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NOTE ON SOME SILURIAN LAGENÆ.

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(PLATE XIII.)

WE are in possession of so little accurate information concernin Foraminifera of pre-Carboniferous age, that any contributio to the knowledge of the subject, however insignificant it may o itself appear, has a very distinct value. The only notices of pre Carboniferous examples of the genus *Lagena* hitherto publishe occur in a provisional list of Microzoa drawn up by Professor T Rupert Jones, F.R.S., and appended to a paper by Mr. J. Smith o Kilwinning, "On a Collection of Bivalved Entomostraca and othe Microzoa from the Upper-Silurian Strata of the Shropshire District," in the GEOLOGICAL MAGAZINE for February, 1881; and in a brie allusion to the same specimens in the "Report on the Challenge Foraminifera" (p. 449, etc.); but in neither case is the notic accompanied by any details.

Recently, through the kindness of my friend Prof. T. Ruper Jones, I have had the opportunity of examining a number of speci mens, similar in many respects to those just referred to, collected b the late Dr. H. B. Holl in a neighbouring county and from bed approximately of the same age, and have had permission to us them in any way needful for their elucidation. Mr. J. Smith ha also been good enough to lend me his original mountings with th same liberty as to their employment. I have thus been enabled t make a tolerably complete examination of the whole, the results o which are embodied in the following notes.

Prof. T. R. Jones's collection consisted of between forty and fift specimens, typical examples of which are represented in Figs. 1–4 of the accompanying Plate. They were obtained from the base o the Wenlock Shale and from the shales of that part of the Lower Wenlock Series known as the Woolhope Limestone; all from the Wych, Malvern.

The specimens exhibit considerable range of contour; some few are nearly globular, but the larger number are pyriform, the inferio end of the test broad and rounded, the upper portion more or less tapering, as shown in Fig. 1. Some of the shells are perceptibly

flattened on two sides, probably the result of pressure, and present an oval instead of a circular transverse section. A few specimens of smaller size (Fig. 4) are more elongate and fusiform, the two ends being drawn out nearly equally and the inferior extremity bluntly pointed. The surface of the fossils is generally rough, owing partly to the corrosion of the test and partly to the adhesion of minute fragments of the matrix. The aperture is simple and circular, often indistinct owing to the nature of the infiltrated material. The specimens vary much in point of size, measuring from $\frac{1}{25}$ to $\frac{1}{18}$ inch (roughly from 1 to 2 millim.) in length, and from $\frac{1}{60}$ to $\frac{1}{16}$ inch (0·42 to 1·4 mm.) in transverse diameter.

None of this set exhibit the long tapering neck which gives to the typical *Lagena lævis* its characteristic flask-like contour. It is true that the neck may have existed; but if so, it is remarkable that it has not in any case been preserved either in the form of external shell or internal cast, inasmuch as it remains uninjured in smaller and more delicate specimens from a not far distant locality. When first examined, it was thought possible, chiefly on account of their size, that some of these little fossils might turn out to be *Polymorphinæ*, as they bear considerable external resemblance to certain species of the "Globuline" section of that genus; but neither on the surface nor in the interior have any traces of septation been discovered. After careful comparison it does not appear that the dimensions of even the larger examples need be a serious objection to their acceptance as *Lagenæ*. It is true that either amongst recent or fossil *Lagenæ*, shells measuring $\frac{1}{20}$ inch (1·2 mm.) are very rare; but the "Challenger" dredgings furnished at least one representative of this genus (*Lagena marginata*), the diameter of which including the wing was just about the same as that of the largest of the Silurian specimens, namely, $\frac{1}{13}$ inch (2 mm.).

That some of the specimens under notice are only casts, and that the others have had the exterior much weathered and corroded, admits of no doubt; nevertheless, thin sections of the smoother more perfect individuals show unmistakable remains of the original test (Fig. 3). Where least altered this is seen to be a tolerably homogeneous wall about $\frac{1}{700}$ inch (0·036 mm.) in thickness. Treated with weak acid both the test and its subcrystalline contents dissolve rapidly, leaving only a faint trace of siliceous residue.

Compared with the foregoing, the specimens collected by Mr. J. Smith, which number about twenty in all, are of exceedingly small dimensions. In point of size they have nothing to distinguish them from average recent examples of the genus. They are mostly of the simple flask-shaped type, with rounded base and long tapering neck (Figs. 6—10), with which we are familiar as *Lagena lævis*. They vary in length from $\frac{1}{90}$ to $\frac{1}{45}$ inch (0·28 to 0·57 mm). A few have the pointed base (Fig. 5) which characterizes the varietal form known as *L. clavata*. They are for the most part casts, and it is difficult to say whether any portion of the original shell-wall remains, though transparent sections (Fig. 10) show in places a more or less distinct external layer, differing in texture from the inner subcrystal-

line mass. One or two of the fossils exhibit traces of exogenous spiral ornament round the neck (Fig. 6), a not uncommon feature of recent *Lagenæ* and *Nodosariæ*. What is more remarkable is the tendency shown in a very large proportion of the specimens to produce a local thickening of the neck in the form of an external rim or collar. Many years ago Dr. Alcock described some similar flask-like *Lagenæ* from the shore-sand of Dog's Bay, Connemara, in the following terms :—"Finely granular in texture, the surface without any raised markings, and at the base of the neck a projecting collar."[1] To these he gave the name *Lagena antiqua*. More recently Dr. Marsson has figured a costate variety with similar collar from the Chalk at Rügen, under a distinct generic name, *Capitellina*.[2] But the fact is that ectosolenian *Lagenæ* of all kinds may be found with exogenous neck-ornament, which may either take the form of a collar, as in the present case, or of a series of rings, a spiral thread, scattered spines, or a number of symmetrically disposed vertical buttresses. Recent specimens exhibiting these and other varieties of neck-ornament are figured in Plates lvii. and lviii. of the Report on tbe 'Challenger' Foraminifera, and it will be readily seen from them how little importance is to be attached to such features as distinctive zoological characters: nevertheless, it is exceedingly interesting to meet with like morphological conditions amongst the earliest known representatives of the genus. That the ring or collar is seldom quite symmetrical in the fossil specimens under notice, probably depends either on pressure, many of the shells being to all appearance crushed out of shape, or on the unequal weathering of the surface, perhaps on both.

In one or two instances, Fig. 11 is an example, the specimens show the remains of superficial costæ, though considerably obscured by the pressure to which they have been subjected. There need be little hesitation in assigning these to the well-known recent species *Lagena sulcata*.

The localities given with Mr. Smith's series are Lincoln Hill and the railway-cutting at Ironbridge, Dorminton Wood, Benthall Edge, Sedgley, and Woolhope.

From these gatherings we learn that at least four of the varieties of *Lagena* at present living in our seas, namely, *Lagena globosa*, *L. lævis*, *L. clavata*, and *L. sulcata*, have a genealogy reaching back to the Upper-Silurian epoch. Nothing unfortunately can be said as to the probable depth of the deposit in which they have been found, inasmuch as similar forms have been taken in the living condition at almost every depth from the littoral zone down to 2500 fathoms.

I may be permitted just to add that the accompanying Plate has been drawn by Mr. Hollick, with his accustomed accuracy, direct from the specimens.

[1] "Mem. Lit. and Phil. Soc. Manchester," 1868, ser. 3, vol. iii. p. 176, pl. iv. fig. 3.

[2] *Capitellina multistriata*, Marsson, 1878, Mitth. nat. Ver. Neu-Vorpom. u. Rügen, Jahrg. x. p. 123, pl. i. fig. 3.

EXPLANATION OF PLATE XIII.

Figs. 1–3.	*Lagena globosa*, Montagu, sp.	
	1. Lateral aspect; 2. Oral aspect.	Magnified 25 diam.
	3. Longitudinal section	× 35.
Fig. 4.	*Lagena clavata*, D'Orbigny, sp. (?)	× 35.
Fig. 5.	*Lagena clavata*, D'Orbigny, sp.	× 100.
Figs. 6–10.	*Lagena lævis*, Montagu, sp.	
	6. Small specimen with remains of spiral neck-ornament.	× 100.
	7, 8, 9. Specimens with collar encircling the neck.	× 100.
	10. Longitudinal section.	× 100.
Fig. 11.	*Lagena sulcata*, Walker and Jacob.	
	Crushed specimen; lateral aspect.	× 100.

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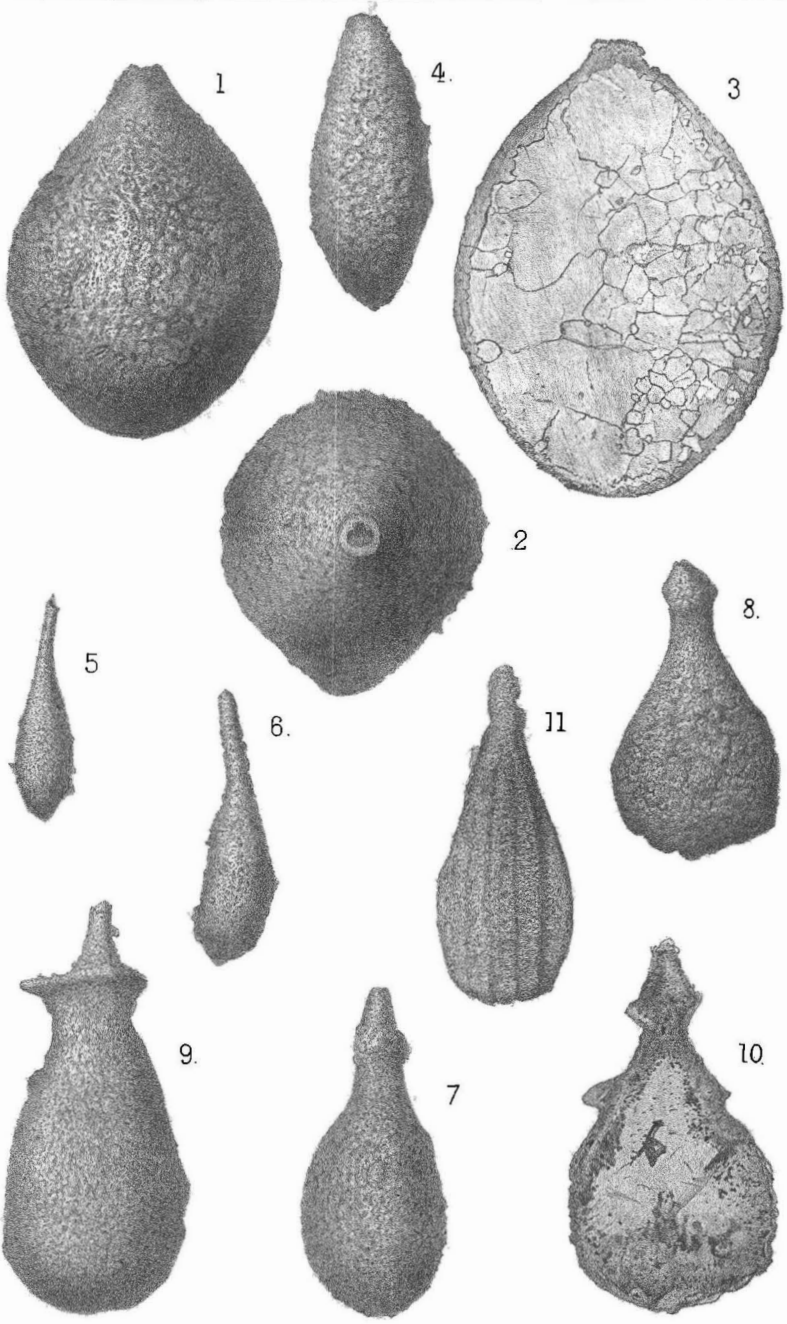
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