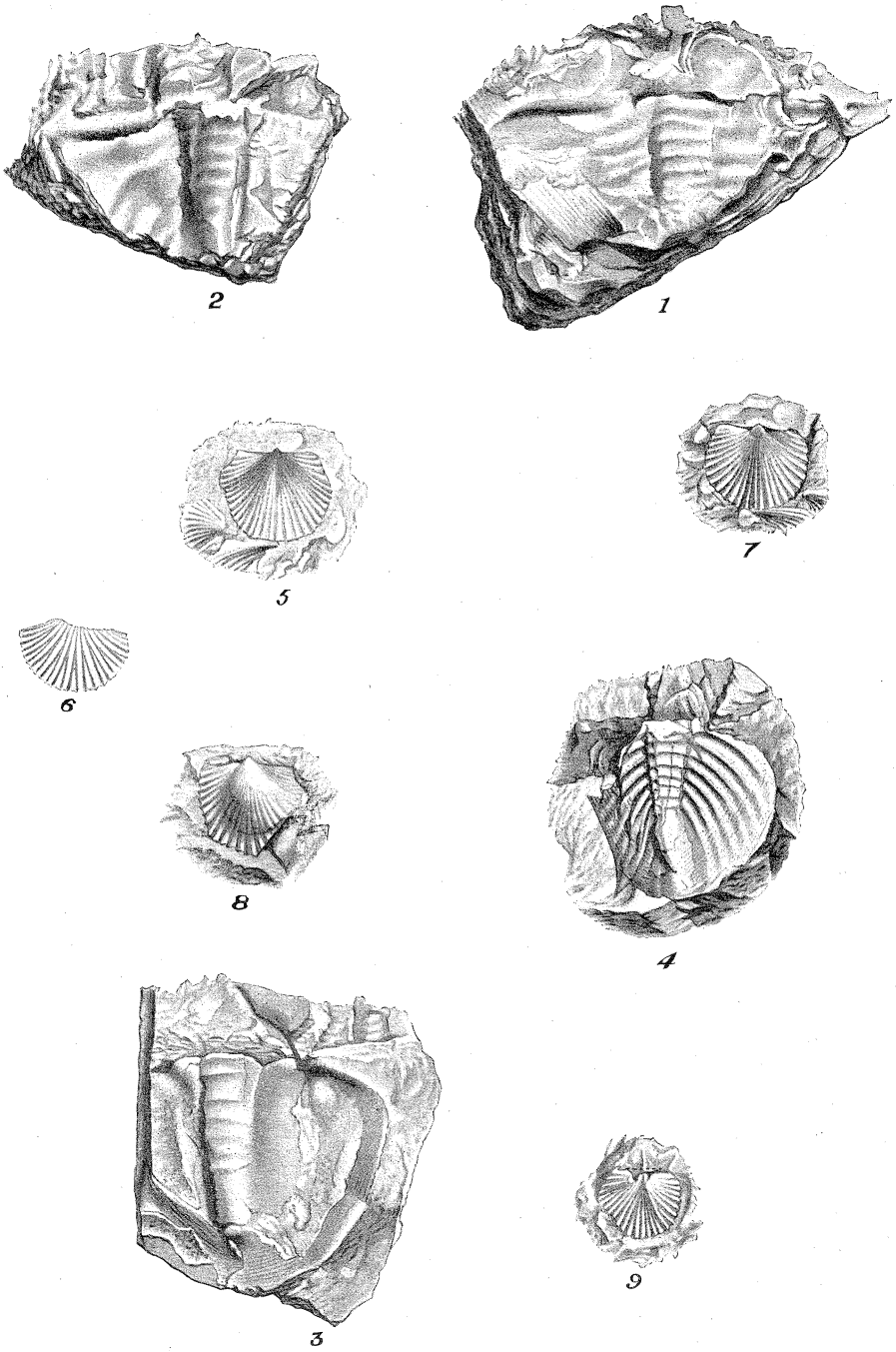
- Fig. 1. Pygidium, laterally distorted.
" 2. A similar specimen.
" 3. Pygidium of the natural form.

DIKELOCEPHALUS FLORENTINENSIS, *Eth. fl.*

- „ 4. Pygidium exhibiting segmentation and one caudal spine.

ORTHIS LENTICULARIS, *Wahlenberg?*

- „ 5 }
„ 7 } Casts in various states of preservation.
„ 8 }
„ 9 }
„ 6 Costæ enlarged showing bifurcation.



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