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A Stereo-Atlas of Ostracod Shells

edited by R. H. Bate, J. W. Neale, David J. Siveter and
P. C. Sylvester-Bradley

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Acknowledgments

This Volume of the *Stereo-Atlas* has been aided by generous financial support from Robertson Research International Limited.

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ON *CRYPTOPHYLLUS GUTTA* SCHALLREUTER

by Roger E.L. Schallreuter
(University of Hamburg, German Federal Republic)

Cryptophyllus gutta Schallreuter, 1968

1968 *Cryptophyllus gutta* sp. n. R.E.L. Schallreuter, *Paläont. Z.* 42, 1/2, 110, pl. 13, figs. 4 - 7.

Holotype: Department of Geological Sciences, University of Greifswald, Pomerania, German Democratic Republic, no. 40/4; an adult RV (without nauplioconch and second larva).

Type locality: Norderstrand Visby, Isle of Gotland (Baltic Sea); lat. 57° 40'N long. 18° 18.5'E. Öjlemyrflint erratic boulder (no. G2), Upper Ordovician.

Diagnosis: Adult valve length = 0.79mm. Umbo strong, outline therefore drop-like (= name). Maximum of 9 lamellae. Nauplioconch with a short spine. Inner surface with a very broad duplicature (only in adults) and an internal ridge (sulcament), corresponding external sulcus; sulcament consists dorsally of a sharp ridge which has a spine-like ventral termination and ventrally, at about valve centre, of a similar spine-like process or a less developed node-like thickening.

Explanation of Plate 4, 2

Fig. 1, RV, without nauplioconch, ext. lat. (SGPIH 1907, 735 μ m long); figs. 2, 3, RV (SGPIH 1906, 660 μ m long): fig. 2, int. lat.; fig. 3, ext. dors.

Scale A (250 μ m; x 92), figs. 1, 3; scale B (250 μ m; x 89), fig. 2.

Figured specimens: Geologisch - Paläontologisches Institut, University of Hamburg, nos. 1906 (complete RV: Pl. 4, 2, figs. 2, 3; Pl. 4, 6, fig. 1), 1907 (RV without nauplioconch: Pl. 4, 2, fig. 1), 1908 (LV with 6 lamellae only: Pl. 4, 6, figs. 2, 3), 1909 (juv. - 3 LV without nauplioconch and second larva: Pl. 4, 4, fig. 2), 1910 (complete juv. - 3 LV: Pl. 4, 4, fig. 3), 1911 (RV with 3 lamellae only: Pl. 4, 4, fig. 1), 1912 (juv. - 1 RV without nauplioconch: Pl. 4, 8, fig. 3), 1913 (fragmentary RV without nauplioconch: Pl. 4, 8, fig. 1), 1914 (fragmentary juv. - 1 RV without nauplioconch: Pl. 4, 8, fig. 2).

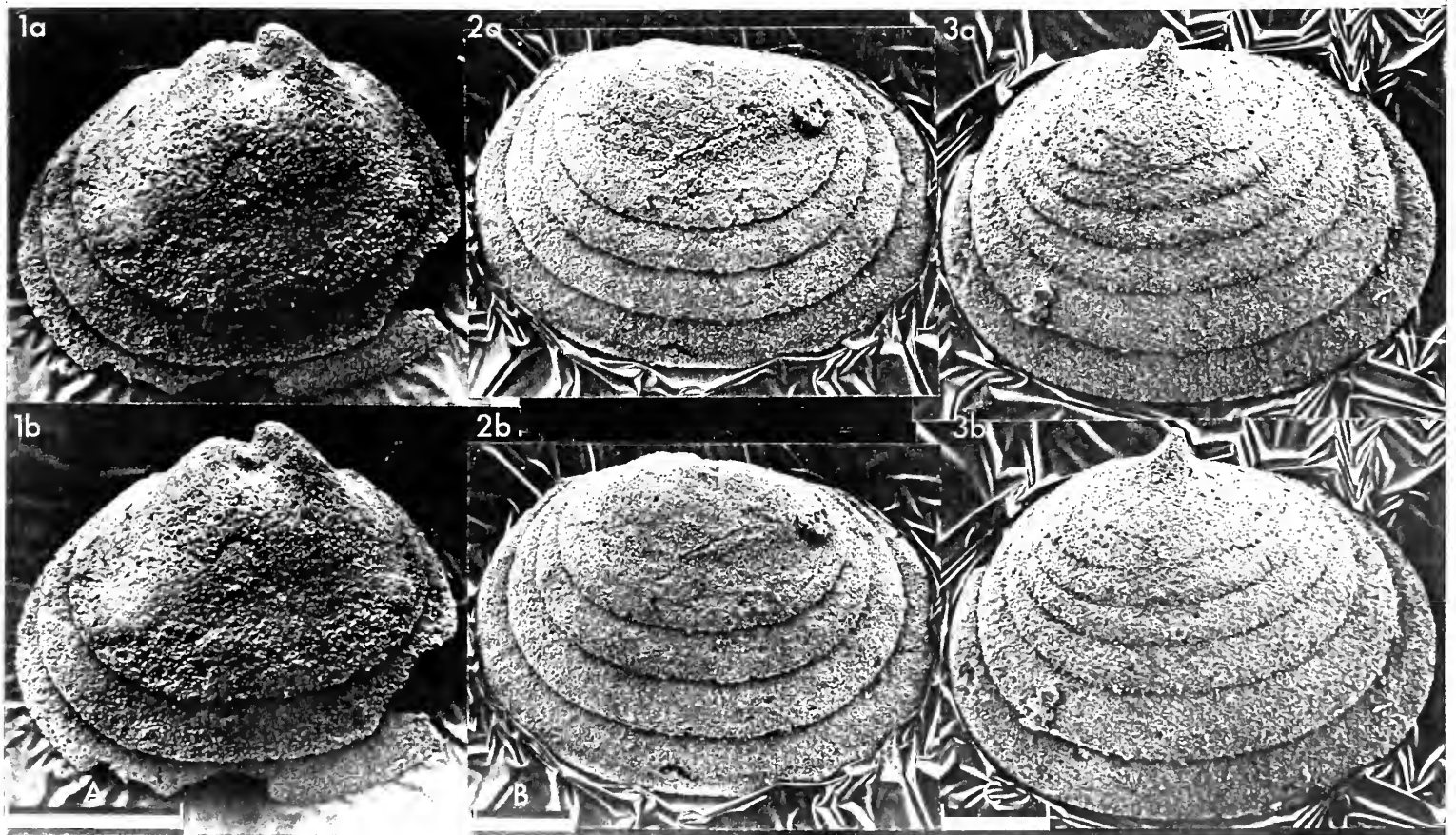
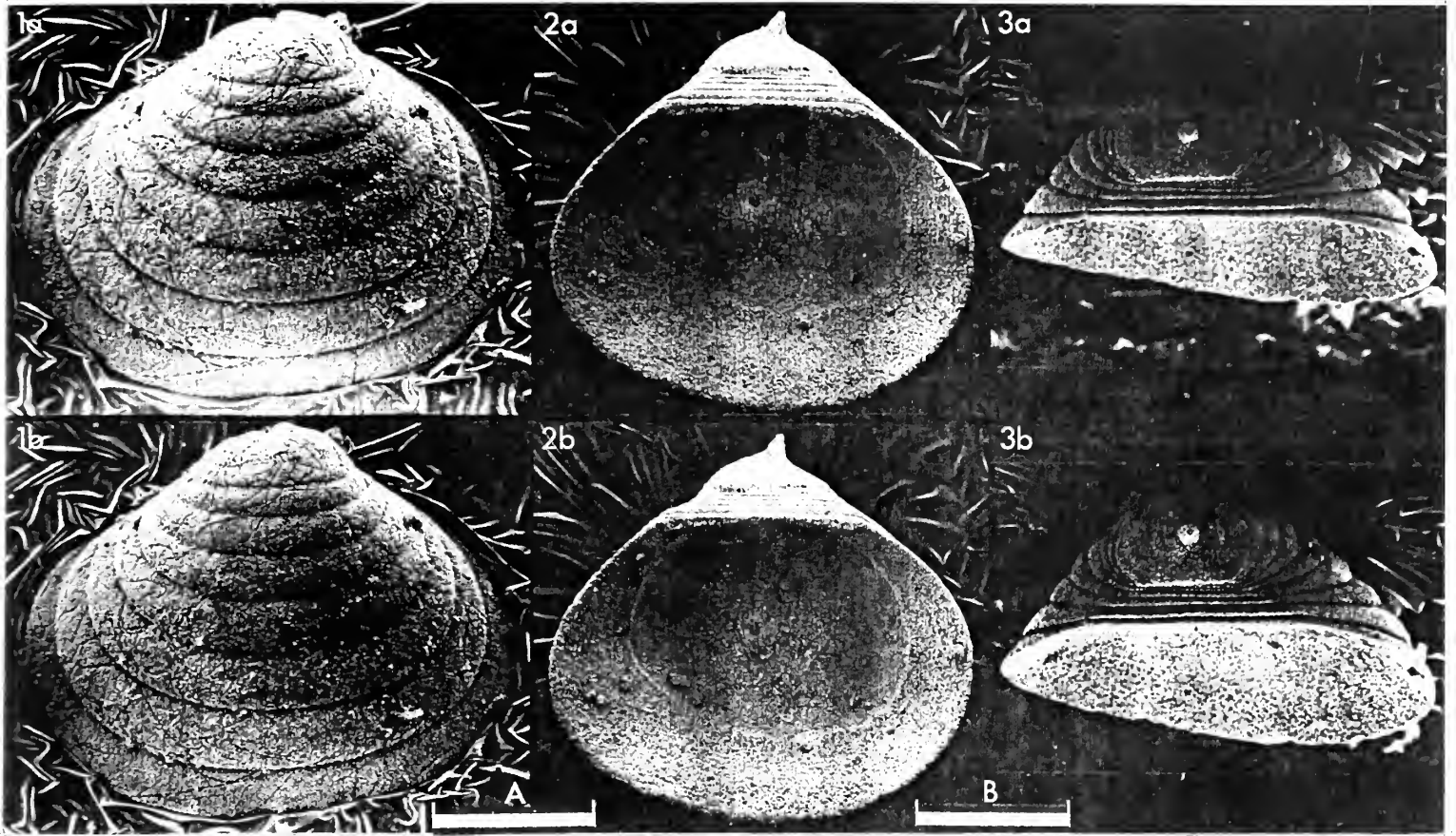
From the Isle of Gotland (Baltic Sea), Öjlemyrflint erratic boulders, no. G4 (1906, 1907; Licker-shamn: lat. 57° 49.5'N, long. 18° 30.5'E) and G9 (1908 - 1914; Gnisvärds: lat. 57° 30'N, long. 18° 7'E), Upper Ordovician; coll. by Horst Kaufmann, 1974 - 75.

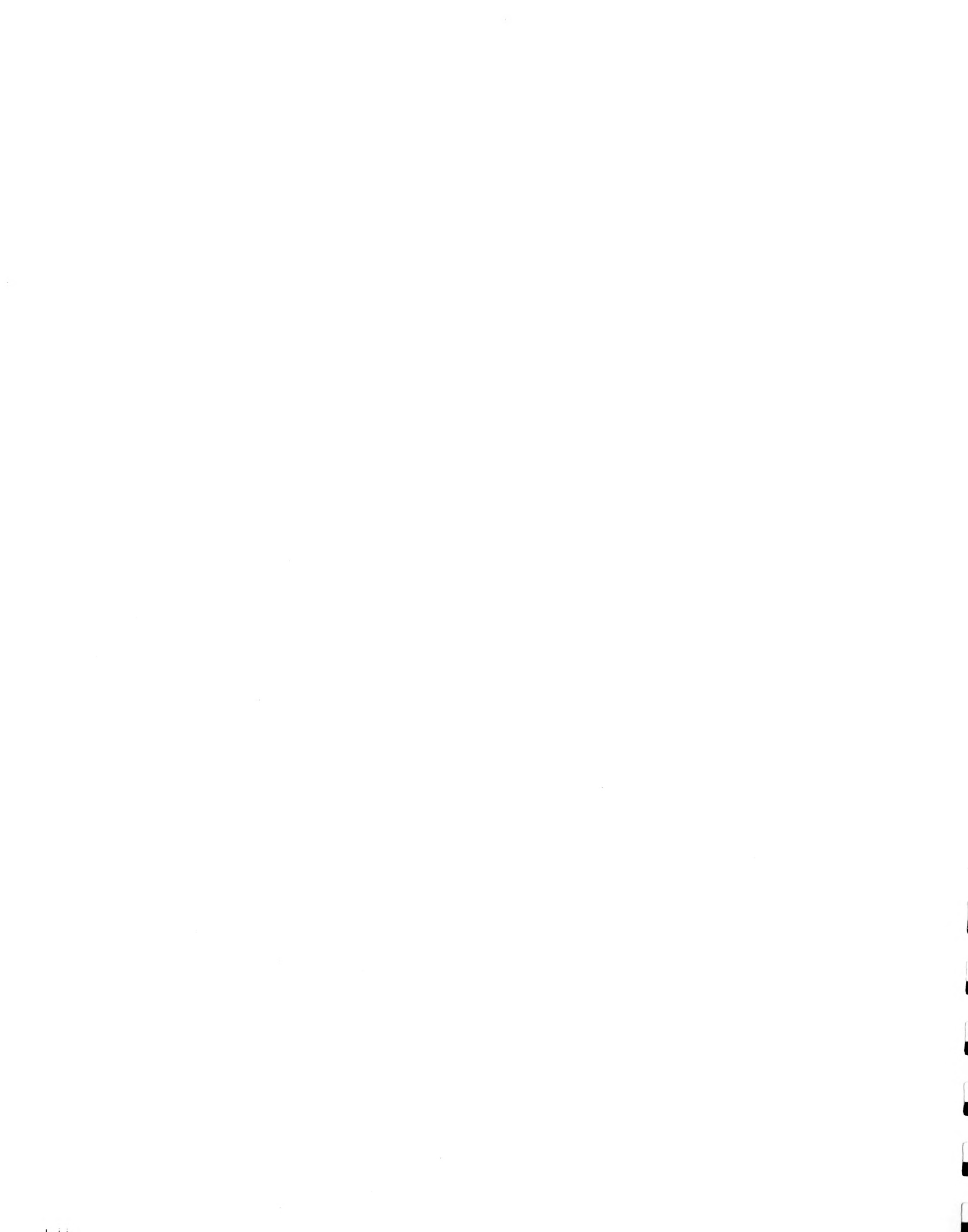
Remarks: Some of the features cited in the diagnosis are probably not only characteristic for the species but also for the genus as a whole. The discrimination of many *Cryptophyllus* species on the basis of published information is rather difficult. Even the affiliation of the Eridostraca (to which *Cryptophyllus* belongs) to the Ostracoda has been questioned by some authors (Schmidt, *Abh. senckenb. naturforsch. Ges.* 454, 18, 1941; Hartmann, *Z. Zool. Syst. Evolut. - forsch.* 1, 5, 146, 1963; Gorak, *The Fauna of the lowest part of the Tournaisian (zone C₁[†]a) in the Donetz Basin*, 106, Kiev, 1966; Jones, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.* 99, 1, 64, 65, 1968; Jordan, *Freiberger ForschHft.*, ser. C, 265, 28, 1970; Langer, *Palaeontographica*, Abt. A, 144, 38, 1973).

Explanation of Plate 4, 4

Fig. 1, RV, 3 lamellae only, ext. lat. (SGPIH 1911, 621 μ m long); fig. 2, juv. - 3 LV, without nauplioconch and second larva, ext. lat. (SGPIH 1909, 455 μ m long); fig. 3, complete juv. - 3 LV, ext. lat. (SGPIH 1910, 455 μ m long).

Scale A (250 μ m; x 98), fig. 1; scale B (100 μ m; x 143), fig. 2; scale C (100 μ m; x 152), fig. 3.





Remarks: The mechanism of growth in *Cryptophyllus* is shown in Pl. 4, 2, fig. 2 and Pl. 4, 6, figs. 1, 3. The new valve (*contd.*) develops a complete new hinge, rendering obsolete the previous hinge which migrates away from the contact plane. The lamellae of the younger instars do not therefore extend to the contact plane as in the forms of Eridostraca illustrated by Adamczak (*Acta palaeont. pol.* 6, figs. 1, 9A - E, 17, 20, 23, 1961), and there is no "innige Verzahnung der einzelnen Lamellen" (Langer, *op. cit.*, 36). The complete separation of the two valves of the carapace at the dorsal margin is, according to Hartmann (*op. cit.*, 8), a special feature of the Ostracoda.

Cryptophyllus gutta also has another structure typical of ostracods; a broad duplicature very similar to the inner lamella of *Oejlemyra* Schallreuter, 1968 (*Wiss. Z. Univ. Greifswald*, 17, fig. 26.3). This feature provides strong additional evidence that the Eridostraca are true ostracods and, moreover, indicates affinities with the Podocopida. There are also some similarities in this respect in the morphology of the adductor muscle scar field (cf. *Cryptophyllus platyogmus* Jones, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.* 62, 17, fig. 6f, 1962, and *Steusloffina cuneata* (Steusloff) in Hessland & Adamczak, *Geosci. Man.* 6, 60, pl. 3, figs. 1b - 2c, 1974).

Septum-like sulcamentations are also known to occur in other ostracods (e.g., see Adamczak, *Stockh. Contr. Geol.* 17, 76, pl. 30, figs. 2c - e, 3c - e, 1968; Bonnema, *Mitt. miner. - geol. Inst. Reichsuniv. Groningen* 2, 1, 73, pl. 8, fig. 7, 1909; Blumenstengel, *Freiberger ForschHft.*, ser. C, 182, 73, fig. 23, 1965).

Explanation of Plate 4, 6

Fig. 1, RV, hinges and nauplioconch, ext. dors. (SGPIH 1906); figs. 2, 3, LV, 6 lamellae only (SGPIH 1908, 712 μm long): fig. 2, int. dors. obl.; fig. 3, int. lat.

Scale A (100 μm ; x 220), fig. 1; scale B (250 μm ; x 90), fig. 2; scale C (250 μm ; x 79), fig. 3.

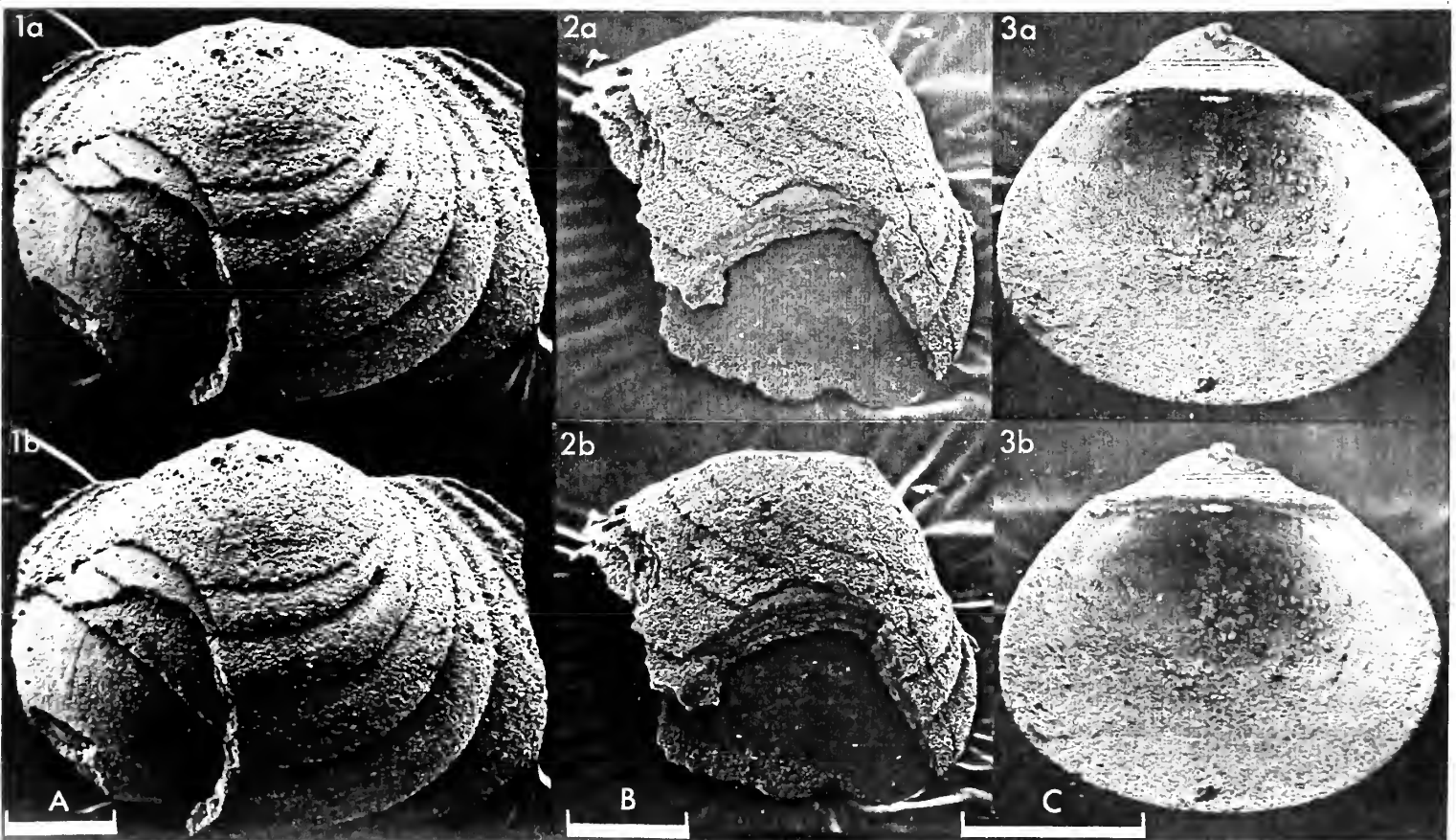
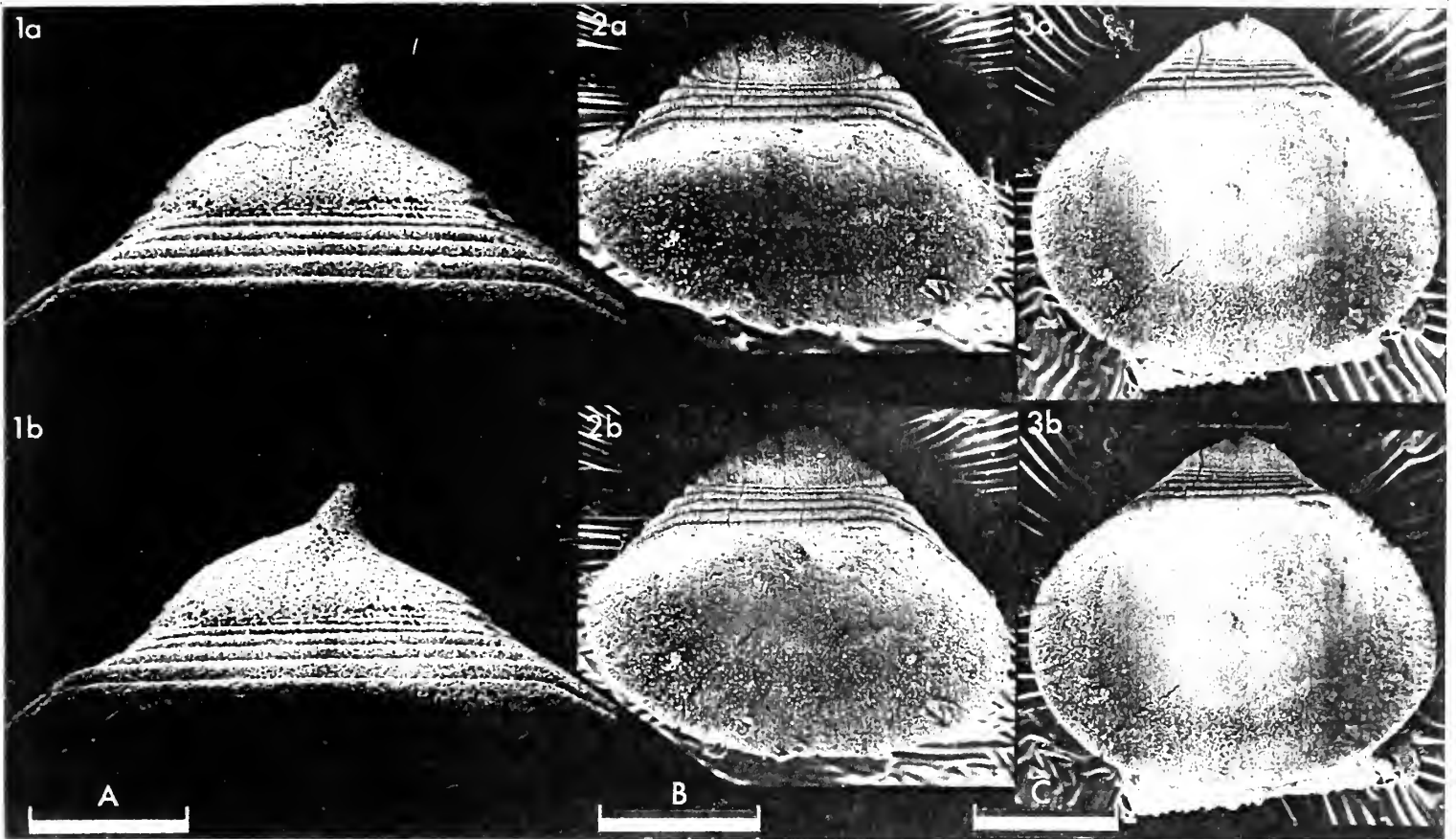
Remarks: Like most Recent ostracods, *C. gutta* has nine instars. Other *Cryptophyllus* species (especially post-Ordovician) have more instars, the maximum recorded number being 15 (cf. Becker & Bless, *Internat. Symp. Belg. Micropaleont. Limits Namur*, Publ. 1, pl. 17, fig. 5, 1974). Evolution within the Eridostraca is characterised by the prolongation of ontogeny (insertion or addition of stages of development). Although some ostracods have a constant series of larval stages, a similar prolongation may still occur if earlier ontogenetic stages are lost as later stages are added.

Distribution: Isle of Gotland (Baltic Sea); Öjlemyrflint erratic boulders, Upper Ordovician.

Explanation of Plate 4, 8

Fig. 1, fragmentary RV, without nauplioconch, ext. lat. (SGPIH 1913, 462 μm long); fig. 2, fragmentary juv. - 1 RV, without nauplioconch, ext. anterovent. obl. (SGPIH 1914), fig. 3, juv. - 1 RV, without nauplioconch, int. lat. (SGPIH 1912, 606 μm long).

Scale A (100 μm ; x 159), fig. 1; scale B (100 μm ; x 165), fig. 2; scale C (250 μm ; x 101), fig. 3.



ON *MIEHLKELLA CRIBROPORATA* SCHALLREUTER gen. et sp. nov.

by Roger E.L. Schallreuter
(University of Hamburg, German Federal Republic)

Genus *MIEHLKELLA* gen. nov.

Type-species: *Miehlkella cribroporata* sp. nov.

Derivation of name: In honour of Dr. Otto Miehlke, Warnemünde, German Democratic Republic. Gender, feminine.

Diagnosis: A median-sized (to large ?) genus of Aparchitidae (suborder Leiocopa; see Schallreuter, *Geol. För. Stockh. Förh.* 95, 37 - 49, 1973), without adventral sculptures. Outline \pm postplete. Right/left overlap; ventrally, the right valve has a contact groove and a wide contact ridge which overlaps the left valve. Muscle spot slightly anterior of centre. Surface with densely developed pores which on the inner side end as sieve-pores of a special type.

Explanation of Plate 4, 10

Figs. 1, 2, RV (holotype, SGPIH 1915, 768 μ m long): fig. 1, ext. lat.; fig. 2, ext. vent. obl.; fig. 3, fragmentary LV, int. lat., detail showing sieve-pores (SGPIH 1916).

Scale A (250 μ m; x 82), fig. 1; scale B (250 μ m; x 105), fig. 2; scale C (25 μ m; x 550), fig. 3.

Remarks: *Miehlkella* is characterised by a special type of sieve-pore, the first sieve-pores to be observed in any Palaeozoic ostracod. It resembles *Baltonotella* Sarv, 1959 (*Eesti NSV Tead. Akad. Geol. Inst. uurimused* 4, 161 - 3) in its main features (right/left overlap, short straight hinge-line, missing adventral sculpture), but the type-species of that genus has an \pm amplete outline, a more anterior muscle spot and puncta which are relatively larger, less close together and more elongate than the pores of *Miehlkella* (op. cit., pl. 32, figs. 17 - 20; Bonnema, *Mitt. miner. - geol. Inst. Reichsuniv. Groningen* 2, pl. 3, figs. 1 - 9, 1909).

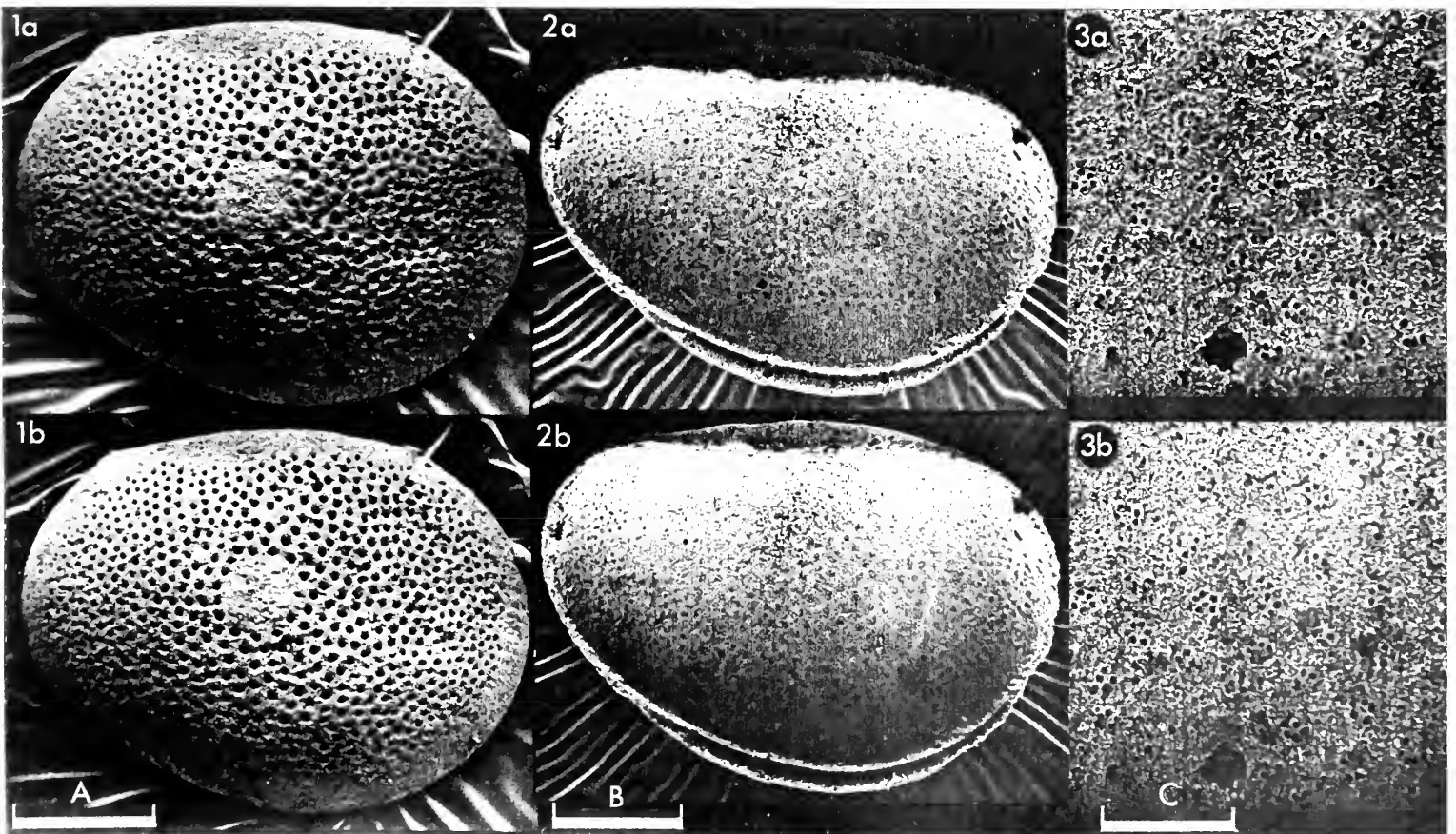
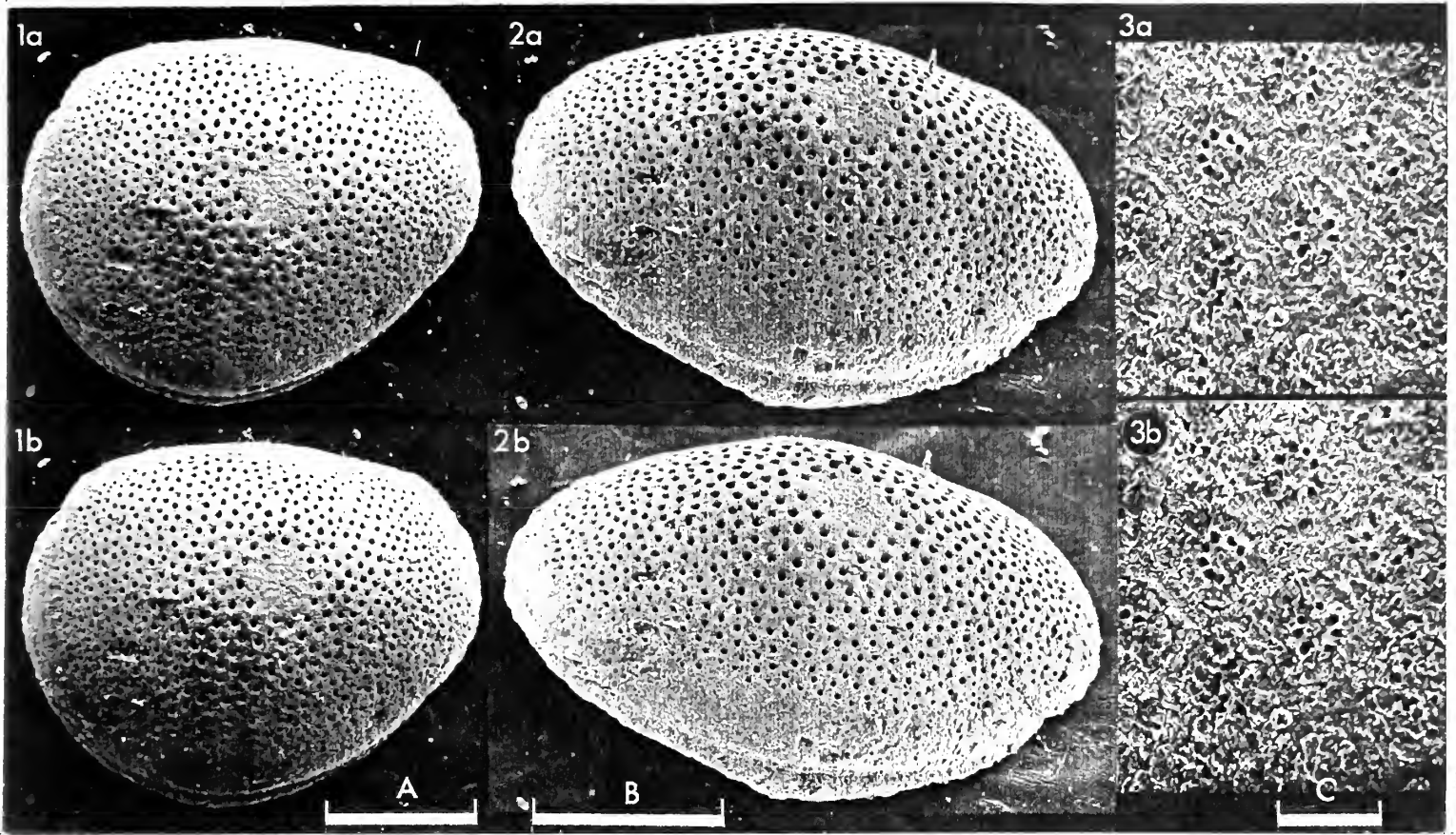
Hyperchilarina Harris, 1957 (cf. Schallreuter, 1973) also resembles *Miehlkella* in some respects (right/left overlap, short straight hinge-line, muscle spot near centre), but strongly differs by its \pm amplete outline and adventral sculpture.

Although similar, the genus *Bullatella* Swain & Cornell (in Swain et al., *J. Paleont.* 35, 354, 1961; cf. especially pl. 47, figs. 1a - c) possesses a "pronounced midventral swelling and a low narrow ridge or row of spines adjacent to free margin of each valve." The type species of *Conchooides* Hessland, 1949, *C. micropunctata* Hessland, 1949 (*Bull. geol. Instn. Univ. Upsala* 33, 149), is much larger, \pm amplete, and exhibits an indistinct and short step-like marking in the dorsal half of the anterior margin, a groove in the dorsal part of the posterior margin, a very shallow dorsoventral depression (S2), and a minutely punctate surface with scattered, larger puncta.

Explanation of Plate 4, 12

Fig. 1, LV, ext. lat. (SGPIH 1917, 863 μ m long); figs. 2, 3, RV (SGPIH 1918, 1000 μ m long): fig. 2, int. obl.; fig. 3, int. obl., detail showing sieve-pores.

Scale A (250 μ m; x 81), fig. 1; scale B (250 μ m; x 72), fig. 2; scale C (50 μ m; x 370), fig. 3.



Miehlkella cribroporata sp. nov.

Holotype: Geologisch - Paläontologisches Institute, University of Hamburg, no. 1915, RV.

Type locality: Beach at Dornbusch, Isle of Hiddensee (Baltic Sea); lat. 54° 36'N, long. 13° 7'E. Backsteinkalk erratic boulder (1B2 Type, no. 1B9), Middle Ordovician.

Derivation of name: Latin *cribrum*, sieve, and *porus*, pore; alluding to the sieve-pores.

Figured specimens: Geologisch Paläontologisches Institut, University of Hamburg, nos. 1915 (RV: Pl. 4, 10, figs. 1, 2; Pl. 4, 16, fig. 2), 1916 (fragmentary LV: Pl. 4, 10, fig. 3; Pl. 4, 16, fig. 3), 1917 (LV: Pl. 4, 12, fig. 1; Pl. 4, 16, fig. 1), 1918 (RV: Pl. 4, 12, figs. 2, 3), 1919 (RV: Pl. 4, 14, fig. 1), 1920 (LV: Pl. 4, 14, figs. 2, 3). From Backsteinkalk erratic boulders nos. 1B4 (1920), 28B1 (1919) and 1B9 (for further data see Schallreuter, *Palaeontographica*, Abt. A, 144, 65, 1973).

Diagnosis: As for the genus.

Explanation of Plate 4, 14

Fig. 1, RV, ext. lat. (SGPIH 1919, 871 μ m long); figs. 2, 3, LV (SGPIH 1920, 866 μ m long): fig. 2, ext. dors. obl.; fig. 3, ext. lat.

Scale A (250 μ m; x 74), fig. 1; scale B (250 μ m; x 70), figs. 2, 3.

Remarks: *M. cribroporata* is the only known certain species of the genus. One or more additional species are possibly concealed in material described by Hessland (op. cit.) and Sarv (op. cit.) under *Conchooides* and *Conchoprimitia* respectively. The most likely congeneric candidate is *Miehlkella* ? *meganotifera* (Hessland) (op. cit., pl. 2, figs. 1a - d) which, according to Sarv. (op. cit., 165), has *Conchooides ventropunctata* Hessland, *Conchooides dorsodepressula* Hessland and *Conchooides levis* Hessland as probable synonyms. *Conchoprimitia distincta* Sarv and *Conchoprimitia luxuriosa* Sarv also more probably belong to *Miehlkella* than to *Conchoprimitia*. All these questionable *Miehlkella* species are larger than the type species and occur in Lower Ordovician beds. Moreover, all of them apparently have a left/right overlap.

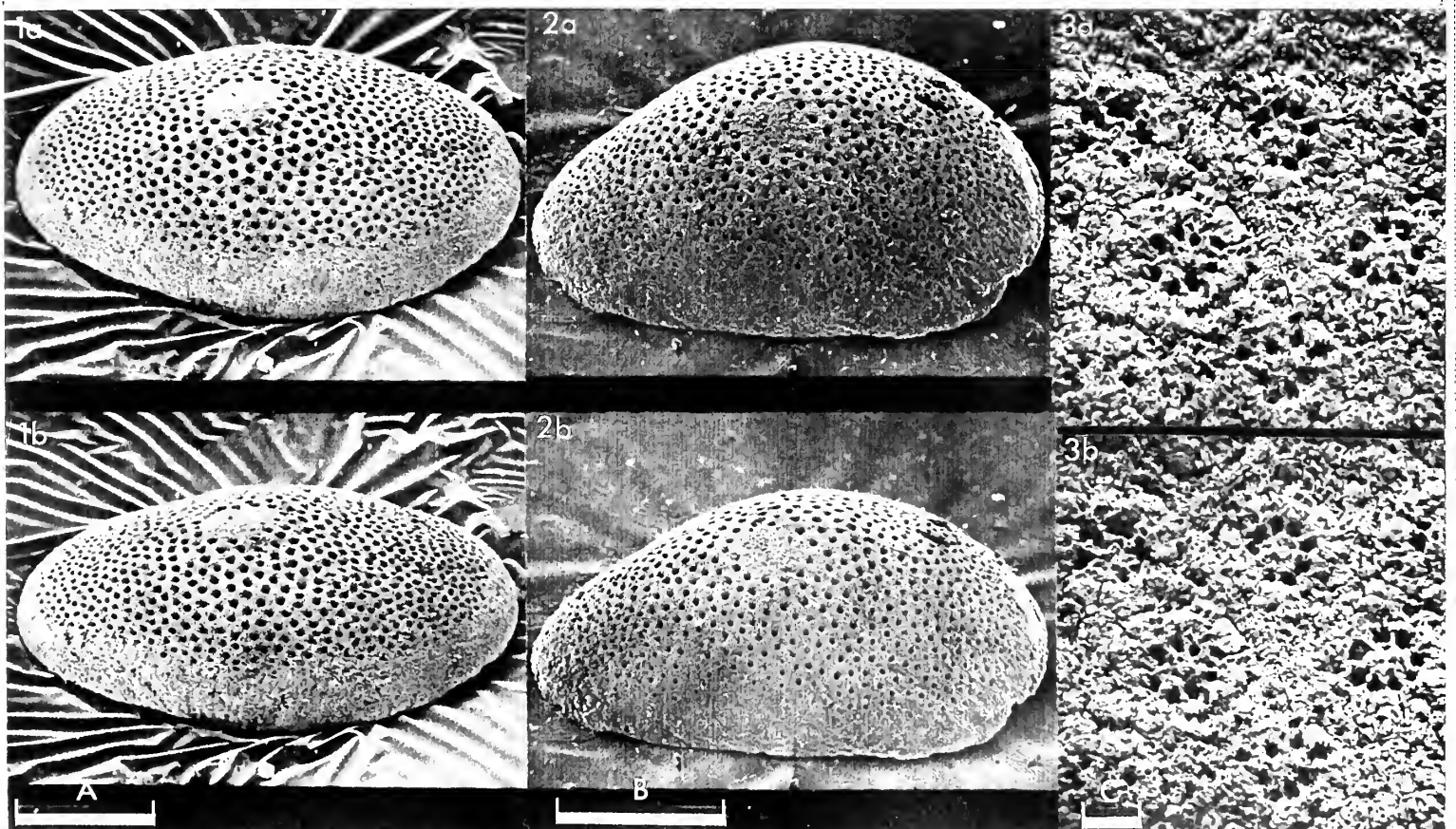
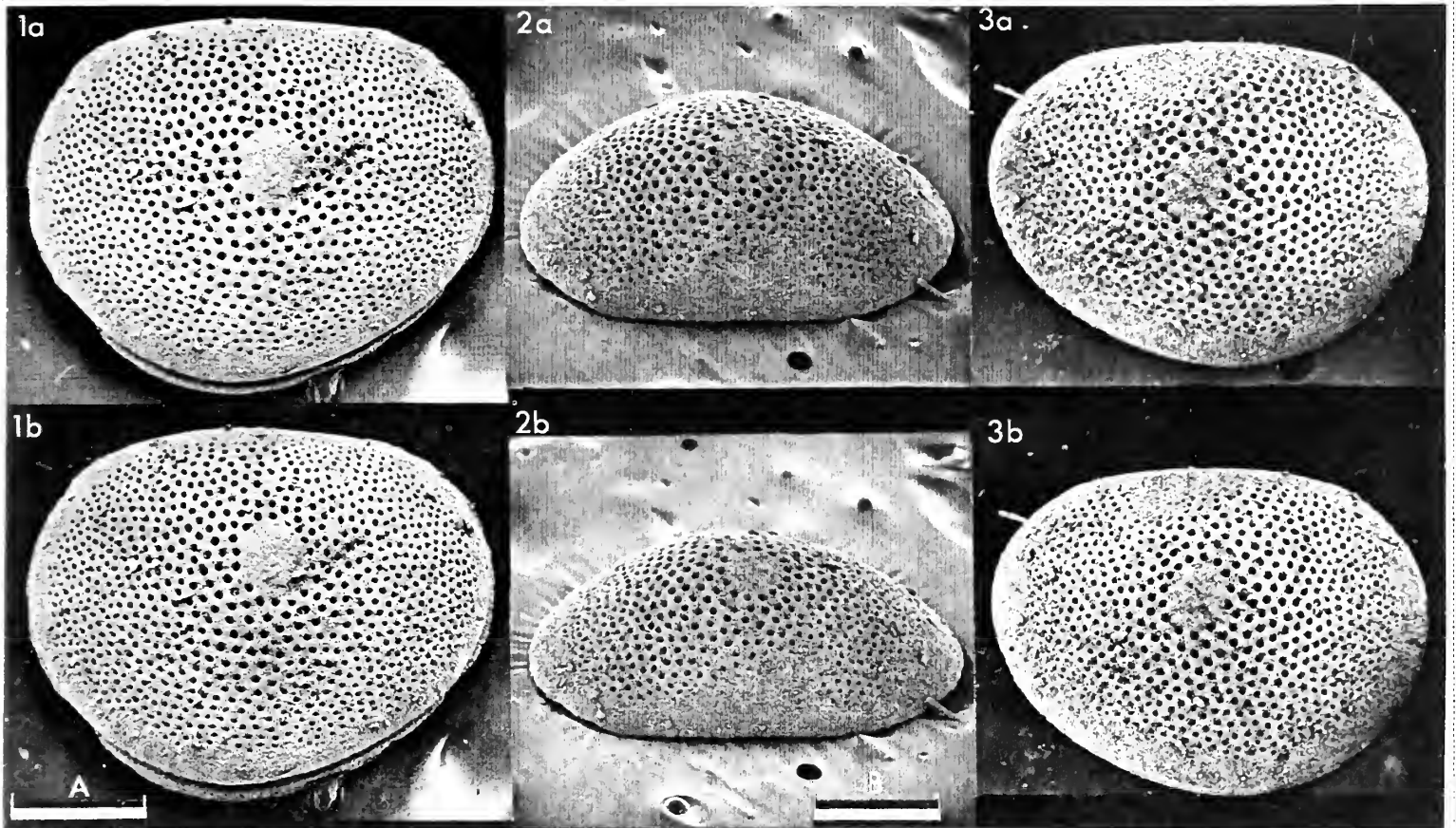
'*Bradoria* sp.' of Bolton & Copeland (*J. Paleont.*, 37, 1070, 1963), from the Middle Cambrian of western Canada, also resembles *M. cribroporata* (postplete outline, right/left overlap, no adventral sculpture, porate surface) but is larger (3.2 mm long) and possesses a muscle spot distinctly anterior of centre.

Distribution: Backsteinkalk erratic boulders of northern central Europe, Middle Ordovician (from the Upper Dalby and Skagen Limestones of Sweden and the Idavere [C₃]/Jõhvi Stages [D₁] of Estonia).

Explanation of Plate 4, 16

Fig. 1, LV, ext. vent. obl. (SGPIH 1917); fig. 2, RV, ext. dors. obl. (holotype, SGPIH 1915); fig. 3, fragmentary LV; int. lat., detail showing sieve-pores (SGPIH 1916).

Scale A (250 μ m; x 81), fig. 1; scale B (250 μ m; x 93), fig. 2; scale C (10 μ m; x 800), fig. 3.



ON *DISTOBOLBINA BISPINATA* SCHALLREUTER sp nov.

by Roger E.L. Schallreuter
(University of Hamburg, German Federal Republic)

Distobolbina bispinata sp. nov.

Holotype: Geologisch - Paläontologisches Institut, University of Hamburg, no. 1921, ♀ LV.

Type locality: Beach at Lummelunds bruk, Isle of Gotland (Baltic Sea); lat. 57° 44.5'N, long. 18° 24.5'E. Öjlemyrflint erratic boulder (no. 791), Upper Ordovician.

Derivation of name: Latin *spina*, spine; alluding to the two larger spines in the posterior half of the valve.

Figured specimens: Geologisch - Paläontologisches Institut, University of Hamburg, nos. 1921 (♀ LV: Pl. 4, 18, fig. 2; Pl. 4, 20, fig. 1; Pl. 4, 22, fig. 3), 1922 (♀ RV: Pl. 4, 18, fig. 1; Pl. 4, 20, figs. 2, 3), 1923 (♂ LV: Pl. 4, 18, fig. 3; Pl. 4, 24, figs. 2, 3), 1924 (♂ RV: Pl. 4, 22, fig. 1; Pl. 4, 24, fig. 1), 1925 (juv. RV: Pl. 4, 22, fig. 2).
All from Öjlemyrflint erratic boulder no. 791 (for further data see type locality).

Diagnosis: Adult valves c. 0.60 - 0.65 mm long. Preadductorial node tiny but distinct. Posteroventral lobule and centro-dorsal node extended into stout, posteriorly directed lobal spines.

Explanation of Plate 4, 18

Fig. 1, ♀ RV, ext. lat. (SGPIH 1922, 634 µm long); fig. 2, ♀ LV, ext. lat. (holotype, SGPIH 1921, 642 µm long); fig. 3, ♂ LV, ext. lat. (SGPIH 1923, 601 µm long).
Scale A (250 µm; x 98), figs. 1, 2; scale B (250 µm; x 108), fig. 3.

Diagnosis: Tecnomorphic velum ridge-like or flange-like in anterocentral to centro- or posteroventral region. Dolon (*contd.*) strongly convex, forms two deep loculi, external surface striate.

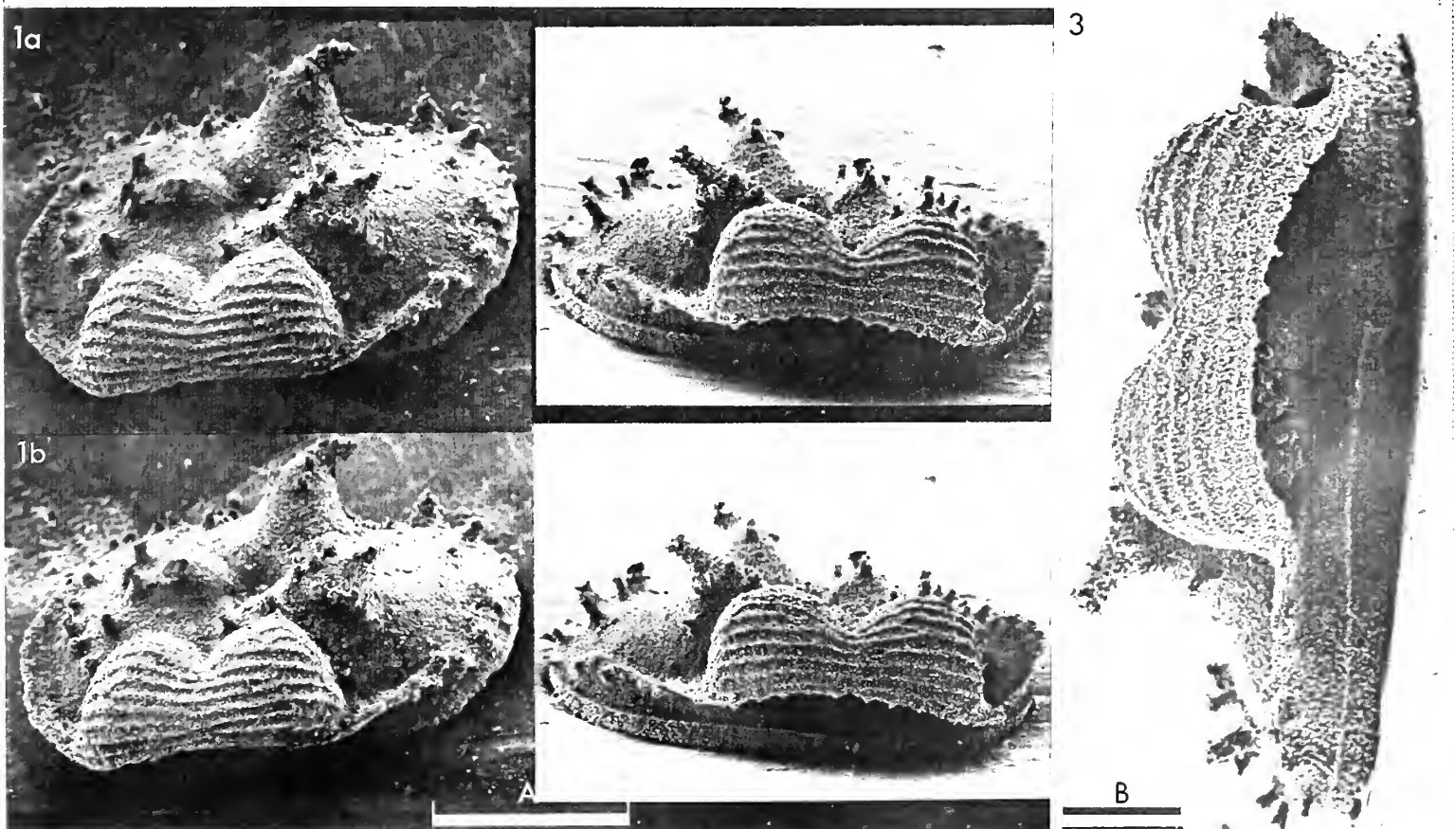
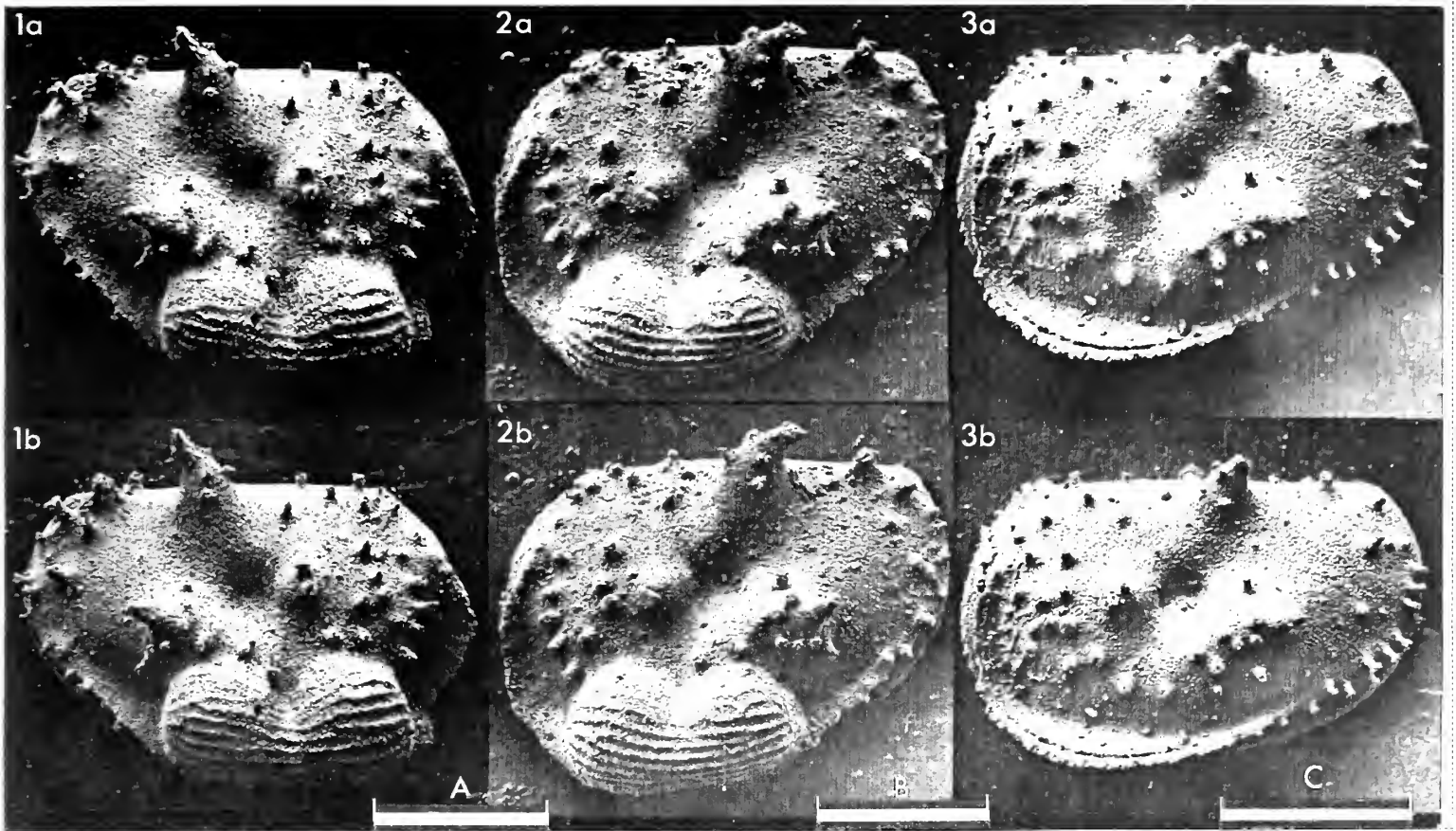
Remarks: As the name implies, *D. bispinata* is characterised by two strongly developed lateral lobal spines. Of the known congeneric taxa, *Distobolbina nabalaensis* Sarv, 1959 (*Eesti NSV Tead. Akad. Geol. Inst. uurimused* 4, 150) and *D. tuberculata* (Henningsmoen, 1954) (*Norsk geol. Tidsskr.* 33, 78) resemble the new species in most respects, especially in the morphology of the antrum and the dolon, which in both species houses two deep loculi and has a striate external surface. *D. nabalaensis*, the type species, can be distinguished by its much larger size (0.94 mm); according to Sarv it also has a small preadductorial node and a low node of uncertain form dorsal to S2. *D. tuberculata*, which can occur together with the new species, is somewhat larger (-0.78 mm long) and is characterized mainly by a single, stouter spine in the posterodorsal region and only a weak and indistinct preadductorial node. Furthermore, in *D. tuberculata* the tecnomorphic velum does not normally extend to the anterocentral region.

Distobolbina pinna Schallreuter, 1964 (*Ber. geol. Ges. D.D.R.*, Sonderh. 2, 90) is about the same size as *D. bispinata*, but its central dorsal spine is not more strongly developed than its anterodorsal and posterodorsal spines, and its dolon is non-loculate or only indistinctly loculate and therefore lacks a furrow marking the ventral prolongation of S2 (Schallreuter, *Palaeontographica*, Abt. A, 149, pl. 30(9), figs. 4 - 6, 1975).

Distobolbina grekoffi Schallreuter (*Stereo-Atlas of Ostracod Shells* 4, 25 - 28, 1977) is larger (c. 0.91 mm long) and has a botulate (= non-loculate) antrum and only a faintly convex dolon. Furthermore, in the males of that species the velum is developed ventrally as a row of spines, not a flange.

Explanation of Plate 4, 20

Fig. 1, ♀ LV, ext. vent. obl. (holotype, SGPIH 1921); figs. 2, 3, ♀ RV (SGPIH 1922): fig. 2, ext. vent. obl.; fig. 3, ext. vent.
Scale A (250 µm; x 109), figs. 1, 2; scale B (100 µm; x 169), fig. 3.



Distribution: Known only from the type locality.

Explanation of Plate 4, 22

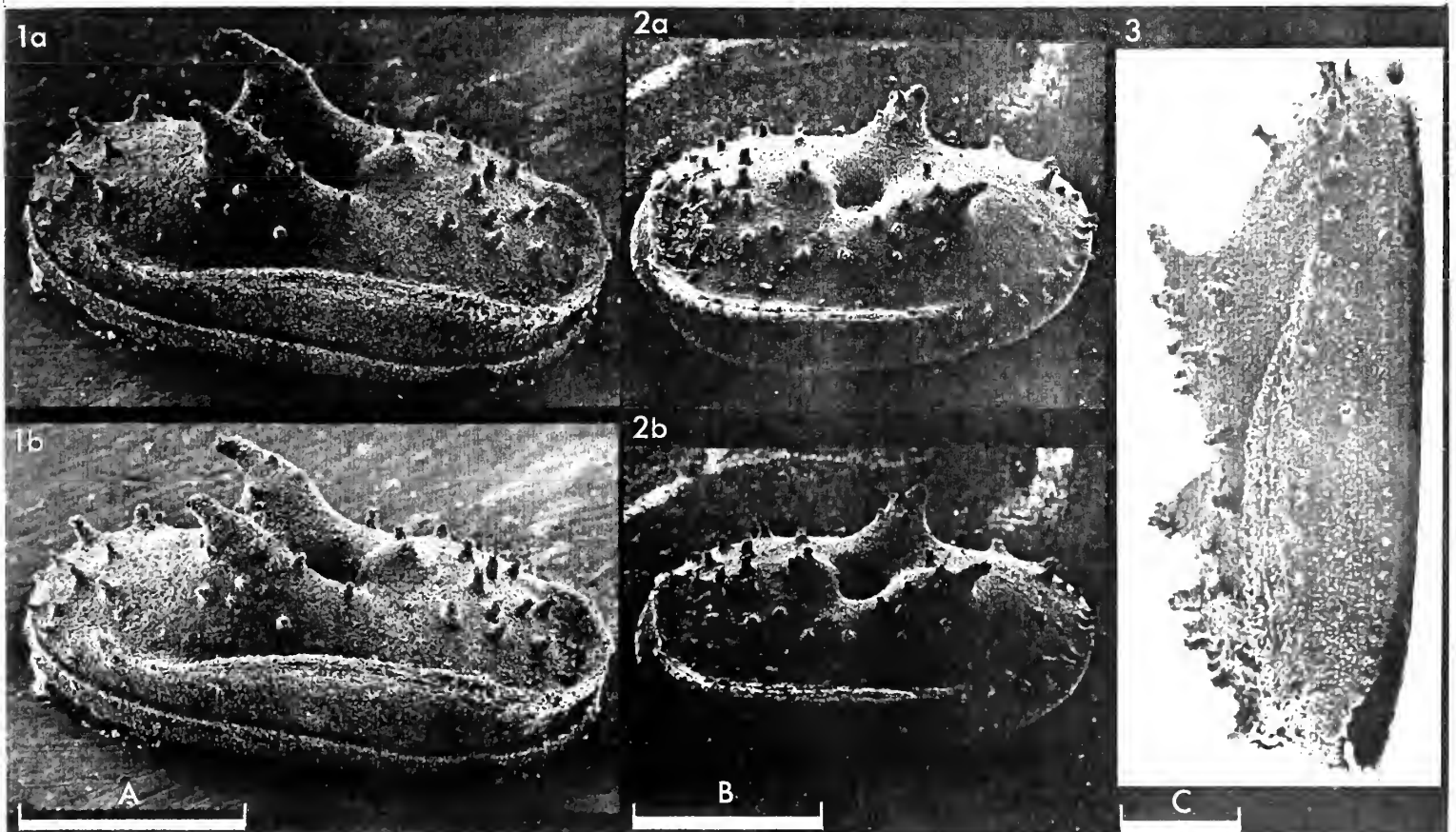
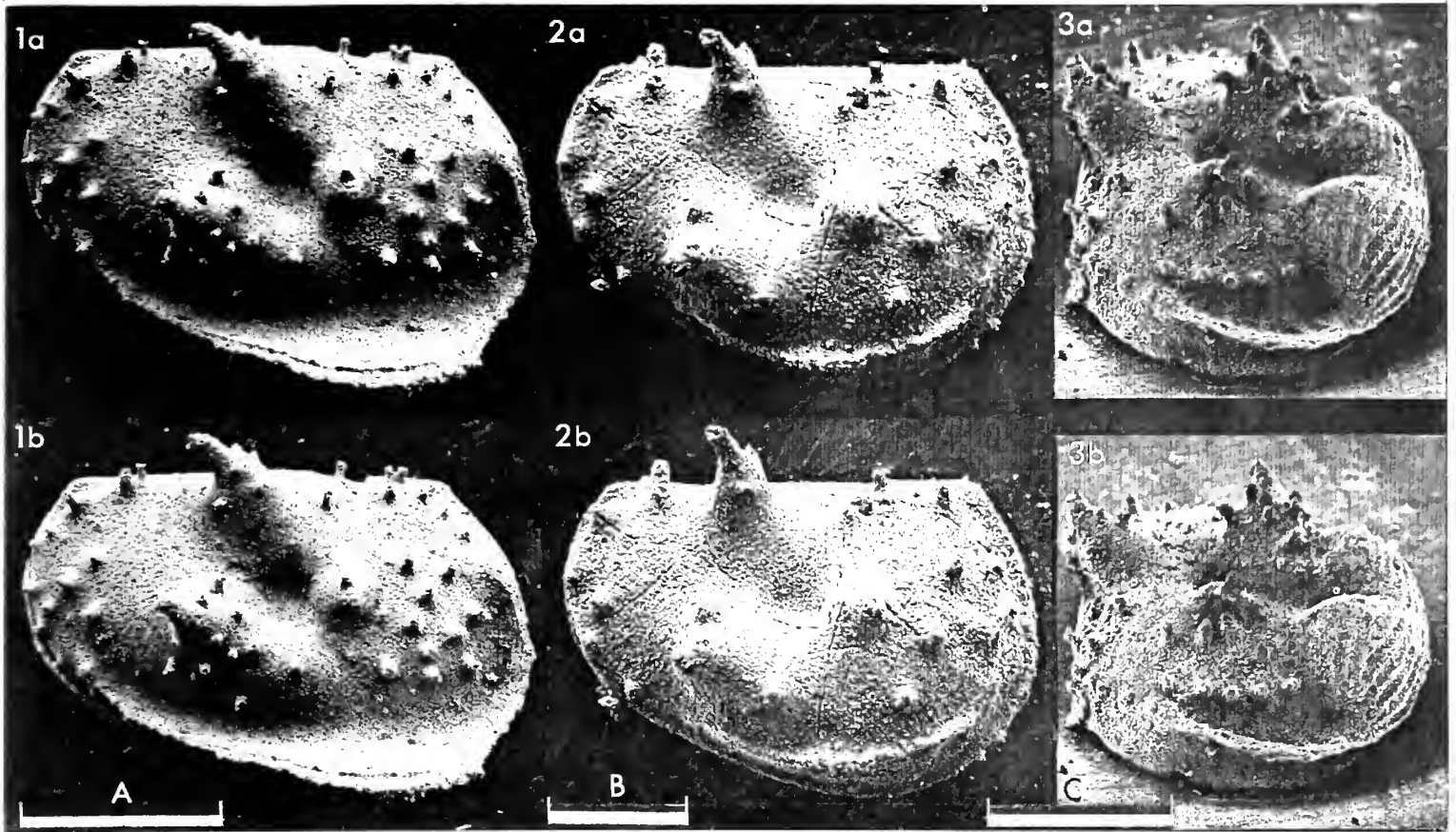
Fig. 1, ♂ RV, ext. lat. (SGPIH 1924, 635 μm long); fig. 2, juv. RV, ext. lat. (SGPIH 1925, 355 μm long); fig. 3, ♀ LV, ext. ant. obl. (holotype, SGPIH 1921).

Scale A (250 μm ; x 110), fig. 1; scale B (100 μm ; x 186), fig. 2; scale C (250 μm ; x 103), fig. 3.

Explanation of Plate 4, 24

Fig. 1, ♂ RV, ext. vent. obl. (SGPIH 1924); figs. 2, 3, ♂ LV (SGPIH 1923): fig. 2, ext. vent. obl.; fig. 3, ext. vent.

Scale A (250 μm ; x 126), fig. 1; scale B (250 μm ; x 105), fig. 2; scale C (100 μm ; x 163), fig. 3.



ON *DISTOBOLBINA GREKOFFI* SCHALLREUTER sp nov.

by Roger E.L. Schallreuter
(University of Hamburg, German Federal Republic)

Distobolbina grekoffi sp. nov.

Holotype: Geologisch - Paläontologisches Institut, University of Hamburg, no. 1926, ♀ LV.

Type locality: Beach at Gnisvärds, Isle of Gotland (Baltic Sea); lat. 57° 30'N, long. 18° 7'E. Öjlemyrflint erratic boulder (no. G8), Upper Ordovician.

Derivation of name: In honour of Prof. Dr. Nicolas Grekoff, Boulogne, France.

Figured specimens: Geologisch - Paläontologisches Institut, University of Hamburg, nos. 1926 (♀ LV: Pl. 4, 26, figs. 1 - 3), 1927 (juv. LV: Pl. 4, 28, fig. 1), 1928 (♂ RV: Pl. 4, 28, figs. 2, 3).

All from Öjlemyrflint erratic boulder no. G8 (for further data see type locality); coll. by Horst Kaufmann, 1975.

Explanation of Plate 4, 26

Figs. 1 - 3, ♀ LV (holotype, SGPIH 1926, 0.91 mm long): fig. 1, ext. lat.; fig. 2 ext. vent. obl.; fig. 3, ext. ant. obl. Scale A (250 µm; x 80), fig. 1; scale B (250 µm; x 68), fig. 2; scale C (250 µm; x 87), fig. 3.

Diagnosis: Adult ♀ c. 0.91 mm in length. Preadductorial node weak, diminutive, mounted by a spine which is approximately equal in size to the other spines of the lateral surface. Velum in males and larvae represented as a row of spines. Dolon faintly convex; antrum botulate (= non-loculate), extends posteriorly to the region below the posterior margin of S2 and the anteroventral half of the posteroventral lobule.

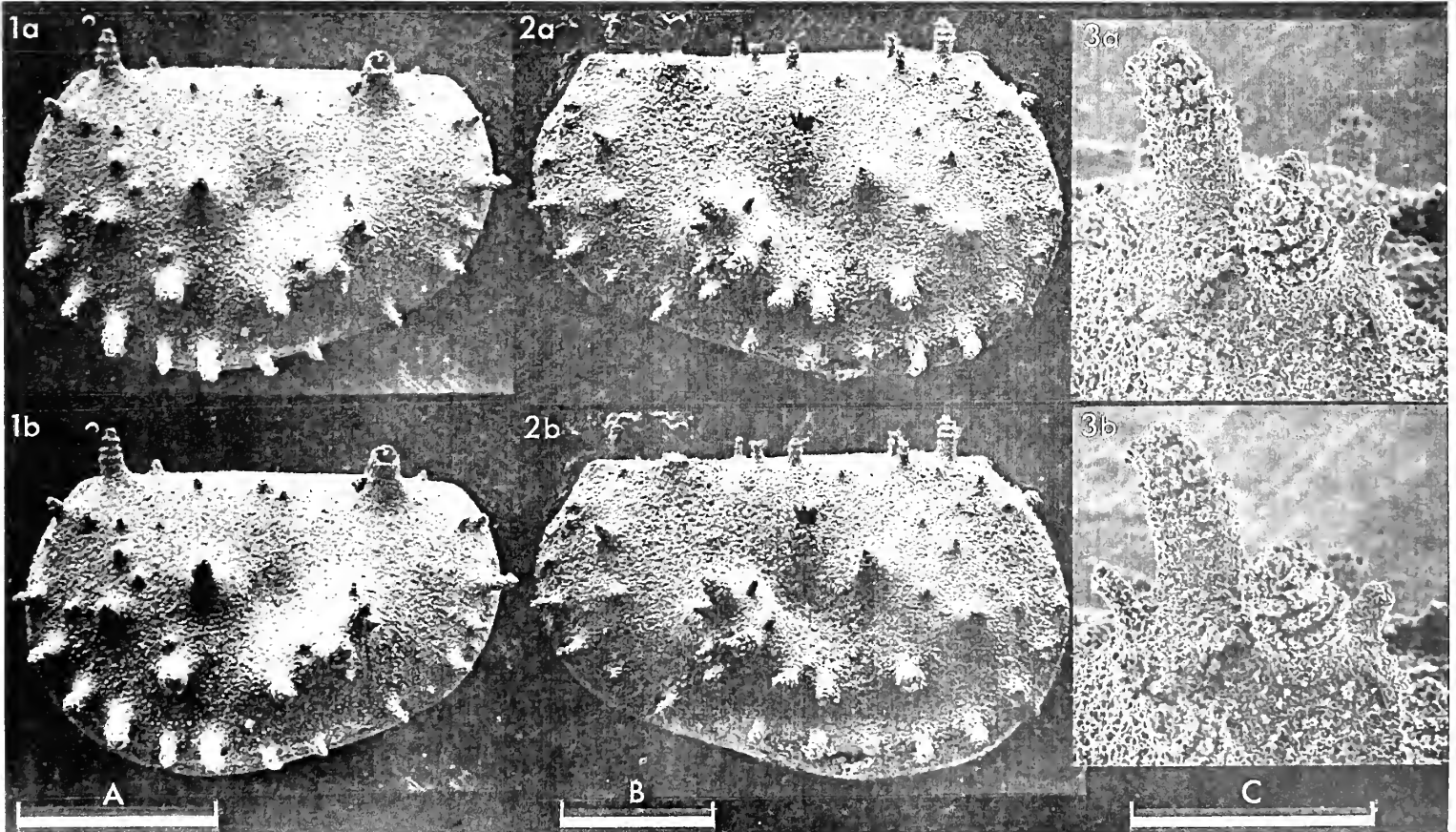
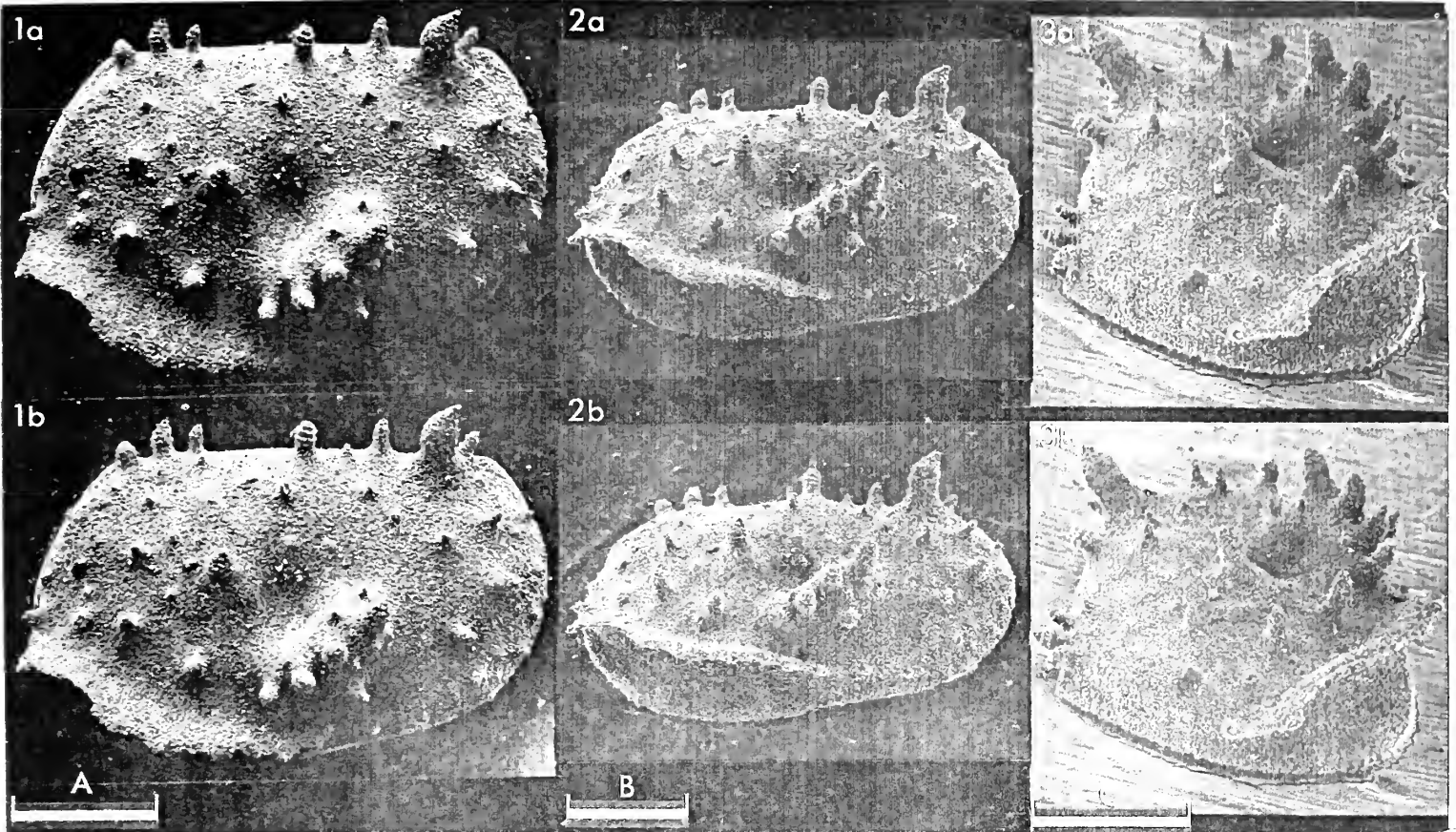
Remarks: This species is distinguished from the other known species of the genus, *D. tuberculata* (Henningsmoen) (*Norsk geol. Tidsskr.* 33, 78, 1954), *D. nabalaensis* Sarv (*Eesti NSV Tead. Akad. Geol. Inst. uurimused* 4, 150, 1959), *D. pinna* Schallreuter (*Palaeontographica*, ser. A, 149, 182, 1975), and *D. bispinata* Schallreuter (*Stereo-Atlas of Ostracod Shells* 4, 17 - 24, 1977) by its botulate (= non-loculate) antrum and/or its faintly convex dolon and its velar morphology, developed as a row of spines in the males. *D. grekoffi* therefore represents a special branch of evolution within the genus and could possibly belong to a distinct subgenus.

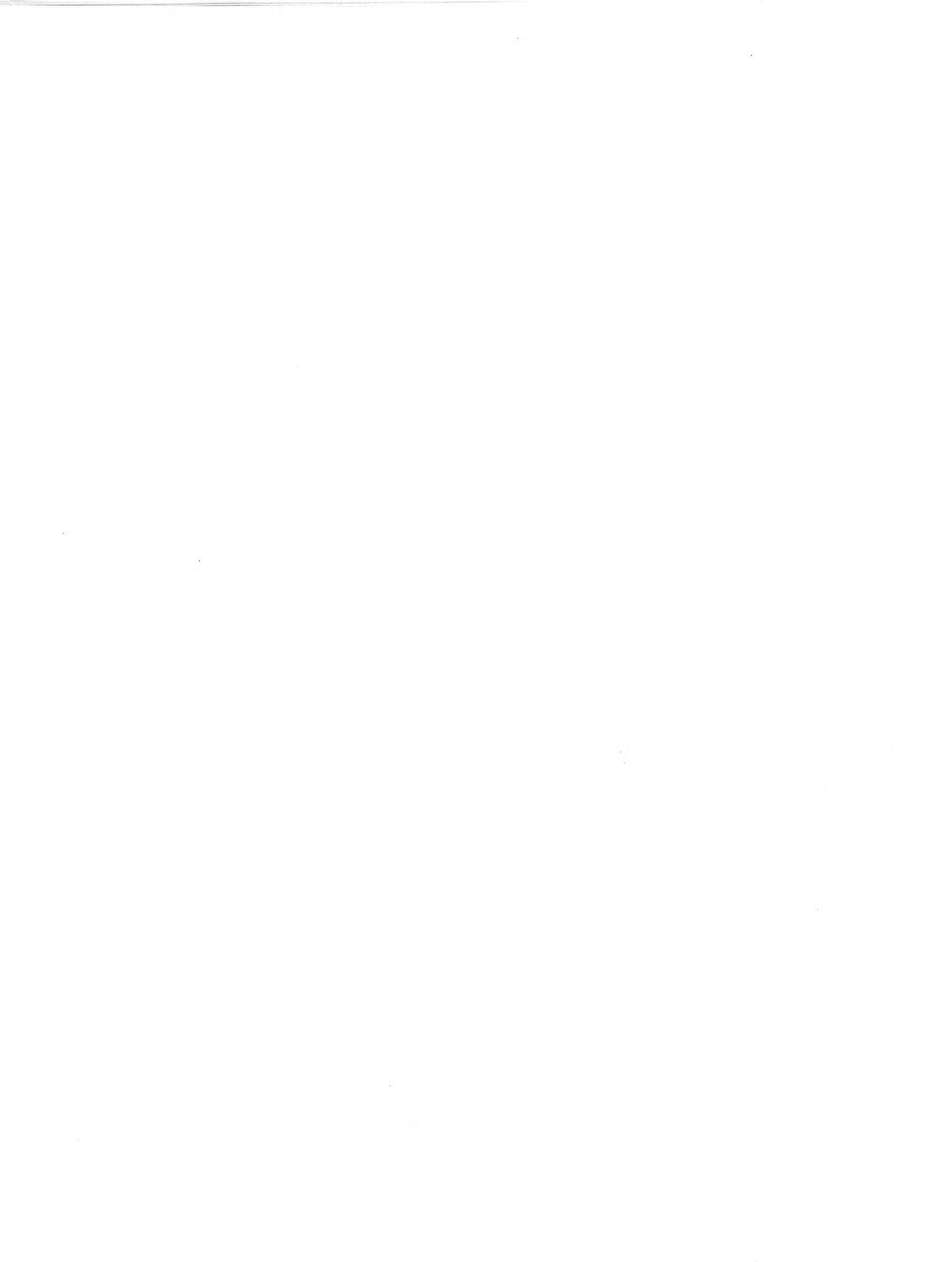
Distribution: Known only from the type locality.

Explanation of Plate 4, 28

Fig. 1, juv. LV, ext. lat. (SGPIH 1927, 0.58 mm long); figs. 2, 3, ♂ RV (SGPIH 1928, 0.85 mm long): fig. 2, ext. lat.; fig. 3, ext. vent. obl., spines on posteroventral lobule.

Scale A (250 µm; x 111), fig. 1; scale B (250 µm; x 86), fig. 2; scale C (10 µm; x 350), fig. 3.





ON *ANTIAECHMINA PSEUDOVELATA* SCHALLREUTER sp. nov.

by Roger E.L. Schallreuter
(University of Hamburg, German Federal Republic)

Antiaechmina pseudovelata sp. nov.

Holotype: Geologisch-Paläontologisches Institut, University of Hamburg, no. 1929, RV.

Type locality: Beach at Häftings, Isle of Gotland (Baltic Sea); lat. 57° 53'N, long. 18° 37'E. Öjlemyrflint erratic boulder (no. G13), Upper Ordovician.

Derivation of name: Referring to the 'pseudovelum'.

Figured specimens: Geologisch-Paläontologisches Institut, University of Hamburg, no. 1929 (RV: Pl. 4, 30, figs. 1 - 3; Pl. 4, 32, figs. 1, 2). From Öjlemyrflint erratic boulder no. G13 (for further data see type locality); coll. by Horst Kaufmann, 1975.

Explanation of Plate 4, 30

Figs. 1 - 3, RV (holotype, SGPIH 1929, 0.75mm long): fig. 1, ext. lat.; fig. 2, ext. anterodors. obl.; fig. 3, ext. vent.
Scale A (250 μ m; x 107), fig. 1; scale B (250 μ m; x 98), fig. 2; scale C (100 μ m; x 138), fig. 3.

Diagnosis: Valve length 0.75mm. Length: height ratio c. 1.61. Outline amplete. Cardinal corners distinct, cardinal angles much $> 90^\circ$. Anterodorsal spine occurs distinctly before mid-height and behind anterodorsal corner; base bulbous, tapers to a long, posteriorly directed spine not protruding over hinge line in lateral view. A shallow S2 skirts the posteroventral base of the spine. A ridge-like pseudovelum occurs parallel to the free margin and is entire between cardinal corners. Both the dorsum and the marginal surface are hypocline. Lateral surface reticulate.

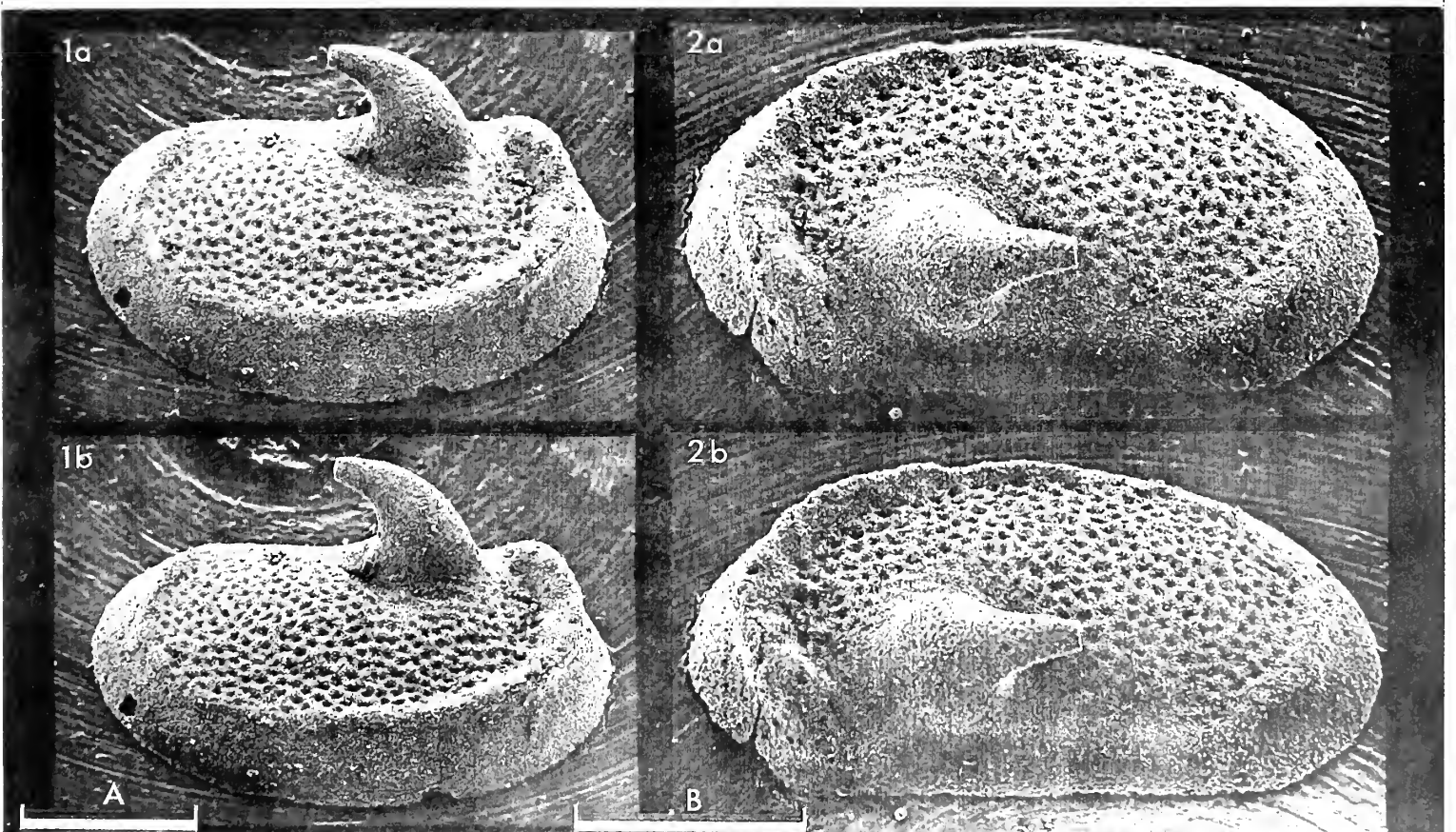
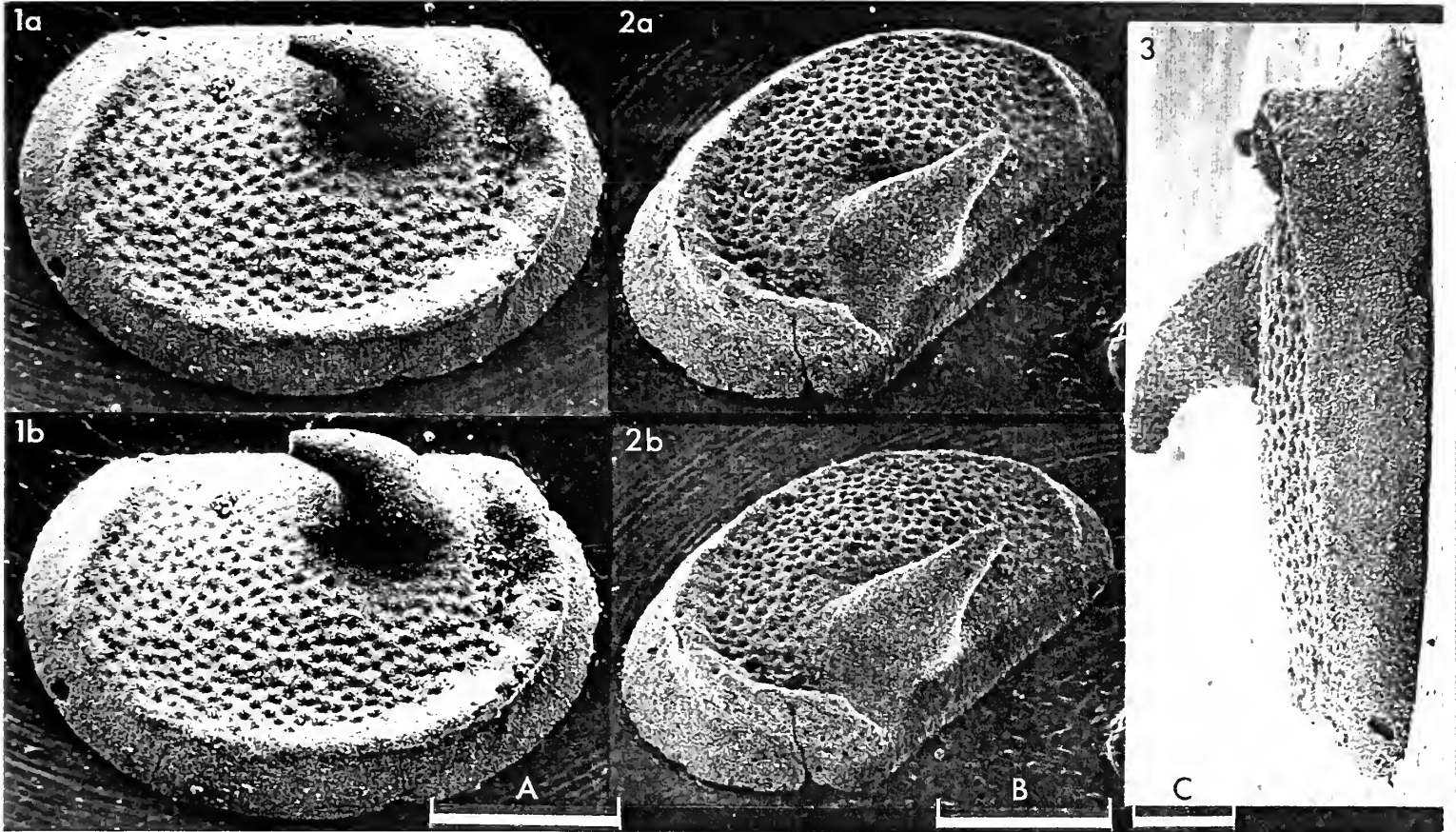
Remarks: In contrast to most other species of the genus the new species possesses a prominent pseudovelum and a reticulate lateral surface. Only *Antiaechmina anterobulbosa* (Blumenstengel) (*Freiberger ForschHft.*, ser. C. 182, 65, 1965) and *Antiaechmina ? taurea* (Keenan) (*J. Paleont.* 25, 573, 1951) exhibit a similar weak ridge parallel to the free margin. In the latter species, the systematic position of which is equivocal, the ridge forms the base for a row of small spines.

Differentiation at generic level within the Circulinidae and Aechminidae is still a little obscure. The taxonomic importance of variation exhibited by the spine, pseudovelum and reticulation is difficult to assess. Thus, some *Kinnekullea* species, for example, *K. thorslundi* Henningsmoen (*Bull. geol. Inst. Univ. Upsala* 32, 414, 1948) and *K. henningsmoeni* Neckaja (*Trudy vses neft. nauchno-issed. geol. -razv. Inst.* 251, 20, 1966), also resemble *A. pseudovelata*, but in these species the spine is confluent with the pseudovelum.

Distribution: Known only from the type locality.

Explanation of Plate 4, 32

Figs. 1, 2, RV (holotype, SGPIH 1929): fig. 1, ext. vent. obl.; fig. 2, ext. dors. obl.
Scale A (250 μ m; x 96), fig. 1; scale B (250 μ m; x 128), fig. 2.



ON *GLYPTOCYTHERE PENNI* BATE & MAYES sp. nov.

by R.H. Bate and Carol Mayes
(British Museum [Natural History], London)

Glyptocythere penni sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) OS 7582, ♀ RV. [Paratypes: Brit. Mus. (Nat. Hist.) OS 7583 – 7591].

Type locality: Middle Jurassic (Upper Bathonian, Fimbriata - Waltoni Clay: *Oppelia aspidoides* Zone of authors but dated here as *Clydoniceras discus* Zone) from Old Cement Quarry, Kirtlington, Oxfordshire, England; Grid Ref. SP 49451985.

Derivation of name: After Dr. Ian E. Penn, Institute of Geological Sciences, London, for his work on British Bathonian stratigraphy.

Diagnosis: Species of *Glyptocythere* having coarsely rugose and reticulate ornamentation, two median swellings and pinched-out ventrolateral border.

Explanation of Plate 4, 34

Fig. 1, ♀ LV, ext. lat. (OS 7583, 900 μ m long); fig. 2, ♀ LV, ext. lat. (OS 7585, 930 μ m long); fig. 3, ♀ RV, ext. lat. (holotype, OS 7582, 880 μ m long).

Scale A (250 μ m; x 67), fig. 1; scale B (250 μ m; x 65), fig. 2; scale C (250 μ m; x 68), fig. 3.

Figured specimens: Brit. Mus. (Nat. Hist.) OS 7582 (♀ RV: Pl. 4, 34, fig. 3), OS 7583 (♀ LV: Pl. 4, 34, fig. 1), OS 7584 (♂ car.: Pl. 4, 36, fig. 1; Pl. 4, 40, fig. 3), OS 7585 (♀ LV: Pl. 4, 34, fig. 2), OS 7586 (juv. - 1 LV: Pl. 4, 38, fig. 2), OS 7587 (♂ LV: Pl. 4, 36, figs. 2, 3), OS 7588 (juv. - 1 car.: Pl. 4, 38, fig. 3), OS 7589 (juv. - 1 car.: Pl. 4, 40, fig. 1), OS 7590 (juv. - 1 RV: Pl. 4, 38, fig. 1), OS 7591 (♂ car.: Pl. 4, 40, fig. 2).

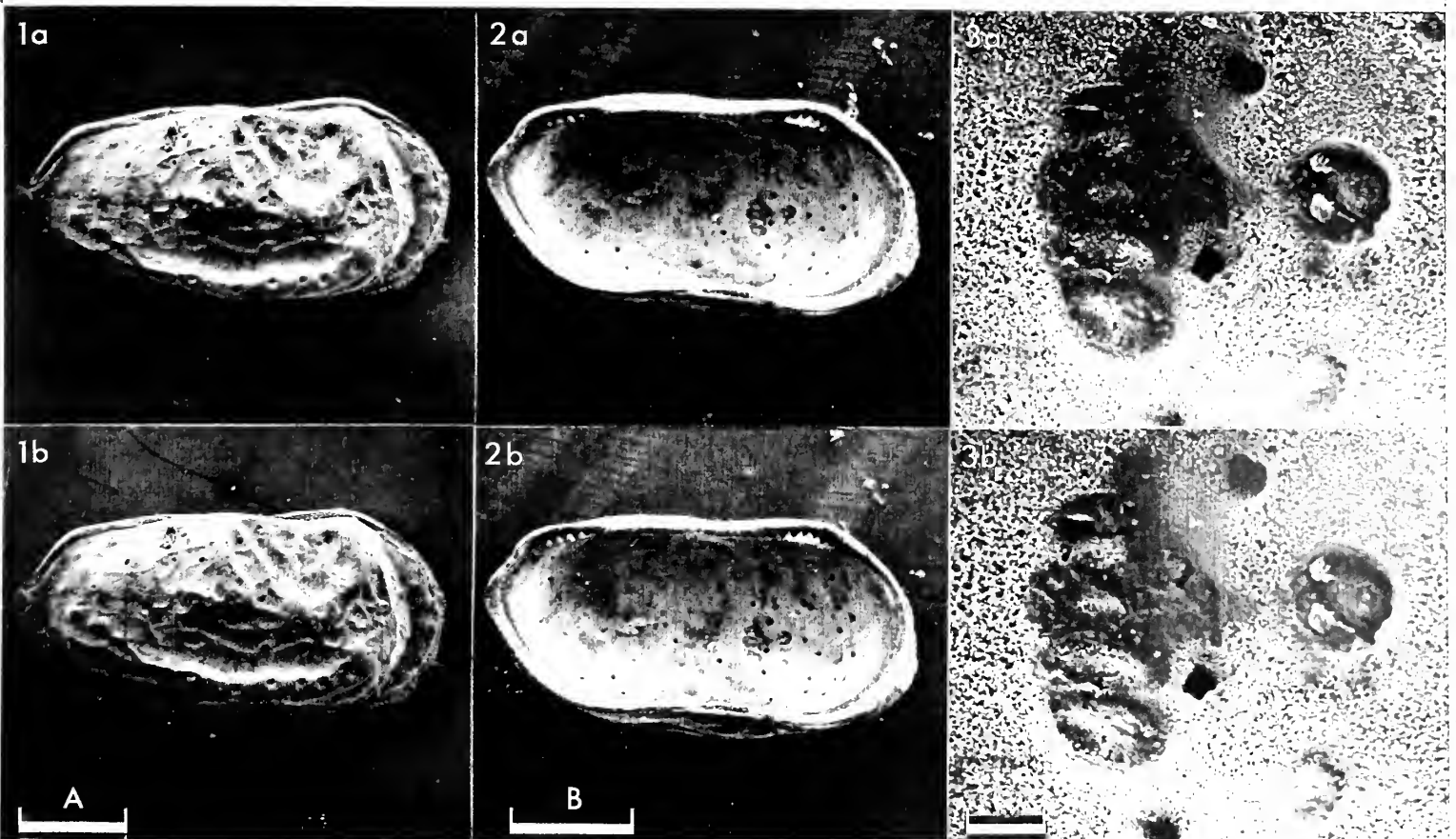
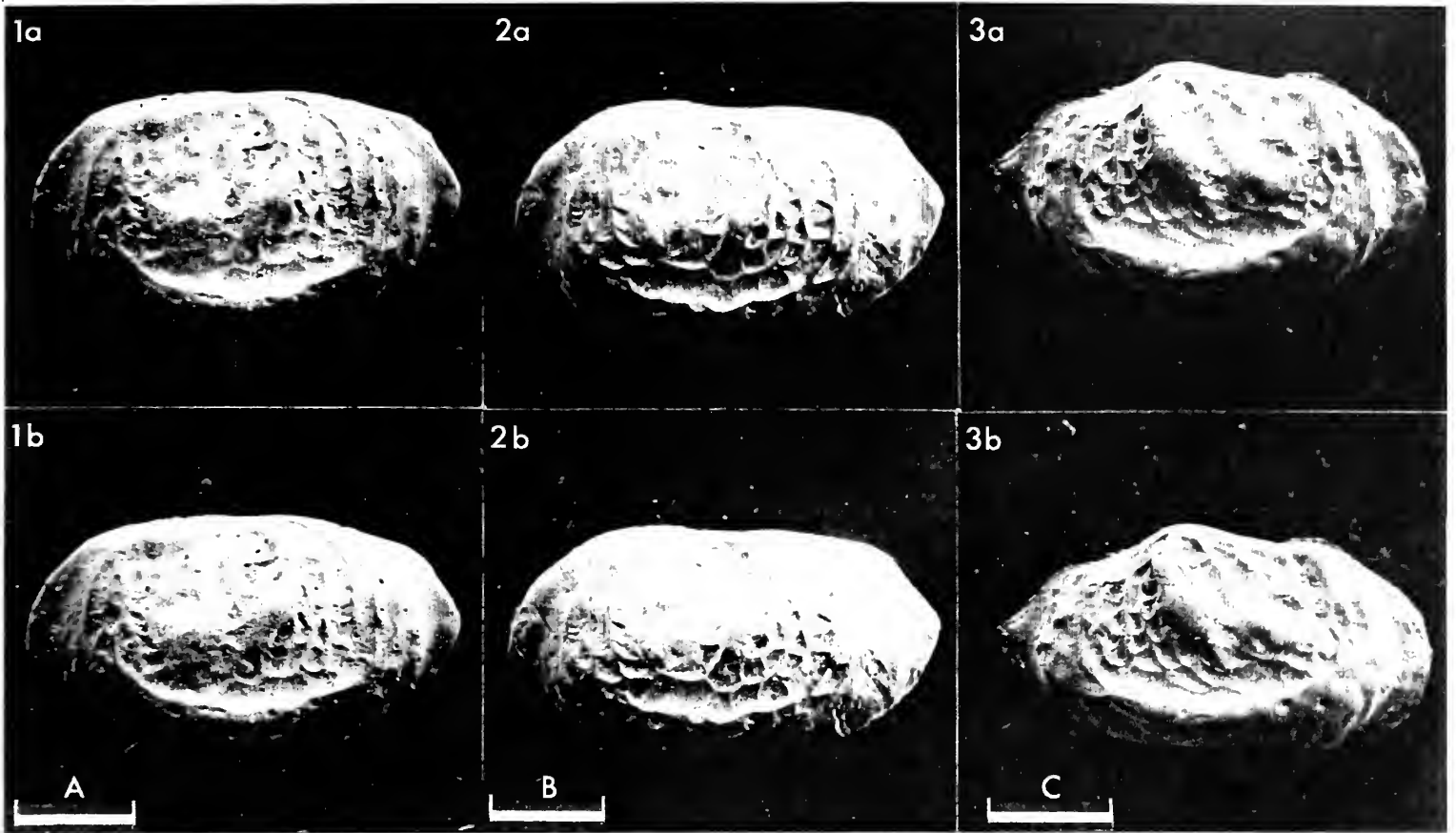
All specimens collected from the Fimbriata - Waltoni Clay at the base of the Forest Marble, Old Cement Quarry, Kirtlington, Oxfordshire.

Remarks: The Middle Bathonian *Glyptocythere oscillum* (Jones & Sherborn, 1888), like *Glyptocythere penni* sp. nov. possesses two median swellings and a pinched-out ventrolateral border. The two species are, however, readily distinguishable by the coarse reticulation and rather rugose appearance of *G. penni*. Indeed, the surface ornamentation of *G. penni* sets this species apart from all others so far described, although it shares with them the entomodont hinge, muscle scar pattern (pl. 4, 36, fig. 3), sieve plate normal pores and simple, straight marginal pore canals (*G. penni* has 7 - 8 anterior canals and 2 - 3 posterior canals; Text-fig. 1) of the genus.

Explanation of Plate 4, 36

Fig. 1, ♂ car., ext. rt. lat. (OS 7584, 1030 μ m long); figs. 2, 3, ♂ LV, int. lat. & int. musc. sc. (OS 7587, 900 μ m long).

Scale A (250 μ m; x 58), fig. 1; scale B (250 μ m; x 67), fig. 2; scale C (25 μ m; x 450), fig. 3.



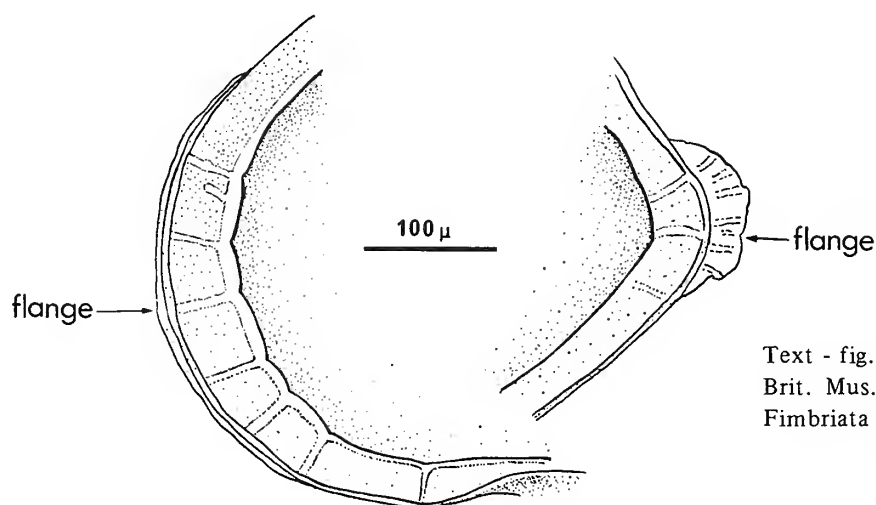
Remarks: (contd.)	Dimensions (mm)	length	height	width
	♀ RV, OS 7582	0.88	0.51	
	♀ LV, OS 7583	0.90	0.55	
	♂ car., OS 7584	1.03	0.49	0.44
	♀ LV, OS 7585	0.93	0.56	
	juv. - 1 LV, OS 7586	0.76	0.46	
	♂ LV, OS 7587	0.90	0.47	
	juv. - 1 car., OS 7588	0.76	0.44	0.37
	juv. - 1 car., OS 7589	0.77	0.45	0.38
	juv. - 1 RV, OS 7590	0.72	0.42	
	♂ car., OS 7591	0.94	0.48	0.40

Distribution: The many short-ranging species of *Glyptocythere* present in the Bajocian and Bathonian of Britain and Europe (see Brand & Malz, *Senckenberg. leth.* 47, 481 - 535, 1966, and Bate in: *A Stratigraphical Index of British Ostracoda* [in press], Seel House Press) make this a stratigraphically important genus. *Glyptocythere penni*, used by Bate (op. cit.) as the index ostracod for the uppermost Bathonian ostracod zone, is restricted to beds of known *Clydoniceras discus* Zone age; it has not been found in sediments dated as belonging to the *Oppelia aspidoides* Zone. Because of this the Fimbriata - Waltoni Clay of Kirtlington is dated as being of *C. discus* Zone age with the beds between this and the White Limestone beneath having been removed prior to the deposition of the Fimbriata - Waltoni Clay.

Explanation of Plate 4, 38

Fig. 1, juv. - 1, int. rt. lat. (OS 7590, 720 μ m long); fig. 2, juv. - 1, int. lt. lat. (OS 7586, 760 μ m long); fig. 3, juv. - 1 car., vent. (OS 7588, 760 μ m long).

Scale A (250 μ m; x 83), fig. 1; scale B (250 μ m; x 80), figs. 2, 3.

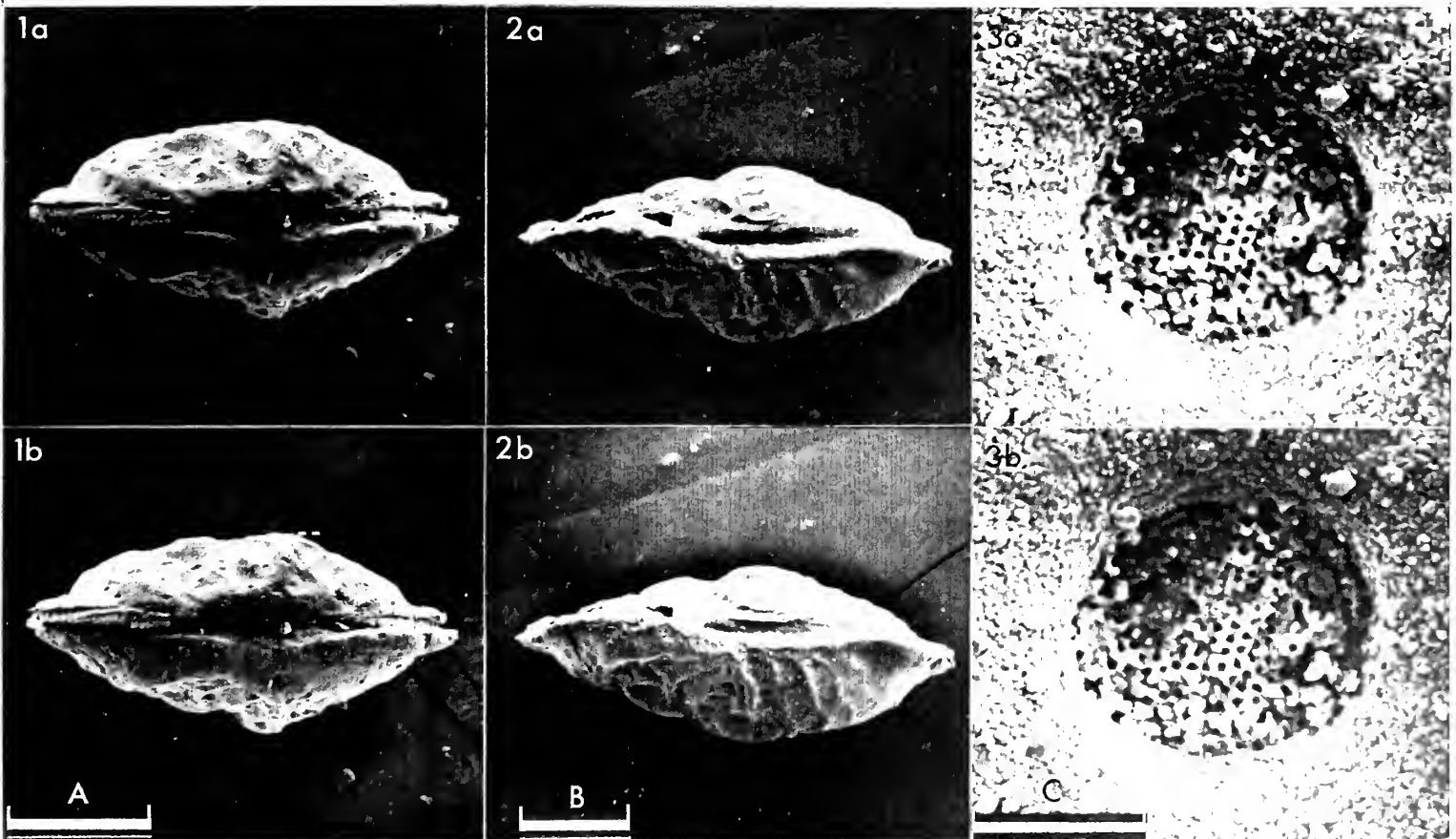
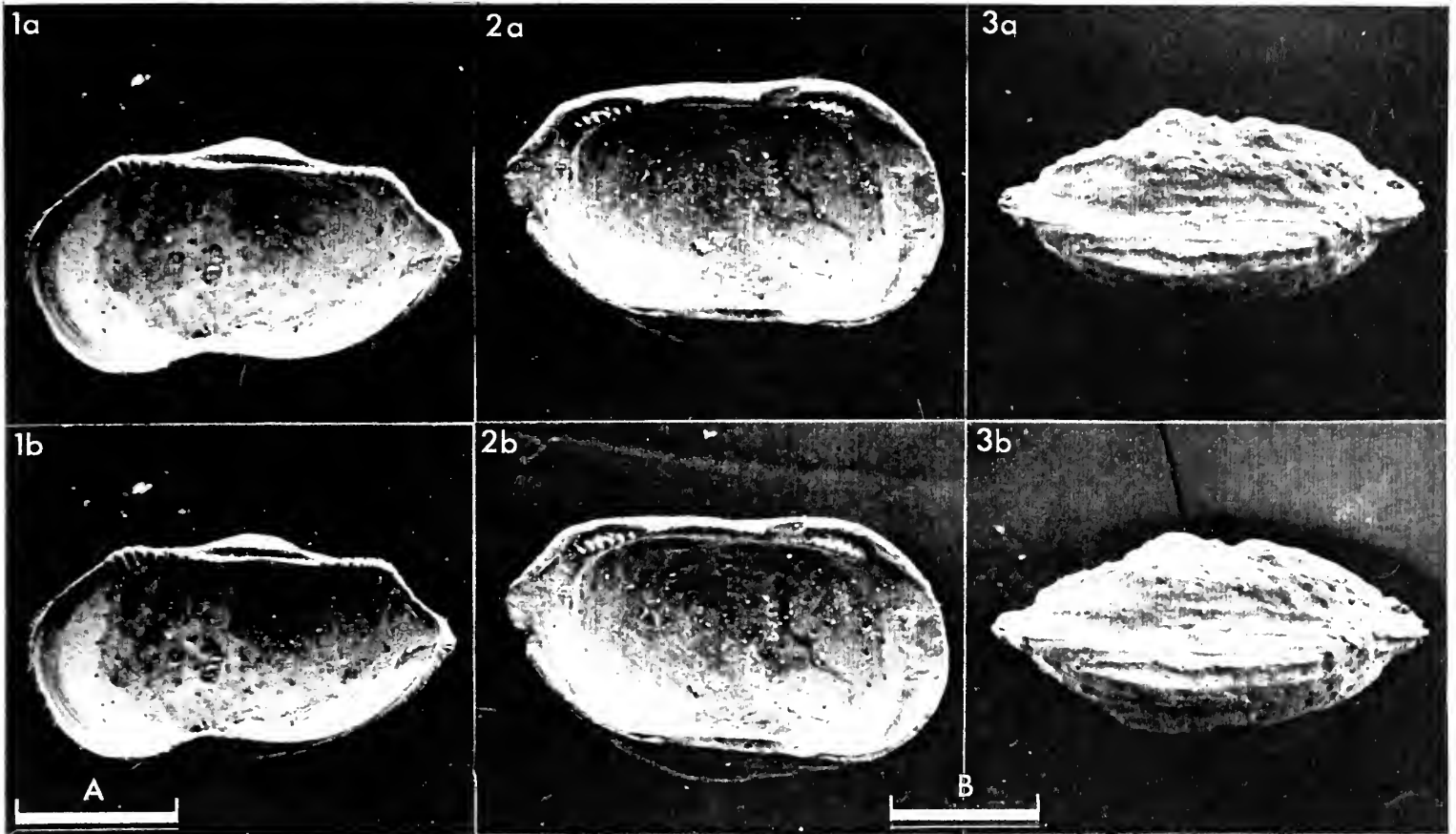


Text - fig. 1. Ant. & post. marginal pore canals in *G. penni*. Brit. Mus. [Nat. Hist.] IO 5503, ♀ RV, length 0.80mm; Fimbriata - Waltoni Clay, Kirtlington.

Explanation of Plate 4, 40

Fig. 1, juv. - 1 car., dors. (OS 7589, 770 μ m long); fig. 2, ♂ car., dors. (OS 7591, 940 μ m long); fig. 3, ♂ car., normal pore with sieve plate (OS 7584).

Scale A (250 μ m; x 78), fig. 1; scale B (250 μ m; x 64), fig. 2; scale C (10 μ m; x 2,400), fig. 3.



ON *PARACYTHERIDEA ANAPETES* AHMAD sp. nov.

by Manzoor Ahmad
(University of Hull, England)

Paracytheridea anapetes sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) no. OS 7757, ♀ car. [Paratypes: Brit. Mus. (Nat. Hist.) nos. OS 7758, OS 7760]

Type locality: E Shore, Lindi Creek, Tanzania; from sample FCRM 2034 at lat. 10° 3.4'S, long. 39° 42.03'E. Upper Eocene.

Derivation of name: Greek *anapetes*, expanded. A reference to the posterodorsal swelling and ventral ala.

Figured specimens: Brit. Mus. (Nat. Hist.) coll. nos. OS 7759 (♂ LV: Pl. 4, 42, fig. 1), OS 7757 (♀ car.: Pl. 4, 42, figs. 2, 3; Pl. 4, 44, fig. 1), OS 7758 (♀ LV: Pl. 4, 44, fig. 2). Specimens OS 7757, OS 7758 from type locality; OS 7759 (Sample FCRM 2033) from 10m N of type locality, Upper Eocene.

Explanation of Plate 4, 42

Fig. 1, ♂ LV, ext. lat. (OS 7759, 625 µm long); figs. 2, 3, ♀ car. (holotype, OS 7757, 580 µm long): fig. 2, ext. lt. lat.; fig. 3, ext. rt. lat.
Scale A (100 µm; x 101), fig. 1; scale B (100 µm; x 107), fig. 2; scale C (100 µm; x 193), fig. 3.

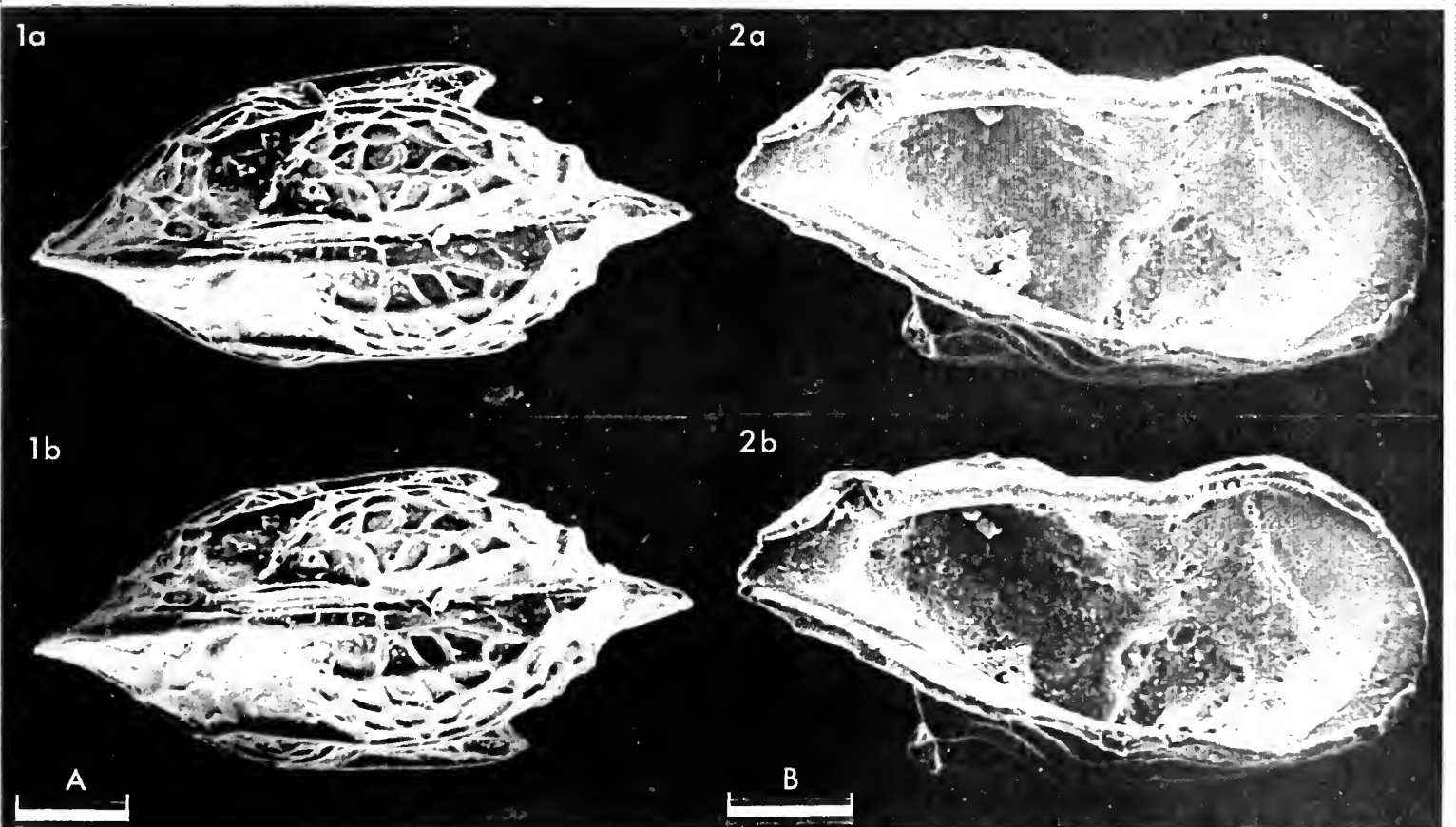
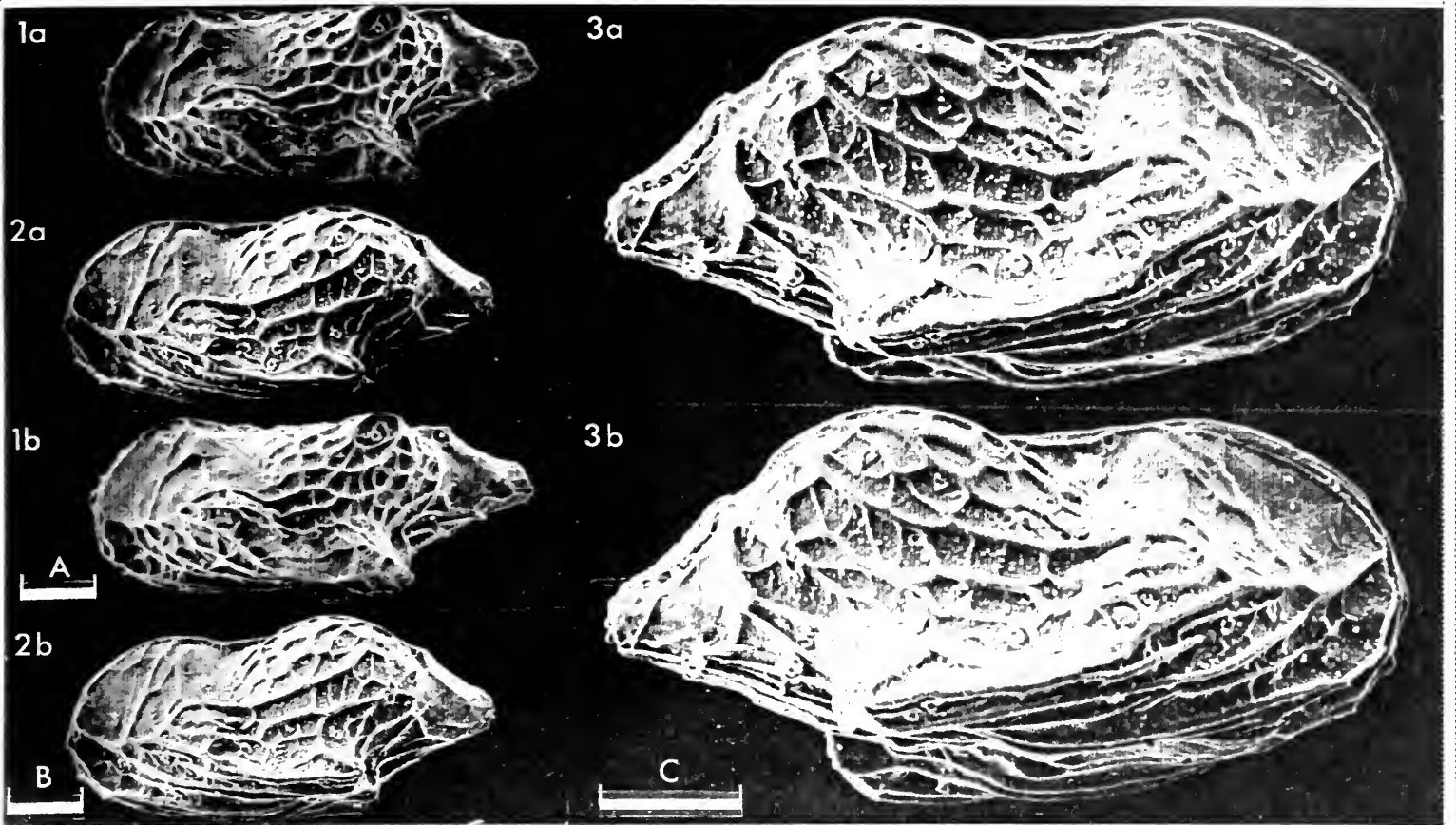
Diagnosis: A species with distinct sexual dimorphism; the presumed females are shorter compared with the presumed males and have a bulbous posterodorsal swelling which is much reduced in the males. Besides the usual hinge elements of the genus, the right valve has 14 - 15 small denticles in front of the anterior cusped dental area. The left valve has corresponding sockets.

Remarks: *Paracytheridea longicaudata chilensis* Hartmann, 1962 (*Mitt. zool. Mus. Hamb.* 60, 211, 212), a Recent form from northern Chile, resembles the new species in general shape and the coarser ornamentation but the Tanzanian species can easily be distinguished by its thin ribs criss-crossing the thicker ribs and the slightly different hinge outlined above. No other similarities have so far been found between E African and Chilean post-Mesozoic ostracods.

Distribution: So far only known from Tanzania, mostly from Auversian - Bartonian, Eocene beds, but recorded also from Lattorfian - Rupelian, Oligocene.

Explanation of Plate 4, 44

Fig. 1, ♀ car., dors. (holotype, OS 7757, 580 µm long); fig. 2, ♀ LV, int. lat. (OS 7758, 574 µm long).
Scale A (100 µm; x 160), fig. 1; scale B (100 µm; x 171), fig. 2.



ON *CLADAROCY THERE PTEROTA* AHMAD gen. et. sp. nov.

by Manzoor Ahmad
(University of Hull, England)

Genus *CLADAROCY THERE* gen. nov.
Type-species: *Cladarocythere pterota* sp. nov.

Derivation of name: From the Greek *kladaros*, fragile, and the generic name *Cythere*; with reference to the fragility of the shell. Gender, feminine.

Diagnosis: Small to medium sized, very fragile. Lateral surface almost smooth except for a prominent adventral frill, which is divided into 11 compartments by thickened normal pore canals. Muscle scar pattern consists of four small adductor scars arranged in a vertical row with three larger frontal scars placed dorsally, the ventral one of which is 'V-shaped'. Eye spot absent.

Remarks: The new genus is closely related to *Pseudocytherura* Dubowsky, 1939 (= *Paracytheropteron* Ruggieri, 1952) and *Paracytheridea* Müller, 1894, but can be distinguished by the absence of lateral ornamentation and eye tubercle, less calcification and the different development of the frill, which gives *Cladarocythere* a very different shape in dorsal view. The frill on *Manawa* Hornibrook, 1949 and *Cladarocythere* is very similar, but in all other respects the two genera are different.

Explanation of Plate 4, 46

Fig. 1, LV, ext. lat. (OS 7774, 492 μ m long); fig. 2, RV, ext. lat. (holotype, OS 7772, 496 μ m long).
Scale A (100 μ m; x 182), fig. 1; scale B (100 μ m; x 171), fig. 2.

Remarks: 'Genus Uncertain, species RC' of Maddocks 1966 (*Univ. Kans. Paleont. Contr.* 12) belongs in (contd.) *Cladarocythere*.

Maddocks (1966, p.67) reported subfossil specimens from carbonate and quartz carbonate sands, muddy sands and clays in depths of 2 - 24m from the Nosy Bé area of N Madagascar. The Tanzanian specimens occur in shallow water, carbonate muddy sands.

Cladarocythere pterota sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) coll. no. OS 7772, RV. [Paratypes: Ten single valves, Brit. Mus. (Nat. Hist.) coll. nos. OS 7773 - OS 7782].

Type locality: Stream SW of Mtweru, Lindi, Tanzania; from sample no. FCRM 2010, approx. lat. 9° 56'S, long. 39° 43'E. Lower Miocene.

Derivation of name: From the Greek *pteros*, winged; with reference to the wing-like frill.

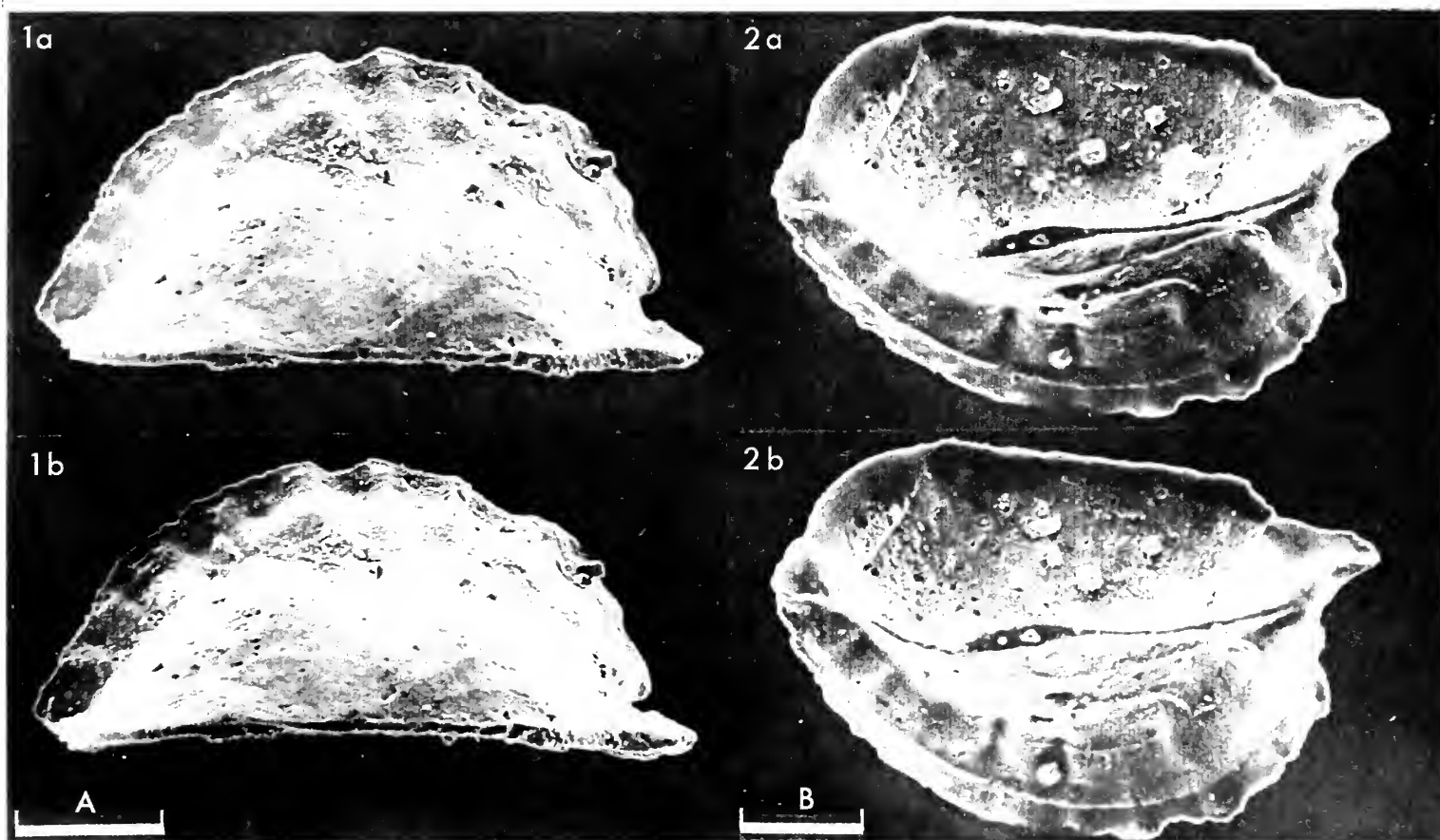
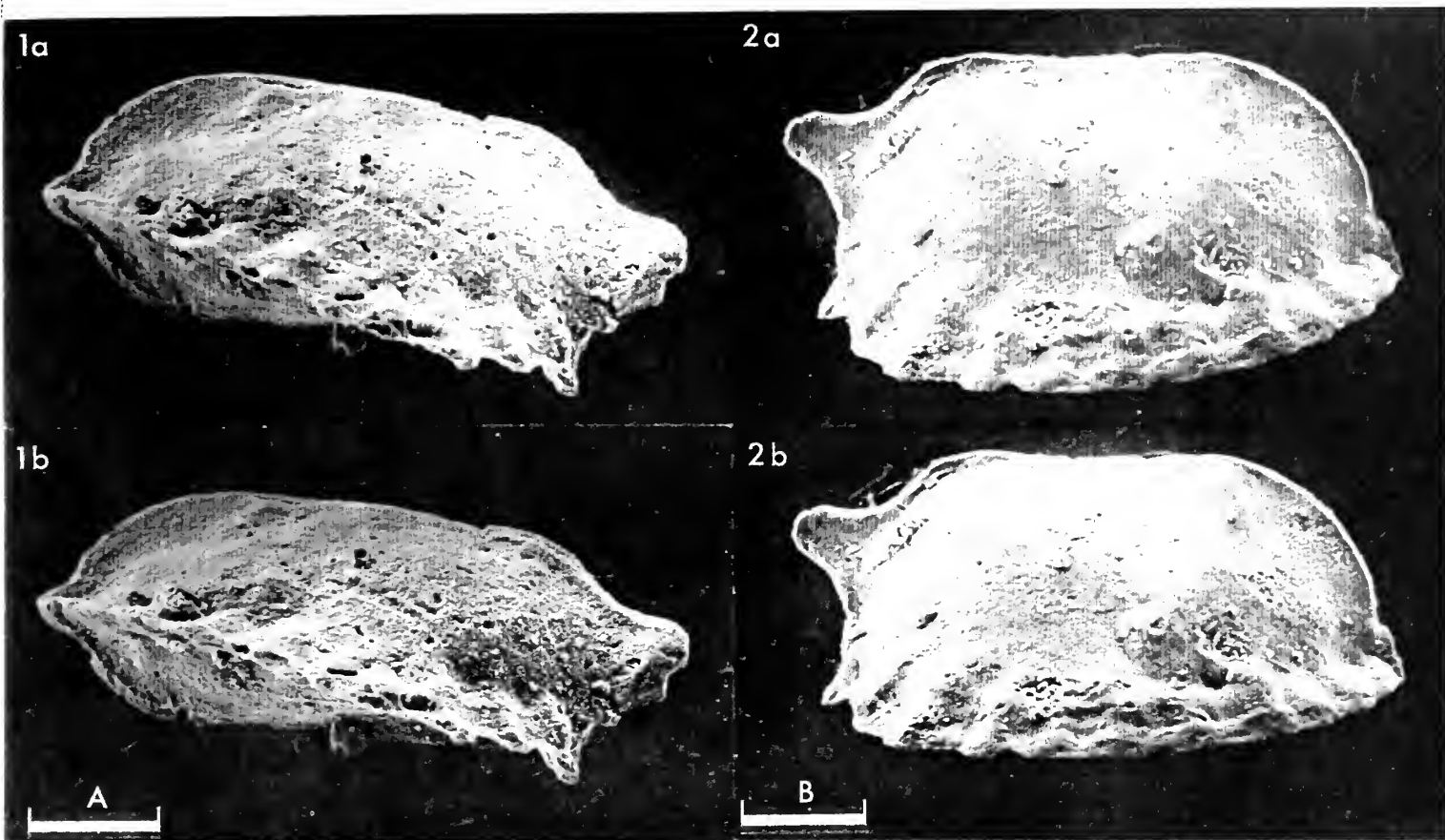
Figured specimens: Brit. Mus. (Nat. Hist.) coll. nos. OS 7774 (LV: Pl. 4, 46, fig. 1), OS 7772 (RV: Pl. 4, 46, fig. 2; Pl. 4, 48, fig. 2), OS 7773 (RV: Pl. 4, 48, fig. 1). All specimens are from the type locality and horizon.

Diagnosis: As for the genus. Frill with about 11 compartments and ventral to the frill in the posterior half are two very fine ribs which run parallel to the ventral margin.

Remarks: 'Genus Uncertain, species RC' of Maddocks (1966, figs. 55.1, 55.2) is a very closely related form and may even be conspecific with *C. pterota*.

Explanation of Plate 4, 48

Fig. 1, RV, ext. dors. (OS 7773, 472 μ m long); fig. 2, RV, int. vent. obl. (holotype, OS 7772, 496 μ m long).
Scale A (100 μ m; x 199), fig. 1; scale B (100 μ m; x 171), fig. 2.



ON *GAMMACY THERE UBIQUITA* MALZ & LORD

by Alan Lord and Heinz Malz

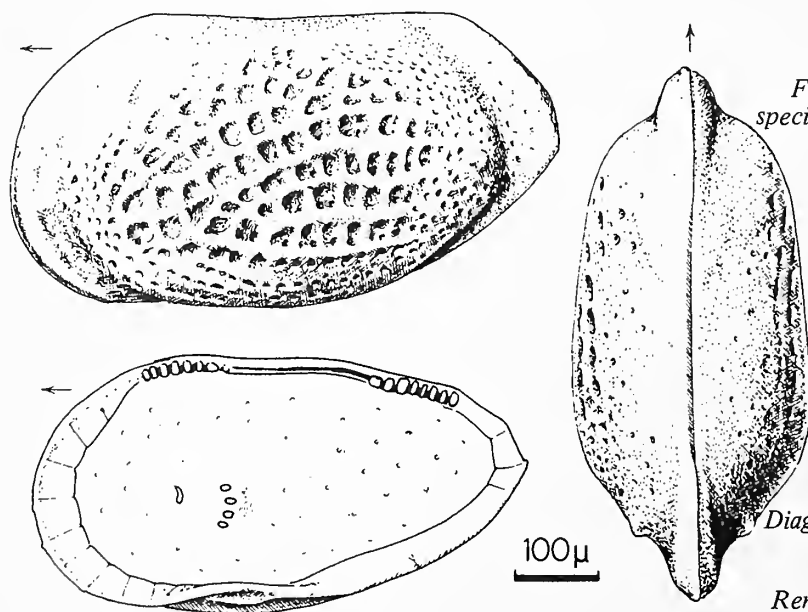
(University College London & Forschungsinstitut Senckenberg, Frankfurt am Main)

Genus *GAMMACY THERE* Malz & Lord, 1976Type-species (by original designation): *Gammacythere ubiquita* Malz & Lord, 1976

Diagnosis: Elliptical in lateral view with valves ventrally inflated. Smooth, flat, and protruding marginal rims are present anteriorly and posteriorly. Dorsal valve edges straight or very slightly curved and close together throughout the length of the dorsal margin. Anterior marginal pore canals widely and evenly spaced; eight canals anteriorly, four posteriorly. Hinge tripartite; terminal loculate grooves with a smooth connecting bar in the left valve. Strongly dimorphic.

Gammacythere ubiquita Malz & Lord, 19761938 Ostracode (513); C.A. Wicher, *Abh. preuss. geol. Landesanst.* 193, 15, pl. 27, fig. 5.1976 *Gammacythere ubiquita* sp. nov. H. Malz & A.R. Lord, *Senckenberg leth.* 57 (4/6), 252, pls. 1, 2 (q.v. for full synonymy).**Holotype:** Forschungsinstitut Senckenberg, Frankfurt, SMF Xe 10429, ♂ LV.**Type locality:** Borehole Hambühren – WA 2, W Germany (MTB 3325, Winsen a.d. Aller), 630m below surface; Lower Pliensbachian (Lias ♂).

Explanation of Plate 4, 50

Fig. 1, ♂ LV, ext. lt. lat. (holotype, Xe 10429, 910 μ m long); fig. 2, ♂ RV, ext. rt. lat. (Xe 10452, 770 μ m long).Scale A (200 μ m; x 90), fig. 1; scale B (200 μ m; x 110), fig. 2.**Figured specimens:**

Forschungsinstitut Senckenberg nos. Xe 10429 (holotype, ♂ LV: Pl. 4, 50, fig. 1), Xe 10452 (♂ RV: Pl. 4, 50, fig. 2), Xe 10431 (♀ car.: Pl. 4, 52, fig. 1), Xe 10430 (♀ car.: Pl. 4, 52, fig. 2), Xe 10449 (♀ LV: Pl. 4, 52, fig. 3), Xe 10432 (♂ car.: Pl. 4, 52, fig. 4) and Xe 10431 (♂ car.: Pl. 4, 52, fig. 5). Specimens Xe 10429 – Xe 10432 from Hambühren – WA 2, W Germany (Lower Pliensbachian; type locality and horizon); Xe 10449 from Borehole Schlieven 4, W Mecklenburg, E Germany (Lower Pliensbachian); Xe 10452 from Stowell Park Borehole, Gloucestershire, England (1090 - 1100 ft below surface, Lower Pliensbachian), Grid ref. SP 084118.

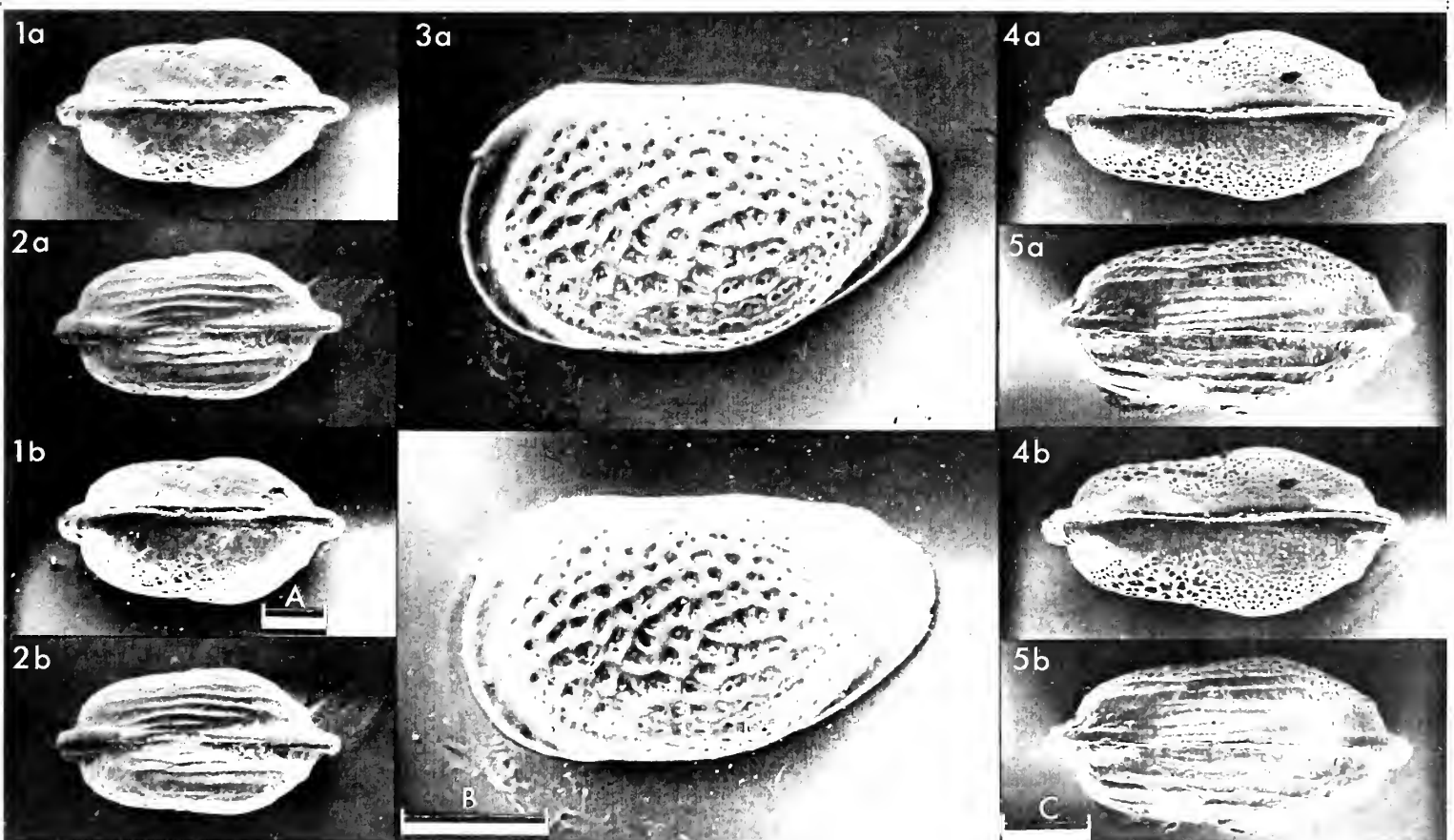
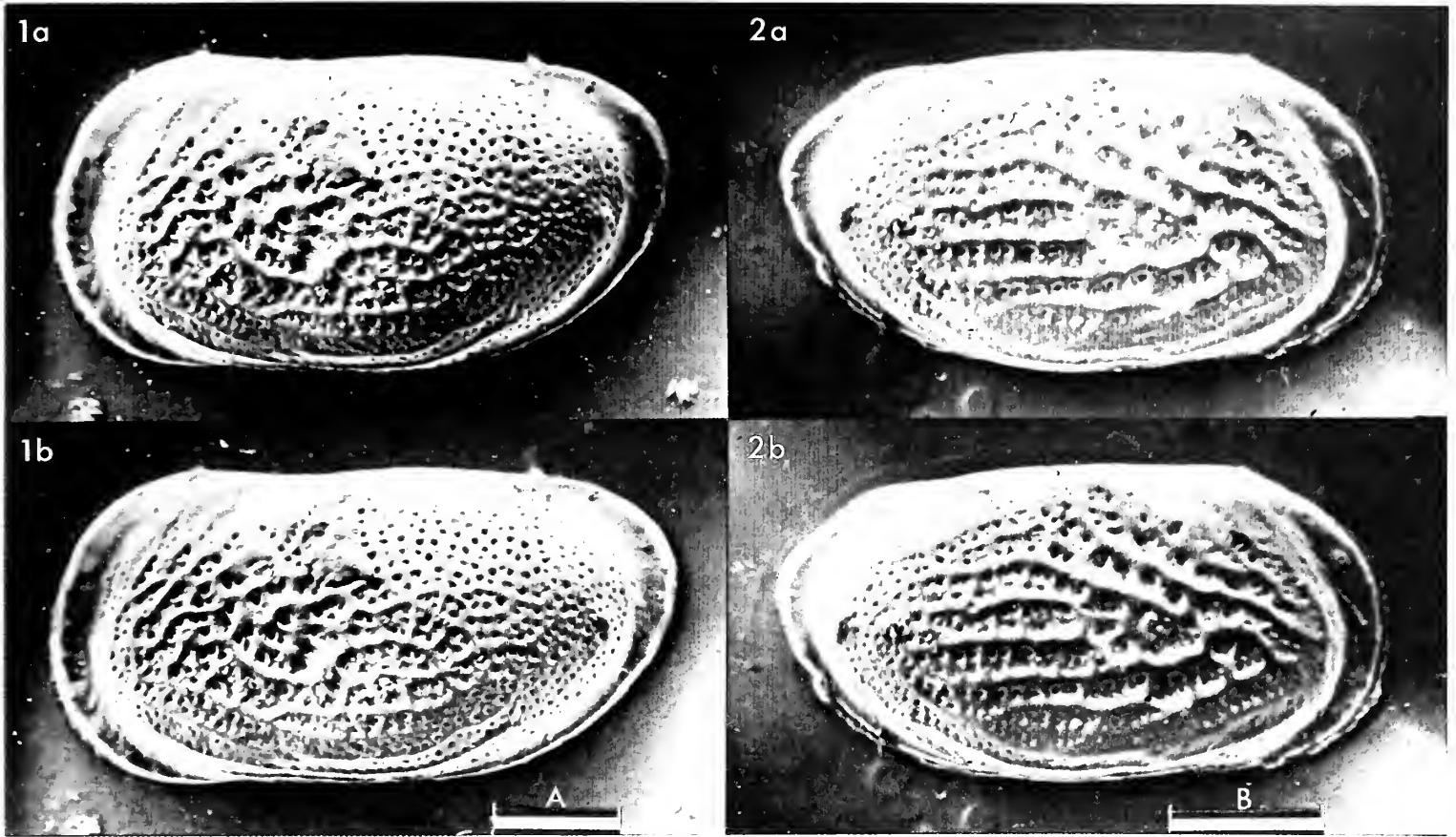
Diagnosis: As for the genus (*Gammacythere* is at present monospecific).**Remarks:** A distinctive and widespread early Pliensbachian species in NW Europe. Highly variable in size and ornament. Discussed in detail by Malz & Lord (1976).

Text - fig. 1. *Gammacythere ubiquita* Malz & Lord (♀); ibex Zone, Lower Pliensbachian, Blockley Station Quarry, Gloucestershire, England. Drawings by Dr. John C. Holden.

Explanation of Plate 4, 52

Fig. 1, ♀ car., ext. dors. (Xe 10431, 800 μ m long); fig. 2, ♀ car., ext. vent. (Xe 10430, 810 μ m long); fig. 3, ♀ LV, ext. lt. lat. (Xe 10449, 680 μ m long); fig. 4, ♂ car., ext. dors. (Xe 10432, 930 μ m long); fig. 5, ♂ car., ext. vent. (Xe 10431, 910 μ m long).

Scale A (200 μ m; x 50), figs. 1, 2, 4; scale B (200 μ m; x 100), fig. 3; scale C (200 μ m; x 60), fig. 5.



ON *CALLISTOCY THERE BADIA* (NORMAN)

by John Athersuch and John E. Whittaker
(University of Leicester and British Museum [Nat. Hist.], London)

Callistocythere badia (Norman, 1862)

1862 *Cythere badia* sp. nov. A.M. Norman, *Ann. Mag. Nat. Hist.* ser. 3, 9, 48, pl. 3, figs. 13 - 15.

Lectotype: (here designated) ♀ carapace, housed with the Brady coll., Hancock Museum. Newcastle-upon-Tyne; no catalogue no., but placed in a separate, labelled slide.

Type locality: Mount's Bay, Penzance, Cornwall, SW England, approx. lat. 50° 04'N, long. 05° 30'W; Recent.

Diagnosis: Ornament very subdued for genus; pattern distinctive; fossae best developed at anterior and posterior margins.

Figured specimens: Hancock Museum specimen: lectotype (♀ car.: Pl. 4, 54, fig. 1), collected alive by the Rev. A.M. Norman, May, 1855, from marine algae in rock-pools.

Explanation of Plate 4, 54

Fig. 1, ♀ car., ext. lt. lat. (lectotype, 520 μm long); fig. 2, ♀ car., ext. lt. lat. (1976.1304, 520 μm long); fig. 3., ♀ car., ext. lt. lat. (1976.1305, 510 μm long); fig. 4, juv. - 1 car., ext. lt. lat. (1976.1306, 450 μm long); fig. 5, ♂ car., ext. lt. lat. (1976.1307, 500 μm long); fig. 6, ♂ car., ext. rt. lat. (1976.1308, 510 μm long); fig. 7, ♀ LV, int. lat. (1976.1309, 500 μm long), fig. 8, ♂ LV, int. lat. showing soft parts (1976.1310, 505 μm long).
Scale A (125 μm; x 95), figs. 1 - 8.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. 1976.1304 (♀ car.: Pl. 4, 54, fig. 2); 1976.1305 (♀ car.: Pl. 4, 54, fig. 3); (contd.) 1976.1306 (juv. - 1 car.: Pl. 4, 54, fig. 4); 1976.1307 (♂ car.: Pl. 4, 54, fig. 5); 1976.1308 (♂ car.: Pl. 4, 54, fig. 6; Pl. 4, 56, fig. 1); 1976.1309 (♀ LV: Pl. 4, 54, fig. 7; Pl. 4, 56, figs. 2, 3, 5, 7); 1976.1310 (♂ LV: Pl. 4, 54, fig. 8); 1976.1311 (♀ RV: Pl. 4, 56, figs. 4, 6). Text-figs. 1 - 3 are based on 1976.1312.

1976.1304, 1306 were collected alive by J.E. Whittaker on 3rd. August, 1969 from the alga *Enteromorpha intestinalis* in rock-pools at Osmington Mills, Weymouth Bay, S England, approx. lat. 50° 38'N, long. 02° 23'W; water temperature 19°C, salinity 34°/oo.

1976.1305, 1307 - 1312 were collected alive by J. Athersuch during autumn, 1973, from filamentous algae at Dhekelia, Cyprus, approx. lat. 34° 58'N, long. 33° 46'E; water temperature 24°C, depth 5 cm, salinity 39°/oo.

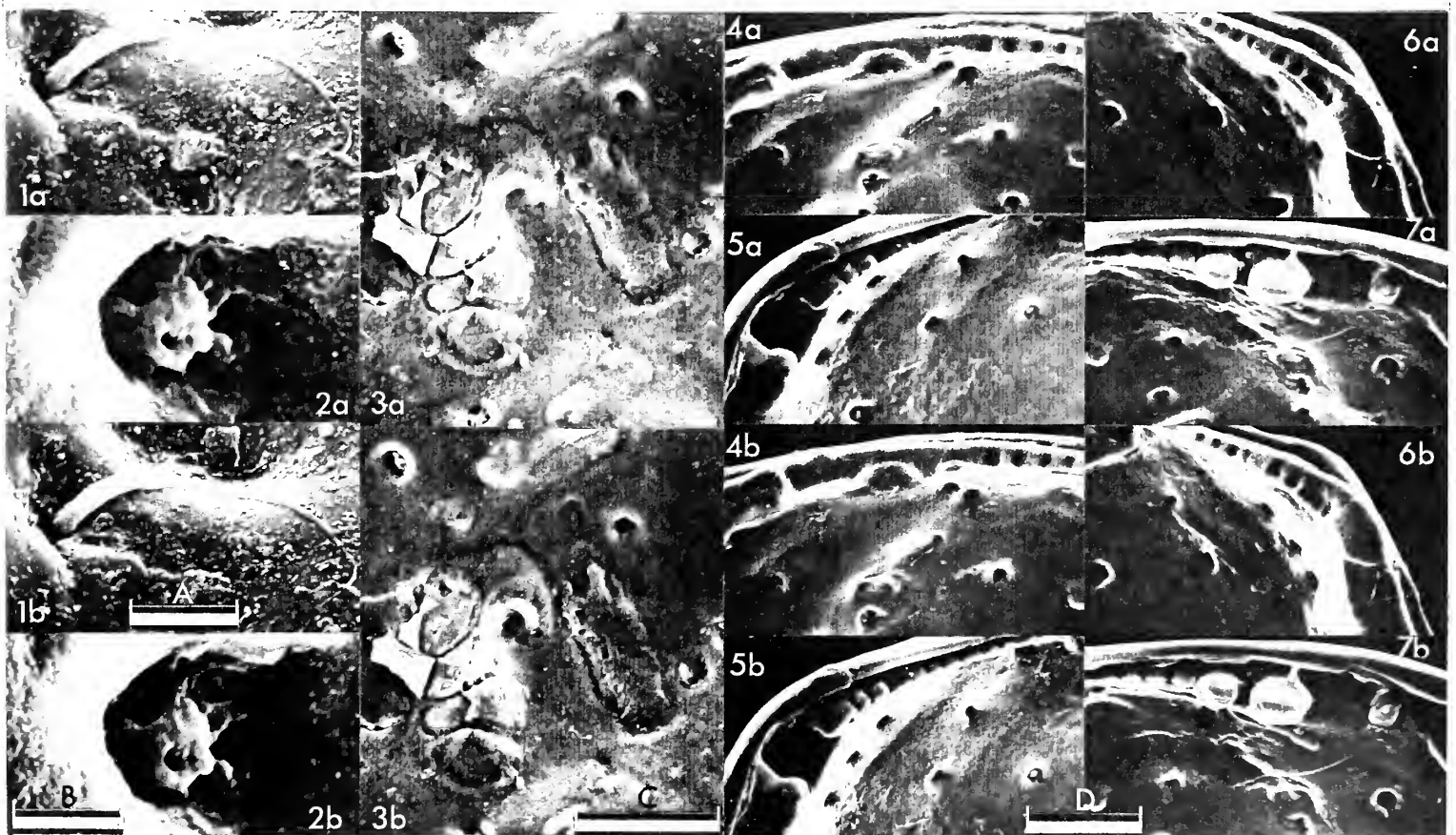
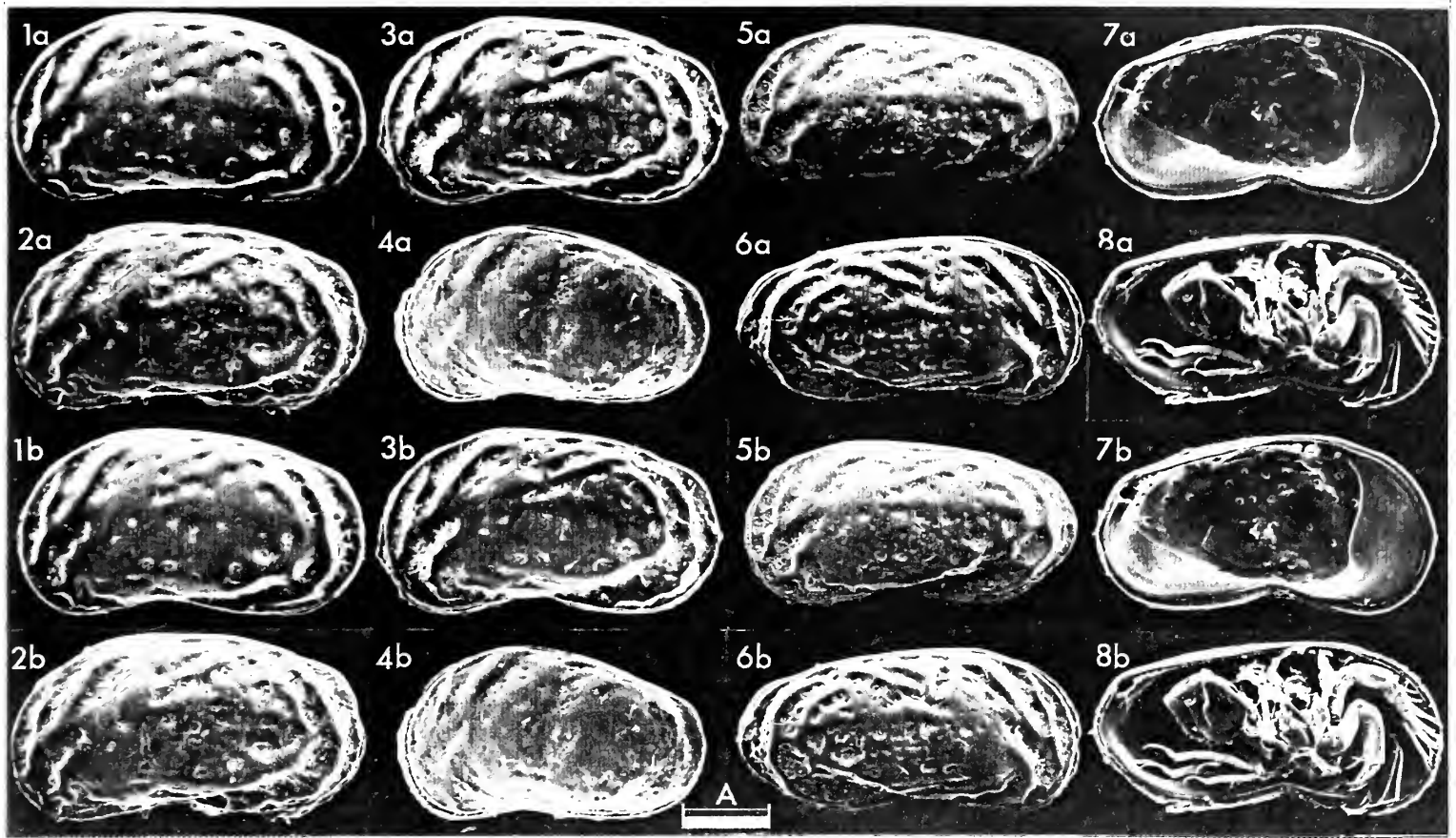
Remarks: Previous records of *C. badia* have been confined almost exclusively to the shores of the British Isles. An examination of material in the Brit. Mus. (Nat. Hist.), Hancock Museum and our own collections revealed only females and confirmed the widespread, but infrequent, occurrence of this dimorph of the species in Britain. However, one of us (J.A.) has found both dimorphs living in Cyprus. We have not been able to confirm records from other areas. This little known species may well have a wider European distribution, but probably has not been recognised due to the inadequacy of the original illustrations and description.

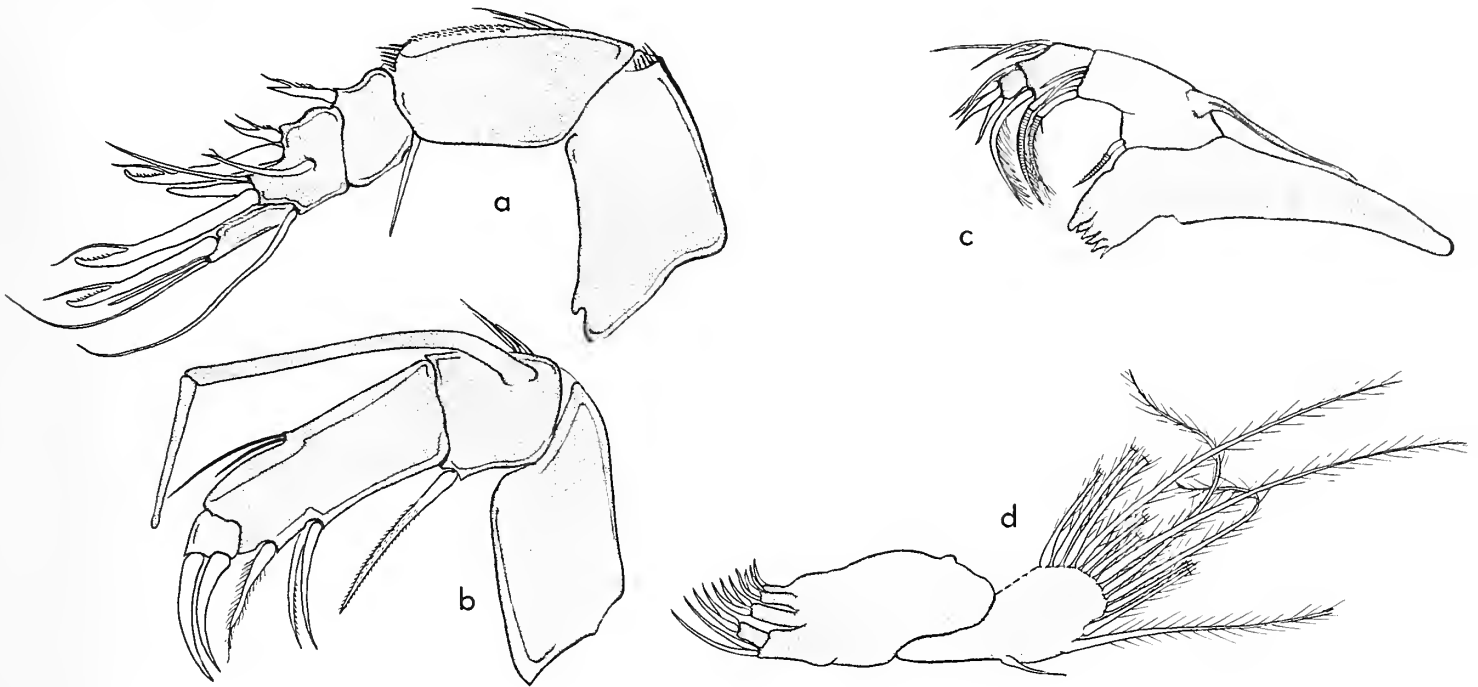


Text-fig. 1. ♂ RV, internal, transmitted light. Radial pore canals. (x 154; 1976.1312).

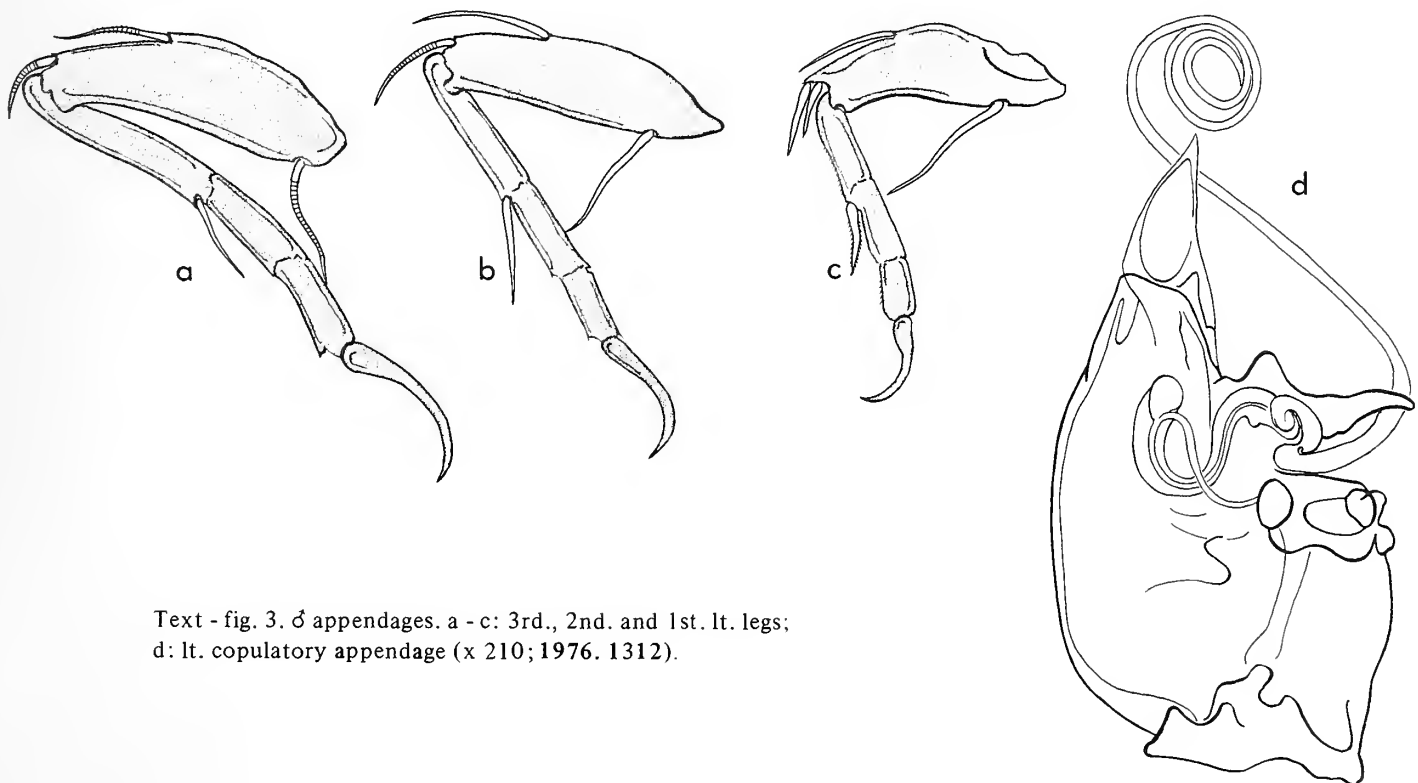
Explanation of Plate 4, 56

Fig. 1, ♂ car., pore and seta, anterodorsal area (1976.1308); figs. 2, 3, 5, 7, ♀ LV, int. lat. (1976.1309): fig. 2, int. view of pore showing sieve plate, post. area; fig. 3, musc. sc.; fig. 5, post. hinge; fig. 7, ant. hinge. Figs. 4, 6, ♀ RV, int. lat. (1976.1311): fig. 4, ant. hinge; fig. 6, post. hinge.
Scale A (10 μm; x 1500), fig. 1; scale B (5 μm; x 3000), fig. 2; scale C (50 μm; x 400), fig. 3; scale D (50 μm; x 300), figs. 4 - 7.





Text - fig. 2. ♂ appendages a: 1st. lt. antenna; b: 2nd. lt. antenna; c: lt. mandible; d: lt. maxilla (x 210; 1976.1312).



Text - fig. 3. ♂ appendages. a - c: 3rd., 2nd. and 1st. lt. legs; d: lt. copulatory appendage (x 210; 1976. 1312).

ON *CYTHERETTA JUDAEA* (BRADY)

by John Athersuch
(University of Leicester, England)

Genus *CYTHERETTA* Müller, 1894

Type-species (by monotypy): *Cytheretta rubra* Müller, 1894; here considered conspecific with *Ilyobates* (?) *judaea* Brady, 1868.

Diagnosis: Carapace elongate - ovate, shell thick. Marked asymmetry of valves; smooth or with ornament of longitudinal ribs. Hinge strong, holamphidont, anterior tooth prominent. Fulcral point developed into a strong pillar. Inner margin highly sinuous; numerous, unbranched radial pore canals anteriorly and posteriorly. First, and, in some species, second legs of male asymmetric.

Explanation of Plate 4, 60

Fig. 1, lectotype, ♂ LV, ext. lat. (Hancock Museum specimen, 720 μm long); fig. 2, lectotype, ♂ RV, ext. lat. (Hancock Museum specimen, 720 μm long); fig. 3, ♂ rt. car., ext. lat. (1976.1103, 804 μm long).
Scale A (250 μm; x 83), figs. 1, 2; scale B (250 μm; x 75), fig. 3.

Cytheretta judaea (Brady, 1868)

- 1868 *Ilyobates* (?) *judaea* sp. nov. G.S. Brady, La côte de Syrie; in: *Les Fonds de la Mer*, L. De Folin & L. Perier, Paris, pt. 1, 112, pl. 13, figs. 17, 18.
1894 *Cytheretta rubra* sp. nov. G.W. Müller, *Fauna Flora Golf. Neapel* 21, 382, pl. 8, figs. 9, 10, 16; pl. 39, figs. 8 - 22, 24; non pl. 8, fig. 13.
1971 *Cytheretta subradiosa* (Roemer); P.J. Barbeito - Gonzalez, *Mitt. hamb. zool. Mus. Inst.* 67, 284, pl. 17, figs. 1a, 2a.
1972 *Cytheretta judaea* (Brady); M.C. Keen, *Bull. Br. Mus. nat. Hist. (Geol.)* 21, (6), 283, pl. 1, figs. 1, 4 - 7, 9, text-fig. 8.

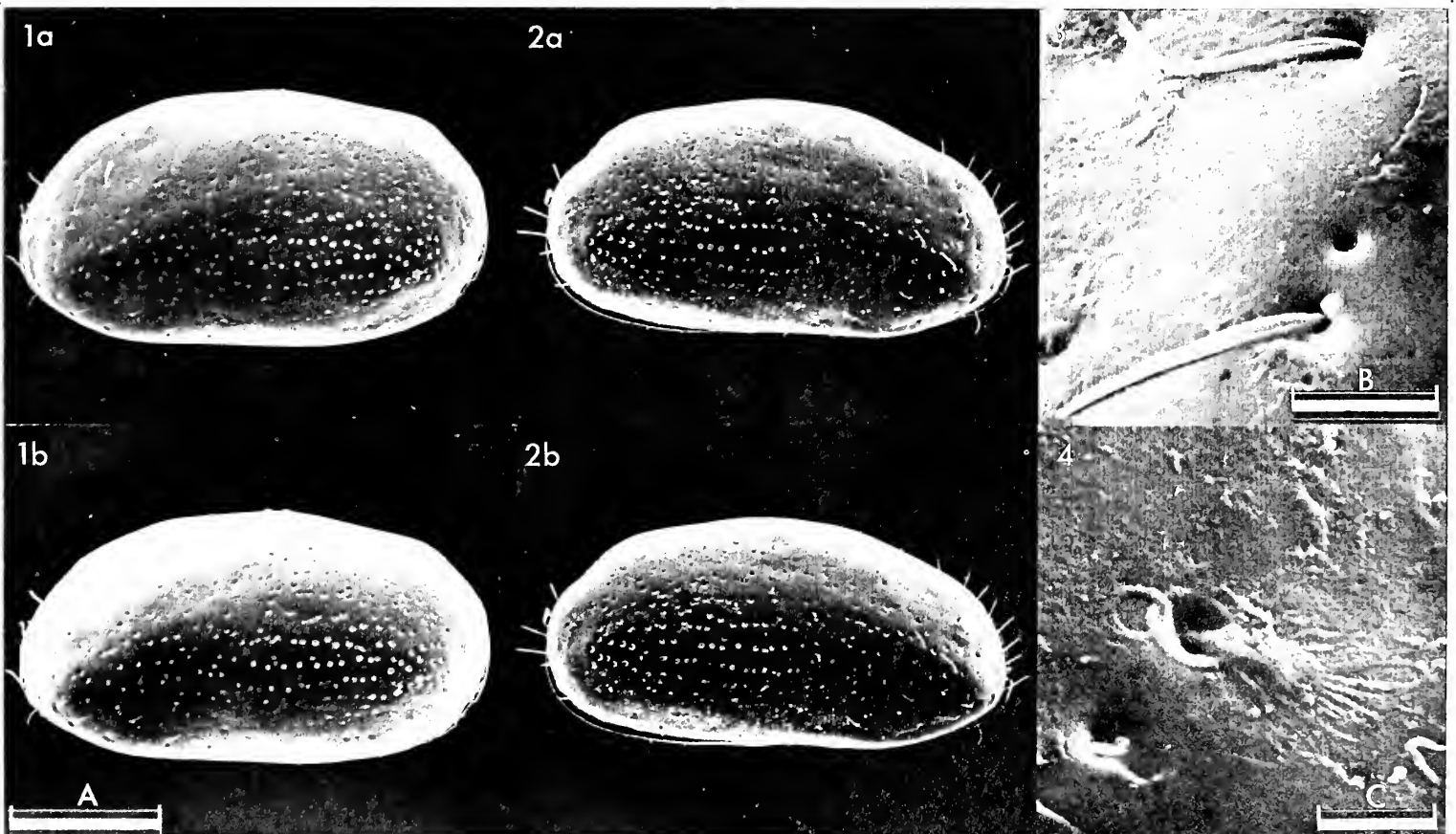
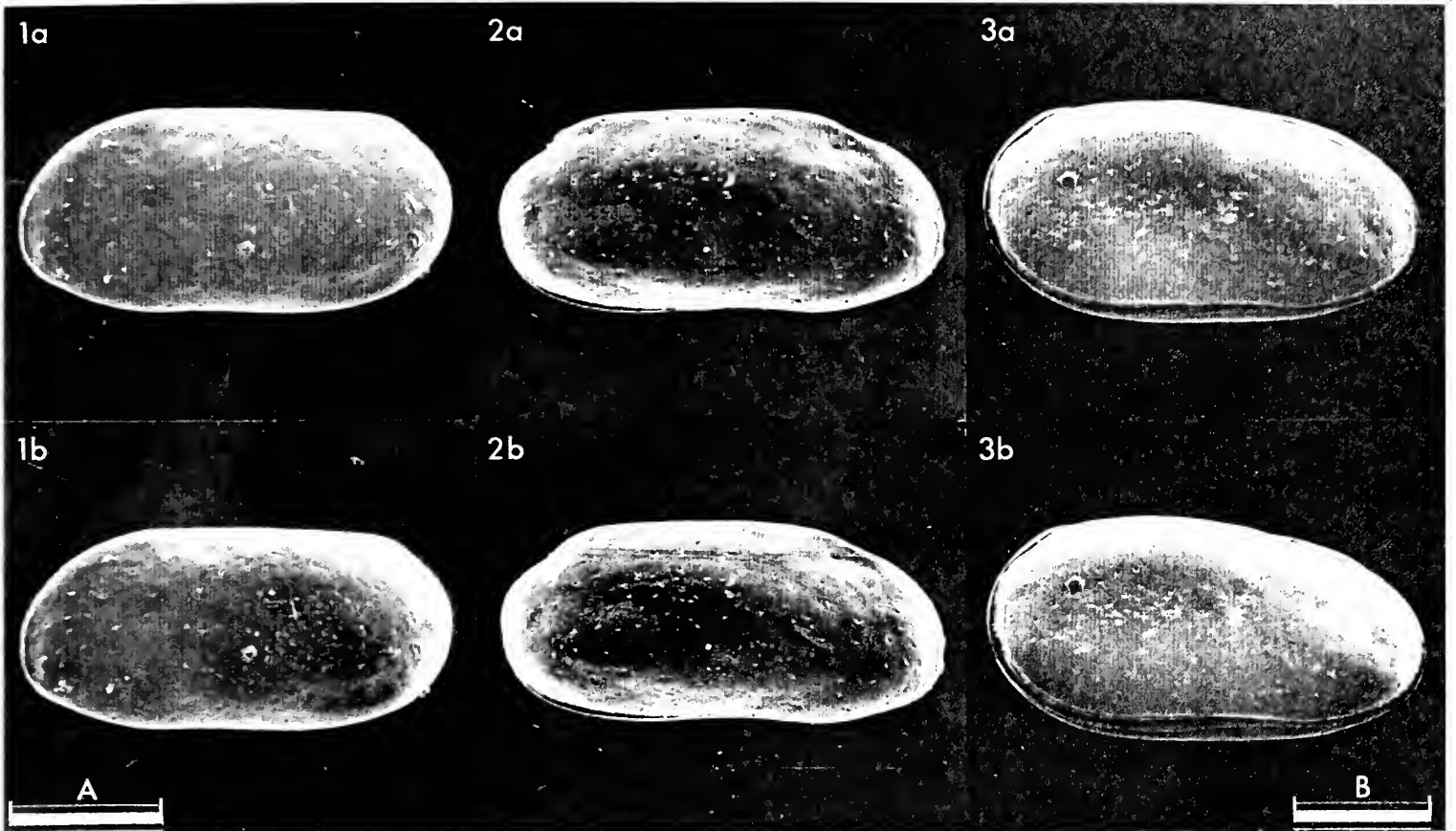
Lectotype: (here designated) ♂ LV, housed with the Brady collection, Hancock Museum, Newcastle-upon-Tyne; no catalogue number, but placed in a separate, labelled slide.

Type locality: Jaffa (Tel Aviv), coast of Israel, approx. lat. 32° 04'N, long. 34° 45'E; Recent.

Diagnosis: Surface unornamented but with irregular rows of small circular pores. Male copulatory appendages, distribution of radial pore canals and opaque areas distinctive.

Explanation of Plate 4, 62

Fig. 1, ♀ LV, ext. lat. (1976.1104, 756 μm long); fig. 2, ♀ RV, ext. lat. (1976.1104); figs. 3, 4, ♀ RV, details of ornament (1976.1104).
Scale A (250 μm; x 83), figs. 1, 2; scale B (25 μm; x 800), fig. 3; scale C (10 μm; x 1600), fig. 4.



Figured specimens: Hancock Museum specimen (δ LV: Pl. 4, 60, fig. 1; RV: Pl. 4, 60, fig. 2). Brit. Mus. (Nat. Hist.) 1976.1103 (δ car.: Pl. 4, 60, fig. 3); 1976.1104 (δ LV: Pl. 4, 62, fig. 1; RV: Pl. 4, 62, figs. 2 - 4); 1976.1105 (δ LV: Pl. 4, 64, fig. 1; Pl. 4, 66, figs. 3, 5); 1976.1106 (δ LV & soft parts: Pl. 4, 64, fig. 2); 1976.1107 (δ car.: Pl. 4, 64, fig. 3); 1976.1108 (? δ RV: Pl. 4, 66, fig. 1); 1976.1109 (δ RV: Pl. 4, 66, figs. 2, 4).

Nos. 1976.1103, 1109 from beach sand at Rimini, Italy, kindly given by Prof. Ruggieri. 1976.1107, ? sub-Recent from the Bay of Naples, given by Dr. G. Bonaduce. 1976. 1104, 1106 collected by Squ. Ldr. C.R. Chrisp in Cyprus; 1976.1104 from sand at 13m in Akrotiri Bay; 1976.1106 from sand at 40 m off Klidhes Island. 1976.1105 collected by the author during November, 1973, from near Cape Greco, Cyprus, approx. lat. $34^{\circ} 04'N$, long. $35^{\circ} 00'E$, in sand, water temperature $25^{\circ}C$, depth 8m, O_2 102%, salinity $39^{\circ}/\text{oo}$.

Remarks: Brady (op. cit.) first recorded *Ilyobates* (?) *judaea* from Latakia, Syria (p. 110) and Jaffa, Israel (p. 112) but did not designate a type specimen. The specimens from Latakia are not in the Brady collection in the Hancock Museum, and are therefore presumed lost. However, two specimens from Jaffa remain undamaged. The lectotype has been selected from this material.

Müller (op. cit.) illustrated the carapace and soft parts of *Cytheretta rubra* sp. nov., here considered conspecific with *C. judaea*. Drawings of soft parts (herein) are based on a specimen from Müller's syntype collection (ex - 9308), now on separate, labelled slides housed in the Zoological Museum, E Berlin.

Explanation of Plate 4, 64

Fig. 1, δ LV, int. lat. (1976.1105, 890 μm long); fig. 2, δ LV & soft parts (1976.1106, 800 μm long); fig. 3, δ car., vent. (1976.1107, 730 μm long).

Scale A (250 μm ; x 73), fig. 1; scale B (250 μm ; x 78), fig. 2; scale C (250 μm ; x 82), fig. 3.

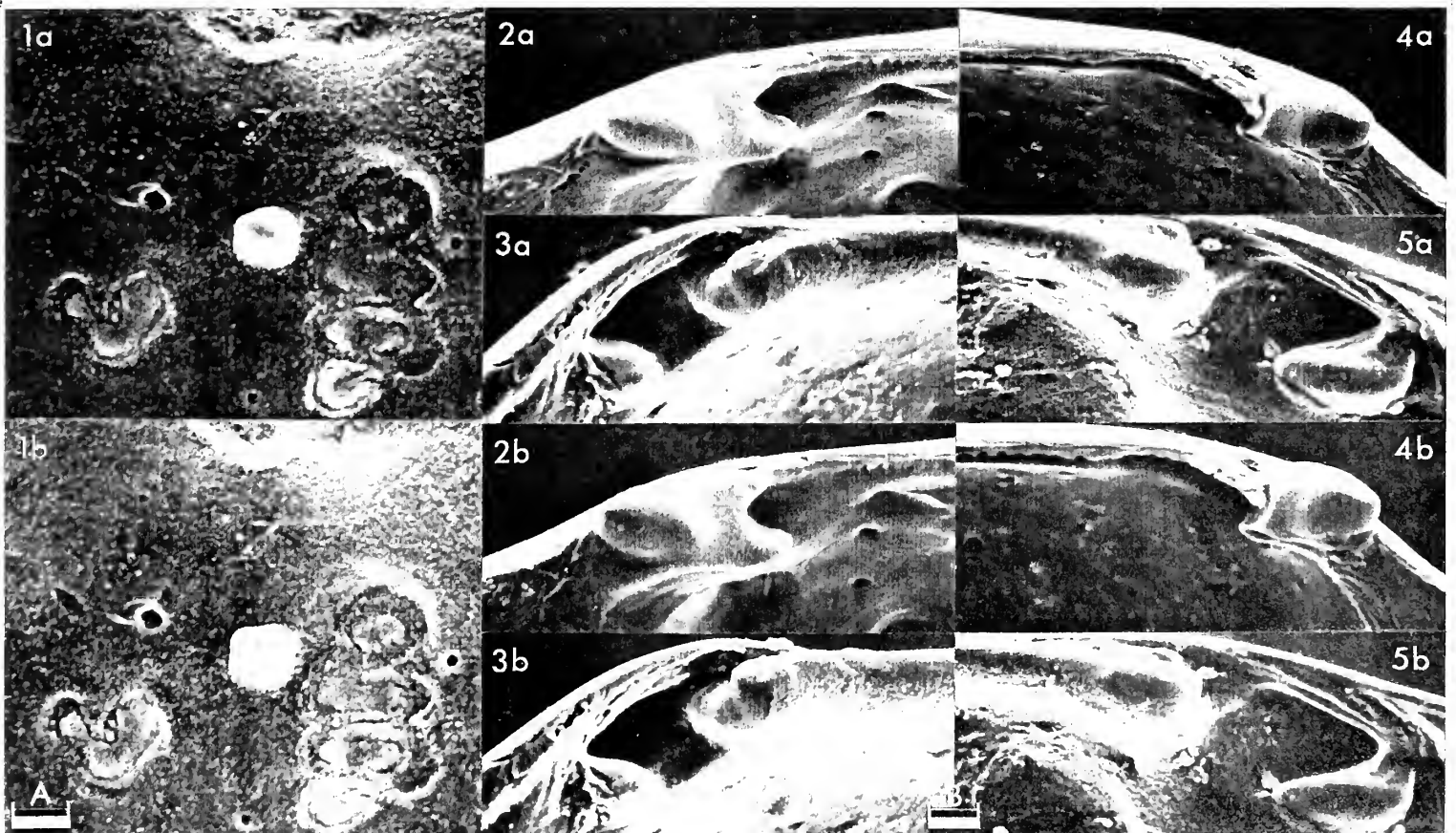
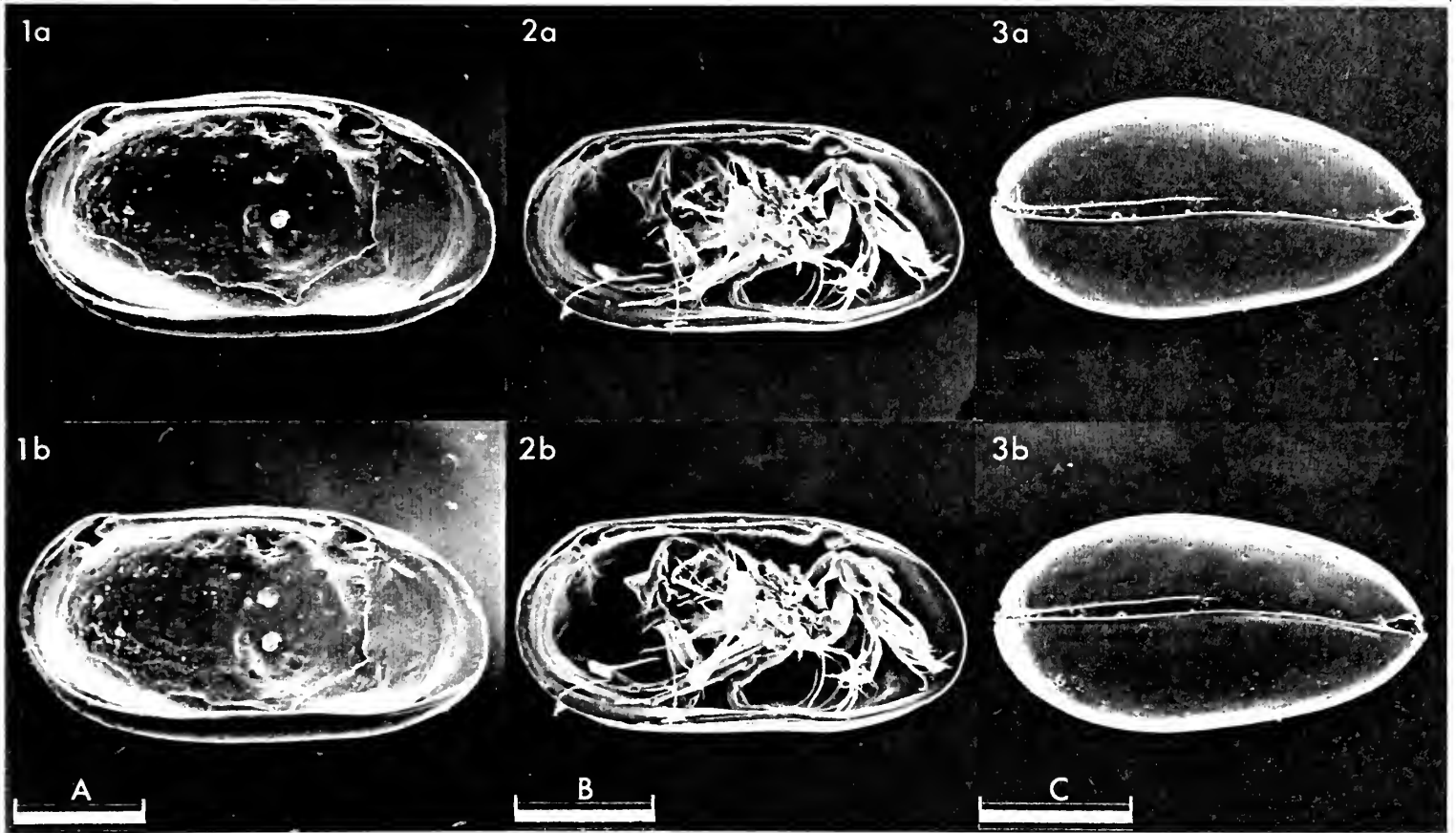
Remarks: This species has been considered by some authors (e.g. Ruggieri 1950, *G. Geol.* ser. 2, 21; Hazel (contd.) 1967, *Prof. Pap. U.S. geol. Surv.* no. 564) to be conspecific with *Cytherina subradiosa* Roemer, 1838 from the Pliocene of Castellarquato, Italy. Roemer's original material is lost (pers. comm. Prof. G. Ruggieri) and his description and illustration inadequately define this species. Keen (op. cit.) considered the Pliocene *C. subradiosa* (Roemer) to be distinct from the present species and with this I agree. For full details see Keen, op. cit., p. 281.

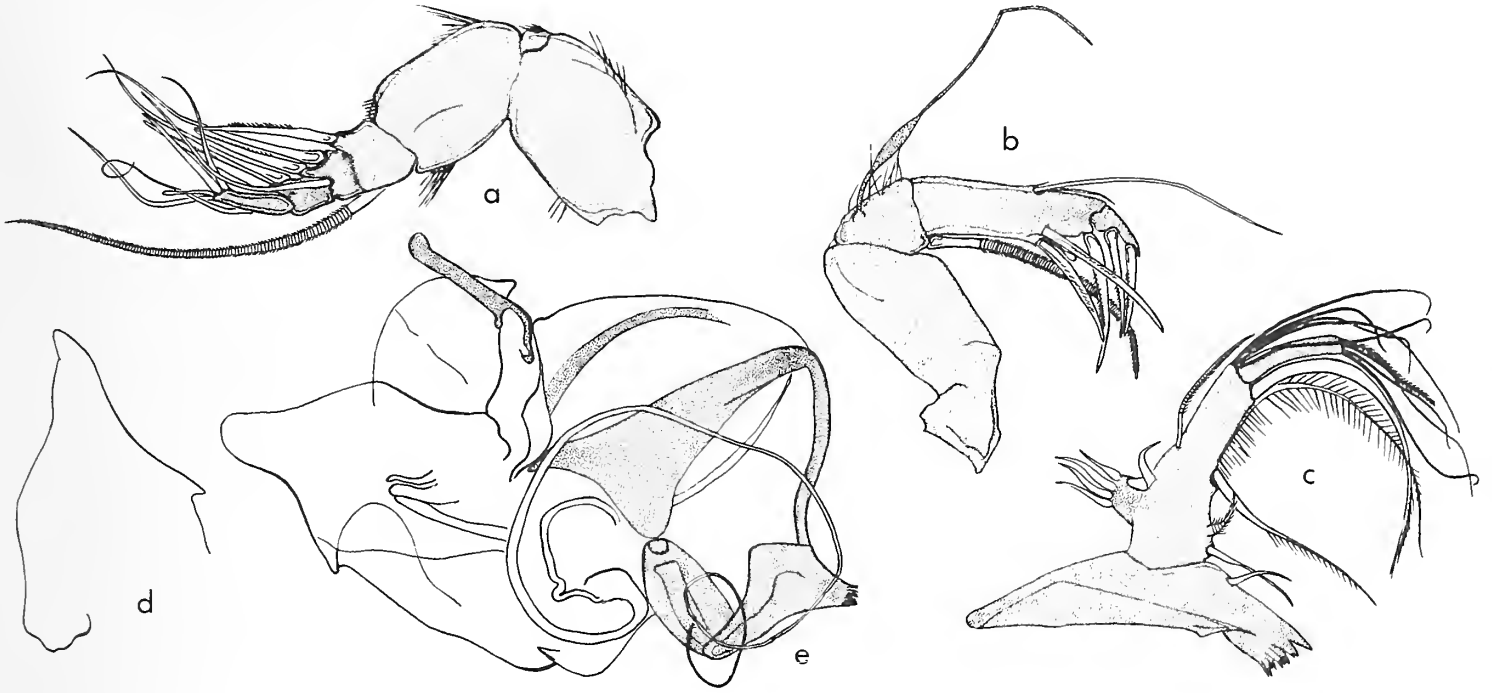
Distribution: Recent: coasts of Syria and Israel (Brady, op. cit.), the Aegean (Brady collection), the Adriatic (Ruggieri, op. cit. and others), Naples (Müller, op. cit.), Monaco (Rome 1942, *Monaco Inst. Oceanogr.*, Bull. 819), and Cyprus (herein).

Explanation of Plate 4, 66

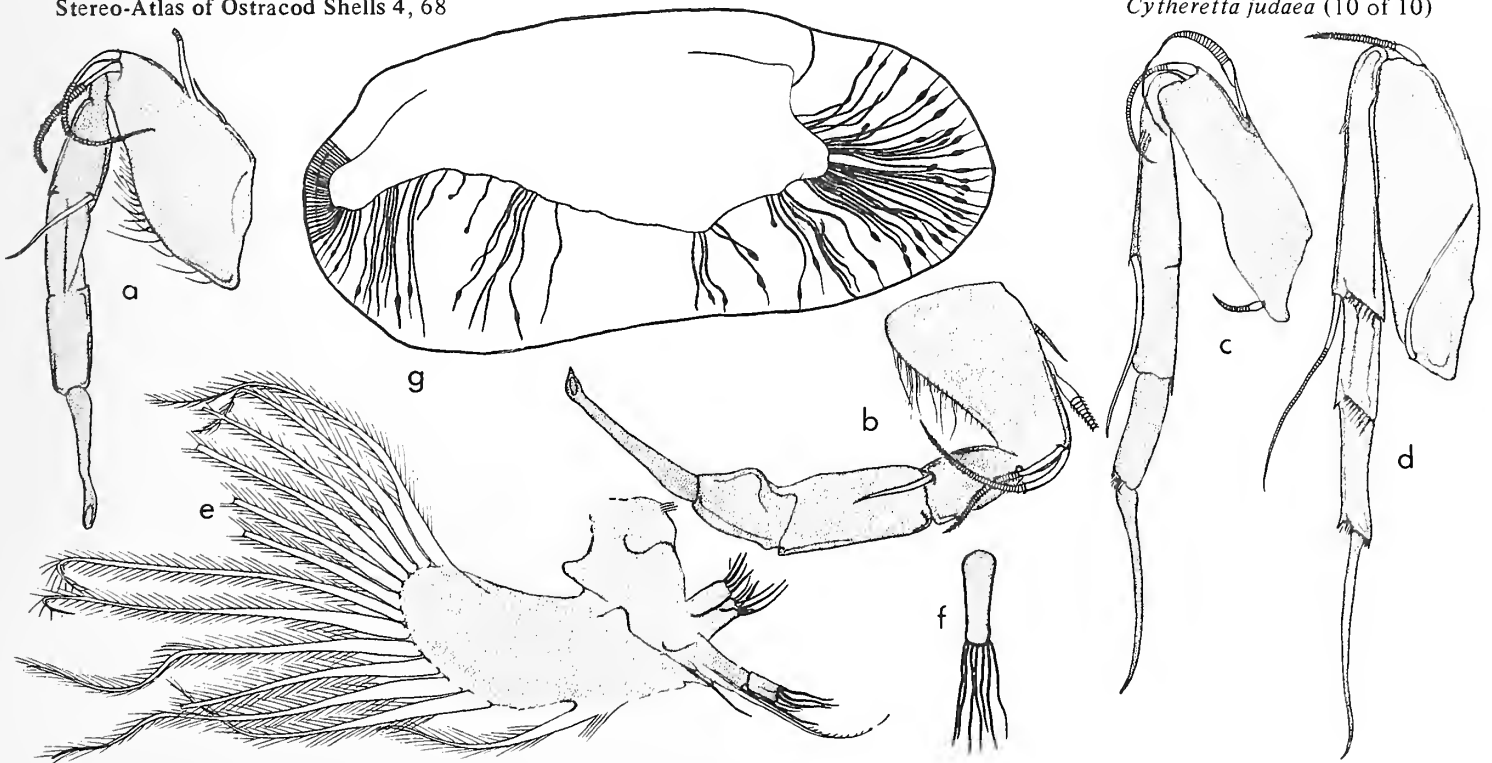
Fig. 1, δ RV, int. lat. musc. sc. (1976.1108, 902 μm long); figs. 2, 4, δ RV, terminal hinge elements (1976.1109); figs. 3, 5 δ LV, terminal hinge elements (1976.1105).

Scale A (25 μm ; x 290), fig. 1; scale B (25 μm ; x 262), figs. 2 - 5.





Text - fig. 1. ♂ appendages (x 190). a: 1st. lt. antenna; b: 2nd. rt. antenna; c: lt. copulatory appendage; d: distal part of rt. copulatory appendage; e: mandible.



Text - fig. 2. a - f. ♂ appendages (x 190). a: 1st. lt. leg; b: 1st. rt. leg; c: 2nd. lt. leg; d: 3rd. lt. leg; e: maxilla; f: brush shaped organ. 2. g: Radial pore canals and opaque areas of a ♂ RV from Cyprus (x 110).

ON *CYTHERETTA ADRIATICA* RUGGIERI

by John Athersuch
(University of Leicester, England)

Cytheretta adriatica Ruggieri, 1952

- 1866 *Cythere jurinei* Münster; G.S. Brady, *Trans. zool. Soc. Lond.* 5, 372, pl. 59, figs. la - f (non *C. jurinei* Münster, 1830).
1878 *Cythere jurinei* Münster; G.S. Brady, *Trans. zool. Soc. Lond.* 10, 305, pl. 65, fig. 2.
1950 *Cytheretta jurinei* (Münster); G. Ruggieri, *G. Geol.*, ser. 2, 21, 11, pl. 1, fig. 11, text-fig. 3.
1952 *Cytheretta adriatica* sp. nov. G. Ruggieri, *G. Geol.*, ser. 2, 22, 36.
1958 *Cytheretta ruggierii* sp. nov. H.S. Puri, *Trans. Gulf Coast Assoc. Geol. Soc.* 8, 186, pl. 2, figs. 1 - 5.
1971 *Cytheretta adriatica* Ruggieri; P.J. Barbeito-Gonzalez, *Mitt. hamb. zool. Mus. Inst.* 67, 285, pl. 17, figs. 1b, 2b, 3b.

Holotype: (not figured herein) Deposited in the Ruggieri collection, Institute of Geology, University of Bologna, Italy; no. 555.

Type locality: The bed of the Santerna River, S of Imola, N Italy, approx. lat. 44° 22'N, long. 11° 43'E; Milazzian (Quaternary), in a sub-littoral, grey sand.

Explanation of Plate 4, 70

Fig. 1, ♀ LV, ext. lat. (1976.1110, 1220 μm long); fig. 2, ♂ LV, ext. lat. (1976.1111, 1340 μm long); fig. 3, juv. - 1 RV, ext. lat. (1976.1112, 817 μm long).

Scale A (250 μm; x 53), figs. 1, 2; scale B (250 μm; x 62), fig. 3.

Figured specimens: Brit. Mus. (Nat. Hist.) 1976. 1110 (♀ LV: Pl. 4, 70, fig. 1; Pl. 4, 74, fig. 1); 1976.1111 (♂ LV: Pl. 4, 70, fig. 2; Pl. 4, 74, figs. 5, 6); 1976.1112 (juv. - 1: Pl. 4, 74, fig. 3); 1976.1113 (? ♂: Pl. 4, 72, fig. 1; text-fig. 1, a, c); 1976.1114 (♀ RV: Pl. 4, 72, fig. 2; LV: Pl. 4, 72, fig. 3); 1976.1115 (♂ LV: Pl. 4, 74, fig. 2); 1976.1116 (♂ RV & soft parts: Pl. 4, 74, fig. 3); 1976.1117 (♂ LV: Pl. 4, 74, fig. 4); 1976.1118 (♂ LV: Pl. 4, 76, figs. 1, 3, 5); 1976.1119 (♂ RV: Pl. 4, 76, figs. 2, 4). Text figs. 2, 3 are based on 1976.1110, 1111.

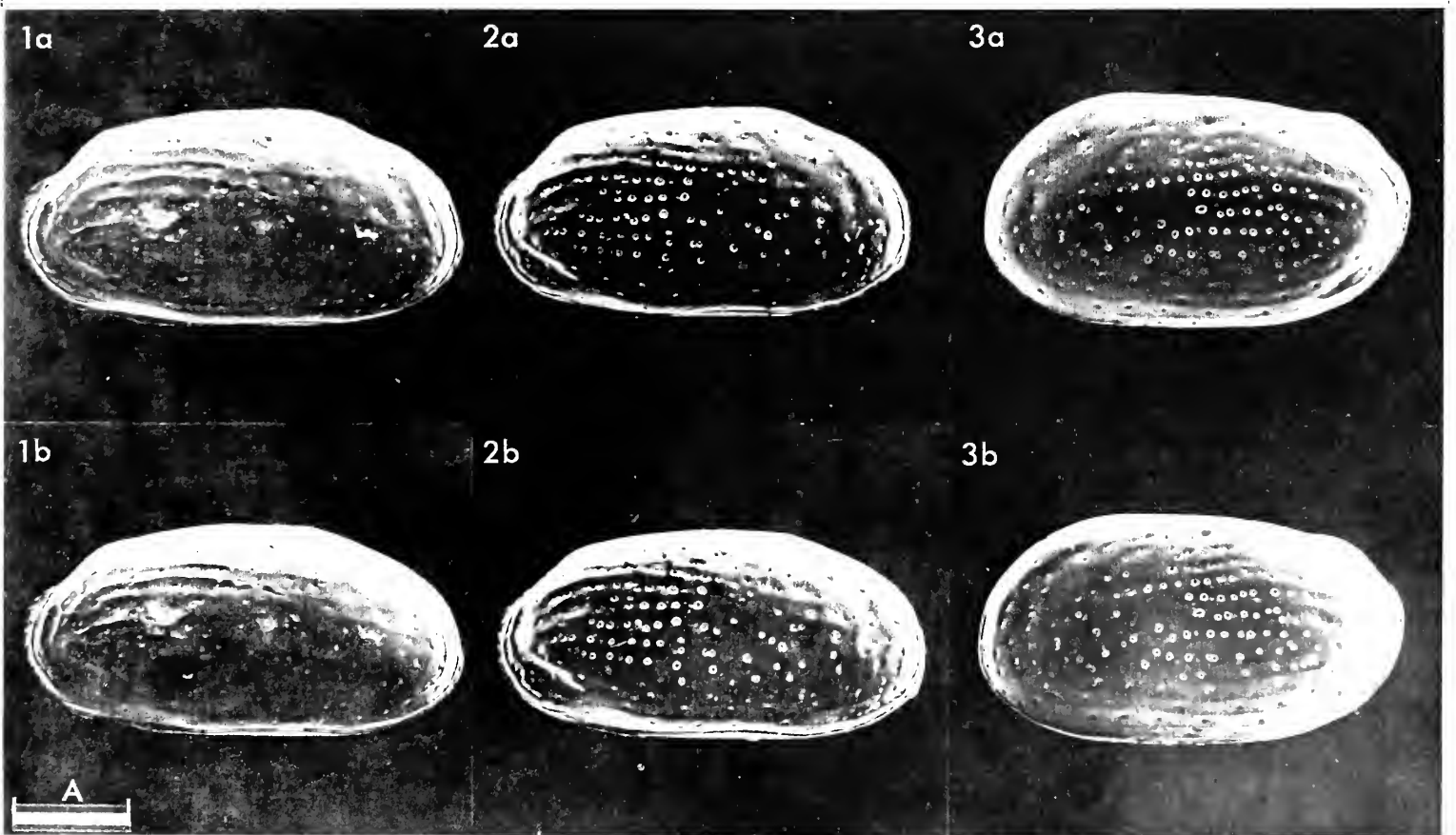
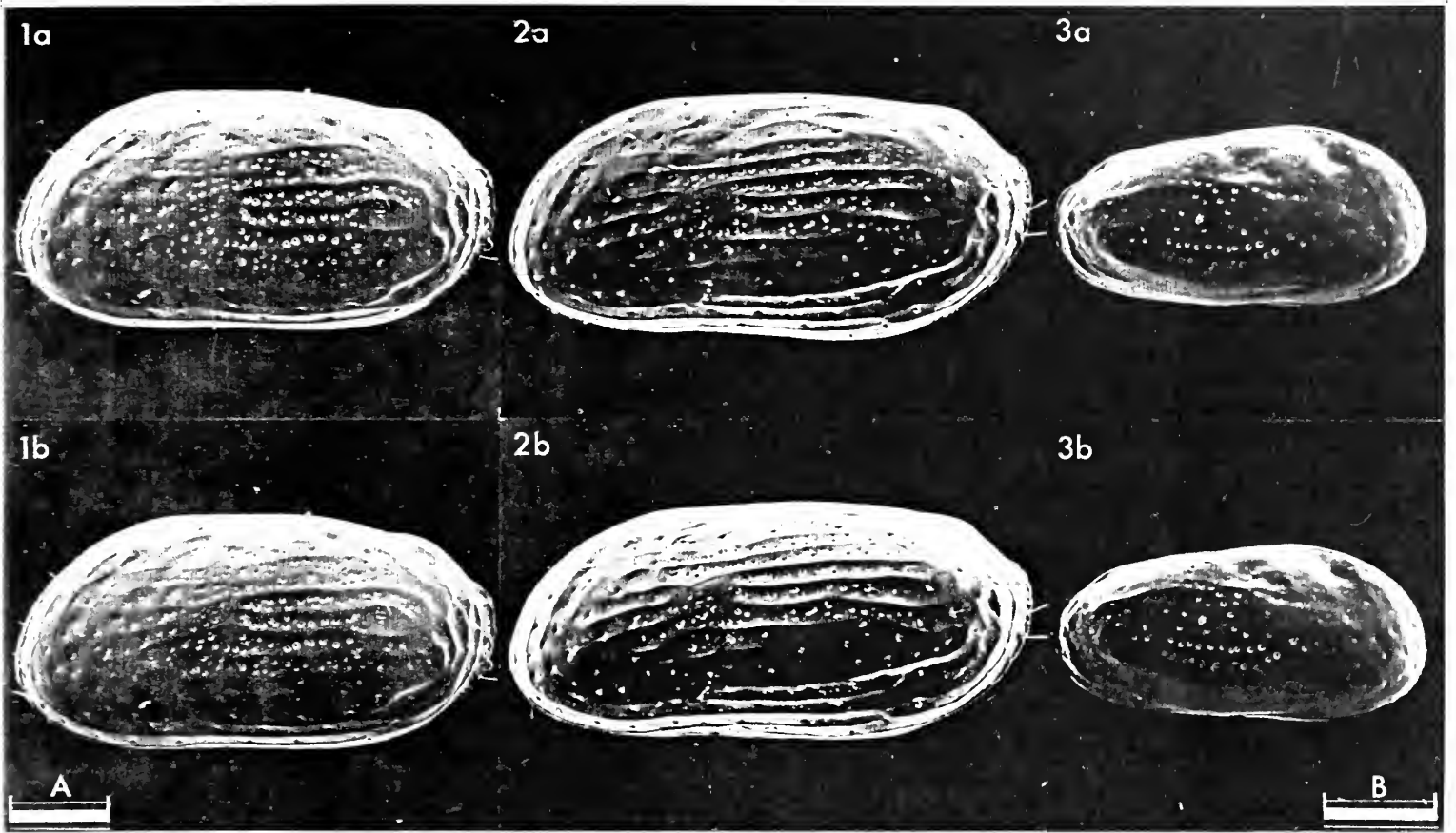
1976.1112 - 1114, 1117 - 1119 collected in Italy by Prof. G. Ruggieri; 1976.1112, 1117 from beach sand at Rimini; 1976.1114, 1118, 1119 from beach sand at Porto Corsini; 1976.1113 from the type locality. 1976.1115 from beach sand in Tunisia collected by Dr. G. Bonaduce. 1976.1110, 1111, 1116 collected alive in Cyprus by J. Athersuch; 1976.1110 from sand near Cape Greco, approx. lat. 34° 57'N, long. 34° 04'E, water depth 19m; 1976.1111 from sand near Cape Greco, approx. lat. 35° 00'N, long. 34° 04'E, water temperature 20.5°C, depth 12m, pH 8.2, O₂ 103%, salinity 39⁰/oo; 1976.1116 from sand outside Yialousa harbour, approx. lat. 35° 34'N, long. 34° 14'E, water temperature 21°C, depth 11m, pH 8.1, salinity 39⁰/oo.

Diagnosis: Carapace surface bears ridges of variable strength which run parallel to the dorsal and ventral margins and tend to coalesce posteriorly and sub-centrally. Soft parts distinctive.

Explanation of Plate 4, 72

Fig. 1, ? ♂ RV, ext. lat. (1976.1113, 951 μm long); fig. 2, ♀ RV, ext. lat. (1976.1114, 939 μm long); fig. 3, ♀ LV, ext. lat. (1976.1114).

Scale A (250 μm; x 64), figs. 1 - 3.



Remarks: In transmitted light, the distribution and number of radial pore canals appears to differ between the Recent and the few Quaternary specimens examined. The former have a greater number posteriorly and fewer anteriorly than the latter. These differences, however, are not considered sufficient to distinguish separate species (see Text - fig. 1).

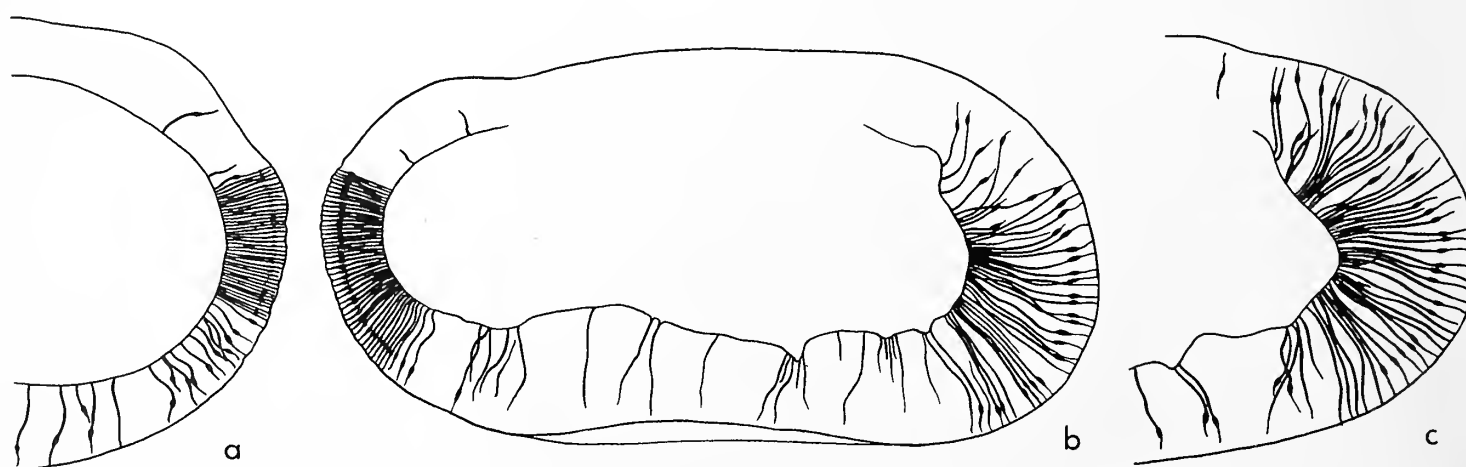
Recent species of *Cytheretta* are characterised by the asymmetry of the first pair of legs in the male. In this species, there is extreme transformation, not only of the first, but also of the second male legs (See Hazel, 1967, *Prof. Pap. U.S. geol. Surv.* no. 564, 40). Living specimens are usually associated with shallow water sands.

Distribution: Recent: Rimini, Italy (Puri, op. cit.); Naxos, Greece (Barbeito-Gonzalez, op. cit.); Cyprus, Tunisia and Porto Corsini, Italy (author's collection); Levant (Brady 1866). Quaternary: N Italy (Ruggieri 1950, op. cit.).

Explanation of Plate 4, 74

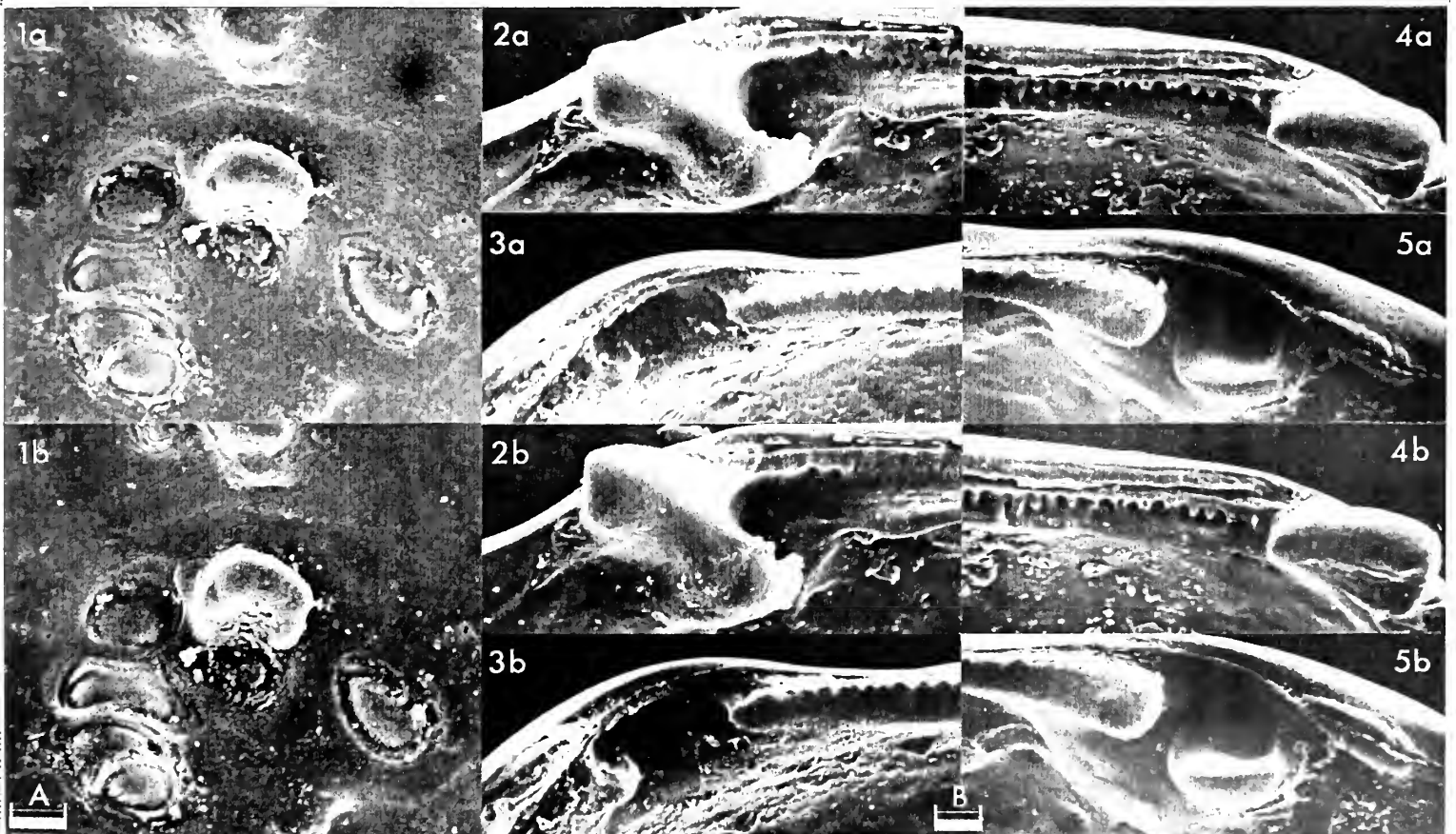
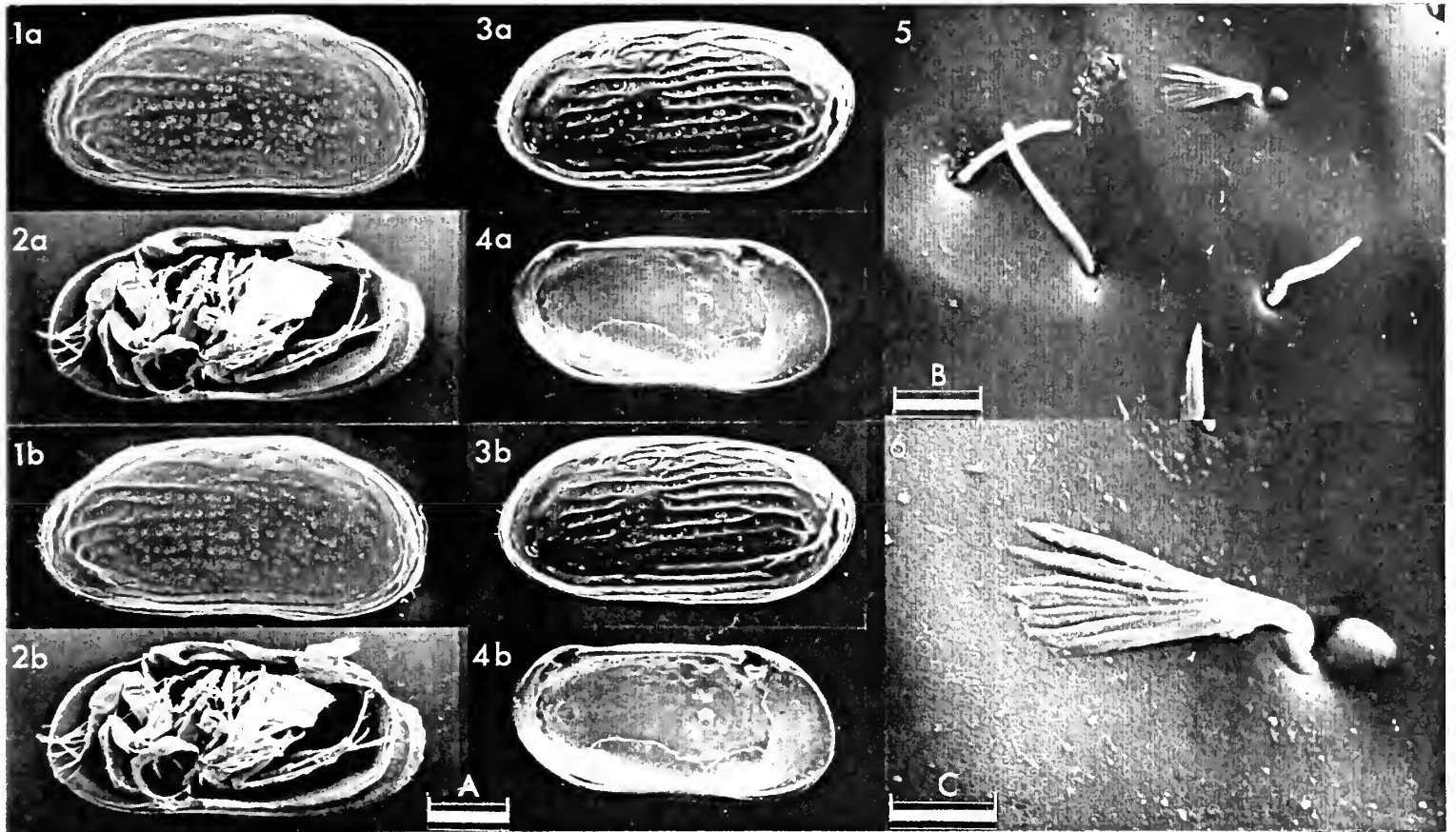
Fig. 1, ♀ RV, ext. lat. (1976.1110, 1220 μm long); fig. 2, ♀ LV & soft parts, int. lat. (1976.1116, 1122 μm long); fig. 3, ♂ LV, ext. lat. (1976.1115, 1049 μm long); fig. 4, ♂ LV, int. lat. (1976.1117, 1024 μm long); figs. 5, 6, ♂ LV, details of ornament and setae (1976.1111).
Scale A (250 μm ; x 45), figs. 1 - 4; scale B (25 μm ; x 473), fig. 5; scale C (10 μm ; x 1455), fig. 6.

Text - fig. 1. Radial pore canals. a, c: post. LV and ant. RV of Quaternary specimen from type locality (1976.1113); b: RV of Recent specimen from Rimini, Italy. (x 85).

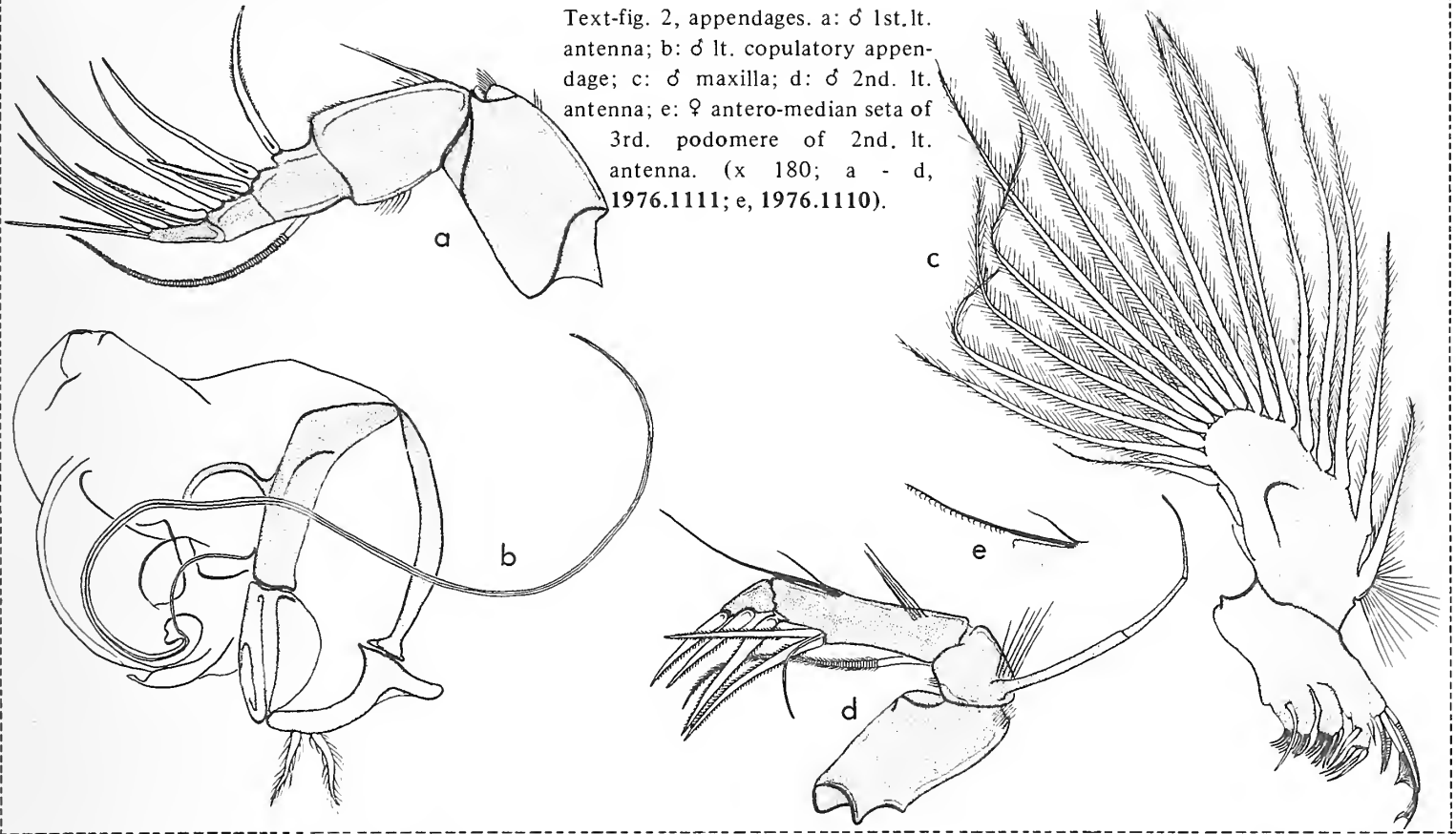


Explanation of Plate 4, 76

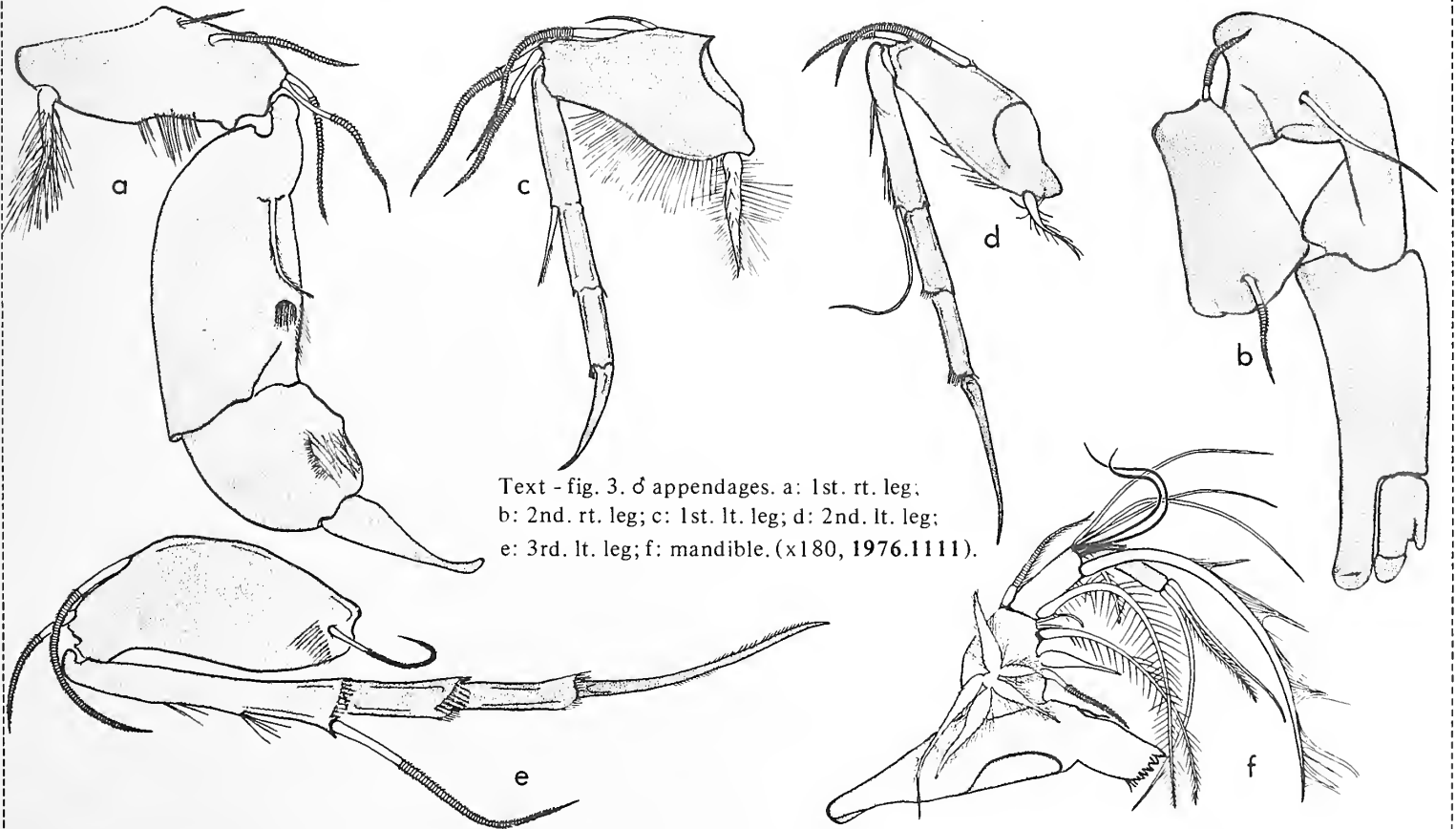
Fig. 1, ♂ LV, int. musc. sc. (1976.1118); figs. 2, 4 ♂ RV, terminal hinge elements (1976.1119); figs. 3, 5, ♂ LV, terminal hinge elements (1976.1118).
Scale A (25 μm ; x 290), fig. 1; scale B (25 μm ; x 230), figs. 3 - 5.



Text-fig. 2, appendages. a: ♂ 1st.lt. antenna; b: ♂ lt. copulatory appendage; c: ♂ maxilla; d: ♂ 2nd. lt. antenna; e: ♀ antero-median seta of 3rd. podomere of 2nd. lt. antenna. (x 180; a - d, 1976.1111; e, 1976.1110).



Text - fig. 3. ♂ appendages. a: 1st. rt. leg; b: 2nd. rt. leg; c: 1st. lt. leg; d: 2nd. lt. leg; e: 3rd. lt. leg; f: mandible. (x180, 1976.1111).





Stereo-Atlas of Ostracod Shells: Vol.4, Part 1

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