

## ***Praeschuleridea ventriosa ventriosa* (Plumhoff) and *Paraschuleridea ornata* Bate [Ostracoda] from the Bajocian of N.E. England**

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### **Introduction**

In describing a large and interesting ostracod fauna from the Middle Jurassic of N.W. Germany, Plumhoff (1963) introduced the species *Procytheridea* ? *ventriosa*, of which there were two subspecies, *P.* ? *ventriosa ventriosa* and *P.* ? *ventriosa angulata*, the latter being described as new and the former being attributed to Fischer (1963). Unfortunately, Fischer's description was not published until after that of Plumhoff so that the author of the species was Plumhoff. This has already been pointed out in Bate (1963 b : 46), but because of Malz's (1966) interpretation of the ostracod material of Plumhoff, Fischer and myself, it has become necessary to re-describe the specimens which in 1963 I identified as *Praeschuleridea ventriosa ventriosa* (Plumhoff).

### ***Praeschuleridea ventriosa* (Plumhoff) and *Paraschuleridea ornata* Bate**

A few miles to the west of Hull, Yorkshire, a large quarry (Eastfield Quarry) in South Cave exposes a good section of the Middle Jurassic Cave Oolite. In 1947 a temporary sump dug into the quarry floor exposed a sequence of the underlying fossiliferous clays and marls of the Basement Beds containing a rich and well-preserved ostracod fauna. This fauna was described in Bate (1963 b) whilst the stratigraphy and correlation of the sediments has been discussed in Bate (1967). The two species with which I am concerned in this paper, *Praeschuleridea ventriosa* (Plumhoff) as described by Bate (1963 b : 39) and *Paraschuleridea ornata* Bate (1963 b : 37), occur in large numbers within the marl facies of the Basement Beds. Whilst *Praeschuleridea ventriosa* s.l. occurs in the Basement Beds, closely associated Hydraulic Limestone, in the Yons Nab Beds of Yorkshire and the Kirton Cementstone Series of Lincolnshire (see table 4, Bate, 1967), *Paraschuleridea ornata* has been found only within the marl facies of the Basement Beds, and is not associated with *P. ventriosa* at any other locality.

When Dr. H. Malz of the Forschungs-Institut Senckenberg, Frankfurt, was visiting the British Museum (Natural History) in 1966 I had the opportunity to examine German material of *Procytheridea* ? *ventriosa ventriosa* Plumhoff and subsequently through the kindness of Dr. E. Triebel was able to examine

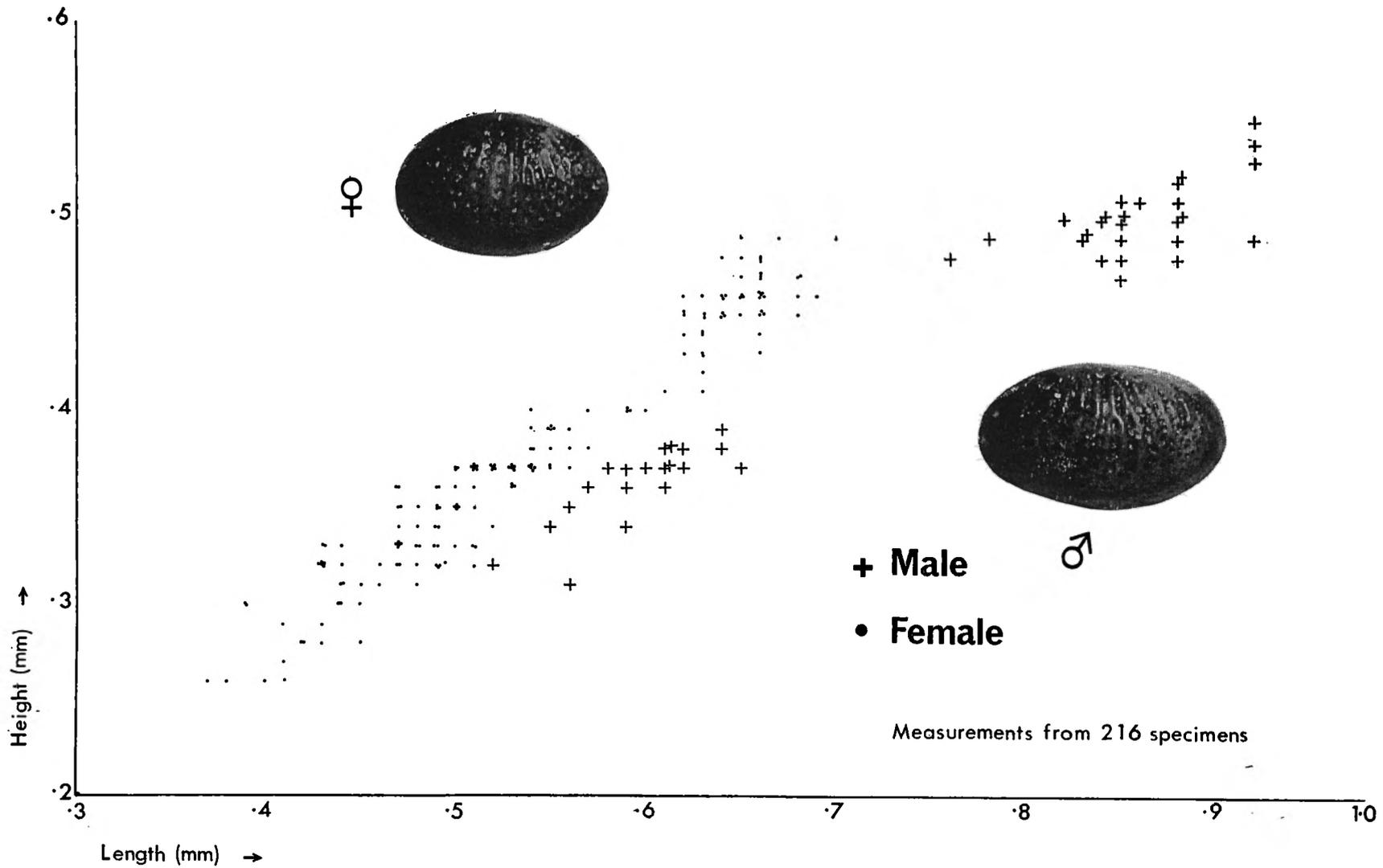


FIG. 1. Ontogenetic series of *Praeschuleridea decorata* sp. nov. Length/height measurements taken from complete carapaces and left valves.

some of Plumhoff's original material (Xe.3836). Dr. Malz and I agreed that *ventriosa* belonged to the genus *Praeschuleridea* and that the British species which I had identified as *ventriosa* was quite distinct and therefore new. It is the intention in this paper to show how *P. ventriosa* s.l. (from the Basement Beds) differs from *P. ventriosa* s.s. from Germany and how *P. ornata* is a valid species and not the juvenile form of *P. ventriosa* s.l. as suggested by Malz (1966 : 399).

An interesting feature of my *ventriosa* material from South Cave is the presence of juvenile instars in which there is a male dimorph smaller than the adult males (see fig. 1). If the first appearance of sexual dimorphism is taken to indicate adult status, then in this material we could postulate a small species morphologically indistinguishable from the larger species and reaching maturity at a length of about 0.56 mm for the female and 0.60 mm for the male. Reference to fig. 1 will show, however, that there is a scatter of size ranges around these points. The presence of small males in the series can be explained more reasonably as the appearance of sexual dimorphism at a pre-adult stage. Whether the species was sexually mature at that time is conjectural. The elongate scatter (fig. 1) for the small male dimorphs is probably the result of measuring specimens from different populations in time. This is bound to occur whenever a sample is taken from an excavation. Only by collecting specimens from a single time plane can we expect to record precise sizes of a single interbreeding population.

When first describing the species *Praeschuleridea ventriosa* (Plumhoff) (Bate, 1963 b : 39) full details of the ontogenetic series were not given although the measurements of a small male (Io. 981) of length 0.56 mm were included together with an illustration of its muscle scar pattern. The small specimens were then, as they are now, regarded as being the juvenile instars of *ventriosa* s.l. (Bate, 1963 b). In fig. 1 the measurements of left valves and carapaces of both the large and small instars have been plotted, the smaller right valve measurements have been omitted. The graph thus illustrates a good ontogenetic series traceable back from the large adult female, through a decreasing series to a juvenile instar of length 0.37 mm. If the details of fig. 2 were superimposed upon fig. 1 it would be seen that the larger left valve measurements of *Paraschuleridea ornata* would coincide with the smaller male dimorphs of *ventriosa* and would continue the ontogenetic series back from there. This is precisely the proposal propounded by Malz (1966 : 399) in synonymizing *Paraschuleridea ornata* with *Praeschuleridea ventriosa* of Bate (1963 b); *P. ornata* being considered to be the juvenile instars of the adult male and female dimorphs of length 0.76–0.92 mm (male) and 0.62–0.70 mm (female) in fig. 1. Malz (p. 402) further suggests that the smallest size for the adult *ventriosa* (my material) is 0.65 mm whilst the smaller dimorphic specimens, which I consider to be the juveniles of *ventriosa*, have a maximum size of length 0.56 mm (male) and 0.50 mm (female). Again, examination of fig. 1 shows the smaller specimens to have a maximum length 0.61 mm (female) and 0.65 mm (male).

The problem is this : Malz has removed from *Praeschuleridea ventriosa* (Plumhoff) (Bate, 1963 b) the juvenile instars plotted on fig. 1, on the grounds that in exhibiting dimorphism they are themselves adult although he admits it is not possible to separate them morphologically. Size is the only determining factor. However, as we have seen the size measurements given by Malz (p. 402)



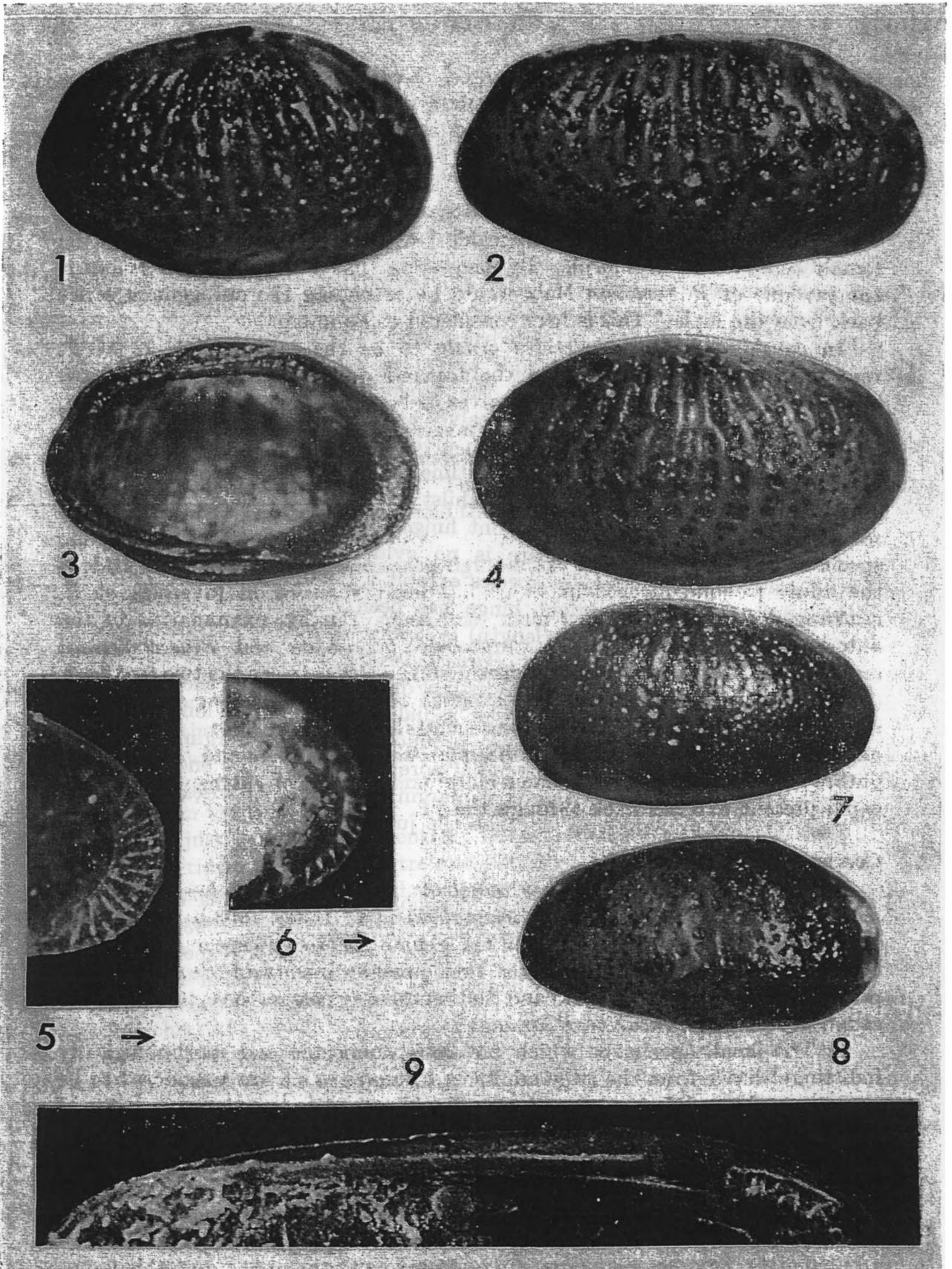


FIG. 3. *Praeschuleridea decorata* sp. nov. (1) Right side of female carapace, paratype Io.976,  $\times 85$ ; (2) external view, male right valve, paratype Io.978,  $\times 85$ ; (3) internal view, female left valve, paratype Io.974,  $\times 85$ ; (4) external view, male left valve, paratype Io.980,  $\times 85$ ; (5) anterior radial pore canals, male left valve, paratype Io.980,  $\times 85$ . *Paraschuleridea ornata* Bate. (6) anterior radial pore canals, right valve, paratype Io.968,  $\times 135$ ; (7) external view, left valve, holotype Io.965,  $\times 85$ ; (8) external view, right valve, paratype Io.966,  $\times 85$ ; (9) left valve hinge, Io.4239,  $\times 250$ .

for the smallest *ventriosa* and the largest dimorphs of the smaller specimens are not consistent with the sizes plotted. It should also be noted that by taking the small, but morphologically identical, specimens as the juveniles of *Praeschuleridea ventriosa* s.l. as plotted (fig. 1) the ontogenetic series extends back from the female dimorph. This is characteristic of Mesozoic to Recent ostracods of the Cytheracea and contrasts markedly with Palaeozoic ostracods where the ontogenetic series is traceable back from the male dimorph; the female being the heteromorph. By suggesting that *Paraschuleridea ornata* is the juvenile of *P. ventriosa* Malz would be extending the ontogenetic series back from the male. This is here considered to be untenable.

In considering *Paraschuleridea ornata* to be the juvenile instars of *P. ventriosa* Malz (1966 : 402) cites the tapered outline, weak hinge, narrow marginal zone and thinness of the valves as being juvenile characters. True, such characters are to be expected in juvenile instars but are not necessarily restricted to these. The tapered outline of *P. ornata* is considered to be a generic character of the species whilst the hemimerodont hinge is quite dissimilar to the paleohemimerodont hinge (see Bate, 1963 a : 179) of *Praeschuleridea*. Furthermore there is no evidence to suggest that juvenile specimens of *Praeschuleridea* species exhibit a hemimerodont stage. Indeed the adult paleohemimerodont hinge has been observed in juveniles of *P. ventriosa* down to a size of (length) 0.38 mm. Finally, examination of the anterior radial pore canals of *Paraschuleridea ornata* and *Praeschuleridea ventriosa* s.l. illustrates a clear and distinct difference between the two (see fig. 3, (5, 6)). In *P. ventriosa* the anterior radial pore canals are long and slender, slightly curved and arranged fan-like around the anterior margin. In *P. ornata* on the other hand, the anterior radial pore canals are short and triangular in outline, widening towards the inner margin. The type of anterior radial pore canal present extends back through the juvenile instars.

### Conclusions

1. There are sufficiently clear morphological distinctions between *Paraschuleridea ornata* and *Praeschuleridea ventriosa* (Bate, 1963 b), especially in the anterior radial pore canals and hinge, for a generic and specific separation to be made. There is no evidence that juvenile instars of *Praeschuleridea* possess a hemimerodont hinge and neither do they possess the type of anterior radial pore canals present in *P. ornata*.

2. The small specimens which are both dimorphic and morphologically indistinguishable from the large adults of *P. ventriosa* s.l. are considered to be juvenile instars of that species, the small males representing the appearance of pre-adult dimorphism.

3. *Paraschuleridea ornata* Bate (1963 b : 37) is considered to be a valid species.

4. The plot of the length/height ratio of the small specimens of *P. ventriosa* s.l. (fig. 1) shows the ontogenetic lineage extending to the large adult female dimorph, characteristic of Mesozoic Cytheracea; but this is not evident in a length/height plot of *P. ornata* (fig. 2.)

5. *P. ornata* has been found in association with *P. ventriosa* s.l. at a single locality only, which is additional evidence against this species being the juvenile form of *ventriosa*.

**Systematic description**Family **SCHULERIDEIDAE** Mandelstam, 1959Subfamily **SCHULERIDEINAE** Mandelstam, 1959Genus **PRAESCHULERIDEA** Bate, 1963*Praeschuleridea decorata* sp. nov.

(Figs. 1, 3 (1-5), 4 (1-3))

*Praeschuleridea ventriosa ventriosa* (Plumhoff, 1963), Bate, 1963 : 39, pl. 10, figs. 8-13, pl. 11, figs. 1-9, pl. 12, figs. 1-4, 7, 8 ; Bate, 1964 : 24. pars. *Praeschuleridea ornata* (Bate), 1966 Malz. : 399, pl. 49, figs. 26-30. not *Procytheridea ? ventriosa ventriosa* Plumhoff, 1963 : 36, pl. 6, figs. 95-98. not *Paraschuleridea ornata* Bate, 1963, 37, pl. 9, figs. 9-12, pl. 1, 10 figs. 1-3, text-fig. 2.

**DIAGNOSIS.** Species of *Praeschuleridea* with strong ornamentation of transverse, sometimes bifurcating, ridges extending down from the dorsal margin to die out just below line of greatest length. Large, 5-6 sided pits are situated between the ridges and continue onto the lateral margins of the carapace with a gradual reduction in size. Twelve anterior radial pore canals are situated in a fan-like arrangement around the anterior margin. Other internal details as for the genus.

**HOLOTYPE.** Io.973, male carapace figured fig. 3(1-3). Basement Beds, Eastfield Quarry, South Cave, Yorkshire.

**PARATYPES.** Io.974-82, 111 specimens, male and female carapaces and single valves. Horizon and locality as above.

**OTHER MATERIAL.** Over 100 specimens from the above horizon and locality.

**DESCRIPTION.** *Carapace* oval in outline, elongate in the male dimorph, high domed in the female. Greatest length passes through mid-point, greatest height slightly anterior of mid-point ; greatest width median. *Shell surface* strongly ornamented with transverse ridges which radiate outwards and downwards from the dorsal margin. The ridges may bifurcate, especially the ridge situated just behind valve centre. Large 5-6 sided pits are situated in between the ridges about the centre and dorsal part of the carapace whilst towards the periphery where the ridges die out the pits are present alone but very much reduced in size. An oblique swelling is situated on the right valve just below the anterior cardinal angle, with an oblique furrow associated beneath. This swelling has not been observed in the left valve. *Normal pore canals* large and circular, only clearly seen around the periphery. *Left valve* larger than the right which it overreaches on all sides except mid-ventrally, where the left overlaps the right. Dorsal margin broadly convex in the left valve with rounded cardinal angles ; in the right valve the cardinal angles are more strongly angled. Anterior broadly rounded in both valves ; posterior rounded-triangular with concave (in the right valve) postero-dorsal slope and convex postero-ventral slope. Ventral margin convex with antero-median incurvature and slightly overhung by convex ventro-lateral margin. Anterior and posterior margins compressed. *Hinge* paleohemimerodont, with, in the left valve, terminal loculate sockets and a smooth median groove upraised across a smooth median bar. Accommodation groove broad and shelf-like. Right valve hinge with 6-7 anterior and 7-8 posterior teeth, separated by a smooth median groove, across which the teeth are connected by a low ridge. *Inner margin* and *line of concrescence* coincide ; *duplicature* broad ; *anterior radial pore canals* widely spaced and splayed out, fan-like, around the

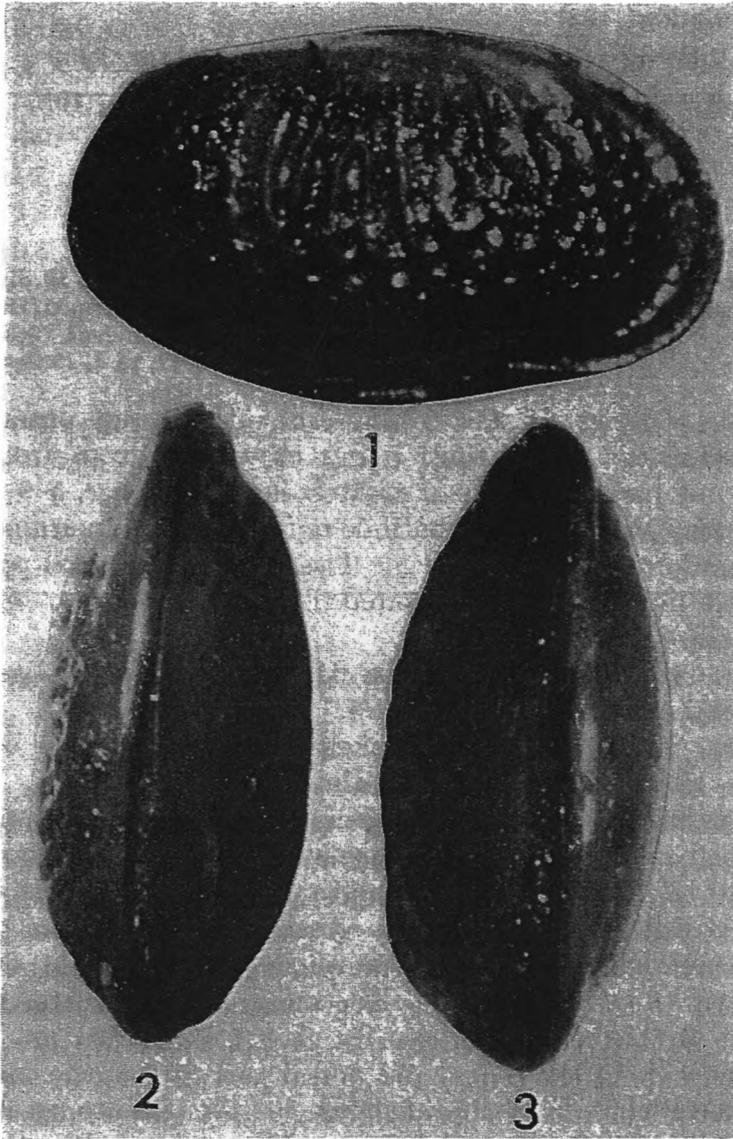


FIG. 4. *Praeschuleridea decorata* sp. nov. Right, dorsal and ventral views, male carapace, holotype Io.973,  $\times 85$ .

anterior margin, where there are 12 in number. Posteriorly there are approximately 4 marginal radial canals. *Selvage* prominent; a narrow *flange* is present around the anterior margin of both valves. *Muscle scars* of type *C* (see Bate, 1963 a : 181, 1963 b, pl. 12, figs. 3, 4). with the antero-median crescentic antennal scar sometimes having a small circular scar situated in front. In other cases the small circular scar appears to have fused with the large crescentic scar to produce a larger, almost oval scar. The four adductor scars are situated in a crescentic row behind the antennal scar(s) whilst the small, circular mandibular scar has a low, antero-ventral position. Dorsal muscle scars have been observed situated close to the hinge and situated above the muscle scars just described.

**DIMENSIONS.** Holotype. Io.973, male carapace, length 0.88 mm; height 0.52 mm; width 0.36 mm.

Paratypes. Io.974, female left valve, length 0.68 mm ; height 0.47 mm. Io.975, female right valve, length 0.67 mm ; height 0.43 mm. Io.976, female carapace, length 0.68 mm ; height 0.45 mm ; width 0.37 mm. Io.977, male left valve, length 0.78 mm ; height 0.49 mm. Io.978, male right valve, length 0.85 mm ; height 0.47 mm. Io.979, female right valve, length 0.63 mm ; height 0.41 mm. Io.980, male left valve, length 0.88 mm ; height 0.49 mm. Io.981, male right valve, length 0.56 mm ; height 0.31 mm.

REMARKS. *Praeschuleridea decorata* was originally described under the name of *Praeschuleridea ventriosa ventriosa* (Plumhoff) in Bate (1963 b : 39). Although it was the original intention in 1963 to describe this British species of *Praeschuleridea* under the specific name now given to it, the publication by Plumhoff of his species *ventriosa* and the apparent identity in illustration with my species necessitated a rapid substitution of name. However, examination of the German material sent on loan by Dr. Triebel has confirmed that the German and British material is not, in fact, conspecific. *P. decorata* differs from *P. ventriosa* s.s. in outline, especially in the male dimorph which in *decorata*, for the same height measurement, is very much more elongate. The male *ventriosa* is much more oval in outline. As far as the ornamentation is concerned, that of *ventriosa* is much more strongly reticulate with less emphasis on transverse ridges. This is more noticeably demonstrated in the illustrations of Malz (1966, pl. 49, figs. 21-23).

At the end of the synonymy of *P. decorata* I have listed two species which are not synonymous : *P. ventriosa* (Plumhoff) we have already dealt with. The second species, *Paraschuleridea ornata* Bate (1963 : 37) has been discussed in the first part of this paper. The placing of *P. ornata* into synonymy with the present species by Malz (1966 : 399) is not accepted here. This means that only part of the species described by Malz as *Praeschuleridea ornata* (Bate) can be accepted into synonymy, the juveniles of the species as described there must be removed.

## Summary

The ostracod *Praeschuleridea ventriosa ventriosa* (Plumhoff) (Bate 1963 b : 39) described from the Bajocian Basement Beds of Yorkshire, N.E. England is critically reviewed. The placing of *Paraschuleridea ornata* Bate (1963 : 37) into synonymy with this species by Malz (1966 : 399) is rejected. The British material first described as *Praeschuleridea ventriosa ventriosa* (Plumhoff) is recognised as a new species and described as *Praeschuleridea decorata* sp. nov.

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