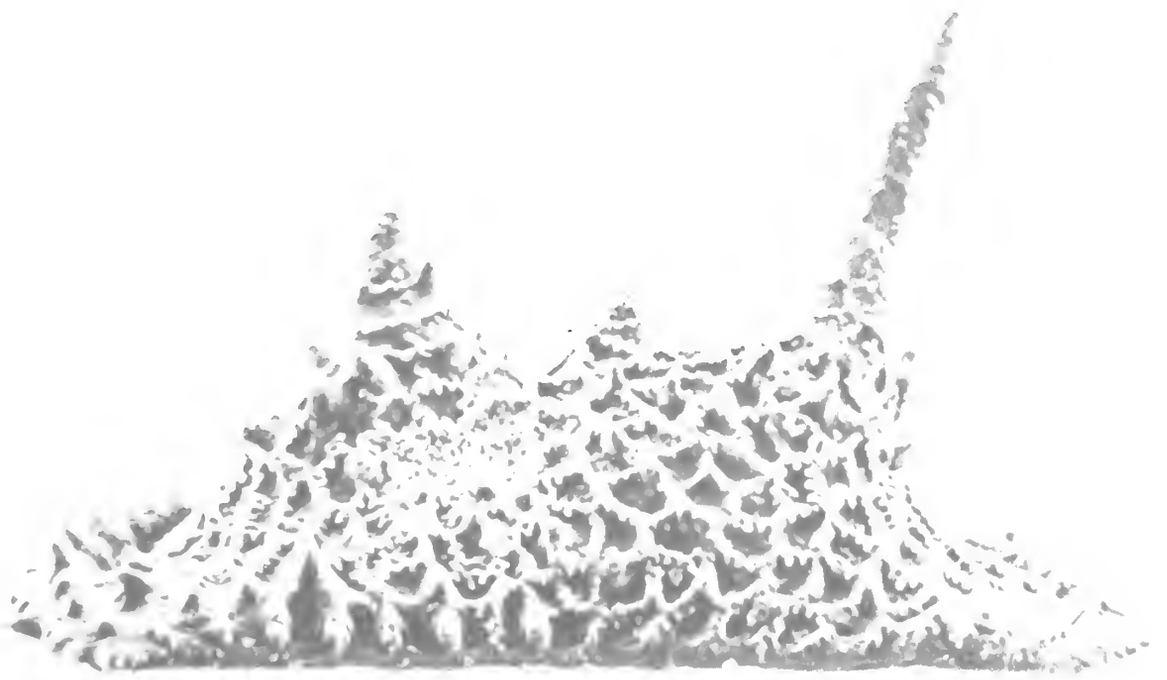
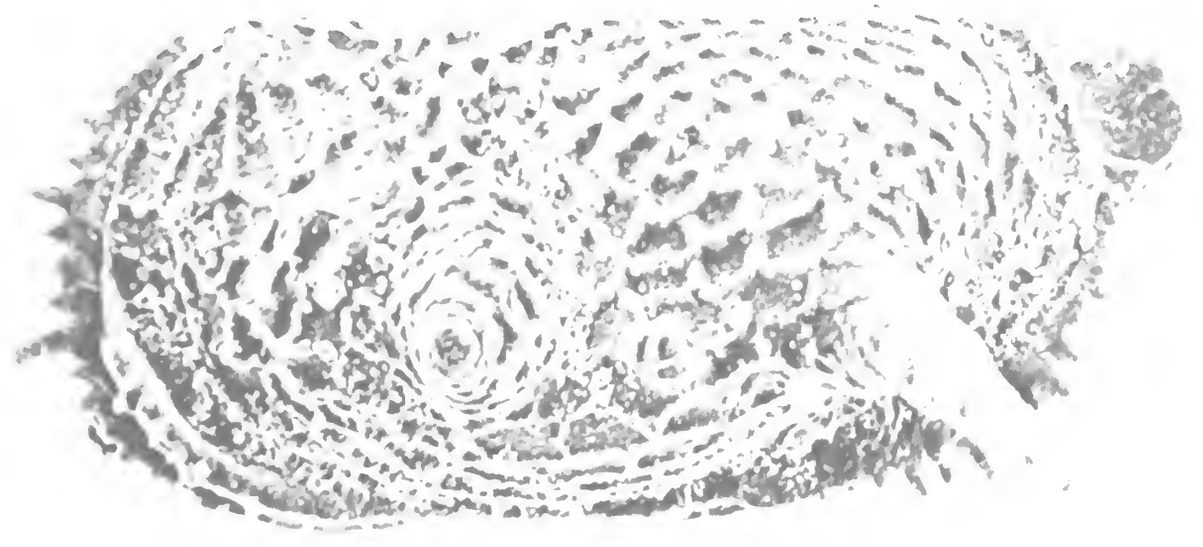
A Stereo-Atlas of Ostracod Shells

edited by I. Boomer, D. J. Horne, A. R. Lord, D. J. Siveter, and J. E. Whittaker



Volume 22, Part 1; 31st August, 1995



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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. All contributions submitted for possible publication in *A Stereo-Atlas of Ostracod Shells* are peer-reviewed by an appropriate international specialist. "Instructions to Authors" and plate blanks for mounting photographs may be obtained from any Editor. Manuscripts should be submitted to Dr Ian Boomer.

The front cover shows (upper) the holotype (RV, dorsal view, BMNH no. **OS 14654**) and (lower) a paratype (LV, external lateral view, BMNH no. **OS 14653**) of *Pariceratina ubiquita* Boomer, 1994 from the Palaeogene of ODP Site 865, Central Pacific Ocean. This species was described in *A Stereo-Atlas of Ostracod Shells,* **21,** 79-86.

595.336.16 (113.313) (474.2 : 161.026.59) 551.351 + 552.52

ON *BALTOCYAMUS PRIMARIUS* MEIDLA gen. et sp. nov.

by Tõnu Meidla
(Institute of Geology, Estonian Academy of Sciences & Institute of Geology, Tartu University, Estonia)

Genus *BALTOCYAMUS* gen. nov.
Type-species: *Baltocyamus primarius* sp. nov.

Derivation of name: *Balto* (the genus originates from the Baltic area) and *cyamus*, hinting at its bean-like shape (and as used in several primitiopsid names). Gender, masculine.

Diagnosis: Small, strongly convex Anisocyaminae with velum proceeding along entire free margin; male velum bend-like, female differing by posterior concave open dolon. Left valve operlaps right valve along the contact margin.

Remarks: This genus differs from *Clavofabella* Martinsson, 1955 and *Anisocyamus* Martinsson, 1960 by having the velum separated from the lateral surface by a furrow. In addition, it differs from *Primitiopsis* Jones, 1887 in possessing an open dolon in females. *Baltocyamus* is assigned to the Anisocyaminae Martinsson, 1960 based on the lack of distinct S2 and L2.

Baltocyamus resembles the non-dimorphic genus *Pyxion* Thorslund, 1948 in having a flat, wide velum which is similar to the marginal lobe (velum?) of the latter. The contact conditions are the same as *Pyxion posterobicarinatum* Schallreuter (*Stereo-Atlas Ostracod Shells*, **6**, 87–90, 1979): the left valve bears an outer list and inner semi-groove, thus complimenting the marginal structures of the right valve. This condition is the reverse of that in *Anisocyamus elegans* (Harris, 1957) (see Siveter & Williams, *Stereo-Atlas Ostracod Shells*, **15**, 107–114, 1988) or *A. bassleri* (Harris, 1931) (see Siveter & Williams, *Stereo-Atlas Ostracod Shells*, **15**, 115–122,

Explanation of Plate 22, 2

Fig. 1, ♀ car., post (**Os 3292**, 0.77 mm long and 0.36 mm wide). Fig. 2, ♀ car., lt. lat (**Os 3291**, 0.73 mm long). Fig. 3, ♂ car., rt. lat. (holotype, **Os 3178**, 0.78 mm long). Fig. 4, ♀ car., rt. lat. (**Os 3293**, 0.77 mm long). Fig. 5, ♀ car. lt. lat. (**Os 3179**, 0.77 mm long). Fig. 6, juv. car. lt. lat. (**Os 3283**, 0.69 mm long). Fig. 7, ♂ car., post. (**Os 3285**, 0.76 mm long and 0.35 mm wide).
Scale A (250 μm; ×57), figs. 1–7.

1988). In some representatives of the genus *Pyxion* the adductorial sulcus may also be poorly developed (e.g. *P. posterobicarinatum*).

The presence of a distinct velum in both heteromorphs and tecnomorphs of an Anisocyaminae species necessitates modification of the diagnosis for the subfamily.

Baltocyamus primarius sp. nov.

Derivative of name: Latin, *primarius* notable, remarkable, one of the first; alluding to its characteristic, striking ornamentation and to the fact that it is one of the oldest known Anisocyaminae in Baltoscandia.

Holotype: Institute of Geology, Estonian Academy of Sciences, no. **Os 3178**; tecnomorphic carapace.
[Paratypes: Institute of Geology, Estonian Academy of Sciences, nos. **Os 3179–Os 3298**].

Type locality: Tõrremägi, Rakvere, West Viru District, Estonia, approximately lat. 59° 21′ 31″ N, long. 26° 21′ 15″ E; Hirmuse Formation, Oandu Stage, Viruan, Ordovician.

Diagnosis: Carapace small (length up to 0.79 mm), high, strongly convex, slightly postplete with considerably larger anterior cardinal corner. Dorsum epicline. Bend-like velum of male extends along the entire free margin, widening ventrally where it merges with the lateral surface. Female has posterior concave open dolon. Lateral surface irregularly, coarsely-pitted. Left valve overlaps right valve along the contact margin.

Figured specimens: Institute of Geology, Estonian Academy of Sciences, nos. **Os 3178** (holotype, ♂ car.: Pl. **22**, 2, fig. 3), **Os 3179** (♀ car.: Pl. **22**, 2, fig. 5), **Os 3281** (♀ car.: Pl. **22**, 4, fig. 4), **Os 3283** (juv. car.: Pl. **22**, 2, fig. 6), **Os 3285** (♂ car.: Pl. **22**, 2, fig. 7), **Os 3286** (♂ car.: Pl. **22**, 4, fig. 3), **Os 3288** (♀ car.: Pl. **22**, 4, fig. 7), **Os 3289** (♀ car.: Pl. **22**, 4, fig. 5), **Os 3291** (♀ car.: Pl. **22**, 2, fig. 2), **Os 3292** (♀ car.: Pl. **22**, 2, fig. 1), **Os 3293** (♀ car:. Pl. **22**, 2, fig. 4), **Os 3295** (♂ LV: Pl. **22**, 4, fig. 8), **Os 3296** (♀ RV: Pl. **22**, 4, fig. 1), **Os 3297** (♀ RV: Pl. **22**, 4, fig. 2) and **Os 3298** (♀ LV: Pl. **22**, 4, fig. 6).

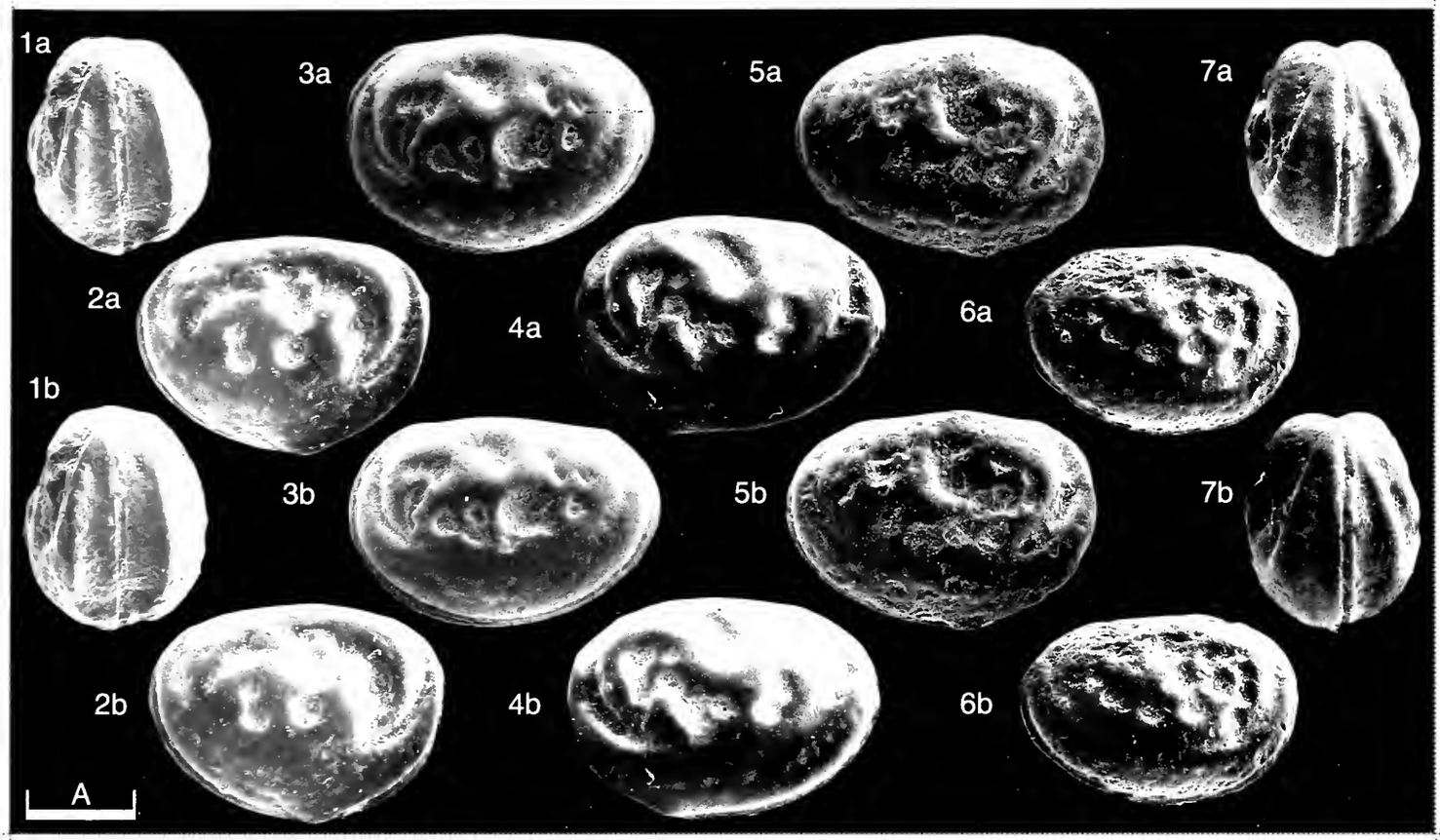
All of the figured specimens are from a single sample from the type locality.

Remarks: *B. primarius* is known from about 120 specimens.

Distribution: Known only from the Hirmuse Formation, Oandu Stage, Caradoc Series, Ordovician, at a few localities in the vicinity of Rakvere, Estonia: the Vinni core (depth 43.25 m) and Tõrremägi section.

Explanation of Plate 21, 4

Fig. 1, ♀ RV, int. lat. (**Os 3296**, 0.72 mm long). Fig. 2, ♀ RV, int. lat. (**Os 3297**, 0.70 mm long). Fig. 3, ♂ car., vent. (**Os 3286**, 0.77 mm long). Fig. 4, ♂ car., lt. lat. (**Os 3281**, 0.79 mm long). Fig. 5, ♀ car., vent. (**Os 3289**, 0.73 mm long. Fig. 6, ♀ LV, int. lat. (**Os 3298**, 0.78 mm long). Fig. 7, ♀ car., vent., half-opened (**Os 3288**, 0.76 mm long). Fig. 8, ♂ LV, int. lat. (**Os 3295**, 0.75 mm long).
Scale A (250 μm; ×57), figs. 1–8.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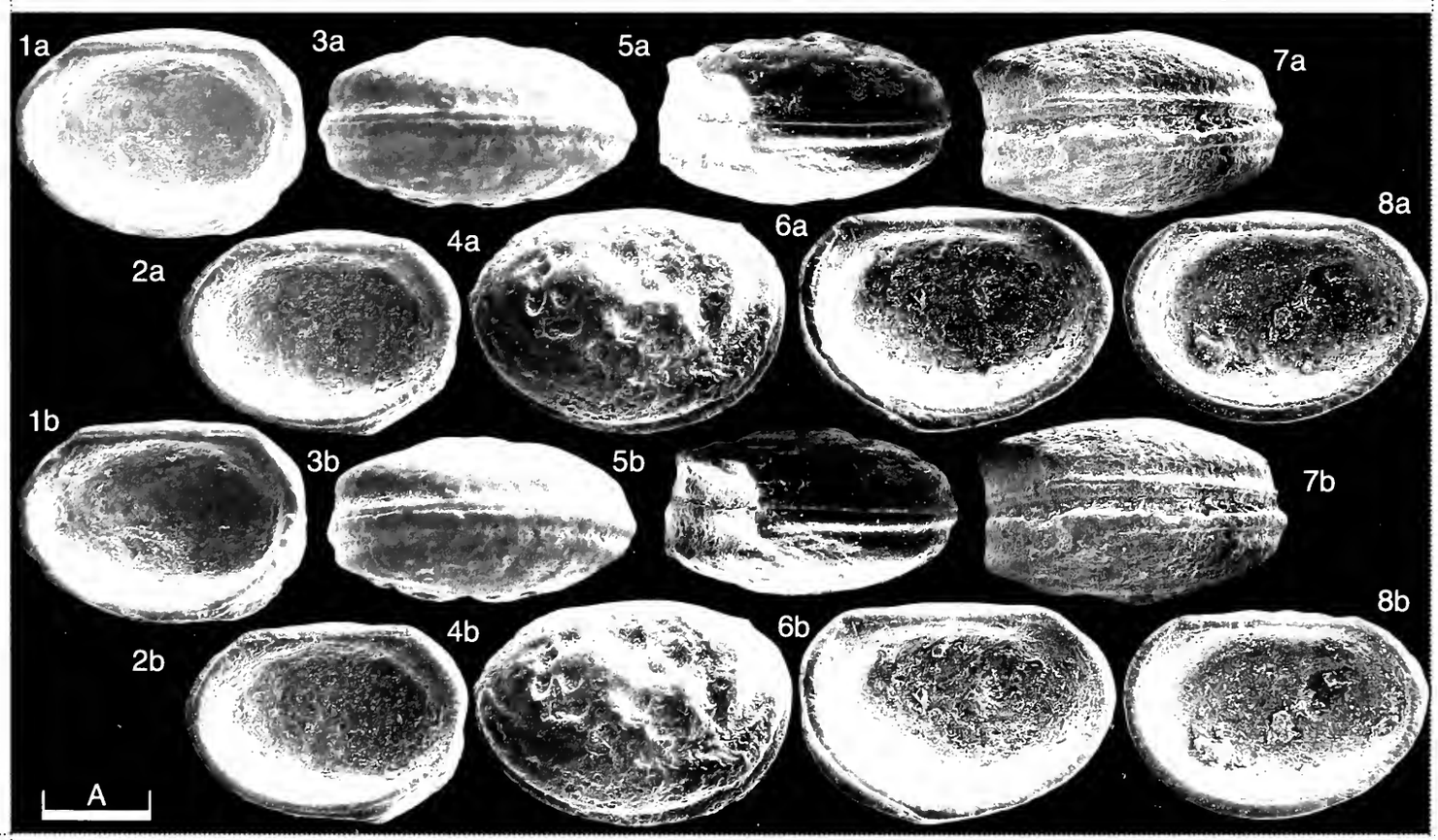
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595.336.21 (113.333) (768 : 162.089.35 + 766 : 162.097.34): 551.351 + 552.54

ON *DIZYGOPLEURA LANDESI* ROTH

by Robert F. Lundin
(Arizona State University, Tempe, U.S.A.)

Dizygopleura landesi Roth, 1929

1929 *Dizygopleura landesi* sp. nov., R. Roth, *J. Paleont.*, **3**, 341, pl. 35, figs. 7a–i.
1965 *Dizygopleura landesi* Roth; R. F. Lundin, *Bull. Okla. geol. Surv.*, **108**, 45.

Lectotype: United States Museum of Natural History (USNM), Washington D.C., U.S.A.; no. **USNM 80645 C**; adult carapace (see Lundin, 1965).

Type locality: The precise locality of the type specimens cannot be established, but it is most likely in the Lawrence Uplift area of Pontotoc County, Oklahoma; approximately lat. 34° 25′ N, long. 96° 50′ W (see Roth 1929, Lundin 1965, T. W. Amsden, *Bull. Okla. geol. Surv.*, **84**, panel 2, 1960). This locality is probably of late Ludlow or Přídolí Series, Silurian, in age.

Figured specimens: Department of Geology, Arizona State University, (**ASU**), nos. **X-214** (♂ car.: Pl. **22**, 6, figs. 1–3), **X-215** (♀ RV: Pl. **22**, 6, fig. 4), **X-216** (♀ LV: Pl. **22**, 6, fig. 5), **X-217** (♂ LV: Pl. **22**, 8, fig. 1), **X-218** (♀ car.: Pl. **22**, 8, figs. 2–4), **X-219** (♂ LV: Pl. **22**, 8, fig. 5). All figured specimens are adults.

ASU X-214, **ASU X-216**, **ASU X-217** and **ASU X-219** are from approximately 49 m above the base of the Henryhouse Formation in the Lawrence Uplift, Pontotoc County, Oklahoma (Section P3, sample 11 of Lundin 1965). **ASU X-215** is from approximately 12 m below the top of the

Explanation of Plate 22, 6

Figs. 1–3, ♂ car. (**ASU X-214**, 1259 μm long): fig. 1, ext. vent.; fig. 2, ext. dors.; fig. 3, ext. rt. lat. Figs. 4, ♀ RV (**ASU X-215**, 1315 μm long): int. lat. Fig. 5, ♀ LV (**ASU X-216**, 1184 μm long): int. lat.
Scale A (200 μm; ×41), figs. 1–3; scale B (200 μm; ×40), fig. 4; scale C (200 μm; ×43), fig. 5.

Brownsport Formation in the Pope Quadrangle, Perry County, Tennessee; **ASU X-218** is from the middle of the same formation in the Olive Hill Quadrangle, Hardin County, Tennessee. All of these specimens are from the late Ludlow of Přídolí Series, Silurian.

Diagnosis: *Dizygopleura* species with distinct, crescent-shaped L1, weakly bulbous L2 connected ventrally with L3 around slightly angulate S2. L3 and L4 confluent dorsally. L4 carina-like in male, swollen in female. Ventral connection of L1 and L4 more distinct in males than females, carina-like in some male specimens. L2, L3 and the ventral connection of L1 and L4 fused below S2. Distinct perimarginal carinae on both valves. Left/right overreach strong ventrally.

Remarks: *D. landesi* is distinguished from *D. chaleurensis* Copeland, 1962 (*Bull. geol. Surv. Can.*, **91**, 40) by its larger size, its distinct ventral left/right overreach and by the fusion of L2 and L3 with the connecting lobe.

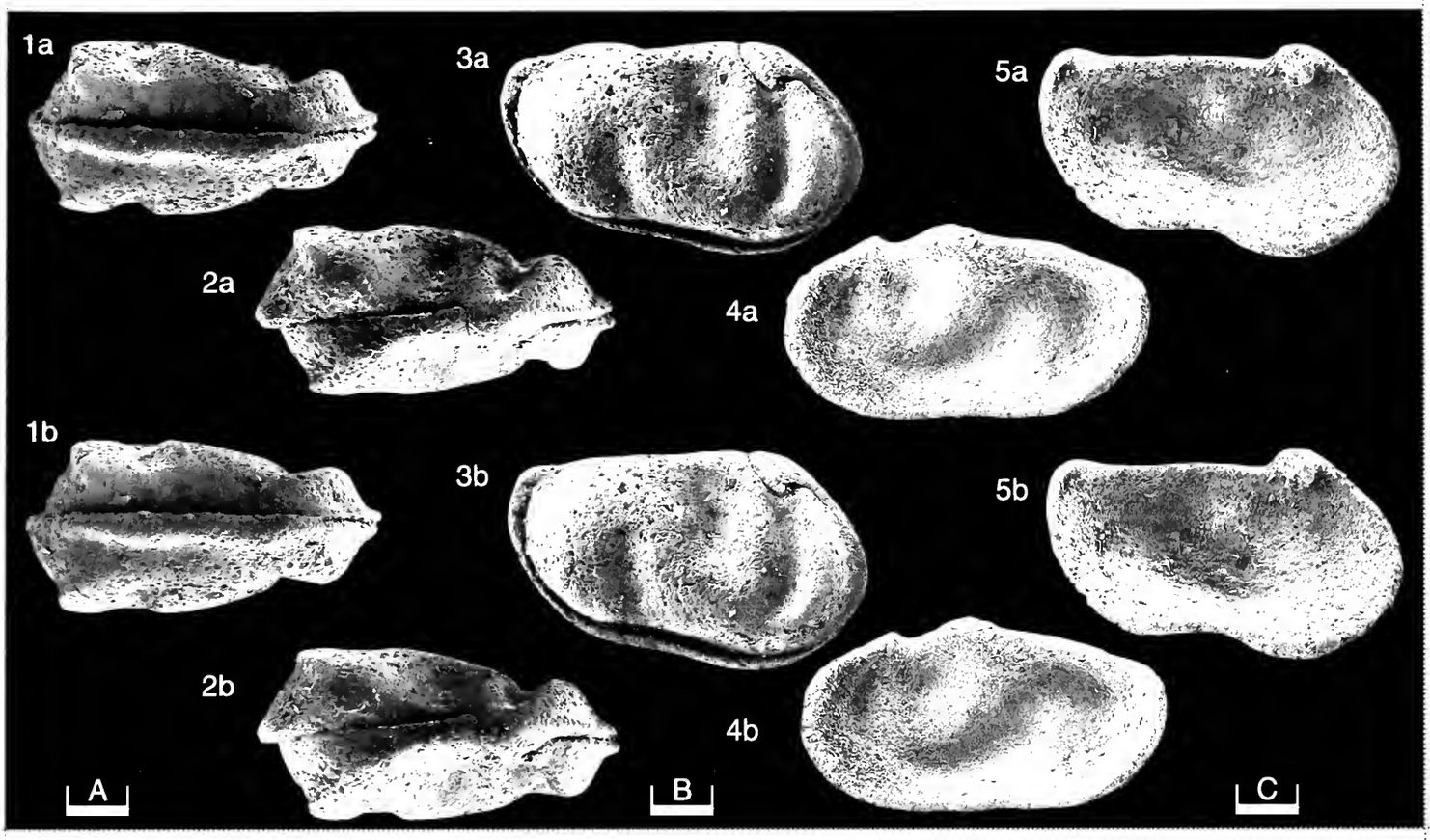
Lundin (1965, 45) described the ontogeny of this species based on a population from the Henryhouse Formation of Oklahoma. This study, in combination with Adamczak's (*Acta palaeont. pol.*, **6**, Text-Pl. 1, 1961) definitive analysis of the ontogeny of *Poloniella* Gürich, makes it clear that these two genera are closely related.

Distribution: With this report of *D. landesi* from the Brownsport Formation, the geographic occurrence of the species is extended from south-central Oklahoma to western Tennessee. The species is known to range from near the base to near the top of the Henryhouse Formation in the Lawrence uplift area of Oklahoma and from 0.6 to 24 m above the base of the Brownsport Formation of western Tennessee. These strata range from middle Ludlow to late Přídolí in age.

Acknowledgement: Support from NATO (Grant 870445) is gratefully acknowledged.

Explanation of Plate 22, 8

Fig. 1, ♂ LV (**ASU X-217**, 1165 μm long): int. lat. Figs. 2–4, ♀ car. (**ASU X-218**, 1240 μm long): fig. 2, ext. dors.; fig. 3, ext. rt. lat.; fig. 4, ext. vent. Fig. 5, ♂ LV (**ASU X-219**, 1240 μm long); int. lat.
Scale A (200 μm; ×44), fig. 1; scale B (200 μm; ×41), figs. 2–5.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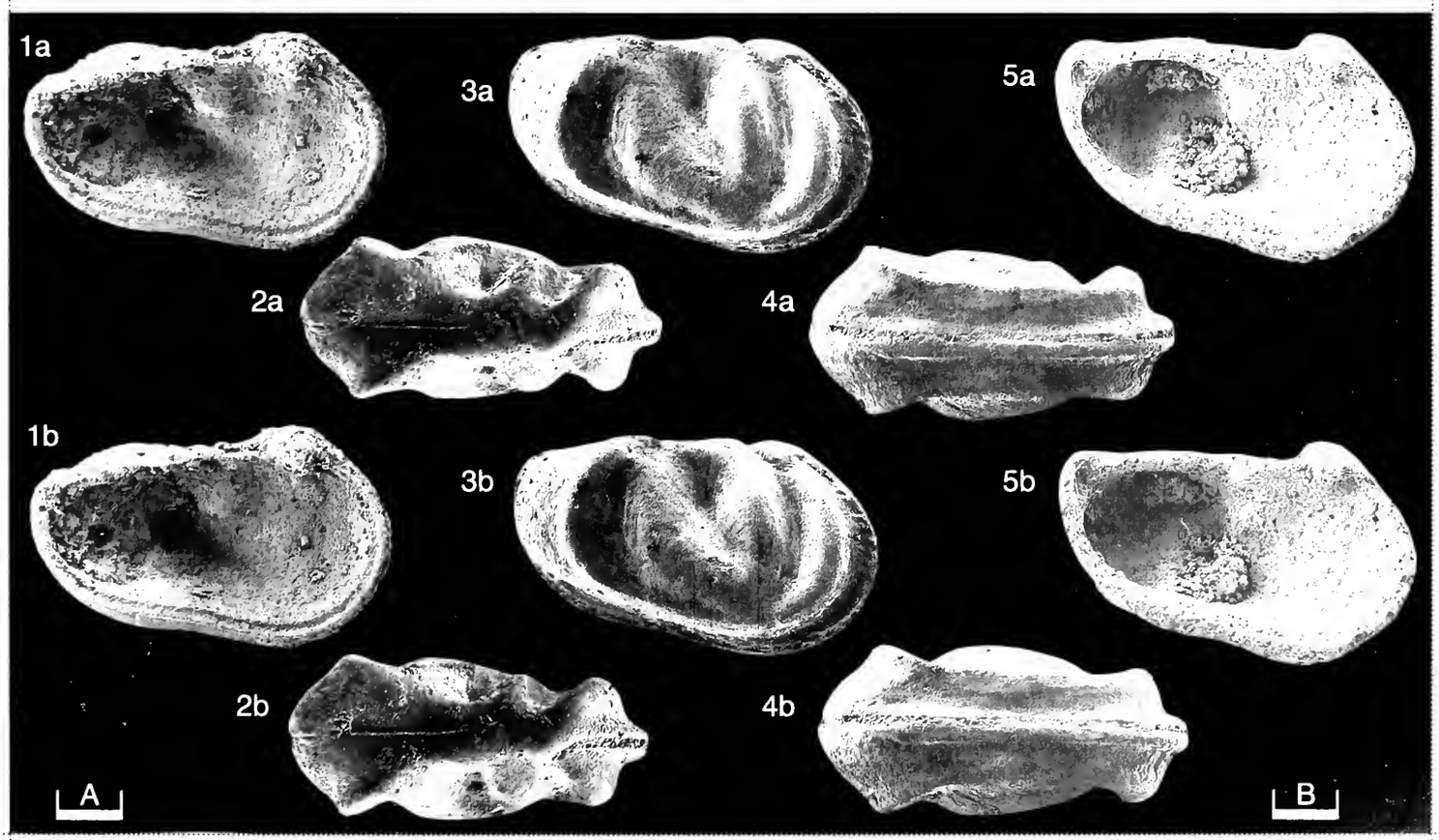
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595.337.23 (113.331) (420 : 162.003.52) : 551.351 + 552.52

ON *LONGISCELLA GRANDIS* (JONES & HOLL)

by Lee E. Petersen & Robert F. Lundin
(Anadarko Petroleum Corporation, Houston & Arizona State University, Tempe, U.S.A.)

Longiscella grandis (Jones & Holl, 1869)

1869 *Cytherellina siliqua* (Jones) var. *grandis* Jones & Hall var. nov., T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (4), **3**, 217, pl. 14, figs. 1a–c.
1869 *Cytherellina siliqua* (Jones) var. *ovata* Jones & Holl var. nov., T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (4), **3**, 217, pl. 14, fig. 4.
1869 *Cytherellina siliqua* (Jones) var. *tersa* Jones & Holl var. nov., T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (4), **3**, 217, pl. 14, figs. 3a–c.
1887 *Bythocypris grandis* (Jones & Holl); T. R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 185.
1887 *Cytherellina siliqua* var. *ovata* Jones & Holl; T. R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 185.
1887 *Cytherellina (Bythocypris?) tersa* Jones & Holl; T. R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 191.
1991 *Longiscella grandis* (Jones & Holl); R. F. Lundin, L. E. Petersen & D. J. Siveter, *J. Micropalaeontol.*, **9**, pl. 1, fig. 10.

Lectotype: Designated herein. The Natural History Museum (BMNH), London, England, no. **I 2068**; adult carapace. Jones and Holl (1869) indicated that several specimens were available to them. The lectotype agrees well with the single specimen which they illustrated.

Type locality: Railway tunnel near The Wych, Malvern, England; approximately lat. 52° 05′ N, long. 2° 21′ W. National Grid Ref.: SO 760428. Woolhope Limestone Formation, Sheinwoodian, Wenlock Series, Silurian.

Figured specimens: Department of Geology, Arizona State University, (**ASU**), nos. **X-133** (adult car.: Pl. **22**, 10, figs. 1–3), **X-258** (adult car.: Pl. **22**, 10, fig. 4; Pl. **22**, 12, fig. 5), **X-259** (juv. car.: Pl. **22**, 10, fig. 5), **X-260** (juv. car.: Pl. **22**, 12, fig. 6.), **X-261** (transverse section of adult car.: Text-fig. 1a), **X-262** (longitudinal section of adult car.: Text-fig. 1b). **BMNH I 2068** (lectotype, adult car.: Pl. **22**, 12, figs. 1–4).

ASU X-133, **ASU X-258**, **ASU X-261** and **ASU X-262** are from the lower part of the Apedale Member, Coalbrookdale Formation at Buildwas Bridge, Shropshire, England (locality 34 of Lundin *et al.*, 1991). **ASU X-259** and **ASU X-260** are from

Explanation of Plate 22, 10

Figs. 1–3, adult car. (**ASU X-133**, 2056 μm long): fig. 1, ext. lt. lat.; fig. 2, ext. rt. lat.; fig. 3, ext. vent. Fig. 4, adult car. (**ASU X-258**, 1953 μm long): ext. dors. Fig. 5, juvenile car. (**ASU X-259**, 959 μm long): ext. rt. lat.
Scale A (300 μm; ×25), figs. 1–3; scale B (300 μm; ×27), fig. 4; scale C (200 μm; ×54), fig. 5.

the upper part of the Buildwas Formation at Buildwas Abbey, Shropshire, England (locality 37 of Lundin *et al.*, 1991). All of these specimens are from approximately lat. 52° 39′ N, 2° 33′ W; the lower to middle Sheinwoodian, Wenlock Series, Silurian.

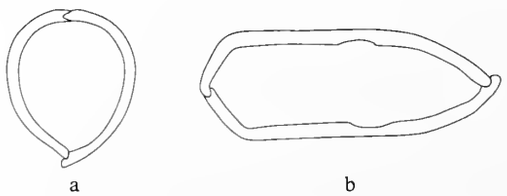
Diagnosis: *Longiscella* species with subreniform lateral outline and subrectangular longitudinal outline. Ventriculus and straguloid processes poorly developed. Adductorial recess distinct. Surface smooth.

Remarks: Comparison of the type specimen of *Cytherellina siliqua* var. *grandis* Jones & Holl with the type specimen of *Longiscella caudalis* (Jones, 1889), the type-species of the thlipsurid *Longiscella* Krandijevsky, indicates that the two species are congeneric. Valve relationships, contact margin features, shape and hingement in the two species are basically alike. We regard the varieties *C. siliqua* var. *tersa* and *C. siliqua* var. *ovata* erected by Jones & Holl (1869, *op cit.*) as synonyms of *L. grandis*, the former being based on a juvenile specimen and the latter being based on a minor shape variant. *Bythocypris holli* var. *oblonga* Jones (*Ann. Mag. nat. Hist.*, (6), **4**, 270, 1889), from the upper Llandovery and lower Wenlock of Gotland, is a *Longiscella* species and differs from *L. grandis* in its much smaller size and the greater convexity of the lateral surfaces of its valves.

All of the approximately 40 specimens from England are carapaces (many of which are deformed). Accordingly, the hingement and contact margin structures are interpreted from longitudinal and transverse thin sections of carapaces (Text-fig. 1) and from single valves of the close relative, *L. oblonga* (Jones, 1889).

Distribution: *L. grandis* is known from late Llandovery (upper part of the Purple Shales Formation) to early Wenlock (Buildwas Formation and lower part of the Coalbrookdale Formation), Silurian strata of Britain (Lundin *et al.*, 1991).

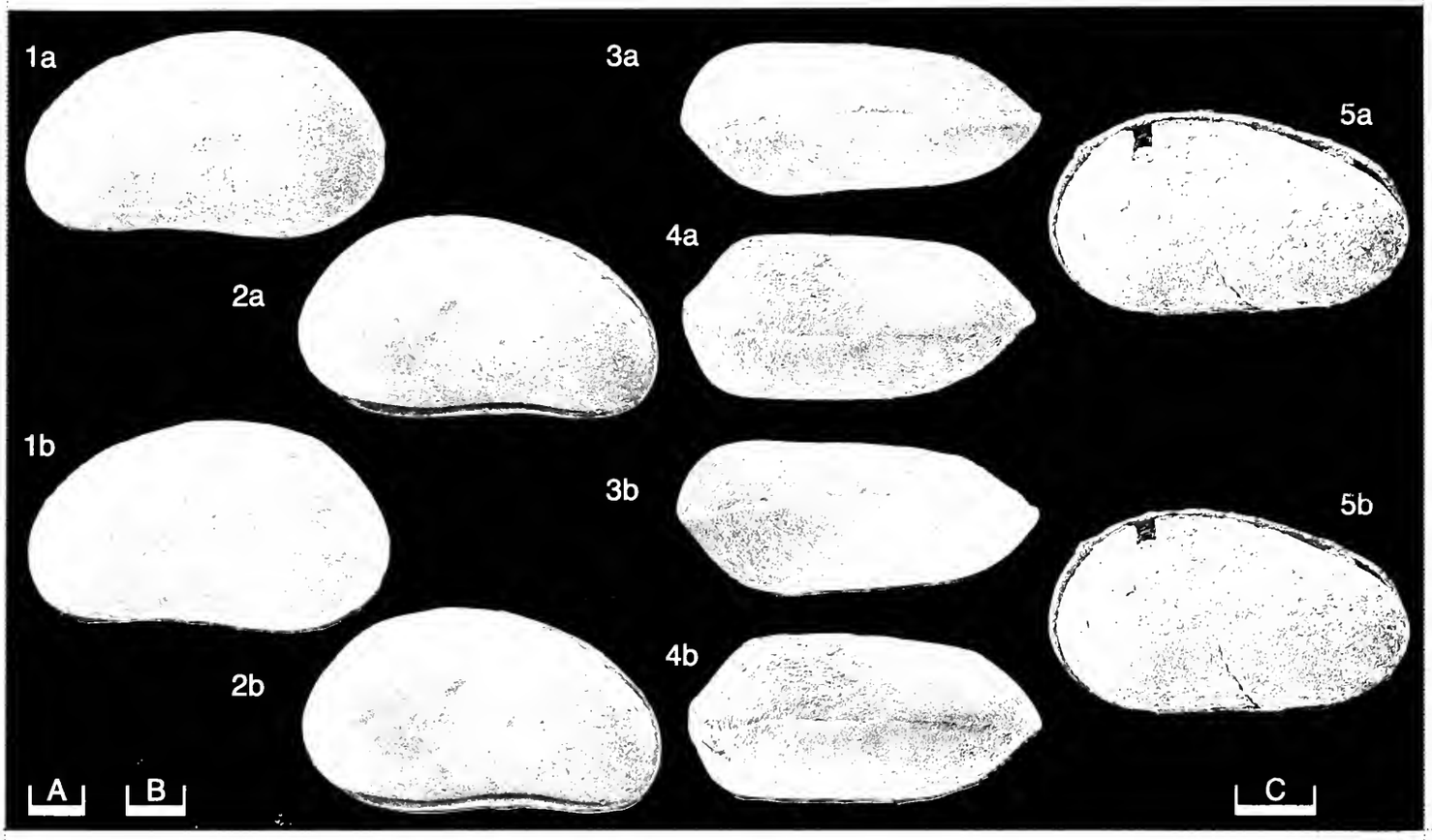
Acknowledgements: We gratefully acknowledge support from NATO (Grant 870445) and the National Science Foundation (Grant EAR-8200816).



Text-fig. 1, Outline drawings from photographs of thin sections of *L. grandis*: 1a, transverse section (**ASU X-261**, anterior view, ×35, 1109 μm high; sample MS 544); 1b, longitudinal section (**ASU X-262**, ventral view, ×34, 2130 μm long; sample MS 541).

Explanation of Plate 22, 12

Fig. 1–4, adult car. (**I 2068**, 1900 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. lt. lat.; fig. 3, ext. dors.; fig. 4, ext. vent. Fig. 5, adult car. (**ASU X-258**, 1953 μm long): ext. rt. lat. Fig. 6, juvenile car. (**ASU X-260**, 1523 μm long); ext. rt. lat.
Scale A (300 μm; ×27), figs. 1–5; scale B (300 μm; ×34), fig. 6.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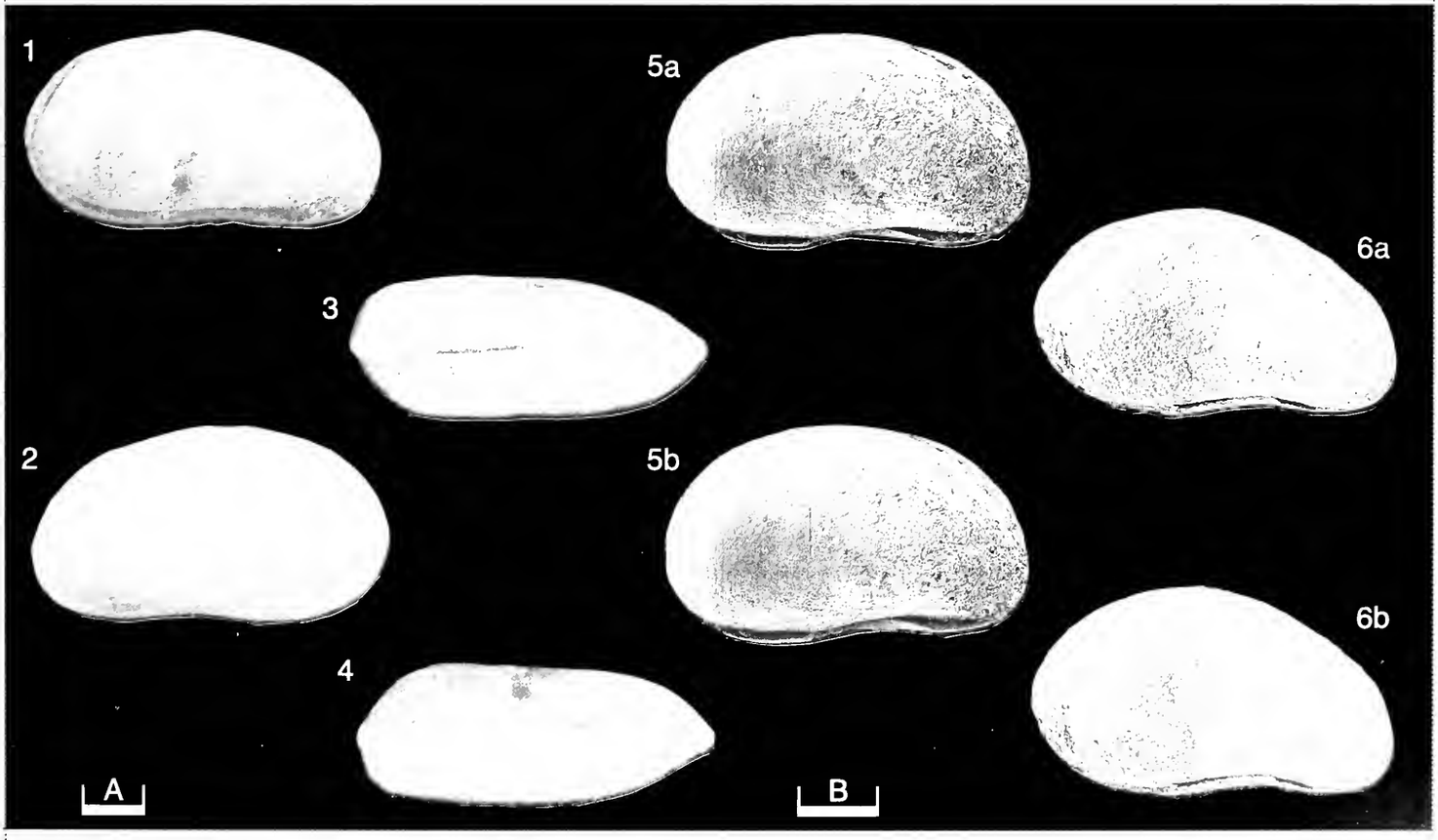
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595.337.2 (113.333) (485 : 161.018.56): 551.351 + 552.54

ON *MICROCHEILINELLA GIGAS* BIRKMANN & LUNDIN sp. nov.

by Harry Birkmann & Robert F. Lundin
(Arizona State University, Tempe, U.S.A.)

Microcheilinella gigas sp. nov.

Holotype: Department of Geology, Arizona State University (**ASU**), no. **ASU X-263**; adult carapace. [Paratypes: Arizona State University, nos. **ASU X-264–X-267**].

Type locality: Lower part of the cliff section approximately 100 m NNW of point 22, 23 on 5 I Hoburgen SO & 5 J Hemse SV topographic map sheet, Gotland, Sweden (locality Hoburgen IIa of Martinsson, *Bull. geol. Instn Univ. Uppsala*, **41**, 59, 1962). Approximately lat. 56° 55′ N, long. 18° 8′ E.

Derivation of name: Latin, *gigas*, a giant; referring to the large size of the species.

Figured specimens: Department of Geology, Arizona State University (**ASU**), nos. **X-263** (holotype, adult car.: Pl. **22**, 14, figs. 1–4; Pl. **22**, 16, fig. 1), **X-264** (paratype, adult car.: Pl. **22**, 16, fig. 2), **X-265** (paratype, juv. car.: Pl. **22**, 16, fig. 3), **X-266** (paratype, adult car.: Pl. **22**, 16, fig. 4), **X-267** (paratype, juvenile RV: Pl. **22**, 16, fig. 5).

ASU X-267 is from the contact between the reef and the overlying bedded limestones, near the top of the cliff at the type section. All of the other figured specimens are from the type locality. All figured specimens are from the Hamra Beds, Ludfordian, Ludlow Series, Silurian.

Diagnosis: Large *Microcheilinella* species with a distinct ventriculus; antero- and postero-lateral surfaces slightly compressed producing a distinctive disk-shaped longitudinal outline. Maximum width at or

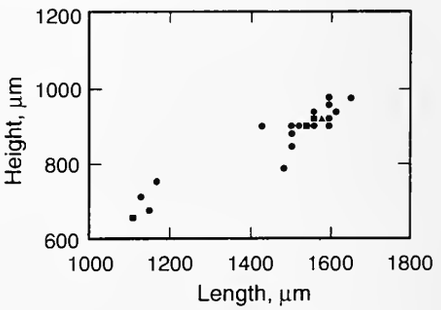
Explanation of Plate 22, 14

Figs. 1–4, adult car. (holotype, **ASU X-263**, 1598 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors.; fig. 3, ext. lt. lat.; fig. 4, ext. vent. Scale A (400 μm; ×33), figs. 1–4.

slightly posterior to midlength. Perimarginal carinae on the posteroventral and anteroventral part of admarginal surface of right valve. Anterior admarginal surface of juvenile right valve crenulate. Dimorphic(?) by posteriorward displacement of maximum width in heteromorph.

Remarks: This very distinctive *Microcheilinella* species is characterized by its very large size, the ventriculus, and the perimarginal carinae on the right valve. It differs from all other Pachydomellidae by its distinctive longitudinal outline, which is present in juveniles as well as adults. All known adult specimens are carapaces and, thus, crenulation of the anterior admarginal surface cannot be verified in adults. The length : width ratio of this species is distinctly greater than in species of *Daleiella* Bouček.

Distribution: Known from eight samples at the type locality, ranging from near the base to near the top of the Hamra Beds, Ludfordian, Ludlow Series, Silurian, of Gotland, Sweden.

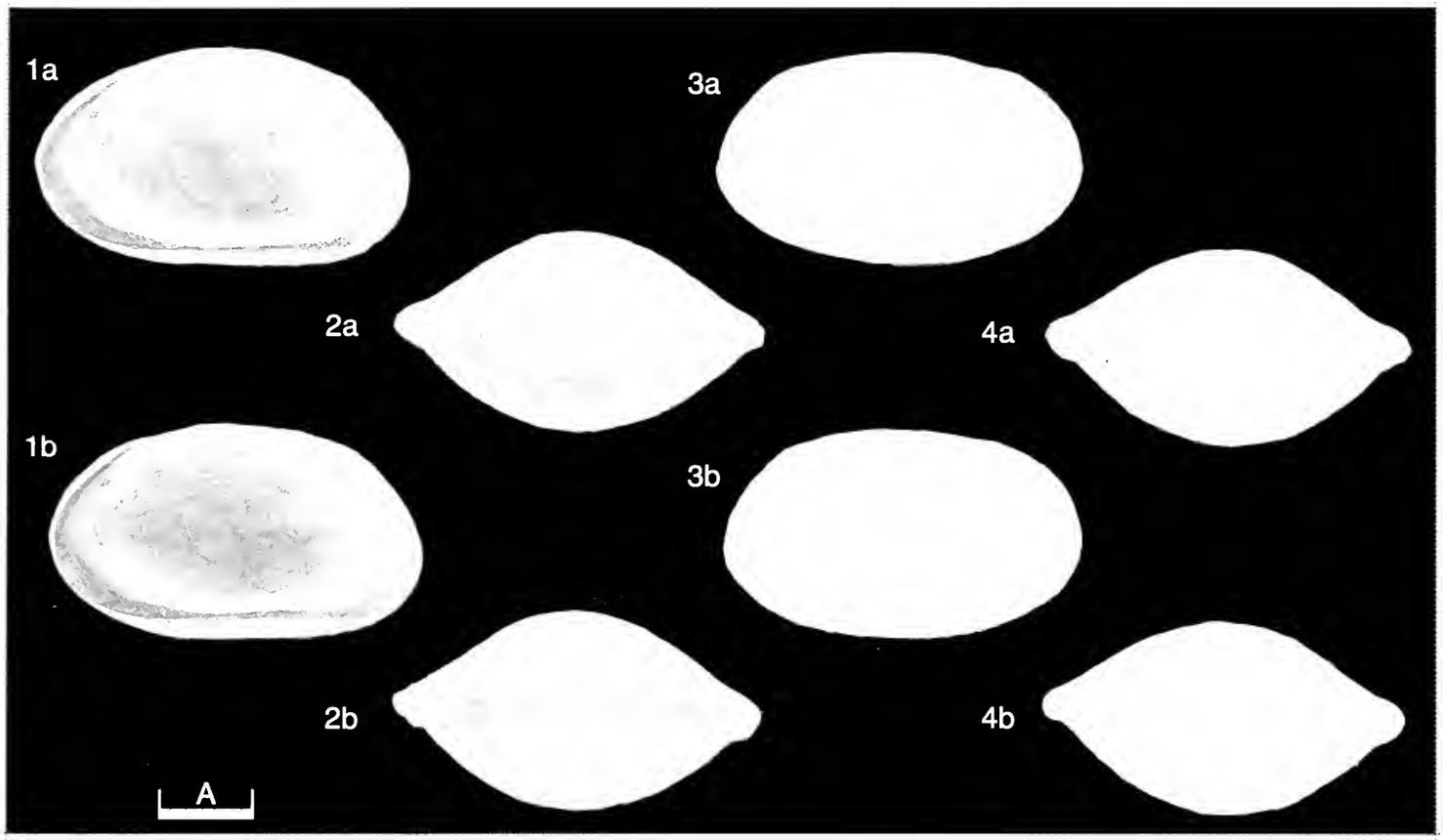


Text-fig. 1. Size dispersion of 21 carapaces from the type locality (Hoburgen IIa, sample MS 2). Triangle = holotype; squares = figured paratypes.

Explanation of Plate 22, 16

Fig. 1, adult. car. (holotype, **ASU X-263**, 930 μm high): ext. ant. Fig. 2, adult car. (paratype, **ASU X-264**, 1541 μm long): ext. rt. lat. Fig. 3, juv. car. (paratype, **ASU X-265**, 1100 μm long): ext. rt. lat. Fig. 4, adult car. (paratype, **ASU X-266**, 1579 μm long): ext. rt. lat. Fig. 5, broken juv. RV (paratype, **ASU X-267**, 1203 μm long): int. of anterior part of valve.

Scale A (400 μm; ×30), figs. 1, 4; scale B (400 μm; ×33), figs. 2, 3; scale C (100 μm; ×106), fig. 5.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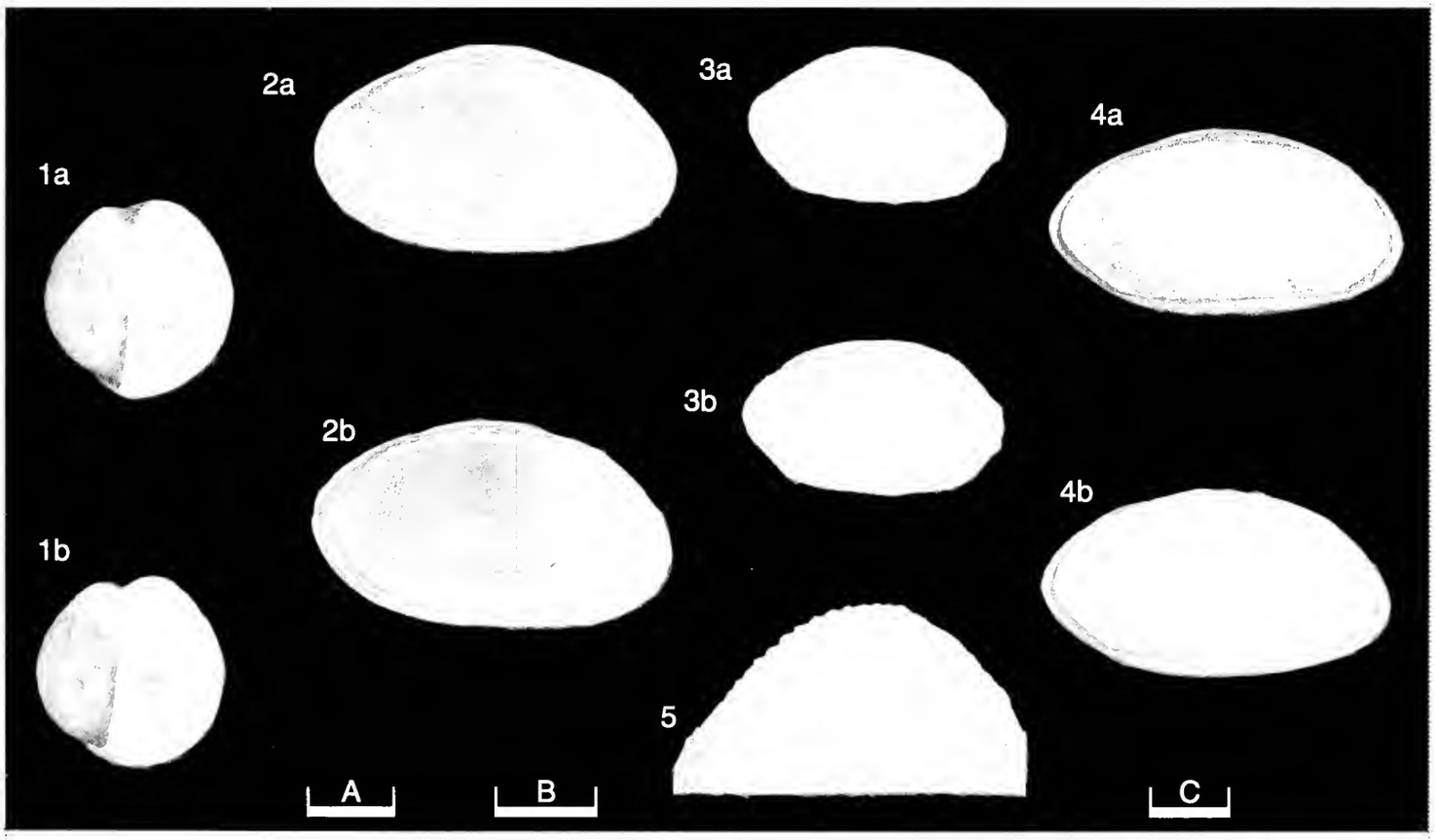
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595.336 (113.31) (261.4 : 162.047.50): 551.351 + 552.54

ON *ORDOVIZONA IMMANIS* BECKER

by Gerhard Becker
(Senckenberg Museum, Frankfurt am Main, Germany)

Ordovizona immanis Becker, 1994

1994 *Ordovizona immanis* sp. nov., G. Becker, *Scr. geol.*, **107**, 8, pl. 1, figs. 1–4.
1994 *Ordovizona immanis* Becker; G. Becker *in* J. E. van Hinte & A. Ruffman, *Scr. geol.*, **107**, pl. 7, figs. 1–5.

Holotype: Nationaal Natuurhistorisch Museum, Leiden, The Netherlands, no. **RGM 414005**; a silicified adult left valve.

Type locality: From seamount 'Orphan Knoll' (see Ruffman, A. & van Hinte, J. E., *Geol. Surv. Pap. Can.*, **71–23**, 407–449, 1973), in the Labrador Sea, approximately 500 km NE of Newfoundland. The material was obtained from a single biologic dredge (LYNCH 7/11/71 cruise, station no. D3-7-11-71) on May 23, 1971, at an average position of 50° 33′ N, 46° 22′ W and from an average depth of 1775 m (see Ruffman, A., *Geol. Surv. Can. Open File*, **2065**, 1989). The specimens of *Ordovizona immanis* come from a single pebble of middle to late Ordovician age.

Figured specimens: Nationaal Natuurhistorisch Museum (**RGM**), Leiden, The Netherlands, nos. **RGM 414005** (adult LV: Pl. **22**, 18, figs. 1, 4; Pl. **22**, 20, fig. 1), **RGM 414006** (adult LV: Pl. **22**, 20, fig. 3), **RGM 414007** (juv. LV: Pl. **22**, 20, fig. 2) and **RGM 414008** (adult LV: Pl. **22**, 18, figs. 2, 3).

All figured specimens are from the type locality.

Diagnosis: Species of *Ordovizona* with a short, straight, ventrally deepened sulcus (S2), a bow shaped dorsal carina, and pronounced costae on the lateral surface which are reduced or absent towards the posterior margin.

Explanation of Plate 22, 18

Figs. 1, 4, adult LV (holotype, **RGM 414005**, 700 μm long): fig. 1, ext. lat.; fig. 4, int. lat. Figs. 2, 3, adult LV (**RGM 414008**, 655 μm long): fig. 2, vent.; fig. 3, ant.
Scale A (200 μm; ×100), figs. 1, 3, 4; scale B (200 μm; ×90), fig. 2.

Remarks: The type-species of *Ordovizona* Schallreuter, 1969 (*Geologie*, **18**, 205), *O. sulcata*, is similar to *O. immanis* in having a subamplete outline, a similar number of costae on the lateral surface (with reticulation developed between the costae) and a distinct dorsal carina and narrow velum. *O. sulcata* differs from *O. immanis* by having a narrower and more clearly defined sulcus (S2) and by the lateral costae which are developed even posteriorly. *Ordovizona longa* Schallreuter, 1983 (*Neues Jb. Geol. Paläont. Mh.*, **1983**, 10, 603) is more elongate than *O. immanis*, has a less distinct sulcus (S2), a less prominent dorsal carina and more numerous but weaker costae on the lateral surface.

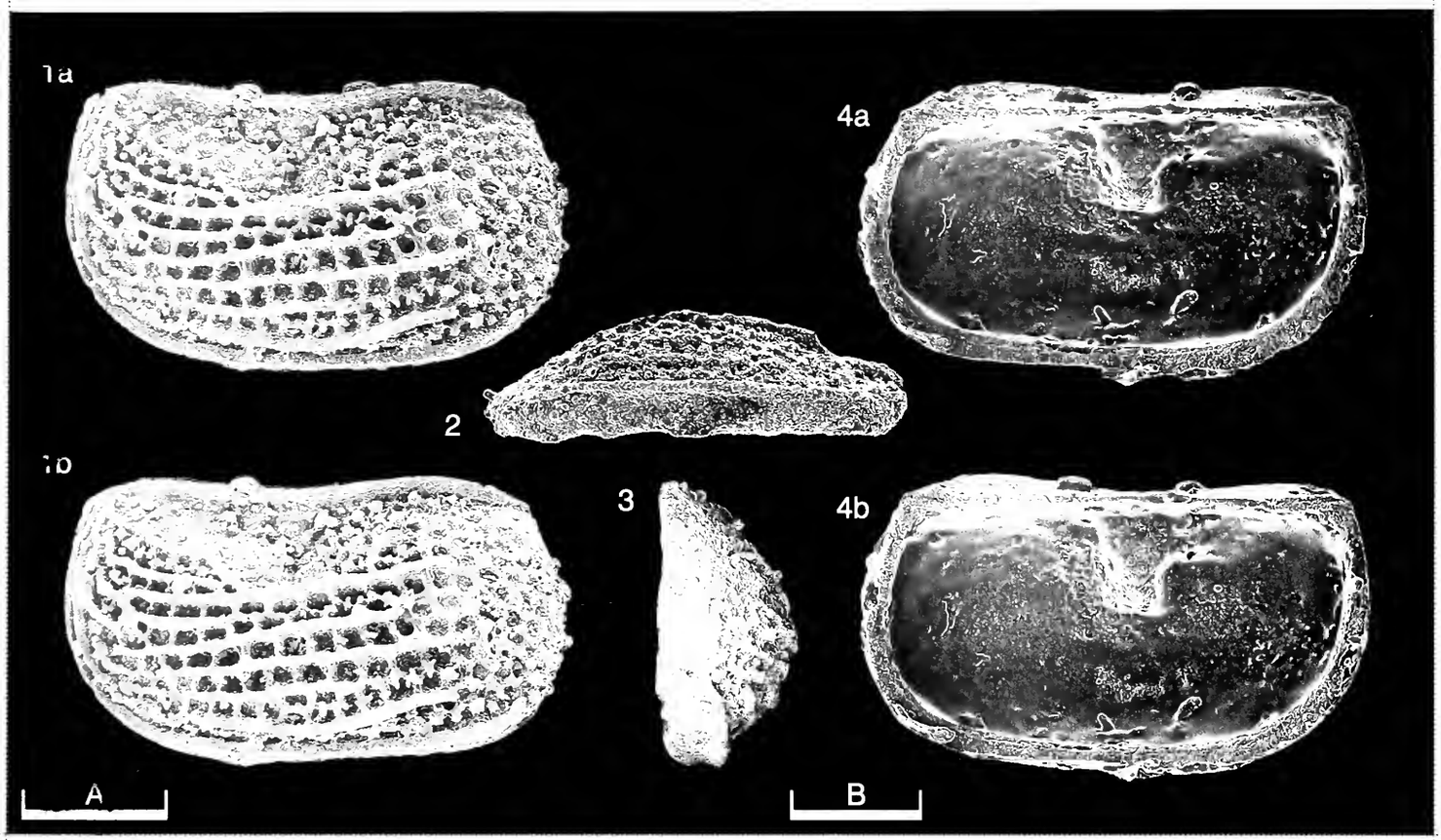
Ordovician forms with a monotiopleurid outline and short, mid-dorsally situated sulcal depressions (e.g. *Ordovizona*) were believed by Schallreuter (*Wiss. Z. Ernst Moritz Arndt-Univ. Greifswald*, **17**, 135, 1968) to be the oldest known members of the Superfamily Kirkbyacea Ulrich & Bassler, 1906. Becker (*Senckenberg. leth.*, **70**, 150, 1990), however, considered them to be related to the Family Kirkbyellidae Sohn, 1961 (Order unknown). Gründel (*Z. geol. Wiss.*, **6**, 74, 1978) suggested that such forms possibly belong to the Family Monotiopleuridae Guber & Jaanusson, 1964 (Superfamily unknown). The early Palaeozoic monotiopleurids and kirkbyaceans *sensu* Schallreuter and the phylogenetically younger kirkbyellids are probably related groups. The Kirkbyacea are a relatively young group with, comparatively advanced carapace architecture; the arcyzonid species *'Amphissites' primaevus* Roth, 1929, from the late Silurian of Oklahoma, U.S.A., is considered by some authors to be the first true kirkbyacean (Becker, G. & Lundin, R. F., *Stereo-Atlas Ostracod Shells*, in press).

O. immanis occurs together with a rich ostracod fauna (see Becker, 1994, 4–9), including species referable to middle to late Ordovician genera such as *Anticostiella* Copeland, 1973 (*Geol. Surv. Pap. Can.*, **72–43**, 9) and *Ectoprimitoides* Berdan, 1988 (*Mem. Bur. Mines Mineral Resourc., New Mex.*, **44**, 278).

Distribution: Known only from the type locality. The material recovered on Orphan Knoll is considered to be from bedrock (Becker, 1994).

Explanation of Plate 22, 20

Fig. 1, adult LV, dors. obl. (holotype, **RGM 414005**, 700 μm long). Fig. 2, juv. LV, dors. (**RGM 414007**, 580 μm long). Fig. 3, adult LV, ext. lat. (**RGM 414006**, 670 μm long).
Scale A (200 μm; ×100), figs. 1–3.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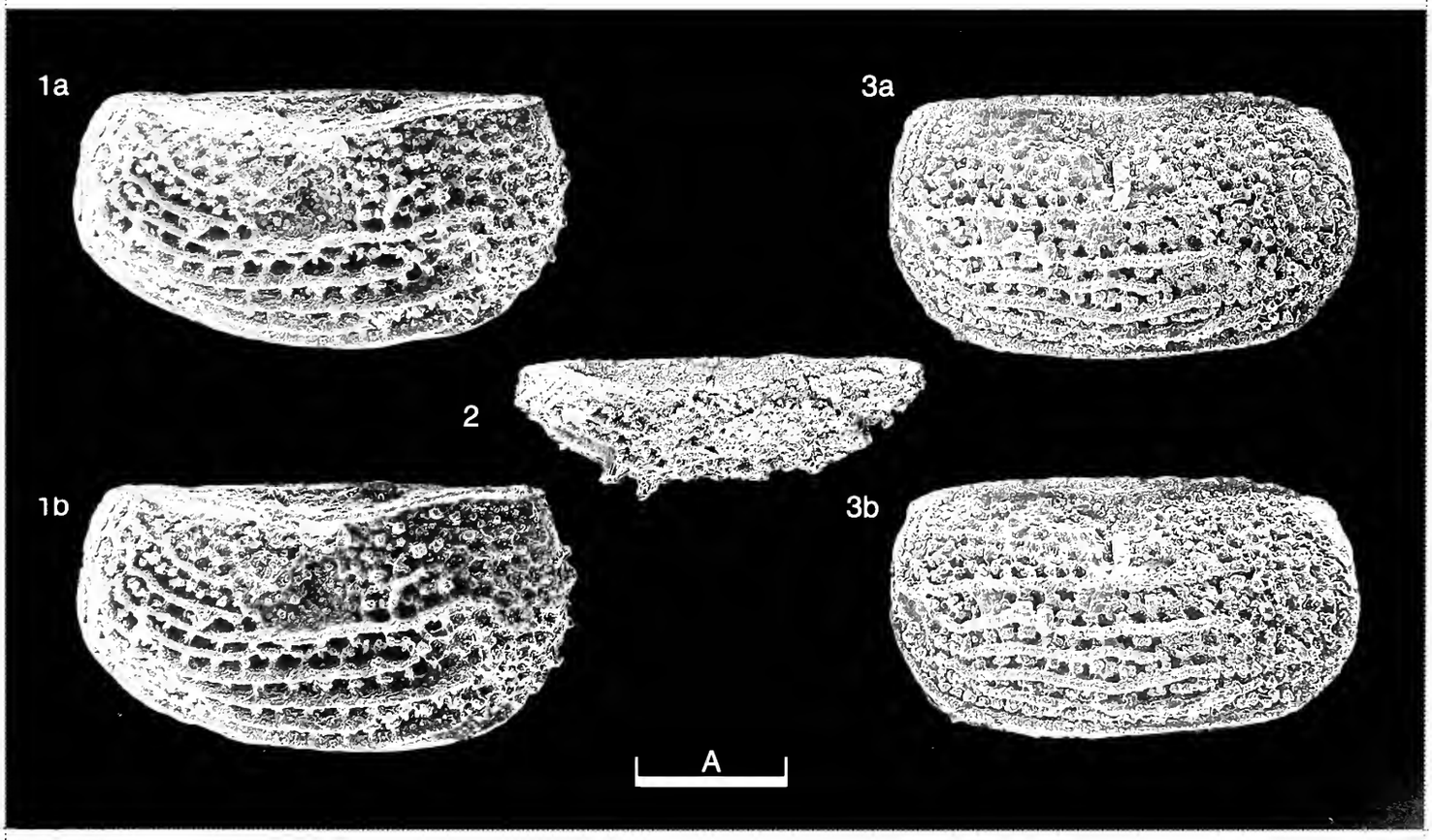
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595.336 (82 : 164.069.30); 551.351 + 552.55

ON *INVERSIBOLBINA LEHNERTI* SCHALLREUTER gen. et sp. nov.

by Roger E. L. Schallreuter
(University of Hamburg, Germany)

Genus *INVERSIBOLBINA* gen. nov.
Type-species: *Inversibolbina lehnerti* sp. nov.

Derivation of name: Latin *inversus* 'turned upside down', plus the generic name *Bolbina*; alluding to the reversal of valve overlap conditions. Gender, feminine.

Diagnosis: Small to medium-size, elongate palaeocope. Unisulcate; short, vertical sulcus (S2) in dorsal half of valve and just in front of mid length. Indistinct, flattish bulb occurs immediately anterior of sulcus. No further special lobes but domicilium generally most inflated in ventrocentral region. Flange-like admarginal ridge in anterior half of valve, narrowing in centroventral region to form a rounded bend (larger valve) or even narrower ridge (smaller valve). Reversal of valve overlap conditions occurs; larger left valve or right valve forms a broad, overlapping vertical flange between the free margin and adventral bend. Surface smooth.

Remarks: The systematic position of the new genus is uncertain. The main adventral sculpture does not seem to be a velum, but rather a differentiated marginal sculpture similar to that in *Eographiodactylus sulcatus* (see Schallreuter, R. E. L., *Stereo-Atlas Ostracod Shells* **7**, 1–8, 1980). The latter differs from *Inversibolbina* by the different construction of its marginal flange, which terminates posteriorly in a long spine.

Explanation of Plate 22, 22

Figs. 1, 2, car. (holotype, **GPIMH 3607**, 835 μm long): fig. 1, ext. rt. lat.: fig. 2, ext. vent. oblique. Fig. 3, car. lt. lat. (**GPIMH 3608**, 884 μm long).

Scale A (250 μm; ×78), figs. 1, 2; scale B (250 μm; ×72), fig. 3.

Inversibolbina lehnerti sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg, Germany (**GPIMH**), no. **3607**; a carapace.
[Paratype: **GPIMH 3609**].

Type locality: Quebrada de Las Aguaditas, San Jose de Jáchal (Hoja 18c), San Juan, Argentina; approximately latitude 30° 18′S, longitude 68° 48′W. Las Aguaditas Formation, Llanvirn-Caradoc series, Ordovician.

Derivation of name: After Dr Oliver Lehnert, who provided the samples.

Diagnosis: As for the genus, which is currently monotypic.

Figured specimens: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (**GPIMH**) nos. **3607** (car.: Pl. **22**, 22, figs. 1, 2), **3608** (car.: Pl. **22**, 22, fig. 3; Pl. **22**, 24, fig. 3), and **3609** (car.: Pl. **22**, 24, figs. 1, 2).

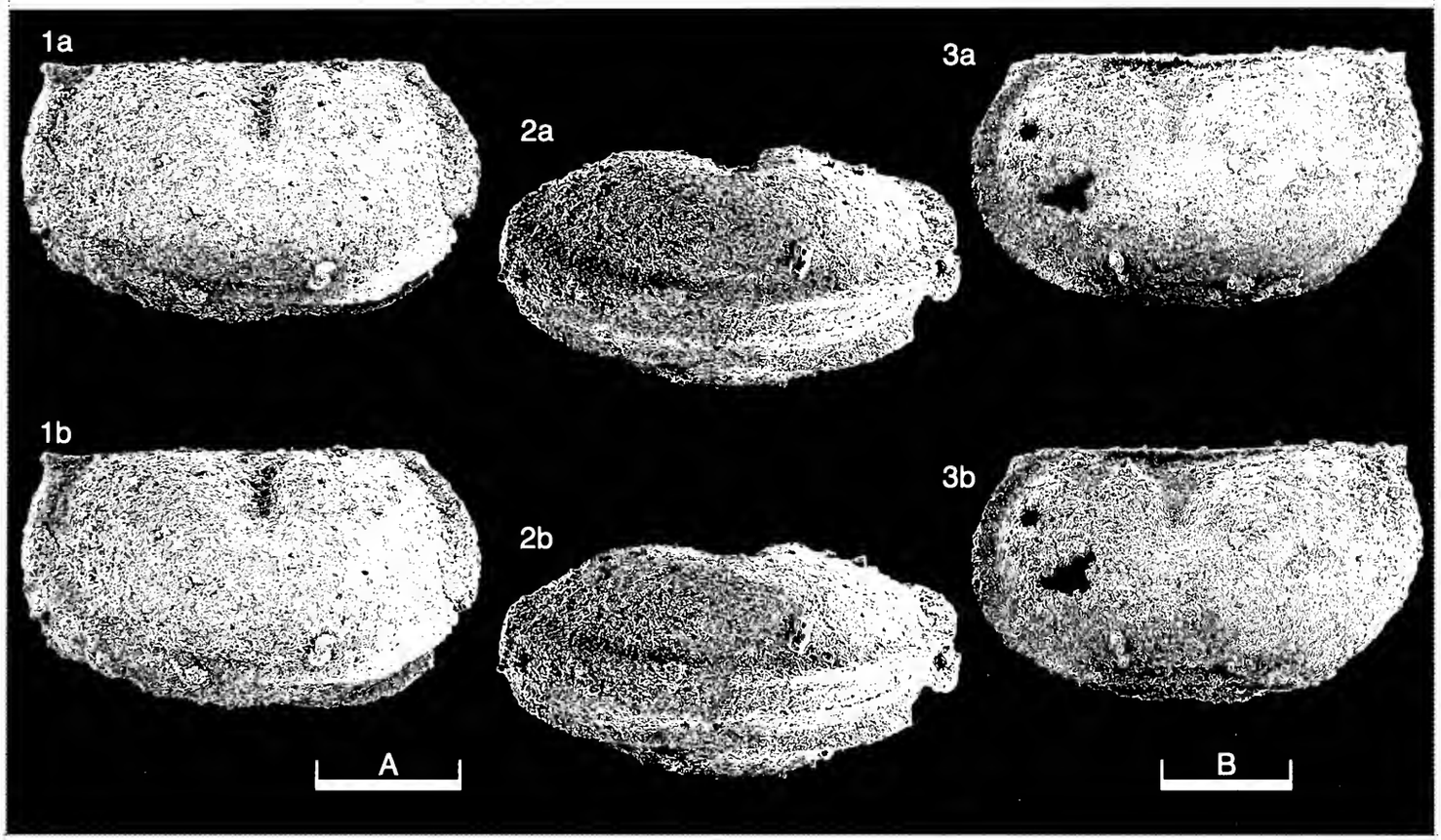
All figured specimens are from the type locality and type section of the Las Aguaditas Formation. The specimens are from material collected by Dr Oliver Lehnert: samples SE-CON 51 (specimen **3608**) and SE-CON 46 (all other specimens); *Pygodes anserinus* conodont zone.

Distribution: Known only from type locality, Ordovician of Argentina.

Explanation of Plate 22, 24

Figs. 1, 2, car. (paratype, **GPIMH 3609**, 1012 μm long): fig. 1. ext. vent. oblique; fig. 2, ext. lt. lat. Fig. 3, car. ext. vent. oblique (**GPIMH 3608**).

Scale A (250 μm; ×65), figs. 1, 2; scale B (250 μm ×75), fig. 3.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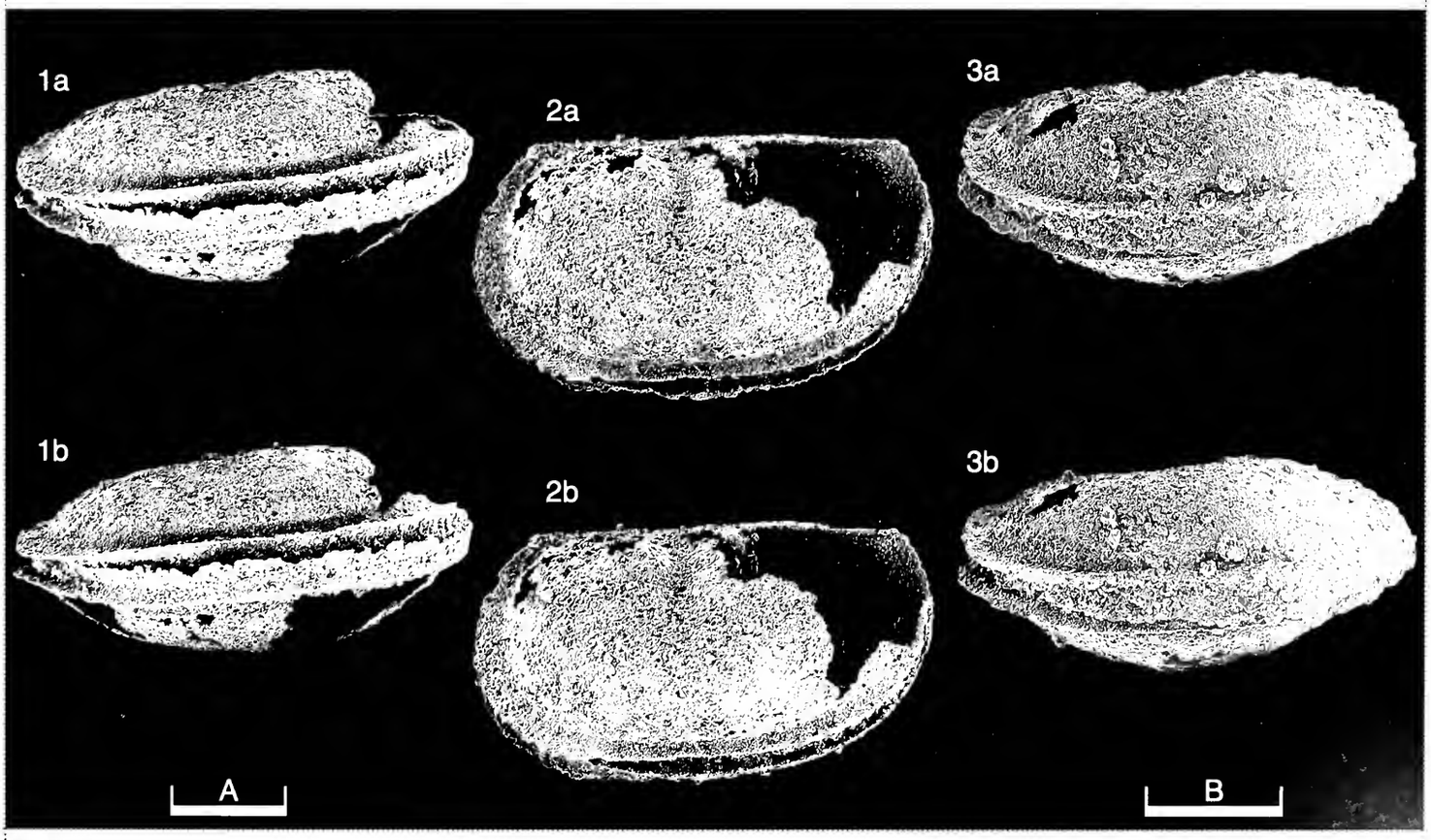
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595.337.14 (116.313 + 116.331) (943 : 163.142.29) 551.35 + 552.52

ON *ARTESIOCYTHERE ARTESICA* KRÖMMELBEIN

by Caroline A. Maybury & Robin C. Whatley
(Institute of Earth Studies, University of Wales, Aberystwyth, U.K.)

Artesiocythere artesica Krömmelbein, 1975

1975 *Artesiocythere artesica* sp. nov., K. Krömmelbein, *Senckenberg. leth.*, **55**, 469-470, pl. 5, figs. 16–17, text-figs. 7–8.

Holotype: BMR (Bureau Mineral Resources) now called AGSO (Australian Geological Survey Organisation), Canberrra no. **CPC 13872**; LV.

Type locality: Borehole Tickalara-1, Great Artesian Basin, SW Queensland, Australia (long. 142°13′E, lat. 28°40′S), 247′0″–248′1″ below surface, Allaru Mudstone, Rolling Downs Group; Albian-Cenomanian.

Figured specimens: AGSO nos. **CPC 13872** (holotype, LV: Pl. **22**, 26, fig. 1; Pl. **22**, 28, figs. 1, 3), **CPC 13873** (paratype, RV: Pl. **22**, 26, figs. 2, 3; Pl. **22**, 28, fig. 2). Paratype from the same borehole as holotype but from 276′3″–277′8½″ below surface.

Diagnosis: *Artesiocythere* with very coarsely reticulate ornament, thick shell and subpyriform shape; with apex of dorsal margin below mid-height. Hinge robustly antimerodont. Radial pore canals straight; 10 anteriorly, 5 posteriorly, the latter concentrated at postero-ventral angle.

Explanation of Plate 22, 26

Figs. 1, LV, ext. lat. (holotype, **CPC 13872**, 630 μm long). Figs. 2, 3, RV (paratype, **CPC 13873**, 600 μm long): fig. 2, ext. lat.; fig. 3, posterior ornament.

Scale A (200 μm; ×95), figs. 1, 2; scale B (50 μm; ×593), fig. 3.

Remarks: This monotypic genus was placed in the Progonocytheridae by Krömmelbein (*op. cit.*) but it clearly belongs in the Cytherideidae, Cytherideinae. The only somewhat similar taxon from the Australian Cretaceous is *Rostrocytheridea westraliensis* (Chapman, 1917) of Neale (J. W. Neale, *Spec. Pap. Palaeont.*, **16**, 39–40, pl. 2, figs. 1–2; pl. 6, fig. 4; pl. 7, figs. 1–3, 1975) but this species is more elongate and has large posterior and postero-ventral spines. Although Kömmelbein in the type description refers to the hingement as 'merodont/entomodont', it is in fact, very robust antimerodont.

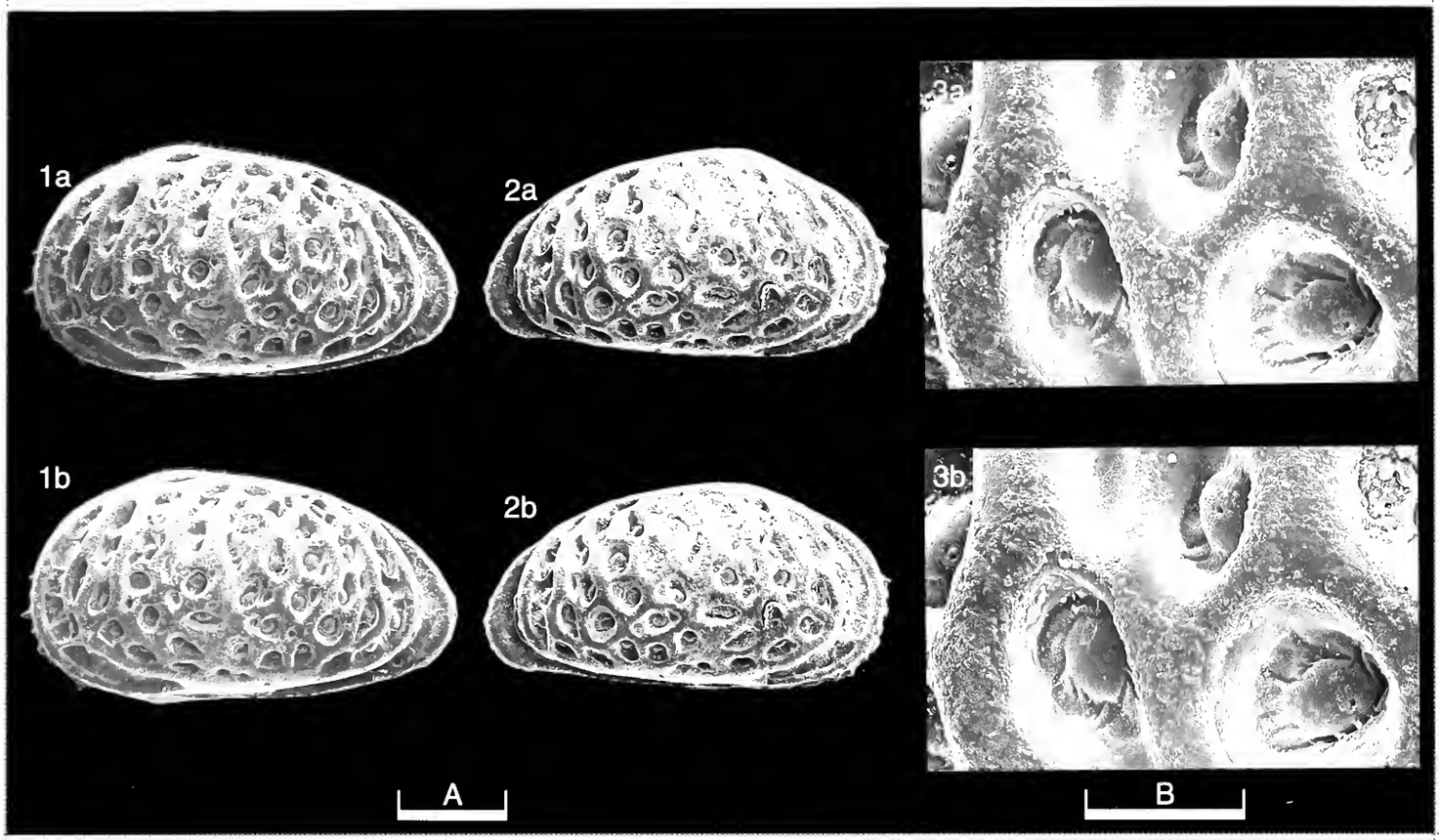
Distribution: This species is known only from the Tickalara Borehole in SW Queensland, Australia.

Acknowledgements: We thank Dr M. A. Ayress (Department of Geology, The Australian National University, Canberra) for photography of Krömmelbein's material.

Explanation of Plate 22, 28

Fig. 1, 3, LV (holotype, **CPC 13872**, 630 μm long): fig. 1, int. lat.; fig. 3, musc. sc. Fig. 2, RV, int. lat. (paratype, **CPC 13873**, 600 μm long).

Scale A (200 μm; ×95), figs. 1, 2; scale B (100 μm; ×294), fig. 3.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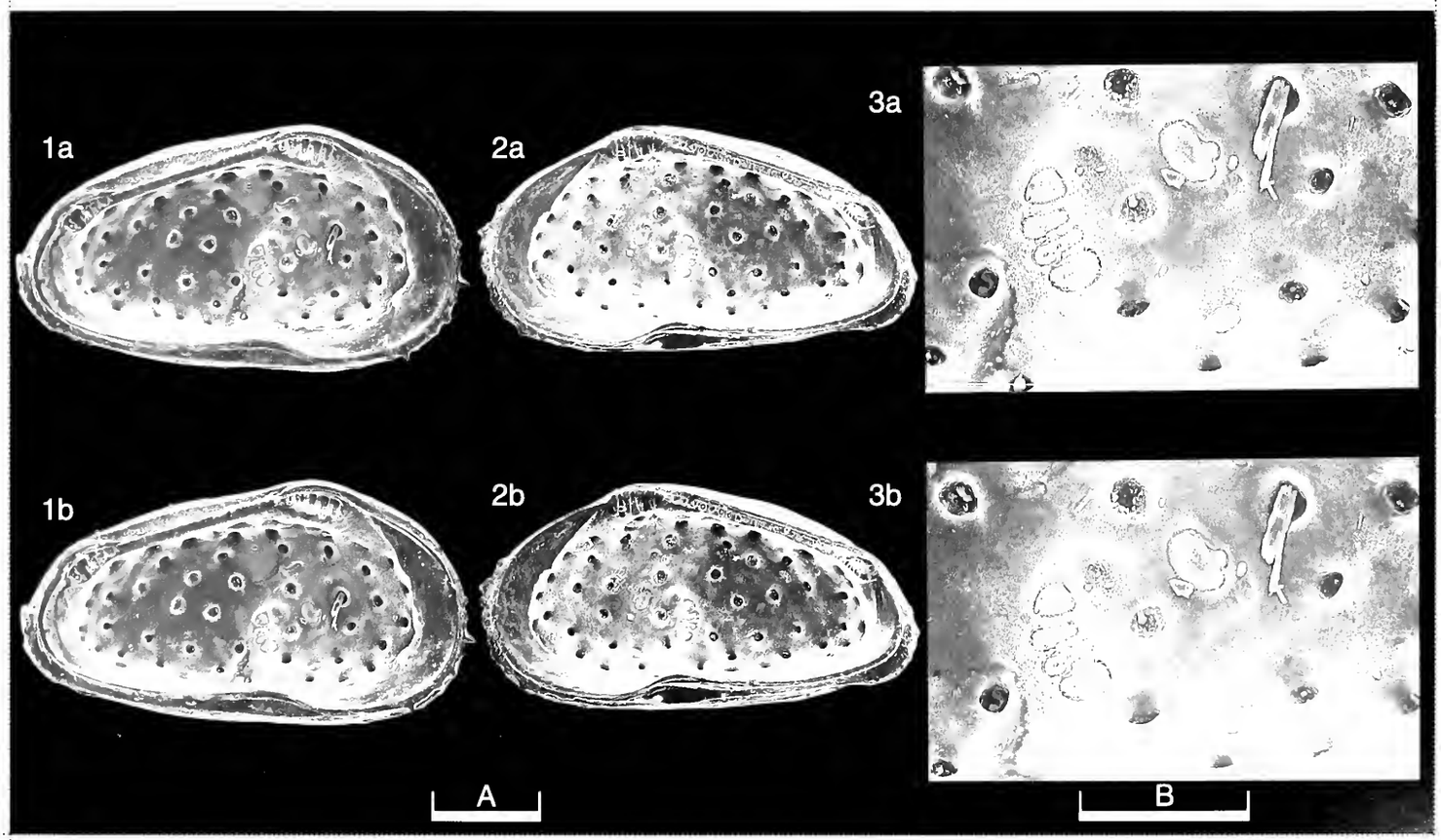
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595.337.14 (116.313 + 116.331) (943 : 163.142.29) : 551.35 + 552.52

ON *ALLARUELLA AUSTRALIENSIS* KRÖMMELBEIN

by Caroline A. Maybury, Robin C. Whatley & Sara Ballent
(Institute of Earth Studies, University of Wales, Aberystwyth, U.K. & University of La Plata, Argentina)

Genus *ALLARUELLA* Krömmelbein, 1975

Type-species (by original designation): *Allaruella australiensis* Krömmelbein, 1975

Diagnosis: A medium, thick-shelled and heavily ornamented cytherurid. Anterior margin broadly and symmetrically rounded; posterior more bluntly so, with apex at about mid-height. Dorsal margin sloping strongly towards posterior, over-reached, particularly in the LV by ornament. Ventral margin with conspicuous oral concavity, overhung medianly by valve tumidity. End margins somewhat compressed. Eye tubercle large and prominent; internal ocular sinus small. Ornament coarsely and very irregularly reticulate and with a series of large hollow tubercles situated sub-centrally, postero-dorsally and postero-ventrally. Strong, almost crest-like vertical ribs occur just in front of the sub-central tubercle, postero-ventrally and on the posterior marginal area. Hinge antimerodont and strongly developed. Calcified inner lamella wide, especially anteriorly where there are (according to Krömmelbein) some 12–17 radial pore canals, with the lower number being characteristic of the RV and the higher of the LV; 6 or 7 radial pore canals occur posteriorly.

Allaruella australiensis Krömmelbein, 1975

1975 *Allaruella australiensis* gen. et sp. nov., K. Krömmelbein, *Senckenberg. leth.*, **55**, 470–472, pl. 2, figs. 8–9, text-figs. 9–10.

Explanation of Plate 22, 30

Figs. 1, ♀ LV, ext. lat. (holotype, **CPC 13878**, 630 μm long). Fig. 2, ♀ RV, ext. lat. (paratype, **CPC 13879**, 600 μm long). Scale A (100 μm; ×150), figs. 1–2.

Holotype: BMR (Bureau Mineral Resources) now called AGSO (Australian Geological Survey Organisation), Canberra no. **CPC 13878**; ♀ LV.

Type locality: Borehole Tickalara-1, Great Artesian Basin, SW Queensland, Australia (long. 142° 13′E, lat. 28° 40′S), 247′0″–248′1″ below surface, Allaru Mudstone, Rolling Downs Group, Albian-Cenomanian.

Figured specimens: AGSO nos. **CPC 13878** (holotype, ♀ LV: Pl. **22**, 30, fig. 1; Pl. **22**, 32, fig. 1), **CPC 13879** (paratype, ♀ RV: Pl. **22**, 30, fig. 2; Pl. **22**, 32, fig. 2). Paratype from same borehole and same level as holotype.

Diagnosis: As for the genus (presently monotypic).

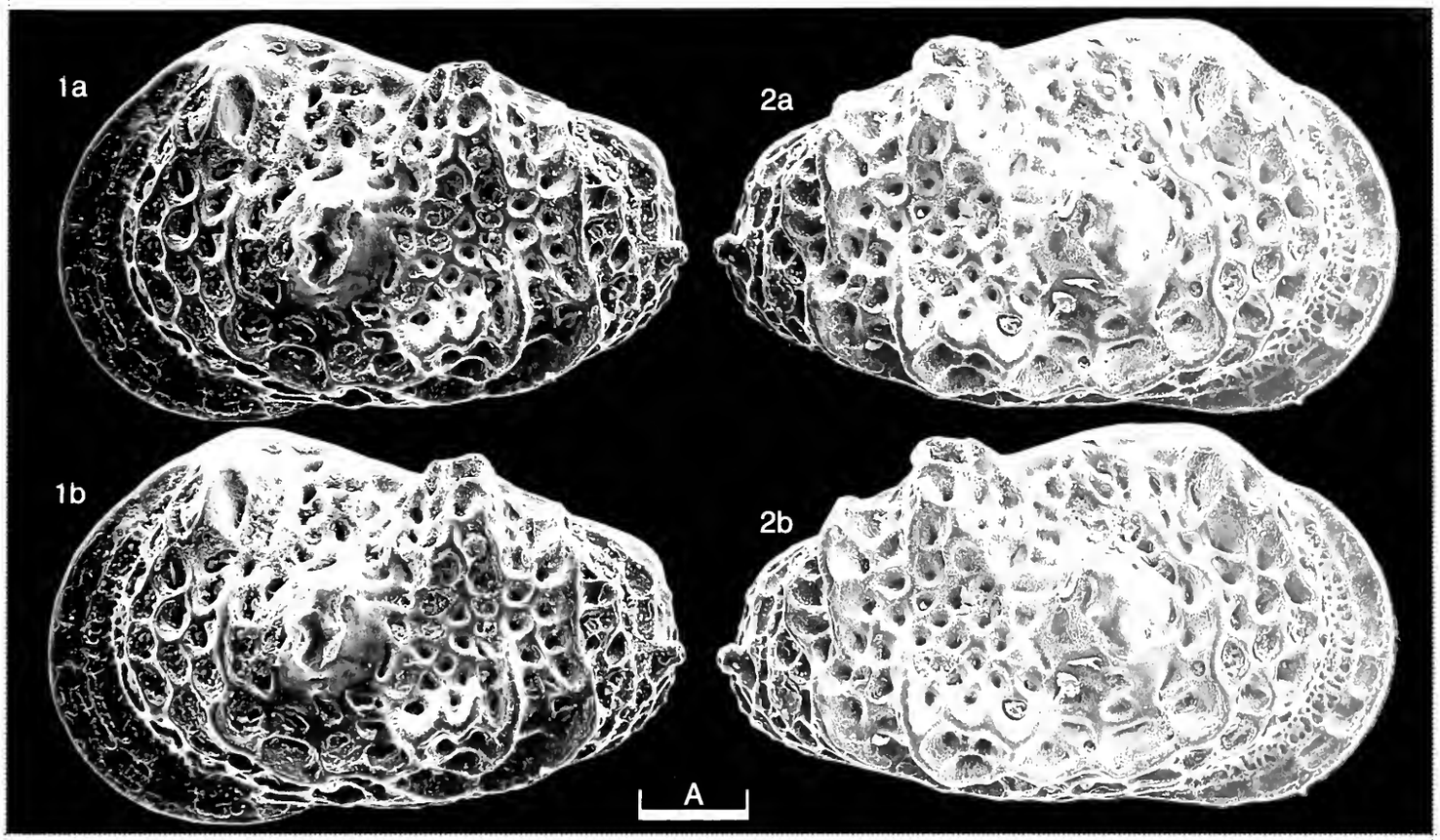
Remarks: The hinge, although described by Krömmelbein (*op. cit.*, 471) as entomodont, is clearly antimerodont. The fact that the illustrated paratype RV has a somewhat broken anterior hinge line could be responsible for this error. The genus seems to be monotypic and not particularly closely related to other taxa. Krömmelbein suggested a similarity with *Orthonotacythere* Alexander, 1933 (C. I. Alexander, *J. Paleont.*, **7**, 199) but the latter genus is more quadrate to sub-rhomboidal in shape. Other Mesozoic cytherurid genera, such as *Trachycythere*, Triebel & Klingler, 1959 (E. Triebel & W. Klingler, *Geol. Jb.*, **76**, 343) are separated by a very large stratigraphical interval (Lower to Middle Jurassic) and *Trachycythere* has an orderly double row of tubercles and is more elongated with a different posterior margin. Some species of *Eucytherura (Vesticytherura)* Gründel, 1964 emend 1981 (J. Gründel, *Mber. dt. Akad. Wiss. Berl.*, **6**, 747, 1964 and *Z. geol. Wiss.*, **9**, 548, 1981) are somewhat similar but have a more sub-dorsal posterior margin and those of *Oligocythereis (=Morkovenicythereis)* Gründel, 1975 (J. Gründel, *Z. geol. Wiss.*, **3**, 368) have much less rugose ornament.

Distribution: Known only from the Albian/Cenomanian of the Tickalara Borehole, SW Queensland, Australia.

Acknowledgements: We thank Dr M. A. Ayress (Department of Geology, The Australian National University, Canberra) for photography of Krömmelbein's material.

Explanation of Plate 22, 32

Fig. 1, ♀ LV, int. lat. (holotype, **CPC 13878**, 630 μm long). Fig. 2, ♀ RV, int. lat. (paratype, **CPC 13879**, 600 μm long). Scale A (100 μm; ×150), figs. 1–2.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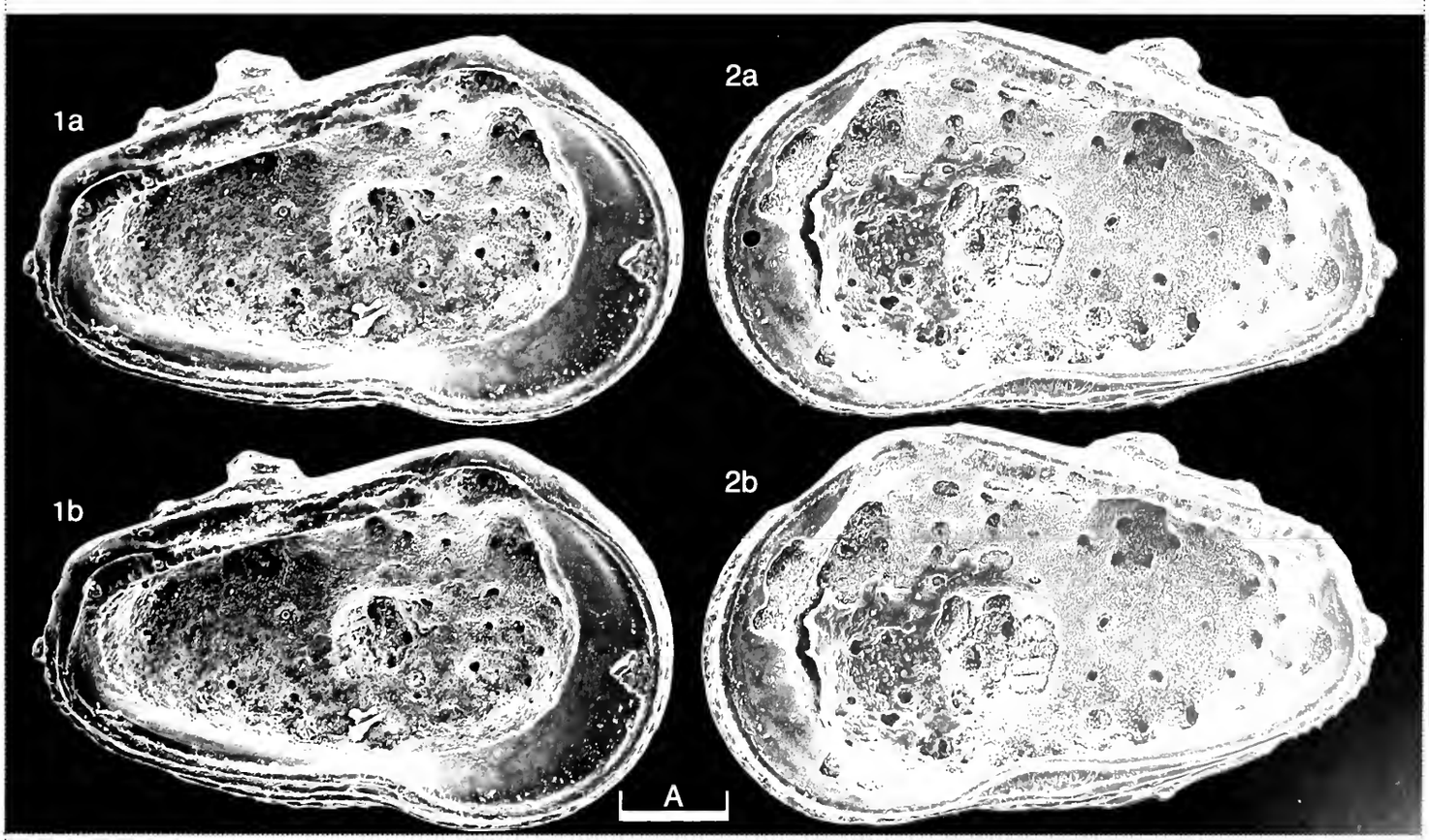
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Stereo-Atlas of Ostracod Shells 22 (9) 33–36 **(1995)**
595.337.14 (118.144) (942 : 163.138.36) : 551.35

ON *ARCACYTHERE RUGOSA* MAJORAN sp. nov.

by Stefan Majoran
(Department of Marine Geology, Göteborg University, Sweden)

Arcacythere rugosa sp. nov.

1979 *Arcacythere* sp., K. G. McKenzie, *in:* B. J. Cooper (Ed.), *Rep. Invest. Dept. Mines S. Aust.*, **50**, 93, 94, pl. 1, fig. 9.
1993 *Arcacythere* sp., K. G. McKenzie, R. A. Reyment & E. R. Reyment, *Revta esp. Paleont.*, **8**, 93, pl. 4, fig. 1.

Holotype: Department of Marine Geology, University of Göteborg, Sweden, no. **DMGUG.Au. 68**; LV.
Type locality: Type section of the Blanche Point Formation, near Willunga, South Australia (lat. 35° 15′S, long. 138° 24′E). Late Eocene, Priabonian. Holotype collected 5 m above base of the Perkana Member (dated by planktonic foraminifera as P16, see McGowran *et al.*, 1992 *in:* D. R. Prothero & W. A. Berggren (Eds.), *Eocene-Oligocene Climatic and Biotic Evolution*, Princeton University Press, 178–201).
Derivation of name: Latin *rugosa*, ridged; alluding to the lateral ornament.
Figured specimens: Department of Marine Geology, Göteborg University, nos. **DMGUG.Au. 68** (holotype, adult LV: Pl. **22**, 34, fig. 1), **DMGUG.Au. 69** (adult car.: Pl. **22**, 34, fig. 2), **DMGUG.Au. 70** (juv. A-1 RV: Pl. **22**, 36, fig. 3), **DMGUG.Au. 73** (adult RV: Pl. **22**, 34, fig. 3), **DMGUG.Au. 71** (adult RV: Pl. **22**, 36, fig. 1), **DMGUG.Au. 72** (adult LV: Pl. **22**, 36, fig. 2).

Explanation of Plate 22, 34

Fig. 1, adult LV, ext. lat. (holotype, **DMGUG.Au. 68**, 420 μm long). Fig. 2, adult car., ext. dors. (**DMGUG.Au. 69**, 420 μm long). Fig. 3, adult RV, ext. lat. (**DMGUG.Au. 73**, 415 μm long).
Scale A (100 μm; ×165), figs. 1–3.

All specimens are from type locality: **DMGUG.Au. 69**, **73** from the Tuketja Member; **DMGUG.Au. 71**, from the Gull Rock Member; and **DMGUG.Au. 68**, **70**, **72** from the Perkana Member. (The Blanche Point Formation is divided into the Tuketja, Gull Rock and Perkana members in ascending stratigraphic order).

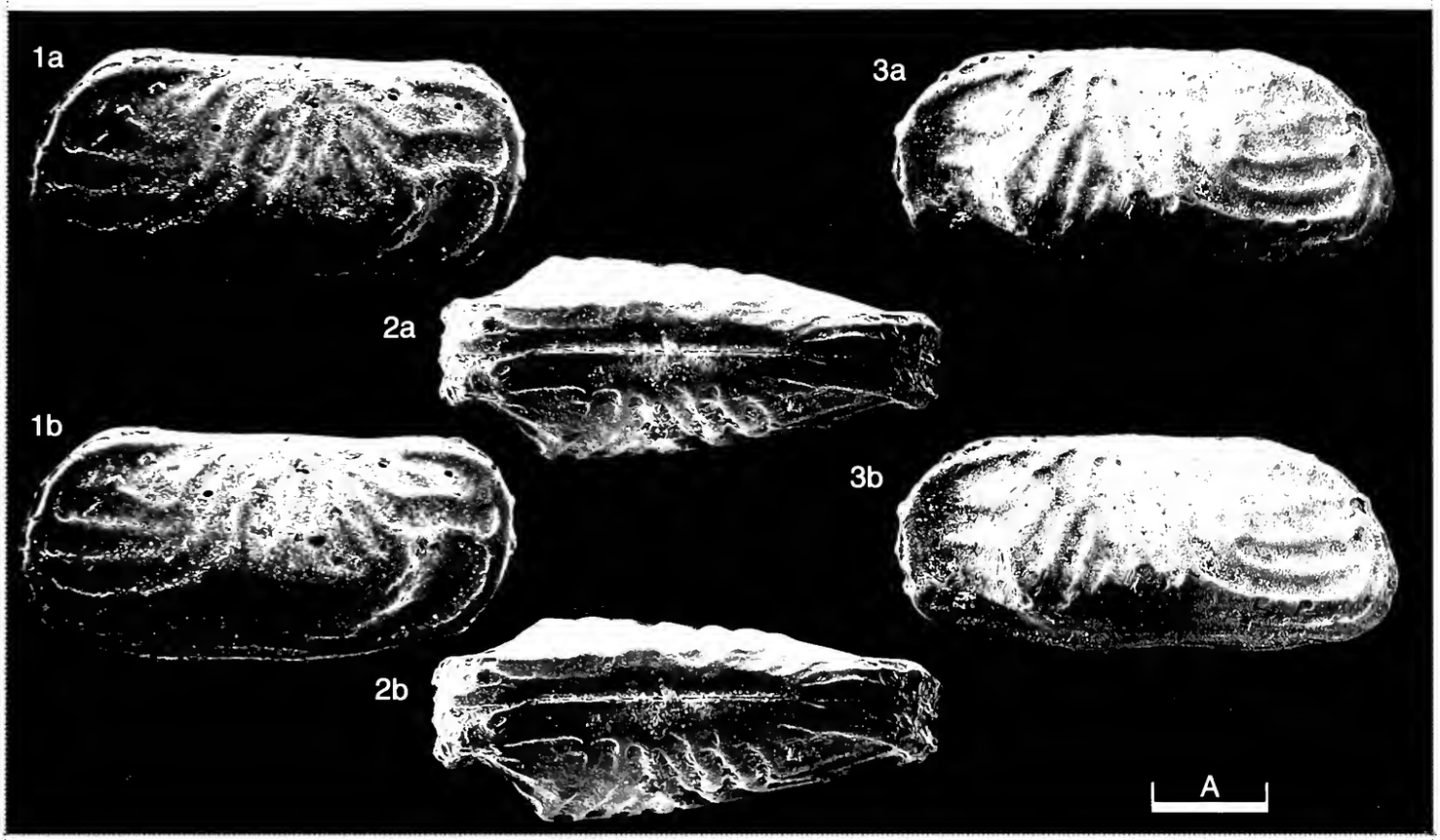
Diagnosis: A non-reticulate species of *Arcacythere* ornamented with conspicuously curved ridges running from the mid-dorsal region towards the anterior and posterior margins. The ventromedian region shows a curved horizontal ridge that forms a median lattice with ascending vertical, slightly inclined ridges. Internal features as for genus.

Remarks: The lateral ornament distinguishes the new taxon from other species of *Arcacythere* (see Hornibrook, 1952, *Palaeont. Bull. Wellington*, **18**, 31–32; Whatley *et al.*, 1982, *J. Micropalaeontol.*, **1**, 1–11; Ayress, 1991, *J. Micropalaeontol.*, **10**, 223–226; McKenzie *et al.*, 1993 (*op. cit.*), although the lateral outline resembles *A. chapmani* Hornibrook, 1952 (*op. cit.*). The new species is very rare in the Blanche Point Formation, only 19 specimens having been recovered, consisting of 15 adults (one carapace and 14 valves) and 4 immature valves (A-1). There is no clear evidence of sexual dimorphism among the adults.

Distribution: Presently known from the Tuketja, Gull Rock and Perkana members of the Blanche Point Formation, South Australia (Late Eocene, Priabonian, Zone P16). Also from the Middle? Eocene, below the Johanna River Greensand Member at Browns Creek, Victoria, and in the Browns Creek Clays (Late Eocene) at Browns Creek (see McKenzie *et al.*, 1993).

Explanation of Plate 22, 36

Fig. 1, adult RV., int. lat. (**DMGUG.Au. 71**, 420 μm long). Fig. 2, adult LV, int. lat., musc. sc. (**DMGUG.Au. 72**); Fig. 3, juv. A-1 RV, ext. lat. (**DMGUG.Au. 70**, 380 μm long).
Scale A (100 μm; ×165), figs. 1, 3; scale B (10 μm; ×565), fig. 2.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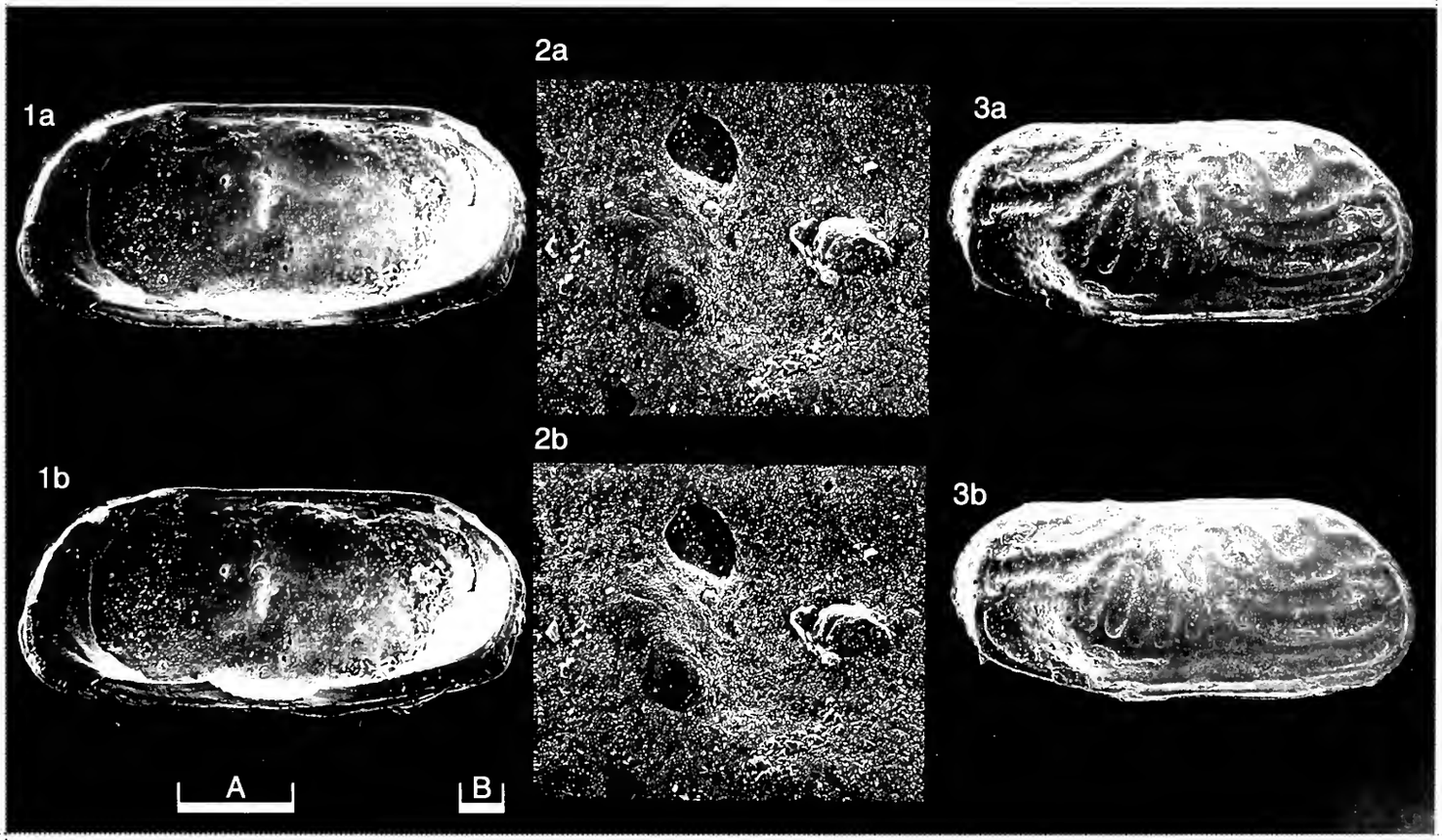
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595.337.14 (118.22) (420 : 162.006.50 + 44 : 002.46): 551.35

ON *KUIPERIANA PARAVARIESCULPTA* MAYBURY sp. nov.

by Caroline A. Maybury
(Institute of Earth Studies, University of Wales, Aberystwyth, U.K.)

Kuiperiana paravariesculpta sp. nov.

1989 *Kuiperiana variesculpta* (Ruggieri); R. C. Whatley & C. Maybury *in:* J. Fourniguet, F. Trautmann, J.-P. Margerel, R. C. Whatley, C. Maybury & M. T. Morzadec-Kerfourn, *Geol. Fr.*, **1989** (1–2), 72 (list) (*non Loxoconcha variesculpta* Ruggieri, 1962).

Holotype: The Natural History Museum, London [BMNH] no. **OS 14647**, ♂ LV.
[Paratypes nos. **OS 14648–14652**].

Type locality: Sample no. 29, Vicarage Pit, St. Erth, Cornwall, England (5° 26′ W, 50° 10′ N; Nat. Grid Ref. SW 556352); Upper Pliocene.

Derivation of name: Latin referring to the similarity of the new species to *Kuiperiana variesculpta* (Ruggieri, 1962) (*Palaeontogr. ital.*, **56** (26), 58, pl. 7, figs. 12–13, text-fig. 13).

Figured specimens: The Natural History Museum, London [BMNH] nos. **OS 14647** (holotype, ♂ LV: Pl. **22**, 38, fig. 1), **OS 14648** (paratype, ♂ RV: Pl. **22**, 38, fig. 2), **OS 14652** (paratype, ♀ LV: Pl. **22**, 38, fig. 3), **OS 14651** (paratype, ♂ car: Pl. **22**, 40, fig. 1), **OS 14649** (paratype, ♂ LV: Pl. **22**, 40, Fig. 2), **OS 14650** (paratype, ♂ RV: Pl. **22**, 40, figs. 3, 4). All paratypes are from the same sample as the holotype, with the exceptions of paratype **OS 14652** which is from sample no. 23, but from the type locality and horizon (see C. A. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and NW France*, unpub. PhD thesis, Univ. Wales, **1**, 3–6, 1985 for further sample details) and paratype **OS 14651** which is from Falleron, NW France (1° 45′ W, 46° 50′ N) (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8–26, 1968 for further sample details).

Explanation of Plate 22, 38

Fig. 1, ♂ LV, ext. lat. (holotype, **OS 14647**, 510 μm long). Fig. 2, ♂ RV, ext. lat. (paratype, **OS 14648**, 510 μm long). Fig. 3, ♀ LV, ext. lat. (paratype, **OS 14652**, 410 μm long).
Scale A (100 μm; ×123), figs. 1–3.

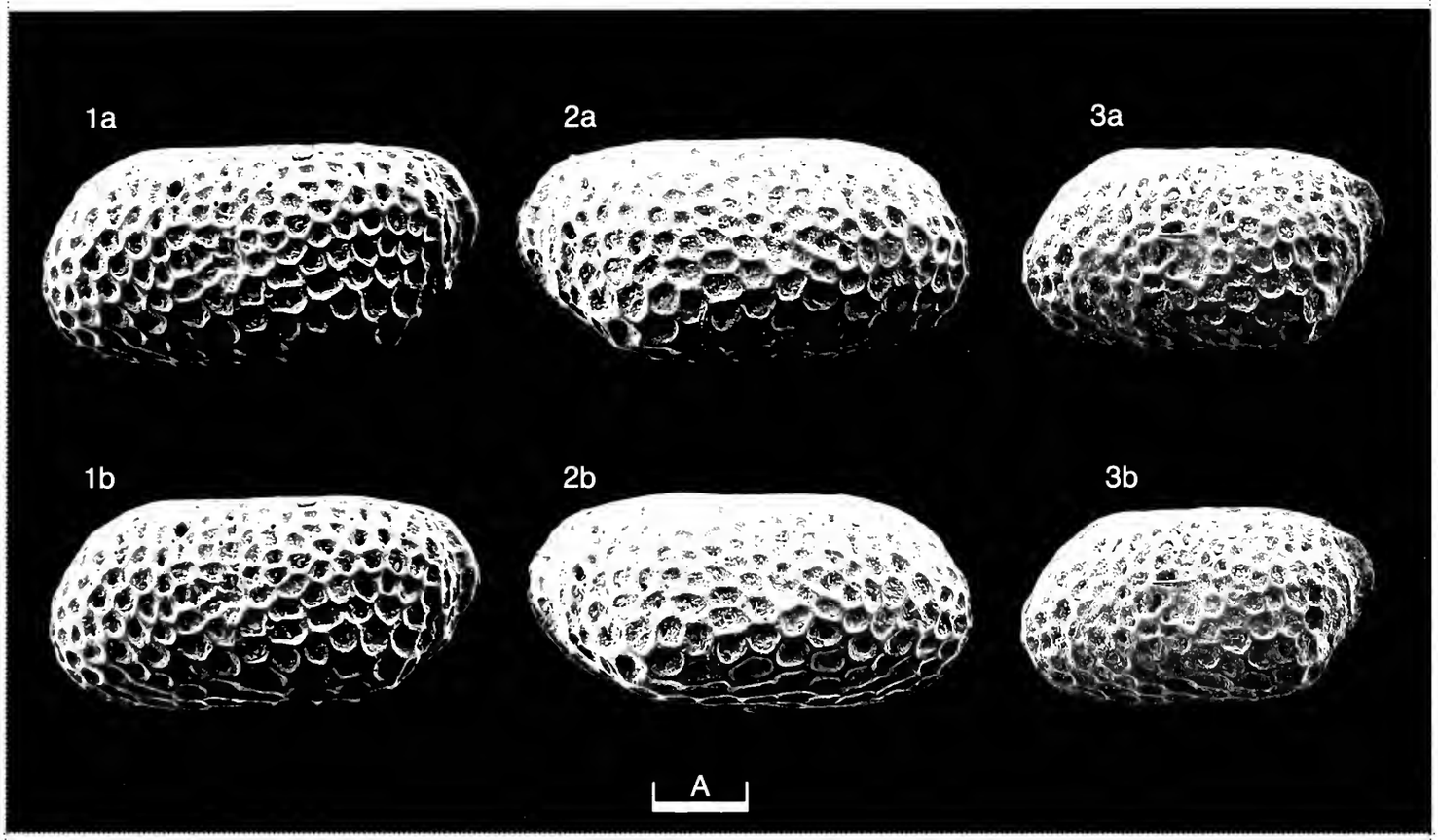
Diagnosis: A small to medium-sized, subelliptical *Kuiperiana* with an ornament of polygonal reticulae. Anterior margin rounded and downturned; posterior margin rounded and upturned; dorsal margin straight, sometimes slightly obscured by valve's tumidity; ventral margin curved, but obscured posteriorly by a subrounded alar protuberance. Eye spot smooth and connected with reticulae. RV hinge composed anteriorly of a comma-shaped socket arching around a subovoid tooth and continuous with the median element, which is a smooth groove. The posterior terminal element is a narrow bar with a frill-like dorsal edge. In the LV the anterior terminal element is a comma-shaped tooth enclosing a small subovoid socket. The median element is a smooth bar communicating with the anterior terminal tooth. The posterior terminal element is a comma-shaped socket and subovoid tooth. Muscle scars an oblique row of 4 adductors with a 'c'-shaped frontal open dorsally. Fulcral point between the median adductors and frontal scar. The 2 mandibular scars are small and circular in outline.

Remarks: This species is similar in size to *Kuiperiana variesculpta* (Ruggieri) (*op. cit.*) and its ornament also appears similar. As Ruggieri's original illustrations are hand drawings and as I have been unable to contact Professor Ruggieri I cannot regard the two species as conspecific. *K. variesculpta* seems, from the illustrations, to have a prominent, strongly laterally compressed anterior margin rim with striate markings parallel to the margin. These features are lacking in *K. paravariesculpta*. The species Whatley & Maybury referred to as *K. variesculpta* (Ruggieri, 1962) (*in:* J. Fourniguet *et al.*, *op. cit.*) is herewith assigned to *K. paravariesculpta*.

Distribution: Upper Pliocene deposits of St. Erth, Cornwall, England (sample nos. 1–4, 7, 10, 12, 14, 16, 18, 21, 23, 25–29) and Upper Pliocene (Redonian) deposits of Apigné Borehole II, Beugnon (sample no. 1), Cricqueville-en-Bessin (sample nos. 5, 9, 13), Falleron, L'Aubier, Le Bosq d'Aubigny, Le Temple du Cerisier, Palluau I (200–280, 380, 640 cm), Palluau II (480, 500–540, 580, >640 cm), Reneauleau, Reneauleau base, Saint-Jean-la-Poterie (sample no. 1549.14) and a mixed sample. See Maybury (*op. cit.*) for further details of the British samples and for the French, see Margerel (*op. cit.*), except for a description of the deposits at Cricqueville-en-Bessin, which may be found in C. Pareyn, P. Brébion, É. Buge, R.-P. Carriol, A. Lauriat-Rage, Y. Le Calvez & J. Roman, *Bull. Mus. natn. Hist. nat. Paris*, ser. 4, **5** (C, 4), 372–373, 1983.

Explanation of Plate 22, 40

Fig. 1, ♂ car., ext. dors. (paratype, **OS 14651**, 490 μm long). Fig. 2, ♂ LV, int. lat. (paratype, **OS 14649**, 490 μm long). Figs. 3, 4, ♂ RV (paratype, **OS 14650**, 550 μm long).
Scale A (100 μm; ×123), figs. 1, 2; scale B (40 μm; ×307), figs. 3, 4.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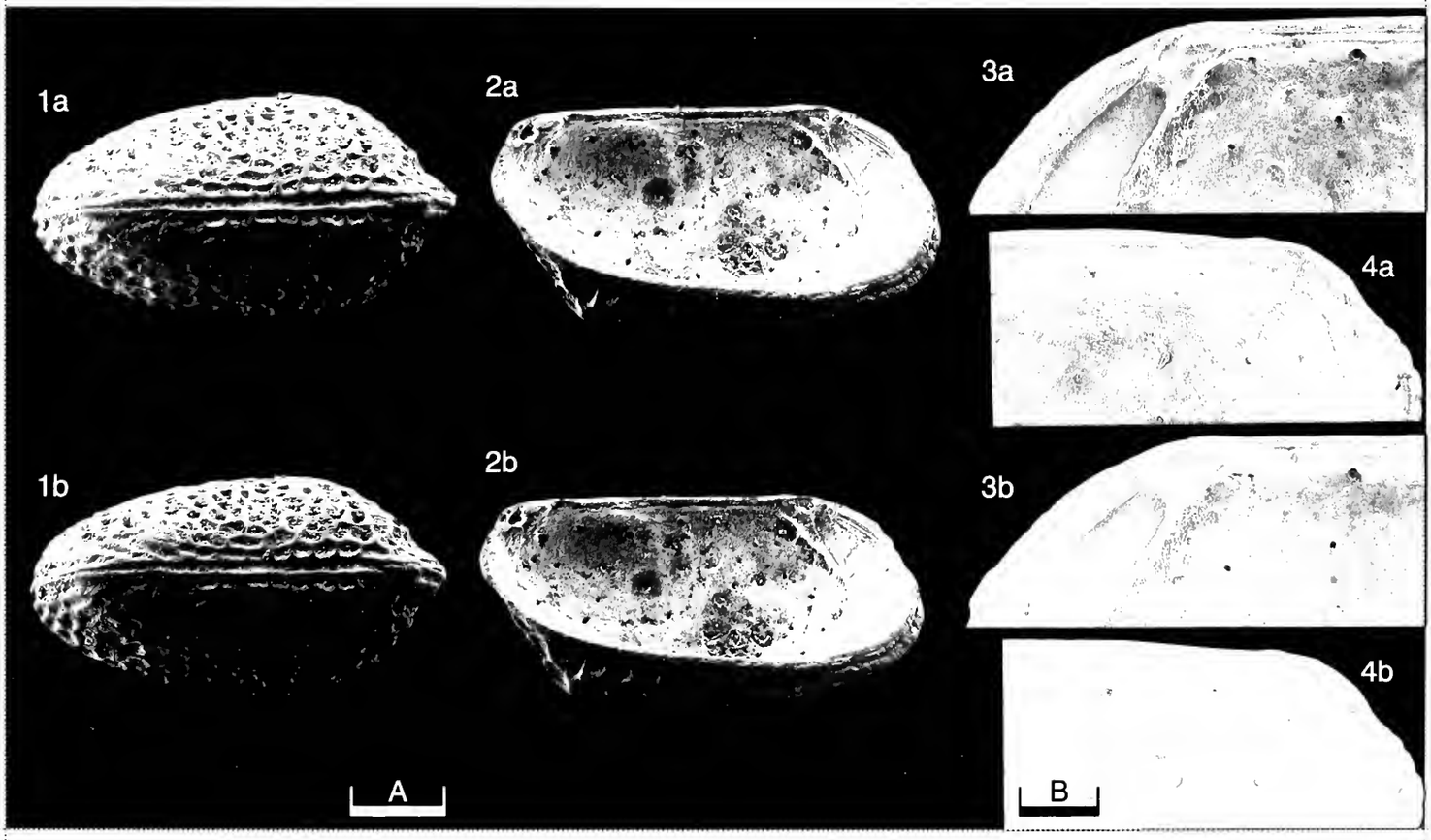
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595.337.14 (119.9) (268 : 162.014.85): 551.353

ON *CYTHEROPTERON BRONWYNAE* JOY & CLARK

by Richard Jones & Robin C. Whatley
(Institute of Earth Studies, University of Wales, Aberystwyth, U.K.)

Cytheropteron bronwynae Joy & Clark, 1977

1977 *Cytheropteron bronwynae* sp. nov., J. A. Joy & D. L. Clark, *Micropaleontology*, **23**, 140, Pl. 2, figs. 1–3.

Type specimens: Department of Geology and Geophysics, University of Wisconsin, Madison (UW): Holotype (**UW 1597-5a**); paratypes (**UW 1597-5b–1597-5d**).

Type locality: Core FL 198, 16–1, central Arctic Ocean (lat. 80° 22.19′ N, long. 172° 33.92′ W), water depth 3198 m; Recent.

Figured specimens: The Natural History Museum, London [BMNH] nos. **1995.1281** (♀ RV: Pl. **22**, 42, fig. 1), **1995.1282** (♀ LV: Pl. **22**, 42, fig. 2), **1995.1283** (♂ RV: Pl. **22**, 42, fig. 3), **1995.1284** (♂ LV: Pl. **22**, 42, fig. 4), **1995.1285** (♀ RV: Pl. **22**, 44, figs. 1, 5, 6), **1995.1286** (♀ LV: Pl. **22**, 44, fig. 2), **1995.1287** (juv. LV: Pl. **22**, 44, fig. 3), **1995.1288** (♀ car.: Pl. **22**, 44, fig. 4).

All specimens are from the Morris Jesup Rise, Arctic Ocean (lat. 85° 19.4′ N, long. 14° W) on the ARK VIII/3 (ARCTIC '91) cruise.

Diagnosis: Subovate with pronounced, smooth caudal process; apex just above mid-height. Anterior margin narrowly rounded and bearing 5–6 strong marginal denticles, mainly above apex. Dorsal margin strongly arched in RV with pronounced keel-like rib; less arched in LV. Ventral margins strongly convex, with marked postero-ventral keel, especially in LV. Valve surface coarsely punctate with puncta orientated in

Explanation of Plate 22, 42

Fig. 1, ♀ RV, ext. lat. (**1995.1281**, 700 μm long). Fig. 2, ♀ LV, ext. lat. (**1995.1282**, 700 μm long). Fig. 3, ♂ RV, ext. lat. (**1995.1283**, 700 μm long). Fig. 4, ♂ LV, ext. lat. (**1995.1284**, 700 μm long).
Scale A (200 μm; ×120), figs. 1–4.

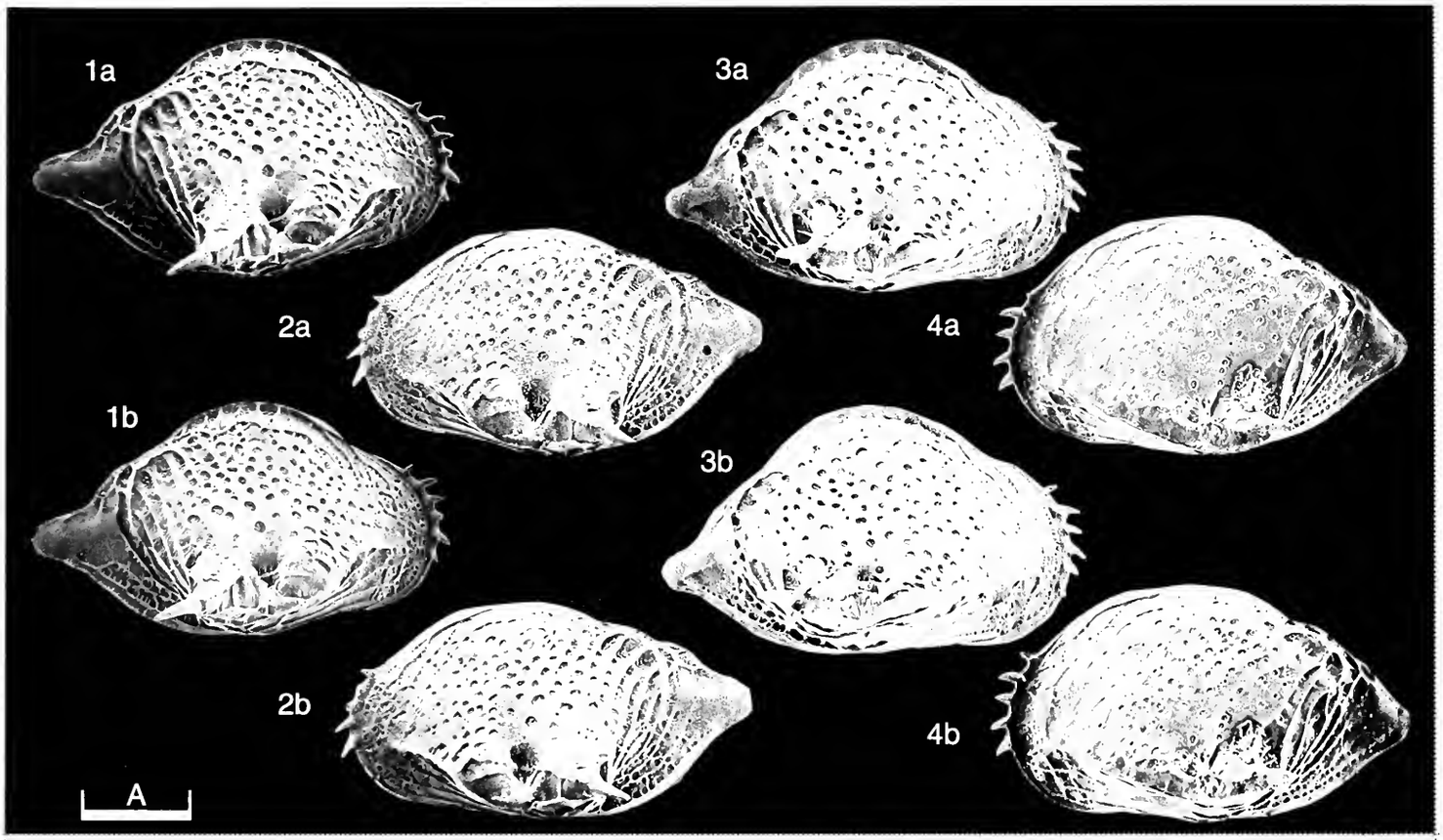
oblique rows and with oblique ribs originating in a postero-dorsal loop crossing valve behind alae. Anterior third with subdued ornament. Ventral surface with parallel ribs and rows of puncta along margin of postero-ventral keel. Alae pronounced; leading edge thick with ventro-lateral deep pit and strong, backward-directed apical spine. Hinge antimerodont with a RV overlap except for the anterior quarter of the hinge where the LV overlaps the RV.

Remarks: This deep water species of *Cytheropteron* co-exists with a number of morphologically similar forms of the same genus in the Arctic Ocean, such as *C. carolinae* Whatley & Coles, 1987 (*Revta esp. Micropaleont.*, **19**, 60), first described from DSDP Leg 94, and *C. hamatum* Sars, 1869 (*Forh. VidenskSelsk. Krist.*, **1868**, 172), first described from the Lofoten Islands and now recognised across the NE Atlantic. The latter differs from the present species primarily by its more acutely tapering alae which possess a characteristic second smaller spine on the training edge. *C. carolinae*, while similar in size and shape to females of *C. bronwynae*, lacks marginal denticles on the anterior margin and has finer puncta on the dorsal alar surface. *C. alatum* Sars, 1866 (*Forh. VidenskSelsk. Krist.*, **1865**, 81) has been compared to *C. bronwynae* but is easily distinguished by its lack of ornamentation and considerably larger alar expansion. Sexual dimorphism is exhibited in many Quaternary and Recent forms of *Cytheropteron*. It is expressed morphologically in *C. bronwynae* in terms of the dimensions of the carapace and length of extension of the alar spines. The shorter, higher forms are probably males and possess a shorter spine.

Distribution: *C. bronwynae* is the only known endemic deep water Arctic species. It is common at depths below 1000 m and together with *Krithe* dominates ostracod assemblages in deep basins which are influenced by the lower Arctic Ocean deep watermass between 2500 and 4500 m. *C. bronwynae* differs from other high latitude species by being absent from the Greenland Sea and by its widespread occurrence in the Canadian and Eurasian basins either side of the Lomonosov Ridge, a well known migrational barrier. A number of *Krithe* and *Cytheropteron* species are absent or rare on the Canadian side of the ridge. The species characterises glacial-age (cold) sediments.

Explanation of Plate 22, 44

Fig. 1, 5, 6, ♀ RV (**1995.1285**, 685 μm long): fig. 1, ext. lat.; figs. 5, 6, ant. and post. hinge elements. Fig. 2, ♀ LV, int. lat. (**1995.1286**, 685 μm long). Fig. 3, juv. LV, ext. lat. (**1995.1287**, 600 μm long). Fig. 4, ♀ car. dors. (**1995.1288**, 700 μm long).
Scale A (200 μm; ×120), figs. 1–4; scale B (100 μm; ×350), figs. 5, 6.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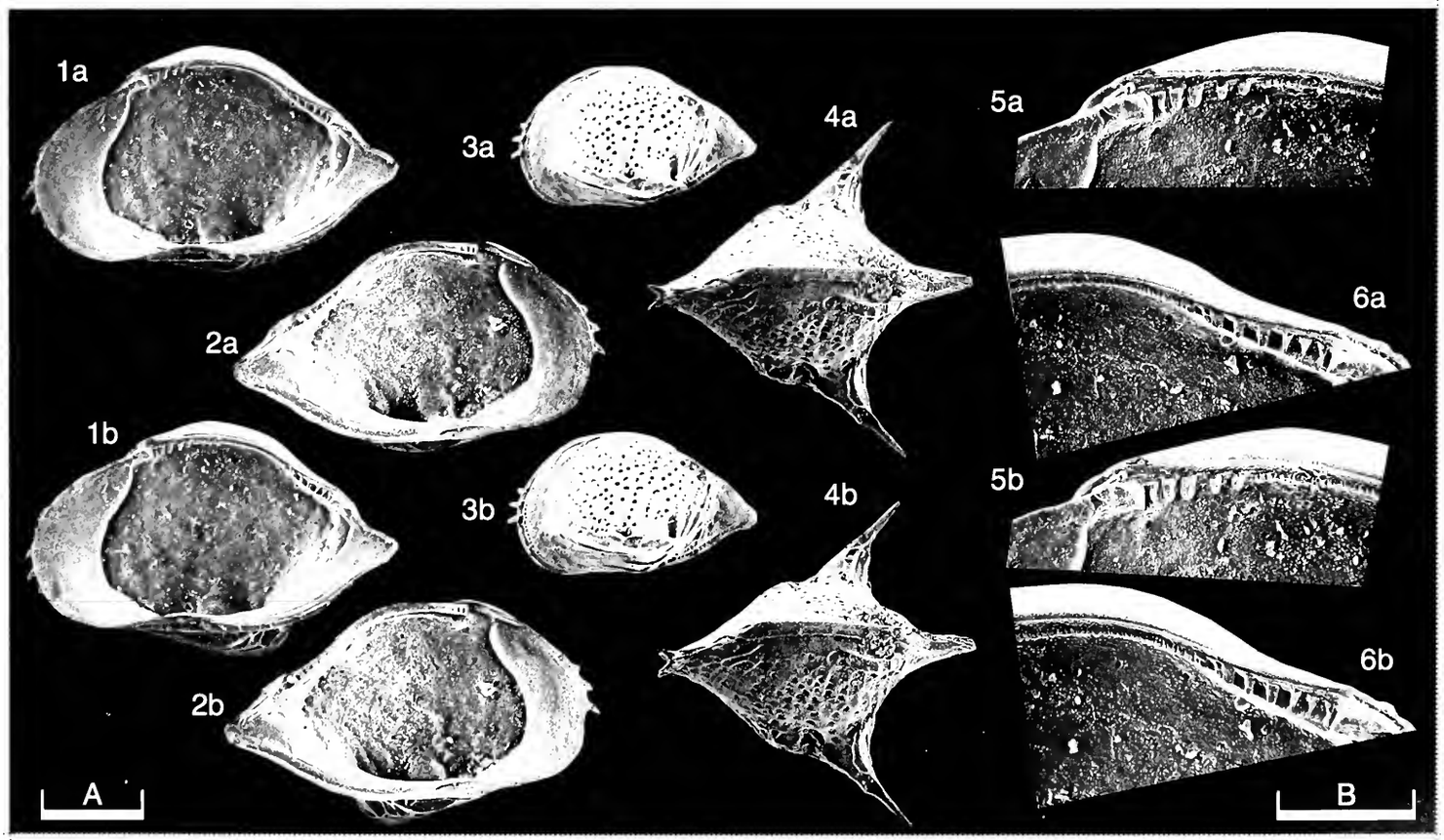
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Stereo-Atlas of Ostracod Shells 22 (12) 45–52 (**1995**)
595.337.3 (116.331 + 116.332 + 116.333.1) (420 : 161.000.51 + 161.001.51): 551.35

ON *CYTHERELLOIDEA KAYEI* WEAVER

by David J. Horne[1], Amnon Rosenfeld[2] & Ian Slipper[1]
([1]School of Earth Sciences, University of Greenwich, Chatham, U.K.;
[2]Geological Survey of Israel, Jerusalem)

Cytherelloidea kayei Weaver, 1982

1982 *Cytherelloidea kayei* sp. nov., P. P. E. Weaver, *Palaeontogr. Soc. (Monogr.)*, **135** (562), 22–23, pl. 3, figs. 4–9.
1988 *Cytherelloidea kayei* Weaver; I. Jarvis, G. A. Carson, M. K. E. Cooper, M. B. Hart, P. N. Leary, B. A. Tocher, D. J. Horne & A. Rosenfeld, *Cret. Res.*, **9**, 34, fig. 15 (h).
1988 *Cytherelloidea kayei* Weaver; I. P. Wilkinson, *in:* T. Hanai, N. Ikeya & K. Ishizaki (Eds.), *Evolutionary Biology of Ostracoda*, Kodansha, Tokyo, pl. 1, fig. 9.
1990 *Cytherelloidea kayei* Weaver; D. J. Horne, I. Jarvis & A. Rosenfeld, *in:* R. Whatley & C. Maybury (Eds.), *Ostracoda and Global Events*, Chapman & Hall, London, 127, pl. 2, fig. 1.

Holotype: The Natural History Museum, London [BMNH] no. **OS 9464**; ♀ RV.
[Paratypes: BMNH nos. **OS 9465–OS 9479**].

Type locality: Bluebell Hill, Kent, SE England (lat. 51° 20′N, long. 00° 30′E), Lower Chalk Formation, Zig Zag Chalk Member, 3.5 m below the Plenus Marls, Upper Cenomanian.

Explanation of Plate 22, 46

Figs. 1, 5, ♀ RV (holotype, **OS 9464**, 595 μm long): fig. 1, ext. lat.; fig. 5, ext. vent. obl. Figs. 2, 4, 6, ♂ car. (paratype, **OS 9465**, 570 μm long): fig. 2, lt. lat.; fig. 4, dors.; fig. 6, lt. vent. obl. Fig. 3, ♀ car. dors. (paratype, **OS 9466**, 600 μm long).
Scale A (100 μm; ×90), figs. 1–6.

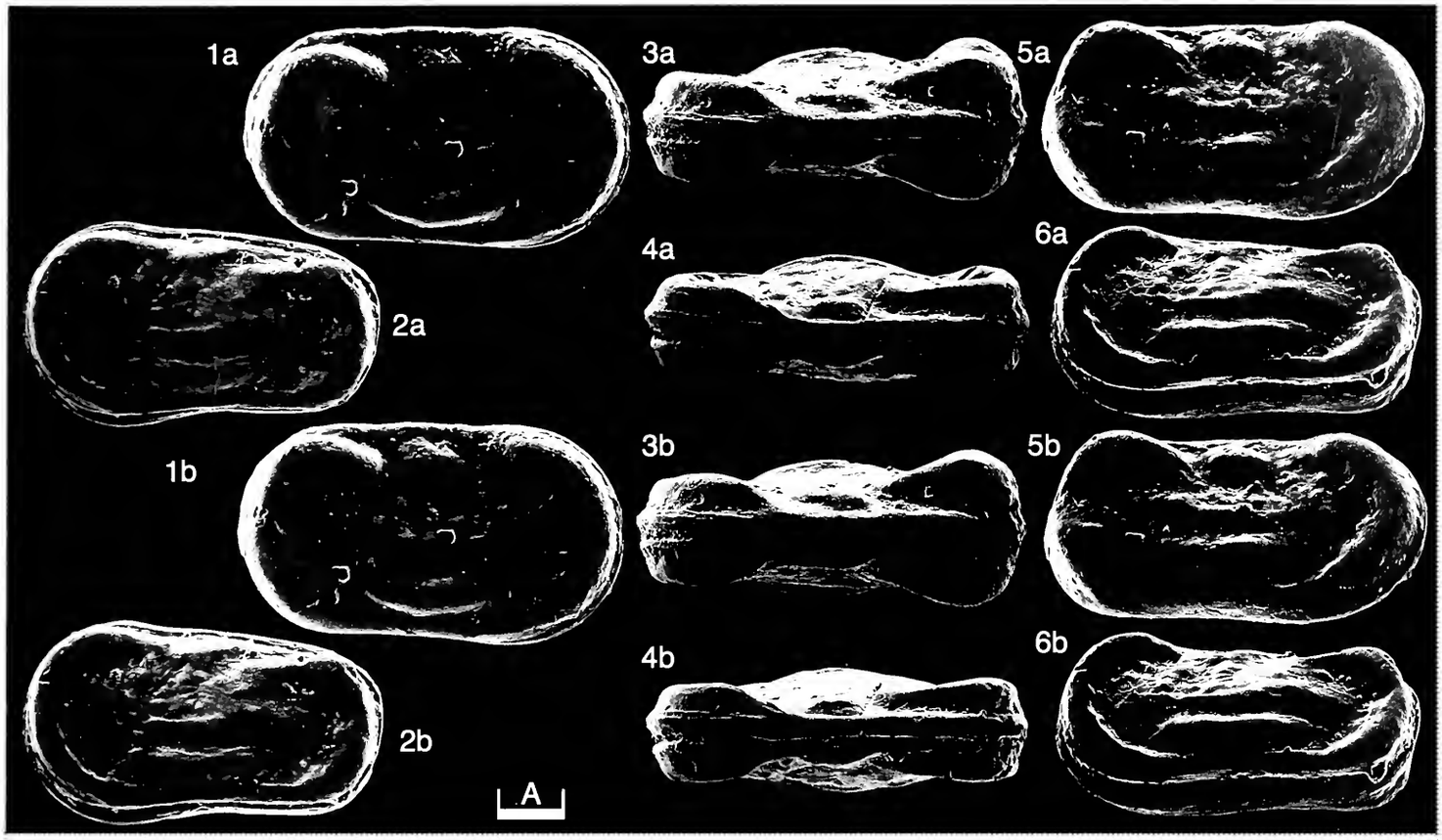
Figured specimens: The Natural History Museum, London [BMNH] nos. **OS 9464** (holotype, ♀ RV: Pl. **22**, 46, fig. 1, 5), **OS 9465** (paratype, ♂ car.: Pl. **22**, 46, figs. 2, 4, 6), **OS 9466** (paratype, ♀ car.: Pl. **22**, 46, fig. 3), **OS 14680** (♀ RV: Pl. **22**, 48, fig. 1, 2), **OS 14681** (♀ LV: Pl. **22**, 48, figs. 3, 4; Pl. **22**, 52, fig. 5), **OS 14682** (♂ LV: Pl. **22**, 48, figs. 5, 6), **OS 13134** (♀ RV: Pl. **22**, 50, figs. 1, 2), **OS 13133** (♂ RV: Pl. **22**, 50, figs. 3, 4), **OS 14683** (♀ RV: Pl. **22**, 50, fig. 5), **OS 13294** (♀ RV: Pl. **22**, 52, figs. 1, 2), **OS 14684** (♀ RV: Pl. **22**, 52, fig. 3, 4).

The holotype and paratypes were collected from the type locality and horizon by P. P. E. Weaver. **OS 14680–OS 14682** are from the Upper Cenomanian Zig Zag Chalk Member (Lower Chalk Formation) at Abbots Cliff, near Folkestone, Kent, SE England (lat. 51° 06′N, long. 01° 14′E), 4.6 m below the base of the Plenus Marls (sample ABC-1), collected by D. J. Horne. **OS 14683**, **OS 14684** are from the Coniacian Seaford Member (Upper Chalk Formation) at Langdon Stairs, near Dover, Kent (lat. 51° 08′N, long. 01° 19′E), from samples D19 and D23 respectively (collected by D. J. Horne and A. Rosenfeld). **OS 13294** is from the Turonian New Pit Member (Middle Chalk Formation) at Akers Steps, near Dover (lat. 51° 08′N, long. 01° 17′E), from sample AKS-C, collected by D. J. Horne and A. Rosenfeld.

Diagnosis: A species of *Cytherelloidea* with prominent, thick anterior marginal rib, an arcuate ventrolateral rib, and posterodorsal and posteroventral swellings in both sexes. The anterior marginal rib runs from below the anterior end of the relatively straight dorsal margin to about halfway along the weakly sinuous ventral margin, the ventral segment being less swollen and tapering posteriorly. The ventrolateral rib is swollen centrally and connects posteriorly, via a constricted section, to the

Explanation of Plate 22, 48

Figs. 1, 2, ♀ RV (**OS 14680**, 585 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl. Figs. 3, 4, ♀ LV (**OS 14681**, 550 μm long): fig. 3, ext. lat.; fig. 4, ext. vent. obl. Figs. 5, 6, ♂ LV (**OS 14682**, 490 μm long): fig. 5, ext. lat.; fig. 6, ext. vent. lat.
Scale A (100 μm; ×90), figs. 1–6.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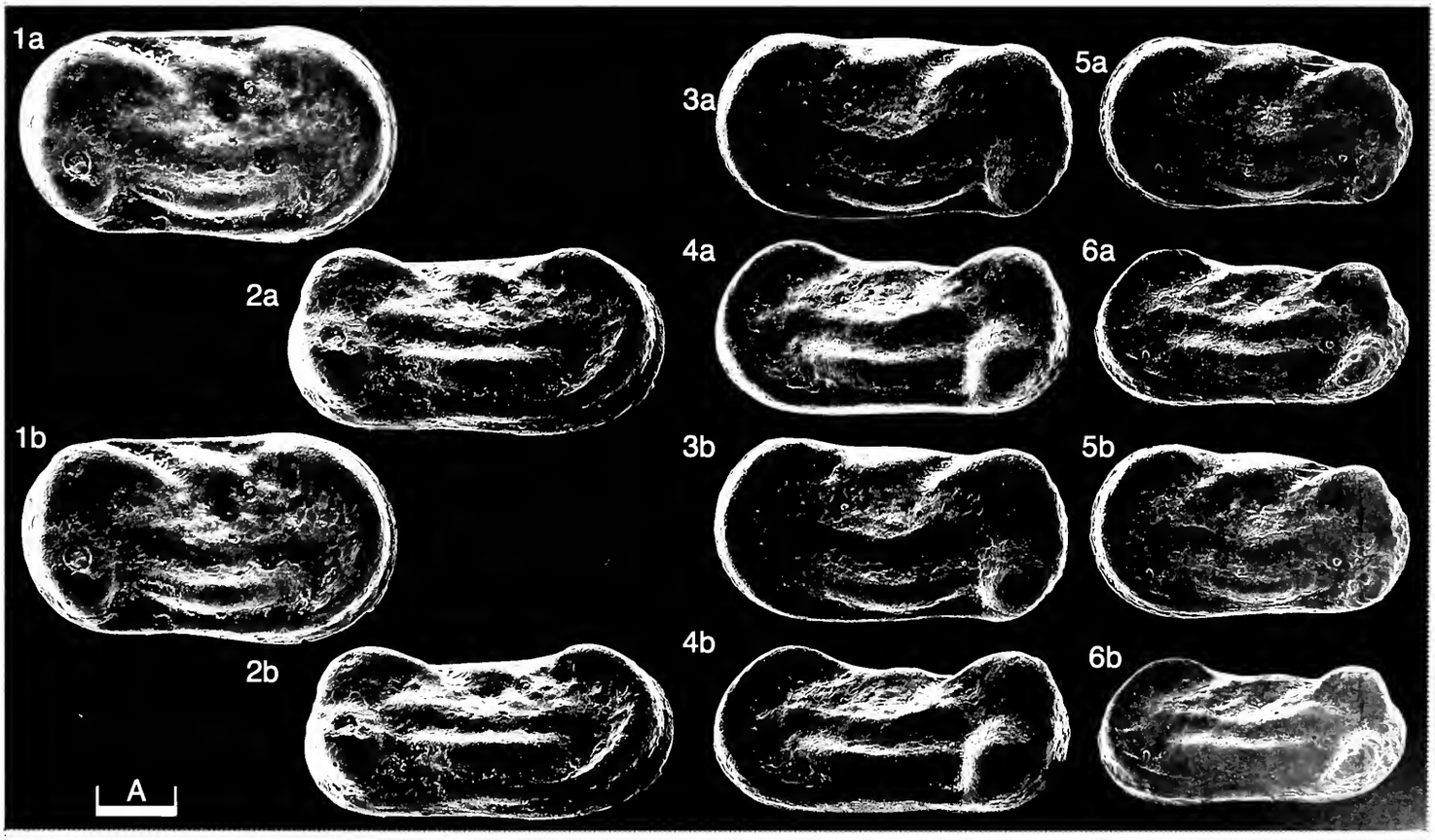
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posteroventral swelling. The posterodorsal swelling is produced anteriorly into a short, tapering diagonal rib which fades out in the direction of the central muscle scar pit. A short, swollen rib inclined down towards the anterior is situated between the top of the central muscle pit and the dorsal margin. A weak arcuate rib slightly swollen at each end, runs longitudinally between the central muscle pit and the more prominent ventrolateral rib. Sexual dimorphism clear; males more tapered posteriorly in lateral outline and with less prominent posterior swellings which in some specimens tend to form a continuous posterior marginal rib. Well-preserved specimens show a fine polygonal reticulation covering most of the external surfaces.

Remarks: Comparison of specimens of *Cytherelloidea kayei* from different parts of its stratigraphic range show subtle differences in the development of the ribs. In particular, the subcentral rib running longitudinally immediately below the muscle pit tends to be narrow and evenly developed in Cenomanian specimens (e.g. Pl. **22**, 50, figs. 1, 2) but stratigraphically higher specimens show the development of weak nodes or swellings at each end of this rib (e.g. Pl. **22**, 52, figs. 1, 2 (Turonian) and Pl. **22**, 52, figs. 3, 4 (Coniacian)). In this respect some of the younger specimens resemble *Cytherelloidea binoda* Clarke (*Geol. Jb.*, **A61**, 45–46, pl. 1, figs. 1–5, 1982) from the Coniacian of NW Germany, which we consider to be a distinct but closely related species. *C. binoda* differs from *C. kayei* in that the rib connecting the two subcentral swellings is absent or at best very weakly developed, and the dorsolateral and posterodorsal diagonal ribs are fused, giving the appearance of a single, sinuous rib, tapering towards the anterior. Since these features are more easily distinguished in oblique ventrolateral views, we have followed Clarke's (*op. cit.*) practice in providing such illustrations is addition to the standard lateral views. *C. binoda* is also larger (length of adults 660–770 μm) than *C. kayei* (<650 μm long).

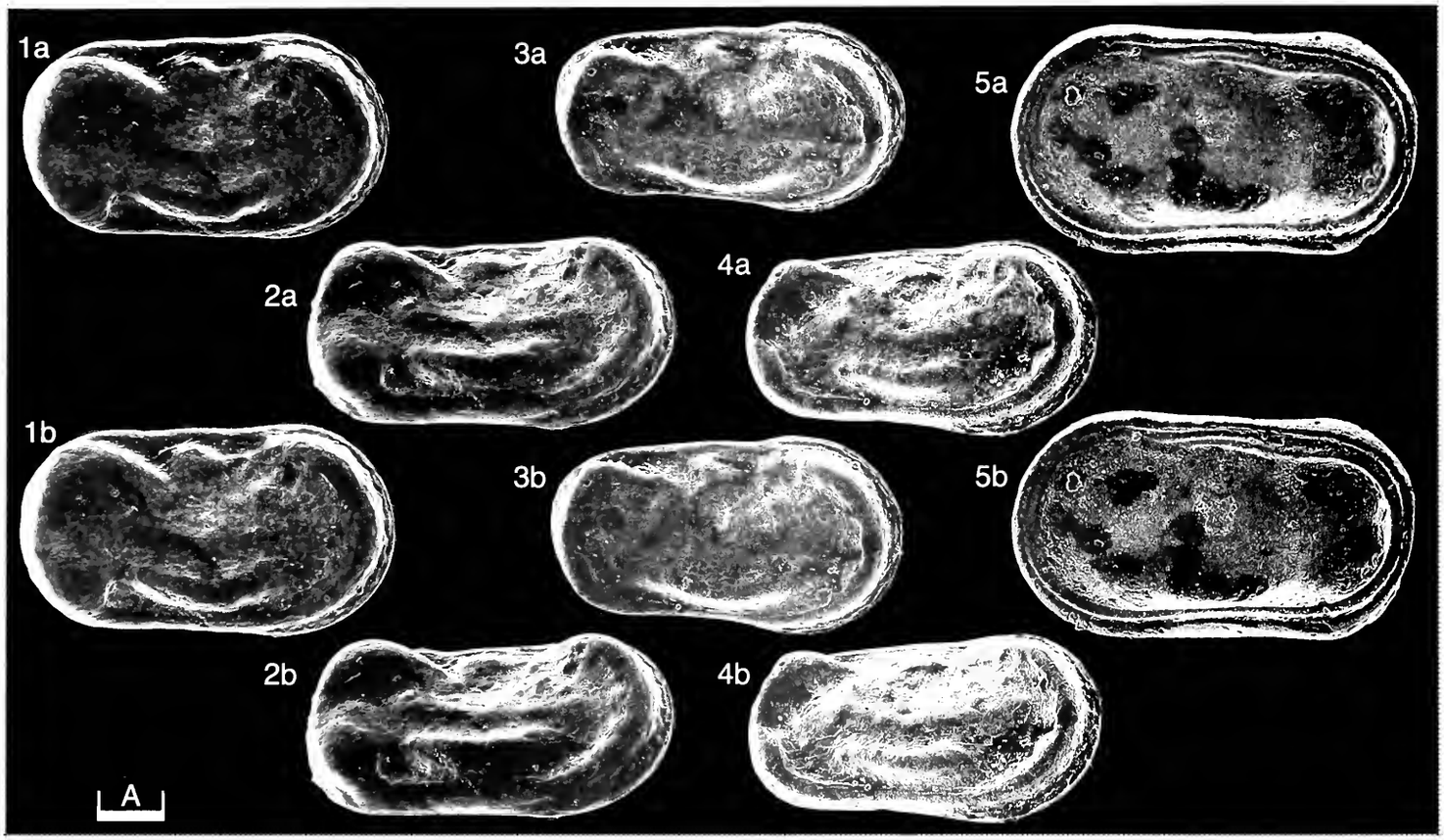
Explanation of Plate 22, 50

Figs. 1, 2, ♀ RV (**OS 13134**, 570 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl. Figs. 3, 4, ♂ RV (**OS 13133**, 540 μm long): fig. 3, ext. lat.; fig. 4, ext. vent. obl. Fig. 5, ♀ RV, int. lat. (**OS 14683**, 620 μm long).
Scale A (100 μm; ×90), figs. 1–5.

Distribution: Marine Upper Cretaceous of the Anglo-Paris Basin: Cenomanian – Coniacian stages. In England, the occurrence of *C. kayei* in the lowest Cenomanian is confirmed (Wilkinson, *op. cit.*); it has also been reported (but not illustrated) in the Upper Albian Hunstanton Chalk Member by Wilkinson, 1990 (*Cour. ForschInst. Senckenberg*, **123**, 239–258).

Explanation of Plate 22, 52

Figs. 1, 2, ♀ RV (**OS 13294**, 600 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl. Figs. 3, 4 (**OS 14684**, 625 μm long): fig. 3, ext. lat.; fig. 4, ext. vent. obl. Fig. 5, ♀ LV, int. lat. (**OS 14681**, 550 μm long).
Scale A (100 μm; ×90), figs. 1–5.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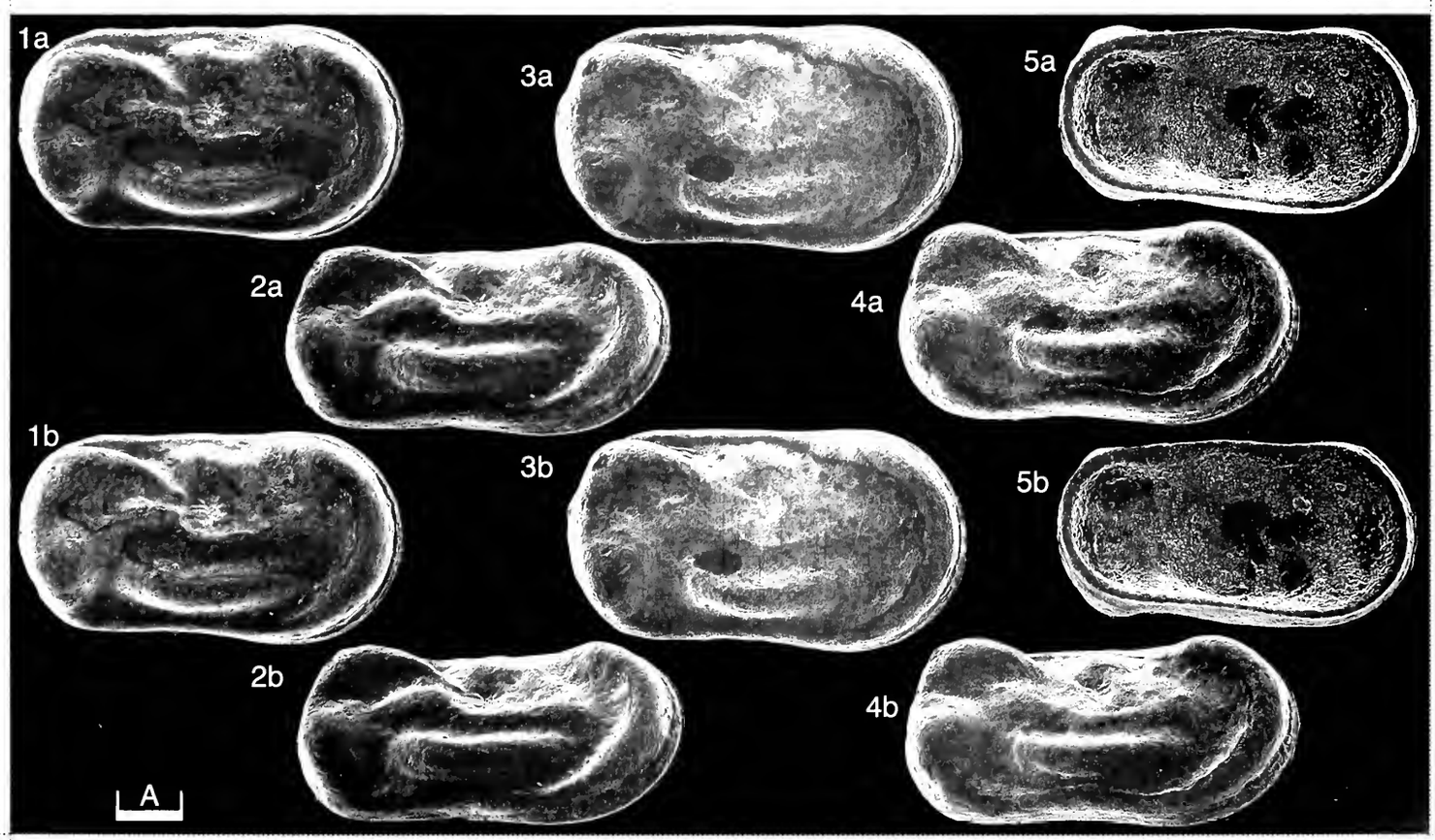
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595.337.14 (119.1 + 119.4 + 119.9) (485 : 161.011.58 + 489 : 161.010.57 + 714 : 162.070.47 + 798 : 162.151.70): 551.351.

ON *SEMICYTHERURA COMPLANATA* (BRADY, CROSSKEY & ROBERTSON)

by David J. Horne & Alan R. Lord
(School of Earth Sciences, University of Greenwich, Chatham & Department of Geological Sciences, University College London, England)

Semicytherura complanata (Brady, Crosskey & Robertson, 1874)

1874 *Cytherura (?) complanata* sp. nov., G. S. Brady, H. S. Crosskey & D. Robertson, *Palaeontogr. Soc. (Monogr.)*, **1874**, 194, pl. 11, figs. 19, 20.
1982 *'Cytherura' complanata* Brady, Crosskey & Robertson; A. R. Lord, *Sver. geol. Unders. Afh.*, **C794**, 138, 145.
1987 *Semicytherura complanata* (Brady, Crosskey & Robertson); T. M. Cronin *in:* N. R. Gadd (Ed.), *Late Quaternary development of the Champlain Sea Basin*, Geol. Assoc. Canada, Special Publ., 20–21, pl. 3, figs. 7–9.
1987 *Semicytherura* sp., K. L. Knudsen & D. N. Penney, *Danm. geol. Unders.*, **B10**, 54, pl. 2, figs. 5, 6.
1987 *Semicytherura complanata* (Brady, Crosskey & Robertson); T. M. Cronin & N. Ikeya, *J. Micropalaeontol.*, **6** (2), 85, pl. 3, fig. 17.

Holotype: Not defined. No material in the Brady Collection, Hancock Museum, Newcastle-upon-Tyne; the Crosskey Collection, Hunterian Museum, Glasgow has two poorly preserved RV, one broken (slide **610**).

Type locality: Annochie, E Scotland (Nat. Grid. Ref. NK 104 532; lat. 57° 34′ 20″ N, long. 1° 49′ 40″ W). Original material from this locality.

Figured specimens: Senckenberg Museum, Frankfurt, Germany nos. **Xe 18047** (♂ LV: Pl. **22**, 54, fig. 3), Skagen Borehole, North Jutland, Denmark (lat. 57° 46′ N, long. 10° 40′ E), 115.14 m; **18048** (♂ car.: Pl. **22**, 56, fig. 1; Pl. **22**, 58, fig. 2), **18049** (♀ RV: Pl. **22**, 58, fig. 4) and **18050** (♂ LV: Pl. **22**, 54, fig. 1), Skagen Borehole,

Explanation of Plate 22, 54

Fig. 1, ♂ LV, ext. lat. (**Xe 18050**, 400 μm long). Fig. 2, ♀ LV, ext. lat. (**18051**, 400 μm long). Fig. 3. ♂ LV, int. lat. (**18047**, 400 μm long). Scale A (100 μm; ×150), figs. 1–3.

119.19 m; **18051** (♀ LV: Pl. **22**, 54, fig. 2), **18052** (♀ RV: Pl. **22**, 56, fig. 2) and **18053** (♀ car.: Pl. **22**, 58, fig. 3), Skagen Borehole, 121.34 m; **18054** (♀ RV: Pl. **22**, 56, fig. 3; Pl. **22**, 58, fig. 1), Skagen Borehole, 125.49 m; **18055** (♀ RV: Pl. **22**, 58, fig. 5), Skagen Borehole, 127.34 m; all from the Pleistocene (Weichselian). **Xe 18058** (♀ LV: Pl. **22**, 60, figs. 1, 2) and **18059** (♀ RV: Pl. **22**, 60, figs. 3, 4), Moltemyr Borehole, Sweden (lat. 58° 26′ 45″ N, long. 11° 32′ 36″ E), 6.10–6.20 m (see Lord, *op. cit.*, 1982); Pleistocene (Weichselian). The Natural History Museum, London [BMNH], Palaeontology Dept. no. **OS 13355** (♀ RV: Text-fig. 1), Pt. Originaux, Quebec, Canada (lat. 47° 29′ N, long. 70° 01′ W), T. Cronin Colln., *c.* 10,000 BP; Zoology Dept. no. **1988.317** (♀ LV and appendages: Text-figs. 2a–c), BARNES 58–60, Beaufort Sea, Alaska (lat. 70° 36.69′ N, long. 150° 24.7′ N), E. Brouwers Colln.; Recent.

Diagnosis: A species of *Semicytherura* lacking a caudal process and characterised by subquadrate outline, a rim running around all margins, and ornament consisting of a primary reticulation of fine ribs posteriorly passing in the mid-valve area into an even punctation (secondary reticulation) which dominates the anterior half of the valve. Weakly dimorphic.

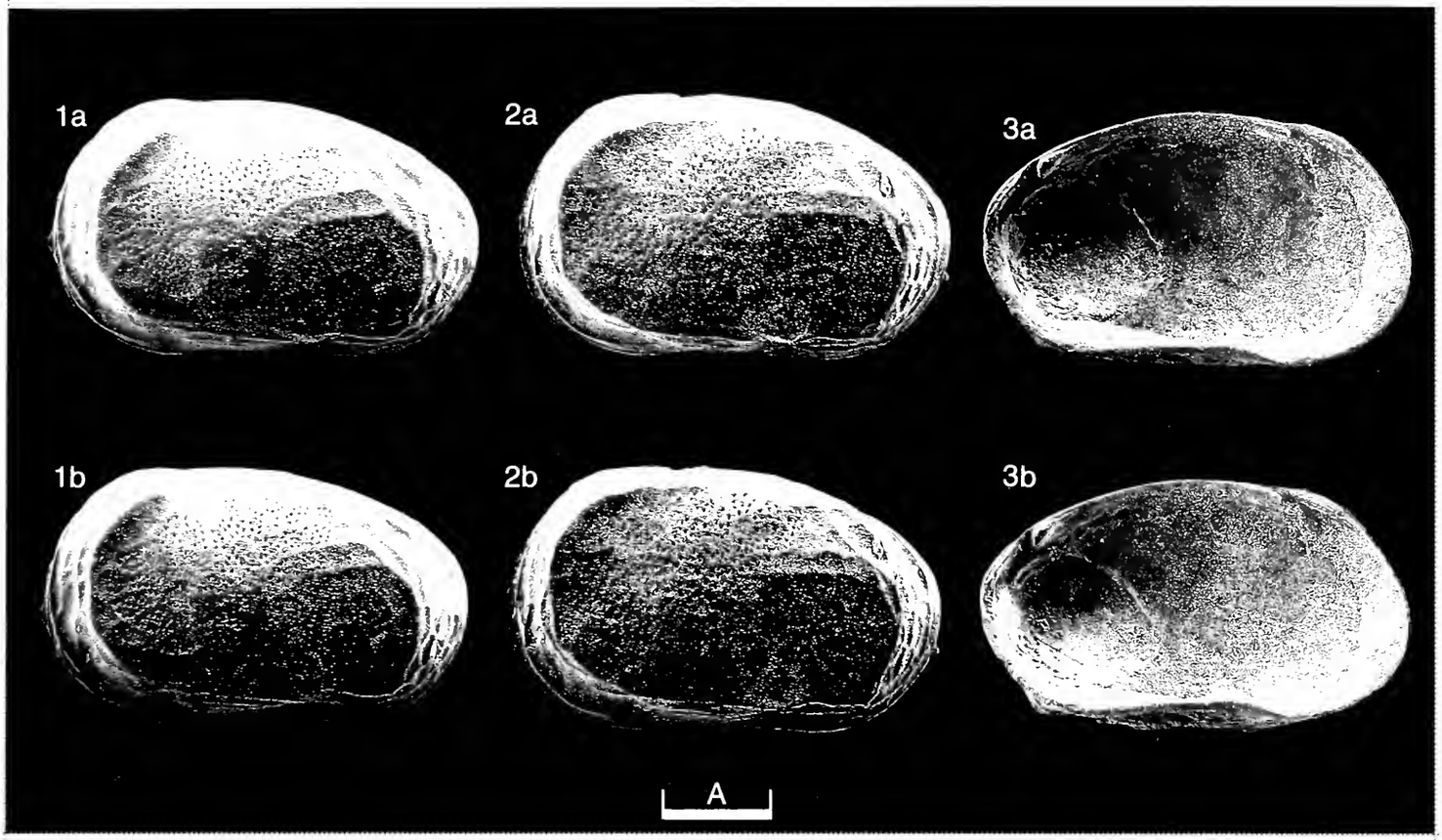
Remarks: A neotype should probably be defined from the material figured here, as recent investigations in the type area of Annochie did not yield ostracods (A. Hall & J. Jarvis, *Quaternary Newsl.*, **59**, 5–7, 1989) and the only specimens in the Crosskey Collection are poorly preserved. We would, however, prefer a neotype to be defined from Scottish material.

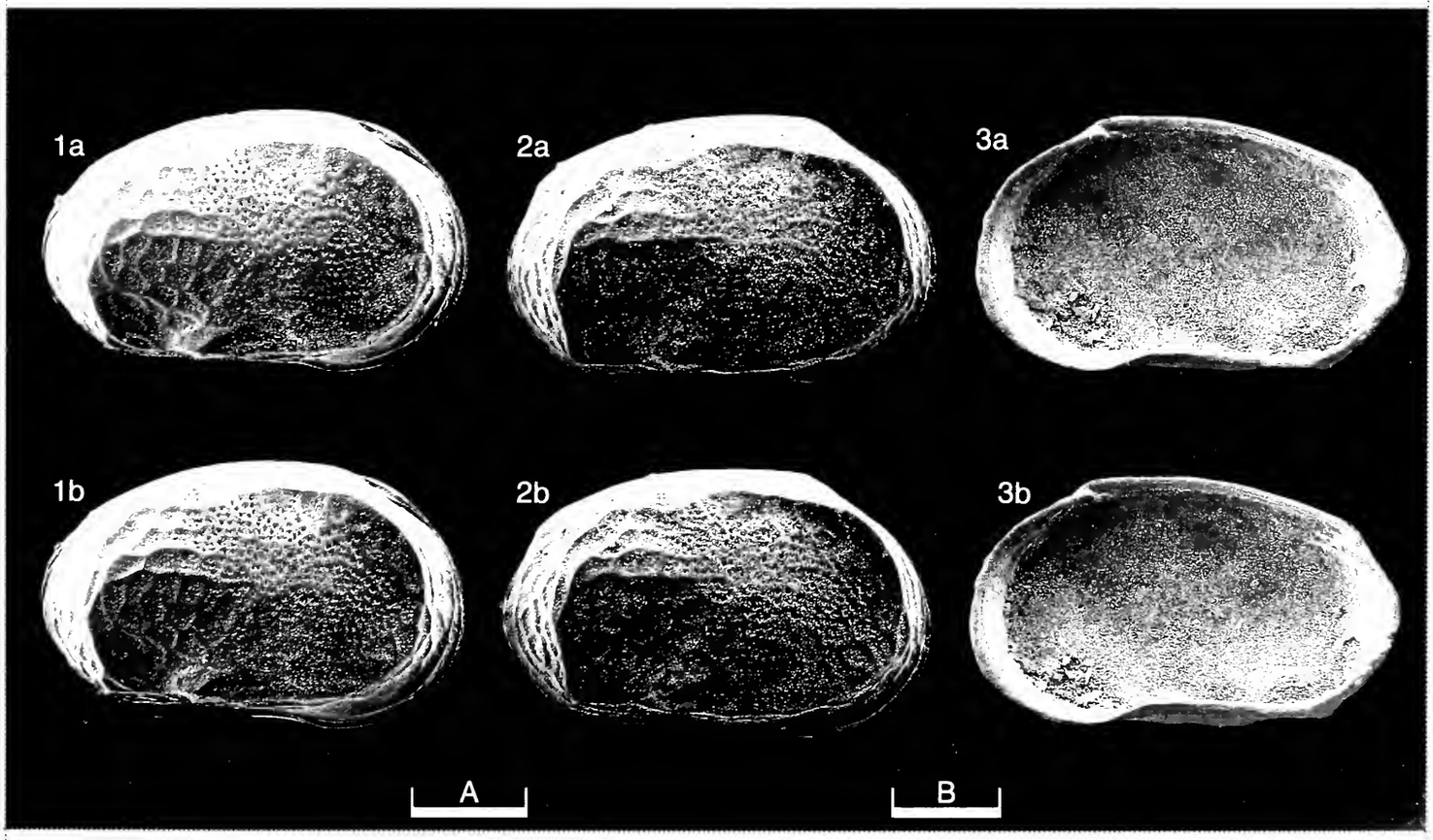
The species is unusual for *Semicytherura* in lacking a caudal process but features of the marginal zone (Text-figs. 1, 2a) and the appendages (Text-figs. 2b, 2c; Recent, Beaufort Sea, Alaska) confirm the generic identification. Some variation in the strength of development of ornament is evident in our material and in published illustrations but the significance is not clear. The ornamental pattern is unusual; posteriorly, a network of fine primary ribs forms cells which enclose 'blind' puncta, but this changes in mid-valve along a distinct line (Pl. **22**, 58, fig. 2) with the primary ribbing fading so that the secondary punctate ornament dominates the anterior part of the valve and the puncta appearing 'open'. Right valves show a small postero-ventral marginal alar protuberance.

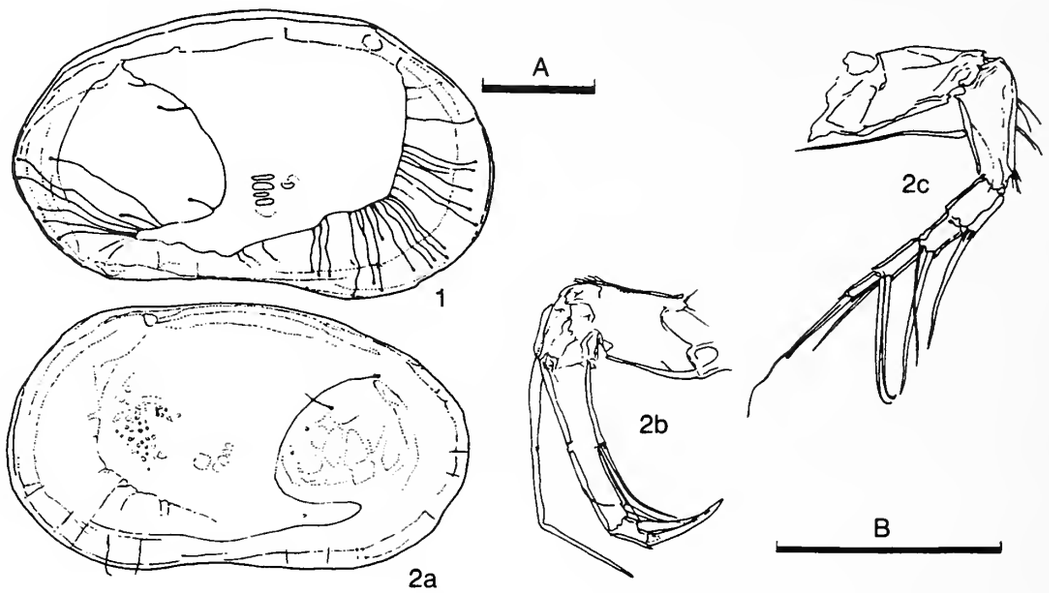
Explanation of Plate 22, 56

Fig. 1, ♂ car., ext. lat. (**Xe 18048**, 375 μm long). Fig. 2, ♀ RV, ext. lat. (**18052**, 375 μm long). Fig. 3, ♀ RV, int. lat. (**18054**, 400 μm long).

Scale A (100 μm; ×160), figs. 1, 2; scale B (100 μm; ×150), fig. 3.


1a
2a
3a
1b
2b
3b
A


1a
2a
3a
1b
2b
3b
A
B

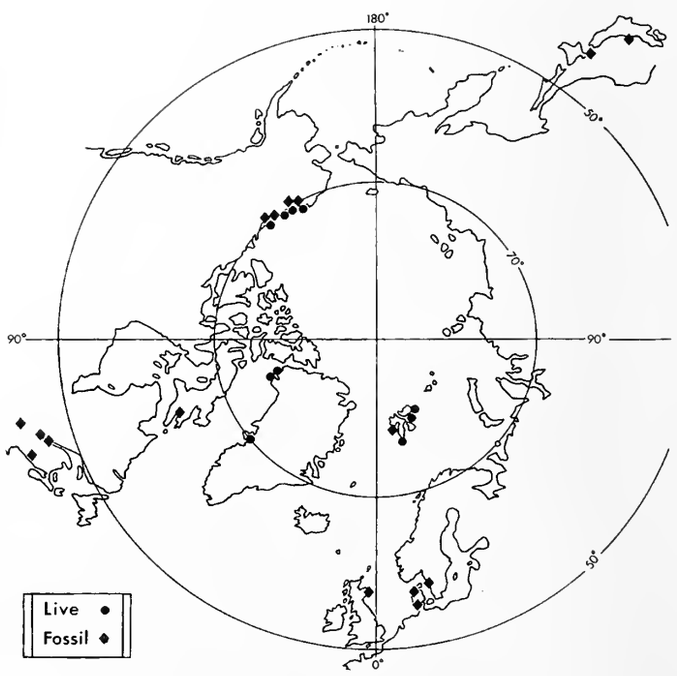


Text-fig. 1. ♀ RV, ext. lat. in transmitted light (**OS 13355**, 400 μm long). Text-fig. 2. ♀ LV (**1988.317**, 400 μm long). 2a, ext. lat. in transmitted light; 2b, antenna; 2c, antennula.
Scale A (100 μm), text-figs. 1, 2a; scale B (100 μm), text-figs. 2b, c.

Explanation of Plate 22, 58

Fig. 1, ♀ RV, ant. hinge (**Xe 18054**). Fig. 2, ♂ car., detail mid-valve (**18048**). Fig. 3, ♀ car., dors. (**18053**, 400 μm long). Fig. 4, ♀ RV, 'open' pores, ant. mid-valve (**18049**, 400 μm long). Fig. 5, ♀ RV, 'closed' pores, post. mid-valve (**18055**, 350 μm long).
Scale A (20 μm; ×700), figs. 1, 2, 5; scale B (100 μm; ×150), fig. 3; scale C (10 μm, ×2100), fig. 4.

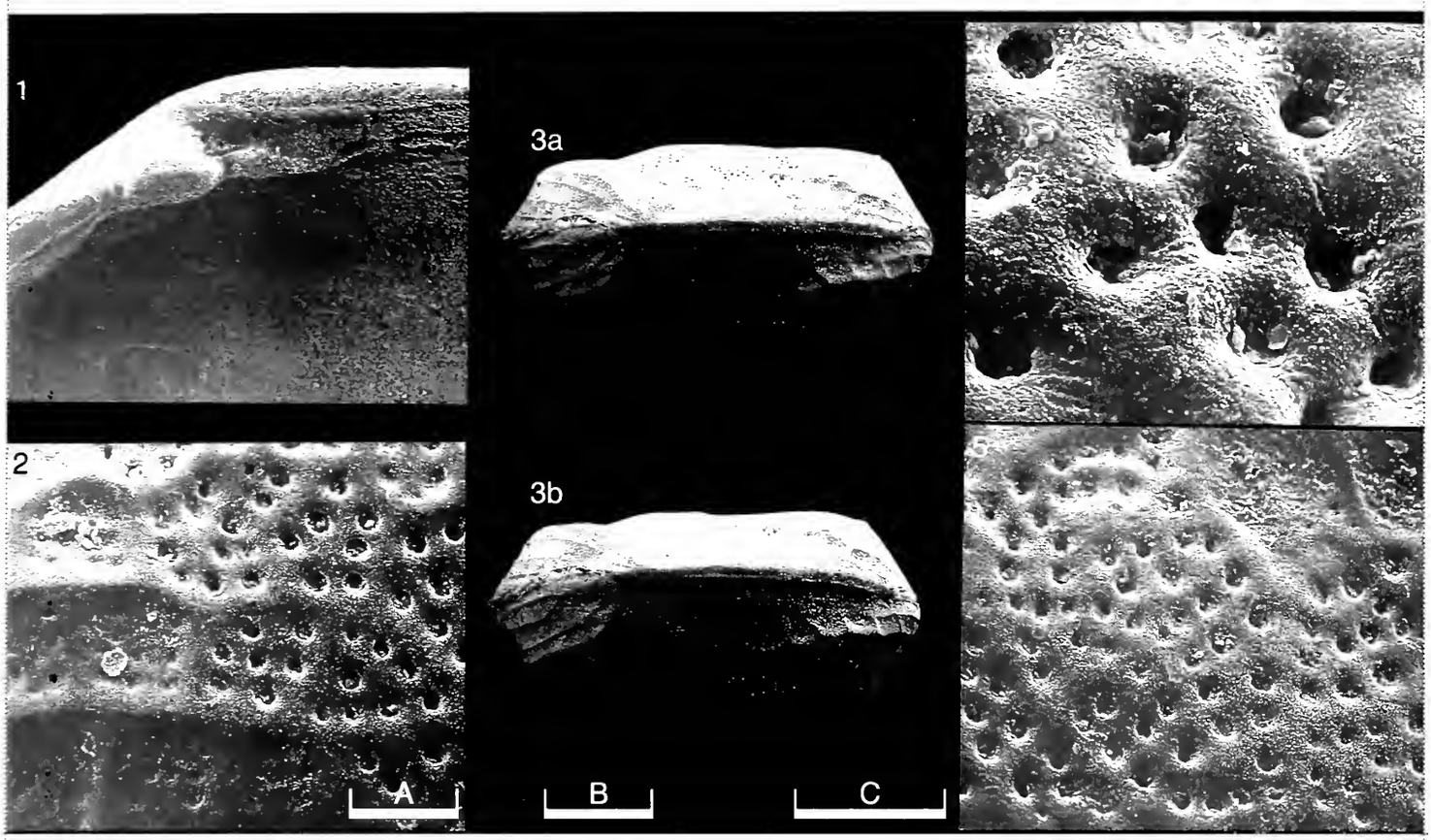
Acknowledgements:
Drs E. M. Brouwers (USGS, Denver) and T. M. Cronin (USGS, Reston) kindly provided material and data from Alaska and eastern North America respectively. K. L. Knudsen (Aarhus, Denmark) generously supplied Danish and Swedish material figured here, Miss T. J. Paramor (UCL) prepared material and Mr J. Davy (UCL) prepared the micrographs.

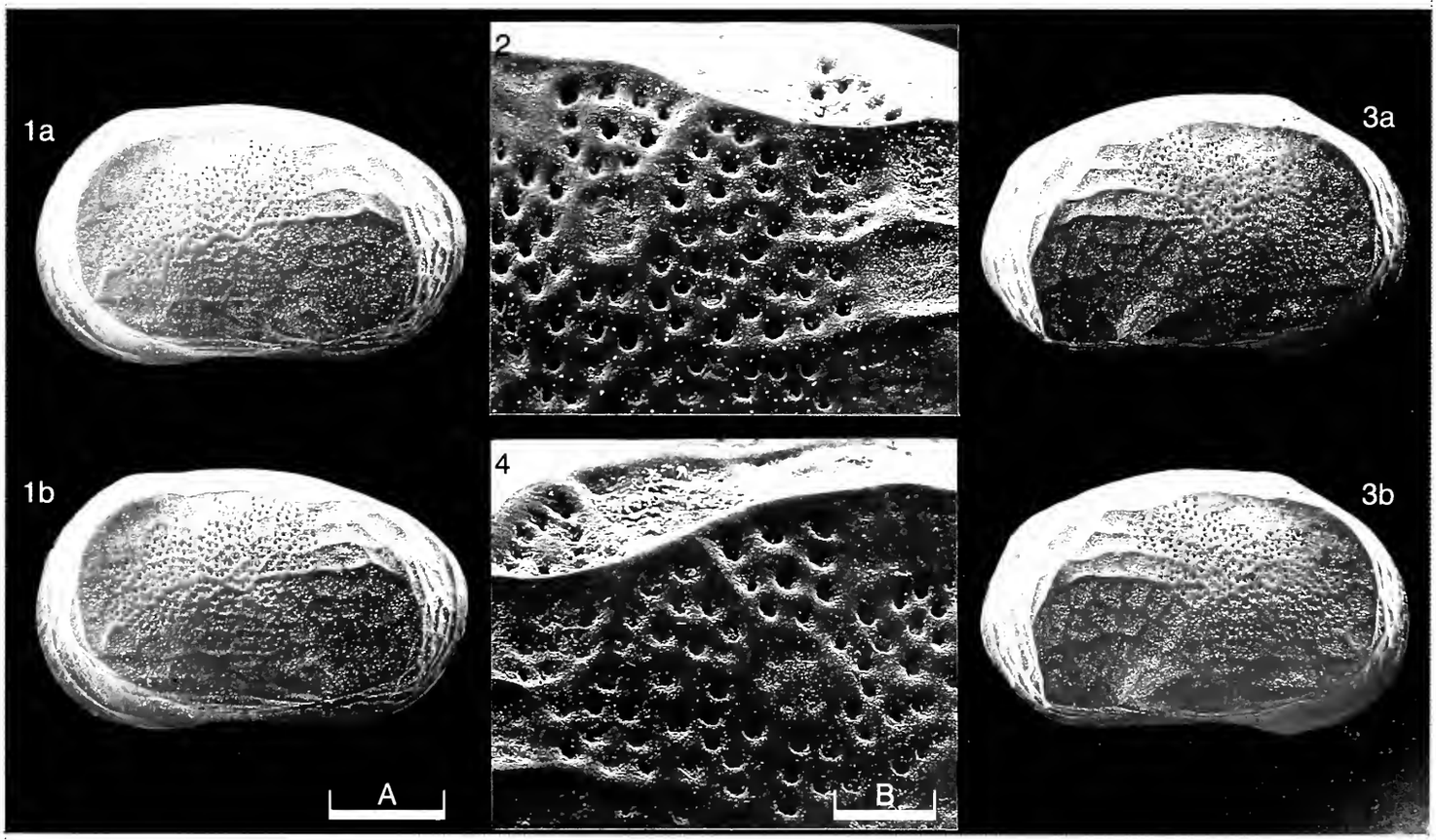


Text-fig. 3. Distribution of *S. complanata:* Late Pliocene (Alaska), Pleistocene and Holocene. Living in Beaufort Sea, Alaska. Widespread coldwater, Arctic species. Known fossil from NW Europe, eastern N America, Svalbard, Greenland, Alaska and Japan.

Explanation of Plate 22, 60

Fig. 1, ♀ LV, ext. lat. (**Xe 18058**, 400 μm long). Fig. 2, detail mid-dorsal area (**18058**). Fig. 3, ♀ RV, ext. lat. (**18059**, 400 μm long). Fig. 4, detail mid-dorsal area (**18059**).
Scale A (100 μm; ×150), figs. 1, 3; scale B (20 μm; ×700), figs, 2, 4.


1
2
3a
3b
A
B
C


1a
1b
2
3a
3b
4
A
B

595.336.21 (113.333) (768 : 162.089.35): 552.351 + 552.54

ON *POLONIELLA SCHALLREUTERI* LUNDIN nom. nov.

by Robert F. Lundin
(Arizona State University, Tempe, U.S.A.)

Poloniella schallreuteri nom. nov.

non 1964 *Poloniella (Parapoloniella) adamczaki* sp. nov., H. Jordan, *Freiberger ForschHft.*, **C170**, 46–47.
non 1983 *Poloniella adamczaki* sp. nov., B. Żbikowska, *Palaeont. pol.*, **44**, 42–43.
1994 *Poloniella adamczaki* sp. nov., R. F. Lundin, *Stereo-Atlas Ostracod Shells*, **21**, 111–114.

Remarks: Drs Helga Uffenorde (University of Göttingen) and Roger Schallreuter (University of Hamburg) have both kindly informed me that I created a primary homonym when I named a new species *Poloniella adamczaki* (Lundin, 1994). That name is occupied by *Poloniella adamczaki* Żbikowska, 1983 which is in turn preoccupied by *Poloniella (Parapoloniella) adamczaki* Jordan, 1964. I hereby replace the 1994 junior primary homonym with the new name *Poloniella schallreuteri* in recognition of the many contributions Dr Schallreuter has made to our knowledge of ostracods.

Stereo-Atlas of Ostracod Shells: Vol. 22, Part 1

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