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Kunihirella, a new marine ostracod genus (Podocopa, Cytheruridae) from the Early Pliocene of Eraclea Minoa (Sicily)

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SUMMARY – *Kunihirella* n. g. (type-species *K. eracleaensis* n. sp.) of the Eraclea Minoa Trubi Formation (Southern Sicily, Italy) is erected from the Early Pliocene. A second species, previously attributed to *Swainocythere Ishizaki*, 1981, is considered to pertain to the proposed new genus.

RIASSUNTO – [*Kunihirella*, un nuovo genere di ostracode marino (Podocopa, Cytheruridae) – Si istituisce il nuovo genere *Kunihirella*, specie-tipo *K. eracleaensis* n. sp., dal Pliocene basale della Formazione Trubi di Eraclea Minoa (Sicilia meridionale, Italia). Una seconda specie, precedentemente attribuita a *Swainocythere Ishizaki*, 1981, è considerata appartenere al proposto nuovo genere.

INTRODUCTION

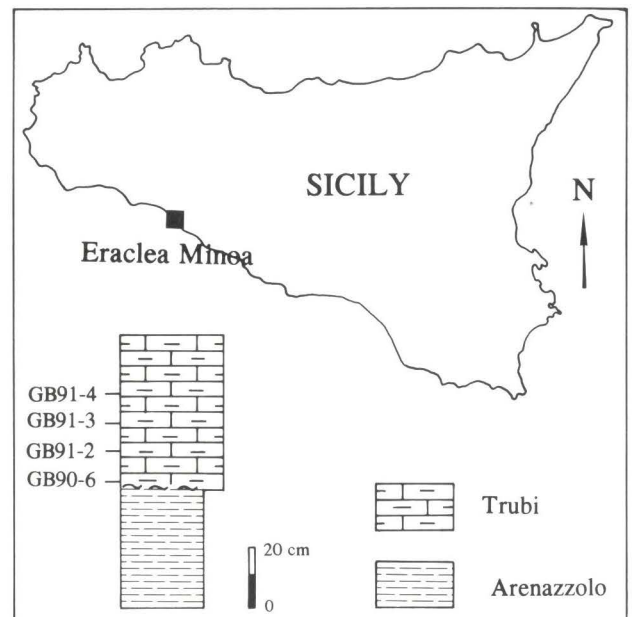
During the study of the ostracod fauna of the Pliocene of Southern Sicily in the area between Eraclea Minoa and Porto Empedocle we collected a certain number of samples at Eraclea Minoa (Text-fig. 1) at the extreme western end of the beach of Capo Bianco where just above the sea level the top part of Arenazzolo Formation (Late Messinian) followed in disconformity by some 40 m of the Trubi Formation (Early Pliocene) outcrop. The section has been sampled from the base up to about 2 m. The contact between Arenazzolo and Trubi is abrupt.

The samples collected just above the contact Arenazzolo-Trubi (Text-fig. 1) for a thickness of about 30 cm yielded an ostracod fauna constituted by species of *Argilloecia*, *Krithe* and *Paijenborchella* and abundant specimens of *Kunihirella eracleaensis* n. sp. which is proposed as type-species of the new genus *Kunihirella*. This assemblage is contaminated by brackish-freshwater genera (eg. *Cyprideis*, *Loxoconcha*, *Candona*, *Metocythere* and *Amnicythere*) reworked from the underlying Arenazzolo.

From the study of some samples collected above in same section, *Kunihirella eracleaensis* n. sp. seems to disappear.

KUNIHIRELLA new genus

Etymology – After Dr. Kunihiro Ishizaki for his contribution to the knowledge of the ostracods of Japan.



Text-fig. 1 - Eraclea Minoa: location, lithostratigraphy and samples position with *Kunihirella eracleaensis* n. sp.

Type-species – *Kunihirella eracleaensis* n. sp.

Diagnosis – A genus pertaining to the family Cytheruridae G. W. Müller, 1894 characterized by valves mytiloid in lateral view with acuminate well developed caudal process; valves hill-tapering anteriorly with maximum height anterior; valves more or less ornamented; eye-tubercle absent; inner

lamella well developed with defined anterior vestibule; hinge lophodont characterized in the LV by a socket at each extremity (posterior rectangular and anterior suboval), bar with numerous denticles in the second half and 2 - 3 denticles at the anterior extremity. Both extremities of the bar are enlarged. Corresponding characters in the RV. In dorsal view anterior and posterior very flattened and acuminate. Right valve overlapping the left except anterodorsally where the overlapping is reversed. Size small.

Affinities – Some genera appear closely related to *Kunihirella* n. gen. as far as the external characters are concerned. We compared the internal characters and some external ones of the proposed new genus with the following similar genera: *Paijenborchellina* Kuznetsova, 1957, *Nipponocythere* Ishizaki, 1971, *Gibboborchella* Gründel, 1976, *Swainocythere* Ishizaki, 1981, *Flexuocythere* Ciampo, 1986 and *Heinia* van den Bold, 1985.

A short description of some internal and external characters of the cited genera is given below, together with comments on their systematics. They are summarized in Tab. 1, to allow a more direct comparison.

Paijenborchellina [type-species *P. excelens* Kuznetsova, 1957] – Absence of anterior vestibule, hinge close to that of *Cytheropteron* Sars, 1866. From the original drawings of Kuznetsova (1957) the median element of the hinge appears all along strongly denticulated. Frontal muscle-scar roundish. Presence of transversal furrow. Ornamentation constituted by small pits, ribs and/or reticulation; presence of a small eye-tubercle (*vide* Reymont, 1963).

Nipponocythere [type-species *N. asamushiensis* Ishizaki, 1971, junior synonym of *N. bicarinata* (Brady, 1880) *vide* Hanai et al., 1977] – Hinge gongylodont, very thin, with (LV) anterior tooth lightly dented downward, median element smooth and thickened posteriorly, posterior socket with a small tooth near its anterior end. Anterior marginal zone with rather broad vestibule.

Gibboborchella [type-species *G. kuznetsovai* (Omatsola, 1969)] – Anterior inner lamella relatively reduced and parallel to the margin, anterior vestibule absent; median furrow absent. Hinge as in *Paijenborchellina* (all characters *vide* Gründel, 1976). Size relatively large.

Swainocythere [type-species *S. chejudoensis* Ishizaki, 1981] – Hinge lophodont with (LV) anterior and posterior sockets small and smooth, median element thickening at the extremities towards which it becomes more coarsely crenulate. Anterior marginal zone without vestibule (Ishizaki 1993, personal communication). Presence of ridges and of the «hill, tapering anteriorly».

Flexuocythere [type-species *F. parva* (Colalongo & Pasini, 1980)] – Ciampo (1986) proposed «*Buntonia*» *parva* as type-species of *Flexuocythere*, species with internal characters badly defined. In fact Colalongo & Pasini (1980) have not been able to describe in detail the hinge; they suggest doubtfully the presence of an anterior vestibule and describe a vertical row of 5 adductor muscle-scars. Because of the insufficient data on the internal characters of the cited species further data should be requested to validate or not this genus.

Ciampo (1986) attributes to this genus also *F. colalongoae* n. sp. In the original diagnosis of *Flexuocythere* n. gen., based on the characters of *F. colalongoae* (and not on that of the type-species) Ciampo describes an amphidont – heterodont hinge with (LV) anterior round socket followed by delicately crenulated median element and posterior socket large and open towards the exterior; anterior marginal zone with narrow and elongated vestibule and muscle-scars constituted by a vertical row of 4 scars.

Ciampo allowed the utilization of his original material (holotype and paratypes) to study in greater detail the hinge structure of *F. colalongoae*. From the SEM pictures (Pl. 1, figs. 13, 14) it appears evidently gongylodont with median element smooth.

The presence of an anterior vestibule, 4 vertical

genus	anterior vestibule	hinge	hinge median element	additional data
<i>Paijenborchellina</i>	absent	entomodont	strongly denticulated	transversal furrow
<i>Gibboborchella</i>	absent	entomodont	crenulate at extremities	anterior lamella reduced
<i>Swainocythere</i>	absent	lophodont	crenulate	hill, tapering anteriorly
<i>Nipponocythere</i>	present	gongylodont	smooth	anterior hearth-shaped scar
<i>Flexuocythere</i>	? present	? heterodont	unknown	5 vertical scars
<i>Heinia</i>	present	gongylodont	anterior faintly crenulate	anterior U-shaped scar
<i>Kunihirella</i>	present	lophodont	small teeth at extremities	hill, tapering anteriorly

Tab. 1 - Synthesis of the principal internal and some external characters of the compared genera (mostly based on type-species).

muscle-scars, the hinge characters and the general shape demonstrate that *Flexuocythere colalongoae* does not pertain to *Flexuocythere* but has to be attributed to *Nipponocythere*.

Heinia [type-species *H. howei* van den Bold, 1985] – As stated by van den Bold this genus has a gongylodont hinge with (LV) 2 anterior teeth separated by a socket, long median element ending posteriorly with a posterior socket which curves around a small tooth. The median element in the type-species is faintly crenulate anteriorly. Anterior marginal zone with broad vestibule. Central muscle-scars constituted by a subvertical row of 4 small scars preceded by a U – shaped frontal one.

Van den Bold states that *Heinia* differs from *Nipponocythere* due to «specimens of larger size, an anterior rim and ventral ridges».

Ayress & Corregge (1993) consider *Heinia* to be a junior synonym of *Nipponocythere* after the examination of the internal characters of type specimens. The differences between *Nipponocythere* and *Heinia*, that is the shape of the anterior muscle-scar and the median hinge-bar, seem to us not completely satisfying to keep the two genera separated. Until more convincing data are known we prefer to consider *Heinia* a junior synonym of *Nipponocythere*.

Differences – *Kunihirella* n. gen. differs from *Paijenborchellina* and *Gibboborchella* due to the presence of a more or less developed anterior vestibule and to the central part of the median hinge element, which appears smooth. Moreover it differs from *Paijenborchellina* due to the absence of the median vertical *sulcus*.

It differs from *Nipponocythere* due to the lophodont hinge instead than gongylodont, to the presence of a series of small teeth at the posterior half of the hinge – bar in the LV and to the presence of 2 - 3 similar teeth at its anterior extremity while *Nipponocythere* shows a smooth bar.

It differs from *Swainocythere* due to the presence of a large and deep anterior vestibule which is absent in *Swainocythere* (Ishizaki, 1993, personal comm.).

A synthesis of the more important characters of the cited genera is reported in table 1.

On the base of the previous definitions of *Kunihirella* n.g., *Swainocythere nanseni* (Joy & Clark, 1981) should be attributed to the proposed new genus.

The synonymy of this species is the following:

- 1977 *Cytheropteron ? nealei* JOY & CLARK, p. 141, pl. 1, figs. 8-11
(nec *Cytheropteron nealei*, Jain, 1975).
1981 *Cytheropteron nanseni* JOY & CLARK, p. 1108 (new name).

1992 *Swainocythere nanseni* (Joy & Clark) - CORREGGE, AYRESS & DRAPALA, pp. 107-110, pl. 19, figs. 1-5.

1995 *Kunihirella nanseni* (Joy & Clark). Present paper.

Remarks – Drapala & Ayress (1993) discuss quite extensively the differences between *Nipponocythere*, *Henia* and *Loxoconchidea*. They conclude that *Henia* is perhaps separable from *Nipponocythere* on the base of the enlarged upper 2 muscle - scars and that *Flexuocythere* is a junior synonym of *Nipponocythere*, of which they figure *N. colalongoae* (Ciampo, 1986).

We are not in agreement with them as far as their specific identification of *Nipponocythere colalongoae* is concerned.

In fact the original *F. colalongoae* (Pl. 1, fig. 12) shows an ornamentation constituted by well defined deep foveolae and along the anterior a series of short radial ridges. The ornamentation of the specimens figured by Drapala & Ayress shows a reticulation in the anterior and anteroventral areas and rare small foveolae mostly restricted to the central part of the valves. Moreover the radial ridges seem absent.

At specific level the form illustrated by Drapala & Ayress is in our opinion a new species for which formally we suggest the name *Nipponocythere drapalaensis* n. sp., selecting as holotype the specimen of figs. 1 a, b of Pl. 18 and paratypes the specimens of figs. 2 a, b of Pl. 18 and figs. 2 a, b of Pl. 20.

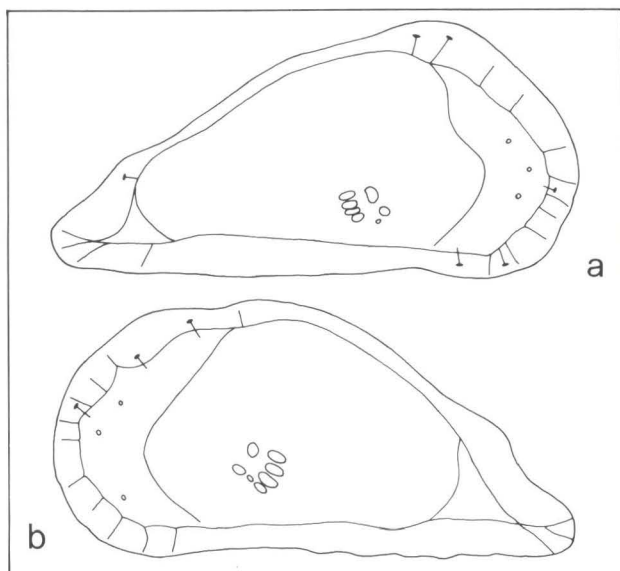
Ecological and paleoecological remarks – The proposed new genus (represented by *K. nanseni*) has been previously found in Recent sediments in the Central Arctic Ocean in water-depth between 1351 to 2810 m (Joy & Clark, 1977); in Australia, South - West Pacific and South - East Indian Ocean from the Late Pleistocene to Recent (Corregge *et al.*, 1992). Its occurrence in these areas shows a bathymetric range from 950 to 2793 m.

In the Mediterranean the genus, represented by *K. eracleaensis* n. sp., seems to occur only at the very base of the Pliocene (M Pl 1) and its ecological meaning has not been yet clearly defined even if the related ostracods assemblage seems to correspond to a deep-water environment. This bathymetrical interpretation seems supported by the depth distribution of the congeneric *K. nanseni*.

KUNIHIRELLA ERACLEAENSIS n. sp.

Pl. 1, figs. 1-11; text-fig. 2

Etymology – From the greek town Eraclea Minoa, Southern Sicily, place of finding.



Text-fig. 2 - *Kunihirella eracleaensis* n. sp. a) Left valve from inside, GB90-6, x 300, B.O.C. 2184; b) Right valve from inside, same specimen of Pl. 1, fig. 5, x 300, B.O.C. 2183. Transmitted light drawings done by Visopan Reichert.

Holotype - A left valve ♀ (Pl. 1, fig. 1). Stn. GB91-2. B.O.C. 2179.

Paratypes - Two carapaces and 3 valves, one of which figured (Pl. 1, fig. 2). B.O.C. 2180.

Age - Basal Pliocene.

Type-locality - Eraclea Minoa, Sicily, Capo Bianco locality, in samples collected at the western end of the beach, just above the contact Arenazzolo - Trubi Formation (text-fig. 1).

Repository - All the specimens figured are stored in the Bonaduce Ostracode Collection (B.O.C.), Department of Paleontology, University of Naples.

Description - A species of *Kunihirella* n. gen. characterized by the gently arched dorsal margin in

lateral view and the relatively short and subacuminate caudal process (Pl. 1, figs. 1-3). The RV overlaps the LV except in the antero-dorsal area where the LV with a peculiar elongate thickening overlaps the RV (Pl. 1, fig. 4). A narrow marginal rim runs parallel to the anterior margin except for the anterior area and the caudal process which appear smooth, the valves are covered by deep, medium sized rounded foveolae, arranged in the posterodorsal area in rows parallel to the margin. The ventral area is contoured by a subdued rope-like ridge, sometimes difficult to detect, which continue in a rib contouring the posterior and posterodorsal. A second rib occurs interiorly posterodorsally, parallel to the previous one. A series of longitudinal ribs are also present ventrally. Valves very flattened and smooth anteriorly. In dorsal view carapace acuminate at both the extremities and relatively inflated in the central part (Pl. 1, fig. 10).

Hinge - constituted in the LV (Pl. 1, figs. 7-9) by two smooth and relatively large and elongate sockets at the extremities open towards the interior. A number of small evident and well spaced dome-shaped teeth (7 - 8) are present at the posterior part of the bar which is thickened at the extremity; the same occurs at the anterior extremity of the bar with a reduced number of teeth (2 - 3); the remaining part of the bar appears smooth.

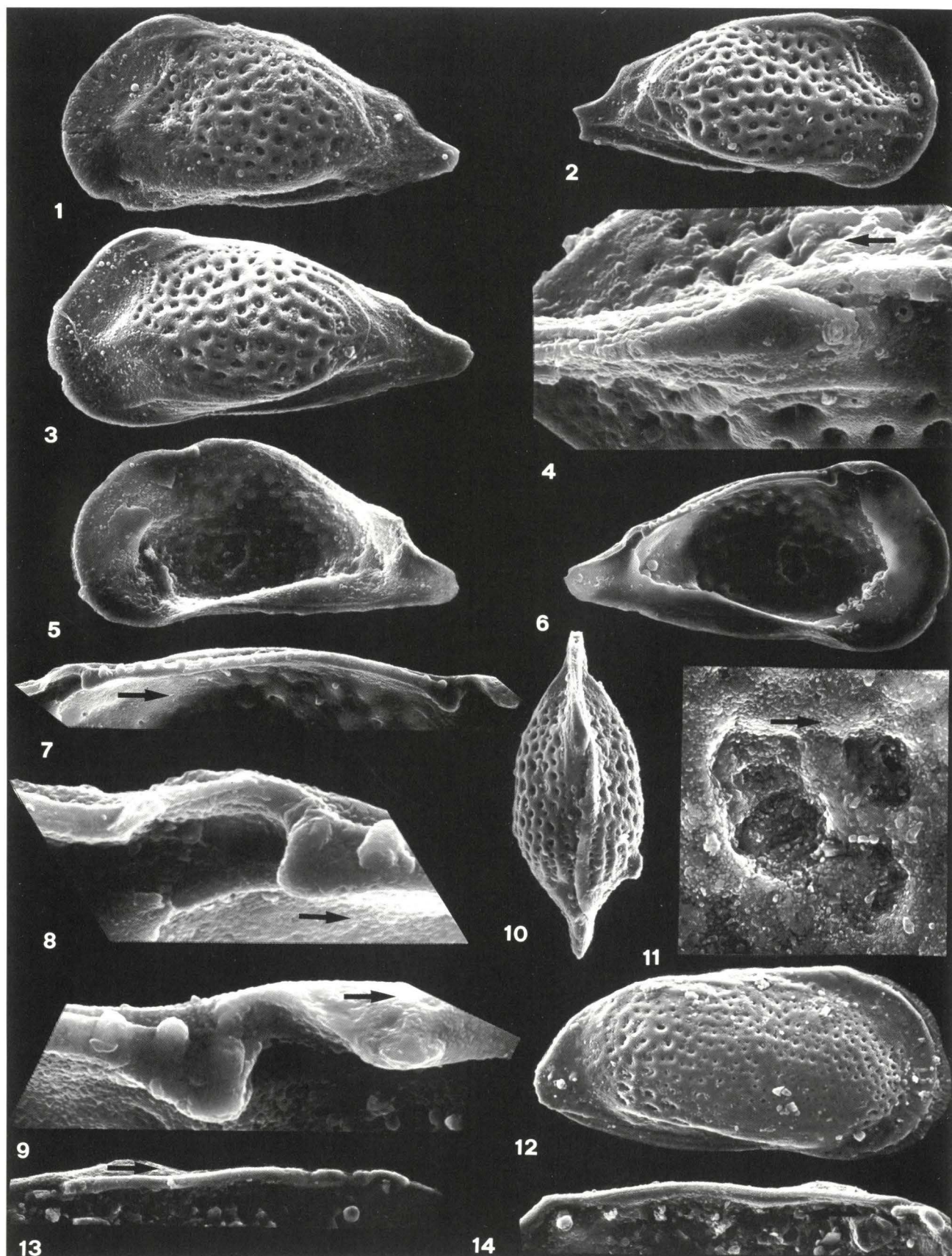
Inner lamella - very wide anteriorly running subparallel to the anterior margin (Pl. 1, figs. 5, 6; text-fig. 2) with a deep vestibule and line of concrescence parallel to the margin; marginal pore canals simple and short, very few above the mid-height and more numerous below (6 - 7). Few other false marginal pore-canals occur. Posterior vestibule relatively small and triangular.

Muscle scars - a subvertical row of 4 relatively small suboval scars, preceded by a subrounded anterior scar and anteroventrally by 2 not well defined mandibular scars (Pl. 1, fig. 11).

Size (in mm) - LV: L = 0.25; H = 0.12 (Pl. 1, fig. 1).
RV: L = 0.24; H = 0.13 (Pl. 1, fig. 2).

EXPLANATION OF PLATE 1

- Figs. 1-11 - *Kunihirella eracleaensis* n. sp. 1) Holotype, LV♀, Stn. GB91-2, x 248, B.O.C. 2179; 2) Paratype, RV, x 248, B.O.C. 2180; 3) LV♂, Stn. GB90-6, x 248, B.O.C. 2181; 4) Detail in DV of the overlapping of the LV on the RV of the specimen of fig. 10, x 995; 5) RV, internal view, Stn. GB90-6, x 248, B.O.C. 2183; 6) LV, internal view, x 248; 7) Hinge of left valve, x 454; 8) LV, posterior socket of the hinge, x 1603; 9) LV, anterior socket of the hinge, x 1816; 10) Carapace in DV, Stn. GB90-6, x 248, B.O.C. 2182; 11) Muscle scars of left valve, x 995.
- Figs. 12-14 - *Nipponocythere colalongoae* (Ciampo). 12) Holotype, RV, Rio Mazzapiedi (Piedmont, Northern Italy) CRM19, Early Messinian, x 168; 13) Paratype, hinge of LV, x 283; 14) Paratype, hinge of RV, x 248.
- Figs. 3, 6-9, 11 refer to the same specimen; LV = left valve; RV = right valve; DV = dorsal view.



Affinities – The proposed new species differs from *K. nanseni* (Joy & Clark, 1981) due to the shorter and much higher carapace, the more arched dorsal margin and in the clearly centrally more inflated valves. Moreover the ornamentation of *K. eracleaensis* n. sp. occupies all the valve's surface except for the smooth anterior area and caudal process while *K. nanseni* shows the ornamentation restricted to the central part. As far as the internal characters are concerned the anterior vestibule of *K. eracleaensis* n. sp. is much more developed and deeper, and the antero-ventral marginal pore-canal shorter and more numerous.

LITERATURE

- AYRESS, M.A. & CORREGE, T., 1993, On *Nipponocythere cuneata* Ayress & Corregge sp. nov. In Athersuch, J., Horne, D.J., Siveter, D.J. & Whittaker, J.E. (eds.), A Stereo Atlas of Ostracod Shells, 20 (6): 25-28.
- BOLD, W.A., VAN DEN, 1985, *Heinia*, a new genus of Ostracoda from the Gulf of Mexico and the Caribbean: J. Paleont., 59 (1): 1-7, 7 figs.
- BRADY, G.S., 1880, Report on the Ostracoda dredged by H.M.S. Challenger during the years 1873-1876: Rep. Sci. Results Voyage Challenger, Zool., 1 (3): 1-184, 44 pls.
- CIAMPO, G., 1986, Ostracodi del limite Tortonian/Messiniano in alcune sezioni italiane: Boll. Soc. Paleont. Ital., 24 (1): 29-110, 18 pls.
- COLALONGO, M.L. & PASINI, G., 1980, La Ostracofauna plio-pleistocenica della Sezione Vrica in Calabria (con considerazioni sul limite Neogene/Quaternario): Boll. Soc. Paleont. Ital. 19 (1): 44-126, 34 pls.
- CORREGE, T., AYRESS, M. A. & DRAPALA, V., 1992, On *Swainocythere nanseni* (Joy & Clark). In Athersuch, J., Horne, D.J., Siveter, D.J. & Whittaker, J.E. (eds.), A Stereo Atlas of Ostracod Shells, 19 (25): 107-110.
- DRAPALA, V. & AYRESS, M.A., 1993, On *Nipponocythere colalongae* (Ciampo). In Athersuch, J., Horne, D. J., Siveter, D. J. & Whittaker, J. E. (eds.), A Stereo Atlas of Ostracod Shells, 20 (5): 17-24.
- GRÜNDEL, J., 1976, Neue taxonomische Einheiten der *Cytherocopina* Grüntel, 1967 (Ostracoda): Z. Geol. Wiss., 4 (9): 1295-1304.
- HANAI, T., IKEYA, N., ISHIZAKI, K., SEKIGUCHI, Y. & YAJIMA, M., 1977, Checklist of Ostracoda from Japan and its adjacent seas: Univ. Mus., Univ. Tokyo, Bull., 12: 1-119, 4 pls.
- ISHIZAKI, K., 1971, Ostracodes from Aomori Bay, Aomori Prefecture, Northeast Honshu, Japan: Tohoku Univ., Sci. Rep., 2nd ser., 43 (1): 59-97, 7 pls.
- , 1981, Ostracoda from the East China Sea: Tohoku Univ., Sci. Rep., 2nd ser., 51 (1-2): 37-65, pls. 8-15.
- JAIN, S.P., 1975, Cytheracea (Ostracoda) from the Ariyalur Formation (Upper Cretaceous) of South India: Indian Geol. Assoc. Bull., 8: 41-70.
- JOY, J.A. & CLARK, D.L., 1977, The distribution, ecology and systematics of the benthic Ostracoda of the central Arctic Ocean: Micropaleontology, 23 (2): 129-154, pls. 1-3.
- & —, 1981, *Cytheropteron nanseni*, a new name for *C. ? nealei* Joy and Clark, 1977: J. Paleont., 55 (5): 1108.
- KUZNETSOVA, Z.V., 1957, New genera of ostracods of the families Cypridae and Cytheridae. In Mandelstam, M.I. et al., Ej. Vse. Paleont. Obshsh., 16: 166-192.
- MÜLLER, G.W., 1894, Die Ostracoden des Golfes von Neapel und der angrenzenden Meeresabschnitte: Naples Staz. Zool. Fauna u. Flora Golfes Neapels, Mon., 21: 1-404, 40 pls.
- OMATSOLA, M.E., 1969, Notes on three new species of Ostracoda from the Niger Delta, Nigeria: Bull. Geol. Inst. Univ. Uppsala, n.s. 2, 11: 97-102.
- REYMENT, R.A., 1963, Occurrence of a Recent *Paijenborchellina* (Ostr., Crust.): Ann. Magaz. Nat. Hist., ser. 13, 6: 271-272, pl. 11.
- SARS, G.O., 1866, Oversigt af Norges marine ostracoder: Forhandlinger i Videnskabs - Selskabet i Christiania, 7: 1-130.

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