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ORIGINAL ARTICLES.

I.—DESCRIPTION OF A NEW GENUS OF TRILOBITES, *ONYCOPYGE*
LIVERSIDGEI, FROM THE SILURIAN OF NEW SOUTH WALES.

By HENRY WOODWARD, LL.D., F.R.S., F.G.S.,
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A NEW and interesting species of Trilobite having lately been obtained by Professor A. Liversidge, F.C.S., F.G.S., of the University of Sydney, in the Silurian rocks of Bombala, New South Wales, and forwarded to my colleague, Mr. R. Etheridge, jun., F.G.S., with a series of other Palæozoic fossils, from Australia, it has been obligingly placed in my hands for description.

I was at first doubtful whether to treat this fossil as a new species of *Deiphon* or as a distinct genus, near to *Deiphon* and *Staurocephalus*; but on a further comparison of these forms with Professor Liversidge's specimen however, there appear to be such important points of difference in the body-segments and pygidium as to entitle it to be

Onycopype Liversidgei, H. Woodw. (restored)¹ nat. size. Silurian, Bombala, New South Wales.

¹ The original specimen is preserved in a black and hard splintery limestone, and has been much broken, a part being seen in intaglio and a part in relieve. The position occupied by the hypostome in the fossil at the back of the glabella is indicated in the woodcut.

considered a distinct genus, having characters which, to some extent, approach both to *Deiphon* and *Staurocephalus*.

Onycopyge,¹ gen. nov.

Glabella broadly dilated in front, attenuated behind, the genal portion reduced to a stout recurved spine, bearing two or more short branch spines or tubercles; axis of body-segments narrow, arched; pleuræ straight, well-articulated, recurved at extremities; pygidium channelled, margin indented, armed on each side with long-recurved spines, extremity shortly bimucronate.

I have very great pleasure in dedicating this new Trilobite to its discoverer under the name of—

Onycopyge Liversidgei, sp. nov.

Animal $1\frac{1}{2}$ inch in length, by $1\frac{1}{4}$ inch wide; surface of test finely granulated; glabella spheroidal, broader than long, slightly compressed in front; eyes nearly concealed beneath the overhanging margin of the glabella; cervical lobe narrow; genal portion reduced to a long rounded strongly-recurved fixed spine, giving off two short, nearly vertical spines or branches (apparently directed forwards and upwards)² at a distance of one-fourth and half its length from the glabella; there is an indication of a third spine on each side directed backwards and inwards; (the facial suture cannot be accurately determined, but it no doubt ended on the exterior margin, as in *Deiphon Forbesii*, Barr.). Thorax broader than long (fourteen millimètres long, by twenty-eight mm. broad), consisting apparently of nine joints; axis narrow, convex; pleuræ united parallel, diverging at right angles from the axis; each pleura being articulated at its fulcral point, which is marked by a small rounded tubercle, and having its termination produced as a free recurved spine, the length of which increases from the first or anterior pleura to the ninth or last.

The pygidium has its axis extending to its posterior extremity (but the surface is broken away); the expanded border of the pygidium is somewhat deeply excavated into five rounded emarginations, principally formed by the two anterior coalesced segments of the pygidium, which, springing from the axis on either side, terminate in long and strongly-recurved marginal spines; they are separated from each other by deep intersecting furrows; behind these we detect indications of five coalesced somites; the pygidium terminates posteriorly in two short cusps separated by a rounded central emargination.

The head in *Onycopyge* agrees most nearly with that of *Deiphon*, the cheeks being reduced in both to long recurved rounded spines; but the glabella is less globular, and the eyes less prominent in the former than in *Deiphon*. The hypostome in *Onycopyge*, although only imperfectly preserved, agrees more nearly with *Deiphon* than it does with *Staurocephalus*. It is exposed by the abrasion of the postero-dorsal surface of the glabella (see Woodcut).

¹ ὄνυξ, *onychos*, a claw; and πύγη, tail.

² The extremities of these branches or spines are broken off, so that their length is not known.

The most important points of difference between *Onycopyge* and *Deiphon* are observable in the thorax or middle-body, the pleura in the former genus being firmly articulated to one another at the fulcral points, whereas in the latter they are ungrooved and free. The pygidium in *Deiphon* is short, with a minute axis of four joints, and is quite truncated below; the pygidium in *Onycopyge* is well developed, and has indications of seven coalesced somites. *Onycopyge* apparently possessed nine free thoracic somites; *Deiphon* has ten somites.

With *Staurocephalus* it agrees in the more compact and firmly articulated character of the thoracic somites; in *Onycopyge*, however, the extremities of the somites lengthen perceptibly from the head to the pygidium; whereas in *Staurocephalus* the anterior pleuræ are the longest.

In *Staurocephalus* the genal portion of the head is not reduced to a mere spine (as is the case in *Deiphon* and *Onycopyge*), but has well-developed fixed cheeks. The pygidium in *Staurocephalus* is composed of four minute coalesced somites; and when provided with prominent spines it has, like the genus *Deiphon*, one spine only on each side.

It is to be hoped that this interesting Trilobite is only the precursor to many others which Professor Liversidge may have the good fortune to obtain, and I may have the pleasure to describe, from the Australian Continent.

II.—NOTE UPON THE COOLING OF THE EARTH.

By Prof. J. MILNE, F.G.S.,
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NEARLY every text-book on geology speaks of the heat which has been lost by the earth, and the consequent contractions which have taken place upon its surface. The way in which all this has come about, however, is either not explained at all or else very imperfectly, and the difficulty experienced by any one endeavouring to find out what the conditions have been will be fully recognized by reference to the lengthy correspondence which was carried on in the columns of *Nature* (December, 1878, and January, 1879) between Mr. A. R. Wallace, Mr. O. Fisher, and others, upon this subject. A fair idea of the succession of conditions which occur in a cooling sphere like our earth may be obtained by combining together the results given by Sir William Thomson in his writings on the secular cooling of the earth (see Thomson and Tait's *Natural Philosophy*, vol. i. pp. 711-727), with the results given by Professors Perry and Ayrton in a paper entitled, "Experiments on the Heat Conductivity of Stone" (*Phil. Mag.* April, 1878). In this latter paper we have given, and I believe for the first time, a series of curves which show the rate of cooling of a ball at its various parts. Two of these curves are reproduced in the accompanying figure, Fig. 1. *PA* represents the cooling at the centre, and *PF* the cooling at the circumference, the direction *OP* measuring temperature, and the direction *OX* measuring time. Curves for intermediate points between the centre and the circum-