

# The genus *Urocythereis* (Crustacea : Ostracoda) in Europe, with particular reference to Recent Mediterranean species

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## Summary

This study is a detailed taxonomic revision of all the known Recent species of the genus *Urocythereis*. Using appendage and carapace characters, five species are redescribed and three new species (*U. britannica*, *U. colum* and *U. neapolitana*) are introduced. In addition, three fossil species are briefly described and type-specimens proposed for two of them (*U. favosa* and *U. lumbricularis*). Where possible, biostratigraphical and ecological data are given. Shell morphology and the development of ornamentation are discussed. A fossal pattern common to many of the species of *Urocythereis* has been recognized.

## Introduction

During the preparation of this paper all the eight known Recent species of *Urocythereis* have been examined. Details of their ecological and stratigraphical distribution are given, and features of the carapace and the soft parts which may be used as reliable specific characters are discussed. It is beyond the scope of this present study to undertake a revision of the fossil forms. Nevertheless, three fossil species, *U. favosa* (Roemer) (the type-species), *U. seminulum* (Seguenza) and *U. lumbricularis* (Terquem) are briefly described and certain stratigraphically important points are considered. In addition, a further one, or possibly two new species from a single sample of beach sand from Libya, N. Africa, are illustrated (Pl. 17), but as few specimens were available and none contained soft-parts, they are for the present left in open nomenclature.

Species of *Urocythereis* have been recorded from the Miocene to Recent. All are large (0.75–1.0 mm) and heavily calcified and are thus readily preserved as fossils. As far as I am aware, the genus occurs only in Europe, although a specimen figured by Sylvester-Bradley & Benson (1971) as 'cf. *Urocythereis*' from S. Africa may be referable to this genus. Living species are usually restricted to coarse sand bottoms at depths of down to 40 m.

In the Mediterranean there are numerous species, both fossil and living, most of which have been inadequately defined. Furthermore, there has been a tendency to 'lump' different forms into single species due to the absence of reliable criteria by which to discriminate individual species within this complexly ornamented group.





## Material examined

During the course of this study, many specimens from the Mediterranean and NW Europe were examined. The principal sources of material were:

(1) G. W. Müller collection: several hundred specimens of *Urocythereis margaritifera* (Müller), one of which was chosen as lectotype, were found in good condition in the Müller collection whilst it was on loan to the Zoological Station, Naples, Italy, during December 1974. The collection is now housed jointly in the Crustacea Division of the Zoological Museum, Berlin, E. Germany, and the Zoological Institute, Greifswald, E. Germany.

(2) G. S. Brady collection, Hancock Museum, Newcastle-upon-Tyne: the type-specimens of *Cythere oblonga* Brady from the Levant were not found nor were they on loan at the time. They must therefore be presumed lost. However, many specimens of *Urocythereis britannica* Athersuch sp. nov. were found in good condition.

(3) Remane collection, Zoological Museum, Hamburg: specimens of *Urocythereis 'oblonga'* were made available by Professor G. Hartmann.

(4) The Recent ostracod collection of the British Museum (Natural History) was searched thoroughly and many specimens of *Urocythereis* spp. from Britain and the Mediterranean were examined.

(5) I am most grateful to Professor G. Ruggieri, Dr G. Bonaduce and Dr J. E. Whittaker for allowing me to examine their private collections.

(6) Material from the Terquem collection containing *U. lumbricularis* (Terquem) from the Pliocene of Rhodes was obtained by Professor P. C. Sylvester-Bradley from the Museum of Natural History, Paris.

(7) Over 250 samples from Cyprus were collected by me during autumn 1973 from depths of 0–40 m off the coasts of Cyprus. Three species of *Urocythereis* were identified, two of which are 'new' and described herein.

## Carapace morphology of *Urocythereis*

The terminology used in the description of the surface features of the carapaces follows Sylvester-Bradley and Benson (1971).

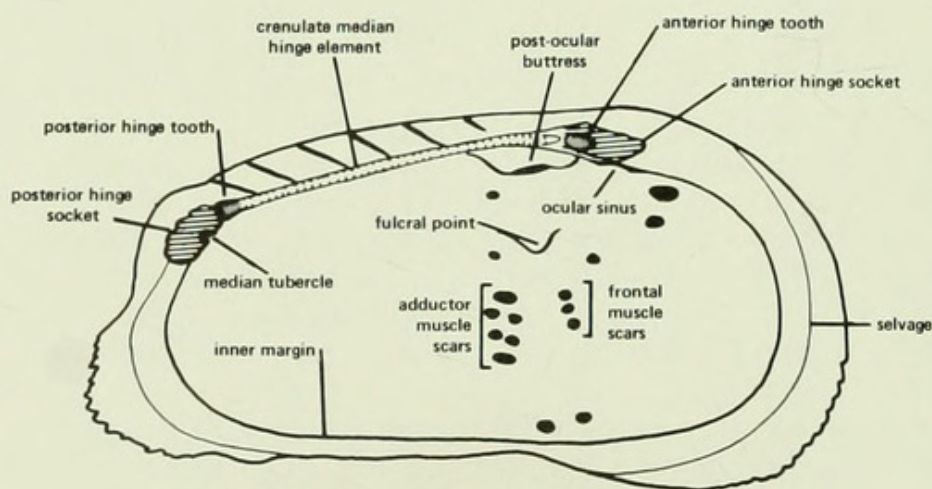
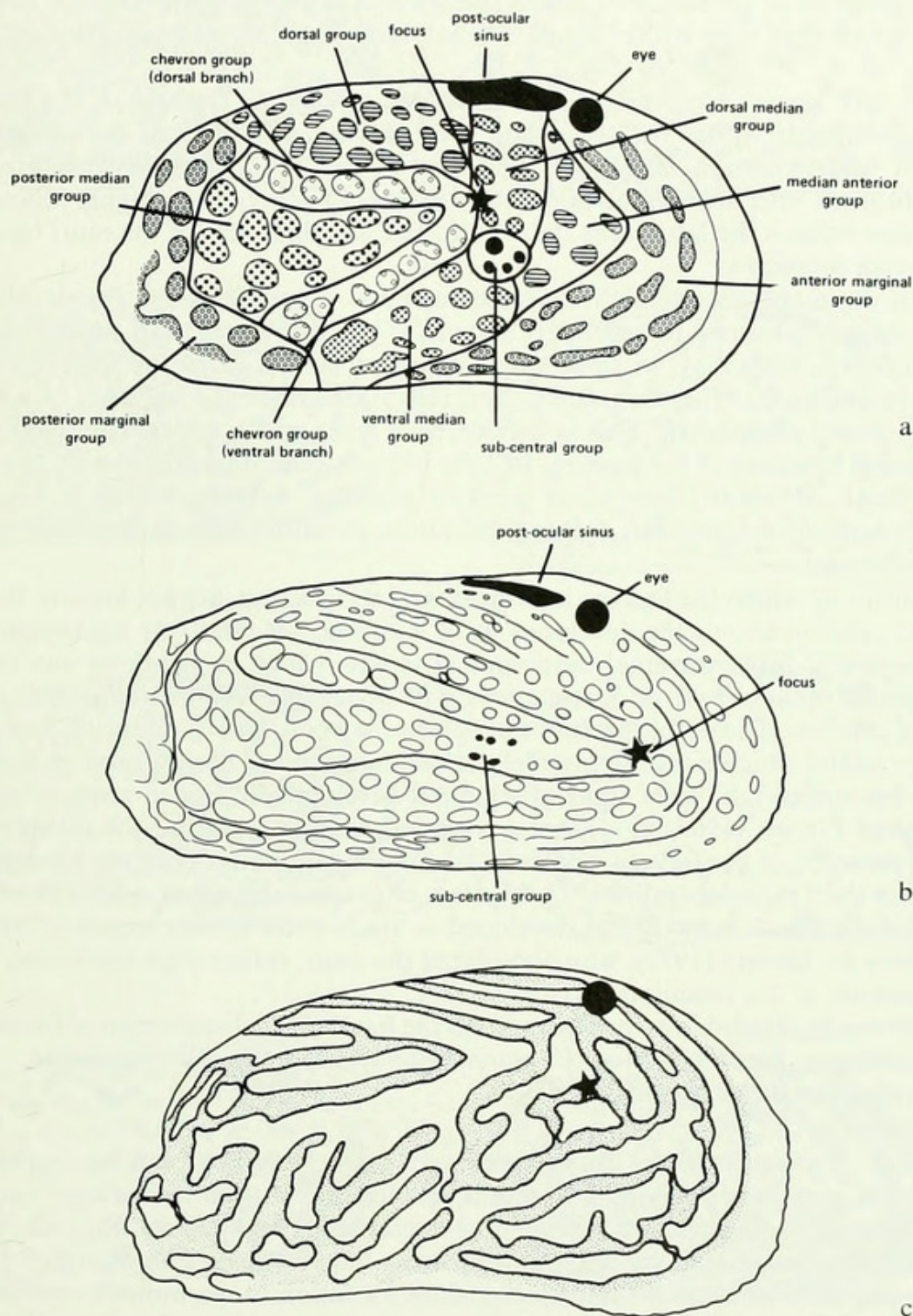


Fig. 1 Internal structure of *Urocythereis*.

Carapace elongate-ovate or sub-rectangular; reticulate or coarsely pitted. Muri foveolate. Valves heavily calcified. Inner lamellar moderately wide. Numerous straight, unbranched radial pore canals. Hinge heterodont often with median tubercle in posterior socket of right valve and with a corresponding lobed tooth in the left valve. In front of the anterior hinge element is a conspicuous, deep ocular sinus and behind is a large solid buttress which bears a large muscle scar.



Two or three frontal muscle scars (not *always* three as stated by Van Morkhoven, 1963, and Hartmann & Puri, 1974); four adductor scars, the centre two of which may be sub-divided. Between these two sets of scars is a deep sub-central depression which corresponds to a flattened sub-central tubercle, externally. Immediately above this depression is a variously developed fulcral point flanked by two small scars and below the sub-central area are two small scars. There are two scars anterior to the ocular sinus, and another just below the buttress (see Fig. 1). Externally, each valve bears a smooth eye tubercle behind which is a conspicuous post-ocular sinus. Dorsal to the hinge, each valve bears a row of oblique elliptical fossae. The two rows of fossae are slightly



**Fig. 2** Fossil pattern and homologous carapace reference points in *Urocythereis* spp. (a) *U. britannica* sp. nov., *U. neapolitana* sp. nov., *U. distinguenda* (Neviani), *U. favosa* (Roemer) and *U. margaritifera* (Müller); (b) *U. seminulum* (Seguenza); (c) *U. lumbricularis* (Terquem). (See pp. 250–252 for explanation.)



offset relative to one another (see Pl. 8, figs 3 & 4). The anterior and posterior margins of the shell are coarsely denticulate. The inner margin and the line of concrescence are coincident and the marginal zone is broad, bearing a prominent selvage half way between the inner and outer margins.

**Pores.** The numerous normal pores open internally, each in a depression in the shell. Both *muri* and *sol*i bear the external openings of normal pore canals. In all the Recent species examined, there appear to be two types of pore present. Simple, single pores, supporting single setae which penetrate the surface of the carapace, and 'sieve' pores which are closed by sieve-like perforated plates, bearing sub-central bosses supporting single setae. The simple pores always appear in the *muri*, the sieve-pores usually in the *sol*i. However, in *U. favosa* (Roemer) sieves have been found in the *muri* as well as in the *sol*i, and in this species also, the simple mural pores often show the presence of a small sieve deep within the pore canal. However, this was not observed in any other species.

**Reticulation.** All known species of *Urocythereis* are reticulate. The size of the fossae and the *muri* vary considerably within the genus and even between members of the same species. The simplest form of reticulation is perhaps that type found in *U. lumbricularis* (Terquem), i.e. simple straight *muri* with intervening labyrinthic fossae. In other, more highly reticulate species, groups of fossae replace the labyrinths. In such forms, the thickness of the *muri* increases as the size of the fossae decreases.

**Celation.** In some species reticulation is accompanied by celation, i.e. the development of a tegmen. The tegmen is formed by secondary growth of the tops of the *muri* which extend laterally towards each other. They may, in some cases, anastomose and often the underlying fossae are almost entirely obscured. Athersuch & Ruggieri (1975) described the presence of a suprattegmen in their *Urocythereis phantastica*. This is a calcareous layer which apparently overlies and often connects adjacent branches of the tegmen. In *Urocythereis*, celation is found only in a few species, all the individuals of which show some signs of tegmental development (e.g. *U. distinguenda* (Neviani), *U. phantastica* Athersuch & Ruggieri), although within one species this is often variable (e.g. *U. distinguenda*).

The mechanism by which the tegmen is formed, and its function, are not known. Benson (1972) suggested that celation allows the development of a strong, yet relatively lightweight, carapace. In *U. distinguenda* at least, tegmental development is not related to depth or any other known ecological factor. Populations from various depths (0–40 m) and locations showed the same range of variation in celation. The development of a tegmen may be a sign of maturity, and perhaps it is only the older adults which possess extremely celate carapaces. The juveniles of this species (at least the last few instars) do show signs of tegmental development, but to a much lesser degree.

**Fossal patterns** Liebau (1969, 1971), employing an arbitrary notation of fossae was able to illustrate the presence of conservative patterns of the reticulum and pore conuli distributions in *Oerthliella* and in the Trachyleberidinae. This system of graphic reduction, which identifies combinations of adjacent fossae, was further developed to study evolutionary trends in *Agrenocythere* and other genera by Benson (1972), who considered the *muri*, rather than the fossae, as the most significant elements of the reticulum.

*Urocythereis* can be divided into three groups on the basis of the distribution of fossae. They are:

- (1) *U. britannica*, *U. distinguenda*, *U. margaritifera*, *U. favosa*, *U. neapolitana*;
- (2) *U. lumbricularis*, *U. phantastica*;
- (3) *U. seminulum*.

The fossae of *U. britannica*, *U. distinguenda* and *U. margaritifera* can be divided into nine arbitrary groups, each group having a constant relationship with adjacent ones and with three homologous carapace reference points (eye, post-ocular sinus and sub-central area; see Fig. 2a). The groups are arranged so that variants show no cross-links between groups, only within groups. Within single populations each of these species show variation in the number and size of fossae, one or more small fossae of one specimen often occupying sites homologous with a large fossa of another specimen. Figs 3a–f are reticular silhouettes based on specimens *U. britannica*, *U. distinguenda* and *U. margaritifera* exhibiting the two extremes in ornamental development. The homologous groups are indicated by different symbols shown in Fig. 2a.

- (1) Sub-central group: about four small fossae situated on the flattened sub-central tubercle.



(2) Anterior marginal group: consists of two or three rows of fossae frequently linked longitudinally and laterally. The group arises at the eye and terminates beneath the sub-central area.

(3) Dorsal median group: two vertical rows of fossae directly beneath the post-ocular sinus and directed towards the sub-central area.

(4) Median anterior group: a triangular group lying between groups 2 & 3 and terminating at the sub-central area.

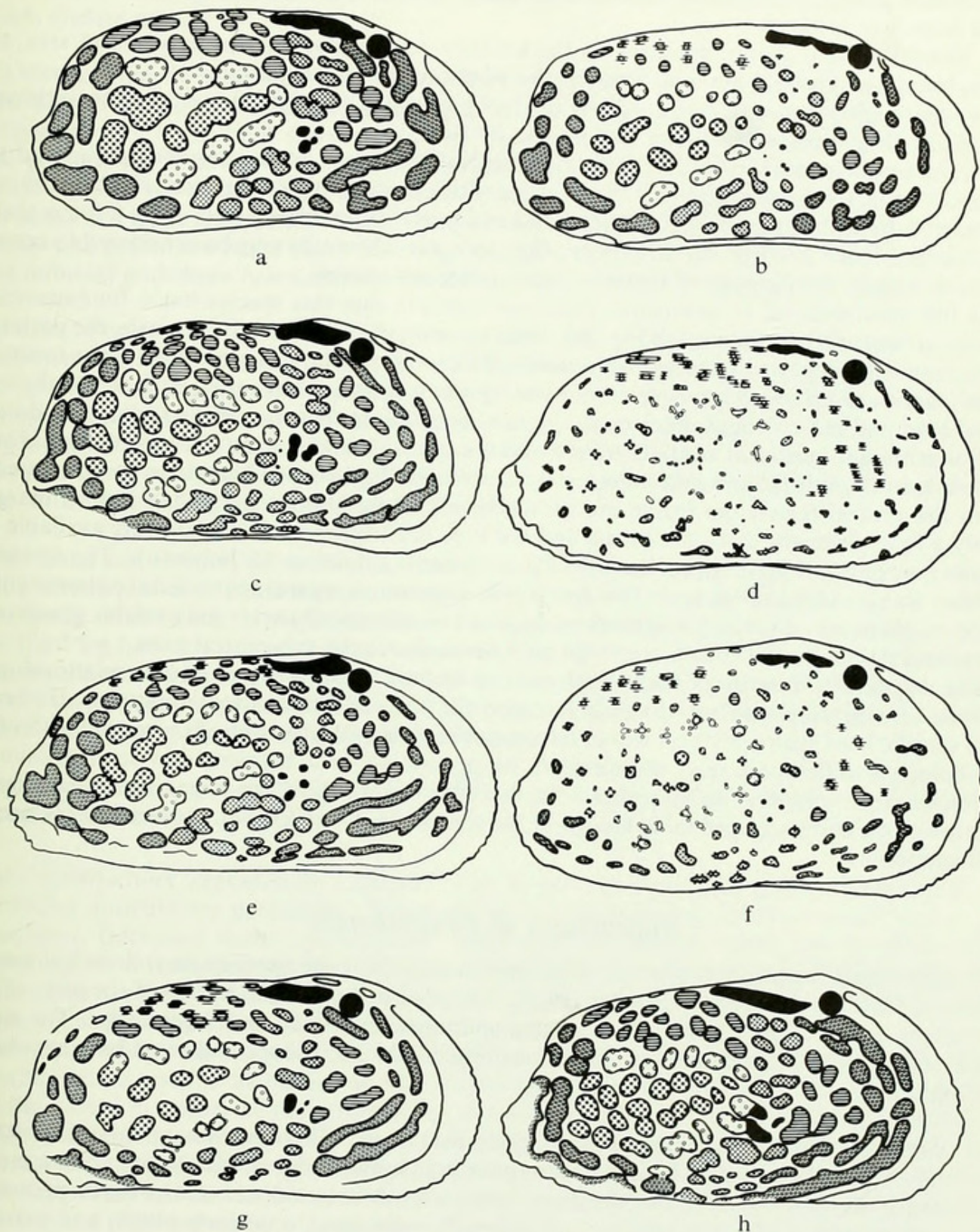


Fig. 3 Fossil patterns in *Urocythereis* spp. (a, b) *U. britannica* sp. nov.; (c, d) *U. distinguenda* (Neviani); (e, f) *U. margaritifera* (Müller); (g) *U. favosa* (Roemer); (h) *U. neapolitana* sp. nov. See Fig. 2a for shading scheme used to delineate fossil groups. For full discussion see pp. 250–252.



(5) Chevron group: The most ventral fossa of group 3 (above) is a point of focus for the two branches of a chevron-shaped group. The end members of this group are adjacent to the end members of group 6.

(6) Posterior marginal group: One or two rows of fossae concentrically arranged around the posterior and postero-ventral margins.

(7) Posterior median group: enclosed by groups 5 & 6.

(8) Dorsal group: this consists of several irregular rows of fossae running sub-parallel to the dorsal branch of group 5.

(9) Ventral median group: enclosed by the anterior marginal group, the sub-central area, the ventral branch of group 5 and end fossa of the posterior marginal group.

*Urocythereis favosa* and *U. neapolitana* (Figs 3g, h) may also be included in this group, although some slight differences in the fossal pattern can be seen.

There are certain similarities in the arrangement of the fossae of the previous group and the labyrinths of *U. lumbricularis* and *U. phantastica*. For example, in *U. lumbricularis* there are two concentric labyrinths anteriorly, and the dorsal and posterior median groups have a focus above the sub-central area (see Fig. 2c). In general, therefore, the labyrinths may be considered to occupy sites homologous with groups of fossae in other reticulate species.

The few specimens of *U. seminulum* examined indicate that this species has a fundamentally different arrangement of fossae (see Fig. 2b). Whereas in *U. distinguenda*, for example, the posterior fossae show a tendency to converge on a point of focus above the sub-central area, the fossae of *U. seminulum* are arranged in groups, bounded by weak costae, which often pass across the sub-central area and have a focus anterior to the sub-central area. It is possible to recognize dorsal, anterior marginal, posterior median groups and the dorsal branch of the chevron-shaped group. The fossae in the ventral and mid-anterior areas are more linearly arranged than in other species and in the ventral region the fossae are arranged in groups sub-parallel to the ventral margin.

Only a few specimens of *U. flexicauda* and the type illustration of *U. schulzi* were available for comparison, but they also appear to have fossal patterns similar to *U. britannica*. The fossae of *U. colum* are so small and far apart that no definite conclusion regarding the fossal patterns could be drawn. However, this species appears to possess a concentrically arranged anterior group, and ventral and dorsal groups which converge on a focus above the sub-central area.

If the degree of similarity of fossal patterns can be used as an index of genetic relationship, it might be considered possible to divide a genus on the basis of differing fossal patterns. However, at the specific level such a division would have taxonomic significance only if correlated with other morphological differences (e.g. muscle-scars or possession of a tegmen). No such division is possible in *Urocythereis*, for in contrast to the wide variation in ornamentation, the internal structure of the carapace, and morphology of the soft-parts, where known, are remarkably similar in all species.

### Appendages of *Urocythereis*

In the following descriptions the terminology used in describing the appendages follows Skogsberg (1928) and Harding & Sylvester-Bradley (1953). The positions and arrangement of the parts of the appendages described always refer to dissected specimens examined under coverslips. The small pili are at the limits of the definition of the transmitted light microscope and some have inevitably been omitted.

FIRST ANTENNA. Strong, 5-jointed. Fourth podomere fused. First podomere hirsute postero-proximally. Second podomere hirsute antero-proximally and mid-posteriorly, with one annular, pilose seta postero-distally. Third podomere bears a stout antero-distal seta. Fourth podomere hirsute antero-proximally, and bearing mid-anteriorly, one stout, anteriorly pilose, and two fine setae, one long, one short. One fine seta is found antero-distally, and a long fine seta and a stout, anteriorly pilose seta are situated terminally (In some specimens of *U. distinguenda*, an additional very small, annulate seta was observed in this position.). Fifth podomere with two short fine, one long fine and one stout, anteriorly pilose seta.



**SECOND ANTENNA.** Strong, 4-jointed (one protopodite and three endopodite podomeres). Second endopodite podomere fused. 2-jointed exopodite well developed, longer and stiletto-like in male, the first joint being shorter and broader in female. Receives duct from large antennal gland. First endopodite podomere hirsute mid-anteriorly and with one long annular, pilose seta postero-distally. Second endopodite podomere long and coarsely bristled posteriorly, with three setae mid-posteriorly, one of which is variously developed. Two fine setae, one long, the other short, occur antero-distally and one fine seta is found postero-distally. Distal podomere with three short, chelate setae.

**MANDIBLE.** Heavily sclerotized first protopodite podomere forms a strong masticatory process. The base of the large mandibular palp consists of a second protopodite podomere bearing an exopodite with ? four setae distally and two setae ventrally. The proximal one is long, annular and pinnate, the distal one, stout and hirsute. The first endopodite podomere bears four setae ventro-distally, of which two are small and two are long, curved and coarsely pinnate. A similar but larger and more finely pinnate seta is present ventro-distally on the next podomere. The second endopodite podomere bears up to five long, whip-like, naked setae and an annular, pilose seta. The terminal podomere bears three setae, the shortest of which is annular and pilose.

**MAXILLA.** Posteriorly, the exopodial vibratory plate has 14 long, tapering, pinnate setae with swollen, naked bases. Maxillary palp: three distinct endites of similar dimensions, each bearing up to eight short, curved, naked setae, the exact number of which being difficult to determine. Endopodite 2-jointed, the proximal podomere being larger with four distal setae, of varying length and detailed structure, dorsal to the second podomere which is small and bears three stout, naked, terminal setae swollen basally. Ventral to the second podomere and arising from the distal part of the first podomere is another, similar seta.

**LEGS.** Long and slender, the second and third pairs being successively larger than the first. The first podomere of each bears a short, annular seta which may also be pilose or hirsute postero-proximally. Mid-anteriorly the first and second legs bear two long, annular, usually pilose, setae. The third leg has only one such seta. Antero-distally, the first leg has two annular, pilose setae, whereas the second and third legs have only one. Each leg bears a short, often pilose seta antero-distally on the second podomere and each leg tends to develop short bristles distally along the anterior margins of the second to fourth podomeres.

**THE BRUSH-SHAPED ORGANS.** Simple, unjointed and sub-quadrangular with about 15 long, whip-like setae terminally.

**MALE COPULATORY APPENDAGES.** Complex, with large oval, articulating chitin framework with transverse musculature proximally. Triangular distal portion with acute terminal 'lappet' and prominent, thickened *ductus ejaculatorius* which may be retained within the structure of the appendage or extend freely to varying degrees, ventrally. The rest of the structure is difficult to define. This appendage, which defies accurate written description, is probably the most important single appendage used in delimiting individual species.

Intraspecifically, the soft-part characters are more stable than those of the carapace. Where possible, initial specific identification should be made using the soft-parts. The greatest inter-specific variation occurs in the structure of the male copulatory appendages which Skogsberg (1928) considered as the primary seat of evolution and basic to delineation of species. The differences lie mainly in the varying size and shape of the distal 'lappet' and the course of the *ductus ejaculatorius*. For instance, a comparison of the lappets of the copulatory appendages of *U. britannica* (Fig. 4a) and *U. margaritifera* (Fig. 4d) shows that in the former the ventral margin is straight whereas in the latter it is incurved; also, the lappet is generally broader and has a curved dorsal margin. In contrast to these two species, the copulatory appendages of *U. flexicauda* (Fig. 4e), as well as being smaller overall than those of any of the other species examined, possess long lappets with almost parallel sides. The course of the *ductus ejaculatorius* also varies consi-



derably within the genus. For instance, in *U. britannica* and *U. margaritifera* the duct is short and is contained within the area of the appendage; in *U. distinguenda* (Fig. 5i) the duct is much longer and passes beyond the ventral margin. In *U. neapolitana* (Fig. 6e) it is extremely long and extends far beyond the ventral margin in a broad loop. In addition, a group of three setae, found posteriorly on the second endopodite podomere of the second antennae, are differently developed in each species. Other characters of the soft-parts which appear to be diagnostic of individual species include the relative and absolute sizes of the podomeres and setae. The appendages of five species of *Urocythereis* are illustrated in Figs 4–6.

### Stratigraphical distribution

Of the seven species of *Urocythereis* known to be living in the Mediterranean only one has, without doubt, a fossil occurrence (i.e. *U. phantastica* Athersuch & Ruggieri). The Recent British species, *U. britannica* Athersuch, has not been recorded living from the Mediterranean but appears to have been in this region during Pliocene and sub-Recent times. Other fossil forms, known only from the Mediterranean region, e.g. *U. favosa*, *U. lumbricularis*, *U. seminulum*, do not appear to have living representatives, although there is some evidence to suggest that *U. favosa* may have Recent (? sub-Recent) representatives (Doruk, 1974).

### Remarks

At present in the Mediterranean, this genus appears to be a large and diverse one and it is probable that in the past there were more species than we have as yet clearly distinguished amongst the available material.

Ascribing names of Recent species to fossil forms has been a misleading, but common, practice in many previous studies of this genus and has done much to confuse the taxonomy.

Future research on this genus must include collection of living material from many more Mediterranean and NW European localities (particularly in N. Africa, see Pl. 17) and a systematic study of the fossil forms.

### Systematic descriptions

Although the primary purpose of this study has been a revision of the Recent species of *Urocythereis*, it was thought essential to include a description and illustrations of the type-species (*U. favosa*) from the Pliocene of Italy to obtain a fuller understanding of the generic concept of *Urocythereis*. Moreover, to show the range of morphological variation within the genus, two other fossil forms, *U. lumbricularis* (Terquem) and *U. seminulum* (Seguenza), are described and illustrated herein. The synonymy listed for each species is not intended to be complete. Only original citations, changes of name and other references of major importance have been included.

The distributions given for each species are those verified by the present author, usually from original material, but occasionally from descriptions and illustrations alone. Fig. 8, at the end of this work, shows a distribution map of the Recent species of *Urocythereis*.

Sub-class **OSTRACODA** Latreille, 1802 (nom. correct., Latreille 1806)

Order **PODOCOPIDA** Müller, 1894

Sub-order **PODOCOPA** Sars, 1866

Family **HEMICYOTHERIDAE** Puri, 1953

Sub-family **UROCYTHEREIDINAE** Hartmann & Puri, 1974

Genus **UROCYTHEREIS** Ruggieri, 1950

TYPE-SPECIES. (Original designation) *Cytherina favosa* Roemer, 1838.

The references cited in the following synonymy of *U. favosa* have been restricted to those which refer to material obtained from the type-locality only. A future revision of fossil representatives of this genus may result in the addition of further references. For details of other citations of *U. favosa*, see Ruggieri (1950) and Doruk (1974).



*Urocythereis favosa* (Roemer)

(Pl. 1, fig. 1; Fig. 3g)

*Cytherina favosa* sp. nov. Roemer, 1838 : 516, pl. 6, fig. 7.

*Urocythereis favosa* (Roemer); Ruggieri, 1950 : 28, pl. 1, fig. 4, text-figs 10–14.

*Urocythereis favosa* (Roemer); Doruk, 1974 : 33, 34, figs 1–3; 36, fig. 2; 38, fig. 1; 42, fig. 1; 44, fig. 1. (?) 36, figs 1, 3; 38, figs 2, 3; 40, figs 1–3; 42, figs 2–5, 44, figs 2–3.

NEOTYPE. (?) Male left valve; B.M.(N.H.) no. I0 5855.

TYPE-LOCALITY. Castellarquato, N. Italy: approx. 44°51' N, 09°52' E; Pliocene.

DIAGNOSIS. No formal diagnosis is given here as it is felt that too few specimens have been examined.

REMARKS. Roemer first described *Cytherina favosa* in 1838 from the Pliocene of Castellarquato, Italy. This species was chosen by Ruggieri in 1950 as the type-species for his new genus *Urocythereis*. He illustrated topotypic material, since Roemer's original specimens are presumed lost. This description was amplified by Doruk (1974) who demonstrated the apparently wide range of fossal development of this species. However, Pliocene forms illustrated have big fossae, and central tubercles occur in the posterior hinge element of the left valve, whereas (sub-)Recent forms have small fossae and lack central tubercles. There are also differences in shape between the two forms. Although *U. distinguenda* clearly demonstrates that even within one population, extreme variation of ornament may occur, it is probable that the forms described by Doruk represent two species, one Pliocene, the other (sub-)Recent.

Many reticulate fossil species, with large rounded fossae, have been recorded as *U. favosa* (Roemer). It is likely that many of these descriptions refer to other, as yet undescribed, species. Other species such as *Cythere sorocula* Seguenza and *Cythere mirabilis* Brady *sensu* Capeder may be synonymous with *U. favosa*. A further study of fossil specimens from the Mediterranean area is now essential.

This species is distinct from any known Recent species from the Mediterranean, and all known references to Recent *U. favosa* are probably incorrect as it is presumed extinct.

FIGURED SPECIMEN. A ? male specimen from Roemer's type-locality, collected by Professor G. Ruggieri, is here proposed as a neotype for this species.

*Urocythereis britannica* sp. nov.

(Pl. 1, figs 4–6; Pl. 2, figs 1–6; Pl. 3, figs 1–6; Pl. 4, figs 1–5; Figs 3a, b; 4a–c, g)

*Cythere oblonga* Brady, 1868; 400, pl. 31, figs 14–17. (non *C. oblonga* Brady, 1866 (= *Urocythereis distinguenda* (Neviani))).

*Urocythereis oblonga* (Brady); Wagner, 1957 : 63, pl. 26, figs 1–5.

*Paracythereis oblonga* (Brady); de Vos, 1957 : 34, pl. 15, figs 1a–h.

? *Urocythereis margaritifera margaritifera* (Müller); Sissingh, 1972 : 128, pl. 10, fig. 8.

HOLOTYPE. Male carapace and soft parts B.M.(N.H.) no. 1976.1041.

PARATYPES. Both sexes B.M.(N.H.) nos 1976.1043–50, 1052.

TYPE-LOCALITY: Poole, Dorset, England; Recent.

DIAGNOSIS: Oblong, rounded and sub-rounded fossae in consistent pattern. Obliquely rounded posterior margin. Muri excavate and foveolate. Male copulatory appendages diagnostic.

DERIVATION OF NAME. Latin, '*Britannica*' – British (refers to its frequent occurrence on British coasts).

DISTRIBUTION: Recent; (as *U. oblonga* (Brady)) – Bay of Biscay, S. Wales (Brady collection, Hancock Museum), S. England, N. Spain and France (author's collection), Heligoland (Remane collection). Holocene; Netherlands (Wagner, 1957). (?) Pliocene; Aegean (Sissingh, 1972). (?) sub-Recent; Cyprus (author's collection).



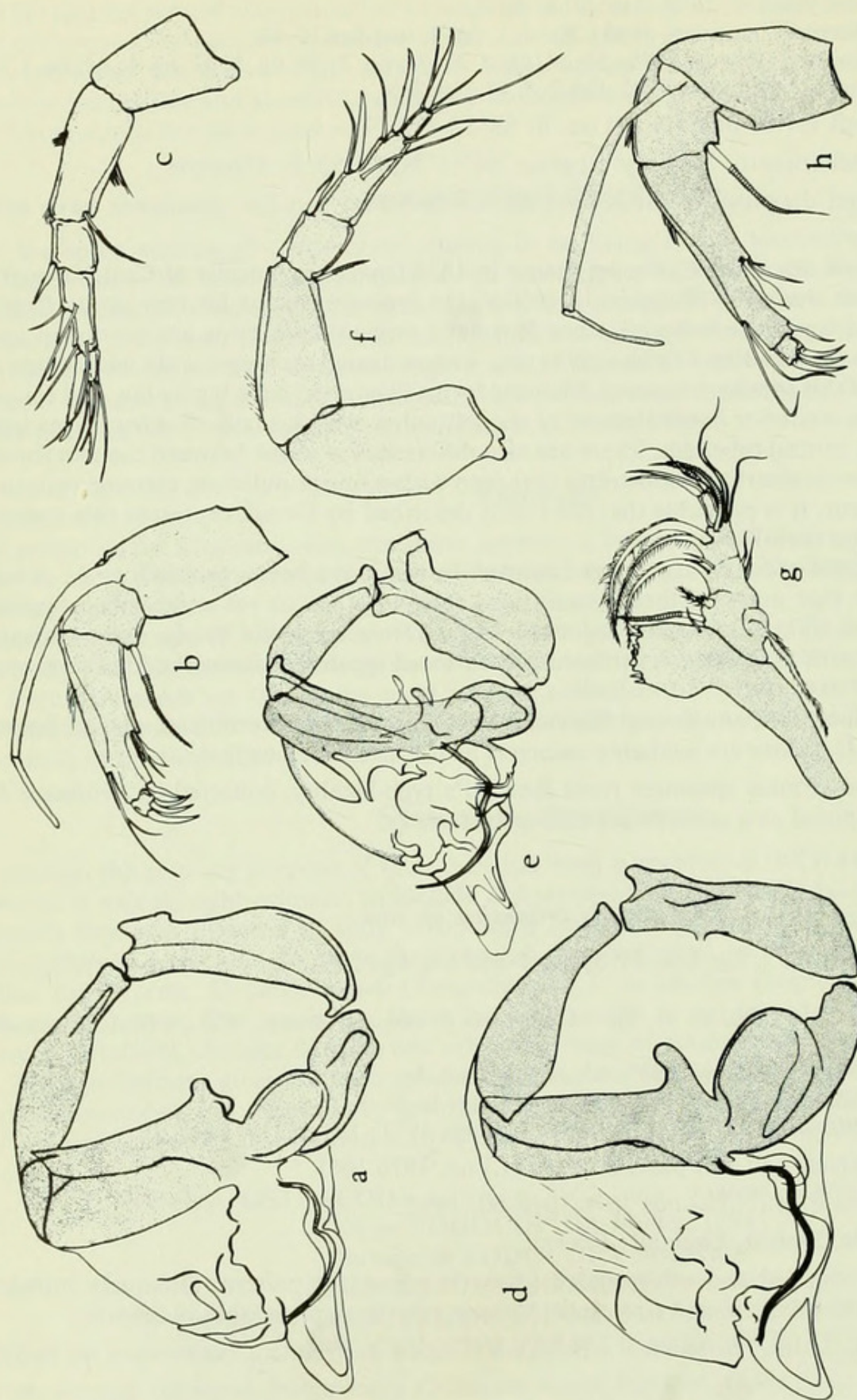


Fig. 4 Appendages of *Urocythereis* spp. (a) *U. britannica* sp. nov., ♂ left copulatory appendage (× 208); (b) *U. britannica* sp. nov., ♂ left second antenna (× 208); (c) *U. britannica* sp. nov., ♂ left first antenna (× 208); (d) *U. margaritifera* Müller, ♂ left copulatory appendage (× 250); (e) *U. flexicauda* Bonaduce, Ciampo & Masoli, ♂ left copulatory appendage (× 300); (f) *U. margaritifera* Müller, ♂ right first antenna (× 250); (g) *U. britannica* sp. nov., ♂ mandible (× 208); (h) *U. margaritifera* Müller, ♂ left second antenna (× 250).



REMARKS. The fossae are extremely variable in size, and in some specimens no fossae are developed over parts of the carapace (see Pl. 2, fig. 4). Massive anterior reticular field. The specimens from Heligoland show ghost reticulation and have a subdued ornament. Posterior element of the hinge of the left valve may possess a median tubercle, and the posterior element of the right valve may be correspondingly lobed. Sexual dimorphism slight: males larger than females more quadrangular and more inflated posteriorly. Fulcral point often pessular.

Both this species and *U. distinguenda* have often been recorded erroneously under the name *U. oblonga* (Brady) (junior objective homonym of *C. oblonga* M'Coy, 1844). Their shapes are, however, quite distinct and in addition *U. distinguenda* develops a tegmen which is lacking in *U. britannica*. The soft parts, particularly the male copulatory appendages, are distinct. *Hemicythere oblonga* (Brady) *sensu* Sars from Scandinavia is probably conspecific with the present species (see Pl. 1, figs 4–6).

FIGURED SPECIMENS. B.M.(N.H.) nos 1976.1041, 1043–1050, 1052 were collected alive by C. P. Palmer from beach sand, Shell Bay,  $\frac{3}{4}$  mile S of Poole Harbour, Dorset, England, approx.  $50^{\circ}42' \text{ N}$ ,  $02^{\circ}00' \text{ W}$ , during August 1975.

No. 1976.1042, from the Brady collection in the B.M.(N.H.) is from the Gulf of Gascogne, SW France.

No. 1976.1051 was collected by Squ. Lrd C. R. Chrisp from Akrotiri Bay, Cyprus, approx.  $34^{\circ}34' \text{ N}$ ,  $33^{\circ}02' \text{ E}$ , during 1968. Nos K30467 a–c were collected by A. Remane from Heligoland during 1933 and are housed in the Zoological Museum, Hamburg.

### *Urocythereis colum* sp. nov.

(Pl. 5, figs 1–6; Pl. 6, figs 1–5)

HOLOTYPE. Male left valve B.M.(N.H.) no. 1976.1066.

PARATYPES. Valves and carapaces of both sexes B.M.(N.H.) Nos 1976.1067–70.

DERIVATION OF NAME. Latin, *colum* (used in apposition) – a colander; refers to appearance of carapace, perforated by large, circular normal pores.

TYPE-LOCALITY. Dhavlos Bay, Cyprus.

DIAGNOSIS. Numerous small, circular, widely separated fossae arranged in a consistent pattern. The soli of most fossae are occupied by large sieve plates. Surface foveolate.

DISTRIBUTION. Known only from Cyprus (author's collection), where it occurs infrequently in shallow water sands.

REMARKS. The sizes of the homologous fossae are consistent in the specimens examined. Males with well-preserved soft-parts unknown.

FIGURED SPECIMENS. All the specimens are from beach sands in Cyprus. Nos 1976.1067, 1068 were collected by J. Athersuch during April 1973 from Khelones Bay, approx.  $35^{\circ}36' \text{ N}$ ,  $34^{\circ}26' \text{ E}$ . Nos 1976.1066, 1069 and 1070 were collected by Professor P. C. Sylvester-Bradley during summer 1972 from Dhavlos Bay, approx.  $33^{\circ}35' \text{ N}$ ,  $35^{\circ}27' \text{ E}$ .

### *Urocythereis distinguenda* (Neviani)

(Pl. 7, figs 1–6; Pl. 8, figs 1–6; Pl. 9, figs 1–5; Pl. 12, figs 5, 6; Figs 3c d; 5a–i)

*Cythere oblonga* sp. nov. Brady, 1866 : 353, pl. 59, figs 5a–d (*non C. oblonga* M'Coy, 1844).

*Cythereis (Auris) distinguenda* nom. nov. Neviani, 1928 : 105 (synonymy only); (*non* p. 105 description and pl. 2, figs 91–93).

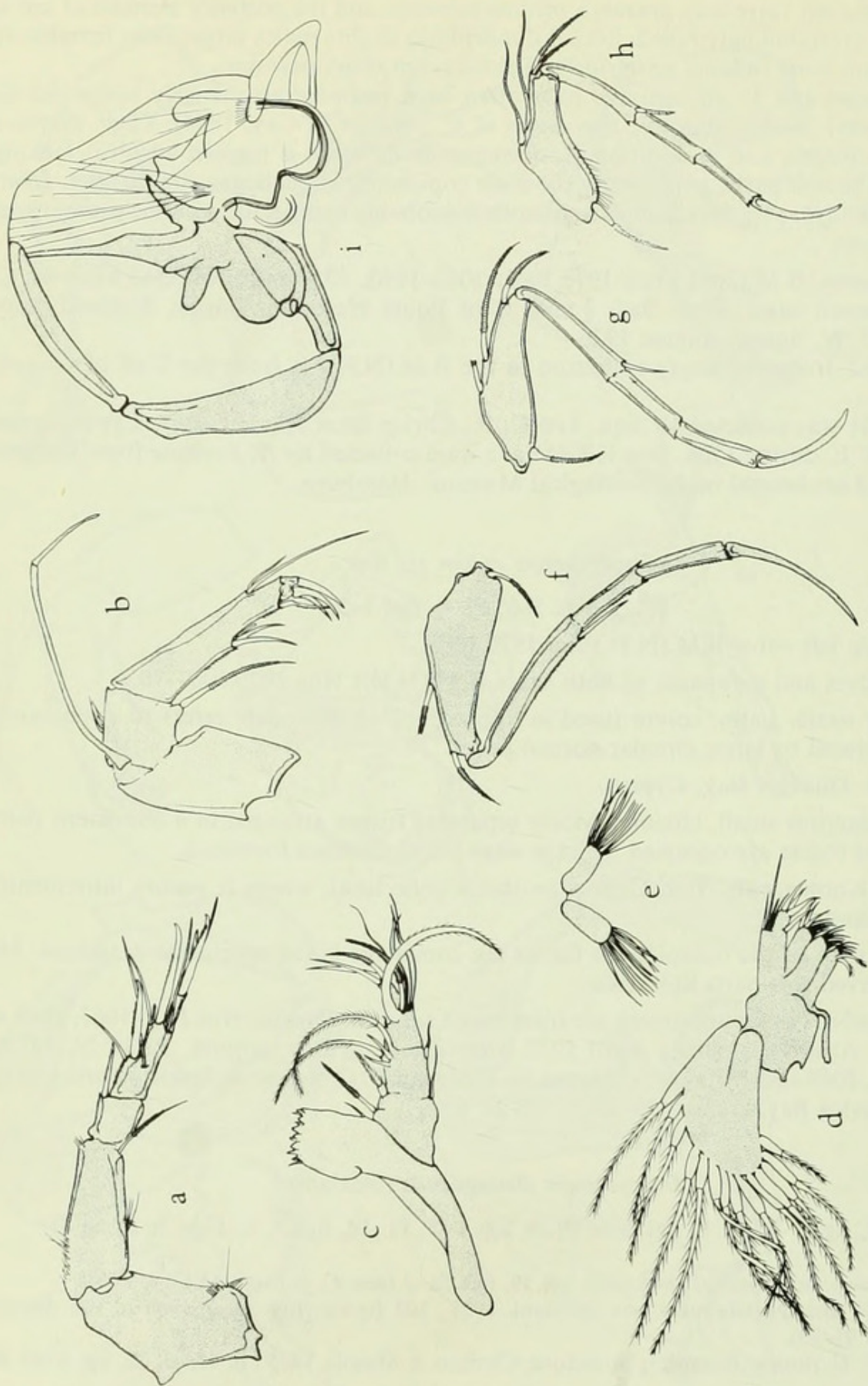
*Urocythereis* aff. *U. favosa* (Roemer); Bonaduce, Ciampo & Masoli, 1975 : p. 45, pl. 22, fig. 8 (*sic* fig. 7).

NEOTYPE. A female carapace and soft-parts B.M.(N.H.) no. 1976.1031.

PARATYPES. Both sexes B.M.(N.H.) nos 1976.1026–30, 1032–40, 1074.

TYPE-LOCALITY. Kyrenia, Cyprus, approx.  $35^{\circ}19' \text{ N}$ ,  $33^{\circ}19' \text{ E}$ ; Recent.





**Fig. 5** Appendages of *Urocythereis distinguenda* (Neviani) ( $\times 208$ ). (a)  $\delta$  right first antenna; (b)  $\delta$  right second antenna; (c)  $\delta$  mandible; (d)  $\delta$  maxilla; (e)  $\delta$  brush-shaped organ; (f)  $\delta$  left third leg; (g)  $\delta$  right third leg; (h)  $\delta$  right first leg; (i)  $\delta$  right copulatory appendage.



**DIAGNOSIS.** A species of *Urocythereis* with deep fossae showing varying degrees of celation. Extreme development of the foveolate tegmen may obscure the underlying fossae, and leave many small, widely spaced pits. Male copulatory appendages diagnostic.

**DISTRIBUTION.** The taxonomy of this species has been always confused and it is impossible to judge from past literature which of the many records of *U. oblonga*, *U. favosa*, *U. distinguenda* and *U. margaritifera*, if any, refer to this species. The following records can be confirmed. Recent; Cyprus (author's coll.), Greece (B.M.(N.H.) coll.), the Levant (Brady, 1866), Nota Marina, Sicily, and Puglia, Italy (author's collection). Living specimens found in coarse sand at 0–40 m.

**REMARKS.** Neviani (1928) provided a new name for Brady's species, *Cythere oblonga*, a junior objective homonym of *C. oblonga* M'Coy, 1844, and also illustrated and re-described the species using his own material from the Pliocene of Italy. I consider that the specimens of Brady and of Neviani are not conspecific. However, *Cythereis distinguenda* remains the next available name for Brady's species. Unfortunately, no specimens attributable to this species remain in the Brady collection at the Hancock Museum, Newcastle-upon-Tyne, or at the British Museum (Natural History) and therefore a neotype has been selected from Cyprus, geographically close to Brady's Levant localities.

Brady himself considered that this species was conspecific with the form now recognized as *U. britannica* sp. nov. (herein) as he illustrated both species as *C. oblonga* (see Brady, 1868 : pl. 31).

Males more quadrangular, more elongate and more inflated posteriorly than females.

**FIGURED SPECIMENS:** B.M.(N.H.) nos 1976.1026, 1028, 1034, 1038 collected by J. Athersuch during April 1973 from Khelones Bay, Cyprus (approx. 35°36' N, 34°26' E), in beach sand.

Nos 1976.1027, 1029–31, 1037, 1074 collected by J. Athersuch from Cyprus during Autumn 1973. All specimens were living or contained remnants of soft-parts when collected. Nos 1976.1027, 1029, 1074 from Cape Greco (approx. 34°58' N, 34°05' E) in sand at 12 m, water temp. 22 °C. No. 1976.1030 from Famagusta Bay (approx. 35°08' N, 33°56' E) in sand at 13 m, water temp. 26 °C, pH 8.2, O<sub>2</sub> 107%. No. 1976.1031 from Kyrenia (approx. 35°19' N, 33°19' E) in sand at 5 m, water temp. 26 °C. No. 1976.1037 from Famagusta (approx. 35°08' N, 33°58' E) in sand.

Nos 1976.1032, 1033, 1035, 1036, 1040 collected by Squ. Ldr C. R. Chrisp from sand 0–7 m in Akrotiri Bay, Cyprus (approx. 34°34' N, 33°02' E), during 1968.

Nos 1976.1039 collected by Dr W. Chaster from Delos, Greece, approx. 37°23' N, 25°17' E (ex- B.M.(N.H.) no. 1963.4.26.6).

### *Urocythereis flexicauda* Bonaduce, Ciampo & Masoli

(Pl. 10, figs 1–6; Pl. 11, figs 1–5; Fig. 4e)

*Urocythereis flexicauda* sp. nov. Bonaduce, Ciampo & Masoli, 1975 : 45, pl. 22, figs 1–6.

**HOLOTYPE.** Single left valve; Bonaduce, Ciampo, Masoli collection no. 225; Zoological Museum, Naples.

**PARATYPES.** Two valves, B.C.M. collection no. 226.

**TYPE-LOCALITY.** Apulia coast of the Adriatic Sea, Italy.

**DIAGNOSIS.** A species of *Urocythereis* with enlarged and depressed postero-ventral region, bearing large labyrinthic fossae. Postero-ventral margin obliquely rounded. Male copulatory appendages diagnostic.

**REMARKS.** Only one live specimen (male) has been found (Apulia, Adriatic coast of Italy). This species is extremely rare and has been recorded only from the coasts of Italy. The shape of the valves varies considerably and the fossae, which are in a consistent pattern, are variously developed.

**DISTRIBUTION.** Recent; Adriatic (Bonaduce, Ciampo and Masoli, 1975 and author's collection); Crotone and Naples, Italy (author's collection).

**FIGURED SPECIMENS.** All the specimens were collected from the coasts of Italy. Nos 1976.1055, 56,



58 were collected by Professor G. Ruggieri from beach sands at Crotone, approx. 39°05' N, 17°15' E.

No. 1976.1054 from Apulia, SE Italy, and 1976.1057 from Naples, approx. 40°50' N, 14°18' E, were kindly given by Dr G. Bonaduce.

*Urocythereis lumbricularis* (Terquem)

(Pl. 1, fig. 3; Fig. 2c)

*Cythere lumbricularis* sp. nov. Terquem, 1878 : 105, pl. 12, figs 6a–c.

*Urocythereis labyrinthica* sp. nov. Uliczny, 1969 : 63, pl. 4, fig. 6; pl. 15, figs 5–7.

*Urocythereis lumbricularis* (Terquem); Sissingh, 1972 : 128, pl. 10, fig. 7.

*Urocythereis labyrinthica* Uliczny; Doruk, 1974 : 49–52.

LECTOTYPE. (?) Male, right valve picked from topotypic material collected by Terquem; no registration number, but placed in a separate, labelled slide with the Terquem collection and housed in the Laboratory of Micropalaeontology, Museum of Natural History, Paris.

TYPE-LOCALITY. Rhodes; (?) Pliocene (see Sissingh, 1972).

DISTRIBUTION. Pliocene; Kephalinia, Greece (Uliczny, 1969), Rhodes (Terquem, 1878); Pleistocene (Calabrian); Italy (Doruk, 1974).

REMARKS. Terquem (1878) commented that there was considerable variation in the ornament of *Cythere lumbricularis*. However, the specimens obtained from the Terquem collection have a consistent pattern, similar to that of the lectotype. Uliczny (1969) recognized two sub-species of *Urocythereis labyrinthica* on the basis of shape differences of the labyrinths, but Doruk (1974) argued that the variation in the labyrinthic patterns of this species was continuous and that there was no evidence of sub-specific differentiation.

*Urocythereis margaritifera* (Müller)

(Pl. 12, figs 1–4; Pl. 13, figs 1–6; Pl. 14, figs 1–5; Figs 3e, f; 4d, f, h)

*Cythereis margaritifera* sp. nov. Müller, 1894 : 368, pl. 32, figs 26, 29, 32, 35–37.

LECTOTYPE. A male carapace and soft-parts from G. W. Müller's syntype collection (no. 9296); no catalogue numbers but placed in separate, labelled slides and housed with the Müller collection (Berlin).

PARATYPES. A large number of males, females and juveniles remain well preserved in the Müller collection (no. 9296).

TYPE-LOCALITY. Bay of Naples, Italy; Recent.

DIAGNOSIS. Irregular, small, rounded, widely separated fossae in a consistent pattern. Male copulatory appendages diagnostic.

DISTRIBUTION. This species is only known from the type-locality, where it was found associated frequently with sand at about 10 m.

REMARKS. Müller (1894) recorded this as one of the most numerous species in the Bay of Naples. However, no specimens referable to this species have been found during recent sampling programmes (pers. comm. G. Bonaduce).

Males more elongate and less inflated than females. Six adductor and three frontal scars; fulcral point pointed. There is a tendency for the posterior element of the right hinge to develop a slight median tubercle and for the posterior element of the left hinge to be correspondingly lobed.

*U. margaritifera sensu* Uliczny (1969) and *sensu* Sissingh (1972) probably represent one or more fossil species closely related to *U. margaritifera* s.s., but displaying different development of the fossae.



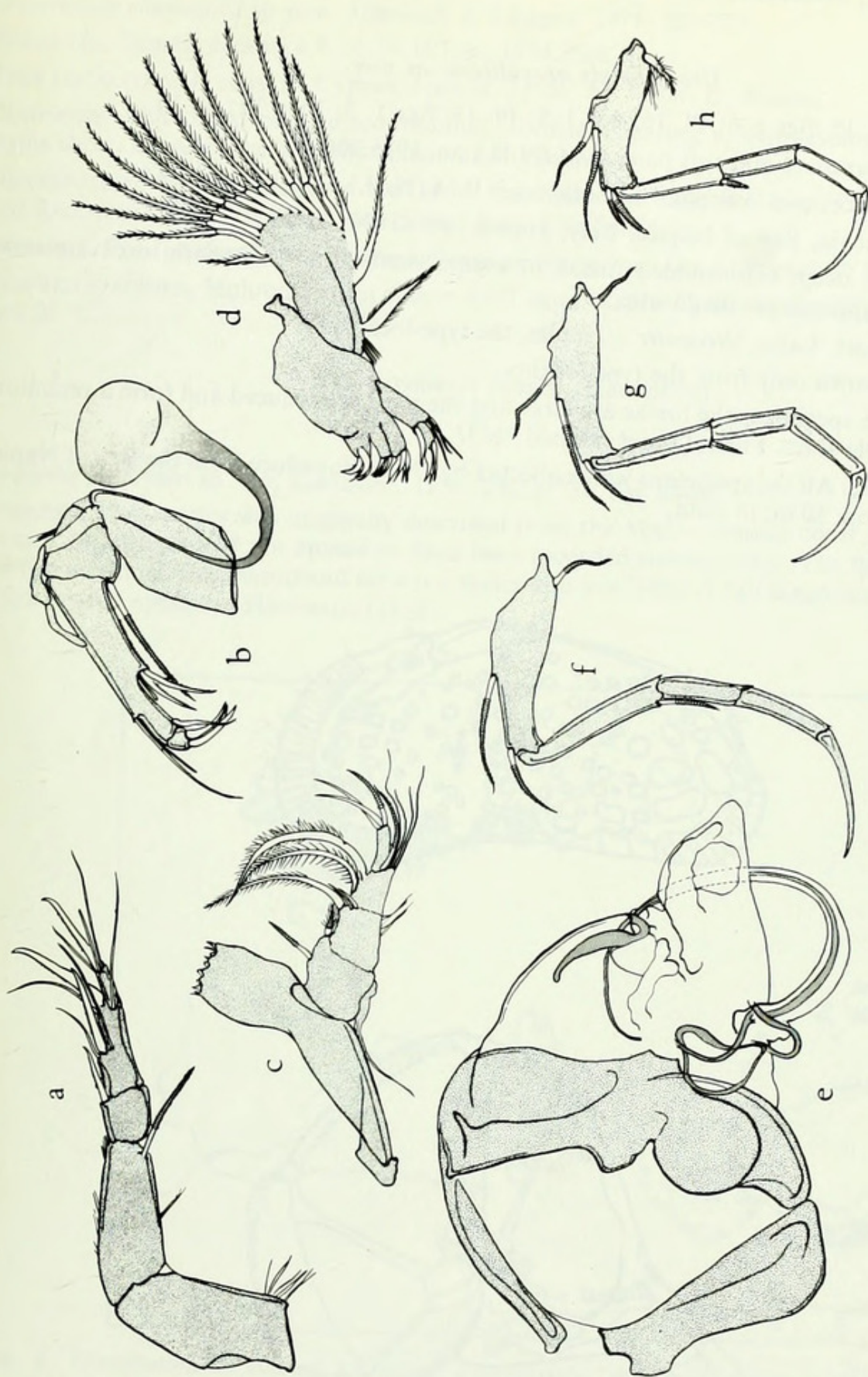


Fig. 6 Appendages of *Urocythereis neapolitana* sp. nov. ( $\times 208$ ). (a) ♀ right first antenna; (b) ♀ left second antenna; (c) ♀ mandible; (d) ♀ maxilla; (e) ♂ right copulatory appendage; (f) ♀ left third leg; (g) ♀ left second leg; (h) ♀ left first leg.



FIGURED SPECIMENS. All the specimens were taken from the G. W. Müller collection (ex.-no. 9296); no catalogue numbers, but placed in separate slides labelled (ex-9296 a-g), and housed in the Crustacea Division, Zoological Museum, E Berlin.

*Urocythereis neapolitana* sp. nov.

(Pl. 15, figs 1-6; Pl. 16, figs 1-5; Pl. 17, figs 1, 3; Figs 3h; 6a-h)

HOLOTYPE. Male carapace and soft parts B.M.(N.H.) no. 1976.1063.

PARATYPES. Carapaces and soft parts of both sexes B.M.(N.H.) nos 1976.1059-65.

TYPE-LOCALITY. Ischia, Bay of Naples, Italy, approx. 40°45' N, 13°50' E.

DIAGNOSIS. Large, deep, sub-rounded fossae in a consistent pattern. Smooth, excavate muri. Male copulatory appendages diagnostic.

DERIVATION OF NAME. Latin, 'Neapolis' - Naples, the type-locality.

DISTRIBUTION. Known only from the type-locality.

REMARKS. In some specimens the fossae are large and the muri are reduced and form a reticulum. Two frontal muscle scars. Fulcral point pointed.

FIGURED SPECIMENS. All the specimens were collected by Dr G. Bonaduce from the Bay of Naples, Italy, depth approx. 50 m, in sand.

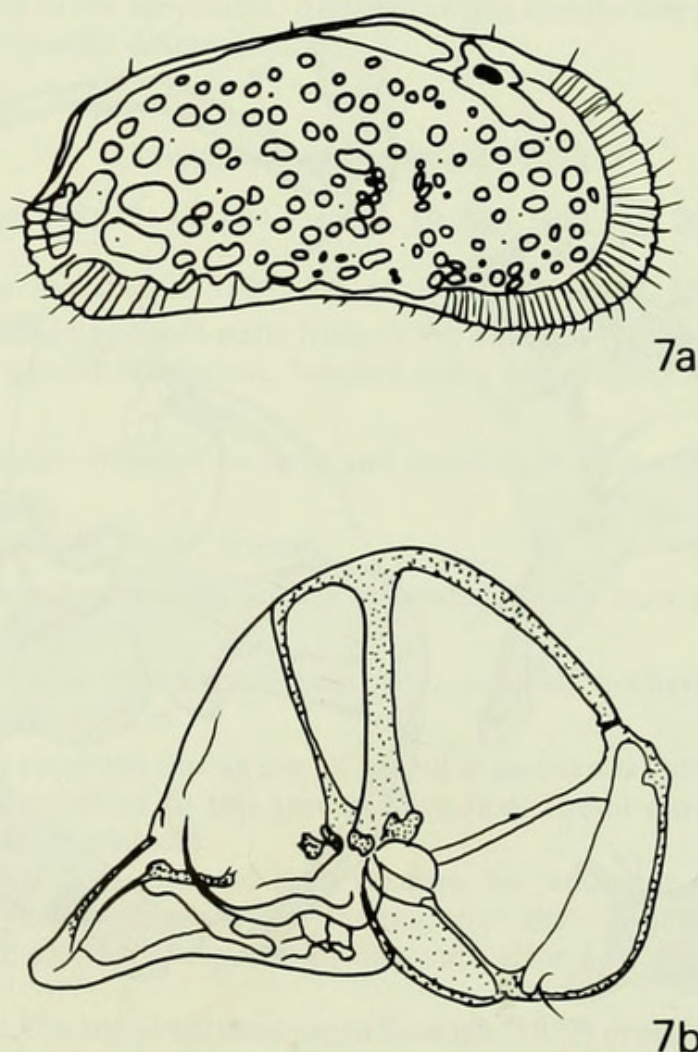


Fig. 7 *Urocythereis schulzi* (Hartmann). (a) ♂ right valve; (b) copulatory appendage. (Both figures after Hartmann, 1958, who gives no indication of size or magnification.)



*Urocythereis phantastica* sp. nov. Athersuch & Ruggieri, 1975 : 223–230.

HOLOTYPE. Female carapace B.M.(N.H.) no. 1974.755a, b.

TYPE-LOCALITY: SE coast of Cyprus, approx. 35°26' N, 34°04' E; Recent.

DIAGNOSIS. Muri high, often discontinuous, normally bearing a well-developed tegmen which forms short, angular, occasionally anastomosing branches.

DISTRIBUTION. Known only from the Lower Calabrian and Sicilian (Lower Pleistocene) in Sicily, and Recent in Cyprus. Possibly also occurs Recent in Tunisia.

REMARKS. For full description of the features of the tegmen see Athersuch & Ruggieri (1975).

FIGURED SPECIMEN. Holotype from coarse shell sand; depth 13 m, salinity 39‰, water temperature 23 °C.

*Urocythereis schulzi* (Hartmann)

(Figs 7a, b)

*Paracythereis schulzi* sp. nov. Hartmann, 1958 : 230, pl. 36, figs 20–30.

REMARKS. This species was originally described from the Mediterranean coast of France and, as far as I am aware, does not appear to have been recorded subsequently. The type-specimens are lost (pers. comm. Hartmann) and no other material is available. A full diagnosis and illustrations of this species appear in Hartmann (1958).

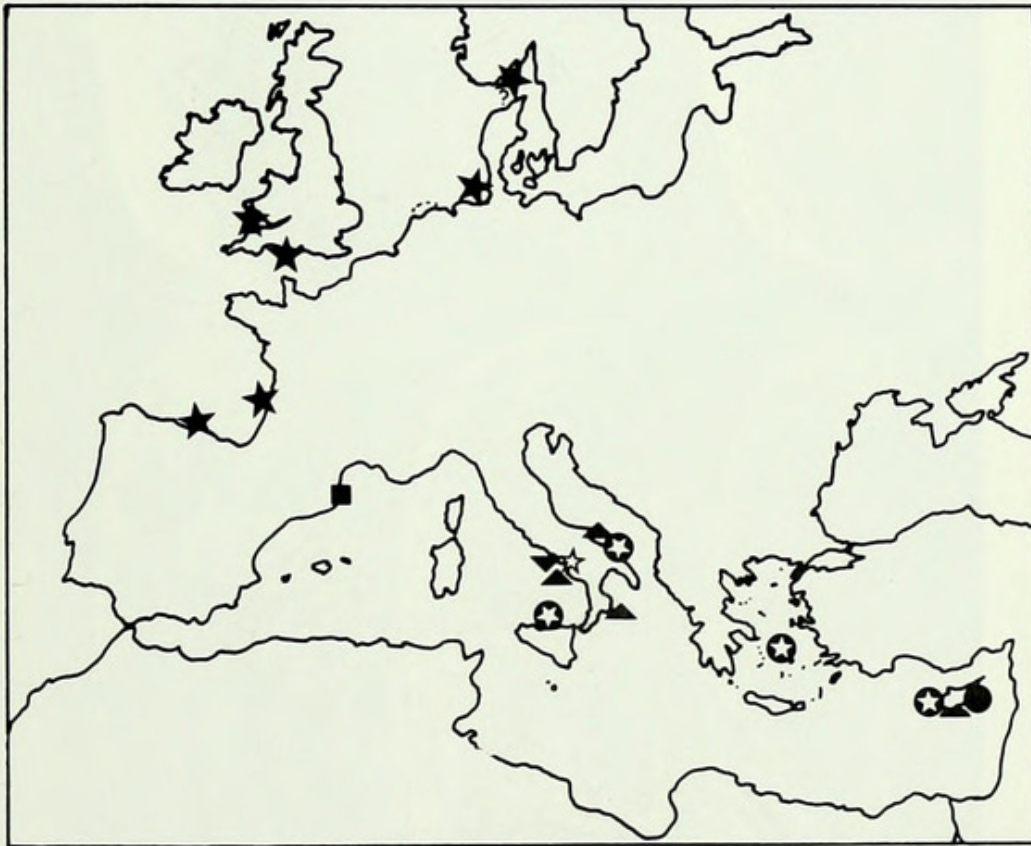


Fig. 8 Distribution of Recent species of *Urocythereis*. ⊛ – *U. distinguenda* (Neviani). ★ – *U. britannica* sp. nov. ☆ – *U. margaritifera* (Müller). ▼ – *U. neapolitana* sp. nov. ● – *U. colum* sp. nov. ▲ – *U. phantastica* Athersuch & Ruggieri. ▴ – *U. flexicauda* Bonaduce, Ciampo & Masoli. ■ – *U. schulzi* (Hartmann). (With the exception of *U. schulzi* (see p. 263), only records of living material, verified by the present author, are shown.)



*Urocythereis seminulum* (Seguenza)

(Pl. 1, fig. 2; Fig. 2b)

*Cythere seminulum* sp. nov. Seguenza, 1880 : 124, pl. 12, figs 4, 4a.

*Urocythereis seminulum* (Seguenza); Ruggieri, 1963 : 6, pl. 1, figs 11, 11a, text-fig. 3.

*Urocythereis seminulum* (Seguenza); Doruk, 1974 : 45-48.

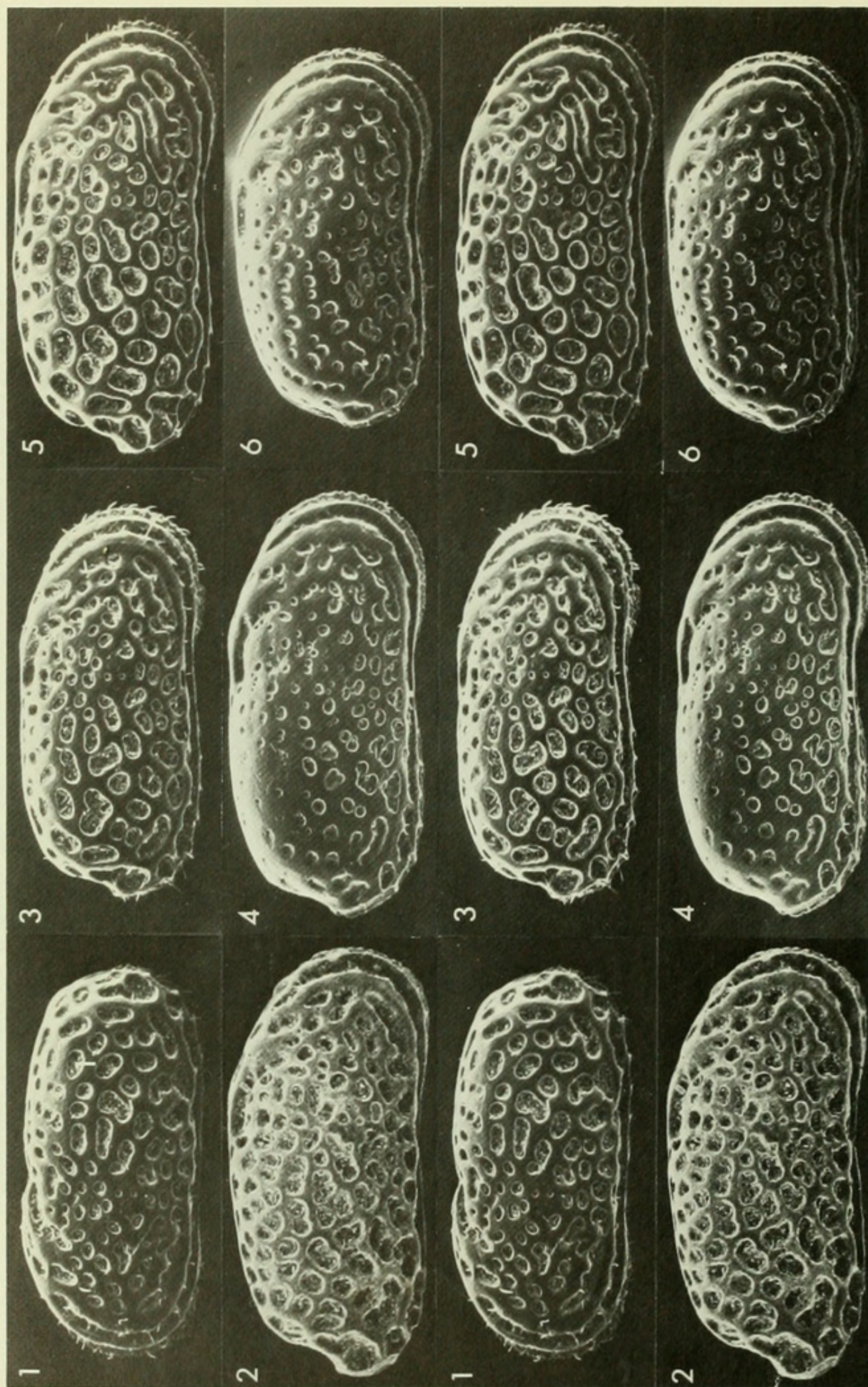
REMARKS. For further information about this species see Ruggieri (1963) and Doruk (1974).  
See also pp. 252, 254.





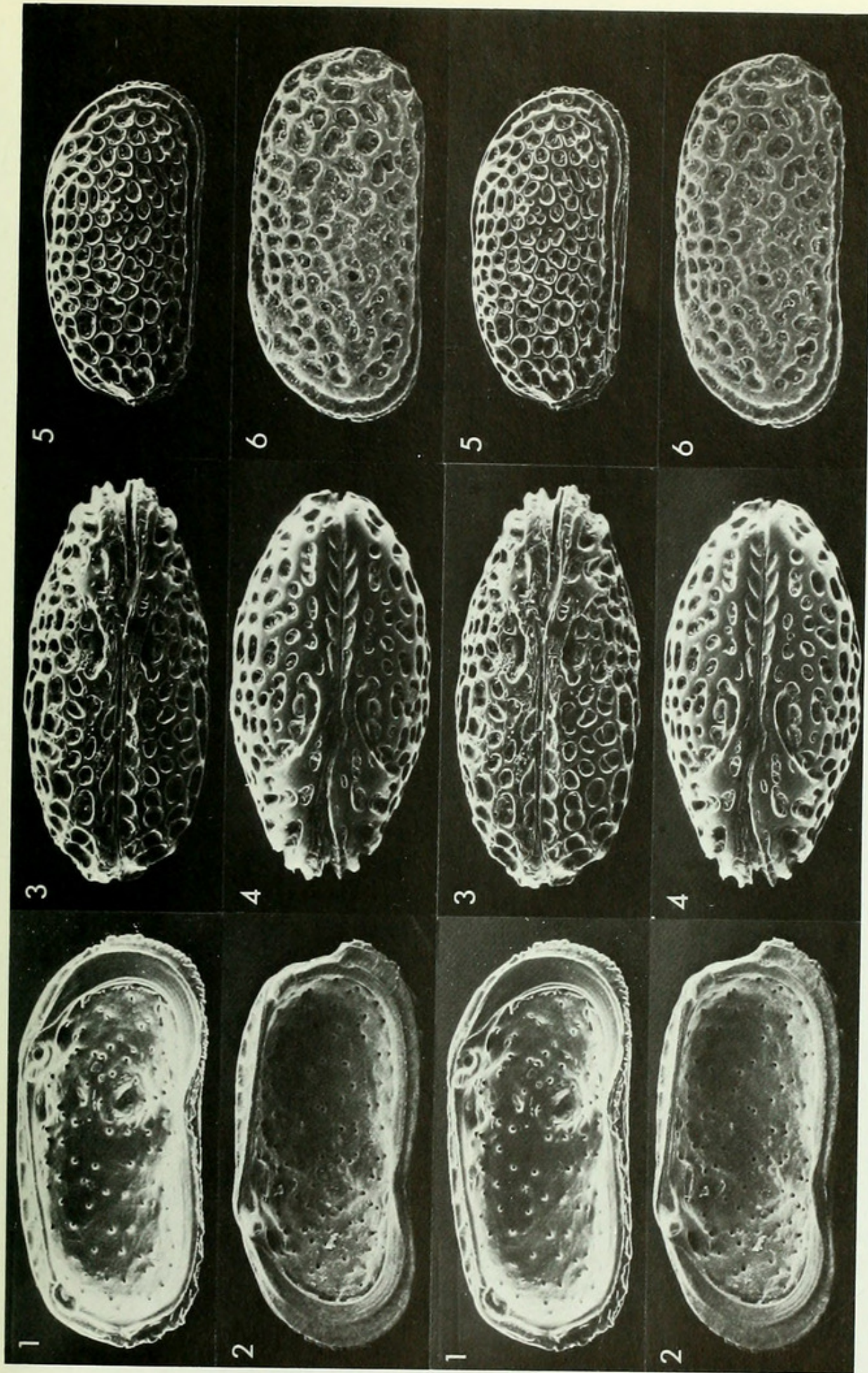






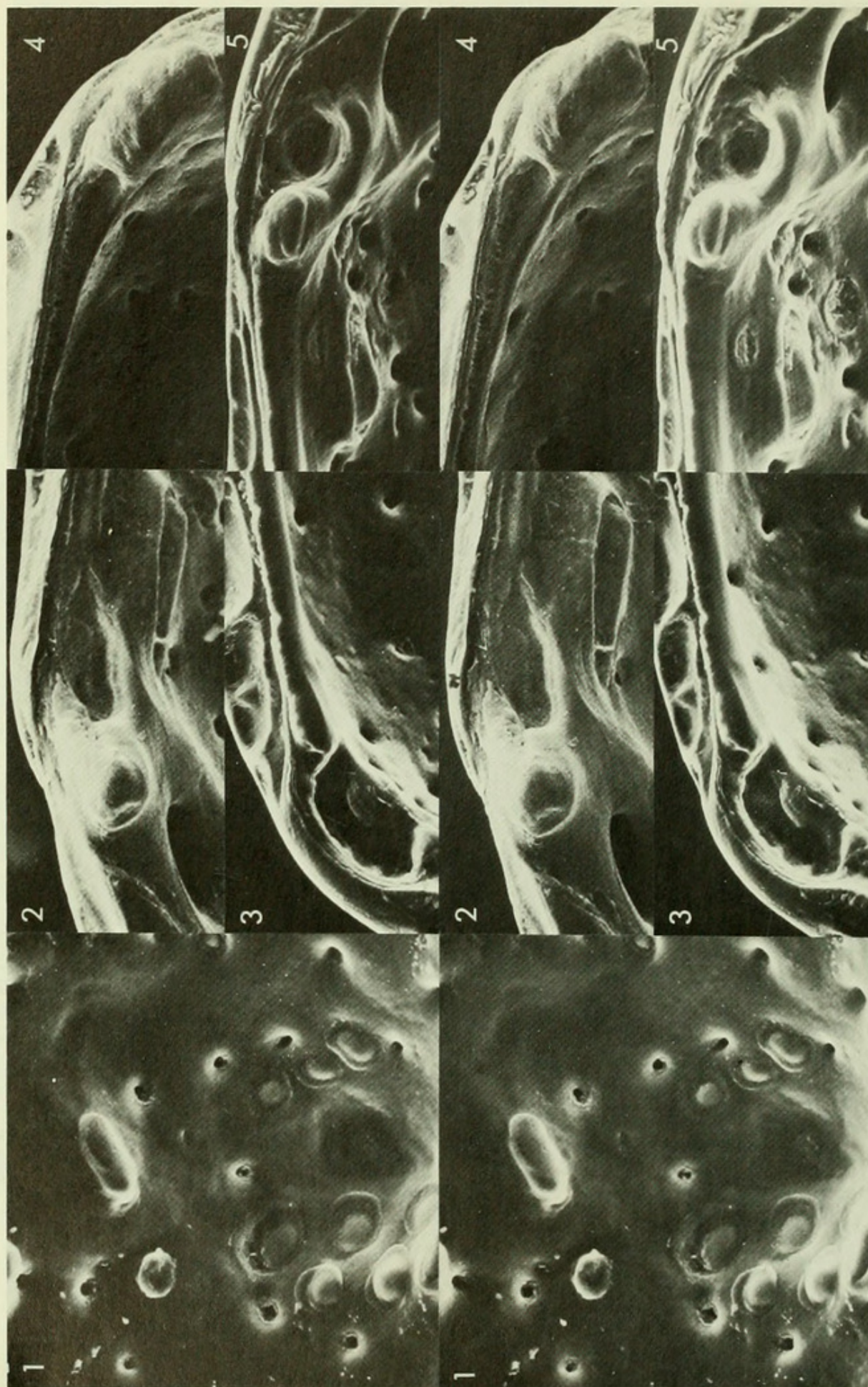
**Plate 2** *Urocysthereis britannica* sp. nov. ( $\times 64$ ). **Fig. 1** holotype, ♂ LV; B.M.(N.H.) no. 1976.1041;  
**Fig. 2** ? ♀ RV; B.M.(N.H.) no. 1976.1042; **Fig. 3** holotype, ♂ RV; B.M.(N.H.) no. 1976.1041;  
**Fig. 4** ♂ RV; B.M.(N.H.) no. 1976.1043; **Fig. 5** ♂ RV; B.M.(N.H.) no. 1976.1044; **Fig. 6** ♀ RV;  
 B.M.(N.H.) no. 1976.1045. (All figures are stereo-pairs.)





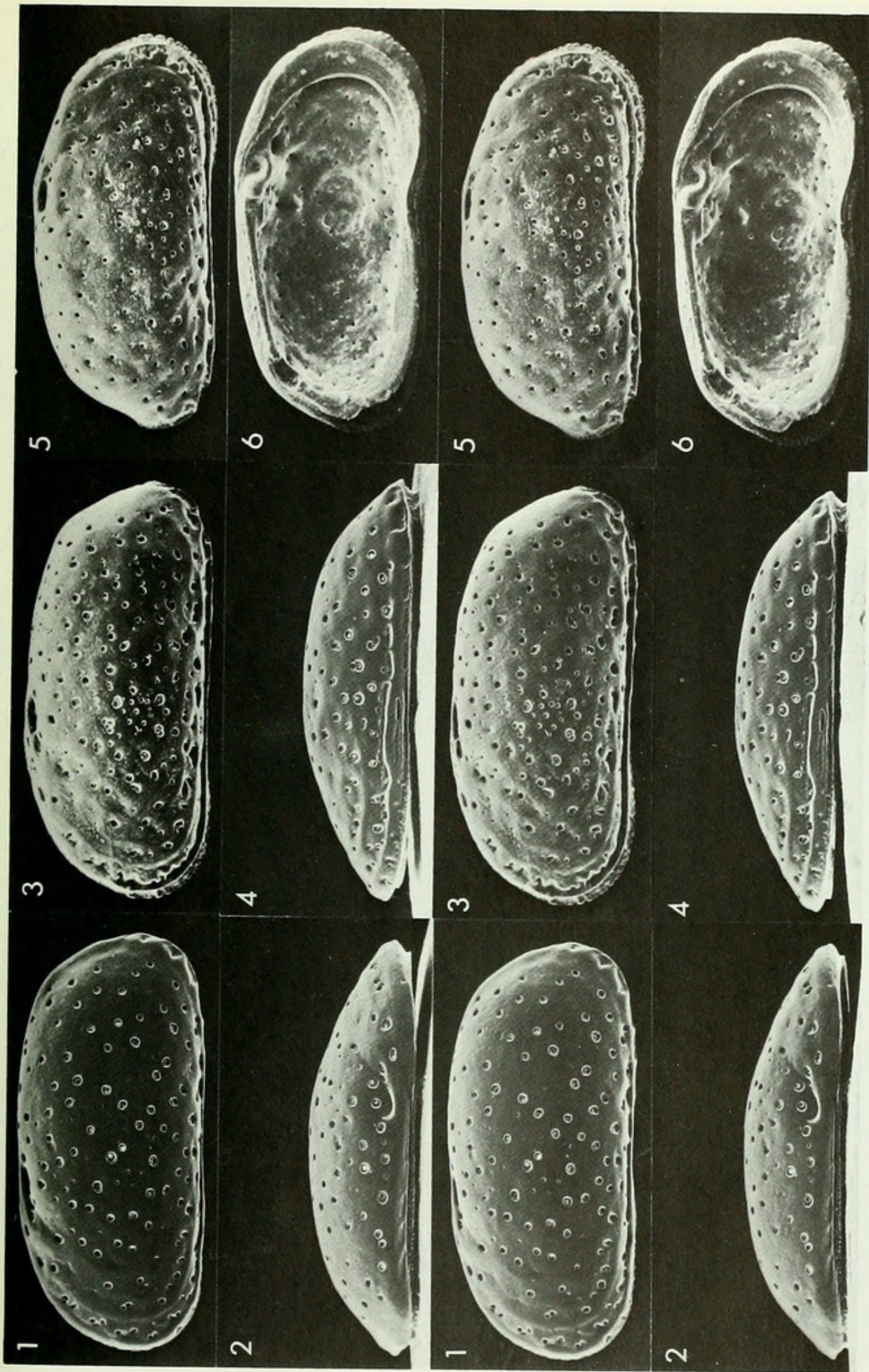
**Plate 3** *Urocythereis britannica* sp. nov. ( $\times 64$ ). **Fig. 1** ♂ LV; B.M.(N.H.) no. 1976.1046; **Fig. 2** ♂ RV; B.M.(N.H.) no. 1976.1047; **Fig. 3** ♂ dorsal carapace; B.M.(N.H.) no. 1976.1048; **Fig. 4** ♀ dorsal carapace; B.M.(N.H.) no. 1976.1049; **Fig. 5** juvenile (– 1) RV; B.M.(N.H.) no. 1976.1050; **Fig. 6** ? sex LV; B.M.(N.H.) no. 1976.1051. (All figures are stereo-pairs.)





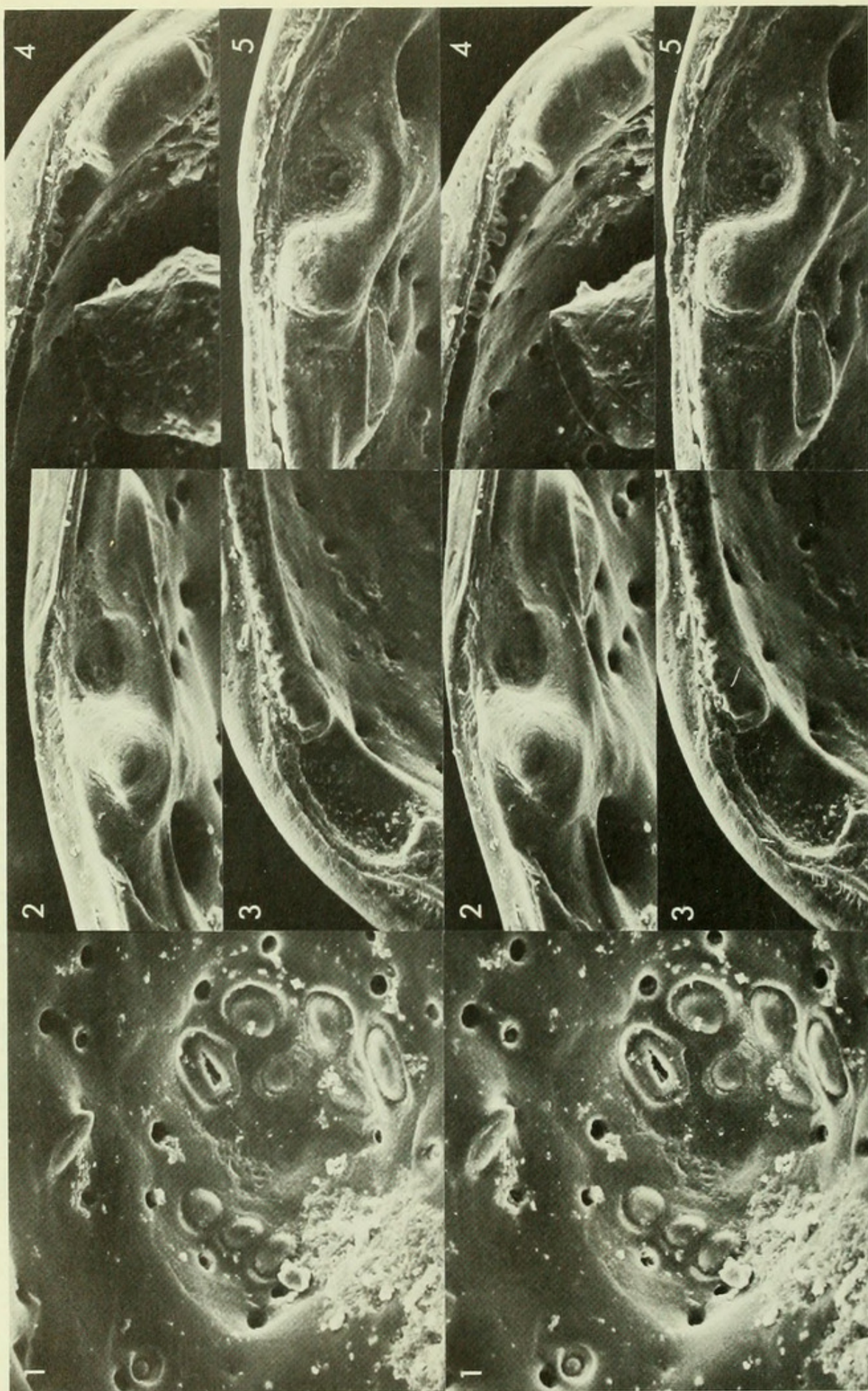
**Plate 4** *Urocythereis britannica* sp. nov. **Fig. 1** ♂ LV muscle scars; B.M.(N.H.) no. 1976.1052 ( $\times 255$ ); **Figs 2, 4** ♂ RV, terminal hinge elements; B.M.(N.H.) no. 1976.1047 ( $\times 218$ ); **Figs 3, 5** ♂ LV, terminal hinge elements; B.M.(N.H.) no. 1976.1046 ( $\times 218$ ). (All figures are stereo-pairs.)





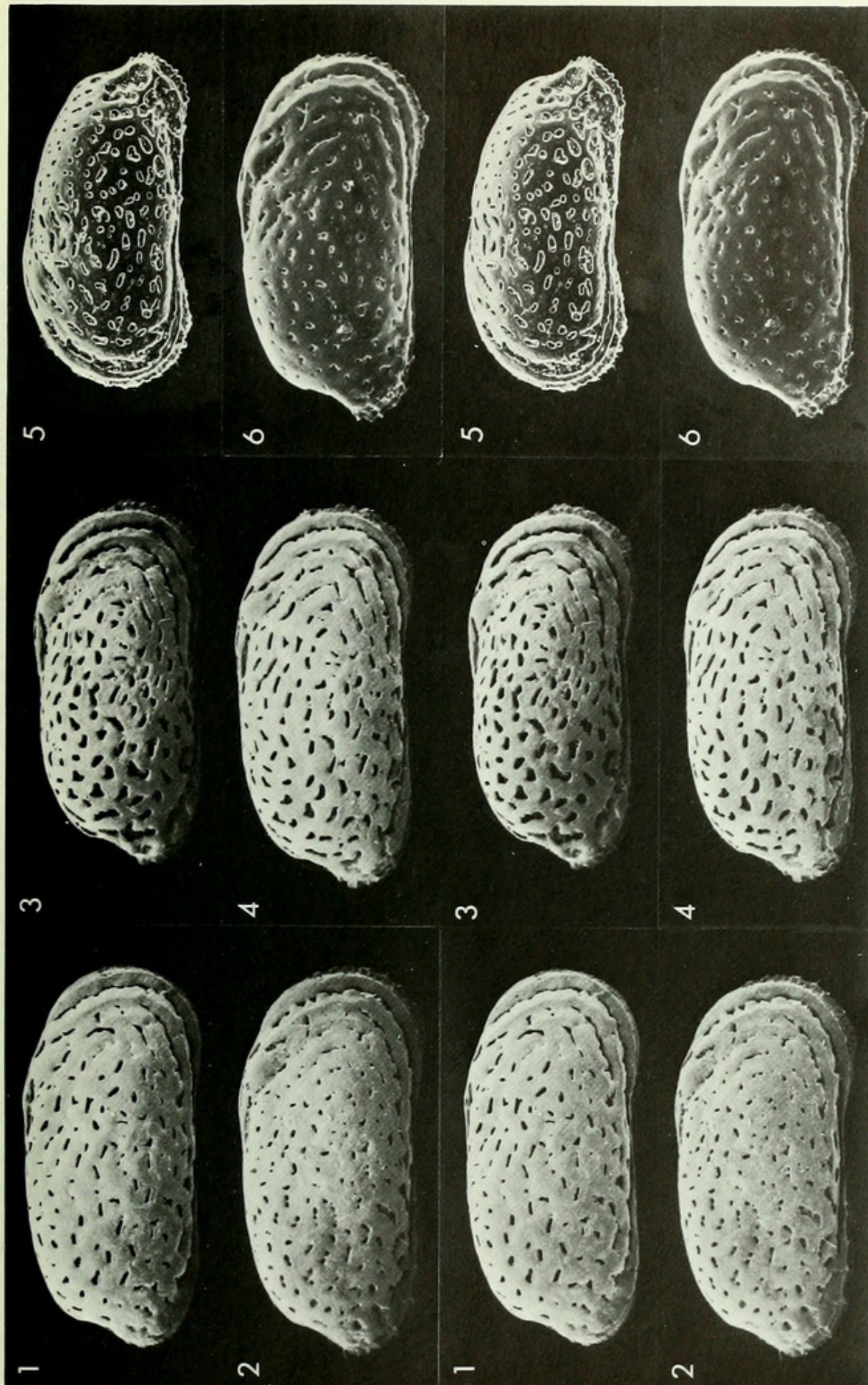
**Plate 5** *Urocythereis colum* sp. nov. ( $\times 66$ ). **Fig. 1** holotype, ♂ LV; B.M.(N.H.) no. 1976.1066; **Fig. 2** holotype, ♂ dorsal LV; B.M.(N.H.) no. 1976.1066; **Fig. 3** ? sex LV; B.M.(N.H.) no. 1976.1067; **Fig. 4** holotype, ♂ ventral LV; B.M.(N.H.) no. 1976.1066; **Fig. 5** ? sex RV; B.M.(N.H.) no. 1976.1068; **Fig. 6** ? ♂ LV; B.M.(N.H.) no. 1976.1069. (All figures are stereo-pairs.)





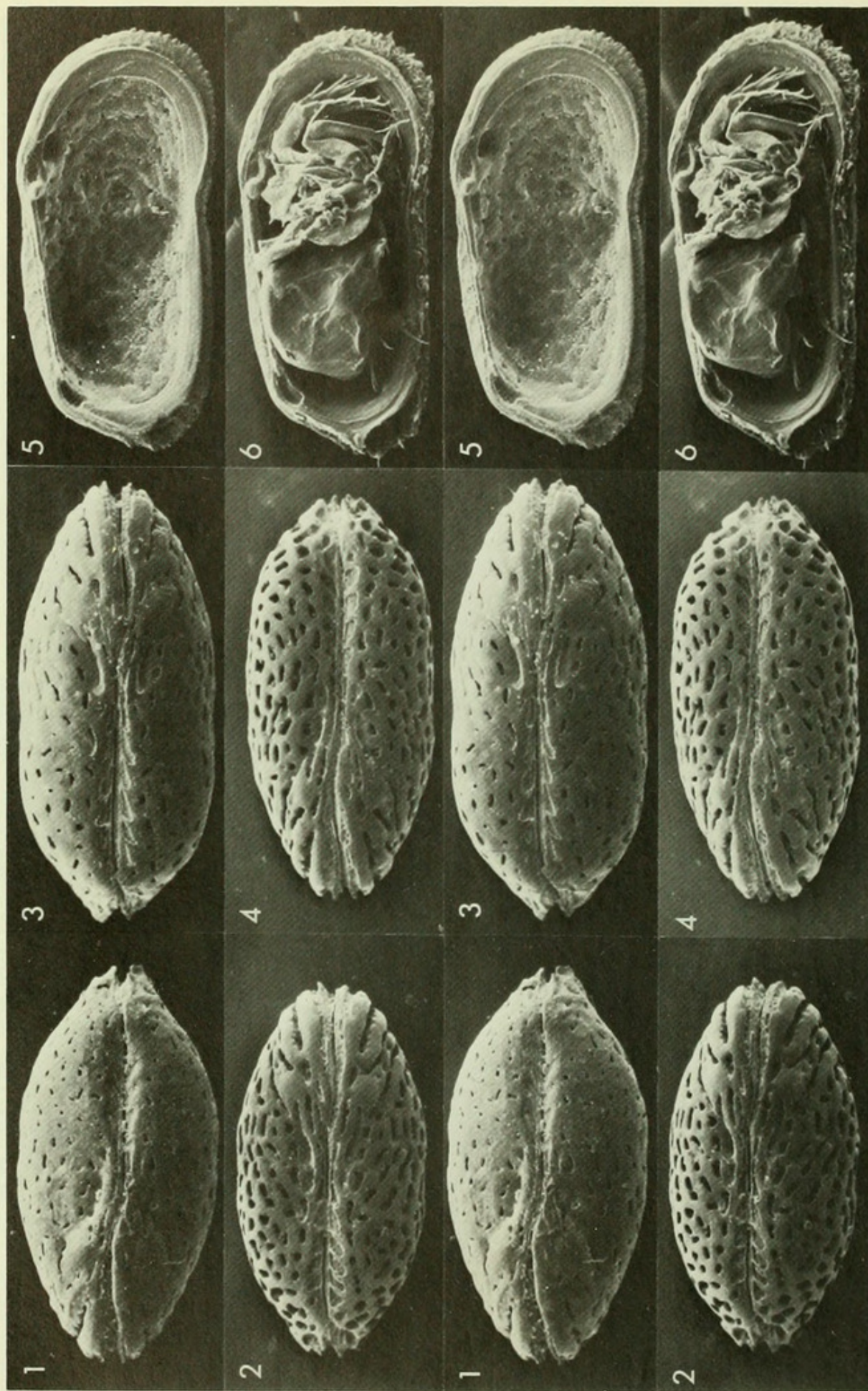
**Plate 6** *Urocythereis colum* sp. nov. **Fig. 1** ♀ LV, muscle scars; B.M.(N.H.) no. 1976.1070 ( $\times 270$ ); **Figs 2, 4** ♀ RV, terminal hinge elements; B.M.(N.H.) no. 1976.1070 ( $\times 255$ ); **Figs. 3 5** ? ♂ LV, terminal hinge elements; B.M.(N.H.) no. 1976.1069 ( $\times 255$ ). (All figures are stereo-pairs.)





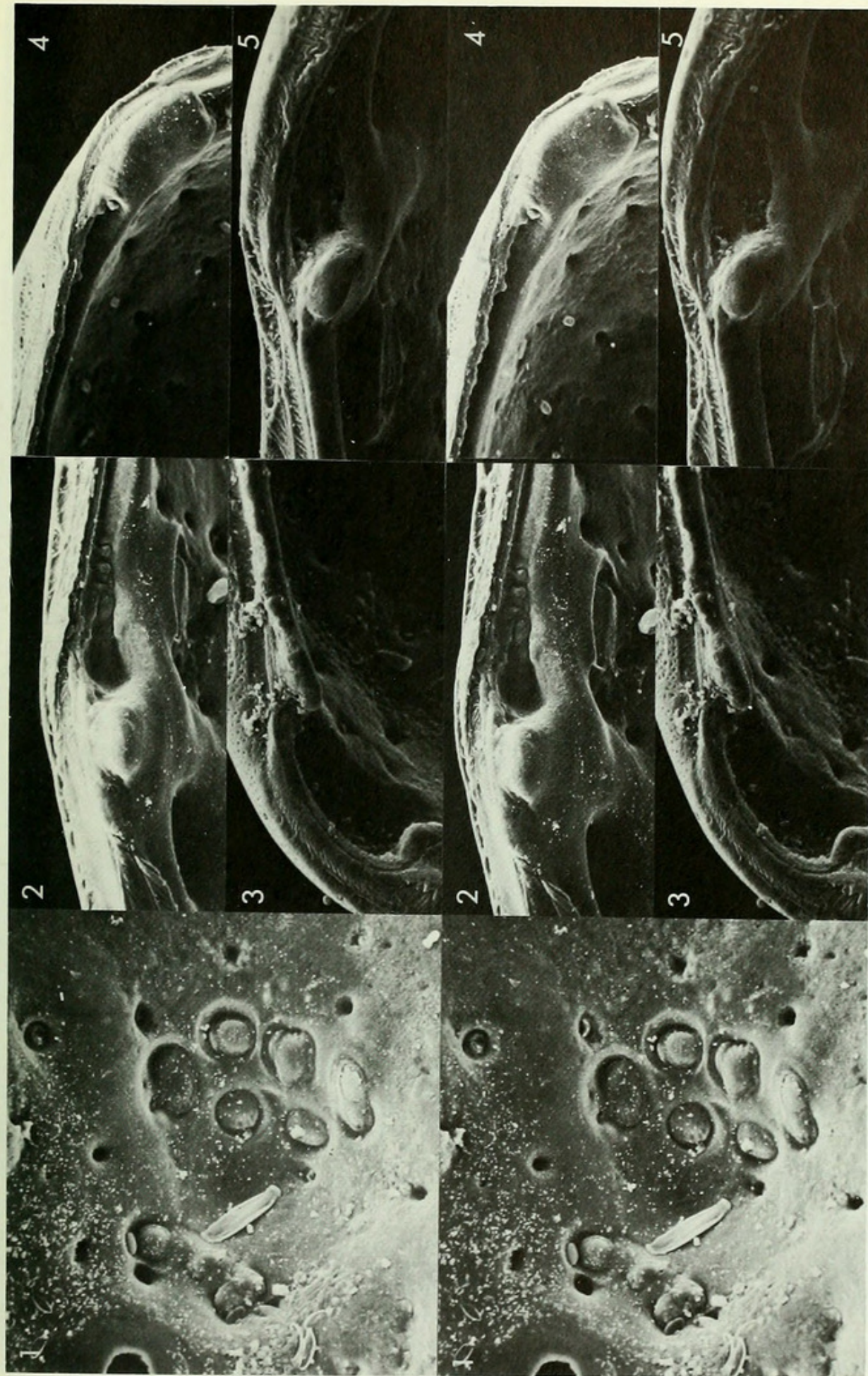
**Plate 7** *Urocythereis distinguenda* (Neviani) ( $\times 60$ ). **Fig. 1** ♂ RV; B.M.(N.H.) no. 1976.1026; **Fig. 2** ♂ RV; B.M.(N.H.) no. 1976.1027; **Fig. 3** ♂ RV; B.M.(N.H.) no. 1976.1028; **Fig. 4** ♂ RV; B.M.(N.H.) no. 1976.1029; **Fig. 5** juvenile - 1 LV; B.M.(N.H.) no. 1976.1030; **Fig. 6** neotype, ♀ RV; B.M.(N.H.) no. 1976.1031. (All figures are stereo-pairs.)





**Plate 8** *Urocythereis distinguenda* (Neviani) ( $\times 60$ ). **Fig. 1** ♀ dorsal carapace; B.M.(N.H.) no. 1976.1032; **Fig. 2** ♀ dorsal carapace; B.M.(N.H.) no. 1976.1033; **Fig. 3** ♂ dorsal carapace; B.M.(N.H.) no. 1976.1034; **Fig. 4** ♂ dorsal carapace; B.M.(N.H.) no. 1976.1035; **Fig. 5** ♀ LV; B.M.(N.H.) no. 1976.1036; **Fig. 6** ♂ LV and soft parts; B.M.(N.H.) no. 1976.1037. (All figures are stereo-pairs.)





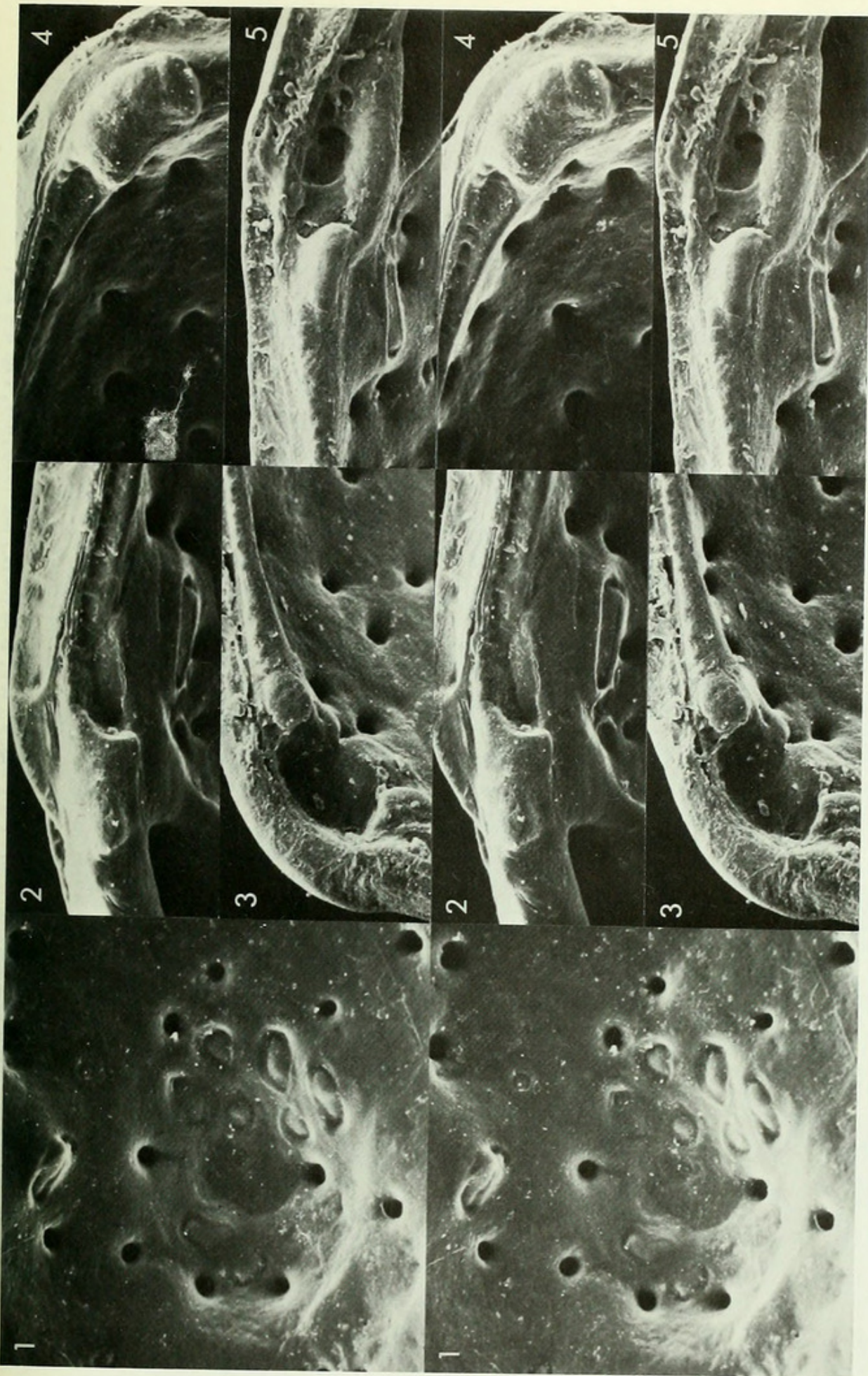
**Plate 9** *Urocythereis distinguenda* (Neviani). Fig. 1 ♂ RV, muscle scars; B.M.(N.H.) no. 1976.1038 ( $\times 290$ ); Figs 2, 4 ♂ RV, terminal hinge elements; B.M.(N.H.) no. 1976.1038 ( $\times 245$ ); Figs 3, 5 ♂ LV, terminal hinge elements; B.M.(N.H.) no. 1976.1040 ( $\times 245$ ). (All figures are stereo-pairs.)





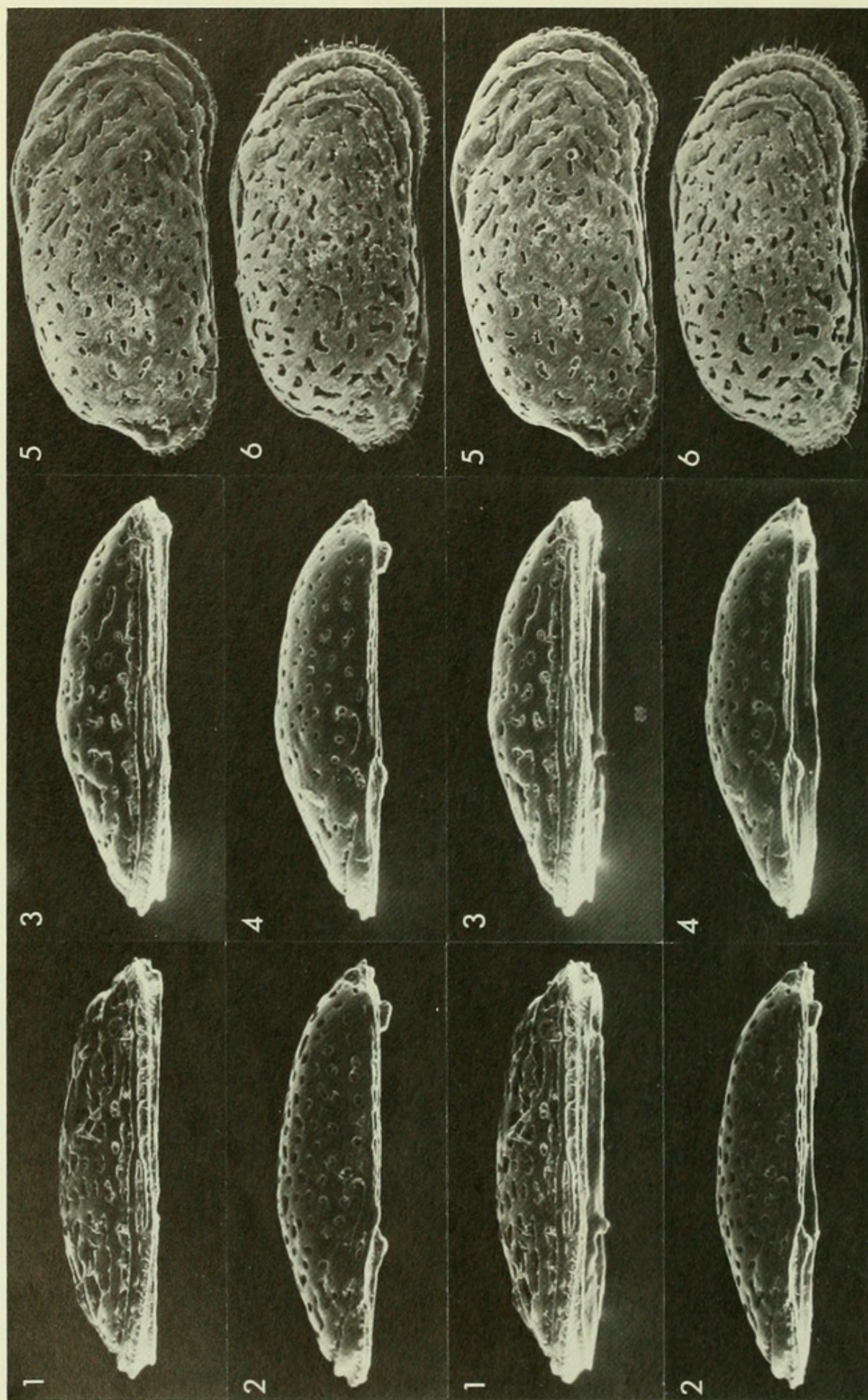
**Plate 10** *Urocythereis flexicauda* Bonaduce, Ciampo & Masoli ( $\times 76$ ). **Fig. 1** ? ♀ RV; B.M.(N.H.) no. 1976.1054; **Fig. 2** ? ♀ RV; B.M.(N.H.) no. 1976.1055; **Fig. 3** ? ♂ LV; B.M.(N.H.) no. 1976.1056; **Fig. 4** ? ♂ ventral carapace; B.M.(N.H.) no. 1976.1057; **Fig. 5** ? ♀ LV; B.M.(N.H.) no. 1976.1055; **Fig. 6** ? ♀ RV; B.M.(N.H.) no. 1976.1058. (All figures are stereo-pairs.)





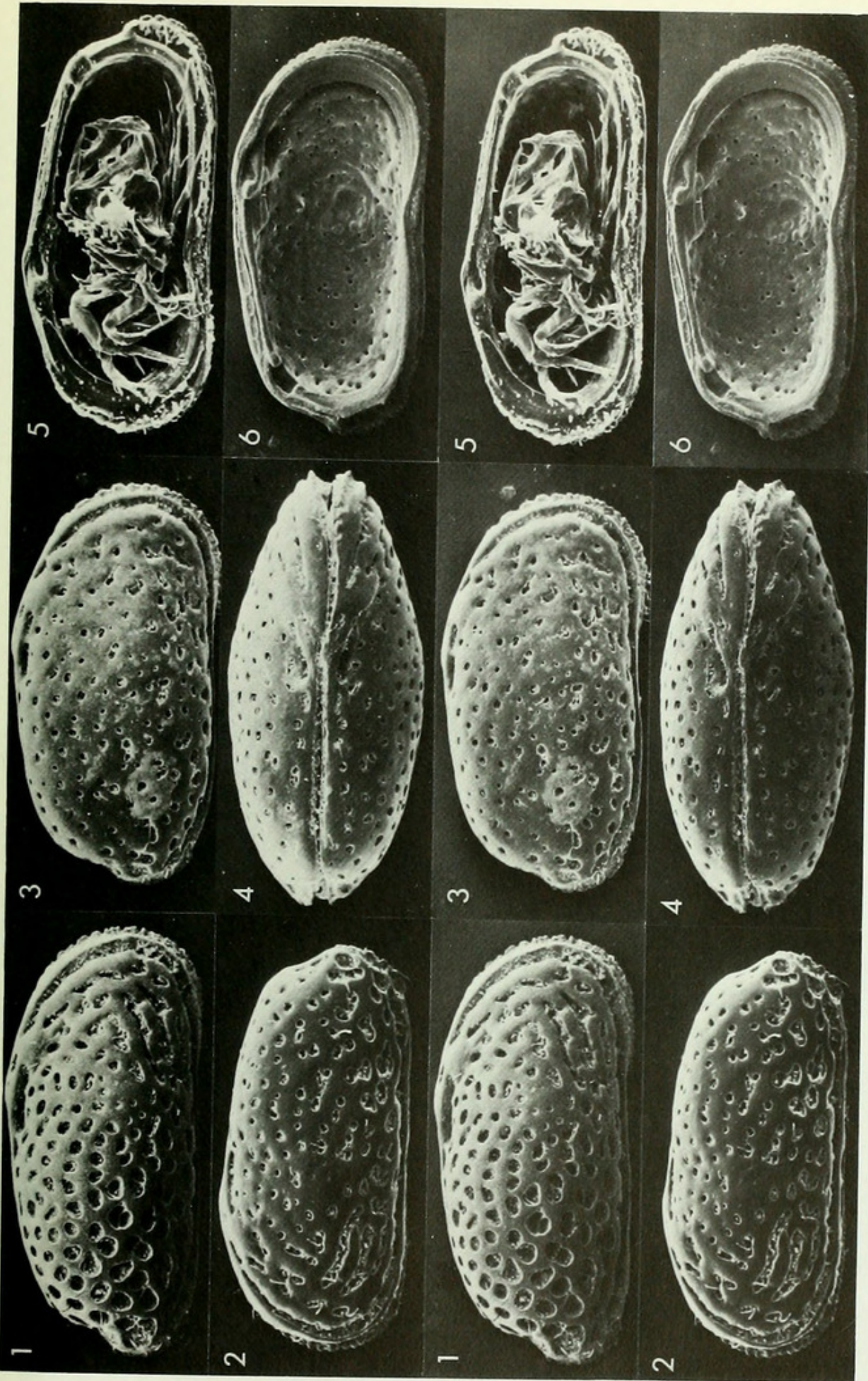
**Plate 11** *Urocythereis flexicauda* Bonaduce, Ciampo & Masoli. **Fig. 1** ? ♀ RV muscle scars; B.M.(N.H.) no. 1976.1055 ( $\times 290$ ); **Figs 2, 4** ? ♀ RV, terminal hinge elements; B.M.(N.H.) no. 1976.1058 ( $\times 276$ ); **Figs 3, 5** ? ♀ LV, terminal hinge elements; B.M.(N.H.) no. 1976.1055 ( $\times 276$ ). (All figures are stereo-pairs.)





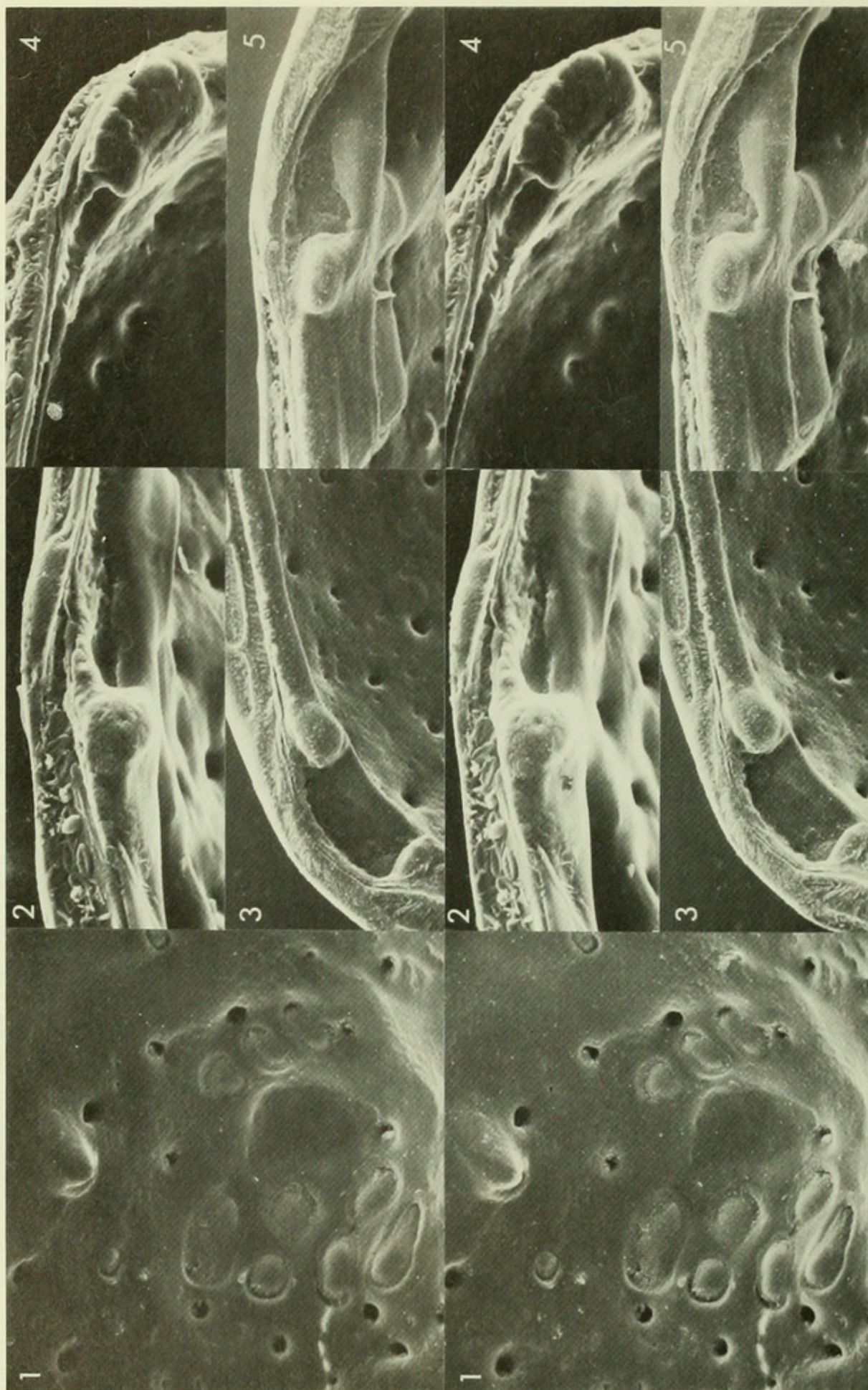
**Plate 12** *Urocythereis margaritifera* (Müller) ( $\times 67$ ). **Fig. 1**  $\delta$  ventral LV; Müller collection no. 9296 (f); **Fig. 2**  $\delta$  dorsal RV; Müller collection no. 9296 (f); **Fig. 3**  $\delta$  ventral LV; Müller collection no. 9296 (g); **Fig. 4**  $\delta$  dorsal RV; Müller collection no. 9296 (g).  
*Urocythereis distinguenda* (Neviani) ( $\times 60$ ). **Fig. 5**  $\delta$  RV; B.M.(N.H.) no. 1976.1039; **Fig. 6**  $\delta$  LV; B.M.(N.H.) no. 1976.1074. (All figures are stereo-pairs.)





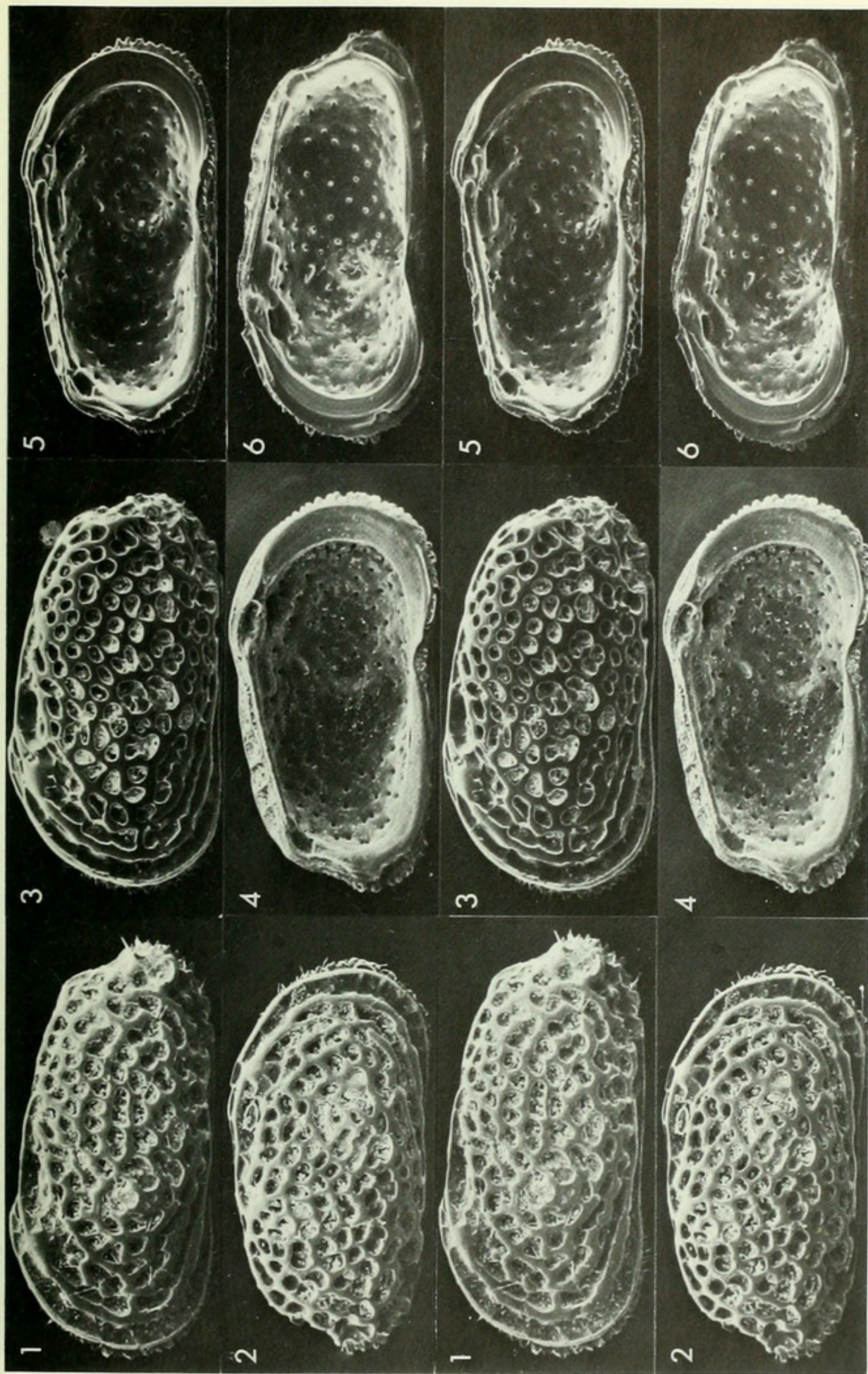
**Plate 13** *Urocys thereis margaritifera* (Müller) ( $\times 67$ ). **Fig. 1** ♂ RV; Müller collection no. 9296 (a); **Fig. 2** lectotype, ♂ LV; Müller collection no. 9296 (b); **Fig. 3** ♀ RV; Müller collection no. 9296 (c); **Fig. 4** ♂ dorsal carapace; Müller collection no. 9296 (d); **Fig. 5** lectotype, ♂ RV and soft parts; Müller collection no. 9296 (b); **Fig. 6** ♀ LV; Müller collection no. 9296 (e). (All figures are stereo-pairs.)





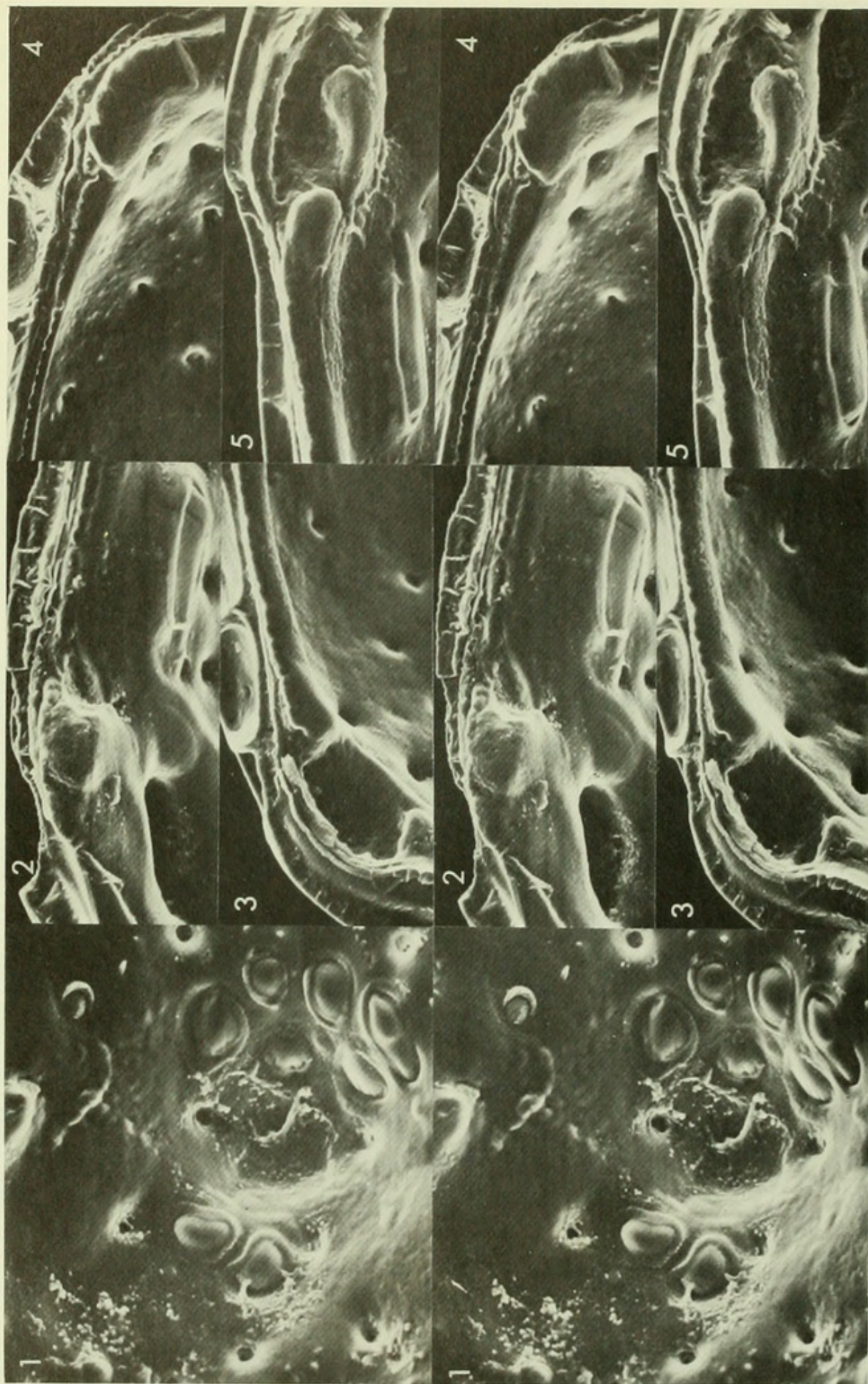
**Plate 14** *Urocythereis margaritifera* (Müller). **Fig. 1** ♀ LV muscle scars; Müller collection no. 9296 (e) ( $\times 255$ ); **Figs 2, 4** ♂ RV, terminal hinge elements; Müller collection no. 9296 (f) ( $\times 230$ ); **Figs 3, 5** ♀ LV, terminal hinge elements; Müller collection no. 9296 (e) ( $\times 230$ ). (All figures are stereopairs.)





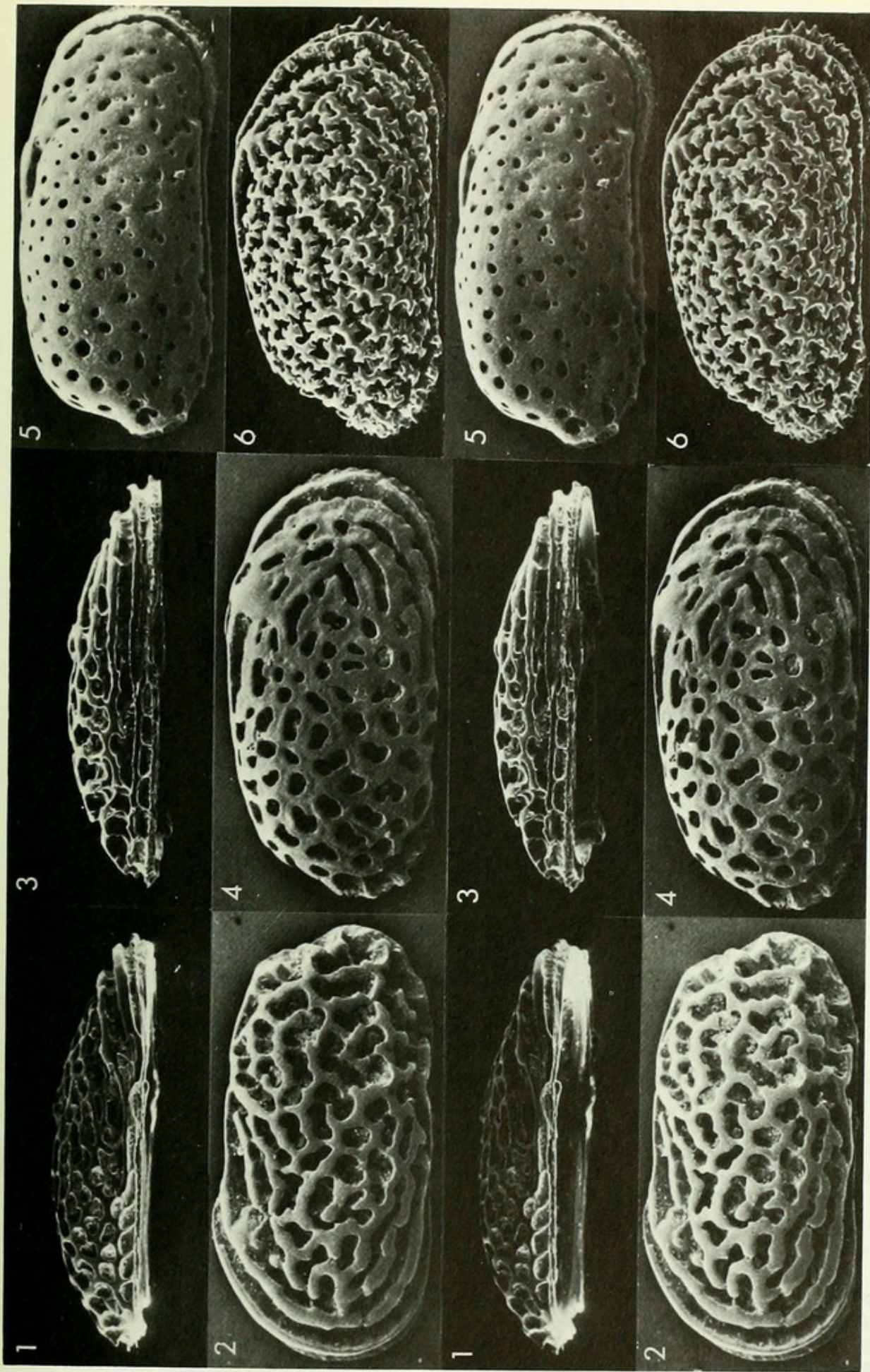
**Plate 15** *Urocythereis neapolitana* sp. nov. ( $\times 60$ ). **Fig. 1** ♂ LV; B.M.(N.H.) no. 1976.1059; **Fig. 2** ♀ RV; B.M.(N.H.) no. 1976.1060; **Fig. 3** ♀ LV; B.M.(N.H.) no. 1976.1061; **Fig. 4** ♀ LV; B.M.(N.H.) no. 1976.1062; **Fig. 5** holotype, ♂ LV; B.M.(N.H.) no. 1976.1063; **Fig. 6** holotype, ♂ RV; B.M.(N.H.) no. 1976.1063. (All figures are stereo-pairs.)





**Plate 16** *Urocythereis neapolitana* sp. nov. **Fig. 1** ♂ RV, muscle scars; B.M.(N.H.) no. 1976.1063 ( $\times 290$ ); **Figs 2, 4** holotype, ♂ RV, terminal hinge elements; B.M.(N.H.) no. 1976.1063 ( $\times 232$ ); **Figs 3, 5** holotype, ♂ LV, terminal hinge elements; B.M.(N.H.) no. 1976.1063 ( $\times 232$ ). (All figures are stereo-pairs.)





**Plate 17** Fig. 1 *Urocythereis neapolitana*; ♂ LV, dorsal; B.M.(N.H.) no. 1976.1064 ( $\times 60$ ); Fig. 2 *Urocythereis* sp.; ? sex LV; B.M.(N.H.) no. 1976.1073 ( $\times 59$ ); Fig. 3 *Urocythereis neapolitana*; ♂ RV, ventral; B.M.(N.H.) no. 1976.1065 ( $\times 60$ ); Fig. 4 *Urocythereis* sp.; ? sex RV; B.M.(N.H.) no. 1976.1071 ( $\times 59$ ); Fig. 5 *Urocythereis* sp.; ? sex RV; B.M.(N.H.) no. 1976.1072 ( $\times 59$ ); Fig. 6 *Urocythereis phantastica* Athersuch & Ruggieri; ♀ LV; B.M.(N.H.) no. 1974.755 ( $\times 63$ ); Figs 2, 4 and 5 are from a single sample of beach sand from Tripoli, Libya. No specific assignment has been made as the material consists of only a few valves and carapaces without soft-parts. However, Figs 2 and 4 are probably variants of the same species. (All figures are stereo-pairs.)



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