

A Stereo-Atlas of Ostracod Shells

edited by R. H. Bate, D. J. Horne, J. W. Neale,
and David J. Siveter



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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the majority of papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a right valve (927 μ m long) of *Newnhamia petiola* De Deckker, 1979, in life position; from the type locality, Pine Tree Creek Lagoon, near Hughenden, Queensland, Australia. This species swims upside down and can stick to the water surface tension with its flat ventral area.

ON *EUCY THERE DECLIVIS* (NORMAN)

by David J. Horne & John E. Whittaker
(City of London Polytechnic & British Museum (Natural History), London)

Genus *EUCY THERE* Brady, 1868

1866 *Cytheropsis* gen. nov. G. O. Sars, *Forh. VidenskSelsk. Krist.*, **1865**, 57–58 (= junior homonym of *Cytheropsis* M'Coy, 1849).

1868 *Eucythere* nom. nov. G. S. Brady, *Trans. Linn. Soc. Lond.*, **26**, 429.

Type-species: *Cythere declivis* Norman, 1865 (subsequent designation by Brady & Norman, *Scient. Trans. R. Dubl. Soc.*, ser. 2, **4**, 178, 1889)

Diagnosis: Carapace sub-triangular in lateral view with greatest height at or in front of mid-length. Anterior margin broadly rounded, dorsal and ventral margins strongly convergent posteriorly. Greatest width at or behind mid-length. External surface smooth or weakly ornamented. Inner lamella broad anteriorly, narrow ventrally and posteriorly. Anterior and posterior vestibula present. Marginal pore-canals straight, usually 10–15 anteriorly and about 3 posteriorly. Hinge lophodont, running from about mid-length to the posterior margin. Four adductor muscle-scars in an arcuate row, the lowermost being relatively large and crescent-shaped. Frontal scar relatively large, asymmetrically U- or V-shaped. Prominent fulcral point. Normal pores conspicuous, sieve-type. Dimorphic, male more elongate than female. Antennula with five articulated podomeres. Maxillular palp and masticatory processes slender, innermost one much reduced. Legs slender. Male brush-shaped organ relatively large, spatulate, with numerous distal setae. Male copulatory appendage relatively small.

Explanation of Plate 12, 2

Fig. 1, ♂ RV, ext. lat. (paralectotype, **1984.194**, 590 μm long); fig. 2, ♀ RV, ext. lat. (lectotype, **1984.193**, 620 μm long); fig. 3, ♀ LV, int. lat. (**1.13.33**, 610 μm long).

Scale A (100 μm; ×95), figs. 1–3.

Eucythere declivis (Norman, 1865)

1865 *Cythere declivis* sp. nov. A. M. Norman, in: G. S. Brady (Ed.), *Nat. Hist. Trans. Northumberland and Durham*, **1** (1865–1867), (1), 16–17, pl. 5, figs. 9–12.

1865 *Cythere declivis*, Norman (n.sp.); A. M. Norman, in: G. S. Brady, *Rept. Brit. Assoc. Adv. Sci.*, **1864**: 192 (identical description to above but without illustrations).

?1866 *Cytheropsis tenuitesta* sp. nov. G. O. Sars, *Forh. VidenskSelsk. Krist.*, **1865**, 59.

1868 *Eucythere declivis* (Norman); G. S. Brady, *Trans. Linn. Soc. Lond.*, **26**, 430–431 (*pars*), pl. 27, figs. 22–26, 54–55 only (*non* pl. 25, figs. 49–50, pl. 27, figs. 52–53).

non 1894 *Eucythere declivis* (Norman); G. W. Müller, *Fauna Flora Golf. Neapel.*, **21**, 363, pl. 29, figs. 5, 13.

?1925 *Eucythere declivis* (Norman); G. O. Sars, *An account of the Crustacea of Norway*, **9**, *Ostracoda*, pts. 9, 10, 163–164, pl. 75, fig. 2, Bergen Museum.

1957 *Eucythere declivis* (Norman); C. W. Wagner, *Sur les Ostracodes du Quaternaire récent des Pays-Bas et leur utilisation dans l'étude géologiques des dépôts holocènes*, 43–44 (*pars*), pl. 15, fig. 5 only (*non* figs. 1–4), Mouton & Co., The Hague.

1977 *Eucythere declivis* (Norman); A. Rosenfeld, *Meyniana*, **29**, 19–20, pl. 3, fig. 42.

Lectotype: Brit. Mus. (Nat. Hist.) no. **1984.193**, ♀ RV + LV.

[Paralectotype: Brit. Mus. (Nat. Hist.) no. **1984.194**, ♂ RV + LV].

Type locality: Plymouth, SW England (approx. lat. 50°23' N, long. 04°09' W); Recent.

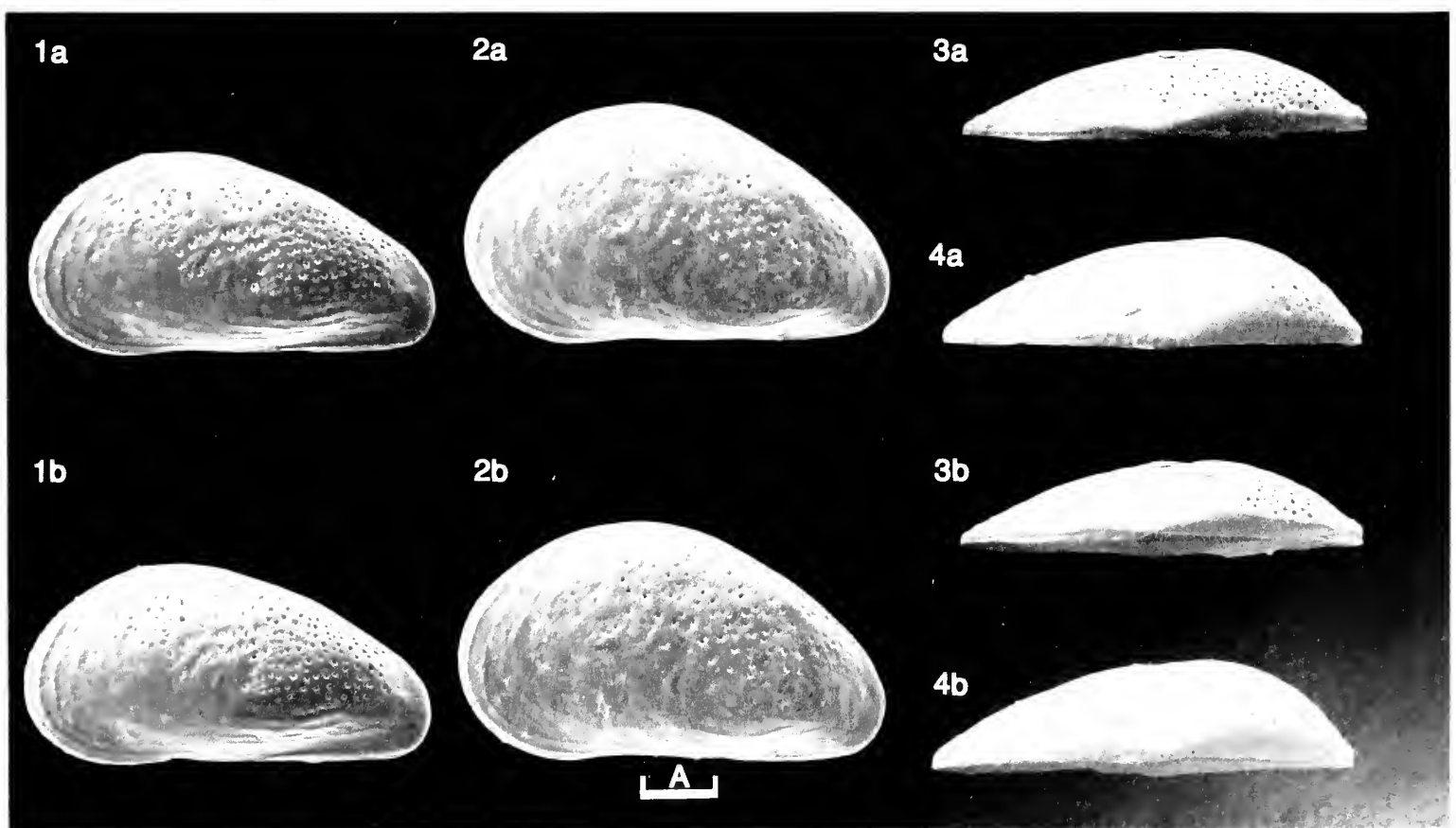
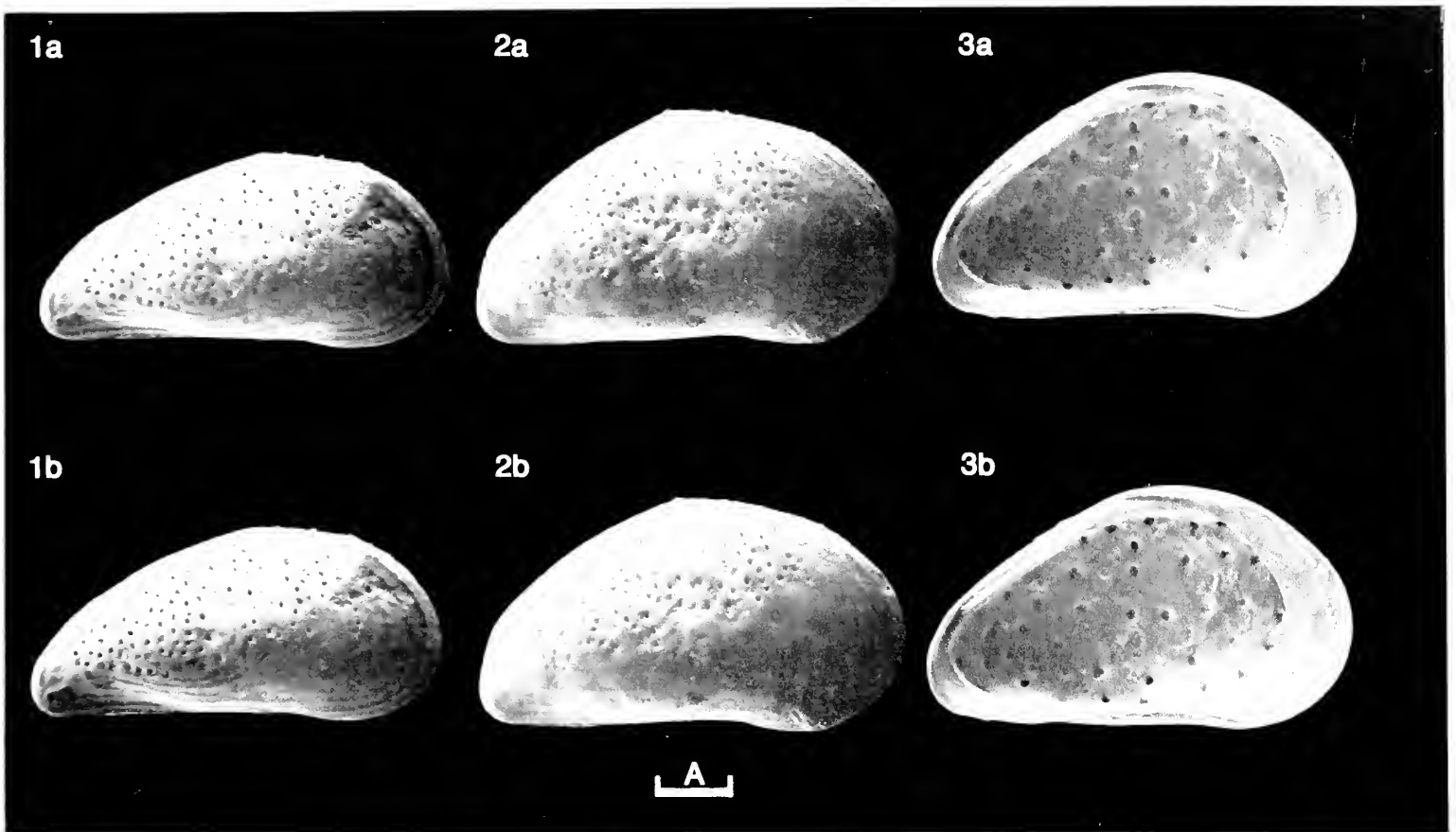
Figured specimens: Brit. Mus. (Nat. Hist.) nos. **1984.194** (paralectotype, ♂ RV : Pl. 12, 2, fig. 1), **1984.193** (lectotype, ♀ RV : Pl. 12, 2, fig. 2, Text-fig. 1a), **1984.195** (♀ car. + appendages; appendages: Text-figs. 1b–c), **1984.196** (♂ car. + appendages; LV: Pl. 12, 4, fig. 1; RV: Pl. 12, 4, fig. 3; appendages: Text-figs. 1g–h). Hancock Mus., University of Newcastle, no. **1.13.33** (♀ car. + appendages; LV: Pl. 12, 2, fig. 3, Pl. 12, 4, fig. 2; RV: Pl. 12, 4, fig. 4; appendages: Text-figs. 1d–f).

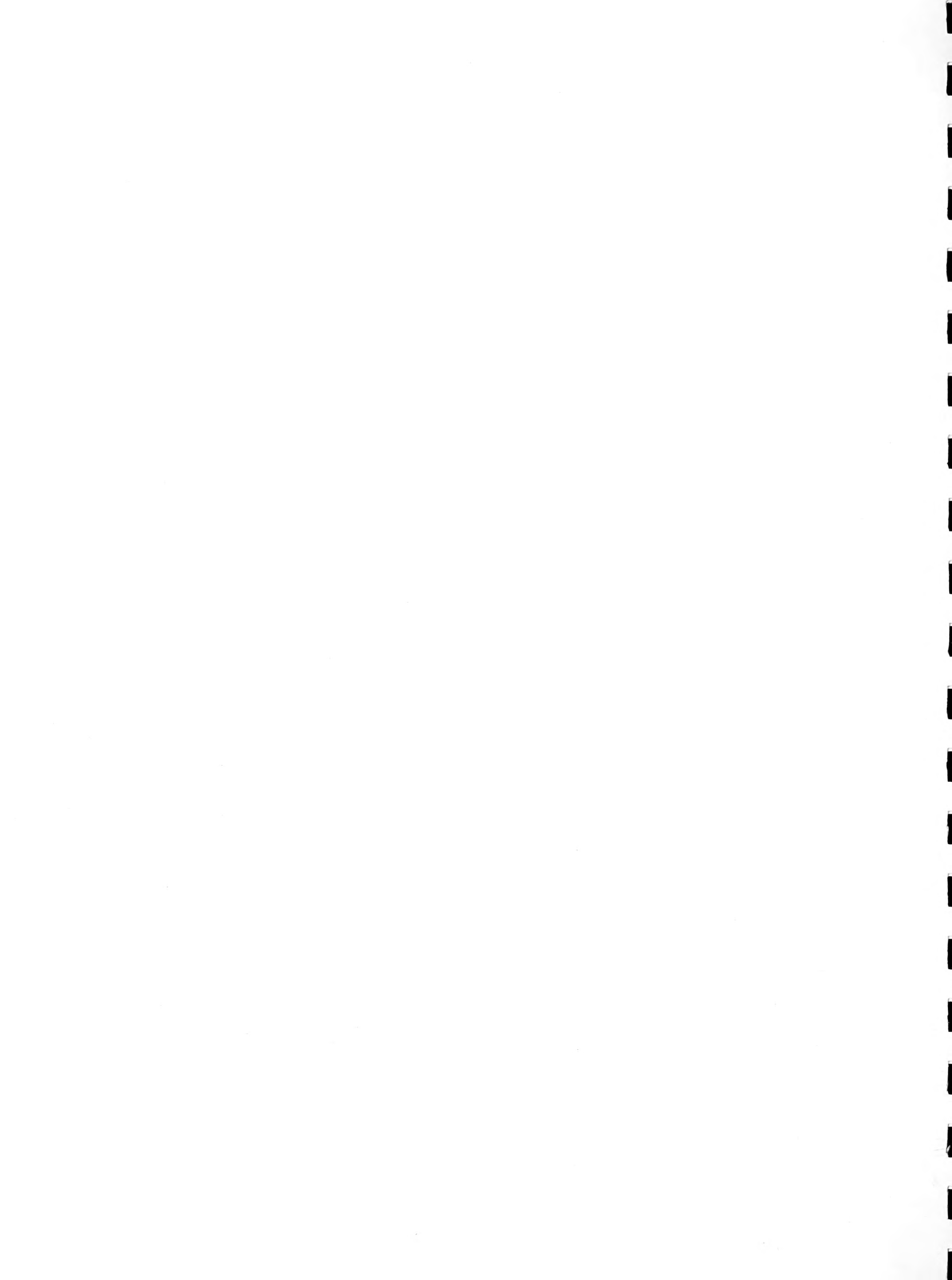
The lectotype and paralectotype were taken from slide no. **1911.11.8 M 3496** in the Norman collection, labelled "*Eucythere declivis* (Norman) Types, Plymouth, Mr Barlee". Nos. **1984.195** and

Explanation of Plate 12, 4

Figs. 1, 3, ♂ (**1984.196**, 560 μm long); fig. 1, LV, ext. lat.; fig. 3, RV, dors.; figs. 2, 4, ♀ (**1.13.33**, 610 μm long); fig. 2, LV, ext. lat.; fig. 4, RV, dors.

Scale A (100 μm; ×95), figs. 1–4.





Figured specimens: 1984.196, both from the North Sea off Aberdeen (approx. lat. 57°N, long. 00°) were provided by J. E. Robinson. Hancock Mus. no. 1.13.33, from 8 miles off the Durham Coast between Seaham and Sunderland (approx. lat. 54°55'N, long. 01°10'W), depth 20–30 fath. (36–55 m), was taken from slide no. 2.11.36 in the Brady collection.

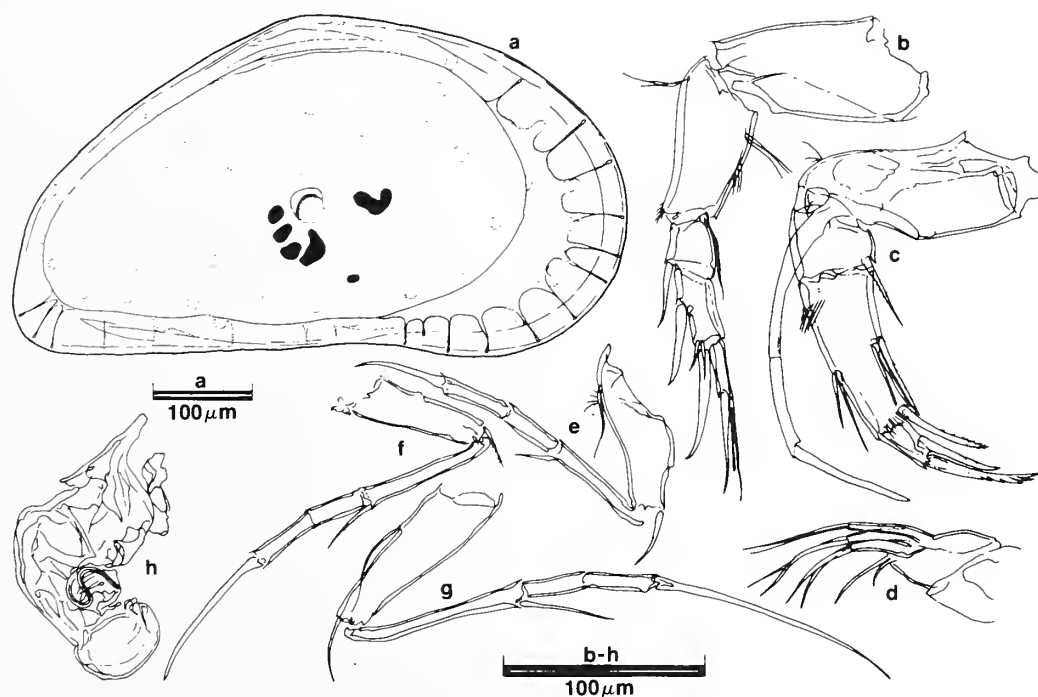
Diagnosis: Carapace finely pitted in dorsal and median areas, smooth or with faint concentric ribbing in anterior and ventral areas. Posteroventral marginal area strongly compressed in male, weakly so in female. Anterior vestibulum relatively broad. Distal process of male copulatory appendage relatively large, semicircular.

Remarks: In his "Monograph of the Recent British Ostracoda" Brady (1868, *op. cit.*) recognised two forms in addition to the true *E. declivis*. One of these he described as *E. anglica* sp. nov. in the appendix of the monograph, while the other was later described by Brady & Robertson (*Ann. Mag. nat. Hist.*, ser. 4, 3, 370–371, pl. 21, figs. 12–14, 1869) as *E. declivis* var. *prava*; both taxa have been largely ignored by subsequent authors. Our examination of their respective type specimens in the Hancock Museum has shown conclusively that they are both valid species (see Horne & Whittaker, *Stereo-Atlas of Ostracod Shells* 12, 7–10 and 12, 11–14, 1985). *E. anglica* is less elongate and more strongly pitted than *E. declivis*, while *E. prava* is easily distinguished by its posteromedian sulcus. The type slides of *E. declivis* in the Norman collection contain specimens of both *E. declivis* and *E. prava*. We have chosen as a lectotype and paralectotype two specimens which correspond closely to the original description and illustrations of *E. declivis*.

The Mediterranean records of *E. declivis* of G. W. Müller (1894, *op. cit.*) and most subsequent authors may be referred to *Eucythere curta* Ruggieri, 1975 (*Revia esp. Micropaleont.*, 6, 433–434, fig. 6; *q.v.* for full synonymy). As far as we can ascertain *E. declivis* does not live in the Mediterranean.

The form illustrated by Sars (1925, *op. cit.*) appears to lack the posteroventral compressed area exhibited by British specimens and also differs in minor details of carapace outline and the male copulatory appendage; we are therefore in some doubt as to whether it is conspecific with *E. declivis*. Of Wagner's (1957, *op. cit.*) illustrations of *E. declivis*, only one can be confidently assigned to that species, while the others should be referred to *E. argus* (Sars, 1866).

Distribution: Records of *E. declivis* require careful re-examination in the light of the above-mentioned confusion with other species. It appears to be fairly common in marine sublittoral waters around Britain and in the North Sea. Rosenfeld (1977, *op. cit.*) recorded it in the Baltic Sea in salinities of 25–30‰.



Text-fig. 1. *Eucythere declivis*. a: ♀ RV seen in transmitted light (lectotype, 1984.193). b–h: appendages; b, c, ♀ (1984.195), b: antennula, c: antenna; d–f, ♀ (1.13.33), d: maxillula, e: first leg, f: second leg; g, h, ♂ (1984.196), g: third leg, h: copulatory appendage.

ON *EUCY THERE ANGLICA* BRADY

by David J. Horne & John E. Whittaker
(City of London Polytechnic & British Museum (Natural History), London)

Eucythere anglica Brady, 1868

1868 *Eucythere declivis* (Norman); G. S. Brady, *Trans.Linn.Soc.Lond.*, 26, (pars), 431, pl. 25, figs. 49, 50 only (non 430, pl. 27, figs. 22-26, 52-55) (non *Cythere declivis* Norman, 1865).

1868 *Eucythere anglica* sp.nov. G. S. Brady, *Trans.Linn.Soc.Lond.*, 26, 475, pl. 25, figs. 49, 50.

Lectotype: Hancock Museum, University of Newcastle, no. 1.54.20, ♀ RV.
[Paralectotype: Hancock Museum no. 1.54.21, ♂ RV].

Type locality: Off Seaham, Durham coast, NE England (approx. lat. 54° 50'N, long. 01° 10'W); Recent.

Figured specimens: Hancock Mus. nos. 1.54.20 (lectotype, ♀ RV: Pl. 12, 8, fig. 2), 1.54.21 (paralectotype, ♂ RV: Pl. 12, 8, fig. 1, Pl. 12, 10, fig. 3), 1.54.22 (♀ car. + appendages; LV: Pl. 12, 8, fig. 3, Pl. 12, 10, fig. 1, Text-fig. 1b; RV: Pl. 12, 10, figs. 2, 4, Text-fig. 1a; appendages: Text-fig. 1c-d). Nos. 1.54.20 and 1.54.21 were taken from slide no. 1.02.35 in the Brady collection, labelled "*Eucythere anglica*, off Seaham". 1.54.22 is from off Hartlepool, NE England (approx. lat. 54° 41'N, long. 01° 08'W) and was taken from slide no. 2.13.04 in the Brady collection.

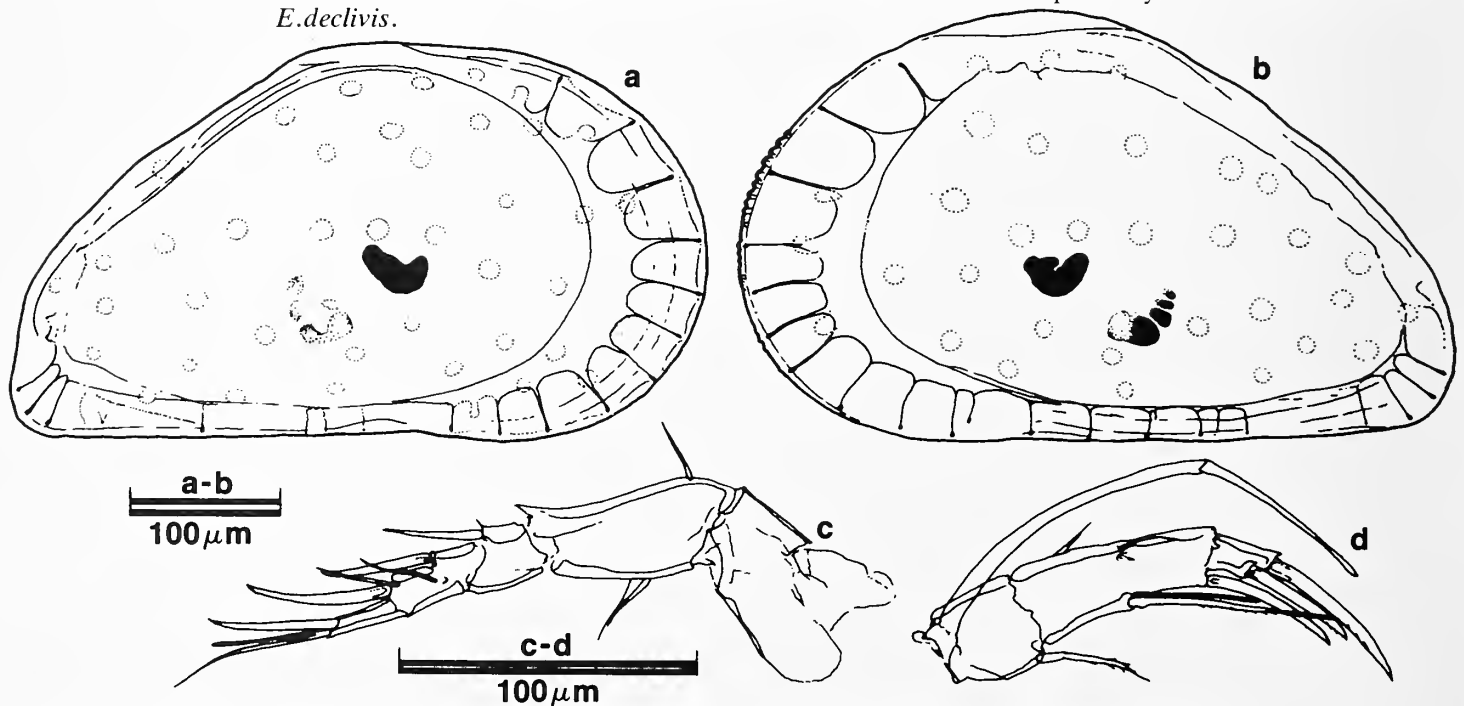
Diagnosis: Carapace small (< 500 µm long), conspicuously pitted in median and dorso-median areas, with concentric ribbing in the anterior and ventral marginal areas. Posteroventral corner somewhat compressed. Anterior vestibulum relatively broad.

Remarks: Brady (1868, *op.cit.*) initially mentioned and illustrated this species as a form of *E.declivis*, but then described it as a new species in the appendix of the same publication. It is smaller, less elongate and more strongly pitted than *E.declivis* (see Horne & Whittaker, *Stereo-Atlas of Ostracod Shells* 12, 1-6, 1985).

Explanation of Plate 12, 8

Fig. 1, ♂ RV, ext.lat. (paralectotype, 1.54.21, 460 µm long); fig. 2, ♀ RV, ext.lat. (lectotype, 1.54.20, 480 µm long); fig. 3, ♀ LV, ext.lat. (1.54.22, 480 µm long). Scale A (100 µm; × 125), figs. 1-3.

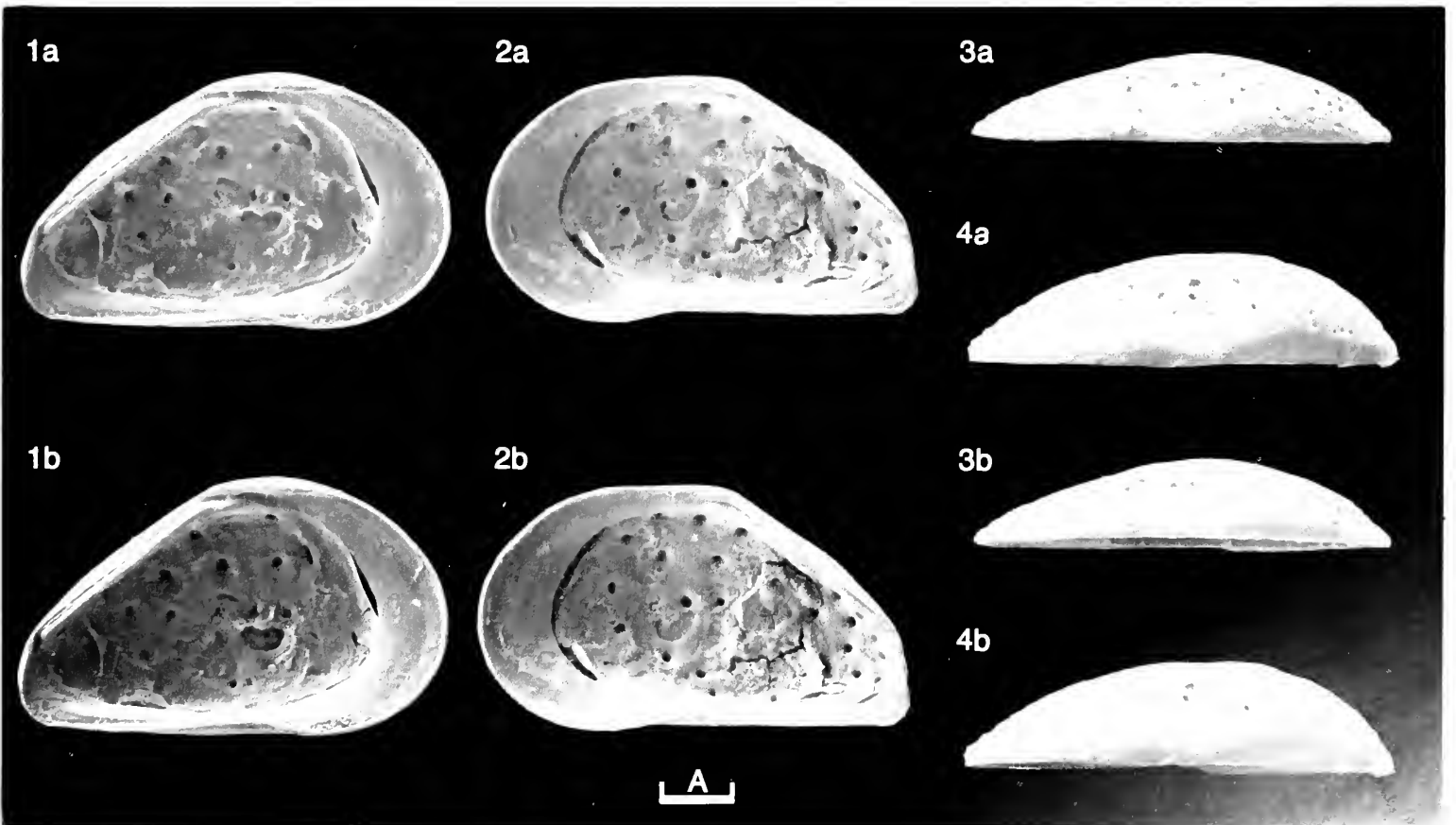
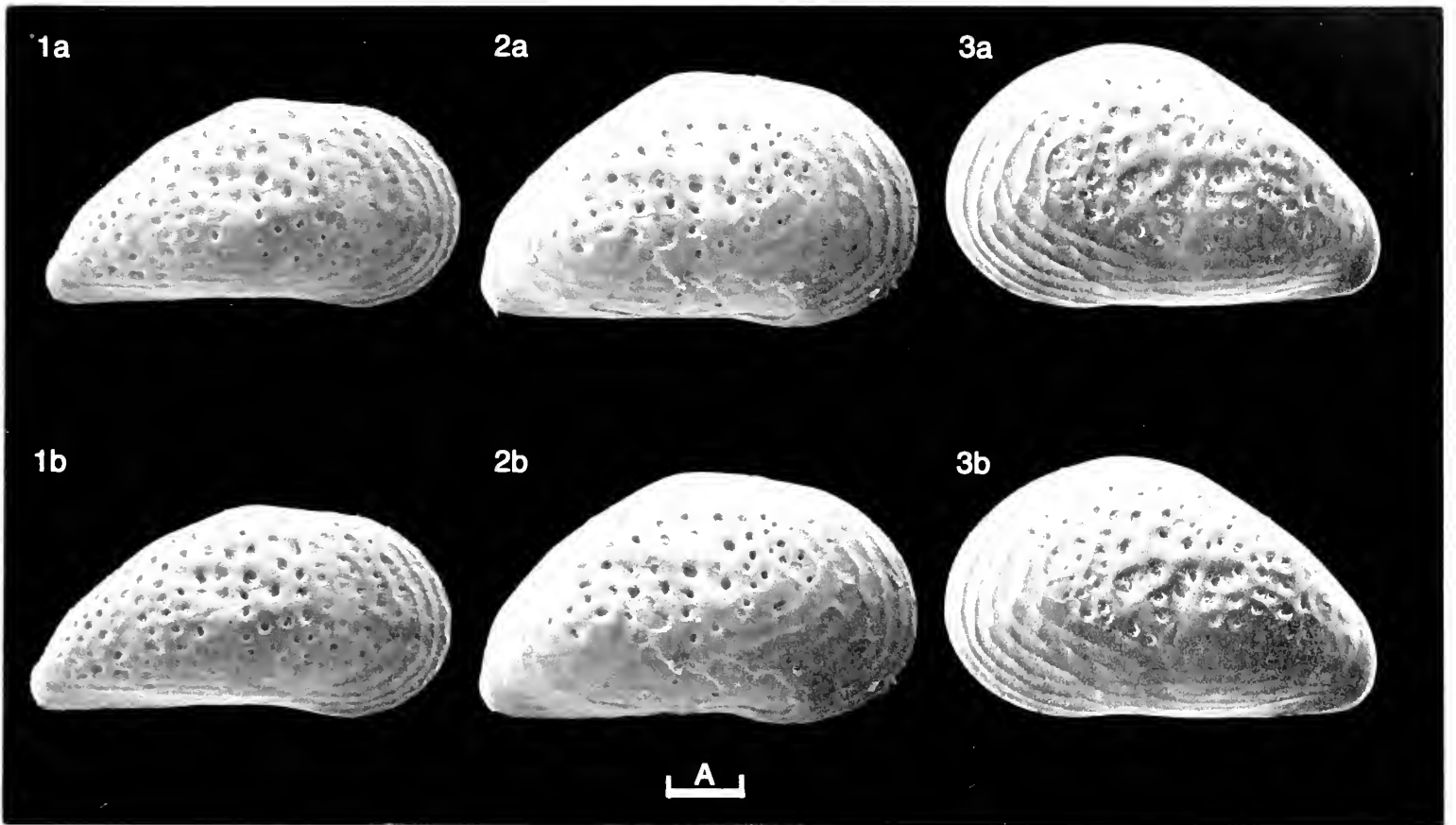
Distribution: The Brady collection contains several examples of this species from marine sublittoral localities around the British Isles. The absence of more recent records is probably due to confusion with *E.declivis*.



Text-fig. 1, ♀ valves + appendages, 1.54.22; a-b: RV & LV drawn in transmitted light; c: antennula; d: antenna.

Explanation of Plate 12, 10

Figs. 1, 2, 4, ♀ (1.54.22, 480 µm long): fig. 1, LV int.lat.; fig. 2, RV int.lat.; fig. 4, RV dors.; fig. 3, ♂ RV, dors. (paralectotype, 1.54.21, 460 µm long). Scale A (100 µm; × 125), figs. 1-4.



ON *EUCY THERE PRAVA* BRADY & ROBERTSON

by David J. Horne & John E. Whittaker
(City of London Polytechnic & British Museum (Natural History), London)

Eucythere prava Brady & Robertson, 1869

1868 *Eucythere declivis* (Norman); G. S. Brady, *Trans.Linn.Soc.Lond.*, 26, 430 (*pars*), pl. 27, figs. 52-53 only (*non* pl. 27, figs. 22-26, 54-55, pl. 25, figs. 49-50) (*non Cythere declivis* Norman, 1865).

1869 *Eucythere declivis* var. *prava*; G. S. Brady & D. Robertson, *Ann.Mag.nat.Hist.*, (ser. 4), 3, 370-371, pl. 21, figs. 12-14.

Lectotype: Hancock Museum, University of Newcastle, no. 1.39.33, ♀ carapace.

Type locality: Westport Bay (= Clew Bay), Co. Mayo, W Ireland (approx. lat. 53° 50'N, long. 09° 40'W); Recent.

Figured specimens: Hancock Mus. nos. 1.39.33 (lectotype, ♀ car.: Pl. 12, 12, fig. 1), 1.39.34 (♂ car. + appendages; LV: Pl. 12, 12, fig. 3, Text-fig. 1a; RV: Pl. 12, 14, fig. 2; copulatory appendages: Text-fig. 1c-d), 1.39.35 (♂ car. + appendages; appendages: Text-fig. 1e-f). Brit. Mus. (Nat.Hist.) no. 1984.187 (♀ car.; LV: Pl. 12, 12, fig. 2, Pl. 12, 14, figs. 1, 4, Text-fig. 1b; RV: Pl. 12, 14, fig. 3). The lectotype was taken from slide no. 2.03.16 in the Brady collection. Hancock Mus. nos. 1.39.34 and 1.39.35, from off St. Mary's, Isles of Scilly (approx. lat. 49° 55'N, long. 06° 15'W), depth 20 fath. (36m), were taken from slide no. 2.12.40 in the Brady collection. Brit.Mus. (Nat.Hist.) no. 1984.187, from the English Channel, S of the Eddystone Lighthouse (approx. lat. 50° 02'N, long. 04° 22'W), depth approx. 75m, was provided by S. Sturrock.

Diagnosis: Posterior half of carapace with an irregular longitudinal posteromedian sulcus, anterior half faintly reticulate. Surface smooth or very finely pitted. Anterior vestibulum relatively narrow. Male copulatory appendage with a lemon-shaped distal process.

Remarks: Brady (1868, *op.cit.*) originally mentioned and illustrated this species as a form of *E.declivis* (Norman, 1865) (see Horne & Whittaker, *Stereo-Atlas of Ostracod Shells* 12, 1-6, 1985); it was later

Explanation of Plate 12, 12

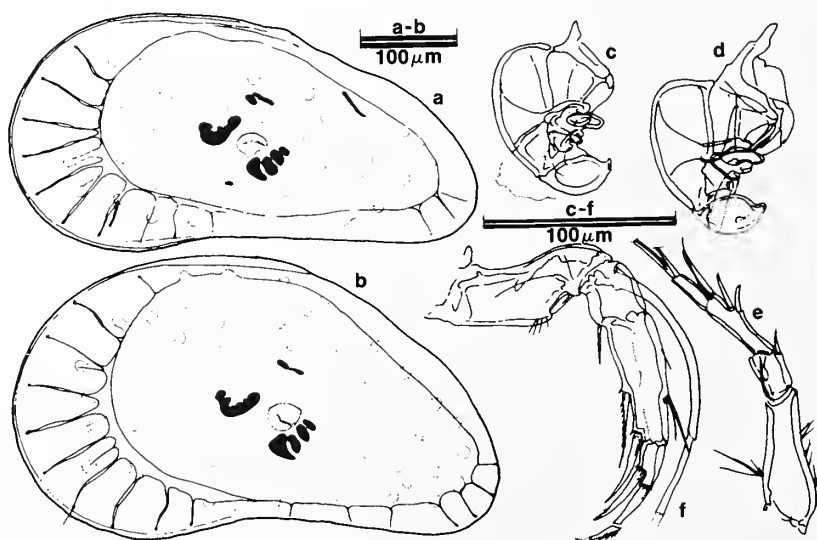
Fig. 1, ♀ car., rt.lat. (lectotype, 1.39.33, 510µm long); fig. 2, ♀ LV, ext.lat. (1984.187, 500µm long); fig. 3, ♂ LV, ext.lat. (1.39.34, 480µm long). Scale A (100µm; ×125), figs. 1-3.

Stereo-Atlas of Ostracod Shells 12, 13

Eucythere prava (3 of 4)

Remarks (contd.): formally described as a variety of *E.declivis* by Brady & Robertson (1869, *op.cit.*) and is here raised to specific status. *E.prava* is easily distinguished from other *Eucythere* species by its characteristic postero-median sulcus.

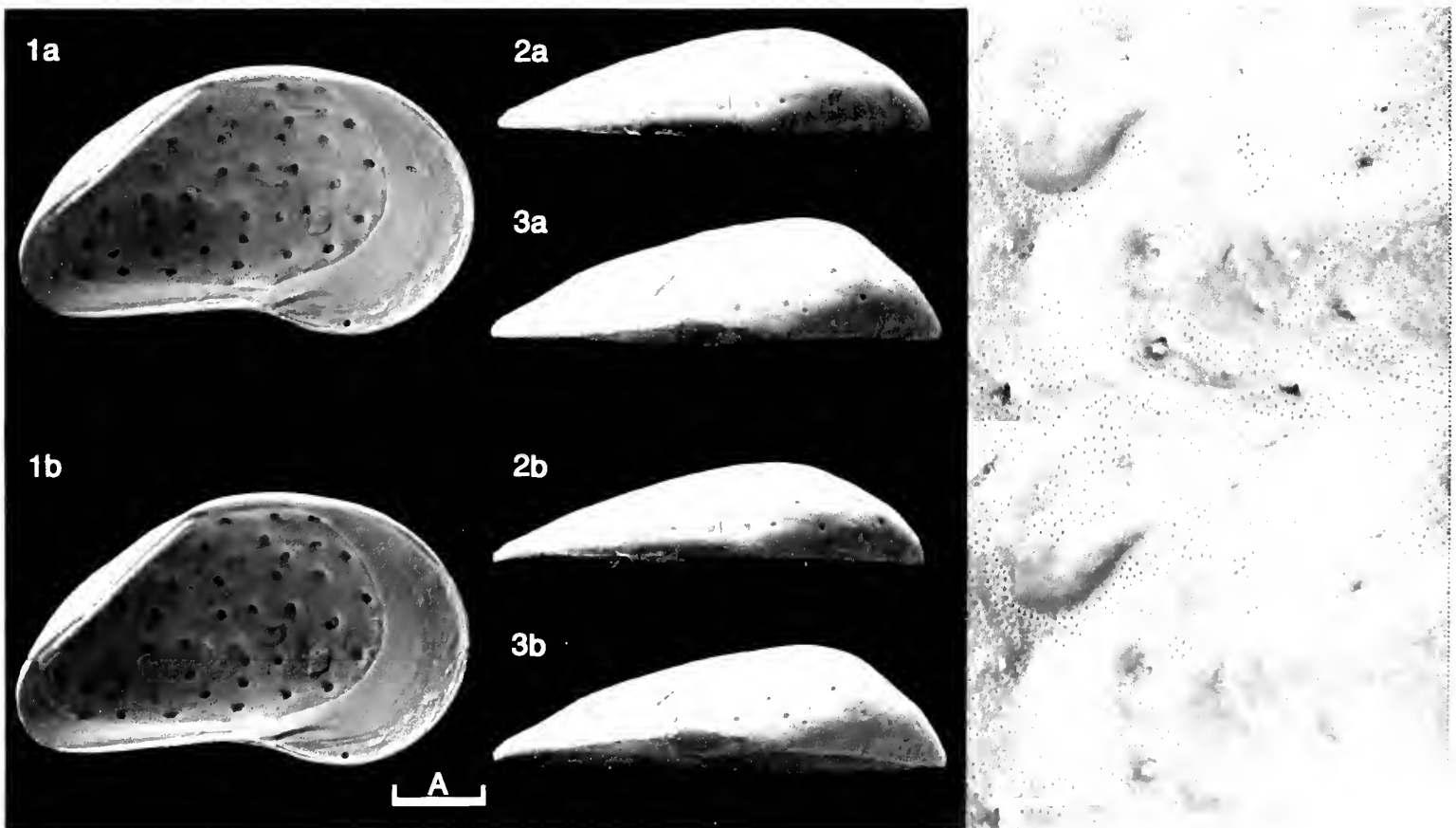
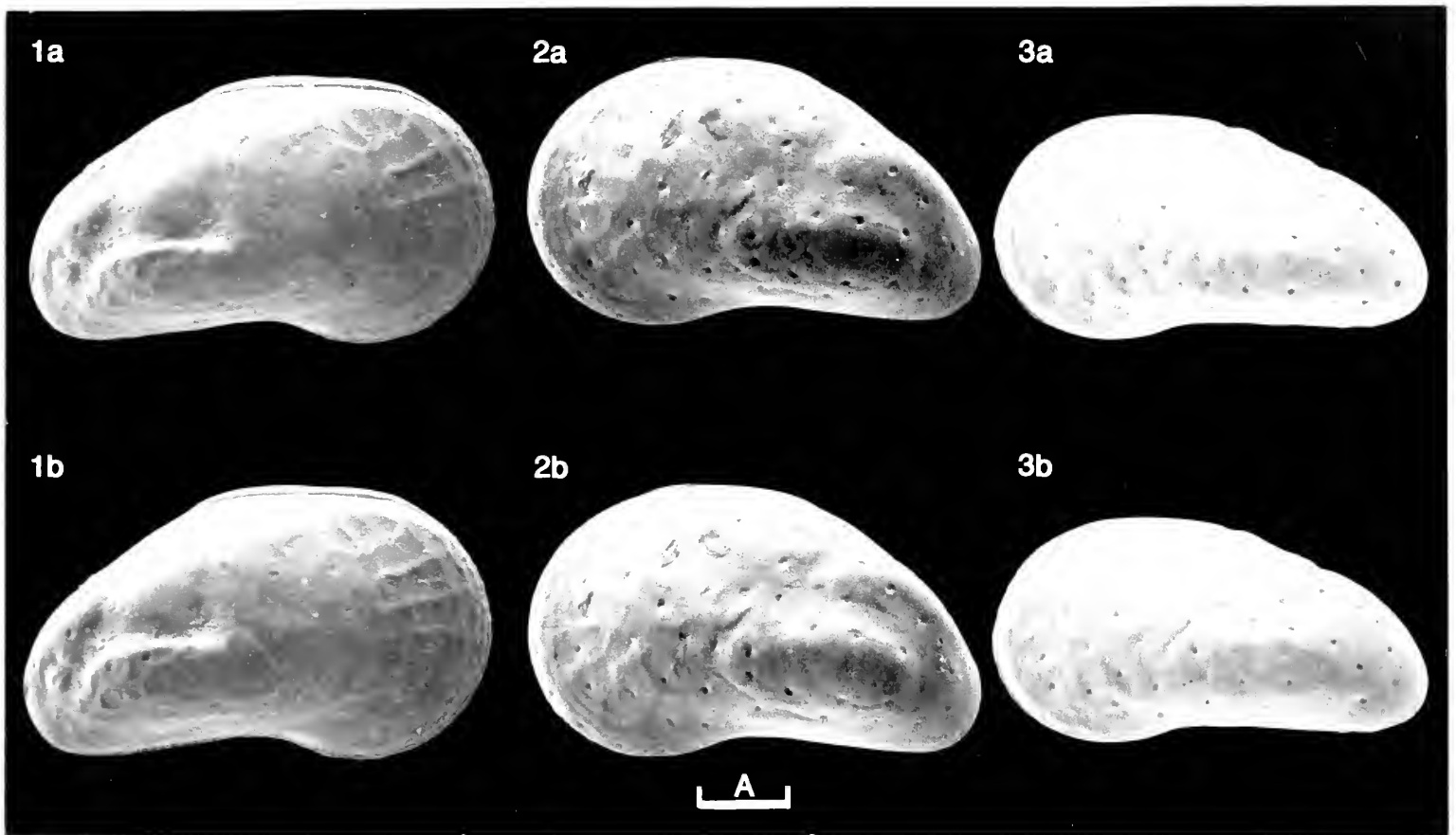
Distribution: *E.prava* appears to be fairly widespread in marine sublittoral waters around the British Isles (Brady and Norman collections and herein).



Text-fig. 1. *Eucythere prava*. a-b: valves seen in transmitted light; a: ♂ LV (1.39.34); b: ♀ LV (1984.187). c-f: appendages; c, d: ♂ copulatory appendages (1.39.34); e, f: ♂ antennula and antenna (1.39.35).

Explanation of Plate 12, 14

Figs. 1, 3, 4, ♀ (1984.187, 500µm long): fig. 1: LV, ext. lat.; fig. 3, RV, dors.; fig. 4, LV, ext.lat., detail of median area showing external trace of central muscle-scar field; fig. 2, ♂ RV, dors. (1.39.34, 480µm long). Scale A (100µm; ×125), figs. 1-3; scale B (50µm; ×350), fig. 4.



ON *PIRETIA COMMASULCATA* SCHALLREUTER sp. nov.

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

Piretia commasulcata sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (GPIMH), no. 2938; ♀ LV, anterodorsally and posterodorsally incomplete.
[Paratypes: GPIMH nos. 2939-2942].

Type locality: Upper Harjuan (upper Ordovician) Öjlemyrflint erratic boulder no. Sy60 of the upper Kaolinsand (lower Pleistocene) from near Braderup, Isle of Sylt (N Frisian Is, N Sea), West Germany; lat. 54° 56'N, long. 8° 21'E.

Derivation of name: Alluding to the comma-shaped sulcus.

Figured specimens: GPIMH nos. 2938 (holotype, incomplete ♀ LV: Pl. 12, 16, figs. 1, 3), 2939 (paratype, juv. LV: Pl. 12, 16, fig. 2, Pl. 12, 18, fig. 1), and 2940 (paratype, nearly complete juv. RV: Pl. 12, 18, fig. 2). All specimens are from the type locality; boulder collected by Ulrich von Hacht (Hamburg) in 1978.

Explanation of Plate 12, 16

Figs. 1, 3, anterodorsally and posteriorly incomplete ♀ LV (holotype, GPIMH 2938, 683 µm long); fig. 1, ext. lat.; fig. 3, ext. anterovent.
Fig. 2, juv. LV, ext. vent. (paratype, GPIMH 2939, 585 µm long).
Scale A (100 µm; × 110), figs. 1, 3; scale B (100 µm; × 170), fig. 2.

Diagnosis: Species of *Piretia* with short, comma-shaped sulcus near the dorsal margin. Preadductorial node bulb-like but flattish. Shape ('Gestalt') rather long to long; shape of domicilium very long. A narrow, low, ridge-like plica occurs along the dorsal border. Velum forms a ridge or narrow flange which terminates posteroventrally in a short spine. Female has a very strongly convex dolon forming a false brood pouch. A ridge occurs along the border of lateral and ventral surfaces of the pouch. Lateral surface reticulate. Adults about 0.8 mm long.

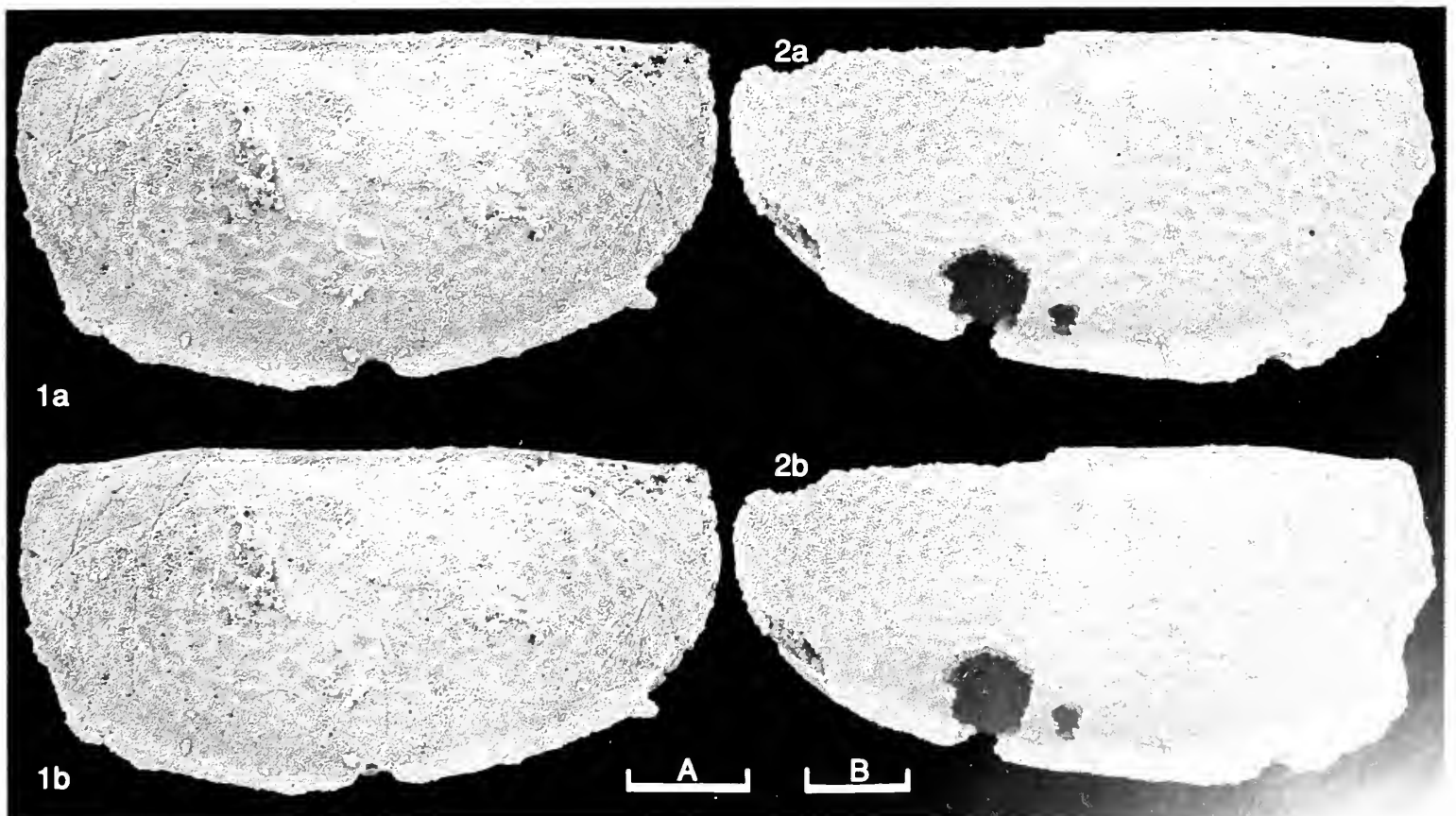
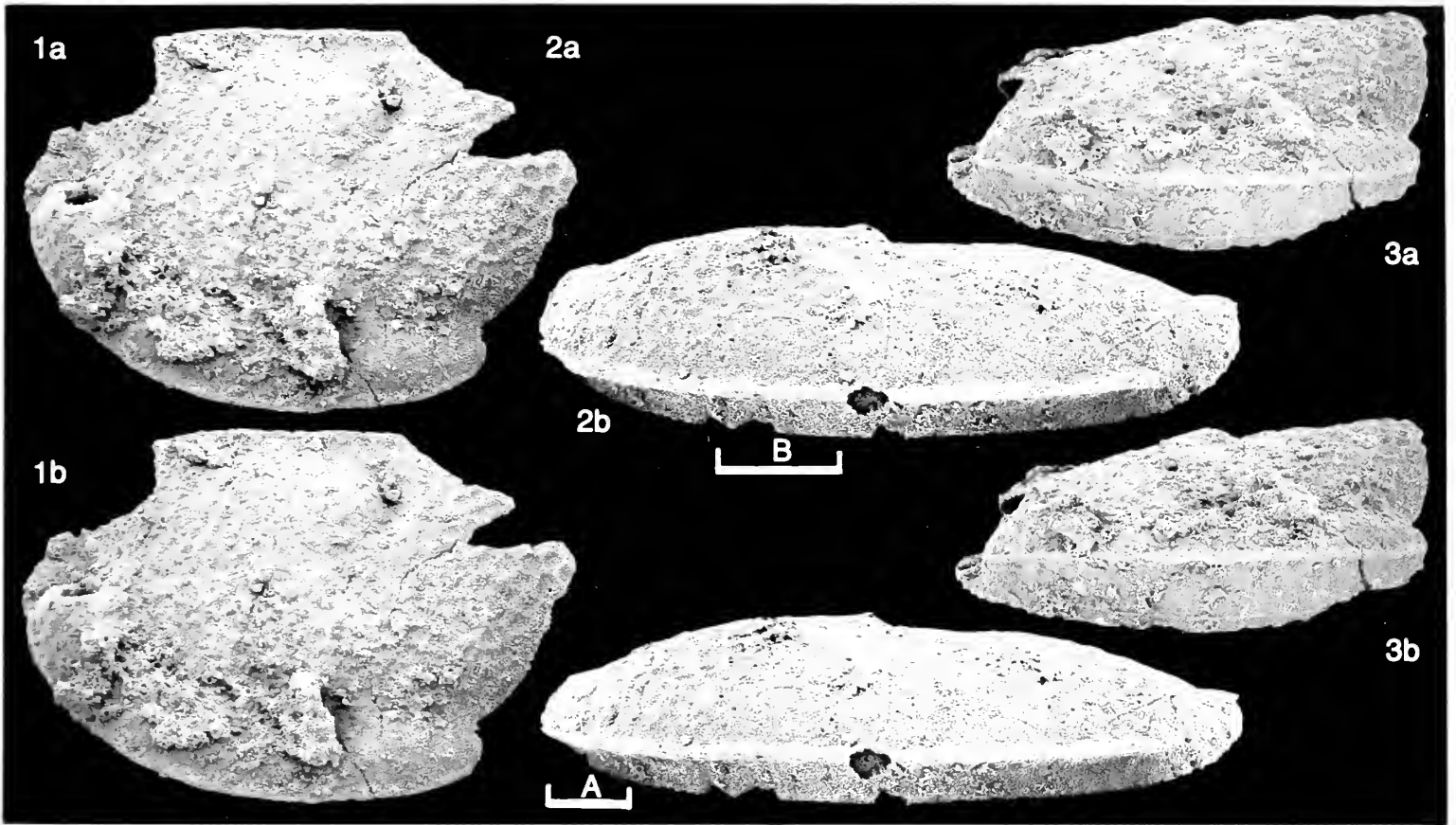
Remarks: *P. commasulcata* is distinguished from congeneric species mainly by its elongate shape and its diagnostic short, comma-shaped sulcus. *Piretia erinacea* Schallreuter, 1964 (lower Upper Viruan Backsteinkalk erratic boulders of Northern Germany) differs further in having a row of short spines instead of a ridge at the border of the lateral and ventral surfaces of the female dolon, its tecnomorphic velum is developed as a spinose ridge or a row of spines and its surface is spinose and granulose (Schallreuter, *Palaeontographica* (A), 144, pl. 18, fig. 1, pl. 17, figs. 5-7, 1973).

Piretia reticulata Qvale, 1980 (*Norsk Geol. Tidsskr.*, 60, 94), from the Caradoc Series of the Oslo region, resembles *P. commasulcata* in having reticulation and a velar flange with an abrupt posterior termination but is distinguished by its much better developed sulcus, its centrodorsal spine and by its tecnomorphic velum which consists of a row of spines recalling that of *P. erinacea* (Qvale, *op. cit.*, figs. 2, 3).

Distribution: Known from the type locality and from Öjlemyrflint erratic boulders of the Isle of Gotland, Baltic Sea (boulder no. G30 of Schallreuter collection).

Explanation of Plate 12, 18

Fig. 1, juv. LV, ext. lat. (paratype, GPIMH 2939); fig. 2, slightly incomplete juv. RV, ext. lat. (paratype, GPIMH 2940, 689 µm long).
Scale A (100 µm; × 170), fig. 1; scale B (100 µm; × 140), fig. 2.



ON *KROEMMELBEINIA VALENSIS* SCHALLREUTER sp. nov.

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

Kroemmelbeinia valensis sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (GPIMH) no. 2943; a carapace.

[Paratypes: nos. 2944–2947].

Type locality: Upper Harjuan (upper Ordovician) Öjlemyrflint erratic boulder no. G287 from the beach at Vale, NE Gotland (Baltic Sea), Sweden; lat. 57°48' N, long. 18°26' E.

Derivation of name: After the type locality, Vale, Gotland.

Figured specimens: GPIMH nos. 2944 (paratype, LV: Pl. 12, 20, fig. 1), 2945 (paratype, RV: Pl. 12, 20, fig. 2), 2943 (holotype, car.: Pl. 12, 22, fig. 1) and 2946 (paratype, LV: Pl. 12, 22, fig. 2). All specimens are from the type locality; boulder collected by the author in 1976.

Explanation of Plate 12, 20

Fig. 1, LV, ext. lat. (paratype, GPIMH 2944, 1505 µm long); fig. 2, RV, ext. lat. (paratype, GPIMH 2945, 1805 µm long). Scale A (250 µm; × 67), fig. 1; scale B (250 µm; × 55), fig. 2.

Diagnosis: Species of *Kroemmelbeinia* with the 'anteroventral corner' situated near the longitudinal middle line and only weakly pointed. Posteroventral corner pointed but not spinose. Adults up to 2.00 mm long.

Remarks: The middle Ordovician type-species, *Kroemmelbeinia ala* Schallreuter (*Geologie* 18, 211, 1969) (= *Beecherellita ordovica* Neckaja, 1973; Schallreuter, *Geol. För Stockh. Förh.* 97, 387, 1975), has the same shape (length : height ratio) but is much smaller (adults 0.82 mm long). Moreover, the anteroventral corner in *K. ala* is more pointed and lies more ventrally than in *K. valensis*, and its posteroventral corner forms a short spine whereas in *K. valensis* it is only pointed.

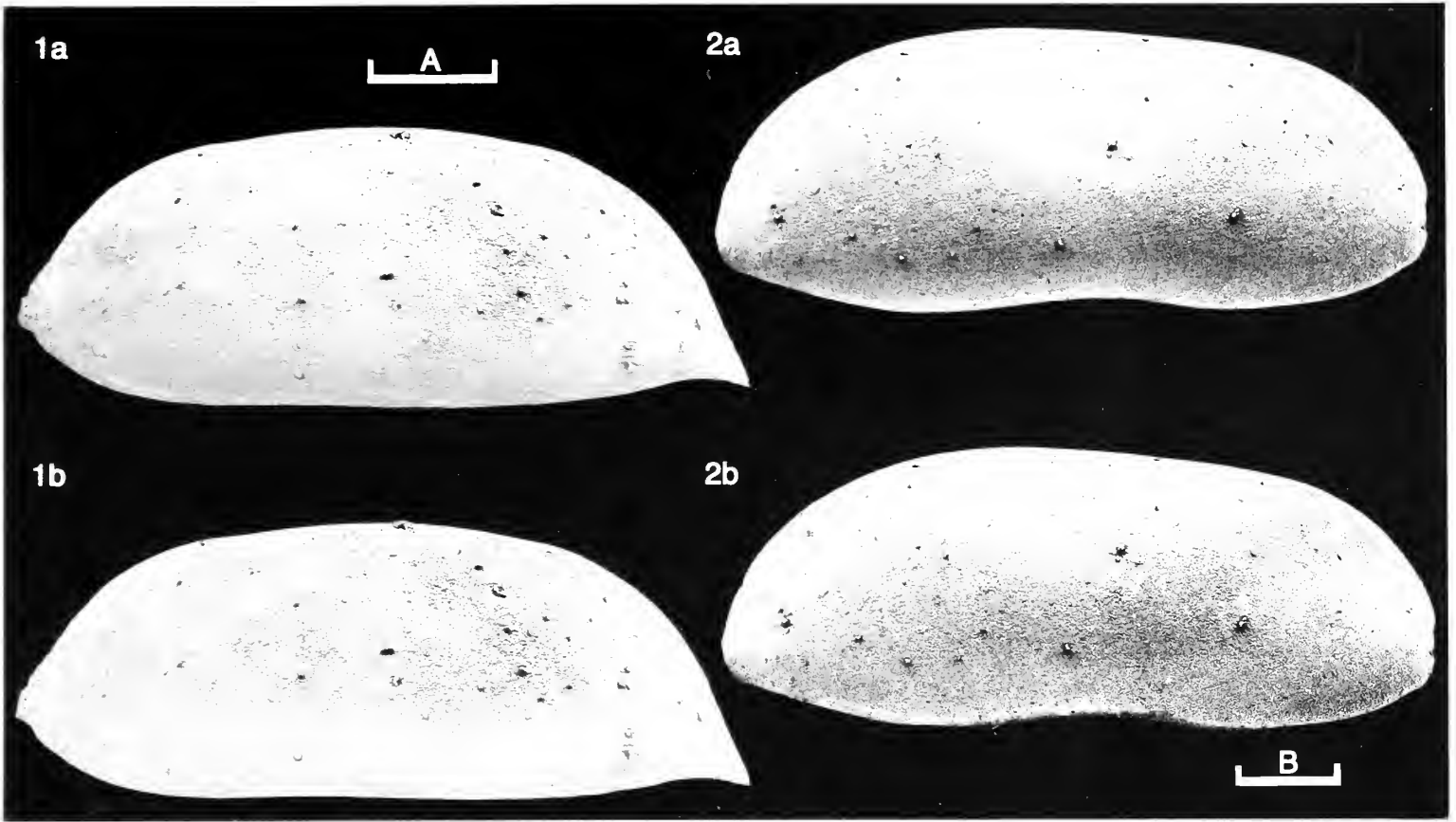
K. valensis clearly displays two stop-pegs in the larger valve (Pl. 12, 22, fig. 2). In the last decade this feature has proved to be very important in the higher taxonomy of Ordovician podocopes. It is characteristic for Ordovician metacopes (e.g., see *Stereo-Atlas Ostracod Shells* 5, 56, fig. 1; 7, 76, fig. 2; 7, 80, figs. 1–2; Schallreuter, *Proc. VII Internat. Symp. Ostracodes Belgrade* 1979, pl. 1, figs. 2, 6, 8, 9, pl. 2, fig. 5), and is taxonomically more important than the general outline and other features. Thus, it has helped unmask excellent examples of homeomorphy in ostracodes; for example, *Kroemmelbeinia spina* Schallreuter, 1969 has a distinct inner lamella but lacks stop-pegs and was therefore later placed in *Spinobairdia*. A second example involves '*Platyrhomboides*' *minimus* (with broad inner lamella) and '*P.*' *breviclastrum* (with two stop-pegs) (Schallreuter, 1979, *op. cit.*, pl. 1, figs. 7, 8 and pl. 2, figs. 3, 4).

Distribution: Known only from the type locality; upper Ordovician.

Explanation of Plate 12, 22

Fig. 1, car., ext. rt. lat. (holotype, GPIMH 2943, 1765 µm long); fig. 2, LV, int. lat., slightly obl., showing stop-pegs (paratype, GPIMH 2946, 2000 µm long).

Scale A (250 µm; × 59), fig. 1; scale B (250 µm; × 51), fig. 2.



ON *GLYPTOCY THERE RAASAYENSIS* STEVENS sp. nov.

by Graham W. Stevens
(University of Hull, England)

Glyptocythere raasayensis sp. nov.

Holotype: University of Hull no. **HU.212.J.1**, a ♀ carapace.
[Paratypes: nos. **HU.212.J.2-6**].

Type locality: Stream section at Brae (Nat. Grid. Ref.: NG 515418), Isle of Raasay, Scotland. Garantiana Clay, *garantiana* Zone, Bajocian, Jurassic.

Derivation of name: From the type locality, Isle of Raasay.

Figured specimens: University of Hull, nos. **HU.212.J.1** (holotype, ♀ car.: Pl. 12, 24, fig. 1, Pl. 12, 26, fig. 1), **HU.212.J.2** (♂ RV: Pl. 12, 24, fig. 2, Pl. 12, 28, fig. 1; specimen broken subsequent to photography), **HU.212.J.3** (♂ car.: Pl. 12, 26, fig. 2), **HU.212.J.4** (♀ LV: Pl. 12, 28, fig. 2, Pl. 12, 30, fig. 2), **HU.212.J.5** (♂ LV: Pl. 12, 30, fig. 1). All the specimens are from the type locality and horizon.

Diagnosis: A species of *Glyptocythere* in which the carapace shows well developed reticulation formed by fine anastomosing ribs over most of the lateral surface. The postero-dorsal, dorsal and antero-dorsal marginal areas are smooth and there are prominent pore conuli in the postero-dorsal area. Five prominent longitudinal ribs are developed ventrally. Sexual dimorphism distinct, the presumed females being proportionally higher and wider than the males. Hinge and muscle scar pattern typical of the genus.

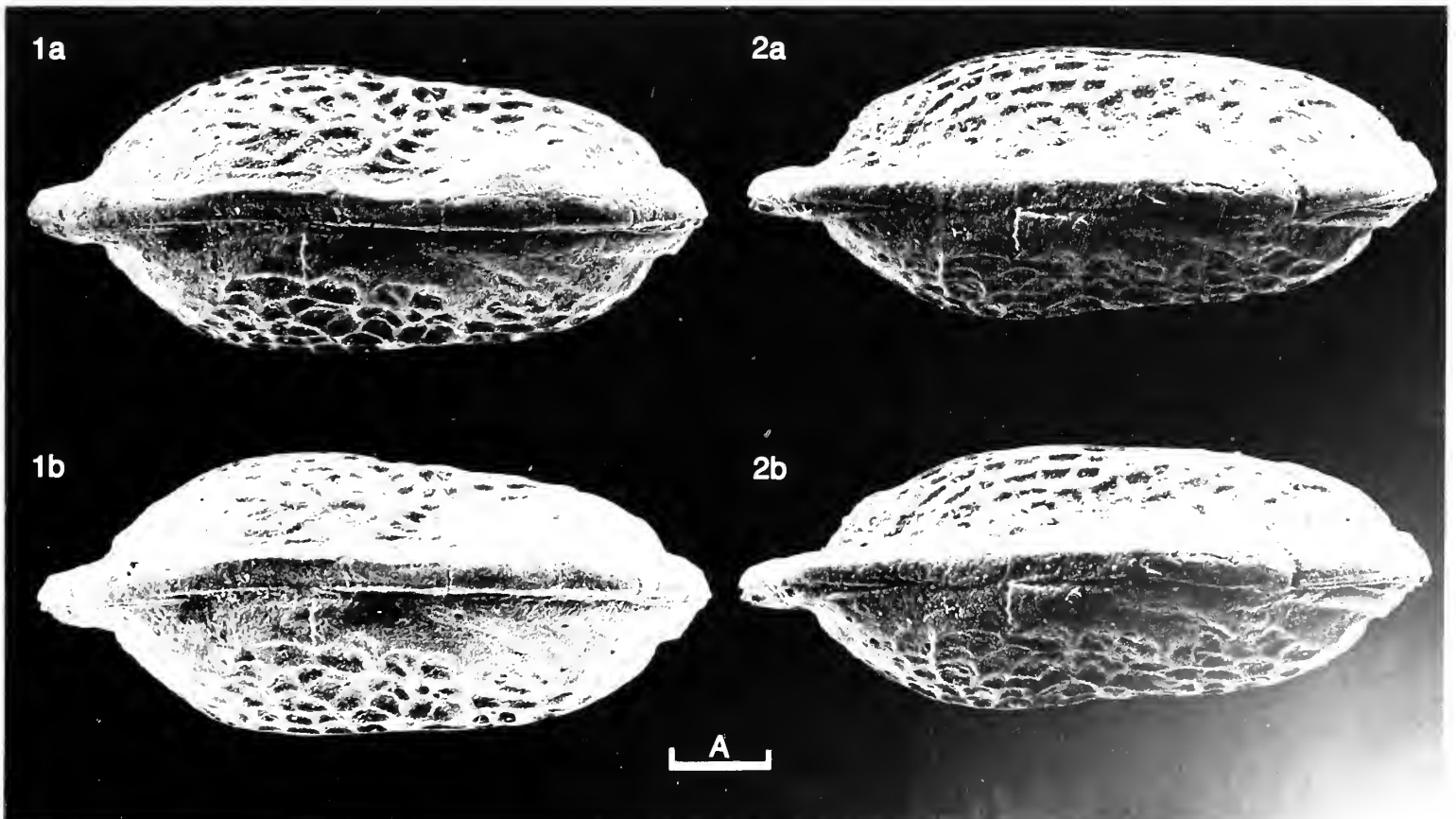
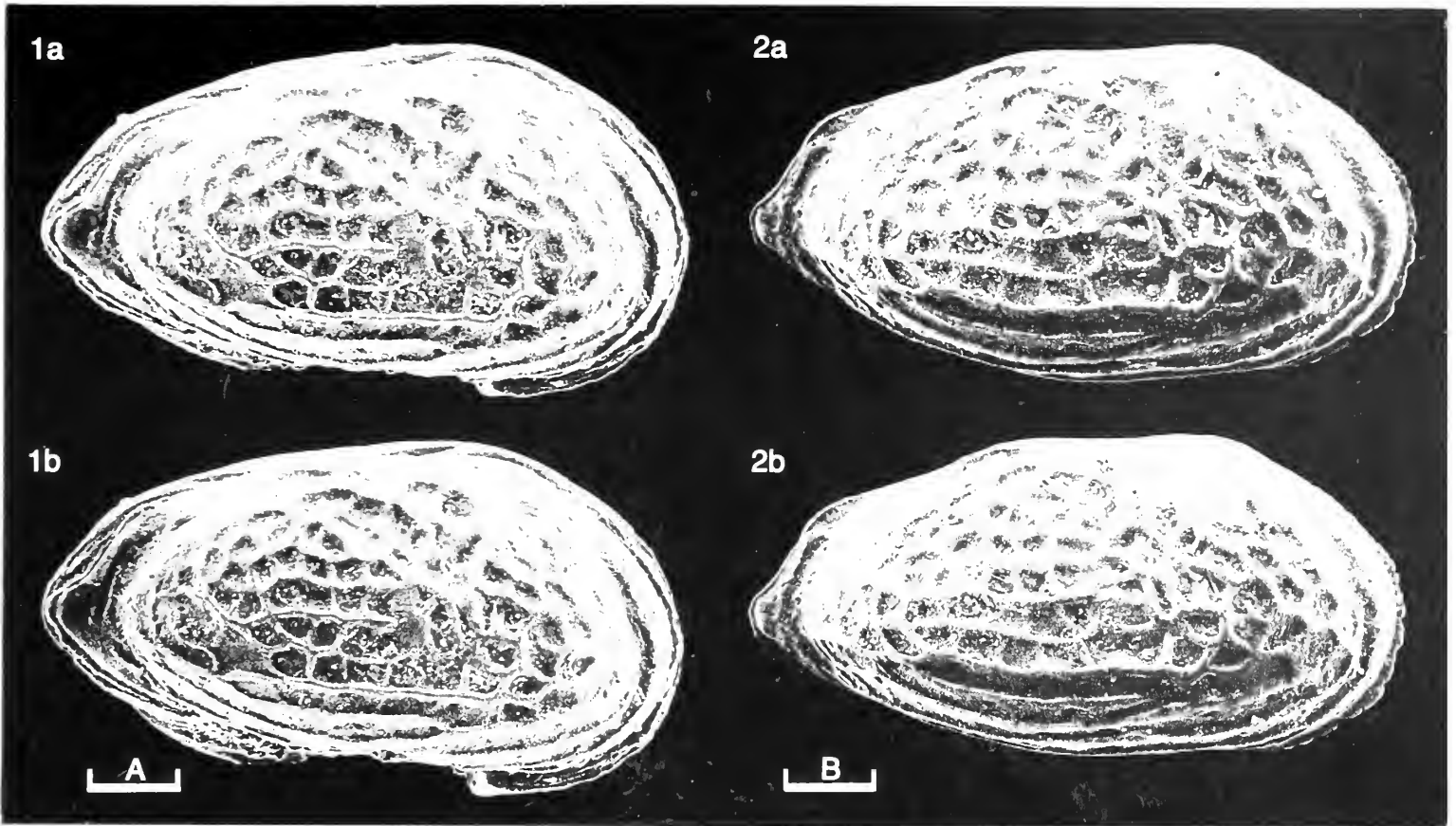
Explanation of Plate 12, 24

Fig. 1, ♀ car., rt.lat. (holotype, **HU.212.J.1**, 750µm long); fig. 2, ♂ RV, ext.lat. (**HU.212.J.2**, 700µm long).
Scale A (100µm; × 120), fig. 1; scale B (100µm; × 130), fig. 2.

Remarks: Whereas the early Bajocian and Bathonian ostracod faunas of Britain are well known, there is a dearth of information on higher Bajocian faunas and so a lack of material with which the present species can be compared. However, on the continent the upper Bajocian *Glyptocythere* species are well known; the type-species, *G.tuberodentina* Brand & Malz, 1962 (*Senckenberg. leth.*, 43, 433-435), comes from the Obere Parkinsonienschichten of NW Germany which lies above the *garantiana* Zone. There are clearly similarities between the present species and the type-species in the general pattern of ornamentation but in *G.raasayensis* the reticulation lacks the accentuation of the vertical element seen in *G.tuberodentina*. General shape is similar in the females, but the male *G.raasayensis* has a narrower caudal projection. The Scottish species also has five longitudinal ventral ribs compared with three or four in the type-species. *G.regulariformis* Brand & Malz, 1962 from the Garantianenschichten in Germany, of comparable age to the Scottish deposit, is much closer to the present species in the form of ornamentation but has a much more convex ventral margin. There is nothing else comparable from the *garantiana* Zone. The slightly earlier *G.praecursor* Brand & Malz, 1966 from the Subfurcatenschichten shows similar but coarser ornamentation and a more convex ventral margin. Other species are less close. Among the earlier British species *G.scitula* Bate, 1965 from the *humphresianum* Zone is closer than any of the German species and *G.raasayensis* could well be a later derivative. The latter differs most obviously in the better-defined postero-dorsal angle and the straight or slightly convex dorsal margin.

Explanation of Plate 12, 26

Fig. 1, ♀ car., dors. (holotype, **HU.212.J.1**, 750µm long); fig. 2, ♂ car., dors. (**HU.212.J.3**, 740µm long).
Scale A (100µm; × 130), figs. 1, 2.



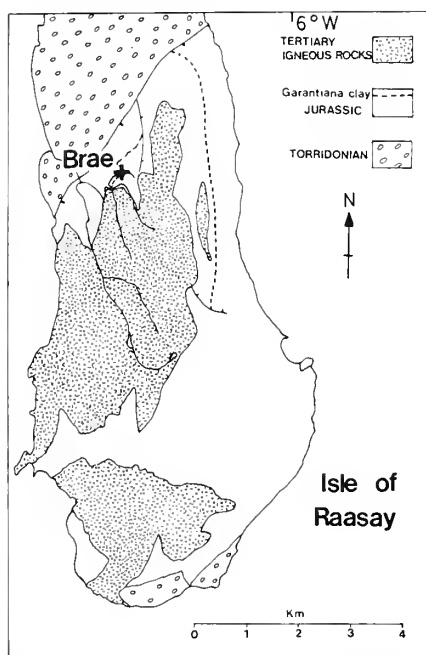
Remarks (contd.):

The type locality, near Storab's Grave, is regarded by Morton (*Scott. J. Geol.*, 12, 24, 1976) as the best in the Hebrides. Here the Garantiana Clay is approximately 2 m thick and lies directly above the Bearreraig Sandstone Formation. It consists of poorly bedded, structureless medium-grey clay which is highly fossiliferous and contains the ammonites *Garantiana (G.) filicosta* and *Garantiana (G.) baculata* as well as a large number of small bivalves including prolific *Avicula*. The microfauna is restricted to three foraminiferal species (*Ammobaculites agglutinans*, *Fronicularia oolithica* and *Lenticulina limbata*) and this single ostracod species. The ammonites and all the other fauna suggest normal marine salinities, but the pyritisation of the ammonites, the small size (less than 4 mm) of the bivalves together with their pyrite skin and the restricted nature of the microfauna suggest generally inimical conditions and perhaps somewhat deoxygenated bottom waters. The general aspect of the fauna suggests a shallow shelf sea with a depth of about 20 m.

Distribution: So far known only from the type locality.

Explanation of Plate 12, 28

Fig. 1, ♂ RV, int.lat. (HU.212.J.2, 700µm long); fig. 2, ♀ LV, int.lat. (HU.212.J.4, 660µm long). Scale A (100µm; × 140), figs. 1, 2.

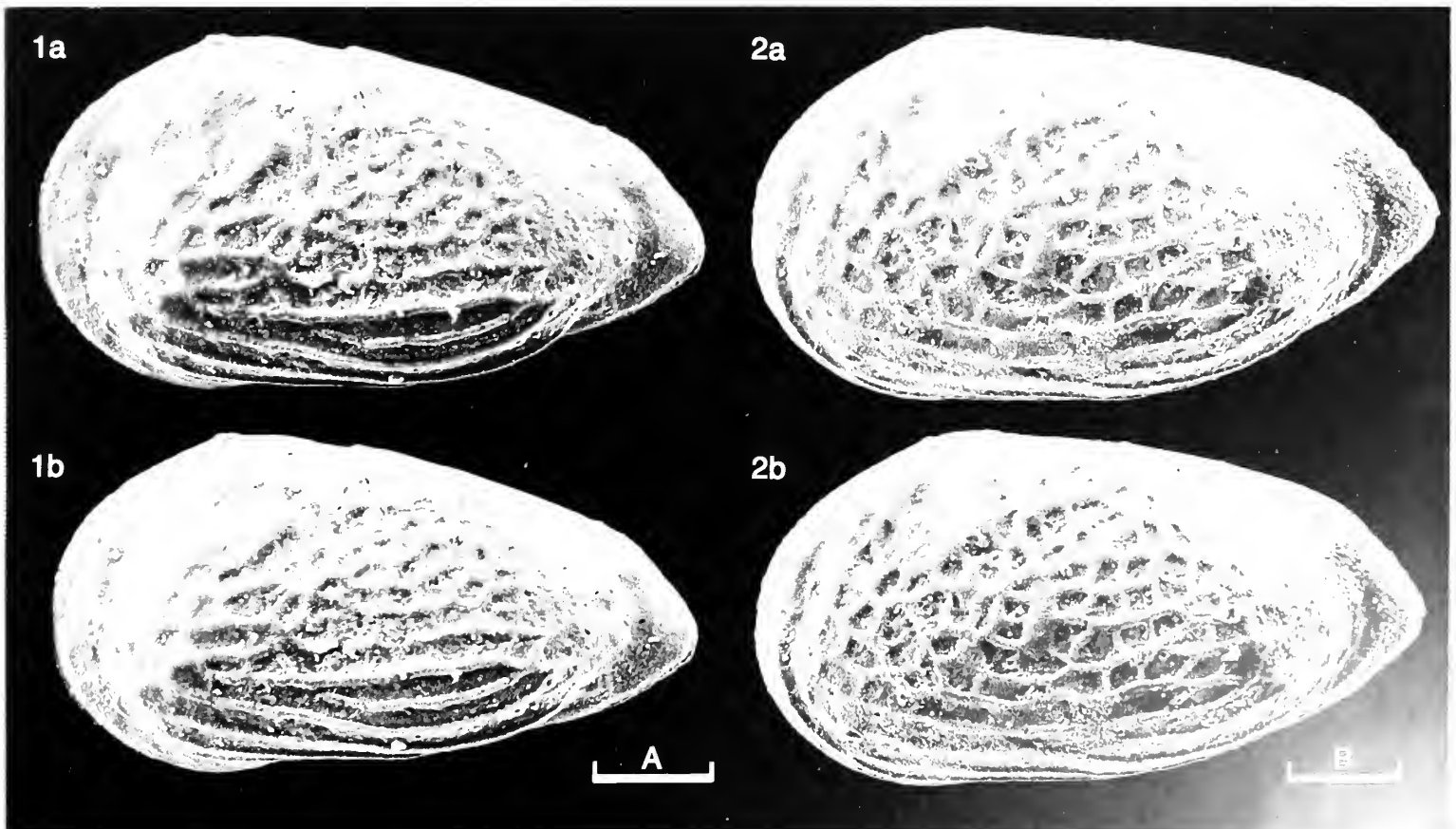
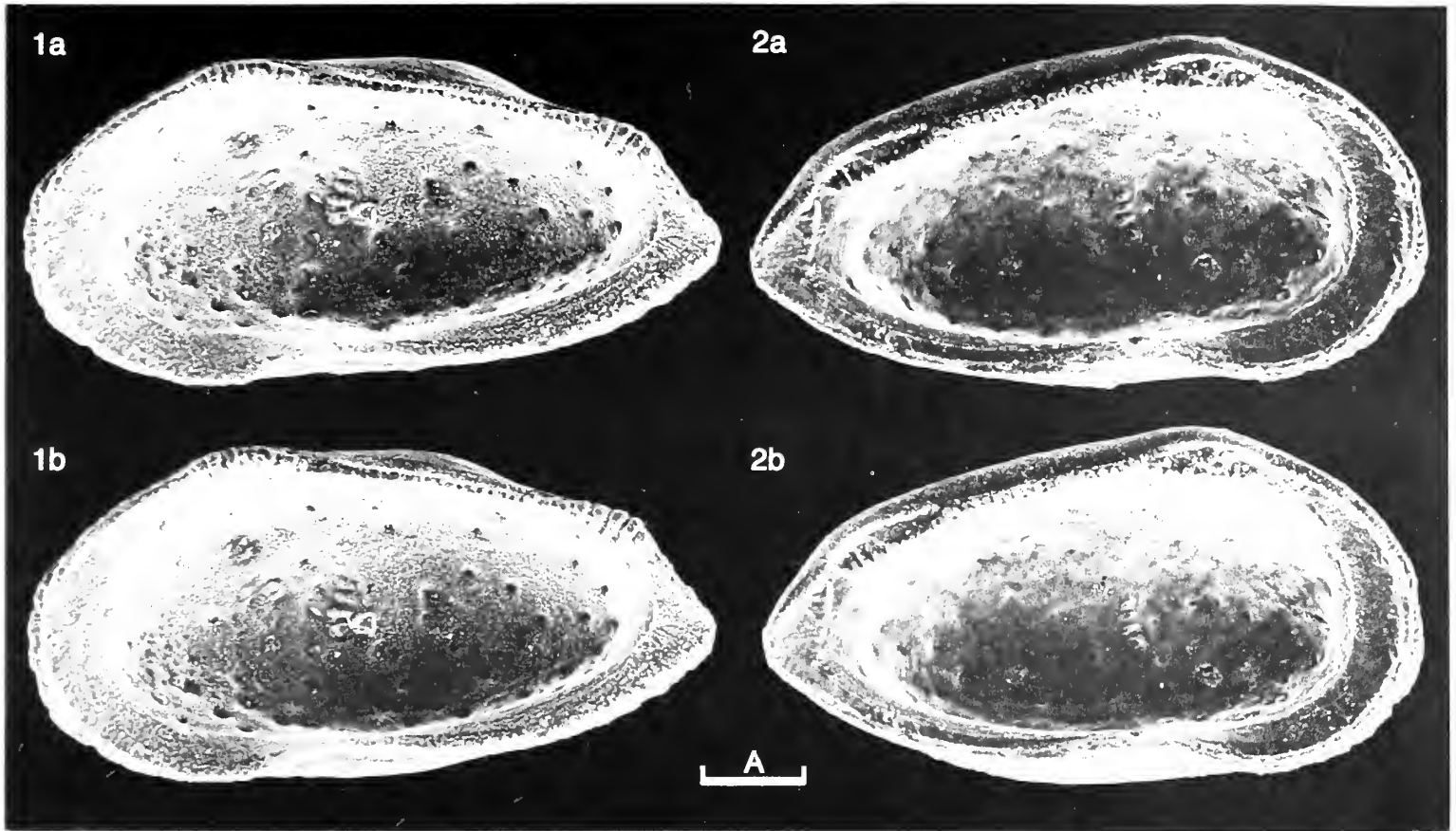


Text-fig. 1. Simplified geological map of central and southern Raasay showing the outcrop of the Garantiana Clay and the type locality at Brae.

Text-fig. 2. Muscle scar pattern of *G. raasayensis*.

Explanation of Plate 12, 30

Fig. 1, ♂ LV, ext.lat. (HU.212.J.5, 575µm long); fig. 2, ♀ LV, ext.lat. (HU.212.J.4, 660µm long). Scale A (100µm; × 160), fig. 1; scale B (100µm; × 150), fig. 2.



ON *LIMNOCY THERE SHIXIAENSIS* (WANG)

by Wang Qiang
(Tianjin Institute of Geology and Mineral Resources, China)

Limnocythere shixiaensis (Wang, 1980)

1980 *Leucocythere shixiaensis* sp.nov. Q.Wang, *Bull.Chinese Acad.geol.Sci.*, ser. 6, 1 (2), 127-134, pl. 1, figs. 1-5, text-fig. 2.

Neotype: Tianjin Institute of Geology and Mineral Resources no. **os.84.7-1**, a ♀ carapace.

Type locality: Basal portion of the Xiashagou section, Yangyuan County, Hebei Province, China. Nihewan Formation, Lower Pleistocene.

Figured specimens: Tianjin Inst. Geol. & Min. Res. nos. **os.84.7-1** (neotype, ♀ car.: Pl. 12, 32, figs. 1-4), **os.84.7-2** (plesiotype, ♀ car.: Pl. 12, 34, figs. 1-4), **os.84.7-3** (plesiotype, ♀ car.: Pl. 12, 36, figs. 1-4), **os.84.7-4** (plesiotype, ♀ juv. car.: Pl. 12, 38, figs. 1-4), **os.84.7-5** (plesiotype, ♀ RV: Pl. 12, 32, fig. 5; Pl. 12, 34, fig. 5; Text-figs. 1a-d), **os.84.7-6** (plesiotype, ♀ LV: Pl. 12, 36, fig. 5; Pl. 12, 38, fig. 5; Text-fig. 2). All the specimens are from the type locality and horizon.

Diagnosis: Carapace reniform in lateral view with broadly rounded anterior margin; posterior margin more squarish. Asymmetrical ridges on both valves; a ridge follows the valve margin in the posterior area of the right valve and a wavy ridge occurs in the ventral area of the left valve. Two nodes occur dorsally, one on either side of a dorso-median sulcus, with the anterior one developing a faint ridge parallel to the antero-dorsal margin.

Explanation of Plate 12, 32

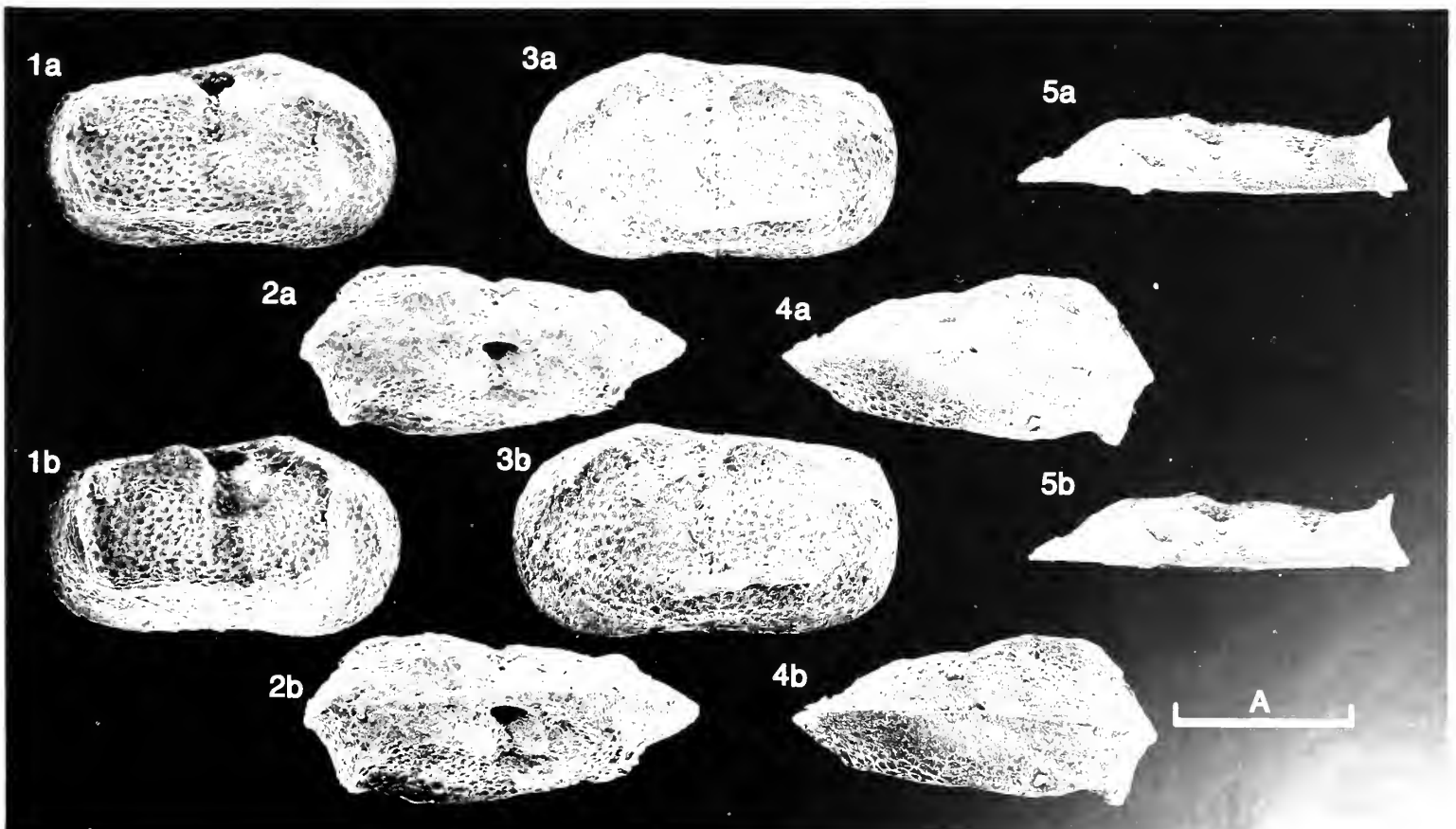
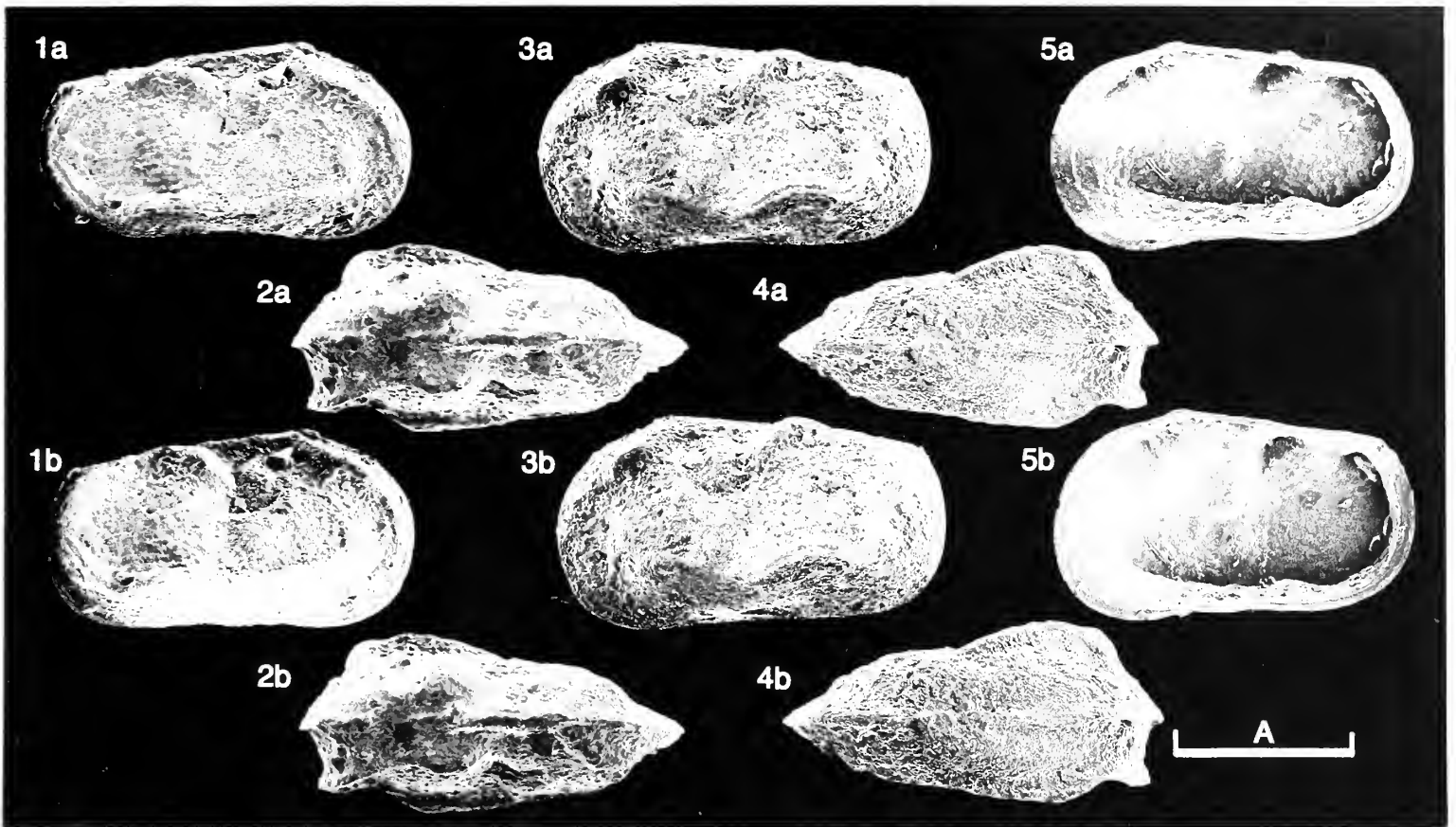
Figs. 1-4, ♀ car. (neotype, **os.84.7-1**, 860 μm long): fig. 1, rt. lat.; fig. 2, dors.; fig. 3, lt. lat.; fig. 4, vent.; fig. 5, ♀ RV, int. lat. (**os.84.7-5**, 820 μm long). Scale A (400 μm; × 60), figs. 1-5.

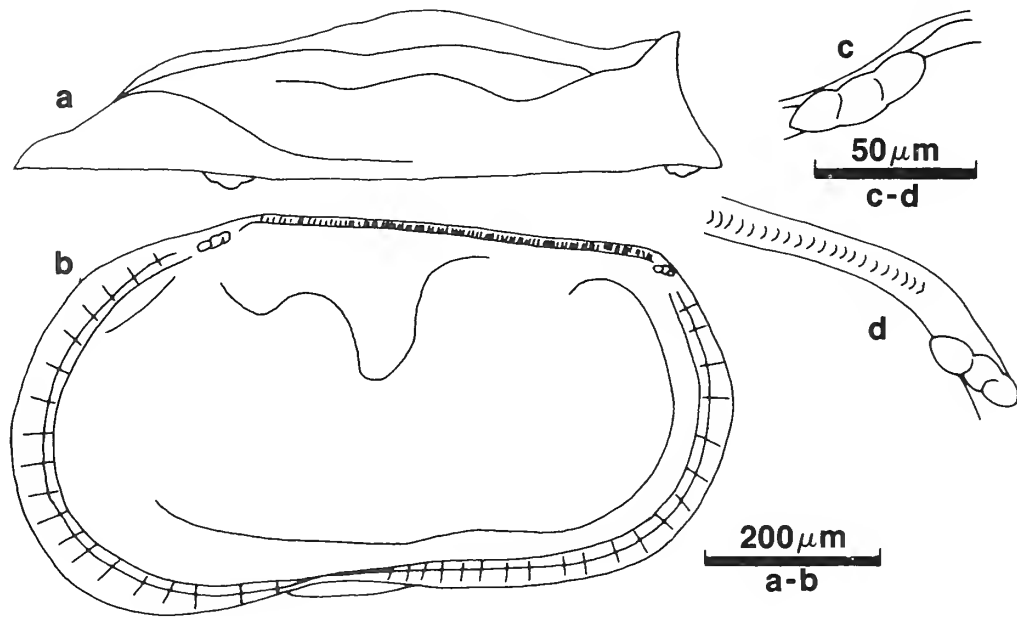
Remarks: Since all the original type specimens of this species have been destroyed, the specimens illustrated herein are designated as a neotype and plesiotypes. Originally this species was thought to belong to the genus *Leucocythere* (Wang 1980, *op.cit.*), but since it appears to be impossible to differentiate between *Leucocythere* and *Limnocythere* on carapace characters alone, it is now decided to place it in the latter genus. It is considered that the unusual morphological features of this species (asymmetrical valves and ridges) do not simply result from a salinity change as was originally suggested (Wang 1980, *op.cit.*). It should be mentioned that *Limnocythere inderica* Sharapova, as described by Kazmina (*Trudy Inst.Geol.Geofiz.sib.Otd.*, **264a**, 1-108, 1975), has a right valve with a peripheral ridge and a left valve with a ventral ridge, or vice versa, but unfortunately she did not illustrate the shape of the carapace. In the Danangou section in Yuxian County, Hebei Province, the author found the carapace of a species with a posterior peripheral ridge in both valves (therefore symmetrical ones), which was determined as *Leucocythere burangensis* Huang (Huang Baoren *et. al.*, 1982; *in: Series of the Scientific Expedition to the Qinghai-Xizang Plateau - Palaeontology of Xizang - Book 4*, 326-348); again the carapace was not illustrated in that book.

Distribution: Mr. Zhao Lianbi collected 125 carapaces and other single valves from the Nihewan Formation in the Nihewan-Shixia village section in 1964; the exact location remains unknown. The author collected a few similar specimens from a yellow-green silt-clay and a green-yellow silt at the type locality (Xiashagou section) in 1979. The Xiashagou section is located between Nihewan and Shixia and yielded the famous Nihewan vertebrate fauna of Middle-Upper Villafranchian age (P. T. de Chardin *et al.*, *Annls Paléont.*, **19**, 8, fig. 2, 1930).

Explanation of Plate 12, 34

Figs. 1-4, ♀ car. (**os.84.7-2**, 820 μm long): fig. 1, rt. lat.; fig. 2, dors.; fig. 3, lt. lat.; fig. 4, vent.; fig. 5, ♀ RV dors. (**os.84.7-5**, 820 μm long). Scale A (400 μm; × 60), figs. 1-5.

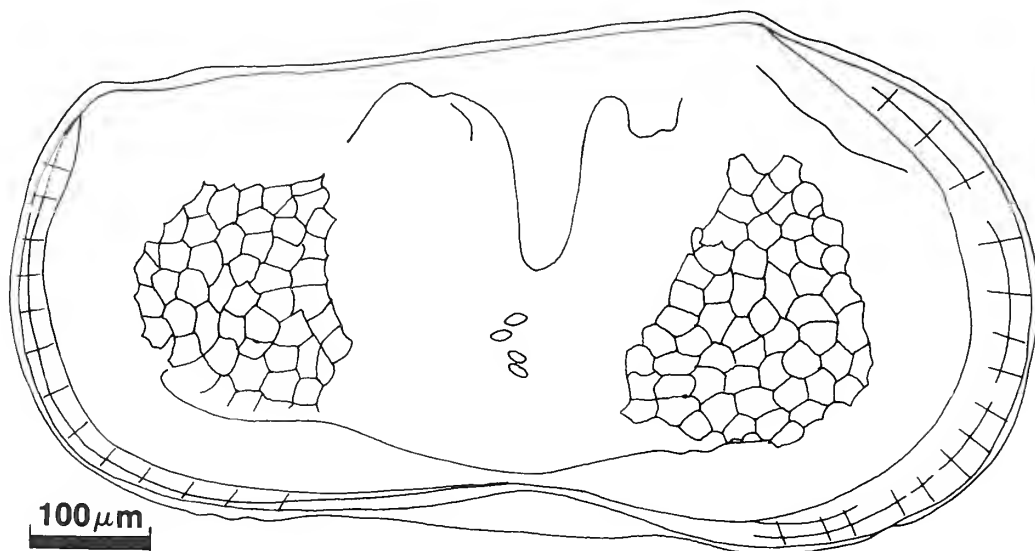




Text-fig. 1. ♀ RV (os.84.7-5) of *L.shixiaensis*: a, dors.; b, int. lat.; c-d, details of anterior and posterior hinge teeth.

Explanation of Plate 12, 36

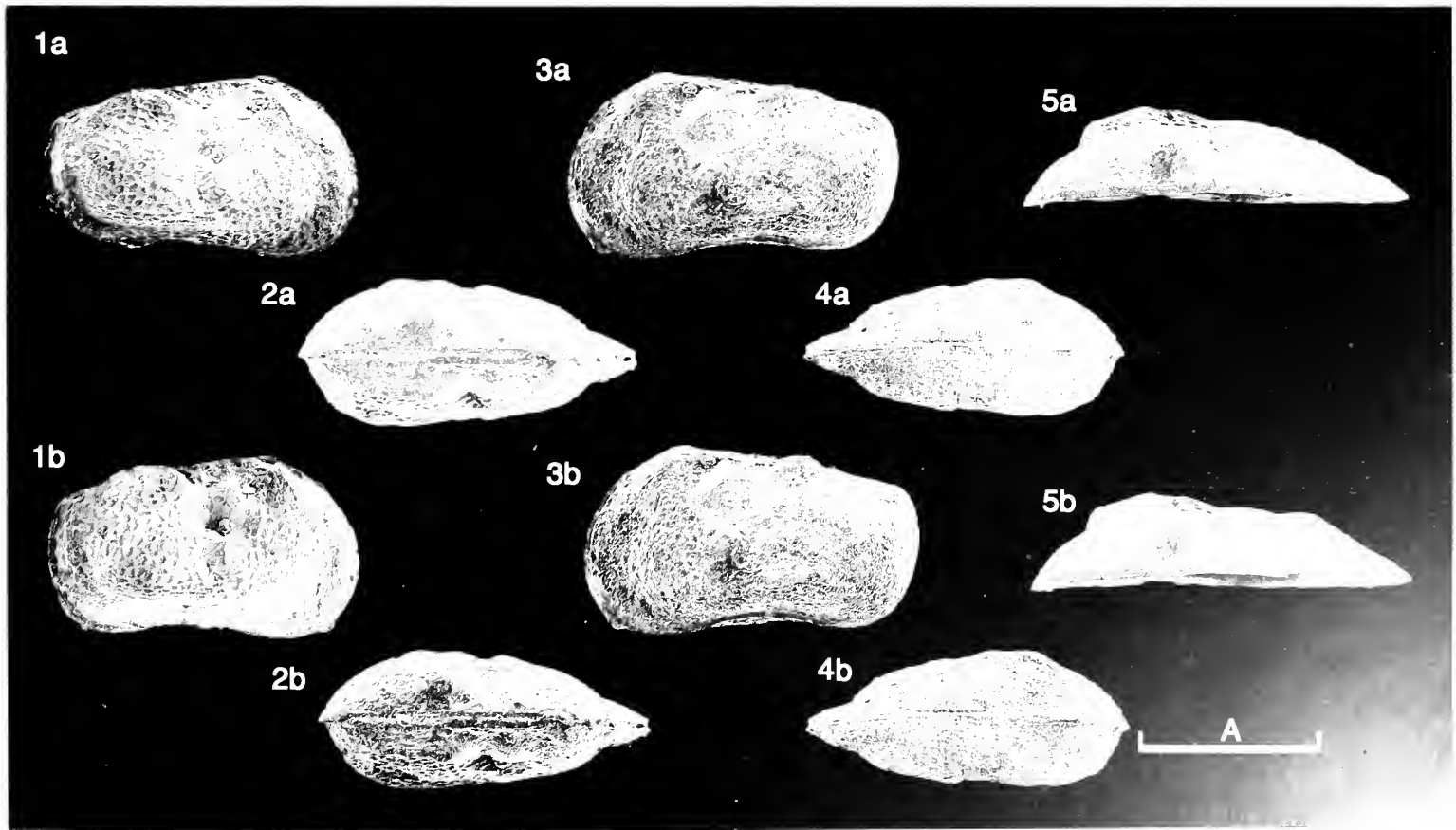
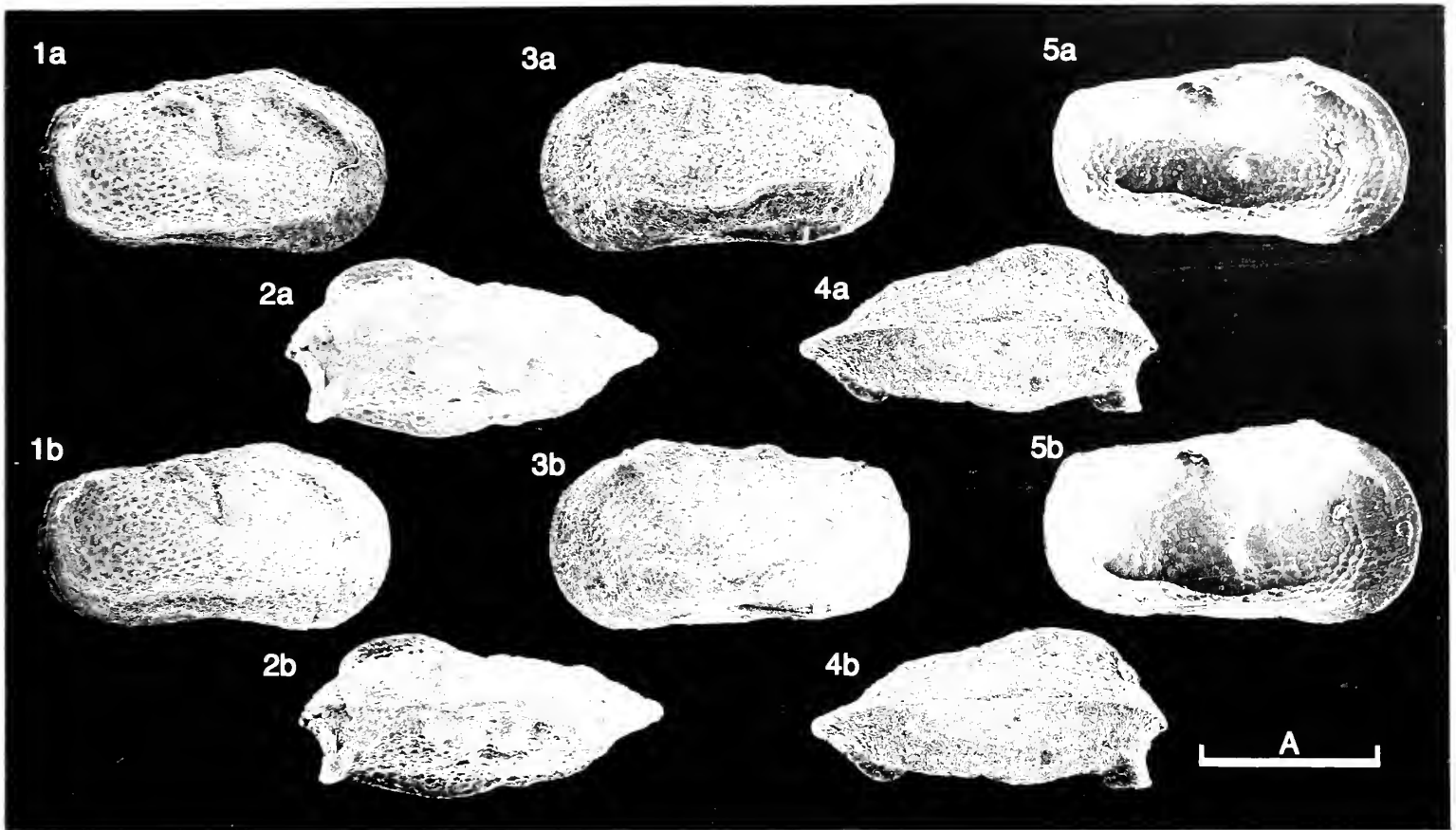
Figs. 1-4, ♀ car. (os.84.7-3, 810µm long): fig. 1, rt. lat.; fig. 2, dors.; fig. 3, lt. lat.; fig. 4, vent.; fig. 5, ♀ LV int. lat. (os.84.7-6, 820µm long). Scale A (400µm; ×60), figs. 1-5.



Text-fig. 2. ♀ LV (os.84.7-6) of *L.shixiaensis*: int. lat.

Explanation of Plate 12, 38

Figs. 1-4, ♀ juv. car. (os.84.7-4, 740µm long): fig. 1, rt. lat.; fig. 2, dors.; fig. 3, lt. lat.; fig. 4, vent.; fig. 5, ♀ LV dors. (os.84.7-6, 820µm long). Scale A (400µm; ×60), figs. 1-5.



ON *HILTERMANNICYTHERE EMACIATA* (BRADY)

by John Athersuch & David J. Horne
(B.P. Research Centre, Sunbury-on-Thames & City of London Polytechnic)

Hiltermannicythere emaciata (Brady, 1867)

- 1867 *Cythere emaciata* sp. nov. G. S. Brady, *Rept. Brit. Assoc. Adv. Sci.*, (for 1866), 210.
1868 *Cythere emaciata* Brady; G. S. Brady, *Trans. Linn. Soc. Lond.*, **26**, 414-415, pl. 31, figs. 31-37.
1874 *Cythere emaciata* Brady; G. S. Brady, H. W. Crosskey & D. Robertson, *Palaeontogr. Soc. [Monogr.]* **28**, 161, pl. 9, figs. 14-17.
1940 *Cythereis emaciata* (Brady); O. Elofson, *J. mar. Biol.*, **24**, 498-499, figs. 6-8.

Type specimens: Not present in the Brady collection at the Hancock Museum, Newcastle or in the British Museum (Natural History) and therefore presumed lost.

Type locality: In his original description Brady (*op. cit.*) gave the occurrence of this species as "Hebrides (locality doubtful), and many other places in Great Britain and Ireland".

Figured specimens: Brit. Mus. (Nat. Hist.) nos. **1984.184** (♀ car.; LV: Pl. 12, 40, fig. 1; Pl. 12, 42, fig. 3; RV: Pl. 12, 40, fig. 2; Pl. 12, 42, fig. 2; appendages: Text-figs. 1a-c, 2a-c), **1984.185** (♂ car.; LV: Pl. 12, 40, fig. 3; RV: Pl. 12, 42, figs. 1, 4; copulatory appendage: Text-fig. 2d). Both specimens are from a sample collected by N. Ainsworth in Dublin Bay, Eire (approx. lat. 53° 18'N, long. 06° 05'W), 1 km off Sandy Cove Harbour, depth 15 m.

Explanation of Plate 12, 40

Figs. 1, 2, ♀ car. (**1984.184**, 900µm long): fig. 1, LV, ext. lat.; fig. 2, RV, ext. lat.; fig. 3, ♂ RV, ext. lat. (**1984.185**, 830µm long). Scale A (200µm; × 65), figs. 1-3.

Diagnosis: Carapace elongate, tapering posteriorly; posterior margin with a pointed extremity at about mid-height. Reticulate ornament consists of relatively large, equal-sized, rounded and polygonal intercostal fossae, a few of which coalesce. Reticulum dominated by anterior concentric costa and three distinct longitudinal costae. Ventral and median costae linked posteriorly by oblique costa. Male carapace asymmetric; right valve compressed postero-ventrally, with ventral costa not developed posteriorly. Distal process of male copulatory appendage lamellar, subtriangular, truncated terminally.

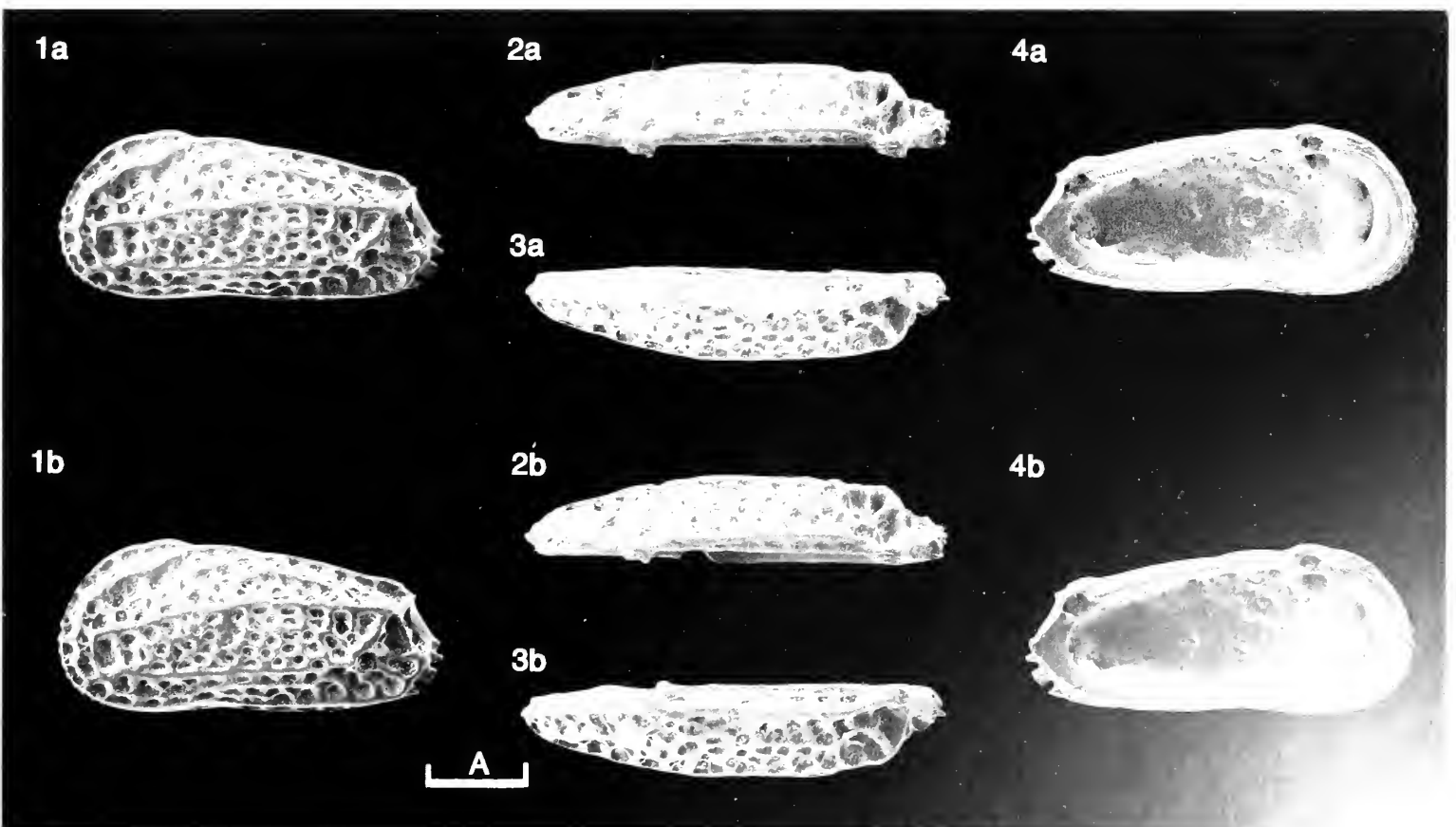
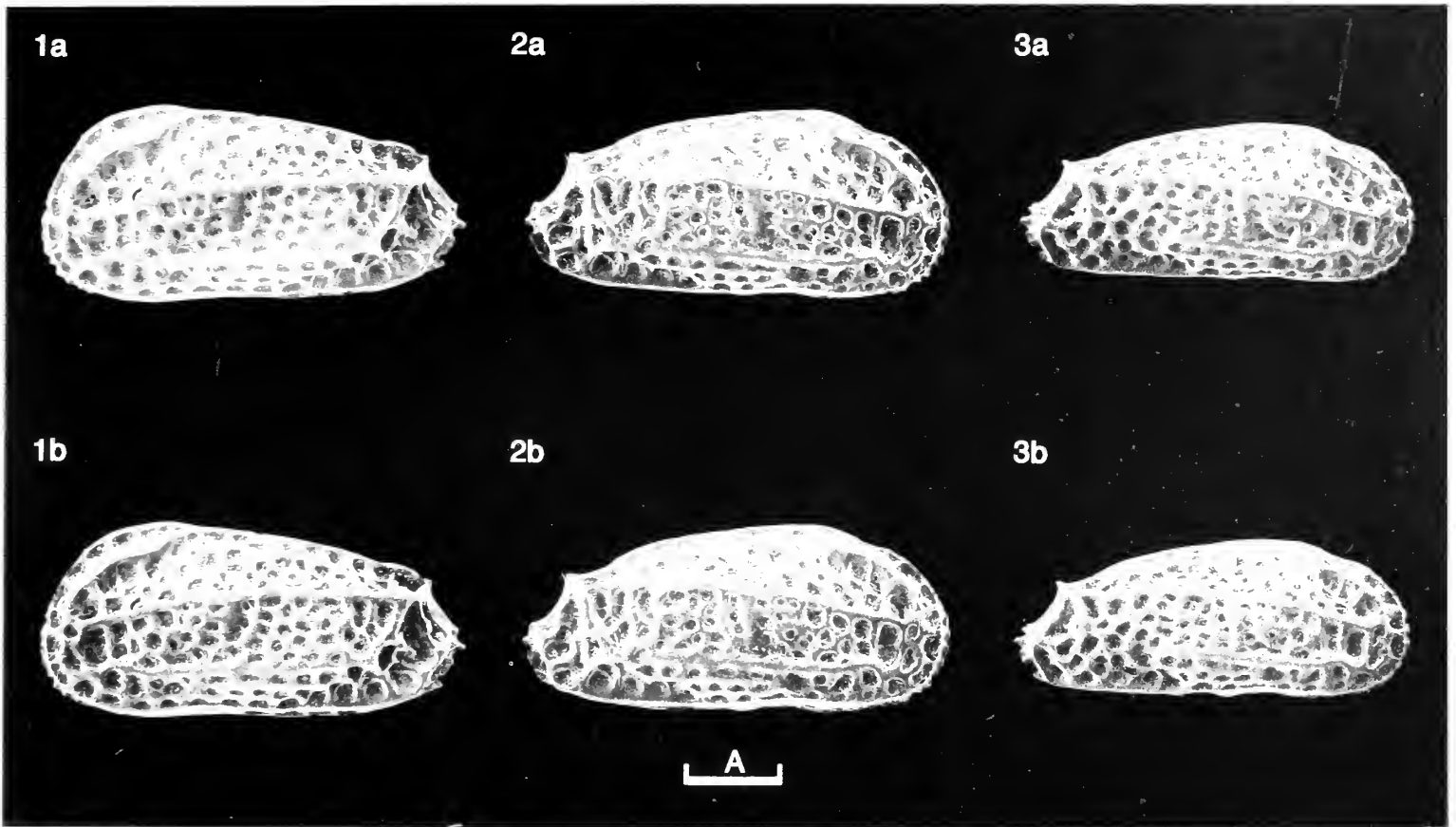
Remarks: *H. rubra* (G. W. Müller, 1894), from the Mediterranean, is very similar to *H. emaciata*. However, *H. rubra* is more quadrate in carapace outline, more truncate posteriorly and the ventral costa is more prominent and not linked posteriorly to the median costa. The sexual dimorphism of the male right valve is strong in *H. emaciata* but only weakly developed in *H. rubra*. The distal process of the male copulatory appendage of *H. rubra* is distally pointed, while that of *H. emaciata* is relatively broader and distally truncate (this comparison is based on Elofson's (*op. cit.*) illustration of the male copulatory appendage of *H. emaciata* as well as on our single, damaged specimen). For further discussion of *H. rubra* see Athersuch & Horne (*Stereo-Atlas of Ostracod Shells* **12**, 45-48, 1985).

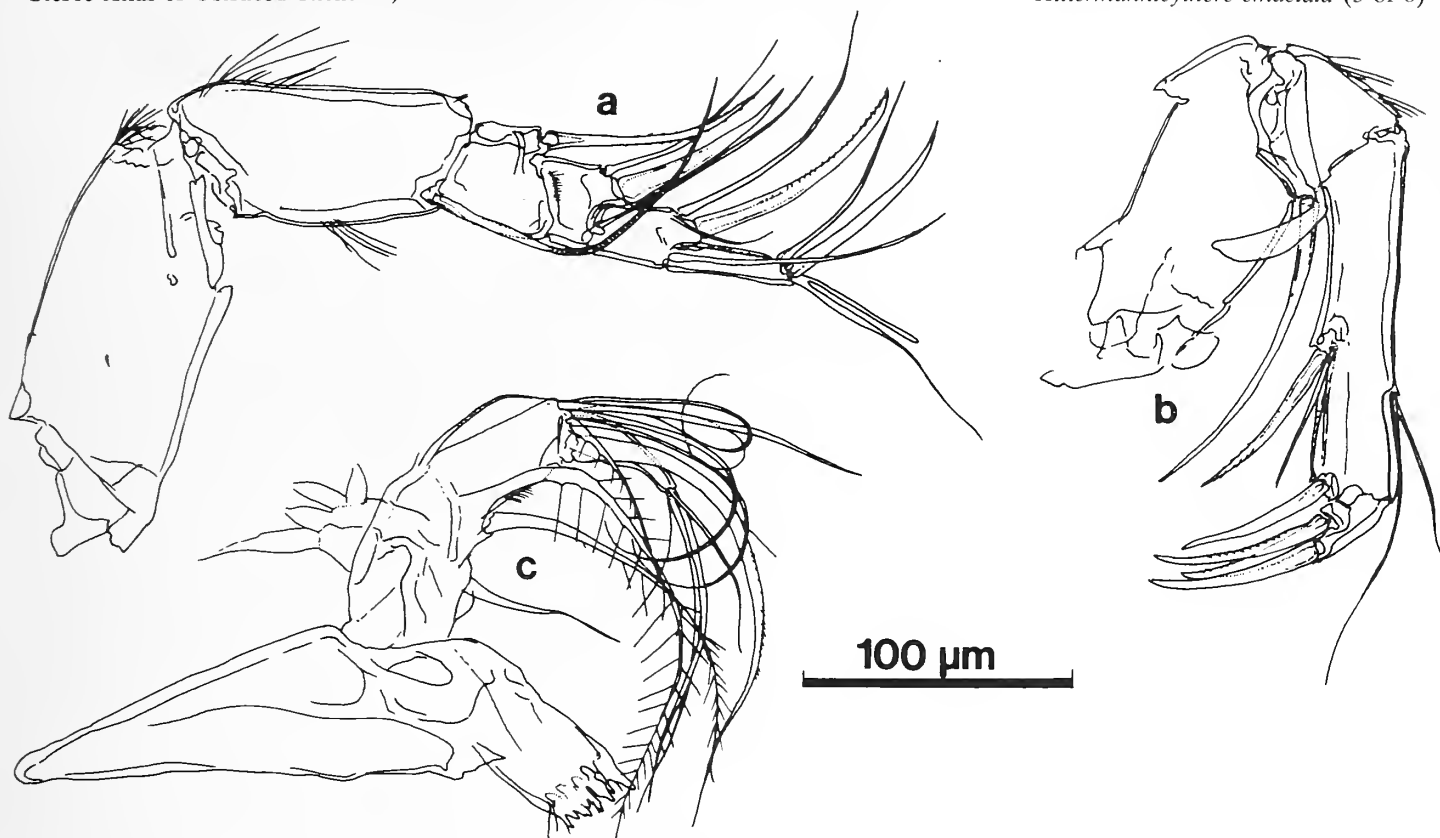
Specimens identified as *Falunia (Hiltermannicythere) emaciata* from the Miocene of Turkey by Doruk (1973, unpublished Ph.D thesis, University of Leicester) correspond well to our Recent examples of the species and her material is regarded as conspecific.

Distribution: The distribution of both living and fossil species of *Hiltermannicythere* in NW Europe needs reappraisal. *H. emaciata* appears to live in shallow sublittoral waters around the coasts of England, Wales and Ireland. Recent Mediterranean records should probably be referred to *H. rubra* (G. W. Müller). *H. emaciata* has also been recorded from the Pleistocene of Great Britain (Brady, Crosskey & Robertson, *op. cit.*) and the Miocene of Turkey (Doruk, *op. cit.*).

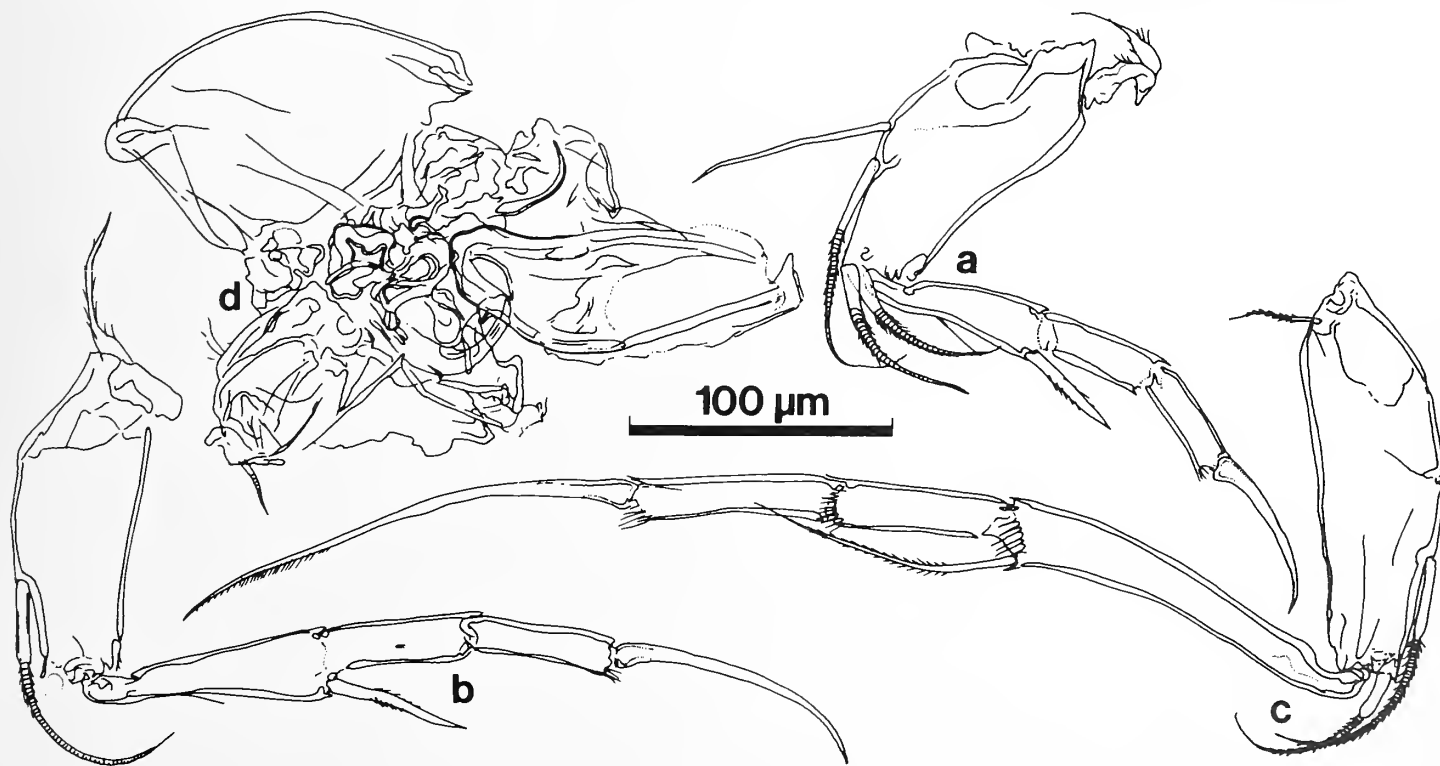
Explanation of Plate 12, 42

Figs. 1, 4, ♂ (**1984.185**, 830µm long): fig. 1, LV, ext. lat.; fig. 4, LV, int. lat.; figs. 2, 3, ♀ (**1984.184**, 900µm long): fig. 2, RV, dors.; fig. 3, LV, dors. Scale A (200µm; × 65), figs. 1-4.





Text-fig. 1. ♀ appendages (1984.184) of *H. emaciata*: a, antennula; b, antenna; c, mandible.



Text-fig. 2. ♀ appendages (1984.184) of *H. emaciata*: a, first leg; b, second leg; c, third leg; d, ♂ copulatory appendage (damaged; 1984.185).

ON *HILTERMANNICYTHERE RUBRA* (MÜLLER)

by John Athersuch & David J. Horne
(B.P. Research Centre, Sunbury-on-Thames & City of London Polytechnic)

Hiltermannicythere rubra (Müller, 1894)

- 1894 *Cythereis rubra* sp. nov. G. W. Müller, *Fauna Flora Golf-Neapel*, 21, 372, pl. 28, figs. 21, 26, pl. 31, figs. 2, 3.
1971 *Carinocythereis* sp.; P. J. Barbeito-Gonzalez, *Mitt.hamb.zool.Mus.Inst.*, 67, 281, pl. 14, figs. 1c, 2c, 3c.
1976 *Hiltermannicythere* aff. *H.rubra* (Müller); G. Bonaduce, G. Ciampo & M. Masoli, *Pubbl.Staz.zool.Napoli*, 40 (1), (for 1975), 49, pl. 28, figs. 1-5.
1979 *Hiltermannicythere rubra* (Müller); J. Athersuch, *J.nat.Hist.*, 13, 140, fig. 2 (13).

Type specimens: Athersuch (*Pubbl.Staz.zool.Napoli* 40 (2), 344-348, 1976) reported specimens in both sections of the G. W. Müller collection: 15 specimens at the Institut für Spezielle Zoologie und Zoologisches Museum der Humboldt Universität zu Berlin, E Germany and 13 specimens at the Zoologischen Institut, Greifswald, E Germany.

Type locality: Bay of Naples, Italy (lat. 40° 40'N, long. 14° 10'E); Recent.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. 1984.186 (♀ car.; LV: Pl. 12, 46, fig. 1; RV: Pl. 12, 46, fig. 2), 1984.187 (♂ car.; RV: Pl. 12, 46, fig. 3; LV: Pl. 12, 48, figs. 1, 4; copulatory appendage: Text-fig. 1), 1984.188 (♀ car.; RV: Pl. 12, 48, fig. 2; LV: Pl. 12, 48, fig. 3). All collected by J. Athersuch from localities in Cyprus during November, 1973. 1984.186 and 1984.188 are from sand in a small cove just North of Cape Greco (lat. 33° 55'N, long. 34° 10'E), water depth 10 m, salinity 39.4‰, temperature 21.5°C. 1984.187 was found in fine sand in Ayia Napa Harbour (lat. 34° 58'N, long. 34° 00'E), water depth 3 m, temperature 20°C.

Diagnosis: Carapace subquadrate, tapering slightly towards posterior; posterior margin truncate with ventral part bearing four distinct marginal denticles. Numerous intercostal fossae of varying size, often

Explanation of Plate 12, 46

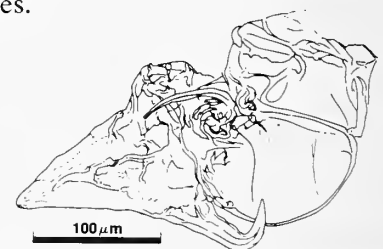
Figs. 1, 2, ♀ (1984.186, 720 μm long): fig. 1, LV, ext. lat.; fig. 2, RV, ext. lat.; fig. 3, ♂ RV, ext. lat. (1984.187, 760 μm long). Scale A (200 μm; × 80), figs. 1-3.

forming small clusters and frequently coalescing. Reticulum dominated by median and ventral longitudinal costae, which are not linked posteriorly or only weakly so. Seen internally, hinge line slightly below dorsal margin. Distal process of male copulatory appendage triangular, lamellar, with a curved, pointed prolongation at its anterior corner.

Remarks: *H.rubra* closely resembles *H.emaciata* (Brady, 1867) but differs in details of shape and ornament, particularly the disposition of the costae, and in the nature of the adult sexual dimorphism (see Athersuch & Horne, *Stereo-Atlas of Ostracod Shells* 12, 39-44, 1985). The sexual dimorphism of the right valve, conspicuous in *H.emaciata*, is only weakly developed in *H.rubra*. Furthermore, on the basis of the limited number of specimens of the two species that we have seen, it appears that in *H.rubra* the male is the larger dimorph, while in *H.emaciata* the reverse is true.

Falunia capsula Uliczny, 1969 (*Hemicytheridae* und *Trachyleberidae* (*Ostracoda*) aus dem Pliozän der Insel Kephallinia, Dissertation, Univ. Munich) and *Cythereis rubra pontica* Caraion, 1967 [*Fauna Republicii Socialiste România*, 4, *Crustacea*, pt. 10 (*Ostracoda*); *Fam. Cytheridae* (*Ostracode marine și salmastricole*), 1-164, Bucarest] also appear to be very similar to *H.rubra* but require detailed examination before they can be assigned with certainty to this species. We consider that the larger size of the specimens reported by Bonaduce *et al.* (1976, *op.cit.*) is not a sufficient difference to preclude them from being referred to this species.

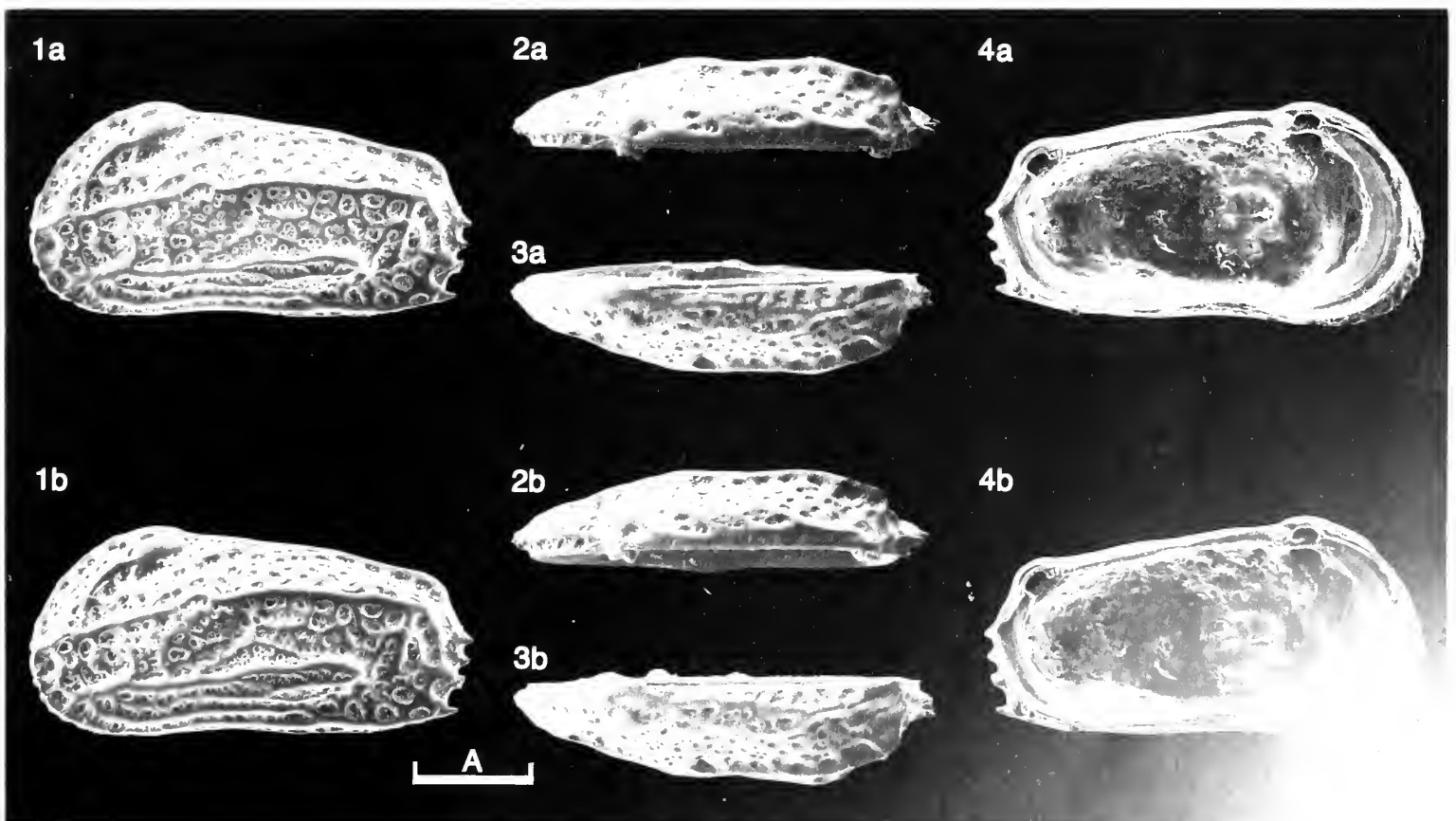
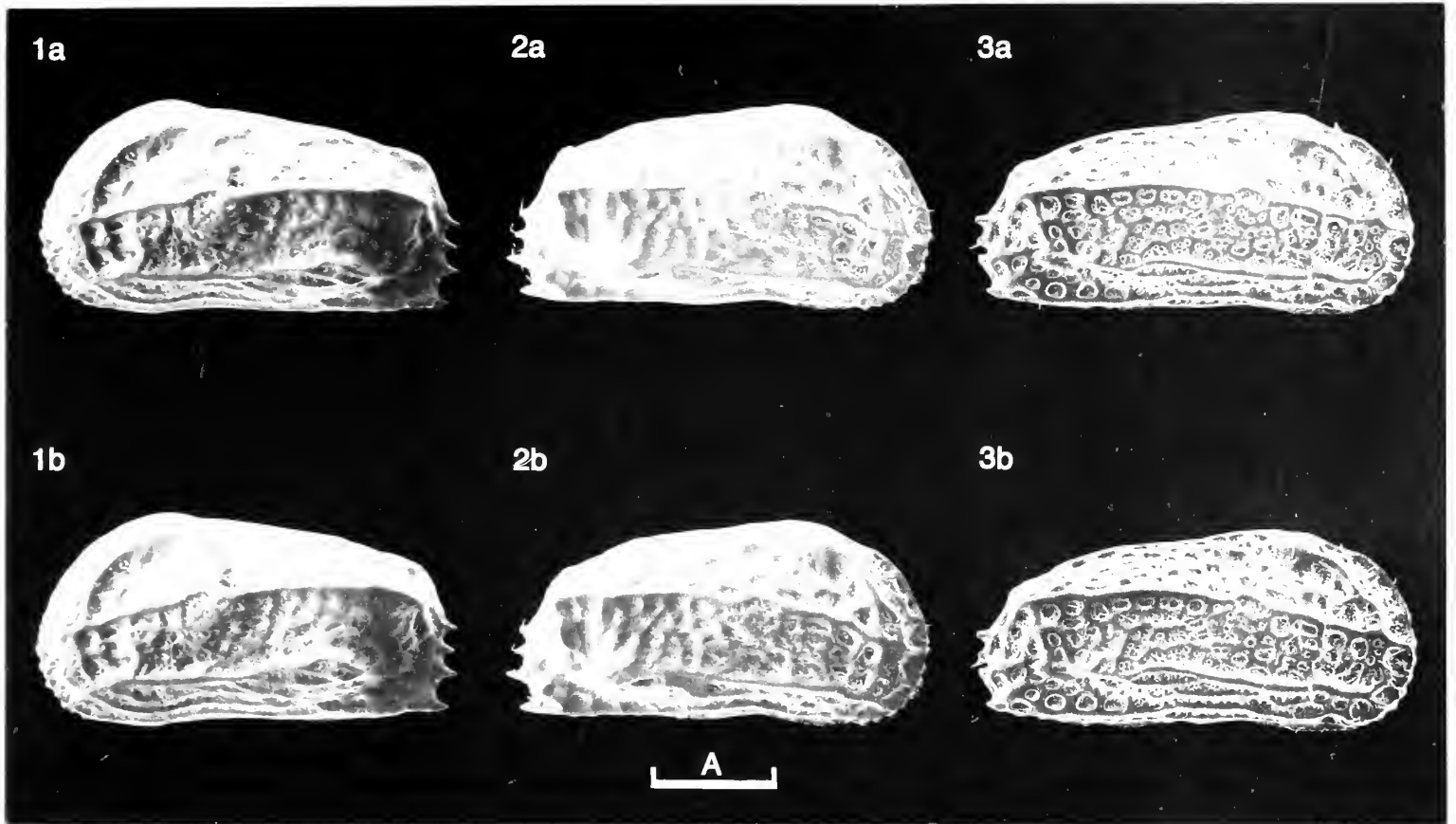
Distribution: Recent of the Mediterranean: Cyprus (herein), Greece (Barbeito-Gonzalez, *op.cit.*), Italy (Müller; Bonaduce *et al.*, *op.cit.*); ? Black Sea (Caraion, *op.cit.*). ?Pliocene of Greece (Uliczny, *op.cit.*). Because of the similarity of this essentially Mediterranean species to *H.emaciata*, all the records of both species require further investigation before their full geographical and stratigraphical distribution can be ascertained.



Text-figure 1. Male copulatory appendage (1984.187).

Explanation of Plate 12, 48

Figs. 1, 4, ♂ (1984.187, 760 μm long); fig. 1, LV, ext. lat.; fig. 4, RV, int. lat.; figs. 2, 3, ♀ (1984.188, 720 μm long); fig. 2, RV dors.; fig. 3, LV dors. Scale A (200 μm; × 80), figs. 1-4.



ON *BREPHOCHARIEIS COMPLICATA* (Salter)

by David J. Siveter
(University of Leicester, England)

Genus *BREPHOCHARIEIS* gen. nov.

Type-species: *Beyrichia complicata* Salter, 1848

- Derivation of name:** Greek *brephos*, embryo + *charieis*, beautiful; resemblance of L1 + L2 to a foetus. Gender feminine.
- Diagnosis:** Quadrilobate tallinnelline. Lobes stout, equally elevated except for depressed dorsal half of L4, confluent with an evenly curved, rounded connecting lobe sited very close to velum in lateral view; laterovelar furrow virtually lacking. L2 short, straight, slopes towards the end of the posteriorly reflexed dorsal part of L1. L3, L1 and, to a lesser extent L4 have cusps above the dorsum. Sulci (S1–S3) well developed, as is infravelar antral dimorphism. Female dolon moderately wide, extends from near anterior cardinal corner to below S2, continues posteriorly (as in tecnomorphs) as a fine ridge along ventral part of the valve.
- Remarks:** The combined nature of its adventral structure, dimorphism (resembling that of the type-genus *Tallinnella*) and lobation indicate the tallinnelline affinities of *Brephocharieis*. However, it is readily distinguished from other, mainly middle Ordovician Baltic genera of the Tallinnellinae Schallreuter, 1976 (*Palaeontographica* (A), **153**, 165; also R. E. L. Schallreuter, *Geologie*, **15**, 200, 1966). Like *Tetrada*, *brephocharieis* lacks the distinctive laterovelar furrow (and very prominent velum) found in *Tallinnella* Öpik (type-species: *T. dimopha* Öpik, *Publ. Geol. Inst. Univ. Tartu.*, **50**, 24, 1937). *Brephocharieis* is distinguished from *Tetrada* Neckaja (type-species: *T. memorabilis* (Neckaja, 1953); see R. E. L. Schallreuter *Palaeontographica* (A), **153**, 166, 1976) by its more clearly differentiated quadrilobation and connecting lobe, more prominent antral dimorphism and its ventrally present velum in both dimorphs. *Homeokiesowia* Schallreuter (*Stereo-Atlas of Ostracod Shells*, **6**, 75–78, 1979) differs in having dissolved lobes, no connecting lobe and a wide, distinct velum.

Explanation of Plate 12. 50

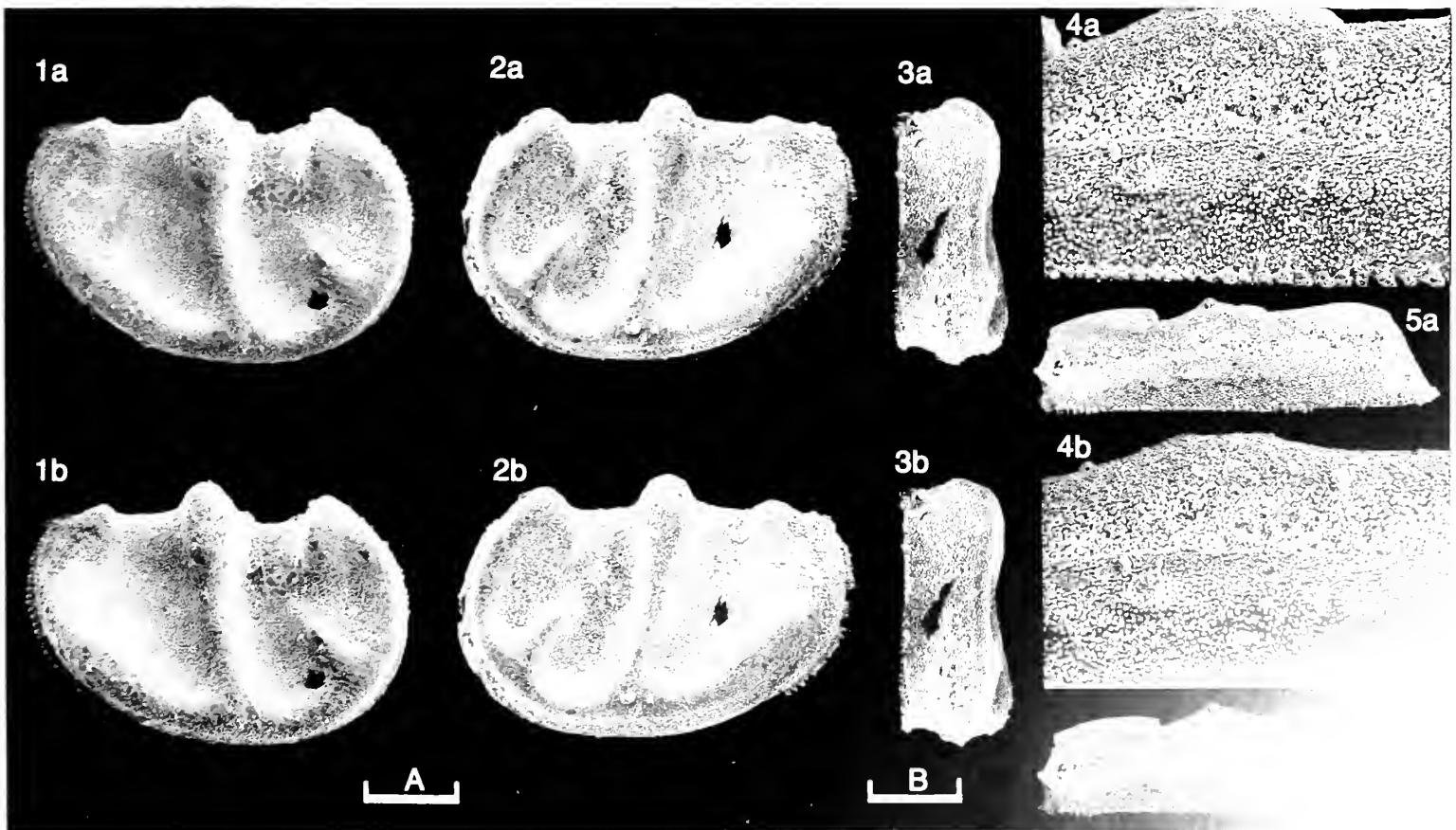
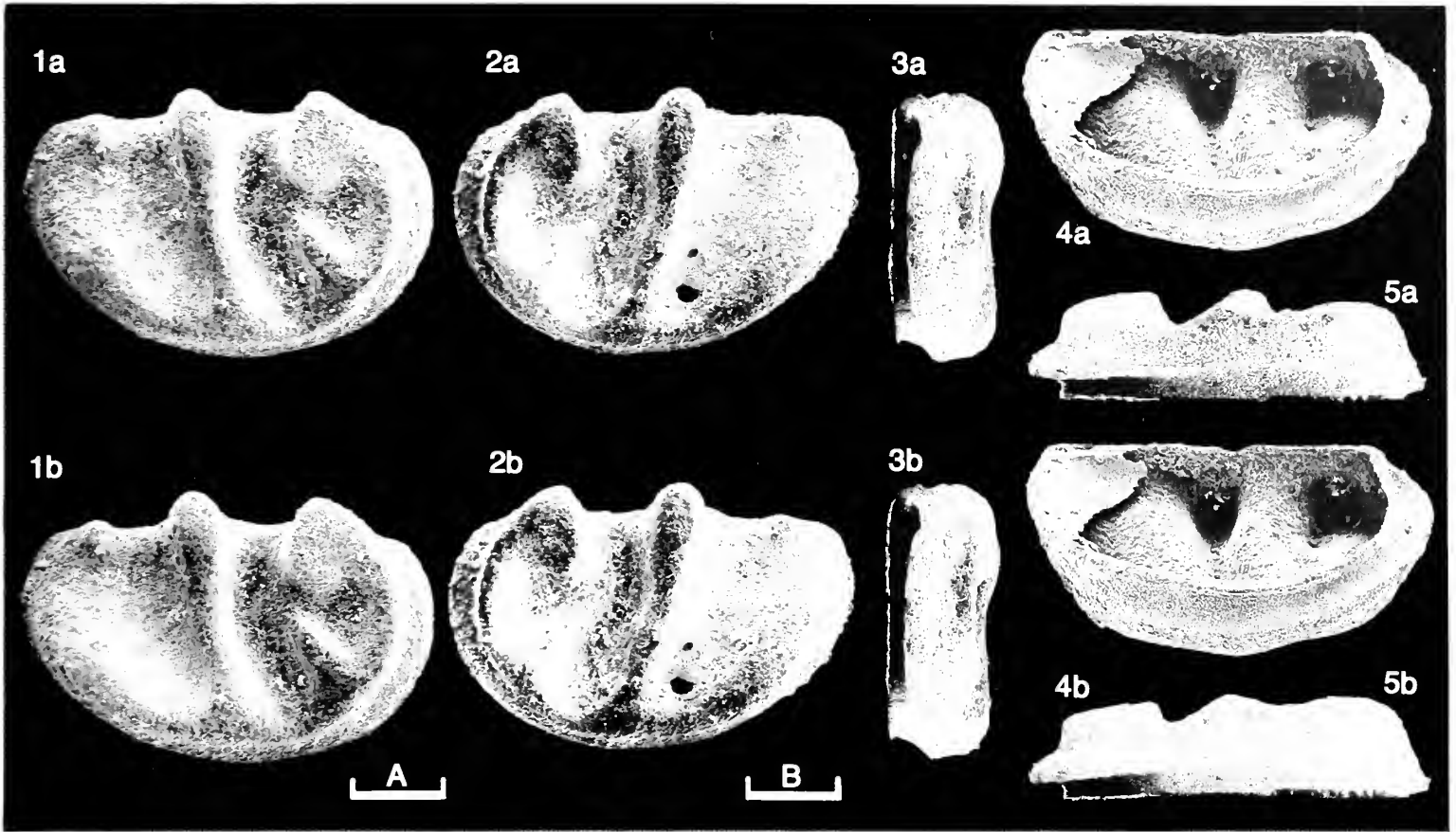
Fig. 1, ♀ RV, ext. lat. (OS 12576, 2150 μm long); figs. 2–5, ♀ LV (OS 12577, 2270 μm long): fig. 2, ext. lat.; fig. 3, ext. ant.; fig. 4 int. vent. obl. showing antrum; fig. 5, ext. vent. Scale A (500 μm; × 25), fig. 1; scale B (500 μm; × 25), figs. 2–5.

Brephocharieis complicata (Salter, 1848)

- 1848 *Beyrichia complicata*, Salter; J. W. Salter in: J. Philips & J. W. Salter, *Palaeontological appendix, Mem. Geol. Surv. U. K.*, **2**, 234 (*pars*), 352 (*pars*), pl. 8, figs. 16, 16a.
- 1851 *Beyrichia complicata* (Salt.); F. McCoy in: A. Sedgwick & F. McCoy, *A synopsis of the classification of the British Palaeozoic Rocks . . .* (1), 1851, 136 (*pars*), non pl. 1E, figs. 3, 3a (= Sedgwick Museum, Cambridge, no. **A. 16696** = *Harperopsis scripta* (Harper, 1947)).
- 1852 *Beyrichia complicata*; J. W. Salter in: A. Sedgwick & F. McCoy, *Ibid.*, appendix A, ii (*pars*), non pl. 1E, figs. 3, 3a (= Sedgwick Museum, Cambridge, no. **A. 16696** = *Harperopsis scripta* (Harper, 1947)).
- 1855 *Beyrichia complicata*, Salter; T. R. Jones, *Ann. Mag. nat. Hist.*, (2), **16**, 163–165 (*pars*), pl. 6, figs. 1–4, non fig. 5 (= on British Geological Survey London, slab no. **49449** = *Harperopsis scripta* (Harper, 1947)).
- 1868 *Beyrichia complicata* Salter; T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (4), **2**, 59 (*pars*).
- 1869 *B. complicata*, Salter; T. R. Jones, *On the Palaeozoic Bivalved Entomostraca*, 15, text-fig. 22, non 11, Hertford.
- 1881 *Beyrichia complicata*, Salter; J. W. Salter & R. Etheridge in: A. C. Ramsey, *Geology of North Wales* (2nd ed.), **3**, *Mem. Geol. Surv. U. K.*, 487 (*pars*), pl. 19, fig. 9, non 106, London.
- 1890 *Tetradella complicata*, Salter; E. O. Ulrich, *Jl. Cincinn. Soc. nat. Hist.*, **13**, 112.
- non 1892 *Beyrichia complicata*, Salt.; T. E. Marr, *Geol. Mag.*, 108.
- 1908 *Tetradella complicata* (Salter); E. O. Ulrich & R. S. Bassler, *Proc. U.S. natn. Mus.*, **35**, 306.
- 1934 *Tetradella complicata* (Salter); R. S. Bassler & B. Kellest, *Spec. Pap. geol. Soc. Am.*, **1**, 190, 480 (*pars*).
- 1938 *Beyrichia complicata* Salter; C. J. Stubblefield, *Summ. Progr. geol. Surv.*, pt. 2 (for 1936), 35.
- 1947 *Tetradella complicata* (Salter); J. C. Harper, *Geol. Mag.*, **84**, 346, pl. 10, fig. 3.
- 1963 *Tallinnella complicata* (Salter); N. Spjeldnaes, *Palaeontology*, **6**, 255, pl. 36, figs. 9–13, text-fig. 1.
- 1966 *Gunnaropsis complicata*; R. E. L. Schallreuter, *Geologie*, **7**, 853.
- 1966 *Cerninella* (*Cerninella*) *complicata* (Salter, 1848); A. Přibyl, *Čas. Národního Musea, odd. přírod.*, **135**, 206–207 (*pars*); non pl. 2, figs. 4–9, text-figs. 4a–c.
- 1977 *Tetradella complicata* Salter; F. M. Swain in: F. M. Swain (ed.), *Stratigraphic Micropaleontology of Atlantic Basin & Borderlands*, 29, fig. 3 (34), Elsevier, Amsterdam.

Explanation of Plate 12. 52

Fig. 1, ♂ RV, ext. lat. (OS 12574, 2125 μm long); figs. 2–5, ♂ LV (OS 12575, 2125 μm long): fig. 2, ext. lat.; fig. 3, ext. ant.; fig. 4, detail of ext. vent. showing ornament and velum; fig. 5, ext. vent. Scale A (500 μm; × 25), figs. 1–3, 5; scale B (200 μm; × 62), fig. 4.



- 1978 '*Tallinnella*' *complicata* (Salter, 1848); D. J. Siveter in: R. H. Bate & E. Robinson (eds.), A Stratigraphical Index of British Ostracoda, *Geol. J. special issue* 8, 41, 43, 45, 48, pl. 1, figs. 7, 8.
- 1979 *Cerninella complicata* (Salter, 1848); A. Přibyl, *Sbornik Národního Musea* (B), 33 (for 1977), 67–68 (pars), pl. 3, figs. 1, 2, non pl. 3, figs. 3–7, text-figs. 3 (3–5), 10 (1), 11 (4), 16 (2).

Lectotype: Designated herein [the neotype designation of Přibyl (1966, 206) is invalid]. A left valve tecnomorph (not heteromorph as stated by Přibyl 1979, 143); internal and external moulds on rock pieces of British Geological Survey Museum, London, nos. **GSM 24525** and **GSM 24526** (= part and counterpart) respectively. The internal mould was figured by Jones 1855 (pl. 6, fig. 3) and Přibyl 1979 (pl. 3, fig. 1). The original of '*Beyrichia*' *complicata* of Jones 1855, pl. 6, fig. 4 (= a tecnomorphic right valve internal mould) is also on **GSM 24525**. From Llan Mill (see 'Type locality').

The specimens of Jones on **GSM 24525** and **24526** are part of Salters 1848 syntype collection: they were considered as "lectosyntypes" by Stubblefield (*op. cit.*) and Harper (*op. cit.*); furthermore, the pieces were catalogued in 1848 (Museum labels) and Jones (1855, 163, 164) acknowledges Salters' help and the use of 'Museum of Practical Geology' (= GSM) specimens.

The specimens of '*Beyrichia*' *complicata* of Jones 1855, pl. 6, figs. 1, 2 are wax casts of left and right valve tecnomorphs respectively, now in the British Museum (Nat. Hist.), London, no. **I 6323**; the original external moulds, from Llan Mill, have not been identified but the probability is that they were also taken from amongst the many external moulds on the original slabs held by the British Geological Survey. Topotype rock piece **GSM 24527**, containing the original of Harper 1947 (*op. cit.*, pl. 10, fig. 3 = a heteromorphic left valve internal mould), is also possibly syntype material (Stubblefield 1938). **GSM 24525**, **24526** and **24527** contain tens of moulds of *B. complicata*.

The original of '*Beyrichia*' *complicata* of Jones 1855, pl. 6, fig. 5, is a small tecnomorphic left valve from Harnage, Shropshire, on British Geological Survey, London, slab no. **49449** and belongs to *Harperopsis scripta* (Harper, 1947); see C. R. Jones & D. J. Siveter, *Stereo-Atlas of Ostracod Shells*, 10, 5–12, 1983. Museum label and catalogue information claim the original of Jones 1855 pl. 6, fig. 5, is British Museum (Nat. Hist.) no. **I 6325**, a single larval quadrilobate palaeocope also from Harnage. As Jones states (1855, 164) that the original is in the 'Museum of Practical Geology', the specimen in the British Museum is considered not to be the figured specimen.

Explanation of Plate 12, 54

Fig. 1, ♀ LV, ext. lat. (**OS 12581**; 2025 μm long); figs. 2, 3, ♂ RV (**OS 6665**, 2180 μm long): fig. 2, ext. lat.; fig. 3, ext. post.; fig. 4, ♀ RV, ext. lat. (**OS 6666**, 2050 μm long). Scale A (500 μm; × 26), figs. 1, 4; scale B (500 μm; × 25), figs. 2, 3.

Type locality: Llandeilo 'Flags' at Llan Mill (= Lann Mill of Salter 1848), 3 km E of Narbeth, Dyfed, S Wales; Nat. Grid Ref.: SN 139 143. The precise locality and horizon is unknown but the hillside quarry 200m NW of Llan Mill Farm is the probable locality; it lies within the Bryn-glass Limestone Member, Lampeter Velfrey Formation, Narberth Group of Addison 1974, Unpublished Ph.D. thesis, Queen's University, Belfast) and is of probable upper Llandeilo age.

Figured specimens: British Museum (Nat. Hist.) nos. **OS 6665** (♂ RV: Pl. 12, 54, figs. 2, 3), **OS 6666** (♀ RV: Pl. 12, 54, fig. 4), **OS 12573** (tecnomorphic LV: Pl. 12, 56, figs. 2–4), **OS 12574** (♂ RV: Pl. 12, 52, fig. 1), **OS 12575** (♂ LV: Pl. 12, 52, figs. 2–5), **OS 12576** (♀ RV: Pl. 12, 50, fig. 1), **OS 12577** (♀ LV: Pl. 12, 50, figs. 2–5), **OS 12578** (tecnomorphic LV: Pl. 12, 56, figs. 5, 6), **OS 12579** (♀ RV: Pl. 12, 56, fig. 1), **OS 12581** (♀ LV: Pl. 12, 54, fig. 1).

All specimens are silicified; obtained by acid preparation of limestone from the old quarry c. 300m S of Cwm Agol Farm, c. 8 km W of Llandeilo, Dyfed, S Wales; approx. lat 51° 51' N, long. 4° 05' W (Nat. Grid Ref.: SN 5655 2070). Llandeilo 'Flags', Llandeilo Series, Ordovician.

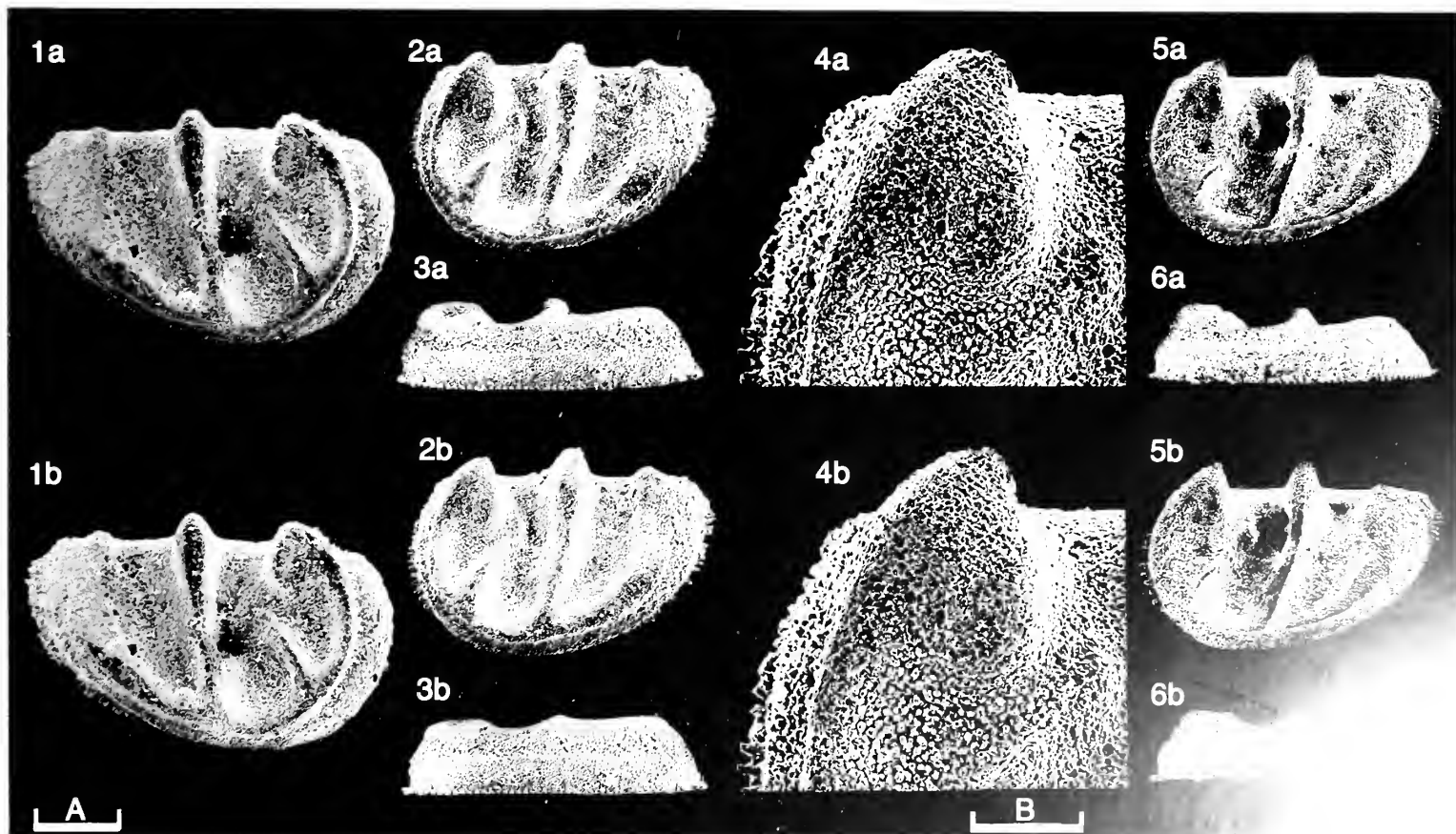
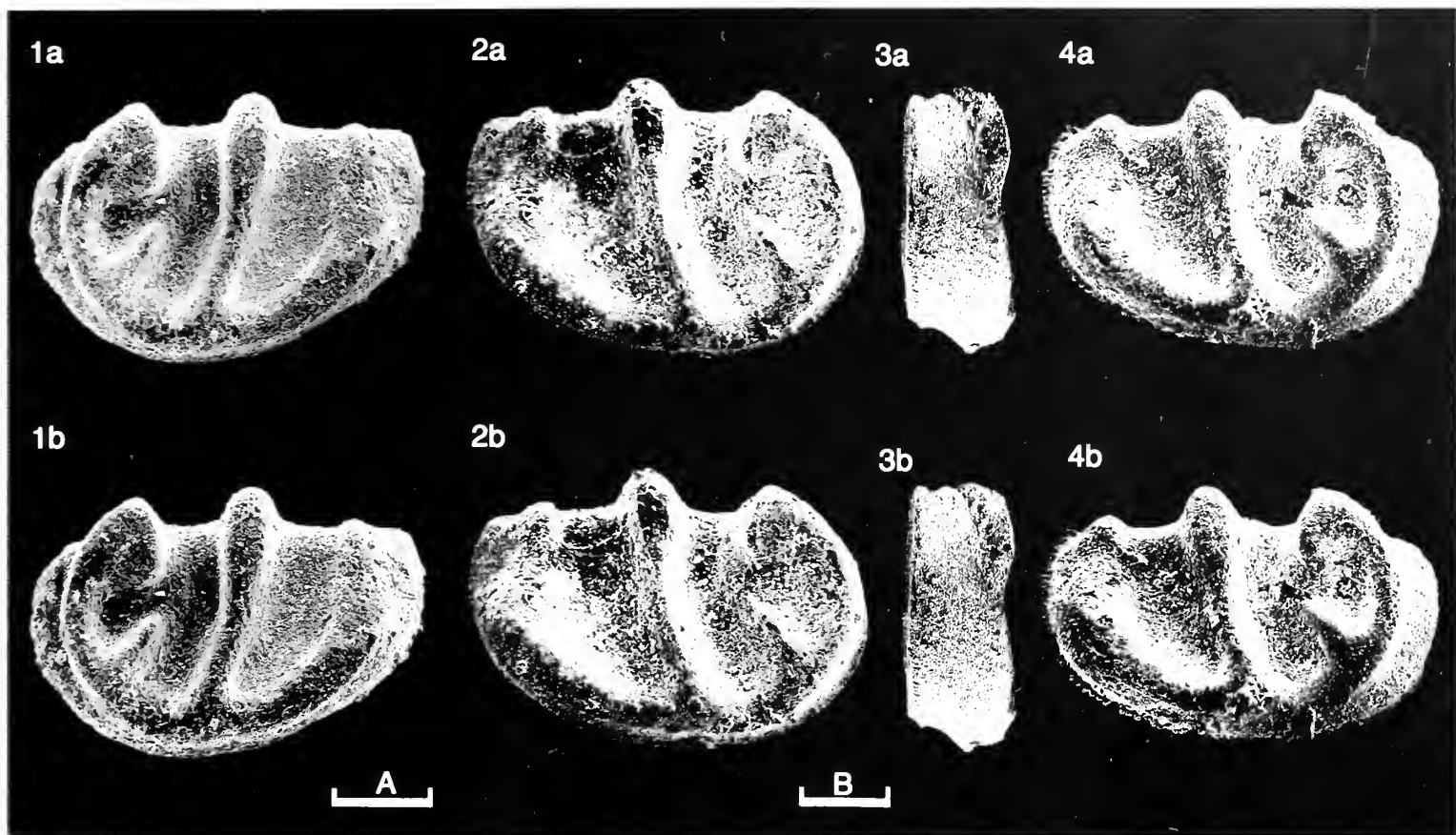
Diagnosis: As for the genus. *Brephocharieis* is at present monotypic.

Remarks: '*Beyrichia*' *complicata* was the first ostracode species erected from the British Ordovician (Siveter 1978, 41). Within the silicified material described herein there is notable size variation (mixed chronodemes/ecodemes?) of females (length, including dolon: c. 1900–2270 μm) within a single, acid prepared sample (e.g. Pl. 12, 54, figs. 1, 3 cf. Pl. 12, 56, fig. 1). Moreover, some of the smaller females (Pl. 12, 56, fig. 1) appear to have relatively more constricted lobes (possibly a factor of size or preservation). A tendency to develop more constricted lobes (not quite cristation) is also seen in younger instars (e.g. Pl. 12, 56, fig. 5).

Distribution: Llandeilo Series around Narberth and Llandeilo, S Wales. The range has now been extended (C. Jones, in prep.) to include the upper Llanvirn and the Costonian Stage, Caradoc Series of that area.

Explanation of Plate 12, 56

Fig. 1, ♀ RV, ext. lat. (**OS 12579**; 1950 μm long); figs. 2–4, tecnomorph LV (**OS 12573**; 1625 μm long): fig. 2, ext. lat., fig. 3, ext. vent.; fig. 4, detail anterodors.; figs. 5, 6, tecnomorphic LV (**OS 12578**; 1500 μm long): fig. 5, ext. lat.; fig. 6, ext. vent. Scale A (500 μm; × 25), figs. 1–3, 5, 6; scale B (200 μm; × 75), fig. 4.



ON *HENNINGSMOENIA GUNNARI* (THORSLUND)

by R. J. Orr
(Queen's University of Belfast, Northern Ireland)

Genus *HENNINGSMOENIA* Schallreuter, 1964

1964 *Henningsmoenia* gen. nov.; R. E. L. Schallreuter, *Ber. geol. Ges. DDR*, 2, 91.

Type-species (by original designation): *Winchellatia gunnari* Thorslund, 1948

Diagnosis: Unisulcate Steusloffinae with a long sigmoidal S2. Preadductorial node a low bulb or indistinct. Plica weak. Posteroventral lobe with a ridge-like crista; crista short or long. Female velum with a S-like step anterocentrally and a ridge-like torus; tecnomorphs with or without torus. Antrum botulate and dolonal. Lateral surface tuberculate or pustulate and also maybe finely reticulate.

Henningsmoenia gunnari (Thorslund, 1948)

1948 *Winchellatia gunnari* sp. nov. P. Thorslund *Bull. geol. Instn. Univ. Upsala*, 23, 368, pl. 20, figs. 2, 3.

1976 *Henningsmoenia gunnari* (Thorslund); R. E. L. Schallreuter, *Palaeontographica* (A) 153, (4/6), 199, pl. 7, figs. 1-8.

1982 *Henningsmoenia gunnari* (Thorslund); L. K. Gailite, in: R. Z. Ulst, L. K. Gailite & V. I. Yakovleva, *Ordovician Latvia*, 119, 124, 130, 191. Riga.

1983 *Henningsmoenia gunnari* (Thorslund); R. E. L. Schallreuter, *Palaeontographica* (A) 180, (4/6), 178, pl. 11, fig. 7 (*q. v.* for full synonymy).

1984 *Henningsmoenia gunnari* (Thorslund); R. E. L. Schallreuter, *Geol. För. Stockh. Förh.*, 101, 95.

Holotype: Palaeontological Institute, University of Uppsala, Sweden; tecnomorphic left valve (listed as a right valve in Thorslund 1948, 373, pl. 20, fig. 2).

Type locality: Kullatorp core (depth 65.05m), Kinnekulle, Västergötland, Sweden; approx. lat. 58° 30'N, long. 13° 25'E. Skagen Limestone (= Johvi Stage), middle Ordovician.

Explanation of Plate 12, 58

Figs. 1, 3, ♀ LV (K 10034, 1020µm long): fig. 1, ext. lat.; fig. 3, ext. obl. vent. Figs. 2, 4, ♀ RV (K 10035, 1030µm long): fig. 2, int. ant. showing part of antrum; fig. 4, int. lat. Scale A (250µm; ×65), figs. 1, 3, 4; scale B (100µm; ×86), fig. 2.

Figured specimens: Ulster Museum, Belfast, nos. K 10034 (♀ LV: Pl. 12, 58, figs. 1, 3), K 10035 (♀ RV: Pl. 12, 58, figs. 2, 4; Pl. 12, 60, fig. 2), K 10036 (tecnomorphic RV: Pl. 12, 60, figs. 1, 3) and K 10037 (juv. RV: Pl. 12, 60, fig. 4). All specimens are silicified, from Backsteinkalk erratic boulder no. Stb 1, from Staberhuk, Isle of Fehman, near Puttgarden, West Germany. Backsteinkalk boulder Type 1B1; source = ? Skagen Limestone, Sweden (Schallreuter, *Palaeontographica* (A), 44, (1/3), 65, 1973). Sample courtesy of Dr. R. E. L. Schallreuter.

Diagnosis: *Henningsmoenia* species with a small, bulb-like preadductorial node. Plica weak, only developed either side of sulcus. Posteroventral crista short, posterior end spine-like, merges with valve posterior to sulcus. Adult male and female similar in lateral view. Anterocentrally female velum follows a S-like course. Female torus strong; broad dolonal botulate antrum; tecnomorphic torus weak to absent. Right valve with a narrow ridge proximal to the free margin. Primary surface ornament pustulate; second-order ornament a fine reticulation, often missing.

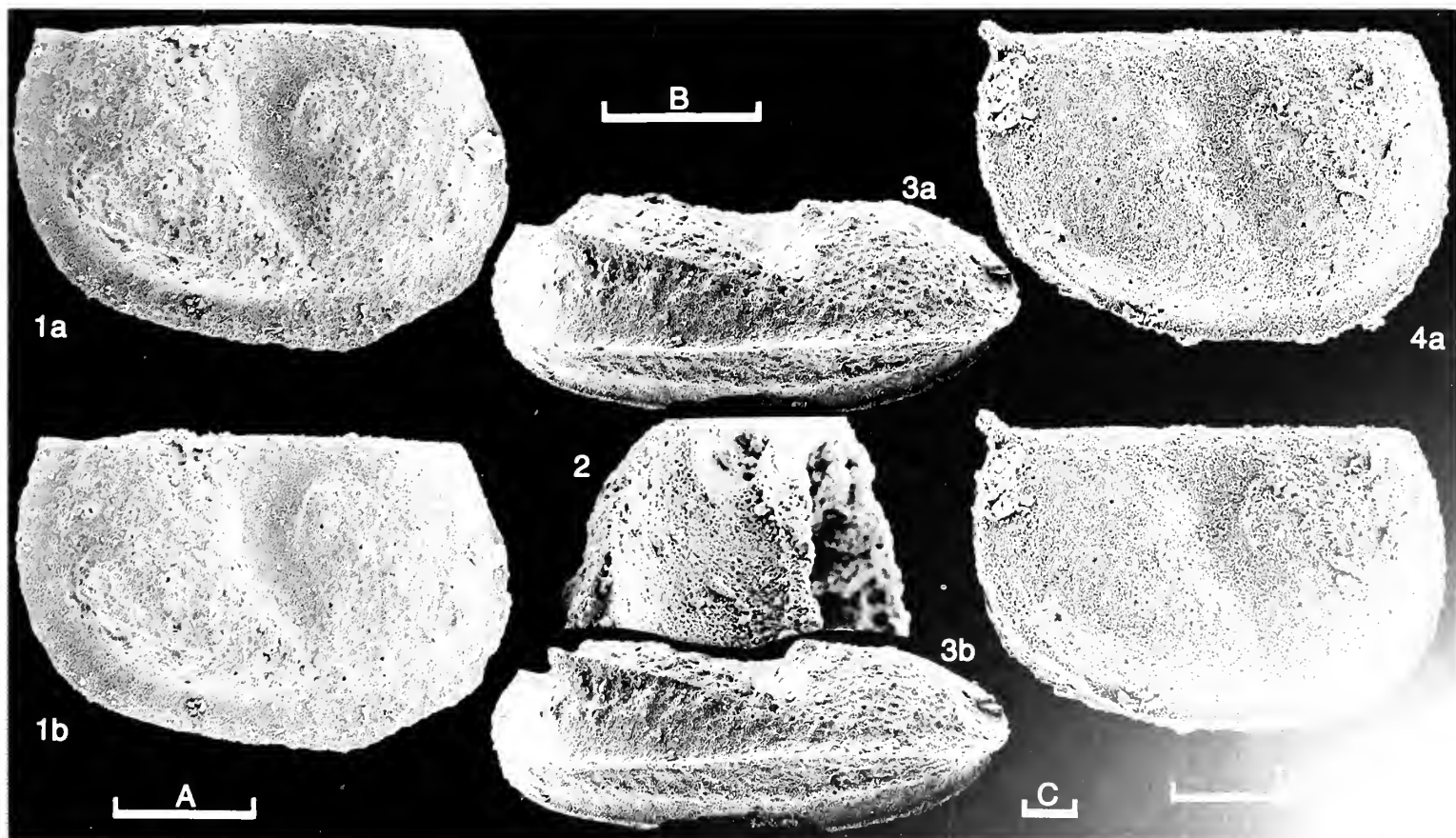
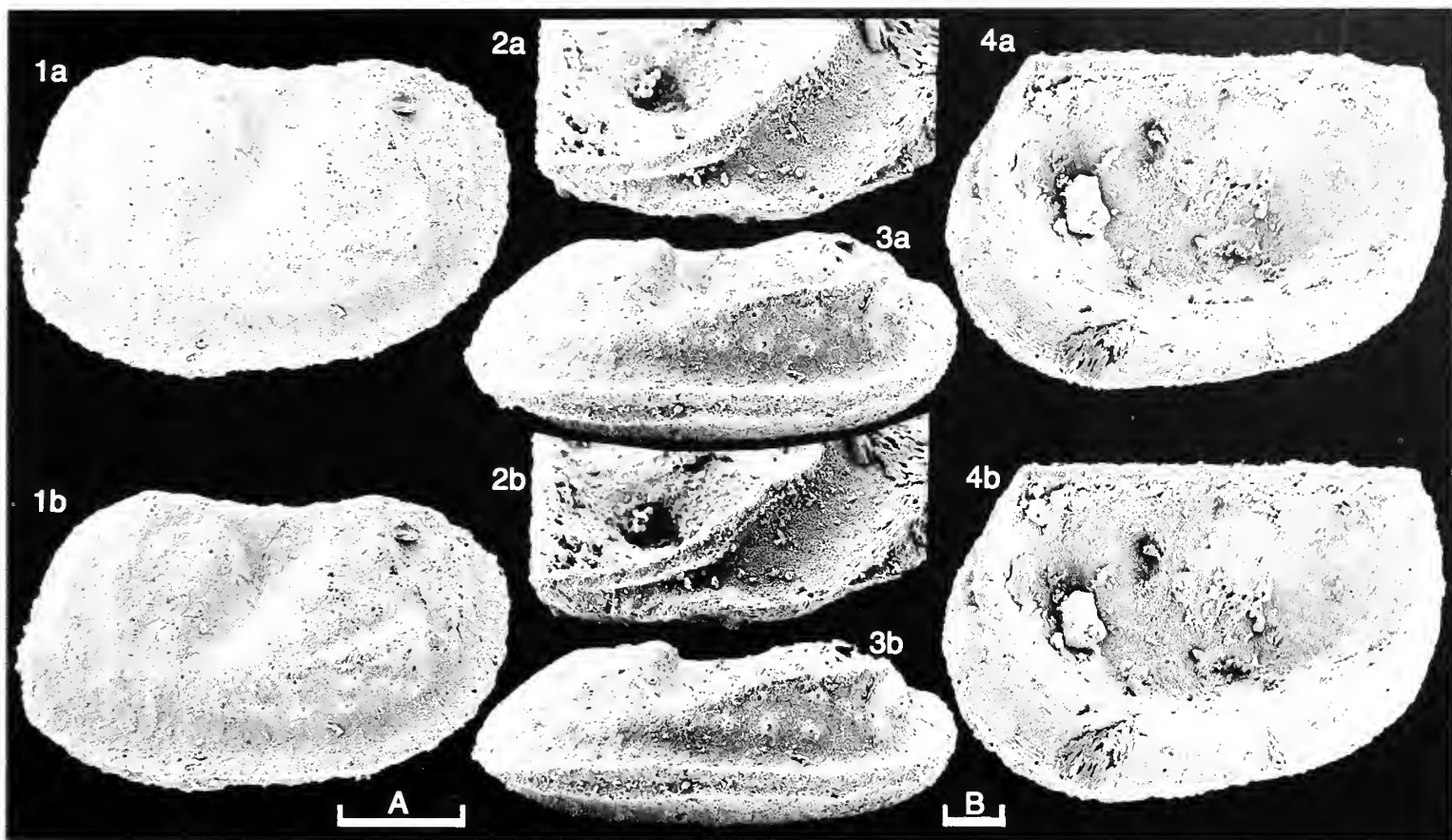
Remarks: The fine reticulation of *Henningsmoenia gunnari* is illustrated for the first time herein. In early juvenile specimens the crista is represented only by a weak posterior spine. This juvenile crista is similar to that seen in the female of *Henningsmoenia billingensis* Schallreuter (*op. cit.*, 95, fig. 3, 1984) from the Upper Dalby Limestone (= Idavere Stage). In *Henningsmoenia costa* Orr (*Stereo-Atlas of Ostracod Shells*, 12, 61-68, 1985), from the upper Ordovician, the crista is complete to the anterodorsal margin.

Distribution: Middle Ordovician of the Baltic and Scandinavia: Skagen Limestone (Johvi [D_I] Stage), Siljan district and Västergötland, Sweden; Lower Chasmops Shale (Idavere [C_{III}] Stage), Oslo Region, Norway; Auleliai Member (upper C_{III}, lower D_I), Lithuania; Adze and Blidene formations (C_{III}, D_I and Keila [D_{II}] Stage, Western Latvia; Svjantusk Member (C_{III}) and Auleliai Member, Eastern Latvia.

Explanation of Plate 12, 60

Figs. 1, 3, tecnomorphic RV (K 10036, 860µm long): fig. 1, ext. lat.; fig. 3, ext. obl. vent. fig. 2, ♀ RV, int. vent., detail of torus, velum and margin (K 10035); fig. 4, juv. RV, ext. lat. (K 10037, 520µm long).

Scale A (250µm; ×78), fig. 1; scale B (250µm; ×82), fig. 3; scale C (50µm; ×115), fig. 2; scale D (250µm; ×125), fig. 4.



ON *HENNINGSMOENIA COSTA* ORR sp. nov.

by R. J. Orr
(Queen's University of Belfast, Northern Ireland)

Henningsmoenia costa sp. nov.

Holotype: Ulster Museum, Belfast, no. **K 10024**; ♀ RV.

Type locality: SW facing cliff, small cove about 230m SW of renovated Martello Tower, 800m SE of Portrane, Co. Dublin, Eire; approx. lat. 53° 29'N, long. 6° 06'W (Nat. Grid.: 0 257504). Bed 7, Locality CN, Lower Limestones Member, Portrane Limestone; Cautleyan, Ashgill Series, upper Ordovician.

Derivation of name: Latin *costa*, rib; referring to the prominent ridge.

Figured specimens: Ulster Museum, Belfast, nos. **K 10024** (holotype, ♀ RV: Pl. 12, 62, fig. 1), **K 10025** (♀ RV: Pl. 12, 62, fig. 2; Pl. 12, 66, figs. 1, 3), **K 10026** (♀ RV: Pl. 12, 62, fig. 3; Pl. 12, 66, fig. 2), **K 10027** (♂ LV: Pl. 12, 62, fig. 4; Pl. 12, 64, fig. 5; Pl. 12, 68, fig. 1), **K 10028** (♀ LV: Pl. 12, 62, fig. 5), **K 10029** (♂ LV: Pl. 12, 64, figs. 1, 2), **K 10030** (juv. RV: Pl. 12, 64, fig. 3), **K 10031** (♂ LV: Pl. 12, 64, fig. 4), **K 10032** (tecnomorphic car.: Pl. 12, 68, fig. 2) and **K 10033** (♀ LV: Pl. 12, 68, fig. 3).

Specimen **K 10026** is from Bed 9 and **K 10027** and **K 10031** are from Bed 22 of loc. F, SW facing cliff, about 145m SW of type locality, Lower Limestones Member, Portrane Limestone. The other specimens are from the type locality. All the material is coarsely silicified.

Diagnosis: Species of *Henningsmoenia* in which the posteroventral crista continues to the anterodorsal border. Plica weak to absent. Female velum with diagnostic S-like step anterocentrally. No torus in tecnomorph, possible torus in female. Marginal sculpture: a narrow marginal ridge in right valve and a narrow admarginal ridge in left valve.

Explanation of Plate 12, 62

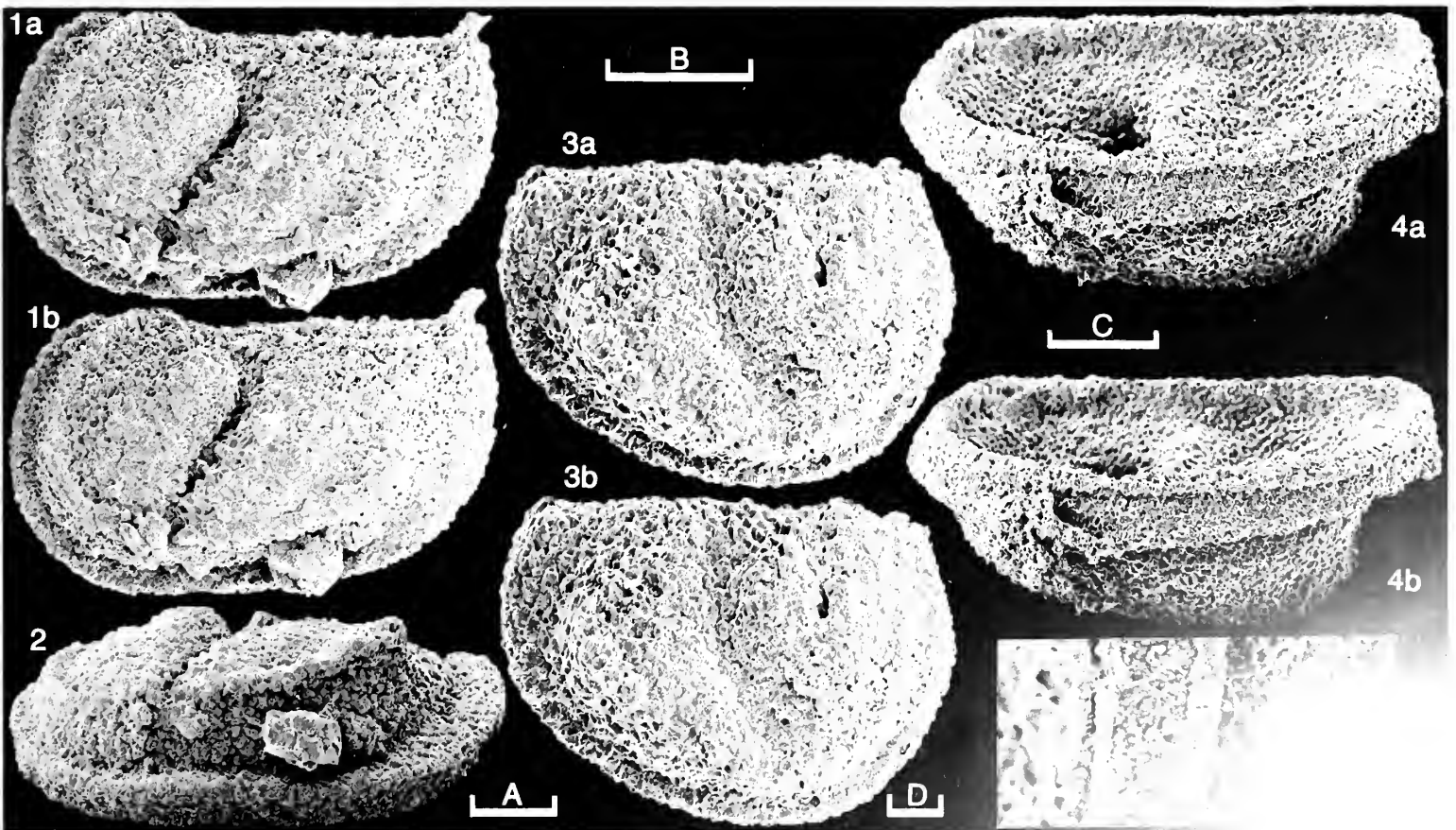
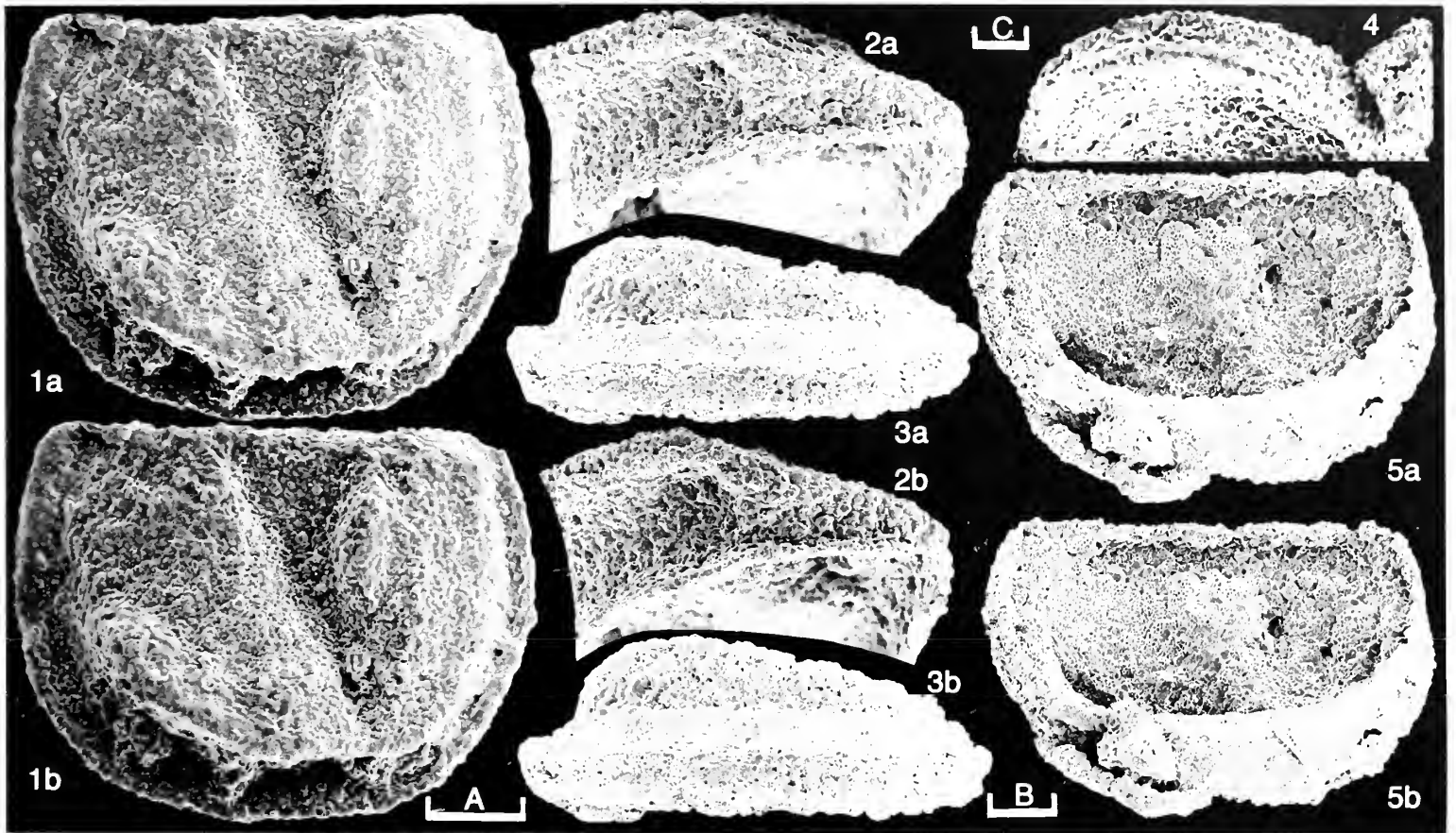
Fig. 1, ♀ RV, ext. lat. (holotype, **K 10024**, 1110 μm long); fig. 2, ♀ RV, int. ant. velum and antrum (**K 10025**, 1005 μm long); fig. 3, ♀ RV, ext. vent. (**K 10026**, 1101 μm long); fig. 4, ♂ LV, int. ant. velum (**K 10027**, 1200 μm long); fig. 5, ♀ LV, int. lat. showing antrum (**K 10028**, 930 μm long). Scale A (200 μm; × 65), figs. 1, 3, 5; scale B (100 μm × 85), fig. 2; scale C (100 μm; × 70), fig. 4.

Remarks: *Henningsmoenia costa* is the youngest recorded species of the genus. The older species assigned to the genus display a progressive elongation of the crista on the wing-like posteroventral structure. In *H. billingensis* Schallreuter (*Geol. För. Stockh. Förh.*, 106, 95, 1984), from the upper Member of the Dalby Limestone (Idavere [C_{III}] Stage), only a short posterior spine is present. In the type-species, *H. gunnari* (Thorslund, 1948) from the Skagen Limestone (Johvi [D_I] Stage; overall stratigraphic range = Idavere to Keila [D_{II}] Stage), the short crista extends from the posterior spine to posterior of the sulcus (see Orr, *Stereo-Atlas of Ostracod Shells*, 12, 57, 1985). In *H. costa* this restricted crista has developed into a long ridge which extends to the anterodorsal border. On first examination this ridge might appear to be histial in position. However, a closer examination of some specimens (see Pl. 12, 64, figs. 4, 5, and Pl. 12, 68, figs. 1, 2) reveals that between the ridge and the velum there is a bend in the histial position.

The oldest specimens of *H. costa* are from the lower Member of the Portrane Limestone (loc. F, bed 48) of Pirgu [F_{IC}] age. Thus, there is a long stratigraphic interval between the youngest record of *H. gunnari* and the introduction of *H. costa*. In terms of its lateral morphology and stratigraphic distribution (Nabala [F_{IA}] to Lower Pirgu [F_{IC}] Stage) '*Ordovicia pictis* Neckaja (*Trudy VNIGRI*, 115, 1958) would appear to partly fill this gap. However, even though the exact nature of its female dimorphic structures are unclear, both Schallreuter (*Palaeontographica*, (A), 178, (1/3), 34, 1982) and Gailite (*Ordovician Latvia*, 120, 1982, Riga) assign the species to *Sigmobolbina Henningsmoen*. According to this interpretation 'O'. *pictis* represents an homeomorph of *Henningsmoenia*. *H. costa* is homeomorphic with other, approximately contemporaneous species such as the Baltic *Naevhithis naevus* Schallreuter (*Stereo-Atlas of Ostracod Shells*, 8, 137-140, 1981) and ?*Pelecypolbina kolkaensis* Gailite (*In: Grigelis, A. A. (Ed.): The fauna and stratigraphy of Palaeozoic and Mesozoic of Baltic and Byelorussia*, 61, 1975, Vilnius). The female of *H. costa* has the anteroventral step to the velum also seen in *H. gunnari* and *N. naevus*. However, *N. naevus* lacks the crista and torus which are indicative of *Henningsmoenia*.

Explanation of Plate 12, 64

Fig. 1, 2, ♂ LV (**K 10029**, 1200 μm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, juv. RV, ext. lat. (**K 10030**, 620 μm long); fig. 4, ♂ LV, int. vent. (**K 10031**, 1010 μm long); fig. 5, ♂ LV, int. vent. detail of margin and velum (**K 10027**, 1200 μm long). Scale A (200 μm; × 55), figs. 1, 2; scale B (200 μm; × 100), fig. 3; scale C (200 μm; × 72), fig. 4; scale D (50 μm; × 140), fig. 5.



Remarks (contd.): In *H. gunnari* and *H. billingensis* the distal edge of the velum is split ventrally to provide a ridge-like torus. In *H. costa* a clear corresponding feature is not immediately apparent, but in female specimens the distal end of the velum is much thicker than in the tecnomorphs (see especially Pl. 12, 66, fig. 1). This thickened velar border probably corresponds to a separate velum and torus, but because of the coarseness of the silicification the individual ridges have coalesced. In one specimen (Pl. 12, 68, fig. 3) three narrow contiguous ridges are visible and may represent one velar and two toric ridges.

A further difference between *H. costa* and *H. gunnari* is the nature of the contact margin. In *H. gunnari* the right valve has a contact list and an admarginal ridge and the left valve an inner semi-sulcus. By contrast in *H. costa* the right valve has a marginal ridge and the left valve an admarginal ridge (see Text-fig. 2). The precise contact structure present in *H. billingensis* is unknown.

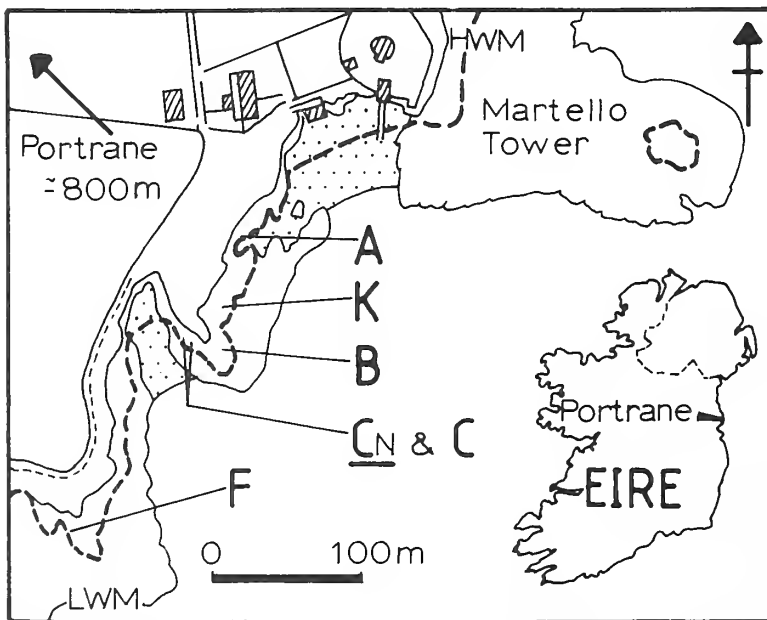
'*Sigmobolbina*' *cuneata* Abushik & Sarv (*Paleontologija Drevnego Palaozoja Pribaltiki i Podolii*, 107, pl. 2, figs. 6-8, 1983), from the Molodovo Stage (= Nabala Stage), may also belong to *Henningsmoenia*, though in this species there is no distinct crista and it more likely belongs in *Naevhithis*.

Distribution: See text-fig. 1. Lower Limestones Member (locs. F, C, CN), Main Limestones Member (loc. B), Upper Limestones Member (locs. B, K, A), Portrane Limestone, Portrane, Eire: Cautleyan to Lower Rawtheyan, Ashgill Series, upper Ordovician.

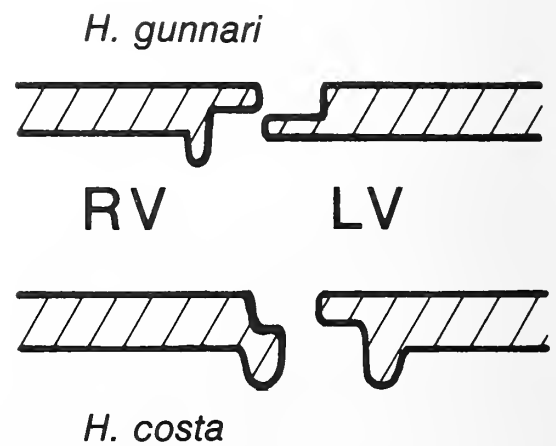
Explanation of Plate 12, 66

Figs. 1, 3, ♀ RV (K 10025, 1050µm long): fig. 1, int. vent., ant. detail of antrum and velum.; fig. 3, int. lat. showing antrum; fig. 2, ♀ RV, ext. ant. (K 10026, 1010µm long).

Scale A 100µm; × 140), fig. 1; scale B (200µm; × 86), fig. 2; scale C (200µm; × 65), fig. 3.



Text-fig. 1. Localities for *H. costa* (CN is the type locality).

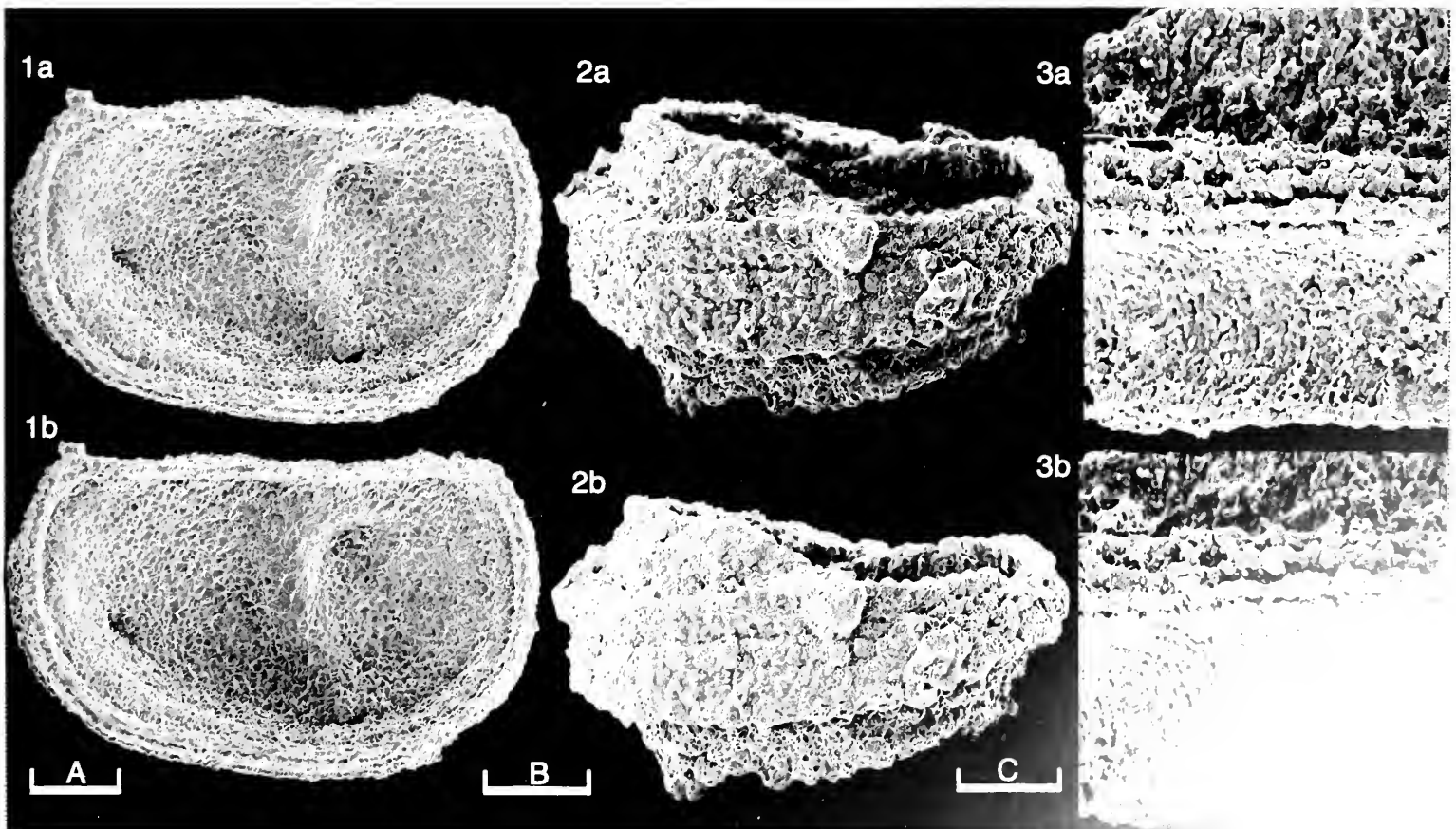
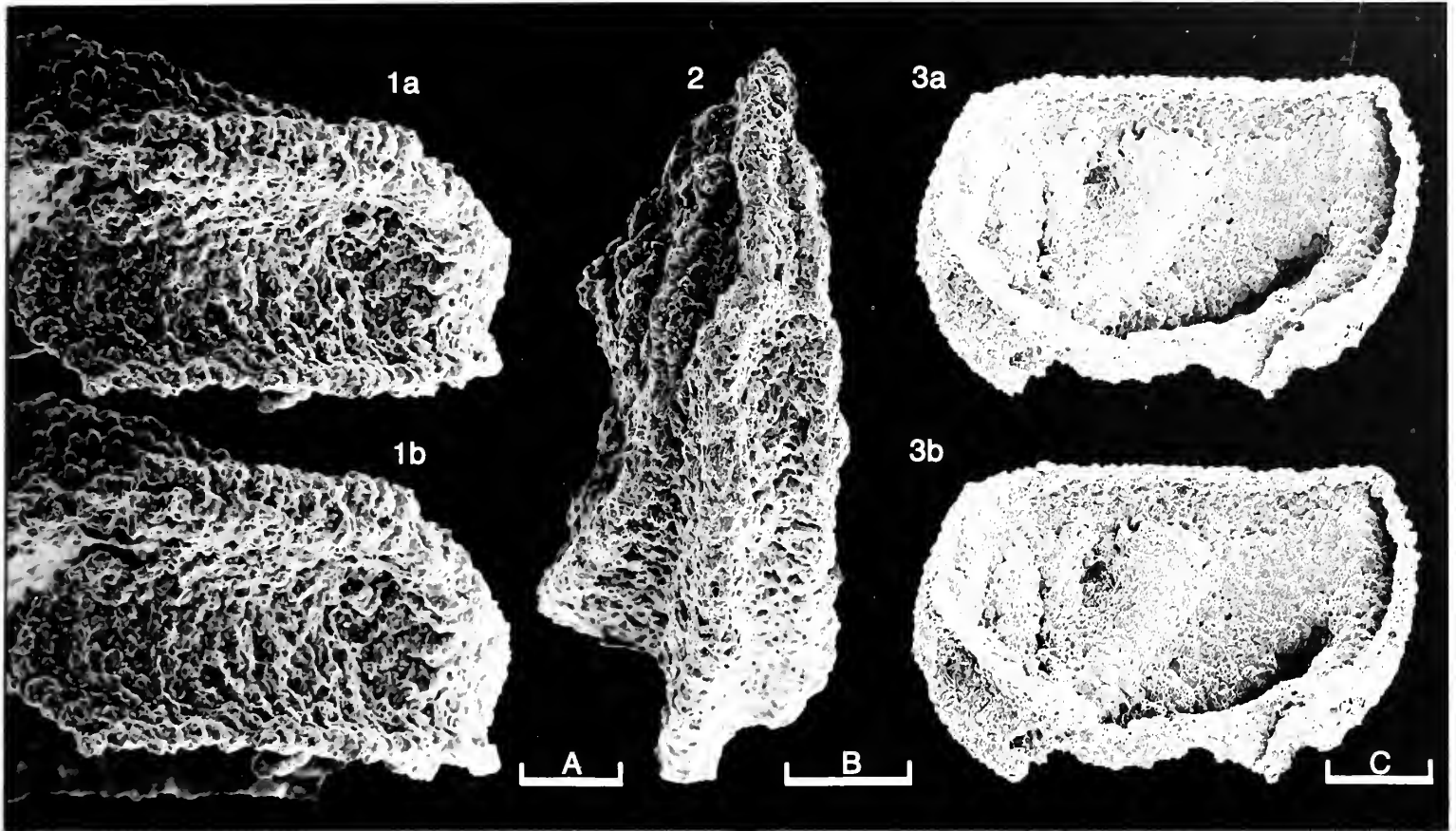


Text-fig. 2. Contact sculptures in *Henningsmoenia*.

Explanation of Plate 12, 68

Fig. 1, ♂ LV, int. lat. (K 10027, 1200µm long); fig. 2, tecnomorphic car., ext. vent. (K 10032, 960µm long); fig. 3, ♀ LV, ext. vent. detail of antrum and velar edge (K 10033, 1220µm long).

Scale A (200µm; × 60), fig. 1; scale B (200µm; × 60), fig. 2; scale C (100µm; × 140), fig. 3.



ON TYRRHENOCY THERE AMNICOLA (SARS)

by Timothy R. Maness & Roger L. Kaesler
(University of Kansas, Lawrence, Kansas, USA)

Genus *TYRRHENOCY THERE* Ruggieri, 1955

Type-species (by original designation): *Tyrrhenocythere pignattii* Ruggieri, 1955 (= *Cythere amnicola* Sars, 1888)

1955 *Tyrrhenocythere* gen. nov. G. Ruggieri; *J. Paleont.*, 29 (4), 698.

Diagnosis: A genus of Hemicytheridea, subrectangular, subtrapezoidal, or auriform in lateral view. Eye tubercle distinct. Anterior vestibule partitioned into pockets; each pocket is the base of a fan-like bundle of radial pore canals. Muscle-scar pattern consists of a row of four adductor scars, dorsomedian scar divided, ventromedian scar usually divided; lone, sometimes divided, scar located dorsomedially; oblique row of three frontal scars anterior to adductors.

Remarks: The peculiar vestibule is the outstanding distinguishing feature of this genus. The appendages are typically hemicytherid and were well illustrated by Sars (1888).

Tyrrhenocythere amnicola (Sars, 1888)

1888 *Cythere amnicola* sp. nov. G. O. Sars, *Arch. Math. Naturv.*, 12, 305-312, pl. 15, figs. 8-10, pl. 10.

1902 *Cythere sicula* sp. nov. G. S. Brady, *Trans. zool. Soc. Lond.*, 16, pt. 4, 198, pl. 25, figs. 1-7.

1947 *Hemicythere sicula* (Brady); Z. S. Bronstein, *Fauna SSSR. Rakoobraznye 2, 1. Ostracodapresnykh vod.*, 293, text-figs. 194-197, Moskva. AN SSSR.

1955 *Tyrrhenocythere pignattii* sp. nov. G. Ruggieri, *J. Paleont.*, 29 (4), 698-699, text-figs. 1-5.

1977 *Tyrrhenocythere amnicola* (Sars); N. Krstić, in H. Löffler & D. Danielopol (eds.), *Aspects of Ecology and Zoogeography of Recent and Fossil Ostracoda*, 395-405, pl. 1, fig. 4, Junk, The Hague (q.v. for full synonymy).

Explanation of Plate 12, 70

Fig. 1, ♂ RV, ext. lat. (1101251, 1250µm long); fig. 2, ♀ RV, ext. lat. (1101253, 1070µm long); fig. 3, ♂ RV, int. lat. (1101257, 1330µm long). Scale A (400µm; ×48), figs. 1-3.

Type specimens: Uncertain; either Zoological Museum, Oslo, or lost. Ruggieri deposited a paratype (of *T. pignattii*), no. OT-167, with the Department of Micropaleontology, American Museum of Natural History, New York.

Type locality: The Cyane River near Siracusa, Sicily (approx. lat. 37°04' N, long. 15°17' E); Recent.

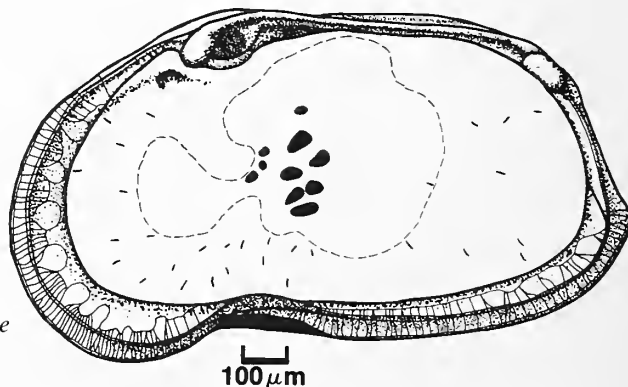
Figured specimens: Mus. of Invert. Paleo., Univ. of Kansas, USA, nos. 1101250 (♂ LV: Pl. 12, 72, fig. 1), 1101251 (♂ RV: Pl. 12, 70, fig. 1), 1101253 (♀ RV: Pl. 12, 70, fig. 2), 1101256 (♂ LV: Pl. 12, 72, fig. 3), 1101257 (♂ RV: Pl. 12, 70, fig. 3), 1101269 (♀ LV: Pl. 12, 72, fig. 2). All from the Gulf of Corinth, Greece, lat. 38°21'40"N, long. 22°25'35"E, water depth 73.2m, from an 8.95 m long core taken by the Lamont-Doherty Geological Observatory.

Diagnosis: Surface, densely finely pitted; faint reticulation near free margin.

Remarks: Strongly dimorphic; males more elongate and laterally compressed; females more auriform.

We are grateful to Dr. N. Krstić for her taxonomic suggestions based on study of our specimens and to the American Museum of Natural History for lending us Ruggieri's paratype.

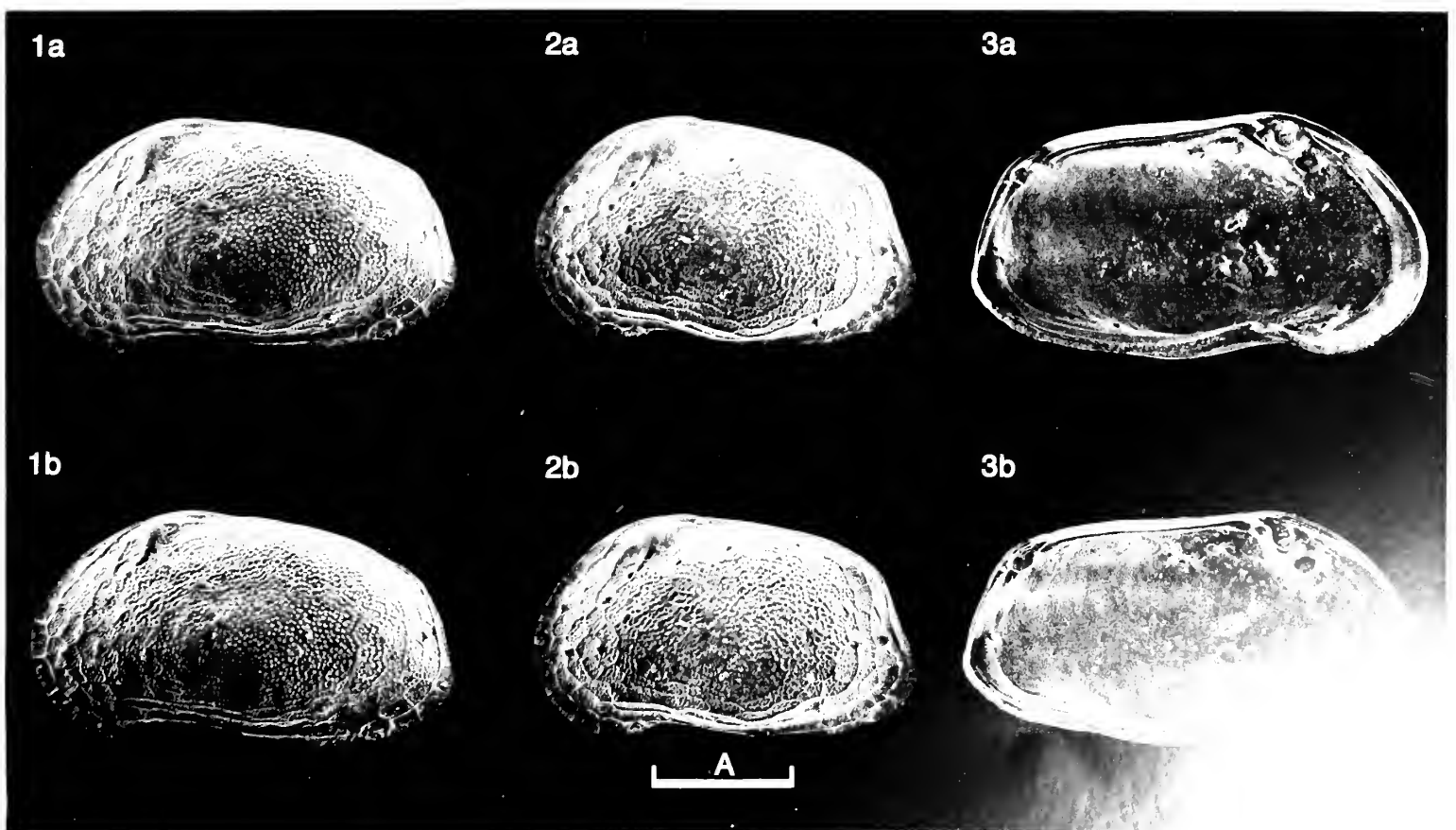
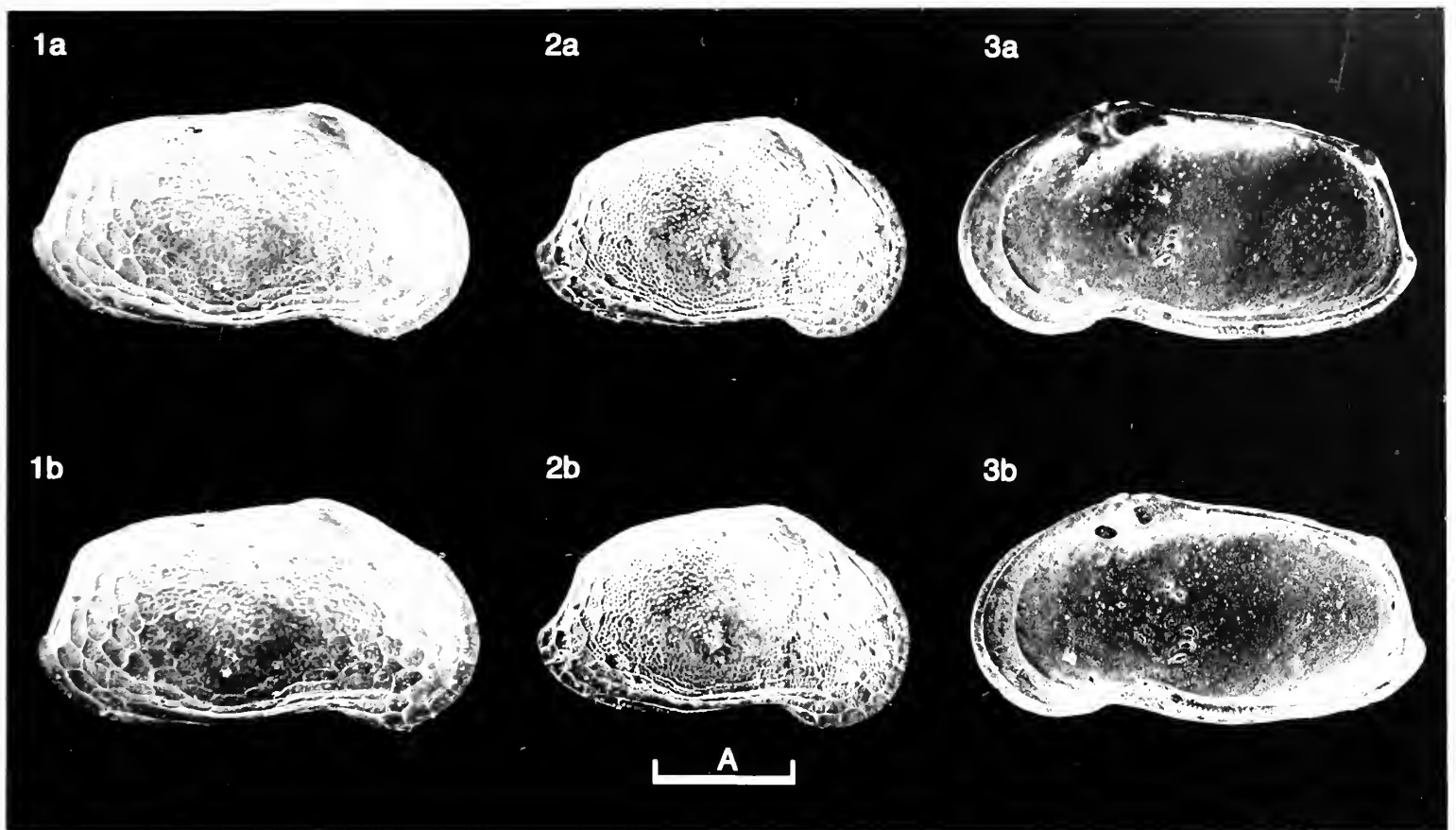
Distribution: Brackish-water deposits of the Mediterranean Region. Krstić (*op. cit.*) presents the following distribution: Recent: Caspian, Pontian, Ionian, and Tyrrhenian basins. Upper Pliocene-Pleistocene: Caspian Basin.



Text-fig. 1. Camera-lucida drawing of *Tyrrhenocythere amnicola*, ♂ RV, int. view.

Explanation of Plate 12, 72

Fig. 1, ♂ LV, ext. lat. (1101250, 1210µm long); fig. 2, ♀ LV, ext. lat. (1101269, 1100µm long); fig. 3, ♂ LV, int. lat. (1101256, 1310µm long). Scale A (400µm; ×48), figs. 1-3.



ON PARANOTACYTHERE (PARANOTACYTHERE) MAGNIFICA LOMAX sp. nov.

by Allistair Lomax
(University of Hull, England)

Paranotacythere (Paranotachthere) magnifica sp. nov.

Holotype: University of Hull coll. no. **HU.307.C.1**; ♂ carapace.

[Paratypes: University of Hull nos. **HU.307.C.2**, **HU.307.C.3**, **HU.307.C.4.1-10**].

Type locality: Bed C9A of coastal section of Speeton Clay, Speeton, E Yorkshire, England; lat. 54° 10' N, long. 0° 14' 40" W. Lower Hauterivian, lower Cretaceous.

Derivation of name: Latin *magnifica*, magnificent; in reference to its excellent ornamentation and preservation.

Figured specimens: University of Hull coll. nos. **HU.307.C.1** (holotype, ♂ car.: Pl. 12, 74, fig. 1; Pl. 12, 76, fig. 2), **HU.307.C.2** (♀ LV: Pl. 12, 74, fig. 2) and **HU.307.C.3** (♀ LV: Pl. 12, 76, fig. 1). All specimens are from the type locality and horizon.

Diagnosis: A species of *Paranotacythere (Paranotacythere)* with strong reticulation, a large postero-dorsal tubercle and in which the uppermost blade-like ventral rib tends to end at the anterior of the two postero-ventral tubercles or only continues between them in much reduced fashion.

Explanation of Plate 12, 74

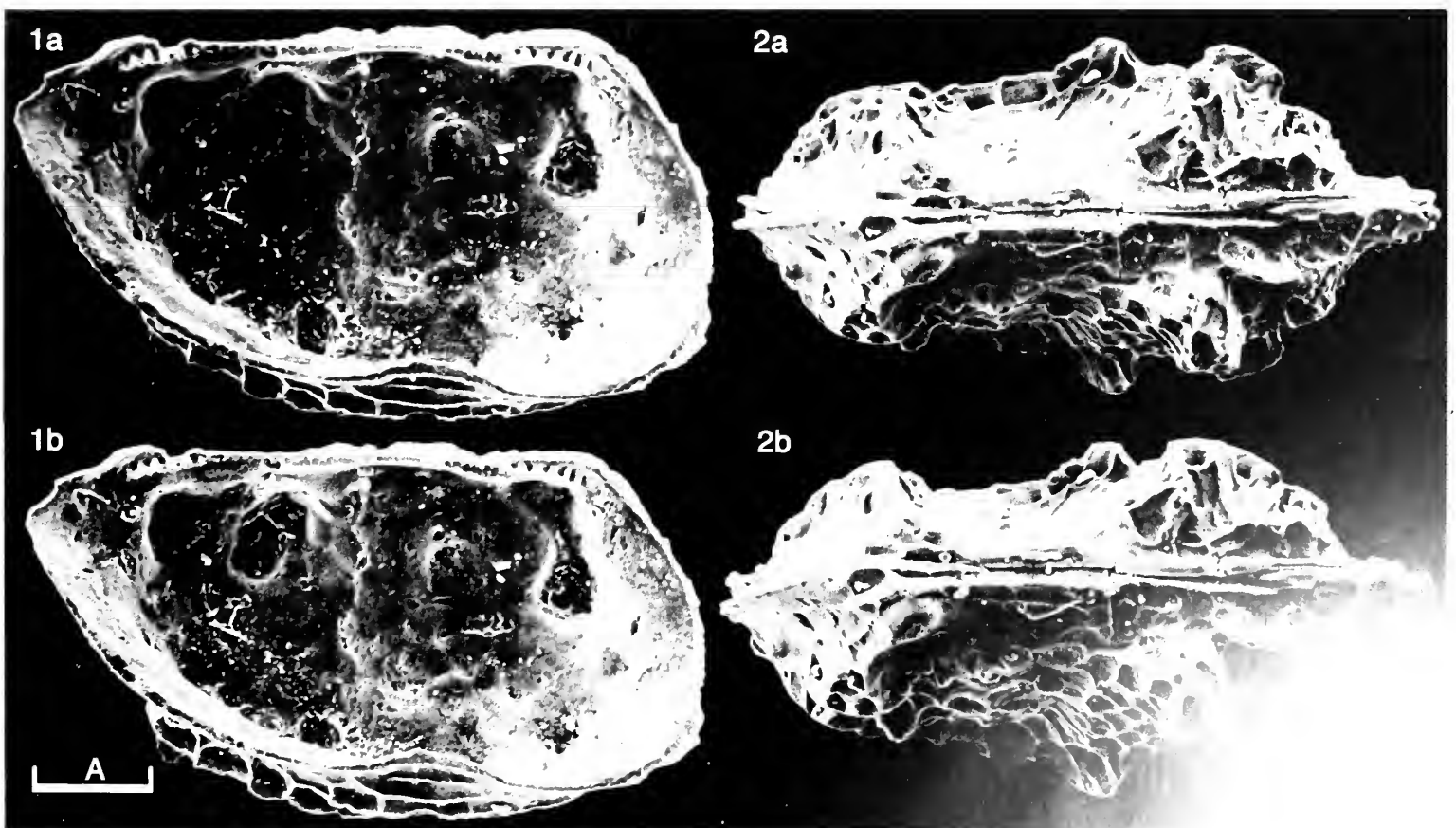
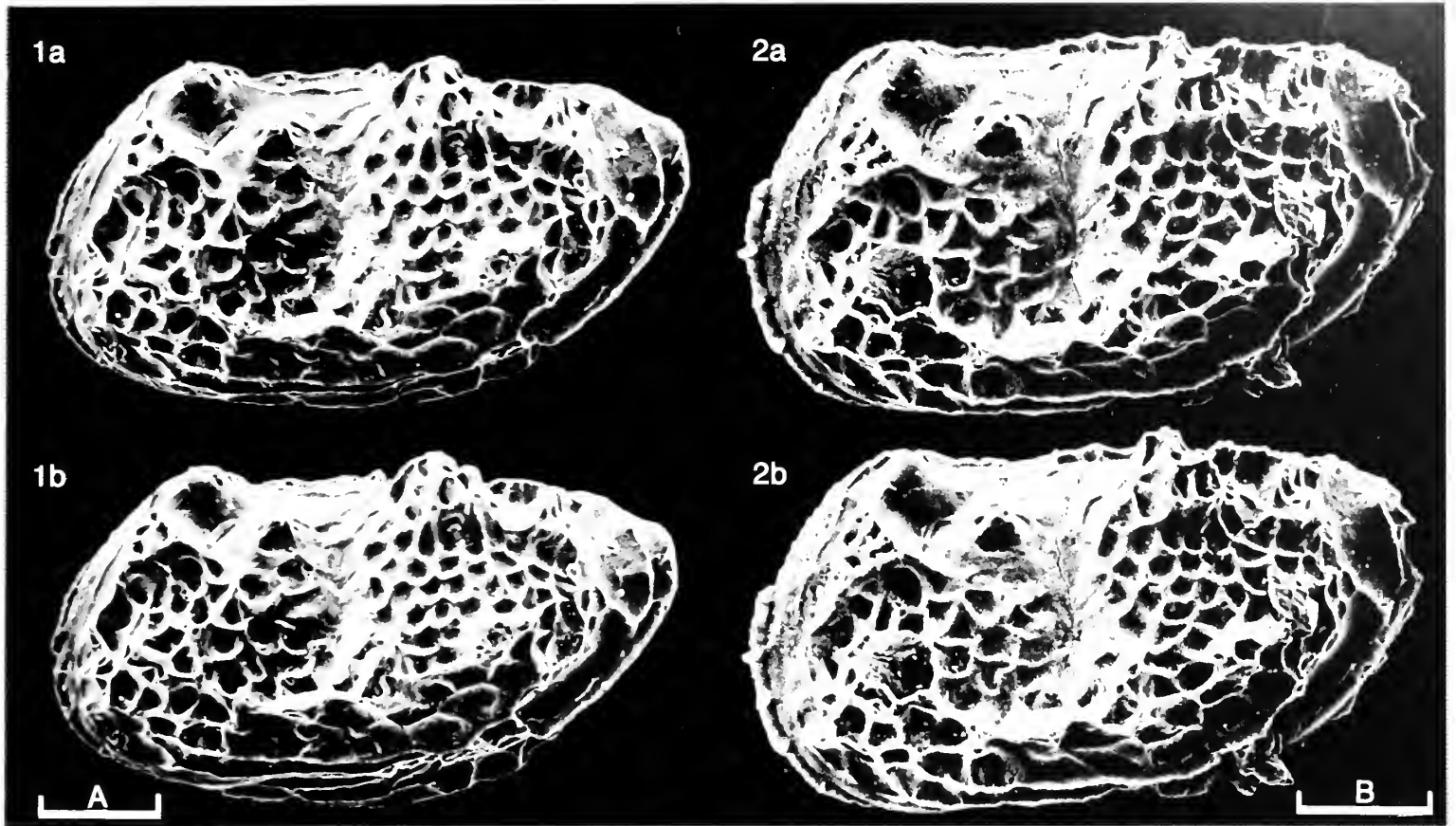
Fig. 1, ♂ car., ext. lt. lat. (holotype, **HU.307.C.1**, 560 µm long); fig. 2, ♀ LV, ext. lat. (paratype, **HU.307.C.2**, 530 µm long). Scale A (100 µm; × 162), fig. 1; scale B (100 µm; × 181), fig. 2.

Remarks: The lower Hauterivian *Paranotacythere (P.) magnifica* differs from the upper Hauterivian *P. costata* (Kaye) in the absence of thick and rounded ventral ribbing. *P. costata* also has a much less prominent dorsal tubercle and reduced reticulation compared with *P. magnifica*. *P. ramulosa* (Sharapova), which is first found in Bed C3, upper Hauterivian at Speeton, differs only in having two large tubercles in the anteroventral region which replace the uppermost ventral rib. This suggests that *P. ramulosa* is related to *P. magnifica* and is probably derived from it by loss of the ventral rib and addition of the two anteroventral tubercles.

Distribution: *P.(P.) magnifica* is rare and has so far only been obtained from Bed C9A in the Speeton Clay of the coastal section, E Yorkshire, England. Over two dozen specimens have been recovered. The lithology is a dark grey, sideritic clay and common ostracod associates include *Schuleridea punctatula* (Roemer), *Protocythere triplicata* (Roemer), *Protocythere hechti* Triebel and *Acrocythere hauteriviana* (Bartenstein).

Explanation of Plate 12, 76

Fig. 1, ♀ LV, int. lat. (paratype, **HU.307.C.3**, 610 µm long); fig. 2, ♂ car., ext. dors. (holotype, **HU.307.C.1**, 560 µm long). Scale A (100 µm; × 159), fig. 1; scale B (100 µm; × 175), fig. 2.



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