III.—NOTE ON THE GENUS *HASTIMIMA* FROM BRAZIL AND THE CAPE.

By HENRY WOODWARD, LL.D., F.R.S.

PROFESSOR SEWARD has called my attention to Figs. 5 and 6 on Plate XXVIII, which accompanies his notes on Fossil Plants from Cape Colony. These fragmentary impressions of organic remains have been compared by him with similar doubtful plant-remains figured by Dr. David White from the Coal-measures of Brazil (see *Commissao dos Estudos das Minas de Carvão de Pedra do Brasil*, Estampa x and xi. Final Report by J. C. White, Rio de Janeiro, 1908, p. 589.) Dr. White had already doubted the vegetable nature of the specimens from Brazil, which doubt is shared by Professor Seward, but the latter expresses himself more definitely against the plant-nature of Figs. 5 and 6, Pl. XXVIII, from the Witteberg Series of Cape Colony. He has, in fact, suggested that they "represent part of a body-segment of a Eurypterid." In this opinion I cordially agree. I also wish to add a word about the specimens figured under the name of *Hastimima* by Dr. David White from the Coal-measures of Brazil.

In this Memoir, on pl. x, five figures are referred to as *Hastimima Whitei*, namely, figs. 1 and 2, which appear to represent, *probably*, the impression and counterpart of an imperfect thoracic segment of an Arthropod, the lateral and posterior margins of which are readily to be seen, and the latero-posterior angle which they form is slightly produced and falcate as shown in the body-segments of *Pterygotus anglicus*, drawn on pls. i and ii, fig. 1, of my monograph on the Merostomata (Pal. Soc. Mon., 1865). The usual scale-like markings, however, are only seen near the margins of fig. 1, and are represented enlarged four times in fig. 1a of Dr. White's plate. The rest of the segment is ornamented by a series of small, short, bluntly-rounded spines, sparsely distributed over the surface and pointing towards the posterior border. They are shown in relief in fig. 1 and as depressions on the surface in fig. 2 of pl. x. Figs. 3 and 4 on the same plate also represent the impression and counterpart of another portion, most probably of the same animal, as the scabrous surface-ornamentation is of the same kind, being in relieve on one half (fig. 3) and in intaglio on the other (fig. 4). This specimen, which is rather acutely hastate in form, may represent the 'telson' or tail-spine of a *Pterygotus*, the margins, as far as preserved, are bilaterally symmetrical, and there is a median ridge on fig. 3 and a corresponding depression on fig. 4. It is too regular and pointed to have been the spatulate extremity of one of the swimming-paddles, and cannot be a leaf, although no doubt at first supposed to be one. The scabrous ornamentation on these specimens agrees very closely with that of *Eurypterus punctatus*, Salter, sp., from the Lower Ludlow Beds, Church Hill, Leintwardine.¹ A similar ornamentation is observed on the segments of a large form referred to *Echinocaris Wrightiana*, Dawson, sp. (Jones & Woodward, GEOL. MAG., 1884, p. 393, Pl. XIII, Figs. 1a, 1b. Woodcuts of

¹ For drawings of *E. punctatus*, Salter, sp., see H. Woodward's Monograph on the Merostomata, 1872, pt. iv, p. 153, fig. 51; p. 157, etc.

ornamentation, drawn by Professor Jas. Hall, are given (see A and B, op. cit., p. 395), from the Portage Group (Upper Erian), New York).

Turning now to pl. xi, also from the Coal-measures of Brazil, Dr. White gives on this plate ten figures, referred to *Hastimima Whitei*: these are mostly small fragments, and having been considered when drawn to be plants, they were nearly all figured with the posterior border upwards; the plate has, consequently, to be turned upside down in order to see the objects properly in their natural position. It is pretty certain that figs. 1-5, 7-9 on this plate (pl. xi) are referable to the same Arthropod as are figs. 1-4, pl. x, already noticed. Figs. 1 and 2 may be parts of appendages, but are very obscure: 2a shows distinct scale-markings, and traces of an obscure appendage, possibly part of a swimming-foot, like fig. 1. Fig. 3 shows impressions of obtuse spines on one part and scale-markings clearly visible on the other part.

The surface of fig. 4 is entirely covered with very minute elongate tubercles, like those seen on *Eurypterus punctatus*, Salter, sp.; fig. 5 is no doubt of the same nature as fig. 3, having impressions of obtuse spines on its surface; figs. 6-8 are small portions of the posterior borders of body-segments of *Eurypterus*, showing rounded (in fig. 6) or pointed (in figs. 7 and 8) marginal serrations, and the surface covered by scale-markings. The margin of fig. 9 resembles those in the specimen from the Witteberg Series of Cape Colony, figured on Professor Seward's plate (Pl. XXVIII, Figs. 5 and 6), in not being so deeply and strongly scalloped along the posterior border, but the surface is also scale-marked and has two spots indicative of two short bluntly-rounded spines. Fig. 10 is too obscure to define with accuracy, but may probably be of the same *Eurypterid* nature as the others.

FIG. 1. Part of one of the body-segments of *Eurypterus hibernicus*, Baily.
 ,, 2. Part of the margin of same (enlarged) from the Devonian of Kiltorcan, Ireland.¹

The Cape specimens—kindly sent to me to examine by Professor Seward—present, like the Brazil coal-shale specimens, clear evidence of being portions of segments of *Eurypterids* (see Pl. XXVIII, Figs. 5 and 6). The surface anteriorly is nearly smooth, that

¹ Reproduced from woodcut (Fig. 45) of *Eurypterus hibernicus*, Baily, from the Devonian rocks of Kiltorcan, Pal. Soc. Mon. Brit. Foss. Crustacea, Order *Merostomata*, by H. Woodward, 1872, pt. iv, p. 150.

portion having been overlapped by another and more anterior body-segment; this is succeeded by a band covered by scale-markings (*a*), about six rows deep, and next these follows the posterior crenulated border (*b*). (The specimens are numbered 2910 and 2911.) The first of these shows a piece of a body-segment, 75 mm. long by 40 mm. deep; only 20 mm. of the margin is preserved. There is a trace of another segment which underlies the above, also showing scale-markings and a small part of the scalloped margin. No. 2911 measures 60 mm. in length, by 40 in depth; 50 mm. of the posterior crenulated margin is preserved.

Like the remains of the Merostomata from British and Irish localities, those from Brazil and the Cape are also associated with plant-remains, and may have been of lacustrine origin. It is highly probable that, although based only upon fragmentary remains, *Hastimima* includes specimens of more than one species, if not of more than one genus. It is not my intention, however, to suggest fresh names for these fragmentary Arthropods; but their presence in such widely separated localities is a matter of extreme interest, and may prove useful as a means of marking synchronous or homotaxial horizons over very large areas. Similar fragments (see woodcut, Fig. 1) were observed by the late Mr. W. H. Baily in the Devonian rocks of Kiltorcan, as well as those already referred to in the Upper Ludlow of Shropshire.

IV.—NOTE ON THE LANGKOFL THRUST-MASS.

By MRS. MARIA M. OGILVIE GORDON, D.Sc., Ph.D., F.L.S.

IT will be remembered that two years ago, in 1907, I pointed out the occurrence of important planes of overthrust at the base of the Dolomite Mountain-massive of Langkofl and Plattkofl in South Tyrol, which explained its apparent 'reef-like' form, and its curious position above Wengen lavas in some places and Muschelkalk at others. I showed that at Langkofl the Upper Werfen Strata and Muschelkalk form a shear-slice above which the Schlern Dolomite rocks of the Langkofl Mountain have been overthrust, and below which the Wengen lavas and tuffs of the Ciampinoi meadowland are present; also that the planes above and below this shear-slice are crush-planes of extremely low inclination.

Last autumn I continued my researches in this district, but unfortunately, owing to the pressure of other business, it is only now that I have had an opportunity of preparing my work for publication.

In mapping the Ciampinoi and Wolkenstein hill area that descends from Langkofl to Gröden Valley, I traced an important thrust-plane northward across the Gröden Valley to the Sorasass Alpe and Pitsch-Berg on the north side. Disturbed strata are present in the Ciampinoi and Wolkenstein hill area, belonging to the Wengen, Buchenstein, Muschelkalk, and Werfen horizons, and they continue the same E.N.E.—W.S.W. strike as the thrust-band below the Langkofl. They are overthrust above the Wengen lavas and tuffs of the valley segment. Where the fault-plane is exposed on the western slope of the Ciampinoi hill it strikes N. 10 E. and dips *ca.* 20 E.,