

## CARNIAN (UPPER TRIASSIC) OSTRACODS OF THE MUFARA FORMATION (SICILY): TAXONOMY AND COMPARATIVE ANALYSIS

MARIE-BÉATRICE FOREL<sup>1,\*</sup>, FRANCESCO SCIUTO<sup>2,3,4</sup> & AGATINO REITANO<sup>5,6</sup>

<sup>1</sup>UMR 7207 CR2P (Centre de Recherche en Paléontologie-Paris), MNHN-Sorbonne Université-CNRS, 8 rue Buffon (CP38), 75005 Paris, France. E-mail: marie-beatrice.forel@mnhn.fr

<sup>2</sup>University of Catania. Department of Biological, Geological, and Environmental Sciences, Corso Italia 55, 95129 Catania, Italy. E-mail: fsciuto@unict.it

<sup>3</sup>Conisma, Roma, Italy.

<sup>4</sup>Stazione Zool. A. Dohrn, Napoli, Italy.

<sup>5</sup>Museo di Storia Naturale di Comiso, via degli Studi 9, 97013 Comiso Ragusa, Italy. E-mail: tinohawk@yahoo.it

<sup>6</sup>Museo della fauna del Dipartimento di Scienze Veterinarie dell'Università di Messina, Italy.

\*Corresponding Author.

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**Abstract.** Ostracods from the Upper Triassic (Carnian, Tuvalian) Mufara Formation exposed in north-west (Monti di Palermo: Reali Celsi and Torrente Cuba) and central-east Sicily (Monte Scalpello: Acquanova and Rocchette) are reported and described for the first time. The studied samples yielded 58 species, including *Petasobairdia scylla* n. sp. and *Triadobealdia kbarybdis* n. sp. *Ptychobairdia indicaensis*, previously described from the Monte Gambanera site, is emended and re-attributed to *Petasobairdia*. Following taxonomic standardization and reassignment of several previously reported species from Monte Gambanera and other sites in Monte Scalpello, 75 species are currently recognized from the Mufara Formation, including 32 formally described species and 43 in open nomenclature or compared to previously known species. The taphonomic analysis of the assemblages reported here and those from the literature indicate that they are all relatively good indicators of their depositional environment, with the exception of the largely undersampled Torrente Cuba site. The comparative analysis points to circalittoral depositional setting for all sites, with possible moderate salinity deviation in all Monte Scalpello and Monte Gambanera sites. All Monte Scalpello sites and possibly Reali Celsi correspond to the shallower sites, though more work is needed to further characterize the depositional environment of Reali Celsi.

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### INTRODUCTION

The current knowledge of the biodiversity of marine ostracods during most of the Triassic is quite detailed (e.g., Anderson 1964; Kristan-Toll-

mann 1970, 1971a, b, 1972; Bolz 1971a, b; Kozur 1971a, b; Arias & Lord 2000; Crasquin-Soleau et al. 2006; Monostori & Tóth 2014). It is now widely recognized that ostracods went through a major reorganization during this interval (e.g., McKenzie 1982; Crasquin-Soleau et al. 2007; Crasquin & Forel 2015; Forel & Crasquin 2022). The Late Triassic

witnessed key events of their evolution, including radiation of ornate Bairdiidae and maximum of diversity of Cytherellidae and Cytheruridae during the Carnian (Forel & Crasquin 2022). Although the spatial distribution of ostracods throughout the Triassic has been investigated since the 1970s (e.g., Kozur 1973; Kristan-Tollmann & Tollmann 1981, 1982; Kristan-Tollmann 1988), the geographical patterns underlying these Triassic evolutionary events remain elusive. In this context, the Mufara Formation exposed in Sicily may be of particular significance. Together with the underlying Lercara Formation, the deposits of the Mufara Formation represent the earliest Mesozoic sediments in Sicily documenting the opening of the Neotethys (e.g., Basilone et al. 2016). They therefore provide a valuable opportunity to gather data for understanding paleoenvironmental and biodiversity patterns in relation to paleogeographic changes.

Marine fossil ostracods from Sicily have so far mainly been documented from Pliocene and Quaternary sediments (e.g., Sciuto 2014; Sciuto & Reitano 2021; Sciuto et al. 2022), while very few studies have investigated Permian and Permian-Triassic faunas (Gemmellaro 1890; Kozur 1991a, b). Triassic ostracods from the area remained relatively poorly documented until the recent reports of well-preserved communities from the Mufara Formation exposed in central-east Sicily at Monte Gambanera and Monte Scalpello, providing key elements for discussing the age of the studied samples (Crasquin et al. 2018, 2020).

Here, we report and describe new Triassic ostracods from the Mufara Formation exposed in north-west Sicily (Monti di Palermo) and central-east Sicily (Monte Scalpello). We also take this opportunity to synthesize and update all available data to characterize the overall ostracod fauna from the Mufara Formation and discuss the communities in terms of paleoenvironment significance.

## GEOLOGICAL AND HISTORICAL CONTEXT

### Palermo Mountains

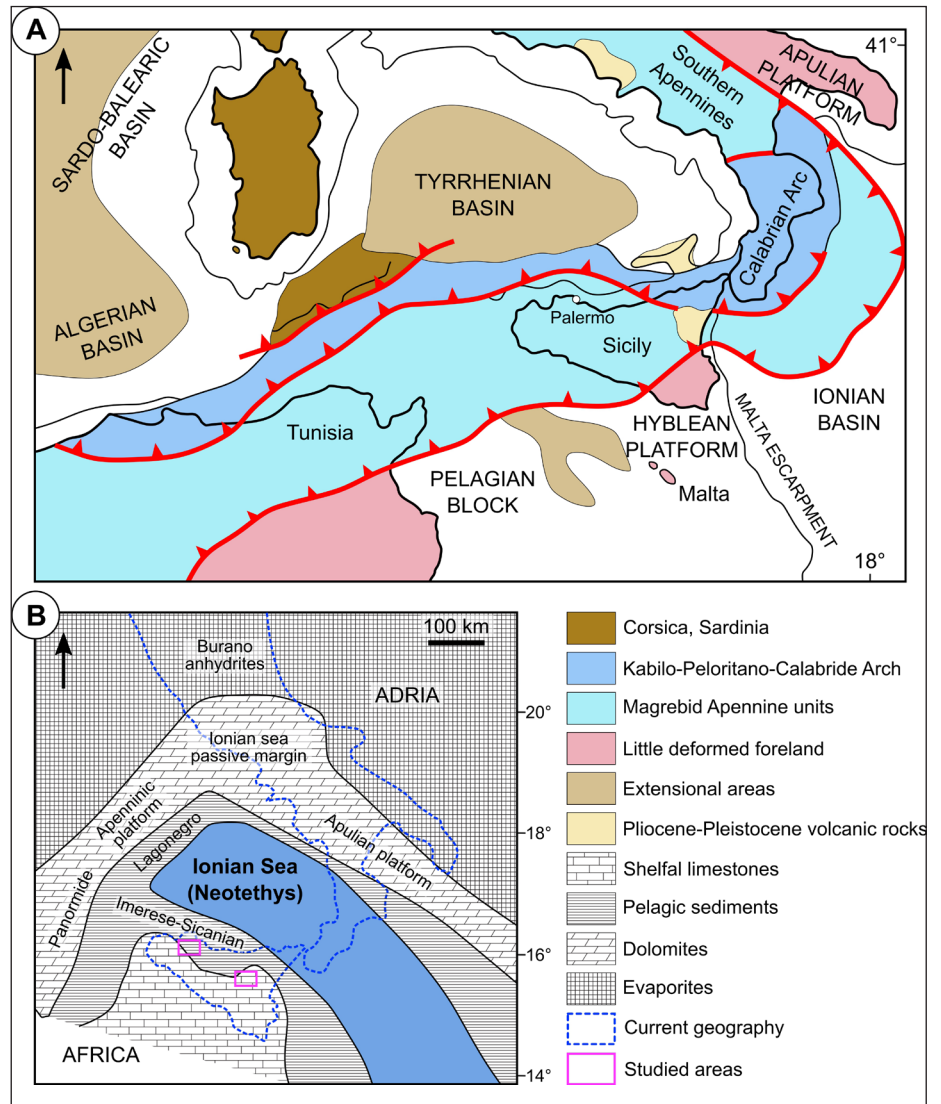
The Palermo Mountains are part of the Apennine-Maghrebid Chain, which is the principal structural element of northern Sicily, consisting predominantly by east/west-trending nappes within a fold-and-thrust belt (Fig. 1A). A segment of this

chain exposes Triassic carbonate, silico-carbonate and siliciclastic sediments. The nappe system results from Mesozoic regional deformation affecting pre-existing paleogeographic domains, notably the Panormide Carbonate Platform and the Imerese Basin (Fig. 1B; Catalano & D'Argenio 1978, 1982; Catalano et al. 1978). During the Early Miocene, the collision of the Sardinian Block with the African margin triggered the forward migration of the thrust belt-foredeep system and the progressive deformation of the paleogeographic domains from internal to external zones (Catalano et al. 1978; Catalano & D'Argenio 1978, 1982; Broquet et al. 1984).

The Triassic Mufara Formation (“Flysch Carnico”) consists of clay-calcareous-arenaceous alternations. Paleogeographically, it has been attributed either to the Imerese Basin (e.g., Lentini et al. 1987; Montanari 1987; Catalano & Di Maggio 1996) or to the Imerese-Sicano Basin (Carrilat & Martini 2009; Di Paolo et al. 2012). It is discontinuously exposed at several localities of north-west Sicily (Palermo Mountains, Sicani Mountains, Madonie Mountains) and central-east Sicily (Caltanissetta Basin and Monte Judica Unit). A fossiliferous Triassic succession was first reported from the Palermo Mountains, specifically between Contrada da Giacalone and Altofonte, by Gemmellaro G. (1904). This finding was subsequently confirmed by Di Stefano (1907) and Gemmellaro M. (1921), who also documented an ammonoid association comprising of Tropitidae Mojsisovics, 1875 (*Paratropites* spp.) and Trachycerata Haug, 1894 (*Trachysagenites* sp.), also recorded from the Monte Scalpello area in central-east Sicily.

Subsequently, Zia (1956) attributed the Triassic sediments cropping out in the Marineo area (Monti di Palermo) to the early Carnian, based on the probably erroneous identification of the ammonoid *Trachyveras aon* (Münster, 1834). Schmidt di Friedberg (1965) correctly assigned the “Flysch Carnico” to the Mufara Formation, which type section is located at Monte Mufara in the Madonie Mountains. Mascle (1979) referred the Mufara Formation exposed in the Sicani Mountains to the Carnian, suggesting a possible Ladinian age for its base. Cafiero & De Capoa Bonardi (1982) assigned a Julian age for the clayey-calcareous deposits of the base of Monte Cammarata succession (Sicani Mountains), based on the occurrence of the ostracod *Mockella muelleri* Bunza & Kozur, 1971 (fide Kozur). On the basis of conodonts, foraminifers and

Fig. 1 - A) Structural scheme of the Central Mediterranean area (modified from Catalano et al. 2013). B) Schematic paleogeographic reconstruction of Pangea and Neotethys in the Late Triassic (modified from Speranza & Minelli 2014).



pollen, Martini et al. (1991) attributed a late Tuvalian age to several Mufara successions in northern Sicily. Well-preserved conodont associations from numerous sections in western and central Sicily led Di Stefano & Gullo (1997) to propose a biostratigraphic framework with Julian and Tuvalian ages to the Mufara deposits. They also emphasized a diachronous transition to the overlying Tuvalian cherty limestone succession. Di Stefano et al. (1998) reported a Julian age for the small outcrop of Mufara Formation at Monte Altesinella (central Sicily), based on conodonts indicative of the *Gladigondolella tethydis* zone (*sensu* Kozur 1989). Senowbari-Daryan & Abate (1986) and Senowbari-Daryan & Di Stefano (2001) assigned a Julian age to the sediments exposed at Cozzo Paparina, between Giacalone and Altofonte, based on radiolarians, halobiids, calcispheres and conodont species *Gladigondolella tethydis*

(Huckriede, 1958) and *Paragondolella polygnathiformis* (Budurov & Stefanov, 1965). Nigro & Renda (1999) referred the Mufara Formation to the Imerese-Sicanian domain and attributed it to the Late Triassic. More recently, Carrillat & Martini (2009) described a 20 m-thick section at Cozzo Paparina, mainly composed of yellow marls and silty marls intercalated with marly limestones, and dated it as late Tuvalian. Buratti & Carrillat (2002) and Carrillat & Martini (2009) identified four distinct palynomorph associations from Sicilian localities of the Mufara Formation, ranging from late Ladinian/early Carnian to late Carnian.

#### Monte Scalpello area

In central-east Sicily, the Mufara Formation is part of the "Monte Judica Units" (Lentini et al. 1987), located along the northern margin of the

Gela Foredeep within the geodynamic framework of the southern termination of the Maghrebian-Sicilian-Southern Apennine nappes (Fig. 1). In this area, the Mufara Formation consists predominantly of marly to silty mudstones, occasionally interbedded with thin fibrous calcite levels containing *Halobia* spp.

Lentini (1974) attributed the lowermost levels of the Mufara Formation exposed at Monte Scalpello (Monte Judica Units) to the early Carnian *Trachyceras aonoides* zone. However, the presence of Tropitidae excludes an early Carnian age (Lucas 2010; Jenks et al. 2015). Lentini (1974) also assigned the overlying sedimentary layers to the *Tropites subbullatus* zone, but the co-occurrence of Trachyceratidae (*Trachysagenites* Mojsisovics, 1893; *Pamphagosirenites* Popov, 1961), Sandlingitidae Mojsisovics, 1893 (*Shastites* Hyatt & Smith, 1905) and Tropitidae (*Tropites* Mojsisovics, 1875; *Paratropites* Mojsisovics, 1893; *Paulotropites* Mojsisovics, 1893) suggests that these fossiliferous horizons are better referred to the *Tropites dilleri* zone (Tozer 1994; Lucas 2010; Jenks et al. 2015). According to Jenks et al. (2015), the base of the Tuvalian (upper part of the Carnian) is marked by the appearance and radiation of Tropitidae. Their presence, already reported by Gemmellaro (1904), Scalia (1909) and Lentini (1974), confirms the assignment of these sedimentary levels to the Tuvalian. Carillat & Martini (2009) summarized that the depositional setting of the Mufara Formation ranged from shallow to deeper offshore zones along a distally steepened shelf or ramp, which may have evolved into a rimmed carbonate platform later in the Late Triassic. An ostracod-rich fauna, including *Mockella muelleri* Bunza & Kozur, 1971, suggests that the clayey-calcareous deposits at the base of the Mufara Formation exposed in the Monti Sicani belong to the Julian (Cafiero & De Capoa Bonardi 1982; Carillat & Martini 2009).

Crasquin et al. (2018) described the ostracod association of the Mufara Formation, *Tropites dilleri* zone of the Carnian, exposed along the east side of Monte Scalpello (Monte Judica Units, central-east Sicily). The analysis of the entire community indicated that it likely inhabited a paleoenvironment characterized by high sedimentation rates and strong depositional energy, consistent with previous interpretations of the Monte Scalpello area as a distal turbiditic sedimentary setting (Carrillat & Martini 2009). Crasquin et al. (2020) reported os-

tracods from the clays and sandstone deposits of the Mufara Formation exposed along the west side of Monte Gambanera (Monte Judica Units, central-east Sicily), referred to the *Tropites subbullatus*/*Anatropites spinosus* zones of the Tuvalian. These studies concluded that the Mufara Basin, located in a transitional position between the bathyal Neotethys facies to the south and southeast and the surrounding carbonate platforms, represented a shallow marine basin within the deepest and most distal part of an extensive continental shelf, characterized by rapid and intense sedimentation. The Mufara Formation at Monte Gambanera occupied a more distal and less turbulent environment compared to Monte Scalpello.

## MATERIALS AND METHODS

### Studied samples

For the present analysis, ostracods from four localities were examined, two from the Monti di Palermo in north-west Sicily and two from Monte Scalpello area in central-east Sicily (Fig. 2A).

*Monti di Palermo.* All samples from this area were collected from pelitic sediments. The first locality is Contrada da Reali Celsi (F. Monreale 249II SO of “Carta d’Italia” IGM 1:25.000), located 800 m north-west of Cozzo Papparina, near Altofonte (Fig. 2B). Here, the Mufara Formation reaches a thickness of 140 m and consists of thin-bedded calcilutites alternating with grey-yellowish clays. Two samples were collected at this site, hereafter referred to as St. 1 (38°2’12.69”N; 13°15’58.10”E) and St. 2 (38°2’9.07”N; 13°15’58.52”E). The residue >63 µm is limited (a few hundred grams) but yielded an abundant and diversified microfauna. Ostracods are silicified and well preserved, retaining both shape and ornamentation. Other fossils recovered include gastropods, brachiopods, bivalves, crinoids and echinoid skeletal remains. Foraminifers are scarce, represented mainly by *Glomospira* Rzehak, 1885 and *Hemidiscus* Schellwien, 1898. St. 1 has also provided numerous oolites.

The second locality is Torrente Cuba (“Vaddi Cuba” F. Monreale 249II SO of “Carta d’Italia” IGM 1:25.000), located 2.5 km south-west of San Martino delle Scale. The outcrop of Torrente Cuba is approximately 20 m thick and exhibits predominantly distal microfacies, with occasional reversed

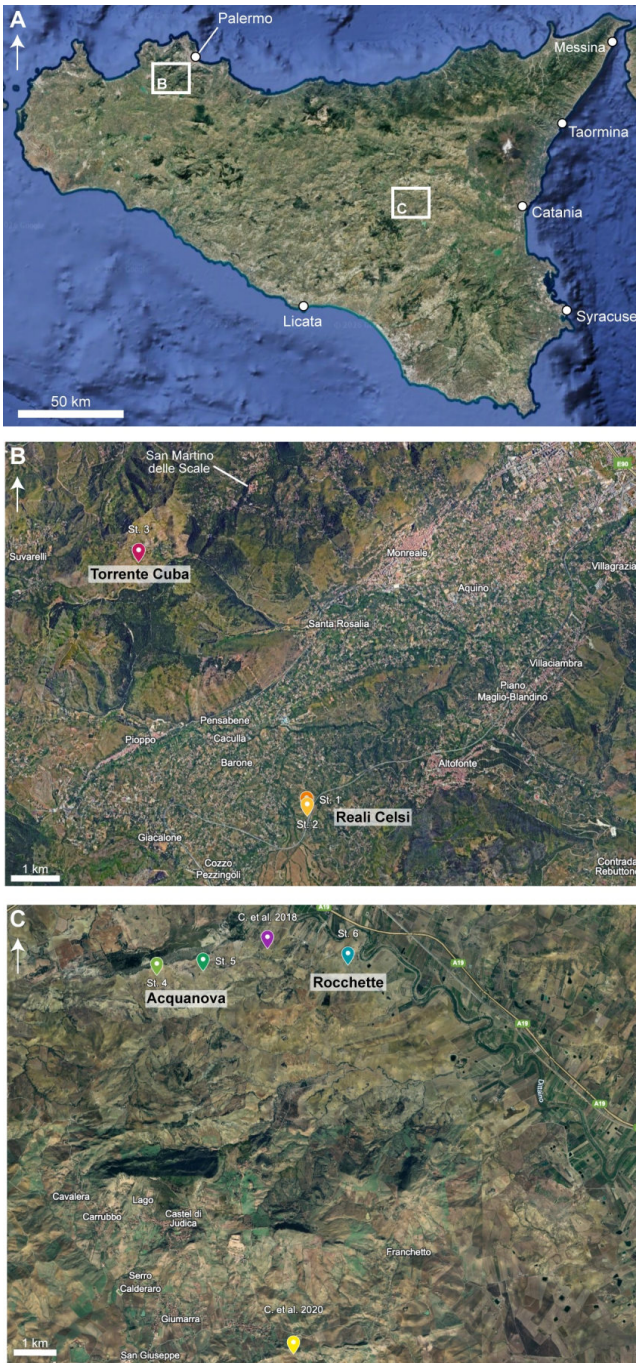


Fig. 2 - A) Geographical location of the studied samples and of previous works in Crasquin et al. (2018, 2020) in Sicily. B) Insight map showing the location of samples studied from Monti di Palermo (this work). C) Position of samples from Monte Scalpello (this work; Crasquin et al. 2018; in purple) and Monte Gambanera (Crasquin et al. 2020; in yellow) (GoogleMaps 2025).

graded bedding, upward-fining sequences, and some parallel lamination in the calciturbidites, collectively indicating an intermediate position on the shelf (Carillat & Martini 2009). The sample collected at this locality, hereafter referred to as St. 3 ( $38^{\circ}4'42.12''\text{N}$ ;  $13^{\circ}13'49.70''\text{E}$ ), was taken from

grey and yellow marls interbedded with marly limestones and calcarenites in the middle section of the Torrente Cuba section. These sediments correspond to the palynomorph “Assemblage D” of the “Torrente Cuba Section” described by Buratti & Carillat (2002), assigned to the late Carnian (Tuvalian). Buratti & Carillat (2002) noted that numerous sections exposing the Mufara Formation, including the Monte Gambanera site which was previously studied for ostracods by Crasquin et al. (2020), belong to this assemblage. Following Carillat (2001) and Carillat & Martini (2009), the Torrente Cuba deposits are attributed to the *Tropites subbullatus*/*Anatropites spinosus* zone. Carillat & Martini (2009) further indicate that Torrente Cuba and Monte Gambanera represent comparable intermediate to distal depositional settings.

Carillat & Martini (2009) described the evolution of the geological and paleoenvironmental settings of the Mufara Formation. Sediments from the Ladinian-Carnian boundary to the lower part of the Carnian suggest deposition on a ramp or distally steepened shelf. In contrast, upper Carnian sediments were deposited near the shelf break, likely reflecting a deepening of the basin.

**Monte Scalpello.** Monte Scalpello is located in central-eastern Sicily, on the right bank of the Dittaino River, southwest of the town of Catenanuova (EN), 40 km west of Catania (F 633 IV NO of the Carta d'Italia alla scala 1: 25.000). The Mufara Formation is exposed on the southern slope of the mountain, with an estimated thickness of around 450 m (Lentini 1974). Lithologically, it consists mainly of marly or silty clays, with occasional centimetric layers yielding *Halobia* Bronn, 1830; stratification is rarely visible at the surface due to intense agricultural activity. Less common are coarser sediments, which are sometimes oolitic.

At the third sampling area in Contrada da Acquanova, two samples were collected: St. 4 ( $37^{\circ}32'36.65''\text{N}$ ;  $14^{\circ}38'50.63''\text{E}$ ), corresponding to one of the oolitic levels described by Lentini (1974), and St. 5 ( $37^{\circ}32'40.10''\text{N}$ ,  $14^{\circ}39'32.26''\text{E}$ ) east of “Case Acquanova” (Fig. 2C). Scalia (1907, 1908, 1909, 1910, 1912, 1914) documented a rich fauna of molluscs (mainly gastropods), echinoderms, and brachiopods. Dal Sasso et al. (2014) reported “saurian remains” with an ammonoid association typical of the *Tropites dilleri* biozone (Fig. 3). One additional sample was finally collected in Contrada da Roc-

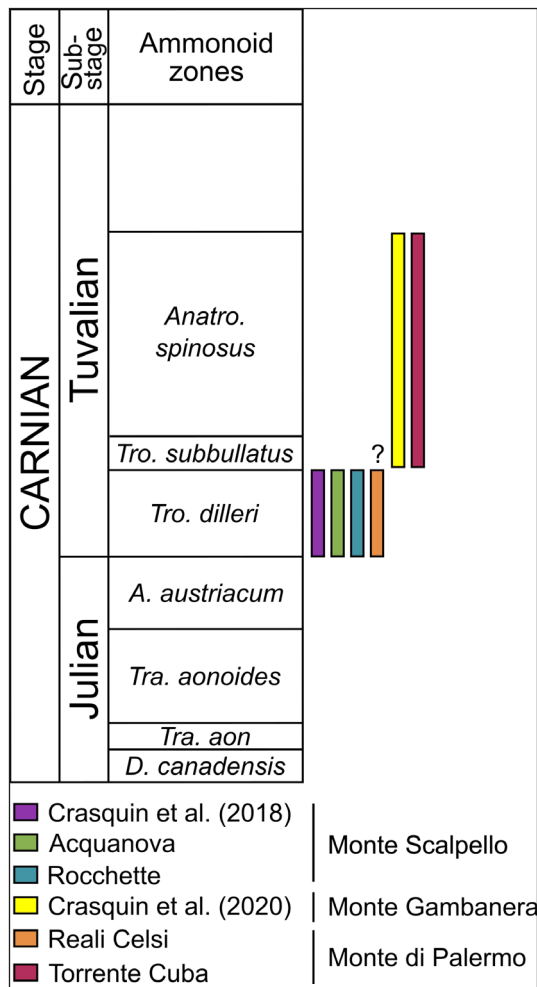


Fig. 3 - Stratigraphy of the Carnian, Upper Triassic, with ammonite zonation modified from Rigo et al. (2018) and position of the ostracod communities reported from Mufara Formation exposed at Monte Scalpello (Crasquin et al. 2018) and Monte Gambanera (Crasquin et al. 2020). *A.*: *Austrotrachyceras*; *Anatro.*: *Anatropites*; *D.*: *Daxatina*; *Tra.*: *Trachyceras*; *Tro.*: *Tropites*.

chette (37°32'45.46"N, 14°41'44.18"E), hereafter referred to as St. 6 (Fig. 2C). These samples complement the previously reported ostracods from the Mufara Formation exposed on the eastern side of Monte Scalpello, at Contrada Paraspora, by Crasquin et al. (2018).

## Methods

At each site, twenty kilograms of sediment were collected. The sediments were routinely washed with tap water, dried in an oven and sieved. Ostracod specimens were picked from the > 63 µm fraction under a stereomicroscope and imaged uncoated under a LMU Tescan Vega II Scanning Electron Microscope in low vacuum modality, in the Electron Microscopy Laboratory of the Department of Biological, Geo-

logical and Environmental Science of the University of Catania. All material is housed in the Paleontological Museum of the University of Catania.

## Description of ostracods

We follow the general classification of ostracods of Moore (1961), Becker (2002) and Horne et al. (2002). The taxonomy of Cytheroidea is based on the revision of Whatley & Boomer (2000) and that of Bythocytheridae follows Schornikov (1990).

Fifty-eight species, distributed across 30 genera and 10 families, are identified (Tab. 1). Several species reported here were previously mentioned in Crasquin et al. (2018, 2020); they are discussed only when necessary, but all synonymies and chresonymies are provided, and all species illustrated (Pl. 1–5).

In the following:

- the dorsal margin is considered as subdivided into dorsal border (between the posterior and anterior cardinal angles), antero-dorsal border (in front of anterior cardinal angle) and postero-dorsal border (behind posterior cardinal angle). In the same manner, the ventral margin is subdivided into ventral border (between the anterior and posterior slope breaks), antero-ventral border (in front of anterior slope break) and postero-ventral border (behind posterior slope break).
- the morphology of antero-ventral and postero-ventral borders can be equicurvate (equally convex with maximum of curvature at mid-height), infracurvate (narrowly rounded towards ventral margin) and supracurvate (narrowly rounded towards dorsal margin) (Lüttig 1962).
- the length convention of carapaces and valves is: <400 µm: very small; 400–500 µm: small; 500–700 µm: medium; 700–1000 µm: large; >1000 µm: very large.

**Zoobank link to the article:** urn:lsid:zoobank.org:pub:8C4C5174-AAB4-438C-B1F8-67DF3A6238D8.

**Abbreviations used in the text:** AB: anterior border; ADB: antero-dorsal border; AVB: antero-ventral border; A-1, A-2, A-3, A-4, Ad: estimated growth stages; C: carapace; DB: dorsal border; H: height; L: length; LV: left valve; PB: posterior border; PDB: postero-dorsal border; PVB: postero-ventral border; RV: right valve; VB: ventral border; W: width.

**Institutional abbreviations:** PCM O: Paleontological Museum Catania (Sicily).

Class <b>OSTRACODA</b> Latreille, 1806	Family Cytheruridae Müller, 1894
Subclass <b>PODOCOPA</b> Müller, 1894	Subfamily Cytheropterinae Hanai, 1957
Order <b>Podocopida</b> Sars, 1866	<b>Cytheropterinae gen. et sp. indet.</b> (Pl. 3, fig. M)
Suborder <b>Bairdiocopina</b> Gründel, 1967	Subfamily Cytherurinae Müller, 1894
Superfamily Bairdioidea Sars, 1887	Genus <i>Judahella</i> Sohn, 1968
Family Bairdiidae Sars, 1887	<b><i>Judahella fortенodosa</i></b> (Urlichs, 1972) (Pl. 3, fig. N)
Genus <i>Acratia</i> Delo, 1930	<b><i>Judahella? montanarii</i></b> Crasquin et al., 2018 (Pl. 3, fig. O)
<b><i>Acratia maugerii</i></b> Crasquin et al., 2018 (Pl. 1, figs. A, B)	<b><i>Judahella nodosa</i></b> (Kozur in Bunza & Kozur, 1971) (Pl. 3, fig. P)
Genus <i>Bairdia</i> M'Coy, 1844	Genus <i>Kerocythere</i> Kozur & Nicklas, 1970
<b><i>Bairdia andreocrasquini</i></b> Crasquin et al., 2020 (Pl. 1, figs. C, D)	<b><i>Kerocythere reticulata</i></b> Kristan-Tollmann, 1972 (Pl. 3, figs. Q, R)
<b><i>Bairdia balatonica</i></b> Méhes, 1911 (Pl. 1, figs. E, F)	<b><i>Kerocythere tuvalica</i></b> Kozur in Bunza & Kozur, 1971 (Pl. 3, fig. S)
<b><i>Bairdia cassiana</i></b> (Reuss, 1868) (Pl. 1, figs. G, H)	Genus <i>Mockella</i> Bunza & Kozur, 1971
<b><i>Bairdia</i> cf. <i>finalyi</i></b> (Méhes, 1911) in Crasquin et al., 2018 (Pl. 1, fig. I)	<b><i>Mockella muelleri</i></b> Bunza & Kozur, 1971 (Pl. 3, figs. T, U)
<b><i>Bairdia</i> cf. <i>monostorii</i></b> Forel & Grädinaru, 2018 in Crasquin et al., 2020 (Pl. 1, fig. J)	Family Limnocytheridae Klie, 1938
<b><i>Bairdia gambaneraensis</i></b> Crasquin et al., 2020 (Pl. 1, figs. K-M)	Genus <i>Simeonella</i> Sohn, 1968
<b><i>Bairdia scaliai</i></b> Crasquin et al., 2018 (Pl. 1, fig. N)	<b><i>Simeonella brotzenorum</i></b> Sohn, 1968 (Pl. 4, figs. A, B)
<b><i>Bairdia</i> sp. 1</b> (Pl. 1, fig. O)	Genus <i>Remngartenella</i> Schneider in Mandelstam et al., 1957
<b><i>Bairdia</i> sp. 2</b> (Pl. 1, fig. P)	<b><i>Remngartenella sanctaerensis</i></b> Kristan-Tollmann in Kristan-Tollmann & Hamedani, 1973 (Pl. 4, fig. C)
Genus <i>Bairdiacypris</i> Bradfield, 1935	Genus <i>Lutkevichinella</i> Schneider, 1956
<b><i>Bairdiacypris triassica</i></b> Kozur, 1971b <i>sensu</i> Crasquin et al., 2020 (Pl. 1, fig. Q)	<b><i>Lutkevichinella simplex oblonga</i></b> Kozur in Bunza & Kozur, 1971 (Pl. 4, figs. D, E)
<b><i>Bairdiacypris</i> cf. <i>mirautae</i></b> Crasquin-Soleau & Grädinaru, 1996 in Crasquin et al., 2018 (Pl. 1, figs. R, S)	Suborder <b>Metacopina</b> Sylvester-Bradley, 1961
<b><i>Bairdiacypris</i> sp. 1</b> (Pl. 1, fig. T)	Superfamily Healdioidea Harlton, 1933
<b><i>Bairdiacypris</i> sp. 2</b> (Pl. 1, fig. U; Pl. 2, fig. A)	Family Healdiidae Harlton, 1933
Genus <i>Ceratobairdia</i> Sohn, 1954	Genus <i>Aneisohealdia</i> Kristan-Tollmann, 1971b
<b><i>Ceratobairdia</i> sp.</b> (Pl. 2, fig. B)	<b><i>Aneisohealdia forelae</i></b> (Crasquin et al., 2020) (Pl. 4, figs. F, G)
Genus <i>Dicerobairdia</i> Kollmann, 1963	<b><i>Aneisohealdia siciliiensis</i></b> (Crasquin et al., 2020) n. comb. (Pl. 4, fig. H)
<b><i>Dicerobairdia</i> sp.</b> (Pl. 2, figs. C, D)	Genus <i>Hungarella</i> Méhes, 1911
Genus <i>Hiatobairdia</i> Kristan-Tollmann, 1970	<b><i>Hungarella</i> cf. <i>bristolensis</i></b> (Anderson, 1964) (Pl. 4, figs. I-L)
<b><i>Hiatobairdia subsymmetrica</i></b> Kristan-Tollmann, 1970 (Pl. 2, fig. E)	<b><i>Hungarella</i> sp. 1</b> (Pl. 4, fig. M)
<b><i>Hiatobairdia</i> sp. A</b> in Crasquin et al., 2020 (Pl. 2, fig. F)	<b><i>Hungarella</i> sp. 2</b> (Pl. 4, fig. N)
Genus <i>Histriabairdia</i> Forel in Forel & Grädinaru, 2020	<b><i>Hungarella</i> sp. 3</b> (Pl. 4, fig. O)
<b><i>Histriabairdia gemmellaroi</i></b> (Crasquin et al., 2018) (Pl. 2, fig. G)	<b><i>Hungarella</i> sp. 4</b> (Pl. 4, figs. P, Q)
Genus <i>Lobobairdia</i> Kollmann, 1963	<b><i>Hungarella</i> sp. A</b> in Crasquin et al., 2020 (Pl. 4, figs. R, S)
<b><i>Lobobairdia</i> sp. 1</b> (Pl. 2, fig. H)	Genus <i>Triadohealdia</i> Kristan-Tollmann, 1971b
<b><i>Lobobairdia</i> sp. 2</b> (Pl. 2, fig. I)	<b><i>Triadohealdia kharybdis</i></b> n. sp. (Pl. 4, figs. T, U; Pl. 5, figs. A-C)
Genus <i>Mirabairdia</i> Kollmann, 1963	Order <b>Platycopida</b> Sars, 1866
<b><i>Mirabairdia pernodosa</i></b> Kollmann, 1963 (Pl. 2, fig. J)	Suborder <b>Platycopina</b> Sars, 1866
Genus <i>Nodobairdia</i> Kollmann, 1963	Superfamily Cytherelloidea Sars, 1866
<b><i>Nodobairdia mammillata</i></b> Kollmann, 1963 (Pl. 2, figs. K, L)	Family Cytherellidae Sars, 1866
Genus <i>Petasobairdia</i> Chen in Chen & Shi, 1982	Genus <i>Cytherella</i> Jones, 1849
<b><i>Petasobairdia jeandercourti</i></b> Crasquin et al., 2020 (Pl. 2, figs. M, N)	<b><i>Cytherella</i> sp.</b> (Pl. 5, fig. D)
<b><i>Petasobairdia scylla</i></b> n. sp. (Pl. 2, figs. O-U)	Genus <i>Leviella</i> Sohn, 1968
<b><i>Petasobairdia iudicaensis</i></b> (Crasquin et al., 2020) n. comb. emend. (Pl. 3, figs. A-D)	<b><i>Leviella bentori</i></b> Sohn, 1968 (Pl. 5, figs. E, F)
Genus <i>Ptychobairdia</i> Kollmann, 1960	Subclass <b>MYODOCOPA</b> Sars, 1866
<b><i>Ptychobairdia kristanae</i></b> Kollmann, 1960 (Pl. 3, fig. E)	Order <b>Halocyprida</b> Dana, 1853
Genus <i>Urobairdia</i> Kollmann, 1963	Suborder <b>Halocypridina</b> Dana, 1853
<b><i>Urobairdia austriaca</i></b> Kollmann, 1963 <i>sensu</i> Crasquin et al., 2020 (Pl. 3, figs. F, G)	Superfamily Thaumatoocypridoidea Müller, 1906
Family Bythocyprididae Maddocks, 1969	Family Thaumatoocyprididae Müller, 1906
Genus <i>'Bythocypris'</i> Brady, 1880	Genus <i>Pokornyopsis</i> Kozur, 1974
<b><i>'Bythocypris'</i> sp.</b> (Pl. 3, fig. H)	<b><i>Pokornyopsis</i> sp.</b> (Pl. 5, fig. G)
Suborder <b>Cypridocopina</b> Jones, 1901	Order <b>Myodocopida</b> Sars, 1866
Superfamily Cypridoidea Baird, 1845	Suborder <b>Cladocopina</b> Sars, 1866
Family Paracyprididae Sars, 1866	Superfamily Polycopoidea Sars, 1866
Genus <i>Paracypris</i> Sars, 1866	Family Polycopidae Sars, 1866
<b><i>Paracypris</i> sp. 1</b> (Pl. 3, fig. I)	Genus <i>Polycope</i> Sars, 1866
<b><i>Paracypris</i> sp. 2</b> (Pl. 3, fig. J)	<b><i>Polycope baudi</i></b> Crasquin-Soleau & Grädinaru, 1996 emend. Forel & Grädinaru, 2022 (Pl. 5, fig. H)
Suborder <b>Cytherocopina</b> Baird, 1850	<b><i>Polycope pumicosa schleiferiae</i></b> Kozur in Bunza & Kozur, 1971 (Pl. 5, fig. I)
Superfamily Cytheroidea Baird, 1850	<b><i>Polycope</i> cf. <i>kilekensis</i></b> Forel et al., 2019 (Pl. 5, fig. J)
Family Bythocytheridae Sars, 1866	
Genus <i>Nemoceratina</i> Gründel & Kozur, 1971	
<b><i>Nemoceratina</i> sp.</b> (Pl. 3, figs. K, L)	

Tab. 1 - Taxonomic list of all ostracod species identified from the Carnian of Mufara Formation exposed in Reali Celsi, Torrente Cuba, Acquanova and Rocchette.

## SYSTEMATIC PALEONTOLOGY

Class **OSTRACODA** Latreille, 1806  
 Subclass **PODOCOPA** Müller, 1894  
 Order **Podocopida** Sars, 1866  
 Suborder **Bairdiocopina** Gründel, 1967  
 Superfamily Bairdioidea Sars, 1887  
 Family Bairdiidae Sars, 1887  
 Genus *Acratia* Delo, 1930

**Type species:** *Acratia typica* Delo, 1930, by original designation.

***Acratia maugeri*** Crasquin et al., 2018

Pl. 1, figs. A, B

1991 *Acratia* sp. Kristan-Tollmann: p. 196, pl. 1, fig. 1.  
 2013 *Acratia goemoeryi* (Kozur, 1970); Monostori & Tóth: p. 6, pl. 4, only fig. 2.  
 2018 *Acratia maugeri* Crasquin et al.: p. 137, figs 7 D-F.  
 2020 *Acratia maugeri* Crasquin et al.: Crasquin et al., p. 10, pl. 2, fig. L.

**Material:** Acquanova: 1C. Reali Celsi: 4C, 2LV. Rocchette: 4C, 1LV.

**Dimensions:** RV: L = 746–1099 µm, H = 295–464 µm. LV: L = 634–1099 µm, H = 287–472 µm.

**Occurrence.** Late Ladinian, Middle Triassic, north-east Iran (Kristan-Tollmann 1991). Late Ladinian, Middle Triassic, Transdanubian Range, Hungary (Monostori & Tóth 2013). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). Tuvallian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1, St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Bairdia* McCoy, 1844

**Type species:** *Bairdia curta* McCoy, 1844, subsequently designated by Ulrich & Bassler (1923).

***Bairdia andreocrasquini*** Crasquin et al., 2020

Pl. 1, figs. C, D

2020 *Bairdia andreocrasquini* Crasquin et al.: p. 5, pl. 1, figs. E, F.

**Material:** Acquanova: 2C. Reali Celsi: 1C.

**Dimensions.** RV: L = 361–431 µm, H = 176–187 µm. LV: L = 364–465 µm, H = 190–197 µm.

**Remarks.** *Bairdia andreocrasquini* was described based on four carapaces from the Mufara Formation exposed at Monte Gambanera (Crasquin et al. 2020). The dimensions reported in that study were problematic, giving identical ranges for H and L (H = 372–415 µm; L = 372–415 µm). Based on the scale bars, the correct measurements are: holotype RV, L = 943 µm, H = 435 µm; holotype LV, L = 943 µm, H = 465 µm; paratype RV, L = 875 µm, H = 386 µm; paratype LV, L = 875 µm, H = 395 µm. The specimens recovered in the present study are significantly smaller and are interpreted as juveniles, exhibiting a much shorter carapace while displaying the diagnostic postero-ventral ridge.

**Occurrence.** *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, Sicily, Italy (Crasquin et al. 2020). Tuvallian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5), Monte Scalpello, central-east Sicily, Italy (this work).

***Bairdia balatonica*** Méhes, 1911

Pl. 1, figs. E, F

1911 *Bairdia balatonica* Méhes: p. 13, pl. 1, figs. 8-11.  
 1911 *Bairdia dadayi* Méhes: p. 17, pl. 1, figs. 29, 30.  
 non 1965 *Bairdia balatonica* Méhes var.; Széles: p. 414, fig. 4.  
 1965 *Bairdia dadayi* Méhes; Széles: p. 412, fig. 1.  
 1978 *Bairdia* cf. *balatonica* Méhes; Kristan-Tollmann: p. 81, pl. 1, figs. 1-3.  
 pars 1995 *Bairdia balatonica* Méhes; Monostori: p. 42, pl. 2, fig. 1 (non figs. 2, 3).  
 2011 *Bairdia balatonica* Méhes; Forel & Crasquin: p. 252, fig. 5A.  
 2013 *Bairdia balatonica* Méhes; Monostori & Tóth: p. 309, figs. 1-4, p. 5.  
 2018 *Bairdia balatonica* Méhes; Crasquin et al.: p. 134, fig. 6P.  
 2020 *Bairdia balatonica* Méhes; Forel et al.: p. 382, fig. 4E.  
 2024 *Bairdia balatonica* Méhes; Budai et al.: p. 123.

**Material:** Acquanova: 5C. Reali Celsi: 1C. Rocchette: 9C.

**Dimensions:** RV: L = 503–899 µm, H = 288–479 µm. LV: L = 503–921 µm, H = 317–538 µm.

**Occurrence.** Spathian-Anisian, Early-Middle Triassic, South Tibet (Forel & Crasquin 2011). Anisian, Ladinian, Middle Triassic and early Carnian, Late Triassic, Transdanubian Range, Hungary (Méhes 1911; Széles 1965; Monostori 1995; Mono-

stori & Tóth 2013; Budai et al. 2024). Early Carnian, Late Triassic, Southern Alps, Italy (Kristan-Tollmann 1978). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Parasporea, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Nicoraella? budaensis* zone, late Julian-?earliest Tuvalian, Carnian, Late Triassic, ‘Raibl Beds’, Karavanke Mountains, Slovenia (Forel et al. 2020). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

### *Bairdia cassiana* (Reuss, 1868)

Pl. 1, figs. G, H

- 1868 *Cythere cassiana*; Reuss: p. 108.  
 1869 *Bairdia cassiana* (Reuss); Gümbel: p. 180, pl. 5, figs. 18, 19.  
 1958 *Bairdia cassiana* (Reuss); Styk: p. 171, fig. 3/1.  
 1971 *Bairdia cassiana* (Reuss); Ulrichs: p. 705, pl. 1, figs. 1, 2.  
 1978 *Bairdia cassiana* (Reuss); Kristan-Tollmann: p. 81, pl. 1, fig. 4; pl. 6, fig. 6.  
 1991 *Bairdia cassiana* (Reuss); Kristan-Tollmann et al.: p. 200, pl. 1, fig. 5.  
 1995 *Bairdia cassiana rotundidorsata* Monostori: p. 42, Pl. 2, figs. 4, 5.  
 1996 *Bairdia (Rectobairdia) garciai* Crasquin-Soleau & Grădinaru: p. 77, pl. 2, figs. 5, 8.  
 2013 *Bairdia cassiana* (Reuss); Monostori & Tóth: p. 310, pl. 2, figs. 7, 8, 10.  
 2014 *Bairdia cassiana* (Reuss); Monostori & Tóth: p. 26, pl. 1, fig. 14.  
 2015 *Bairdia cassiana* (Reuss); Mette et al.: pl. 2, fig. 1.  
 2018 *Bairdia cassiana* (Reuss); Crasquin et al.: p. 134, fig. 6M.  
 2020 *Bairdia cassiana* (Reuss); Crasquin et al.: p. 5, pl. 1, fig. I.  
 2020 *Bairdia cassiana* (Reuss); Forel et al.: figs. 4F-H.  
 2022 *Bairdia cassiana* (Reuss); Karadi et al.: fig. 11K.  
 2024 *Bairdia cassiana* (Reuss); Budai et al.: figs. 4F-H.  
 2025 *Bairdia cassiana* (Reuss); Forel: pl. 1, figs. C-F.  
 2025 *Bairdia cassiana* (Reuss); Mette & Moser: pl. 2, figs. 10, 11.

**Material:** Acquanova: 3C. Reali Celsi: 4C.

**Dimensions:** RV: L = 805–1001 µm, H = 421–445 µm. LV: L = 828–1001 µm, H = 459–508 µm.

**Occurrence.** Early Carnian, Late Triassic, Southern Alps, Italy (Reuss 1868; Gümbel 1869; Ulrichs 1971; Kristan-Tollmann 1978). Carnian, Late Triassic, Święty Krzyż Mountain, Poland (Styk 1958). Late Anisian-Ladinian, Middle Triassic and Carnian, Late Triassic, Transdanubian Range, Hungary (Kristan-Tollmann 1991; Monostori 1995; Monostori & Tóth 2013, 2014; Karadi et al. 2022; Budai et al. 2024). Early Anisian, Middle Triassic, North Dobrogea, Romania (Crasquin-Soleau & Grădinaru 1996). Middle Anisian, Middle Trias-

sic, Northern Calcareous Alps, Austria (Mette et al. 2015). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Parasporea, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites subbullatus/Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Nicoraella? budaensis* zone, late Julian-?earliest Tuvalian, Carnian, Late Triassic, ‘Raibl Beds’, Karavanke Mountains, Slovenia (Forel et al. 2020). *Aon* biozone, Cordevolian, early Carnian, Late Triassic, Upper Cassian Formation, Pralongia, Stuares Wiesen, Dolomites, Italy (Forel 2025). Early Ladinian, Middle Triassic, northern Calcareous Alps, Austria (Mette & Moser 2025). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

### *Bairdia gambaneraensis* Crasquin et al., 2020

Pl. 1, figs. K-M

- 2018 *Bairdia* cf. *deformata* Kollmann, 1963; Crasquin et al.: p. 134, figs. 6K, L.  
 2020 *Bairdia gambaneraensis* Crasquin et al.: p. 5, pl. 1, figs. G, H.  
 2025 *Bairdia gambaneraensis* Crasquin et al.; Forel: pl. 1, fig. I.

**Material:** Acquanova: 5C. Cuba: 1C. Reali Celsi: 14C, 3LV. Rocchette: 4C.

**Dimensions:** RV: L = 399–984 µm, H = 239–589 µm. LV: L = 403–1014 µm, H = 260–682 µm.

**Occurrence.** *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Parasporea, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites subbullatus/Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Aonoides* and *austriacum* biozone, Julian, Carnian, Late Triassic, Upper Cassian Formation, Milières, Dolomites, Italy (Forel 2025). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1, St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

***Bairdia scaliai*** Crasquin et al., 2018

Pl. 1, fig. N

2018 *Bairdia scaliai* n. sp. – Crasquin et al., p. 135, Fig. 6Q, R.**Material:** Acquanova: 1C. Reali Celsi: 4C. Rocchette: 2C. Torrente Cuba: 6C.**Dimensions:** RV: L = 537–854 µm, H = 301–462 µm. LV: L = 546–872 µm, H = 340–509 µm.**Occurrence.** *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspura, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).Genus *Hiatobairdia* Kristan-Tollmann, 1970**Type species:** *Hiatobairdia subsymmetrica* Kristan-Tollmann, 1970, by original designation.***Hiatobairdia subsymmetrica*** Kristan-Tollmann, 1970

Pl. 2, fig. E

- 1970 *Hiatobairdia subsymmetrica* Kristan-Tollmann: p. 268, pl. 35, figs. 1-3.
- 1976 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Tollmann: p. 276, pl. 163, fig. 14.
- 1978 *Hiatobairdia subsymmetrica deformis* Kristan-Tollmann: p. 83, pl. 4, figs. 1-7.
- 1979 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Kristan-Tollmann et al.: p. 147, pl. 6, fig. 4.
- 1980 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Kristan-Tollmann et al.: 179, pl. 9, figs. 1-3.
- 1988 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Kristan-Tollmann: fig. 6.2.
- 1992 *Hiatobairdia subsymmetrica subsymmetrica* Kristan-Tollmann; Dépêche & Crasquin-Soleau: pl. 1, fig. 1.
- 2014 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Monostori & Tóth: pl. 2, figs. 4, 5.
- 2018 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Crasquin et al.: p. 134, figs. 6F-H.
- 2020 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Crasquin et al.: p. 7, pl. 1, fig. R.
- 2022 *Hiatobairdia subsymmetrica* Kristan-Tollmann; Forel et al.: p. 341, pl. 4, fig. C, D.

**Material:** Acquanova: 3C. Reali Celsi: 1LV. Torrente Cuba: 1RV.**Dimensions:** RV: L = 863 µm, H = 418 µm. LV: L = 564–863 µm, H = 298–480 µm.

**Occurrence.** Rhaetian, Late Triassic, Austria (Kristan-Tollmann 1970). Early Carnian, Late Triassic, Italy (Tollmann 1976; Kristan-Tollmann 1978). Rhaetian, Late Triassic, Bagerabad near Isfahan, Iran (Kristan-Tollmann et al. 1979, 1980; Kristan-Tollmann 1988). Rhaetian, Late Triassic, Exmouth Plateau, northwestern margin of Australia (Dépêche & Crasquin-Soleau 1992). Ladinian, Middle Triassic and Carnian, Late Triassic, Transdanubian Range, Hungary (Monostori & Tóth 2014). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspura, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). Late Norian, Late Triassic, Aksala Formation, Lewes River Group, Stikinia terrane, Whitehorse area, Yukon territory, Canada (Forel et al. 2022). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4), Monte Scalpello, central-east Sicily, Italy (this work).

## PLATE 1

- SEM micrographs of ostracods from Carnian deposits of the Mufara Formation, all C in right view. Scale bars: 200 µm.
- Figs. A, B - *Acratia maugeri* Crasquin et al., 2018. A: PCM O FS75, Acquanova St. 4. B: PCM O FS76, Rocchette.
- Figs. C, D - *Bairdia andreocrasquini* Crasquin et al., 2020. C: PCM O FS77, Acquanova St. 4. D: PCM O FS78, Acquanova St. 5.
- Figs. E, F - *Bairdia balatonica* Méhes, 1911. E: PCM O FS79, Acquanova St. 4. F: PCM O FS80, Rocchette.
- Figs. G, H - *Bairdia cassiana* (Reuss, 1868). G: PCM O FS81. H: PCM O FS82. Both from Reali Celsi St. 2.
- Fig. I - *Bairdia* cf. *finalyi* (Méhes, 1911) in Crasquin et al., 2018, PCM O FS83, Rocchette.
- Fig. J - *Bairdia* cf. *monostorii* Forel & Grădinaru, 2018 in Crasquin et al., 2020, PCM O FS84, Acquanova St. 4.
- Figs. K-M - *Bairdia gambaneraensis* Crasquin et al., 2020. K: PCM O FS85. L: PCM O FS86. M: PCM O FS87. All from Reali Celsi St. 2.
- Fig. N - *Bairdia scaliai* Crasquin et al., 2018, PCM O FS88, Acquanova St. 5.
- Fig. O - *Bairdia* sp. 1, PCM O FS89, Reali Celsi St. 1.
- Fig. P - *Bairdia* sp. 2, PCM O FS90, Acquanova St. 4.
- Fig. Q - *Bairdiacypris triassica* Kozur, 1971 *sensu* Crasquin et al., 2020, PCM O FS91, Rocchette.
- Figs. R, S - *Bairdiacypris* cf. *mirantatae* Crasquin-Soleau & Grădinaru, 1996 in Crasquin et al., 2018. R: PCM O FS92. S: PCM O FS93. Both from Rocchette.
- Fig. T - *Bairdiacypris* sp. 1, PCM O FS94, Acquanova St. 4.
- Fig. U - *Bairdiacypris* sp. 2, PCM O FS95, Acquanova St. 4.

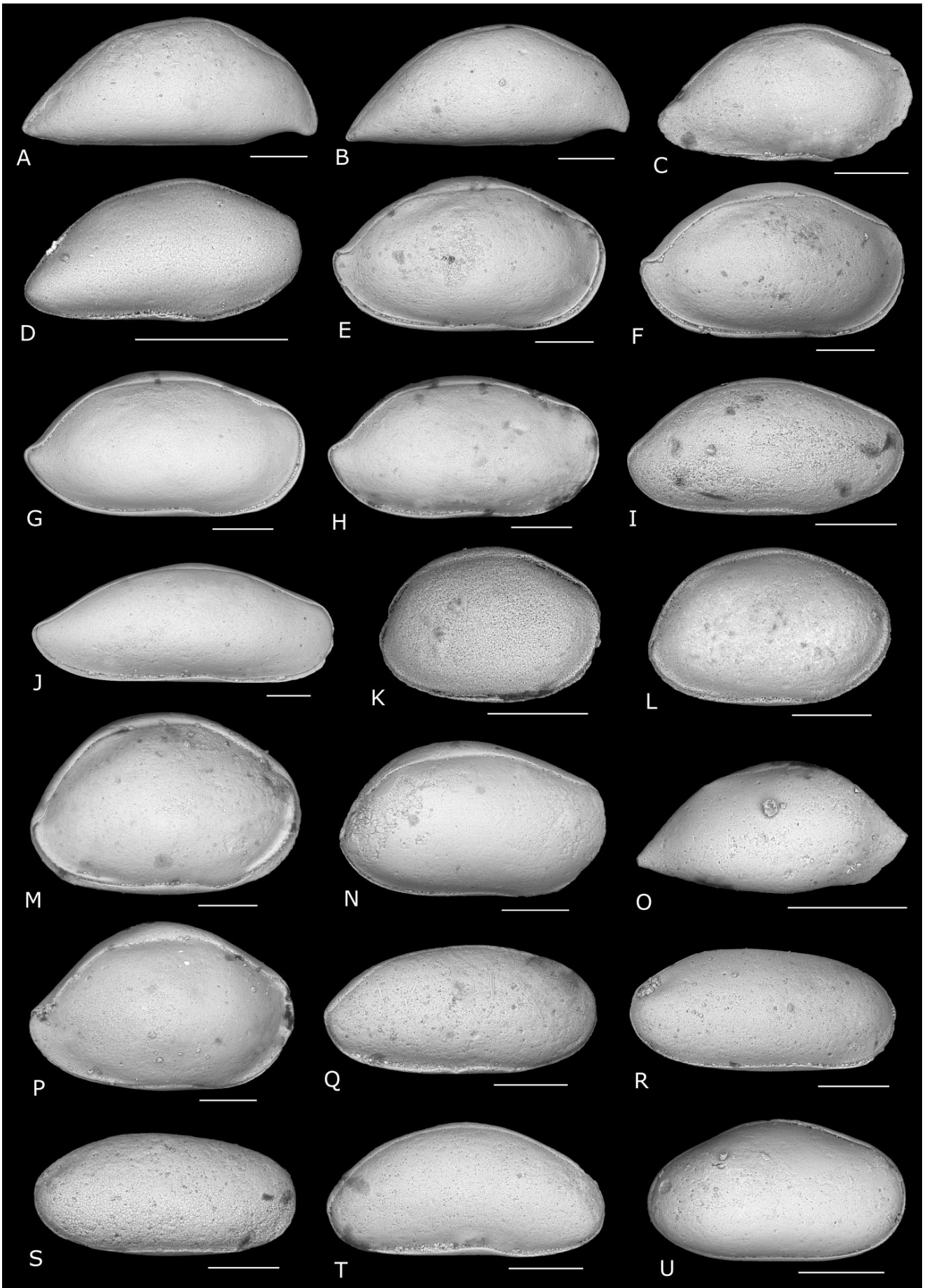


PLATE 1

Genus *Histriabairdia* Forel in Forel & Grădinaru, 2020

**Type species:** *Histriabairdia pontuseuxinusensis* Forel in Forel & Grădinaru, 2020, by original designation.

***Histriabairdia gemmellaroi*** (Crasquin et al., 2018)

Pl. 2, fig. G

2018 “*Anchistrocheles*” *gemmellaroi*; Crasquin et al.: p. 137, figs. 7D-F.

**Material:** Acquanova: 1C. Rocchette: 1C.

**Dimensions:** RV: L = 585 µm, H = 343 µm. LV: L = 593 µm, H = 351 µm.

**Remarks.** We follow Forel & Grădinaru (2020) in considering “*Anchistrocheles*” *gemmellaroi* Crasquin et al., 2018 as belonging to *Histriabairdia*.

**Occurrence.** *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Mirabairdia* Kollmann, 1963

**Type species:** *Mirabairdia pernodosa* Kollmann, 1963, by original designation.

***Mirabairdia pernodosa*** Kollmann, 1963

Pl. 2, fig. J

1963 *Mirabairdia pernodosa* Kollmann, p. 177, pl. 1, figs. 1, 2; pl. 8, figs. 1-6.

1971a *Triebelina* (*Mirabairdia*) *balatonica*; Kozur, p. 15, figs. 2I, 3C.

1971a *Triebelina* (*Mirabairdia*) *pernodosa illyrica* Kozur: p. 17, fig. 1G.

1971a *Mirabairdia pernodosa* Kollmann; Kristan-Tollmann: text-fig. 1/8.

1984 *Triebelina* (*Mirabairdia*) *pernodosa illyrica* Kozur; Salaj & Jendrejškova: pl. 2, figs. 1, 4.

2014 *Triebelina* (*Mirabairdia*) *pernodosa* (Kollmann); Monostori & Tóth: p. 27, pl. 2, figs. 7, 8.

2020 *Mirabairdia pernodosa* Kollmann; Crasquin et al.: p. 7, pl. 2, fig. B.

2024 *Mirabairdia pernodosa* Kollmann; Forel et al.: fig. 10G.

2025 *Mirabairdia pernodosa* Kollmann; Forel: pl. 2O.

**Material:** Acquanova: 1LV. Reali Celsi: 1LV.

**Dimensions (without nodules):** LV: L = 563 µm, H = 304 µm.

**Occurrence.** Anisian, Middle Triassic, Western Carpathians, Slovakia (Salaj & Jendrejškova 1984; Kozur 1971a). Anisian-Ladinian, Middle Tri-

assic Transdanubian Range, Hungary (Kozur 1971a; Monostori & Tóth 2014). Ladinian, Dolomites, South Tirol, Italy (Kristan-Tollmann 1971a). Ladinian, Northern Calcareous Alps, Cassian beds, Austria (Kollmann 1963). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Austriacum* biozone, Julian, Carnian, Late Triassic, upper Cassian Formation, Seelandalpe, Dolomites, Italy (Forel et al. 2024; Forel 2025). Tuvanian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Nodobairdia* Kollmann, 1963

**Type species:** *Nodobairdia mammillata* Kollmann, 1963, by original designation.

PLATE 2

SEM micrographs of ostracods from Carnian deposits of the Mufara Formation, all C in right lateral view of except D, J (C in left view) and U (RV in external view). Scale bars: 200 µm.

Fig. A - *Bairdiacypris* sp. 2, PCM O FS96, Acquanova St. 5.

Fig. B - *Ceratobairdia* sp., PCM O FS97, Acquanova St. 4.

Figs. C, D - *Dicerobairdia* sp. C: PCM O FS98. D: PCM O FS99. Both from Acquanova St. 4.

Fig. E - *Hiatobairdia subsymetrica* Kristan-Tollmann, 1970, PCM O FS100, Acquanova St. 4.

Fig. F - *Hiatobairdia* sp. A in Crasquin et al., 2020, PCM O FS101, Rocchette.

Fig. G - *Histriabairdia gemmellaroi* (Crasquin et al., 2018), PCM O FS102, Acquanova St. 4.

Fig. H - *Lobobairdia* sp. 1, PCM O FS103, Reali Celsi St. 2.

Fig. I - *Lobobairdia* sp. 2, PCM O FS104, Acquanova St. 4.

Fig. J - *Mirabairdia pernodosa* Kollmann, 1963, PCM O FS105, Reali Celsi St. 1.

Figs. K, L - *Nodobairdia mammillata* Kollmann, 1963. K: PCM O FS106, Acquanova St. 4. L: PCM O FS107, Rocchette.

Figs. M, N - *Petasobairdia jeandercourti* Crasquin et al., 2020. M: juvenile, PCM O FS108. N: PCM O FS109. Both from Rocchette.

Figs. O-U - *Petasobairdia scylla* n. sp. O: PCM O FS158, Reali Celsi St. 1. P: PCM O FS110, Rocchette. Q: paratype 2, PMC O 246 P 19/6/25, Rocchette. R: PCM O FS111, Rocchette. S: PCM O FS112, Rocchette. T: paratype 1, PMC O 245 P 19/6/25, Rocchette. U: holotype, PMC O 113 H 19/6/25, Rocchette.

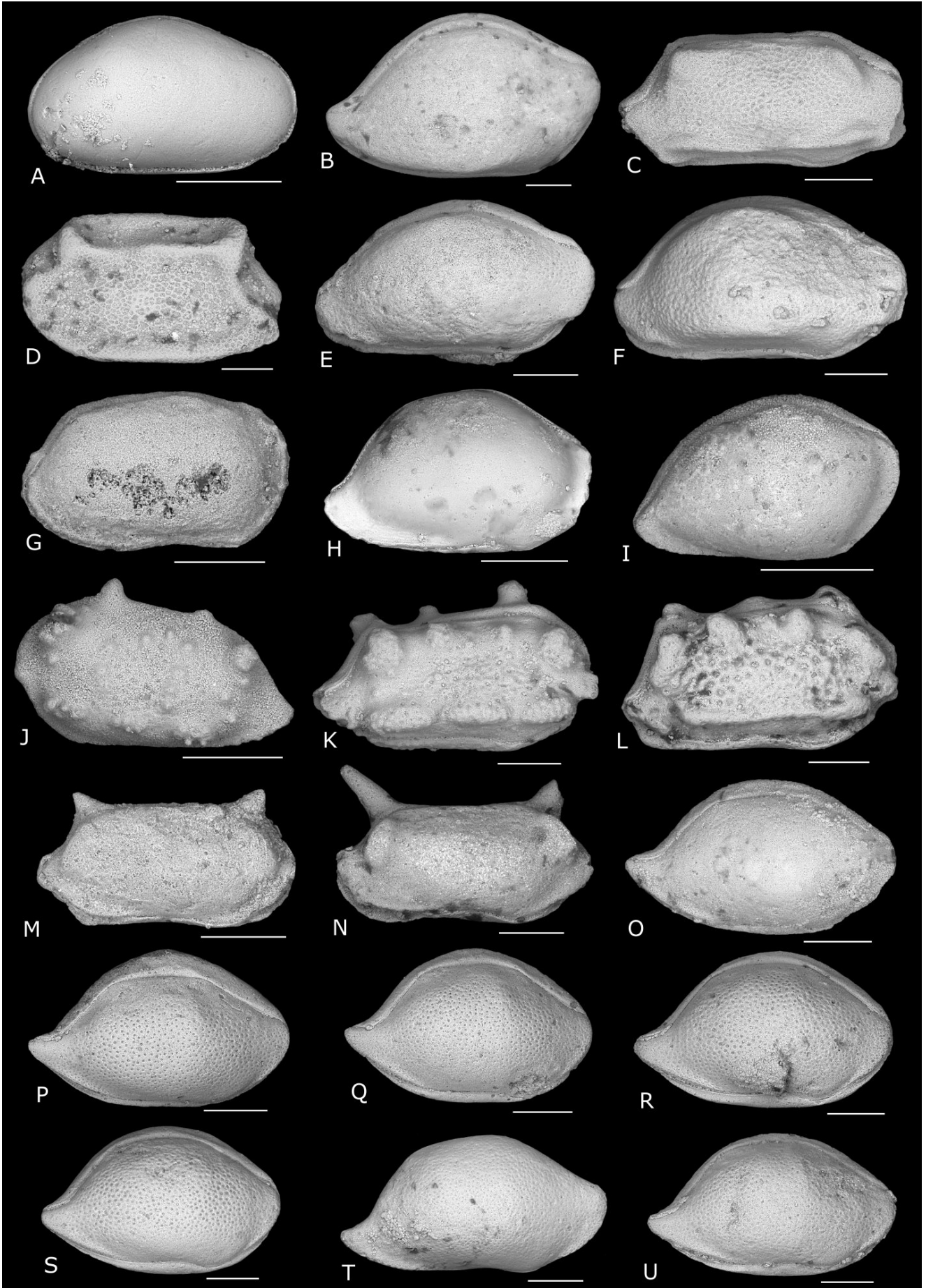


PLATE 2

***Nodobairdia mammillata* Kollmann, 1963**

Pl. 2, figs. K, L

- 1963 *Nodobairdia mammillata* Kollmann: p. 174, pl. 7, figs. 6-15.  
 1971a *Triebelina* sp. G Bolz: pl. 2, fig. 9.  
 1971b *Triebelina* (*Nodobairdia*) *triassica* Bolz: p. 216, pl. 16, figs. 229-232.  
 1971a *Nodobairdia mammillata* Kollmann; Kristan-Tollmann: p. 63, pl. 1, fig. 1.  
 non 1973 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann & Hamedani: pl. 12, fig. 9, pl. 13, fig. 1.  
 1978 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann: p. 84, pl. 8, figs. 1-6.  
 1979 *Nodobairdia mammillata* Kollmann; Lieberman: p. 105.  
 1980 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann et al.: p. 185, pl. 7, fig. 1113.  
 1986 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann: p. 209, 210, fig. 4.  
 1988 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann: fig. 6/6.  
 1991 *Nodobairdia mammillata* Kollmann; Kristan-Tollmann et al.: 201, pl. 1, figs. 1-3.  
 1992 *Nodobairdia mammillata* Kollmann; Dépêche & Crasquin-Soleau: p. 2, figs. 1-4.  
 1993 *Nodobairdia mammillata* Kollmann; Crasquin-Soleau & Dépêche: pl. 1, fig. 12.  
 1993 *Nodobairdia mammillata* Kollmann; Mirăuță et al.: p. 95, pl. 3, figs. 22a, b.  
 1994 *Nodobairdia mammillata* Kollmann; Monostori: p. 316, fig. 4/3.  
 2010 *Nodobairdia mammillata* Kollmann; Zorn: p. 271, pl. 7, figs. 8-11.  
 2014 *Triebelina* (*Nodobairdia*) *mammillata* (Kollmann); Monostori & Tóth: p. 28, pl. 2, figs. 9, 10.  
 2015 *Nodobairdia mammillata* Kollmann; Haussmann & Nützel: p. 241.  
 2016 *Nodobairdia triassica* (Bolz, 1971) – Urlichs and Krystyn: p. 21.  
 2018 *Nodobairdia mammillata* Kollmann; Crasquin et al.: p. 137, fig. 7G.  
 2020 *Nodobairdia mammillata* Kollmann; Forel & Moix: p. 8, pl. 1, figs. C-E.  
 2024 *Nodobairdia mammillata* Kollmann; Forel et al.: figs. 6-8, 10A-F, 11.  
 2025 *Nodobairdia mammillata* Kollmann; Forel: pl. 2, figs. S, T.

**Material:** Acquanova: 2C, 3LV. Rocchette: 4C, 2LV, 1RV.**Dimensions (without nodules):** RV: L = 835–897 µm, H = 394–456 µm. LV: L = 736–1122 µm, H = 432–582 µm.

**Remarks.** The diagnostic features of *Nodobairdia mammillata* include three aligned subventral nodes, two dorsal nodes on LV and four subdorsal nodes on both valves, with the anterior and posterior ones being oblong in shape (Kollmann 1963). In this species, the antero-dorsal and postero-dorsal nodes on LV are reduced in submature and adult stages, and the subventral nodes coalesce in adults (Kollmann 1963). These characteristics are observed on our largest LV, confirming its submature stage, while the pronounced antero-dorsal node and unfused subventral nodes of the carapace indicate a younger stage. The coalescence of the ventral row of nodes in the largest LV further supports the identification as *N. mammillata* and distinguishes it from *N. verrucosa* Kollmann, 1963.

**Occurrence.** Cordevolian, early Carnian, Late Triassic, South Tyrol, Italy (Kollmann 1963; Kristan-Tollmann 1971a; Kristan-Tollmann 1978; Zorn 2010). Rhaetian, Late Triassic, Northern Calcareous Alps (Bolz 1971a, b; Urlichs & Krystyn 2016). Cordevolian, early Carnian, Late Triassic, Cave del Predil (Raibl), Julian Alps, Italy (Lieberman 1979). Rhaetian, Late Triassic, Bagerabad near Isfahan, Iran (Kristan-Tollmann et al. 1980; Kristan-Tollmann 1988). Australia, early Norian, Late Triassic (Kristan-Tollmann 1986). Hungary, upper Julian, Tuvallian, middle-late Carnian, Late Triassic (Kristan-Tollmann et al. 1991; Monostori 1994). Australia, late Norian-mid-Rhaetian, Late Triassic (Dépêche & Crasquin-Soleau 1992; Crasquin-Soleau & Dépêche 1993). Carnian-Rhaetian, Late Triassic, Hungary (Monostori & Tóth 2014). Carnian, Late Triassic, Stuores Wiesen, Italy (Haussmann & Nützel 2015). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Pseudofurnishius murcianus murcianus* zone, Cordevolian, early Carnian, Late Triassic, Karapınar Formation, Karadağ Unit, Lycian Nappes, south-west Turkey (Forel & Moix 2020). *Austriacum* zone, Julian, Carnian, Late Triassic, upper Cassian Formation, Seelandalpe, Dolomites, Italy (Forel et al. 2024; Forel 2025). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Petasobairdia* Chen in Chen & Shi, 1982**Type species:** *Petasobairdia bicornuta* Chen in Chen & Shi, 1982, by original designation.

**Remarks.** Here we follow Forel & Grădinaru (2020) in considering *Praelobobairdia* Kozur, 1991c as junior synonym of *Petasobairdia* Chen in Chen & Shi, 1982, as already evoked by Becker (2001).

***Petasobairdia jeandercourti* Crasquin et al., 2020**

Pl. 2, figs M, N

2020 *Petasobairdia jeandercourti* Crasquin et al.: p. 8, pl. 2, figs. G, H.**Material:** Rocchette: 2C, including a juvenile.**Dimensions (without spines):** RV: L = 596–789 µm, H = 278–359 µm. LV: L = 611–792 µm, H = 292–359 µm.

**Remarks.** The specimen shown in Pl. 2M is the smallest so far reported from this species.

**Occurrence.** *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

### *Petasobairdia scylla* n. sp.

Pl. 2, figs. O-U

**Zoobank Link:** urn:lsid:zoobank.org:act:D9EB7E81-1BEB-4449-AE00-D98730B02097.

**Etymology:** the specific epithet refers to *Scylla*, from the ancient Greek Σκύλλα (*Skýlla*), a legendary monster dwelling in the Strait of Messina; by apposition.

**Holotype:** PMC O 113 H 19/6/25, complete carapace (Pl. 2, fig. U).

**Paratype 1:** PMC O 245 P 19/6/25, right valve (Pl. 2, fig. T).

**Paratype 2:** PMC O 246 P 19/6/25, complete carapace (Pl. 2, fig. Q).

**Referred specimens:** Acquanova (4C), Reali Celsi (1C), Rocchette (8C).

**Type Locality:** Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy.

**Age:** *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic.

**Diagnosis:** a species of *Petasobairdia* with subtriangular-auriform carapace; surface with fine and homogenous punctae; lamellar overlap; straight and compressed PVB raised to caudate posterior end; anterior margin with AVB truncate in ventralmost part and laterally compressed in upper 2/3rd.

### Description

Large subtriangular carapace, with surface finely punctate, punctae of relatively homogenous size, randomly organized and separated by broad muri. Valves asymmetrical with LV overlapping RV all around and distinctly overreaching it along DB, with lip-like contact. Overlap lamellar dorsally, gently compressed laterally along DB, and interrupted along terminal portion of PVB.

LV subtriangular to subauriform with Hmax around mid-L and Lmax below mid-H. Broadly arched dorsal margin with straight ADB, PDB straight and steeper with terminal concavity. Ventral margin very gently arched, rising somewhat more steeply anteriorly than posteriorly, with straight PVB. Anterior margin large with supracurvate AVB, gently arched. Nearly straight and caudate posterior end located at lower 1/3rd of H.

RV subrectangular with Hmax at anterior cardinal angle and Lmax around lower 1/3rd to 1/4th

of H. Dorsal margin tripartite with ADB straight and gently concave anteriorly, DB straight and gently sloping posteriorly, PDB steep and straight with terminal concavity followed by subhorizontal tip. Ventral margin sinuous with oral concavity in front of mid-L and PVB straight, long, laterally compressed. Anterior margin large with maximum located only slightly above mid-H. AVB infracurvate, truncate in ventralmost part, gently arched and laterally compressed in upper 2/3rd. Nearly straight and sharply caudate posterior margin located at lower 1/4th-1/3rd of H.

**Dimensions.** Fig. 4A.

**Remarks.** *Petasobairdia scylla* n. sp. is assigned to *Petasobairdia* based on its massive and lamellar dorsal overlap of LV over RV. *Petasobairdia scylla* is the second species of *Petasobairdia* formally described from the Triassic, together with *Petasobairdia amazonella* Forel in Forel & Grădinaru, 2020 from Rhaetian deposits of the Romanian Black Sea shelf (Forel & Grădinaru 2020). *Petasobairdia amazonella* is however significantly shorter with subsquare outline. The new species is morphologically very close to *Petasobairdia iudicaensis* (Crasquin et al., 2020), emended below. It nonetheless differs by small and homogenous punctae, absence of dorso-lateral sulcus on both valves and of laterally compressed cardinal angles on RV.

**Occurrence.** Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

### *Petasobairdia iudicaensis* (Crasquin et al., 2020) n. comb. emend.

Pl. 3, figs. A-D

2020 *Ptychobairdia iudicaensis* Crasquin et al.: p. 7, pl. 2, figs. C, D.

**Holotype:** PMC O 25 H 13/10/2019, complete carapace (Pl. 2, fig. C in Crasquin et al. 2020, here re-illustrated as Pl. 3, fig. A).

**Paratype:** PMC O 81 P 13/10/2019, complete carapace (Pl. 2, fig. D in Crasquin et al. 2020, here re-illustrated as Pl. 3, fig. B).

**Referred specimens:** PCM O FS113, 1LV (Pl. 3, fig. C). PCM O FS114, 1RV (Pl. 3, fig. D).

**Type Locality:** Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020).

**Age:** *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic (Crasquin et al. 2020).

**Original diagnosis (from Crasquin et al. 2020):** 'A spe-

cies of *Ptychobairdia* with a reticulated carapace which is flattened laterally all around except at the ventral part; LV significantly higher than RV, presence of vertical sulci at antero-dorsal part of the carapace.'

**Emended diagnosis:** A species of *Petasobairdia* with subtriangular carapace; punctate surface with size of punctae increasing anteriorly and posteriorly, smooth along dorsal margin on both valves; lamellar overlap; dorsal margin of both valves compressed laterally, with scattered large normal pores; sulcus on dorso-lateral surface of both valves; anterior margin with AVB truncate in ventralmost part and laterally compressed in upper 2/3rd.

## Description

Very large subrectangular carapace with surface punctate except on the laterally compressed dorsal margin of both valves. Size of punctae increasing from median part of both valves toward the anterior and posterior, with broad muri in the center to narrower muri toward the extremities. Valves asymmetrical with LV overlapping RV all around and strongly overreaching it along DB, with lip-like contact. Overlap interrupted along terminal portion of PVB and dorsally lamellar, with lateral compressions above anterior and posterior cardinal angles.

LV subtriangular with highly convex dorsal margin, with Hmax at mid-L and Lmax slightly below mid-H. Broadly arched dorsal margin with straight ADB eventually displaying gentle terminal concavity, PDB straight and steeper with terminal concavity. Ventral margin arched, rising equally anteriorly and posteriorly, with straight VB, straight to gently convex compressed PVB, gently convex AVB. Anterior margin large with supracurvate AVB, gently arched. Nearly straight and caudate posterior margin located at lower 1/3rd of H. Nearly straight and caudate posterior end located at lower 1/3rd of H. Valve surface centrally inflated and strongly compressed along entire dorsal, posterior and antero-dorsal margins. Compressed dorsal part smooth, scattered with large normal pores on protuberances. Around mid-L, deep and large sulcus oriented anteriorly and located dorso-laterally below compressed zone, not extending below mid-H.

RV subrectangular with Hmax at anterior cardinal angle and Lmax slightly below mid-H. Dorsal margin tripartite with ADB gently concave, DB slightly convex and gently sloping posteriorly, PDB steep and straight with terminal concavity followed by subhorizontal tip. Ventral margin sinuous with oral concavity in front of mid-L and straight, long PVB. Anterior margin large with maximum of con-

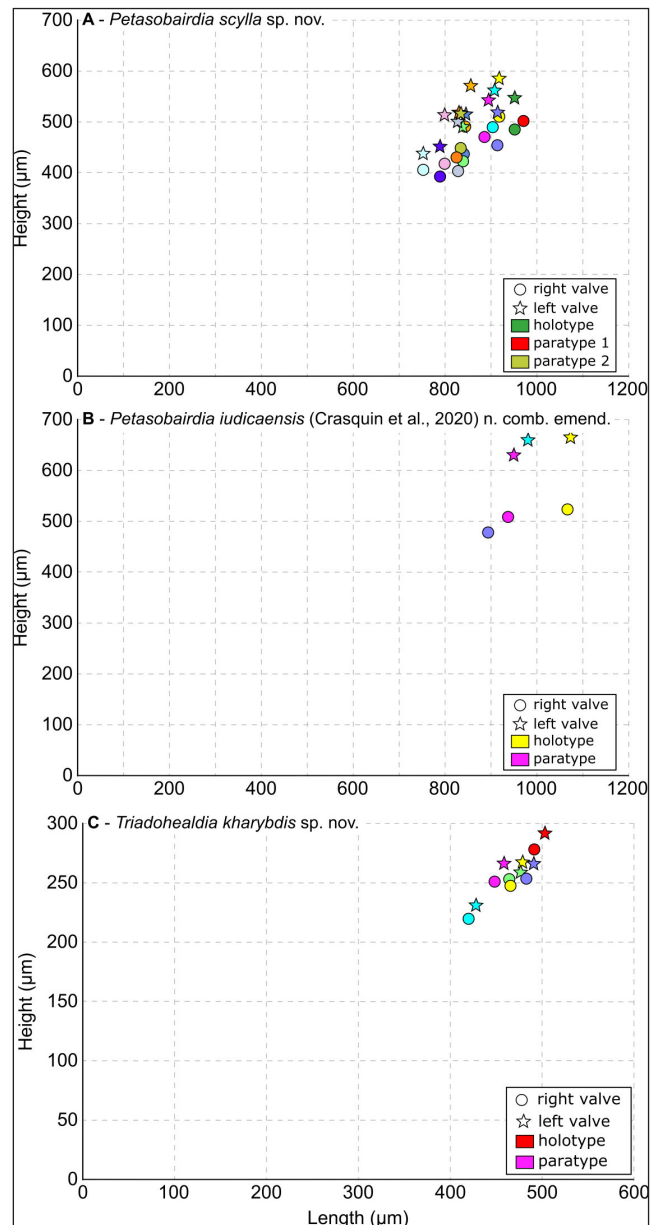


Fig. 4 - Height/Length scatter plots of *Petasobairdia scylla* n. sp. (A), *Petasobairdia iudicaensis* (Crasquin et al., 2020) emend. (B) and *Triadohealdia kharybdis* n. sp. (C). In both diagrams, the dimensions of right and left valves from complete carapaces are shown separately and color-coded, with the right and left valves of each carapace measured independently but displayed in the same color.

vexity located around 1/3rd of H. AVB infracurvate, truncate in ventralmost part, gently arched and laterally compressed in upper 2/3rd. Valve surface centrally inflated, strongly compressed along anterior and posterior cardinal angle, less so along PVB. Compressed dorsal part smooth, scattered with large normal pores on protuberances. Around mid-L, deep and large sulcus oriented anteriorly and located dorso-laterally below compressed zone, not extending below mid-H.

**Dimensions.** Fig. 4B.

**Remarks.** This species was described from the Mufara Formation exposed at Monte Gambanera and assigned to *Ptychobairdia* Kollmann, 1960 (Crasquin et al. 2020). Two specimens were illustrated: the holotype (Pl. 3, fig. A) and the paratype (Pl. 3, fig. B). However, the original description and illustrations present two major issues.

**Generic attribution.** The first issue concerns the original assignment of this species to *Ptychobairdia* Kollmann, 1960, which was made without discussion of the characters supporting this placement. *Ptychobairdia* (type species: *Ptychobairdia kuepperi* Kollmann, 1960) is characterized by latero-dorsal and latero-ventral longitudinal swellings on both valves, with a median area more or less inflated. Such longitudinal structures are lacking on all specimens of this species, that rather display: 1) strong lateral compressions at anterior and posterior cardinal angles on RV, and a strongly compressed dorsal margin on LV, 2) a high and laterally compressed lamellar overreach of LV along the dorsal border of RV. These characters rather relate this species to *Petasobairdia* Chen in Chen in Chen & Shi, 1982, as also discussed in Forel & Grădinaru (2020).

**Characters defining the species.** The original diagnosis and description mentioned “a sulcus in AD part” of RV and “two vertical sulci in dorsal part” of LV. However, the weak development of this structure on the holotype (Pl. 2, fig. A), the encrustation and poor preservation of the paratype (Pl. 2, fig. A) and the absence of an LV illustration in Crasquin et al. (2020) made it difficult to fully evaluate the diagnostic characters of this species. The re-examination of all Monte Gambanera specimens revealed two particularly important specimens (1LV and 1RV; Pl. 3, figs. C, D). The newly illustrated LV displays a single sulcus, symmetrical to that on RV. On the RV of the holotype, which is the largest specimen available, the sulcus is barely expressed, but the specimen retains all other distinctive features of the species. Based on these observations, the diagnosis of *Ptychobairdia indicaensis* is here emended to include all diagnostic characters.

*Ptychobairdia indicaensis* is unquestionably very similar to *Ptychobairdia scylla*. It nonetheless clearly differs by the nature and distribution of its punctation, presence of a dorso-lateral sulcus on each valve, dorso-lateral compressions and higher AB. Despite the weak expression of the dorso-lateral

sulcus, the holotype of *Ptychobairdia indicaensis* exhibits all other diagnostic characters of the species and cannot be confused with *Ptychobairdia scylla*. The reduced expression of the sulcus may be ontogenetic, being less pronounced in adults due to the lateral inflation of the valves.

**Occurrence.** *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al., 2020).

Genus *Ptychobairdia* Kollmann, 1960

**Type species:** *Ptychobairdia kuepperi* Kollmann, 1960, by original designation.

***Ptychobairdia kristanae* Kollmann, 1960**

Pl. 3, fig. E

1960 *Ptychobairdia kristanae* Kollmann; p. 99, pl. 25, figs. 6-9.

1960 *Ptychobairdia medwenitschi* Kollmann; p. 101, pl. 26, figs. 1-11.

1963 *Ptychobairdia kristanae* Kollmann; Kollmann; p. 181.

2018 *Ptychobairdia kristanae* Kollmann; Crasquin et al. p. 135, fig. 7A.

2018 *Ptychobairdia kristanae* Kollmann; Forel et al.: p. 12, fig. 6.2.

**Material:** Acquanova: 3C. Rocchette: 2C. Torrente Cuba: 1C.

**Dimensions:** RV: L = 460–1384 µm, H = 226–866 µm. LV: L = 460–1401 µm, H = 226–937 µm.

**Occurrence.** Rhaetian, Late Triassic, Early Jurassic, Austria (Kollmann 1960, 1963). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Spongotortilis spinus moixi* zone, early Tuvallian, late Carnian, Late Triassic, Killik Formation, Tavuşçayırı Block, Sorgun Ophiolitic Mélange, Huğlu Tuffite, southern Turkey (Forel et al. 2018). Tuvallian, late Carnian, Late Triassic, Mufara Formation, Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Suborder **Cytherocopina** Baird, 1850

Superfamily Cytheroidea Baird, 1850

Family Cytheruridae Müller, 1894

Subfamily Cytherurinae Müller, 1894

Genus *Judabella* Sohn, 1968

**Type species.** *Judabella tsorfatia* Sohn, 1968, by original designation.

***Judabella fortенodosa*** (Urlichs, 1972)

Pl. 3, fig. N

- 1972 *Monoceratina fortенodosa* Urlichs: p. 678, pl. 1, figs. 6-8.  
 1979 *Monoceratina fortенodosa* Urlichs; Kristan-Tollmann et al.: p. 174.  
 1980 *Monoceratina fortенodosa* Urlichs; Kristan-Tollmann et al.: p. 187, pl. 8, fig. 10.  
 1988 *Triceratina fortенodosa* (Urlichs); Kristan-Tollmann: text-fig. 6/10.  
 1991 *Triceratina fortенodosa* (Urlichs); Kristan-Tollmann et al.: pl. 8, figs. 1, 2.  
 1999 *Triceratina fortенodosa* (Urlichs); Mette & Mohtat-Aghai: pl. 6, fig. 7.  
 2012 *Triceratina fortенodosa* (Urlichs); Mette et al.: p. 70.  
 2013 *Tuberoцерatina fortенodosa* (Urlichs); Hillebrandt et al.: p. 70.  
 2014 *Judabella fortенodosa* (Urlichs); Monostori & Tóth: p. 29, pl. 3, figs. 3, 4.  
 2018 *Judabella fortенodosa* (Urlichs); Forel et al.: p. 12, fig. 6.7.

**Material:** Torrente Cuba: 2LV (both incomplete).

**Occurrence.** Rhaetian, Late Triassic, Kössen Formation, Northern Calcareous Alps, Austria (Urlichs 1972; Mette & Mohtat-Aghai 1999; Mette et al. 2012; Hillebrandt et al. 2013). Rhaetian, Late Triassic, Bagerabad near Isfahan, Iran (Kristan-Tollmann et al. 1979, 1980; Kristan-Tollmann 1988). Rhaetian, Late Triassic, Tyrol (Kristan-Tollmann et al. 1991). Ladinian, Middle Triassic and Carnian, Late Triassic, Transdanubian Range, Hungary (Monostori & Tóth 2014). *Spongortilispinus moixi* zone, early Tuvalian, Late Carnian, Late Triassic, Killik Formation, Tavuşçayırı Block, Sorgun Ophiolitic Mélange, Huğlu Tuffite, southern Turkey (Forel et al. 2018). Tuvalian, late Carnian, Late Triassic, Mufara Formation, Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work).

***Judabella? montanarii*** Crasquin et al., 2018

Pl. 30

- 2018 *Judabella? montanarii* Crasquin et al.: p. 138, figs. 7M, N.

**Material:** Rocchette: 1C.

**Occurrence.** *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

***Judabella nodosa*** (Kozur in Bunza & Kozur, 1971)

Pl. 3, fig. P

- 1971 *Mostlerella nodosa nodosa* Kozur in Bunza & Kozur: p. 38, pl. 4, figs. 10, 12, 14, 16.  
 1971 *Mostlerella nodosa parva* Kozur in Bunza & Kozur: p. 39, pl. 4, fig. 2.  
 1973 *Mostlerella nodosa* Kozur in Bunza & Kozur; Kristan-Tollmann & Hamedani: pl. 8, figs. 10, 11; pl. 13, fig. 3.  
 1982 *Mostlerella nodosa parva* Kozur in Bunza & Kozur; Kristan-Tollmann: p. 566, pl. 2, figs. 5-7.  
 ?1982 *Mostlerella nodosa* Kozur in Bunza & Kozur; Basha: p. 8, pl. 1, fig. 17.  
 1990 *Mostlerella nodosa* Kozur in Bunza & Kozur; Gerry et al.: p. 96, pl. 1, fig. 7.  
 non 1989 *Mostlerella nodosa nodosa* Kozur in Bunza & Kozur; Kristan-Tollmann: pl. 4, figs. 6, 7.  
 1989 *Mostlerella nodosa parva* Kozur in Bunza & Kozur; Kristan-Tollmann: pl. 1.  
 1991 *Mostlerella nodosa* Kozur in Bunza & Kozur; Kristan-Tollmann et al.: p. 203, pl. 2, figs. 5-7, 9-12; pl. 3, fig. 6.  
 1994 *Mostlerella nodosa* Kozur in Bunza & Kozur; Monostori: p. 320, fig. 4/7.

**Material:** Acquanova: 2C. Reali Celsi: 1C. Rocchette: 3C.

**Dimensions:** RV: L = 518–535 µm, H = 275–277 µm. LV: L = 421–518 µm, H = 222–275 µm.

## PLATE 3

- SEM micrographs of ostracods from Carnian deposits of the Mufara Formation. Scale bars: 200 µm.  
 Figs. A-D - *Petasobairdia indicaensis* (Crasquin et al., 2020) n. comb. emend. A: C (right view), holotype, PMC O 25 H 13/10/2019 (Plate 2C in Crasquin et al., 2020). B: C (right view), paratype, PMC O 81 P 13/10/2019 (Plate 2D in Crasquin et al., 2020). C: LV, PCM O FS113. D: RV, PCM O FS114. All from Monte Gambanera.  
 Fig. E - *Ptychobairdia kristanae* Kollmann, 1960, C (right view), PCM O FS115, Acquanova St. 4.  
 Figs. F, G - *Urobairdia austriaca* Kollmann, 1963 *sensu* Crasquin et al., 2020. F: C (right view), PCM O FS116. G: C (right view), PCM O FS117 (G). Both from Rocchette.  
 Fig. H - '*Bythocypris*' sp., C (right view), PCM O FS118, Acquanova St. 4.  
 Fig. I - *Paracypris* sp. 1, C (right view), PCM O FS119, Acquanova St. 4.  
 Fig. J - *Paracypris* sp. 2, C (right view), PCM O FS120, Rocchette.  
 Figs. K, L - *Nemoceratina* sp., C (right and dorsal views), PCM O FS121, Reali Celsi St. 2.  
 Fig. M - Cytheropterinae gen. et sp. indet., C (right view), PCM O FS122, Acquanova St. 4.  
 Fig. N - *Judabella fortенodosa* (Urlichs, 1972), C (left view), PCM O FS123, Torrente Cuba.  
 Fig. O - *Judabella? montanarii* Crasquin et al., 2018, C (right view), PCM O FS124, Rocchette.  
 Fig. P - *Judabella nodosa* (Kozur in Bunza & Kozur, 1971), C (left view), PCM O FS125, Reali Celsi St. 2.  
 Figs. Q, R - *Kerocythere reticulata* Kristan-Tollmann, 1972. Q: C (right view), PCM O FS126. R: C (left view), PCM O FS127. Both from Acquanova St. 4.  
 Fig. S - *Kerocythere tualica* Kozur in Bunza & Kozur, 1971, C (left view), PCM O FS128, Rocchette.  
 Figs. T, U - *Mockella muelleri* Bunza & Kozur, 1971, T: PCM O FS129. U: PCM O FS130. Both C (right view) from Rocchette.

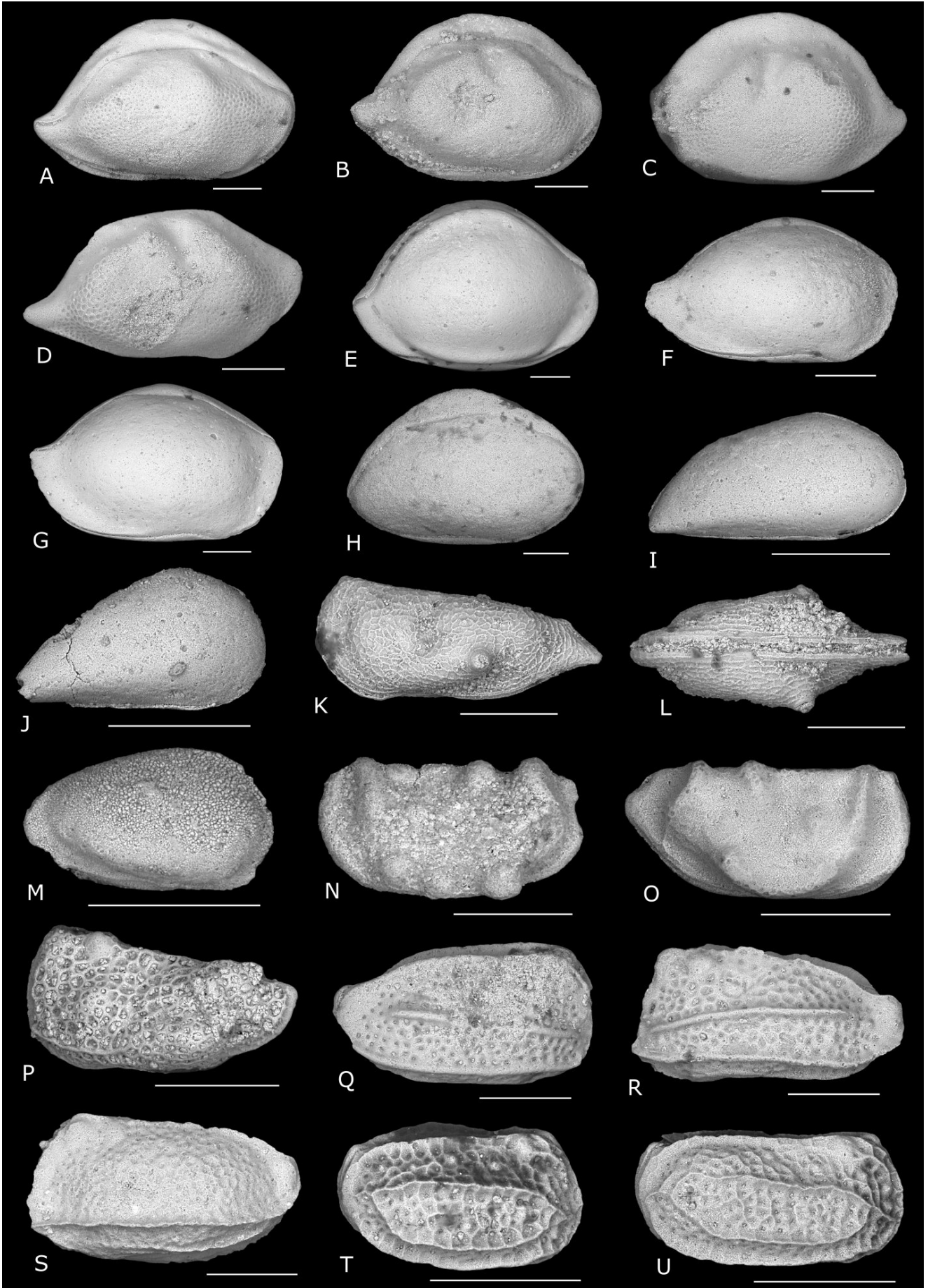


PLATE 3

**Occurrence.** Tuvalian, late Carnian, Late Triassic, Veszprem, Hungary (Bunza & Kozur 1971). Tuvalian, late Carnian, Late Triassic, Austria (Kristan-Tollmann & Hamedani 1973). Ladinian, Middle Triassic, Jordan Valley, Jordan (Basha 1982). Cordevolian, early Carnian, Late Triassic, upper Cassian Formation, Pralongia, Stuares Wiesen, Dolomites, Italy (Kristan-Tollmann 1989). Carnian, Late Triassic, Israel (Gerry et al. 1990). Middle Carnian, Late Triassic, Transdanubian Range, Western Hungary (Kristan-Tollmann et al. 1991). Early Carnian, Late Triassic, Transdanubian Range, Hungary (Monostori 1994). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Kerocythere* Kozur & Nicklas, 1970

**Type species:** *Kerocythere raibliana* (Gümbel, 1869), subsequently designated by Kozur & Nicklas (1970).

### *Kerocythere reticulata* Kristan-Tollmann, 1972

Pl. 3, figs. Q, R

pars 1971 *Kerocythere veghae* Kozur in Bunza & Kozur: p. 49, pl. 4, fig. 19, non fig. 17, 18.

1972 *Kerocythere reticulata* Kristan-Tollmann: p. 46, pl. 2, figs. 4, 5.

1979 *Kerocythere reticulata* Kristan-Tollmann; Lieberman: p. 103, pl. 5, fig. 5.

1991 *Kerocythere reticulata* Kristan-Tollmann; Kristan-Tollmann et al.: p. 204, pl. 1, fig. 8, 9.

2020 *Kerocythere reticulata* Kristan-Tollmann; Forel et al.: p. 391, figs. 7K, M.

**Material:** Acquanova: 5C. Rocchette: 1C.

**Dimensions:** RV: L = 555–614 µm, H = 281–338 µm. LV: L = 567–594 µm, H = 309–351 µm.

**Occurrence.** Tuvalian, late Carnian, Late Triassic, Veszprém, Bakony, Hungary (Bunza & Kozur 1971). Early Carnian, Late Triassic, Cave del Predil, Julian Alps, Italy (Kristan-Tollmann 1972; Lieberman 1979). Carnian, Late Triassic, Transdanubian Range, Hungary (Kristan-Tollmann et al. 1991). *Nicoraella?* *budaensis* conodont zone, late Julian-earliest Tuvalian, Carnian, Late Triassic, 'Raibl Beds', Karavanke Mountains, Slovenia (Forel et al. 2020). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

### *Kerocythere tualica* Kozur in Bunza & Kozur, 1971

Pl. 3, fig. S

1971 *Kerocythere tualica* Kozur in Bunza & Kozur: p. 51, pl. 4, fig. 15.

2019 *Kerocythere tualica* Kozur in Bunza & Kozur; Forel et al.: fig. 20C.

2020 *Kerocythere tualica* Kozur in Bunza & Kozur; Forel et al.: p. 391, figs. 7N, O.

**Material:** Rocchette: 1C.

**Dimensions:** LV: L = 605 µm, H = 327 µm.

**Occurrence.** Tuvalian, late Carnian, Late Triassic, Veszprem, Hungary (Bunza & Kozur 1971). *Tetraporobrachia haeckeli* Zone, Julian, Carnian, Late Triassic, Mersin Mélange, southern Turkey, Huğlu Tuffite (Forel et al. 2019). *Nicoraella?* *budaensis* zone, late Julian-earliest Tuvalian, Carnian, Late Triassic, 'Raibl Beds', Karavanke Mountains, Slovenia (Forel et al. 2020). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Mockella* Bunza & Kozur, 1971

**Type species:** *Kerocythere raibliana* (Gümbel, 1869), subsequently designated by Kozur & Nicklas (1970).

### *Mockella muelleri* Bunza & Kozur, 1971

Pl. 3, figs. T, U

1971 *Mockella muelleri* Bunza & Kozur: p. 8, Pl. 1, Fig. 12.

1979 *Mockella muelleri* Bunza & Kozur; Lieberman: p. 102, Pl. 5, Fig. 2.

2009 *Mockella muelleri* Bunza & Kozur; Carillat & Martini: p. 64 (not illustrated).

non 2018 *Mockella muelleri* Bunza & Kozur; Crasquin et al.: p. 139, figs. 7O-P (= *Mockella barbroae* Crasquin et al., 2020).

**Material:** Acquanova: 8C. Rocchette: 12C.

**Dimensions:** RV: L = 322–370 µm, H = 178–181 µm. LV: L = 329–411 µm, H = 171–235 µm.

**Remarks.** Crasquin et al. (2018, 2020) placed the genus *Mockella* within Glorianellidae Schneider, 1960 emend. Kozur, 1970, following the original attribution by Bunza & Kozur (1971). Here we instead follow: 1) Whatley & Moguevsky (1998) in treating Glorianellidae as a junior synonym of Limnocytheridae Klie, 1938, 2) Whatley & Boomer (2000) in recognizing *Mockella* as a valid genus within the Cytheruridae, subfamily Cytherurinae.

**Occurrence.** Julian, Carnian, Late Triassic, Scholastika, Tyrol, Austria (Bunza & Kozur 1971).

Cordevolian, early Carnian, Late Triassic, Cave del Predil (Raibl), Julian Alps, Italy (Lieberman 1979). Julian, Carnian, Late Triassic, Mufara Formation, Sicily (Carillat & Martini 2009). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Family Limnocytheridae Klie, 1938

Genus *Simeonella* Sohn, 1968

**Type species:** *Simeonella brotzenorum* Sohn, 1968, by original designation.

***Simeonella brotzenorum* Sohn, 1968**

Pl. 4, figs. A, B

- 1968 *Simeonella brotzenorum* Sohn: p. 23, pl. 2, figs. 1-4, 6-8, 12-22.  
 1970 *Lutkevicinella brotzenorum* (Sohn); Wienholz & Kozur: p. 588, pl. 1, figs. 4, 6-8.  
 1971 *Simeonella brotzenorum brotzenorum* Sohn; Bunza & Kozur: p. 3, pl. 1, figs. 8-11.  
 1971 *Simeonella brotzenorum alpina* Bunza & Kozur: p. 4, pl. 1, figs. 5-7, 13.  
 1971 *Simeonella brotzenorum norica* Bunza & Kozur: p. 5, pl. 1, fig. 3.  
 1973 *Simeonella brotzenorum* Sohn; Kristan-Tollmann & Hamedani: text-fig. 13/2.  
 1974 *Simeonella brotzenorum* Sohn; Hirsch & Gerry: pl. 2, figs. 1, 2.  
 1979 *Simeonella brotzenorum* Sohn; Lieberman: p. 103, pl. 5, figs. 6, 7.  
 1980 *Simeonella brotzenorum alpina* Bunza & Kozur; Bilan: p. 190.  
 1982 *Simeonella brotzenorum* Sohn; Basha: pl. 1, fig. 11.  
 1990 *Simeonella brotzenorum* Sohn; Gerry et al.: p. 95, pl. 1, figs. 3-5.  
 1994 *Simeonella brotzenorum nistorica* Monostori: p. 324, text-figs. 6/1-6.  
 2001 *Simeonella brotzenorum nistorica* Monostori; Keim et al.: fig. 8B.  
 2020 *Simeonella brotzenorum* Sohn; Crasquin et al.: p. 11, pl. 2, fig. R.

**Material:** Acquanova: 2C. Rocchette: 5C.

**Dimensions:** RV: L = 352–468 µm, H = 217–324 µm. LV: L = 354–472 µm, H = 223–324 µm.

**Occurrence.** Ladinian-Carnian, Middle-Late Triassic, Makhtesh Ramon, Israel (Sohn 1968; Hirsch & Gerry 1974; Gerry et al. 1990). Carnian, Late Triassic, Germany (Wienholz & Kozur 1970). Carnian, Late Triassic, Northern Calcareous Alps, Austria (Bunza & Kozur 1971; Kristan-Tollmann & Hamedani 1973). Carnian, Late Triassic, Julian Alps, Italy (Lieberman 1979; Keim et al. 2001). Julian, early Carnian, Late Triassic, Reed Sandstone, Silesia, Poland (Bilan 1980). Carnian, Late Triassic, Jordan Valley, Jordan (Basha 1982). Carnian, Late Triassic, Transdanubian Range, Hungary (Monostori 1994; Monostori & Tóth 2014). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Tro-*

*pites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Renngartenella* Schneider in Mandelstam et al., 1957

**Type species:** *Renngartenella pennata* Schneider in Mandelstam et al., 1957, by original designation.

***Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani, 1973**

Pl. 4, fig. C

- 1973 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani: p. 215, pl. 8, figs. 1-6; pl. 11, figs. 1, 3, 5, 6; pl. 12, fig. 10.  
 1979 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Lieberman: p. 215, pl. 5, fig. 2.  
 1982 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Basha: pl. 1, fig. 15.  
 1990 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Gerry et al.: p. 96, pl. 1, figs. 11-13.  
 1994 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Monostori: p. 320, figs. 5/5-7.  
 2001 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Keim et al.: fig. 8C.  
 2014 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Monostori & Tóth: p. 29, pl. 3, figs. 10-12.  
 2020 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Crasquin et al.: p. 10, pl. 2, fig. O.  
 2020 *Renngartenella sanctaecrucis* Kristan-Tollmann in Kristan-Tollmann & Hamedani; Forel et al.: figs. 7I, U, 8A-E.

**Material:** Acquanova: 13C. Rocchette: 14C.

**Dimensions:** RV: L = 496–612 µm, H = 258–324 µm. LV: L = 484–604 µm, H = 263–325 µm.

**Occurrence.** Julian, early Carnian, Late Triassic, Heiligkreuz Formation, Italy (Kristan-Tollmann & Hamedani 1973). Carnian, Late Triassic, Julian Alps, Italy (Lieberman 1979). Cordevolian, early Carnian, Late Triassic, Jordan valley, Jordan (Basha 1982). Carnian, Late Triassic, Israel (Gerry et al. 1990). Early Carnian, Late Triassic, Transdanubian Range, Hungary (Monostori 1994). Carnian, Late Triassic, Heiligkreuz Formation, Dolomites, Northern Italy (Keim et al. 2001). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). *Nicoraella?* *budaensis* zone, late Julian-earliest Tuvallian, Carnian, Late Triassic, 'Raibl Beds', Karavanke Mountains, Slovenia (Forel et al. 2020). *Tropites dilleri* zone, Tuvallian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4,

St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Genus *Lutkevichinella* Schneider, 1956

**Type species:** *Lutkevichinella bruttanae* Schneider, 1956, by original designation.

*Lutkevichinella simplex oblonga* Kozur in Bunza & Kozur, 1971

Pl. 4, figs. D, E

1971 *Lutkevichinella simplex oblonga* Kozur in Bunza & Kozur: p. 37, pl. 4, fig. 7.

1972 *Lutkevichinella simplex oblonga* Kozur in Bunza & Kozur; Kozur: table 1.

1980 *Lutkevichinella simplex oblonga* Kozur in Bunza & Kozur; Bilan: p. 190.

**Material:** Rocchette: 2C.

**Dimensions:** RV: L = 352–368 µm, H = 162–174 µm. LV: L = 352–368 µm, H = 168–174 µm.

**Occurrence.** Early Carnian, Late Triassic, Bakonyszücs, Hungary (Bunza & Kozur 1971). Carnian, Late Triassic, Germany (Kozur 1972). Julian, early Carnian, Late Triassic, Reed Sandstone, Silesia, Poland (Bilan 1980). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Suborder **Metacopina** Sylvester-Bradley, 1961

Superfamily Healdioidea Harlton, 1933

Family Healdiidae Harlton, 1933

**Remarks.** The taxonomic history of Triassic Healdiidae is complex and remains unresolved, as detailed below. For example, certain species have been alternatively assigned to *Hungarella* Méhes, 1911 or to a series of subsequently described genera, including *Aneisobealdia* Kristan-Tollmann, 1971b, *Signobealdia* Kristan-Tollmann, 1971b, *Toro-bealdia* Kristan-Tollmann, 1971c and *Triadobealdia* Kristan-Tollmann, 1971b.

Genus *Aneisobealdia* Kristan-Tollmann, 1971b

**Type species:** *Aneisobealdia diplocerata* Kristan-Tollmann, 1971b, by original designation.

*Aneisobealdia forelae* (Crasquin et al., 2020)

Pl. 4, figs. F, G

2018 *Ogmoconchella felsooersensis* (Kozur, 1970); Crasquin et al.: p. 133, figs. 6°, B.

2020 *Hungarella forelae* Crasquin et al.: p. 3, pl. 1, fig. A.

2025 *Anisobealdia forelae* (Crasquin et al.); Forel et al.: p. 14, pl. 4, figs. C-E.

**Material:** Acquanova: 10C. Reali Celsi: 4C. Rocchette: 6C.

**Dimensions (without spines):** RV: L = 564–875 µm, H = 376–595 µm. LV: L = 600–937 µm, H = 394–715 µm.

**Remarks.** The taxonomic history of this species illustrates the persistent uncertainties surrounding Triassic Healdiidae. Crasquin et al. (2018) initially identified Carnian specimens from Sicily as *Ogmoconchella felsooersensis* (Kozur, 1970), a species originally assigned to *Hungarella* Méhes, 1911. Subsequently, Crasquin et al. (2020) reattributed the Sicilian specimens to the newly described *Hungarella forelae*, following the prevailing consensus to avoid applying the Jurassic *Ogmoconchella* Gründel, 1964

PLATE 4

SEM micrographs of ostracods from Carnian deposits of the Mufara Formation. Scale bars: 200 µm, except C (100 µm).

Figs. A, B - *Simeonella brotzenorum* Sohn, 1968, C (right and left views), PCM O FS131 (A, Acquanova St. 4), PCM O FS132 (B, Rocchette).

Fig. C - *Renngartenella sanctaerensis* Kristan-Tollmann in Kristan-Tollmann & Hamedani, 1973, C (right view), PCM O FS133, Rocchette.

Figs. D, E - *Lutkevichinella simplex oblonga* Kozur in Bunza & Kozur, 1971, C (right and left views), PCM O FS134 (D), PCM O FS1135 (E), both from Rocchette.

Figs. F, G - *Aneisobealdia forelae* (Crasquin et al., 2020), C (right view), PCM O FS136 (F), PCM O FS1137 (G), both from Rocchette.

Fig. H - *Aneisobealdia siciliensis* (Crasquin et al., 2020), C (right view), PCM O FS138, Rocchette.

Figs. I-L - *Hungarella* cf. *bristolensis* (Anderson, 1964). I, C (right view), PCM O FS139, Reali Celsi St. 2. J, same specimen in dorsal view. K, C (right view), PCM O FS140, Reali Celsi St. 1. L, same specimen in dorsal view.

Fig. M - *Hungarella* sp. 1, C (right view), PCM O FS141, Torrente Cuba.

Fig. N - *Hungarella* sp. 2, C (right view), PCM O FS142, Acquanova St. 5.

Fig. O - *Hungarella* sp. 3, C (right view), PCM O FS143, Reali Celsi St. 2.

Figs. P, Q - *Hungarella* sp. 4, C (right view), PCM O FS1144 (P), PCM O FS145 (Q), both from Rocchette.

Figs. R, S - *Hungarella* sp. A in Crasquin et al., 2020, C (right view), PCM O FS146 (R, Acquanova St. 5), PCM O FS147 (S, Rocchette).

Figs. T, U - *Triadobealdia kbarybdis* n. sp. T, PCM O FS148, C (right view), Rocchette. U, paratype, PMC O 247 P 19/6/25, C (right view), Reali Celsi St. 1.



PLATE 4

and *Ogmoconcha* Triebel, 1941 to Triassic species, as briefly discussed below. Forel et al. (2025) reattributed to *Aneisohealdia* Kristan-Tollmann, 1971b, based on the presence of a spine rather than a rim along the anterior border. *Aneisohealdia* and *Hungarella* are further differentiated by the number of adductor muscle scars, respectively 8–10 and 8–14, though these features are not visible on the present material nor on the type specimens.

**Occurrence.** *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Contrada Paraspora, Monte Scalpello, central-east Sicily, Italy (Crasquin et al. 2018). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). Carnian, Late Triassic, Aitututu Formation, Bualaca area, Mota Sahe, Timor-Leste (Forel et al. 2025). Tuvanian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1, St. 2), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4, St. 5) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

***Aneisohealdia siciliensis*** (Crasquin et al., 2020)

n. comb.

Pl. 4, fig. H

2020 *Hungarella siciliensis* Crasquin et al.: p. 4, pl. 1, figs. B, C.

**Material:** Reali Celsi: 1C. Rocchette: 1C.

**Dimensions (without spines):** RV: L = 563–647 µm, H = 390–441 µm. LV: L = 598–674 µm, H = 416–492 µm.

**Remarks.** This species was described from sediments of the Mufara Formation exposed in Monte Gambanera and originally attributed to *Hungarella* (Crasquin et al. 2020). It is here reattributed to *Aneisohealdia* because of the presence of a spine rather than a rim along the anterior border.

**Occurrence.** *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). Tuvanian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvanian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

***Triadohealdia*** Kristan-Tollmann, 1971b

**Type species:** *Triadohealdia alexandri* Kristan-Tollmann, 1971b, by original designation.

***Triadohealdia kharybdis*** n. sp.

Pl. 4, figs. T, U; Pl. 5, figs. A-C

**Zoobank Link:** urn:lsid:zoobank.org:act:3B33CC40-7590-4CDD-91E7-2B8A5094CE6C.

**Etymology:** the specific epithet refers to *Kharybdis*, from the ancient Greek *Χάρυβδις* (*Kharybdis*), the sea monster of the ancient Greek mythology who was believed to live under a small rock in the Strait of Messina; by apposition.

**Holotype:** PMC O 114 H 19/6/25, complete carapace (Pl. 5, fig. C).

**Paratype:** PMC O 247 P 19/6/25, complete carapace (Pl. 4, fig. U).

**Referred specimens:** Reali Celsi (3C), Rocchette (1C).

**Type Locality:** Mufara Formation, C. da Reali Celsi, Monti di Palermo, north-west Sicily, Italy.

**Age:** Tuvanian, late Carnian, Late Triassic.

**Diagnosis:** a species of *Triadohealdia* with elongate, subrectangular carapace, posterior ridge well expressed on both valves ending by dull posterior spine, delimiting a laterally compressed posterior end.

**Description**

Thin-shelled carapace of medium size, elongate and subrectangular in lateral view. In both valves, Hmax at around mid-H or slightly behind it and Lmax at mid-H. Valves only slightly asymmetrical with LV larger than RV, slightly overlapping it all around except at PVB, which is overreached by lateral tumidity. Dorsal margin gently arched with PDB slightly convex, shorter and steeper than straight to gently concave ADB. Ventral margin long and straight with tenuous oral concavity around mid-L, more visible on LV. Anterior margin large, around mid-H to slightly above, with a tendency to develop a slight bulge in its anterodorsal part in some specimens. Posterior margin subvertical and substraight on both valves. On both valves, posterior ridge well-expressed, straight to largely curved, extending very posteriorly from below dorsal margin to blunt posterior spine located above venter. Ridge delimitates very narrow compressed area along posterior margin. Lateral surface with scattered normal pores, otherwise smooth.

**Dimensions.** Fig. 4C.

**Remarks.** The present species is assigned to *Triadohealdia* based on its elongated carapace and posterior ridge terminating in a blunt posterior spine. It differs from all previously known *Triadohealdia* species in its more elongate and subrectangular outline,



PLATE 5

SEM micrographs of ostracods from Carnian deposits of the Mufara Formation. Scale bars: 200  $\mu$ m.

- Figs. A-C - *Triadobealdia kharybdis* n. sp. A, C (right view), PCM O FS149, Reali Celsi St. 2. B, C (right view), PCM O FS150, Reali Celsi St. 2. C, holotype, C (right view), PMC O 114 H 19/6/25, Reali Celsi St. 2.  
 Fig. D - *Cytherella* sp., C (left view), PCM O FS151, Rocchette.  
 Figs. E, F - *Leviella bentori* Sohn, 1968, C (left view), PCM O FS152 (E), PCM O FS153 (F), both from Reali Celsi St. 2.  
 Fig. G - *Pokornyopsis* sp., C (right view), PCM O FS154, Rocchette.  
 Fig. H - *Polycope bandi* Crasquin-Soleau & Grädinaru, 1996 emend. Forel & Grädinaru, 2022, C (right view), PCM O FS155, Reali Celsi St. 2.  
 Fig. I - *Polycope pumicosa schleiferae* Kozur in Bunza & Kozur, 1971, C (right view), PCM O FS156, Rocchette.  
 Fig. J - *Polycope* cf. *kälekensis* Forel et al., 2019, C (left view), PCM O FS157, Rocchette.

narrow surface posterior to ridge and blunt posterior spine. Specifically, it differs from *Triadobealdia alexandri* Kristan-Tollmann, 1971b described from the Norian of Austria (Kristan-Tollmann 1971b), by the absence of a ridge along the free margin and of postero-dorsal swelling on both valves, particularly on RV. *Triadobealdia opisthocopta* Kristan-Tollmann, 1971b, also from the Norian of Austria (Kristan-Tollmann 1971b), is less elongated with PB bent inward and sharper posterior spine positioned higher.

**Occurrence.** Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1, St. 2), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

Order **Platycopida** Sars, 1866  
 Suborder **Platycopina** Sars, 1866  
 Superfamily Cytherelloidea Sars, 1866  
 Family Cytherellidae Sars, 1866  
 Genus *Leviella* Sohn, 1968

**Type species:** *Leviella bentori* Sohn, 1968, by original designation.

***Leviella bentori* Sohn, 1968**

Pl. 5, figs. E, F

- 1968 *Leviella bentori* Sohn: p. 22, pl. 1, figs. 15-18, 23, 25, 26.  
 1974 *Leviella bentori* Sohn; Kozur et al.: p. 42, fig. 21a.  
 ?1982 *Leviella bentori* Sohn; Basha: p. 42, pl. 1, fig. 10.  
 1990 *Leviella bentori* Sohn; Gerry et al.: p. 95, pl. 1, fig. 6.

**Material:** Acquanova: 1LV. Reali Celsi: 5C, 1LV. Torrente Cuba: 1C.

**Dimensions:** RV, L = 393–731  $\mu\text{m}$ ; H = 245–513  $\mu\text{m}$ . LV, L = 382–716  $\mu\text{m}$ ; H = 228–433  $\mu\text{m}$ .

**Occurrence.** Cordevolian, early Carnian, Late Triassic, Limestone Member of Sa'haronim Formation, Makhtesh Ramon, Israel (Sohn 1968). Ladinian, Middle Triassic, Sierra de Gador, area 7, Spain (Kozur et al. 1974). Cordevolian, early Carnian, Late Triassic, Jordan valley, Jordan (Basha 1982). Ladinian, Middle Triassic, Upper Muschelkalk, Toulon area, Var, France (Colin et al. 1983). Carnian, Late Triassic, Israel (Gerry et al. 1990). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 1, St. 2) and Torrente Cuba (St. 3), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4), Monte Scalpello, central-east Sicily, Italy (this work).

Subclass **MYODOCOPA** Sars, 1866  
 Order **Myodocopida** Sars, 1866  
 Suborder **Cladocopina** Sars, 1866  
 Superfamily Polycopoidea Sars, 1866  
 Family Polycopidae Sars, 1866  
 Genus *Polycope* Sars, 1866

**Type species:** *Polycope orbicularis* Sars, 1866, by original designation.

***Polycope baudi*** Crasquin-Soleau & Grădinaru, 1996 emend. Forel & Grădinaru, 2022

Pl. 5, fig. H

- 1996 *Polycope baudi* Crasquin-Soleau & Grădinaru: p. 73, pl. 1, figs. 1–3.  
 non 2013 *Polycope baudi* Crasquin-Soleau & Grădinaru; Sebe et al.: pl. 1, fig. 1.  
 2020 *Polycope baudi* Crasquin-Soleau & Grădinaru; Crasquin et al.: p. 12, pl. 3, fig. F.  
 2022 *Polycope baudi* Crasquin-Soleau & Grădinaru; Forel & Grădinaru: p. 8, figs. 4°–D.

**Material.** Reali Celsi: 1C.

**Dimensions.** RV, L = 385  $\mu\text{m}$ ; H = 383  $\mu\text{m}$ . LV, L = 397  $\mu\text{m}$ ; H = 375  $\mu\text{m}$ .

**Occurrence.** Aegean, early Anisian, Middle Triassic, North Dobrogea, Romania (Crasquin-Soleau & Grădinaru 1996). *Tropites subbullatus*/*Anatropites spinosus* zones, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Monte Gambanera, central-east Sicily, Italy (Crasquin et al. 2020). Deșli Caira section, North Dobrogea, Romania, late Spathian-Aegean, Early-Middle Triassic (Forel &

Grădinaru 2022). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2), Monti di Palermo, north-west Sicily, Italy (this work).

***Polycope pumicosa schleiferae*** Kozur in Bunza & Kozur, 1971

Pl. 5, fig. I

- 1971 *Polycope pumicosa schleiferae* Kozur in Bunza & Kozur: p. 14, pl. 2, fig. 17.  
 2013 *Polycoopsis* n. sp. ex gr. *cincinnata* (Apostolescu, 1959); Moix et al.: pl. 5, fig. 7.  
 non 2013 *Polycope pumicosa schleiferae* [sic] Kozur in Bunza & Kozur; Monostori & Tóth: p. 308, pl. 1, fig. 2.  
 2019 *Polycope pumicosa schleiferae* Kozur in Bunza & Kozur; Forel et al.: p. 36, fig. 24D.  
 2020 *Polycope pumicosa schleiferae* Kozur in Bunza & Kozur; Forel & Moix: p. 9, pl. 1, figs. G, H.

**Material:** Acquanova: 2C. Reali Celsi: 7C. Rocchette: 1C.

**Dimensions:** RV, L = 313–396  $\mu\text{m}$ ; H = 288–374  $\mu\text{m}$ . LV, L = 318–417  $\mu\text{m}$ ; H = 288–391  $\mu\text{m}$ .

**Occurrence.** Cordevolian, early Carnian, Late Triassic, Hungary (Bunza & Kozur 1971). *Tetraporobrachia haeckeli* Zone, Julian, middle Carnian, Late Triassic, Tavusçayiri Block, Sorgun Ophiolitic Mélange, Huğlu Tuffite, southern Turkey (Forel et al. 2019). *Pseudofurnishius murcianus murcianus* zone, Cordevolian, early Carnian, Late Triassic, Karapınar Formation, Karadağ Unit, Ağlıovası Yayla section, Lycian Nappes, south-west Turkey (Forel & Moix 2020). Tuvalian, late Carnian, Late Triassic, Mufara Formation, C. da Reali Celsi (St. 2), Monti di Palermo, north-west Sicily, Italy (this work). *Tropites dilleri* zone, Tuvalian, late Carnian, Late Triassic, Mufara Formation, Acquanova (St. 4) and Rocchette (St. 6), Monte Scalpello, central-east Sicily, Italy (this work).

**TAXONOMY AND DIVERSITY OF OSTRACODS FROM THE MUFARA FORMATION**

During the course of this study, several taxonomic adjustments were made at the species level based on the identifications in Crasquin et al. (2018, 2020):

*Petasobairdia indicaensis* (Crasquin et al., 2020), previously known only from the Monte Gambanera site (Crasquin et al. 2020), has been emended to clarify its diagnostic characters.

The specimens attributed to *Bairdiacypris triasica* Kozur, 1971b by Crasquin et al. (2020) (Pl. 2J in Crasquin et al. 2020) are conspecific with those

recovered in the present study from Torrente Cuba and Rocchette (Pl. 1, fig. Q). However, they do not belong to *Bairdiacypris triassica*, which has a subrectangular outline with a well-expressed posterior cardinal angle, whereas the Mufara specimens exhibit a more convex dorsal margin and poorly expressed cardinal angles.

The specimen identified as *Urobairdia angusta* Kollmann, 1963 (Pl. 2I in Crasquin et al. 2020) is conspecific with those from Acquanova and Rocchette (Pl. 3, figs. F, G). However, these specimens differ from *Urobairdia angusta* in having a less compressed free margin, which is significantly interrupted at the oral concavity, and in lacking the accompanying furrows. Notably, Bolz (1971a) proposed that *Urobairdia angusta* and *Urobairdia austriaca* Kollmann, 1963, type species of the genus, are conspecific, respectively representing male and female dimorphs of *Urobairdia austriaca*. We concur with this view and therefore refer to the present species as *Urobairdia austriaca* Kollmann, 1963 *sensu* Crasquin et al., 2020. Additionally, the Mufara specimens appear to exhibit two distinct morphotypes, which may represent sexual dimorphism. One dimorph displays a slightly lower carapace and a longer caudal process below mid-H (Pl. 3, fig. F in this study and specimen in Crasquin et al. 2020), while the other has a higher and more inflated carapace with a steeper PVB and a higher, shorter caudal process (Pl. 3, fig. G). Maddocks (2013) noted that in recent *Neonesidea* Maddocks, 1969, female carapaces tend to be longer and slightly higher relative to length than males, though distinguishing males from females remains difficult without soft-part anatomy. Accordingly, we hypothesize that the specimen in Pl. 3, fig. F represents a male, whereas that in Pl. 3, fig. G represents a female. It is plausible that the Mufara Formation specimens belong to a new species, characterized by a well-defined oral concavity in front of mid-L, a triangular overlap along dorsal border and a thin ridge along PVB. However, because of the high degree of homeomorphy of bairdiid carapaces (e.g., Maddocks 1969; Forel et al. 2021), additional material is required to fully evaluate the characters of this new species.

A few generic reattributions have also been realized:

*Hungarella siciliensis* Crasquin et al., 2020 (Pl. 4, fig. H) is reattributed to *Aneisobealdia*, as detailed in the systematic paleontology chapter.

*Bairdia* sp. F in Crasquin et al., 2020 is reattributed to *Parurobairdia* Kristan-Tollmann, 1969 based on the presence of a latero-dorsal ornamentation. No specimen attributable to this species or genus were found in the present study.

*Healdia?* sp. in Crasquin et al., 2018 has been reattributed to *Hungarella*, as detailed in the generic comments in the systematic paleontology chapter. This species is referred to as *Hungarella* sp. 4 (Pl. 4, figs. P, Q).

*Thaumatomma?* sp. A in Crasquin et al., 2020 is reattributed to *Pokornyopsis* Kozur, 1974 based on the presence of two antero-ventral thorn-like processes (Pl. 5, fig. G). Our concept of the genus *Pokornyopsis* is slightly larger than the original definition, following for instance Tóth & Cséfan (2018).

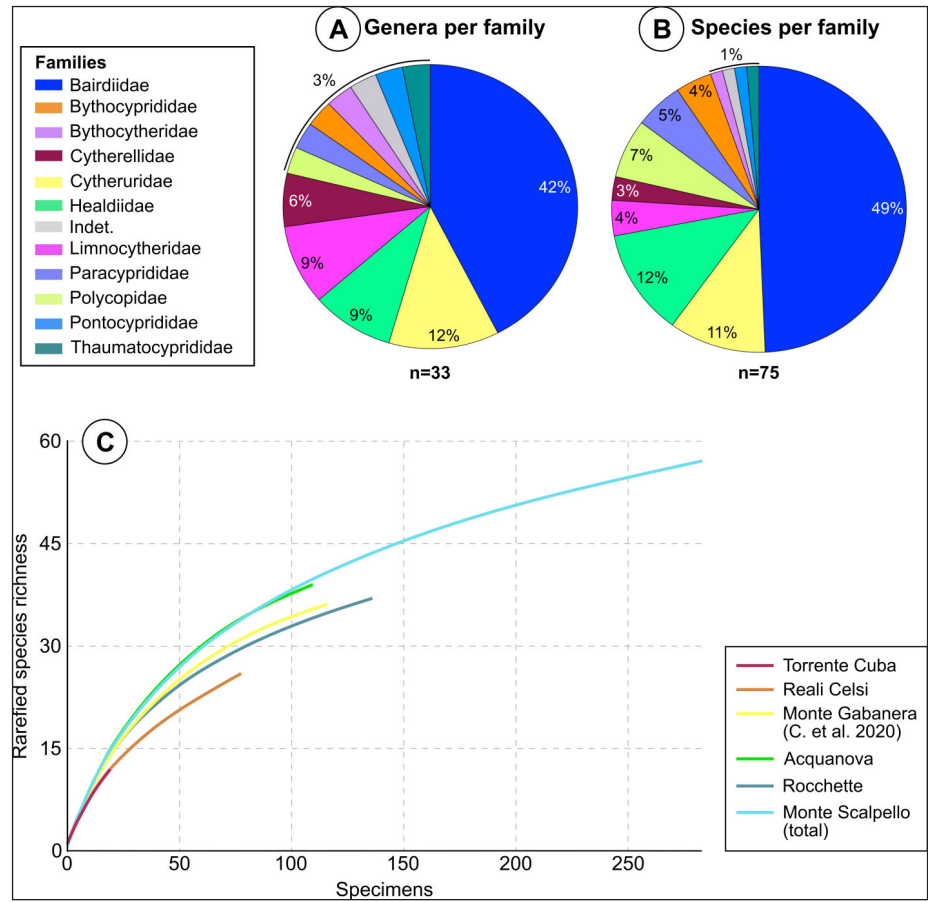
*Bektasia* sp. 1 in Crasquin et al., 2018, *Bektasia* sp. A in Crasquin et al., 2020 and *Bektasia* sp. B in Crasquin et al., 2020 are considered conspecific and are here reattributed to *Cytherella* Jones, 1849 based on the absence of a subcentral pit on the lateral surface (Pl. 5, fig. D). Notably, the specimens illustrated in Crasquin et al. (2020) are incorrectly oriented. While all specimens assigned to this species share a thin ridge along the anterior margin, a very thin ridge along PVB and a high PB, additional material is needed to fully characterize the species and clarify its potential relationship with *Cytherella persensis* Crasquin-Soleau & Teherani, 1995 from the Carnian of Iran (Crasquin-Soleau & Teherani 1995).

Fifty-eight species are reported here from the newly studied sections of the Mufara Formation in Monti di Palermo and Monte Scalpello (Tab. 2). These include 26 formally described species previously known from Triassic deposits, 30 species in open nomenclature or compared to other species and two newly described species (*Petasobairdia scylla* n. sp. and *Triadobealdia kbarybdis* n. sp.). This study substantially enhances the known ostracod biodiversity of the Mufara Formation, bringing it to 75 species, comprising 32 formal species and 43 in open nomenclature or compared to other species (Tab. 2), excluding the unillustrated record of *Mockella muelleri*. The Mufara ostracod assemblage encompasses 33 genera, 12 of which are newly reported in this work (bairdiids: *Ceratobairdia* Sohn, 1954, *Dicerobairdia* Kollmann, 1963, *Histriabairdia* Forel in Forel & Grădinaru, 2020, *Lobobairdia* Kollmann, 1963, *Parurobairdia*; bythocytherids: *Nemoceratina* Gründel & Kozur, 1971; cytherellids: *Cytherella*,

Updated identification	Monte Scalpello			Monti di Palermo		Monte Gambanera
	Acquanova	Rocchette	Crasquin et al. (2018)	C. Reali Celsi	Torrente Cuba	Crasquin et al. (2020)
<i>Bairdiacypris</i> sp. 1	1	0	0	0	0	0
<i>Bythocypris</i> 'sp.	3	0	0	0	0	0
<i>Ceratobairdia</i> sp.	1	0	0	0	0	0
Cytheropterae gen. et sp. indet.	1	0	0	0	0	0
<i>Dicerobairdia</i> sp.	2	0	0	0	0	0
<i>Lobobairdia</i> sp. 2	1	0	0	0	0	0
<i>Bairdiacypris</i> sp. 2	2	0	0	0	0	0
<i>Mirabairdia pernodosa</i> Kollmann, 1963	1	0	0	1	0	14
<i>Bairdia cassiana</i> (Reuss, 1868)	3	0	1	4	0	4
<i>Bairdia andreocrasquini</i> Crasquin et al., 2020	2	0	0	1	0	4
<i>Bairdia</i> sp. 2	2	0	0	1	0	0
<i>Hiatobairdia subsymetrica</i> Kristan-Tollmann, 1970	1	0	3	1	1	3
<i>Leviella bentori</i> Sohn, 1968	1	0	0	6	1	0
<i>Hungarella</i> sp. 2	2	0	0	1	0	0
<i>Hungarella</i> sp. 1	1	0	0	0	2	0
<i>Bairdia scaliai</i> Crasquin et al., 2018	1	2	4	4	6	0
<i>Histriabairdia gemmellaroii</i> (Crasquin et al., 2018)	1	1	7	0	0	0
<i>Paracypris</i> sp. 1	2	1	0	0	0	0
<i>Urobairdia austriaca</i> Kollmann, 1963 <i>sensu</i> Crasquin et al., 2020	1	3	0	0	0	2
<i>Rengartenella sanctaerucis</i> Kristan-Tollmann in Kristan-Tollmann & Hamedani, 1973	13	14	0	0	0	10
<i>Mockella barbroae</i> Crasquin et al., 2020	0	0	2	0	0	7
<i>Mockella muelleri</i> Bunza & Kozur, 1971	8	12	0	0	0	0
<i>Nodobairdia mammillata</i> Kollmann, 1963	5	7	1	0	0	0
<i>Kerocythere reticulata</i> Kristan-Tollmann, 1972	5	2	0	0	0	0
<i>Simeonella brotzenorum</i> Sohn, 1968	2	5	0	0	0	2
<i>Hiatobairdia</i> sp. A in Crasquin et al., 2020	3	8	0	0	0	2
<i>Polycope pumicosa schleiferiae</i> Kozur in Bunza & Kozur, 1971	2	1	0	7	0	0
<i>Acratia magerii</i> Crasquin et al., 2018	1	5	3	6	0	3
<i>Judahella nodosa</i> (Kozur in Bunza & Kozur, 1971)	2	3	0	1	0	0
<i>Hungarella</i> sp. A in Crasquin et al., 2020	3	3	0	4	0	1
<i>Lobobairdia</i> sp. 1	2	2	0	1	0	0
<i>Petasobairdia scylla</i> sp. nov.	4	11	2	1	0	0
<i>Bairdia balatonica</i> Méhes, 1911	5	9	1	1	0	0
<i>Aneisohealdia forelae</i> (Crasquin et al., 2020)	10	6	2	4	0	4
<i>Hungarella</i> sp. 4	2	6	2	2	1	0
<i>Pychoabairdia kristanae</i> Kollmann, 1960	3	2	1	0	1	0
<i>Cytherella</i> sp.	3	3	1	0	1	2
<i>Bairdia</i> cf. <i>monostorii</i> Forel & Grädinaru, 2018	2	4	2	1	1	2
<i>Bairdia gambaneraensis</i> Crasquin et al., 2020	5	4	2	18	1	4
<i>Pokornypopsis</i> sp.	1	2	0	0	0	2
<i>Bairdia</i> cf. <i>finlayi</i> (Méhes, 1911)	0	1	2	0	0	0
<i>Judahella ? montanarii</i> Crasquin et al., 2018	0	1	2	0	0	0
<i>Kerocythere tuvalica</i> Kozur in Bunza & Kozur, 1971	0	1	0	0	0	0
<i>Paracypris</i> sp. 2	0	1	0	0	0	0
<i>Polycope</i> cf. <i>kilekensis</i> Forel et al., 2019	0	1	0	0	0	0
<i>Lutkevichinella simplex oblonga</i> Kozur in Bunza & Kozur, 1971	0	2	0	0	0	0
<i>Petasobairdia jeandercourti</i> Crasquin et al., 2020	0	2	0	0	0	1
<i>Bairdiacypris</i> cf. <i>mirantae</i> Crasquin-Soleau & Grädinaru, 1996	0	7	1	0	0	0
<i>Aneisohealdia siciliensis</i> (Crasquin et al., 2020) n. comb.	0	1	0	1	0	4
<i>Nemoceratina</i> sp.	0	1	0	2	0	0
<i>Triadohealdia kharybdis</i> sp. nov.	0	1	0	5	0	0
<i>Bairdiacypris triassica</i> Kozur, 1971 <i>sensu</i> Crasquin et al., 2020	0	1	0	0	1	2
<i>Hungarella</i> cf. <i>bristolensis</i> (Anderson, 1964)	0	1	0	2	2	0
<i>Polycope baudi</i> Crasquin-Soleau & Grädinaru, 1996 emend. Forel & Grädinaru, 2022	0	0	0	1	0	2
<i>Bairdia</i> sp. 1	0	0	0	1	0	0
<i>Hungarella</i> sp. 3	0	0	0	1	0	0
<i>Judahella fortendosa</i> (Urichs, 1972)	0	0	0	0	2	0
<i>Bairdia</i> sp. A in Crasquin et al., 2020	0	0	0	0	0	2
<i>Bairdia</i> sp. B in Crasquin et al., 2020	0	0	0	0	0	1
<i>Bairdia</i> sp. C in Crasquin et al., 2020	0	0	0	0	0	1
<i>Bairdia</i> sp. D in Crasquin et al., 2020	0	0	0	0	0	1
<i>Bairdia</i> sp. E in Crasquin et al., 2020	0	0	0	0	0	1
<i>Bairdia</i> ? sp. 2 in Crasquin et al., 2018	0	0	1	0	0	0
<i>Bairdiacypris</i> cf. <i>aequisymetrica</i> Mette et al., 2015	0	0	1	0	0	0
<i>Bythocypris</i> sp. A in Crasquin et al., 2020	0	0	0	0	0	4
<i>Bythocypris</i> ? sp. 1 in Crasquin et al., 2018	0	0	1	0	0	0
<i>Kerocythere ditainoensis</i> Crasquin et al. 2020	0	0	0	0	0	4
<i>Paracypris</i> ? cf. <i>redcarensis</i> (Blake, 1876)	0	0	0	0	0	1
<i>Paracypris</i> ? sp. A in Crasquin et al., 2020	0	0	0	0	0	1
<i>Parurobairdia</i> sp. in Crasquin et al., 2020	0	0	0	0	0	2
<i>Petasobairdia iudicaensis</i> (Crasquin et al. 2020) n. comb. emend.	0	0	3	0	0	0
Podocopa gen. sp. indet. in Crasquin et al., 2020	0	0	0	0	0	1
<i>Polycope</i> sp. A in Crasquin et al., 2020	0	0	0	0	0	1
<i>Polycope</i> sp. A in Crasquin et al., 2020	0	0	0	0	0	3
<i>Pontocypris rara</i> Méhes, 1911	0	0	1	0	0	0
<i>Pychoabairdia leonardoi</i> Crasquin et al., 2020	0	0	0	0	0	14

Tab. 2 - Distribution of species across the studied sites with number of specimens (complete carapaces + higher number of right or left valves) per species at sites studied here (Reali Celsi, Torrente Cuba, Acquanova, Rocchette) and from the literature (Crasquin et al. 2018, 2020).

Fig. 5 - A, B - Pie charts of the composition of the total ostracod assemblage of Mufara Formation by number of genera per family (A) and number of species per family (B). C - Individual rarefaction curves for ostracod assemblages from Mufara Formation at each site.



*Leviella*; healdiids: *Aneisobealdia*, *Triadobealdia*; limnocytherids: *Lutkevichinella*; thaumatocyprids: *Pokornyopsis*).

Overall, the ostracod fauna of the Mufara Formation is largely dominated by Bairdiidae, representing 42% of the genera (Fig. 5A) and 49% of the species (Fig. 5B). Cytheruridae and Healdiidae form secondary components of the assemblage, accounting for 9-12% of the genera and 11-12% of the species. In contrast, the generic and species-level patterns of the remaining families are more decoupled. Limnocytheridae and Cytherellidae also constitute notable secondary components at the genus level (9% and 6%, respectively), but their contributions to species richness are lower (4% and 3%, respectively). All other families (Bythocypridae, Bythocytheridae, indet. family, Paracypridae, Pontocypridae, Polycopidae, Thaumatocypridae) make minor contributions to the generic diversity, each being 3%, with their species-level representation ranging from 1% (Bythocytheridae, indet. family, Pontocypridae, Thaumatocypridae) to 7% (Polycopidae).

All families and genera composing the Mufara ostracod community are broadly distributed

in marine environments during the Carnian (e.g., Crasquin-Soleau & Teherani 1995; Forel et al. 2019, 2020, 2021, 2025). Excluding species in open nomenclature or compared to others, 11 species are currently known only from the Mufara Formation: *Acratia maugerii*, *Bairdia andreocrasquini*, *B. gambaneraensis*, *B. scaliai*, *Histriabairdia gemmellaroi*, *Petasobairdia jeandercourti*, *Petasobairdia scylla* n. sp., *P. indicaensis*, *Judabella? montanarii*, *Aneisobealdia siciliensis*, *Triadobealdia kbarybdis* n. sp. Eighteen species have a wider distribution within the Tethys realm, as details in the Systematic Paleontology chapter: *Bairdia balatonica*, *B. cassiana*, *Hiatobairdia subsymmetrica*, *Mirabairdia pernodosa*, *Mockella muelleri*, *Nodobairdia mammilata*, *Ptychobairdia kristanae*, *Judabella fortенodosa*, *J. nodosa*, *Kerocythere reticulata*, *K. tuvalica*, *Simeonella brotzenorum*, *Renngartenella sanctaecrusis*, *Lutkevichinella simplex oblonga*, *Aneisobealdia forelae*, *Leviella bentori*, *Polycope baudi*, *P. pumicosa schleiferae*. Among these, *H. subsymmetrica* has also been reported from Norian deposits of eastern Panthalassa (Yukon; Forel et al. 2022). Of particular notice, *Pokornyopsis* sp. represents the oldest formal record of the genus, the oldest verified report being so far from Rhaetian deposits from the Romanian Black Sea shelf (Forel & Grădinaru 2020).

### Taphonomic analysis

To assess the representativeness of the ostracod assemblages and examine diversity patterns, specimens of each species were counted as articulated carapaces plus highest number of left or right valves (Nützel & Keim 2014; Haussmann & Nützel 2015). Individual rarefaction analyses were performed using PAST version 4.04 (Hammer et al. 2001; Hammer & Harper 2005), estimating the expected number of species as a function of the number of specimens at each site (Fig. 5C). When each site is considered individually, all rarefaction curves are still ascending, indicating that observed taxa counts do not fully capture the diversity of the faunas and that larger sample sizes would likely yield higher species richness. Nevertheless, all curves have passed their maximum of slope, suggesting that they provide a partial but meaningful representation of the communities, with the exception of the Torrente Cuba site. Fossil material from Torrente Cuba site was limited, primarily consisting of isolated valves, rare complete carapaces of ostracods, occasional crinoid fragments and pyritized internal molds of gastropods. Its rarefaction curve, based on 20 identifiable ostracod specimens, has not reached its maximum of slope, indicating that the data from this site are insufficient for robust interpretation.

The proportion of complete carapaces *versus* isolated valves, along with the demographic structure of populations, provide valuable insight into the autochthonous or allochthonous nature of ostracod assemblages (e.g., Oertli 1971; Whatley 1988; Boomer et al. 2003). At Reali Celsi, ostracods are predominantly preserved as complete carapaces, with only rare isolated valves, and are associated with occasional prostyliferid and zygopleurid gastropods, crinoids and bivalves such as *Paleonucula strigilata* (Goldfuss, 1837) at St. 1. At Acquanova and Rocchette, the ostracods are also largely composed of complete carapaces. At all sites, the size distributions (see Systematic Paleontology chapter and Figs. 4A, C) include both adults and late juveniles, with an absence of small specimens, indicating basal truncation. These patterns suggest that the communities at Reali Celsi, Acquanova and Rocchette represent moderate energy thanatocoenoses with minor post-mortem disturbance, yet they remain reliable indicators of the living environments. Comparable interpretations were made in previous

studies dealing of communities from Monte Scalpello (Contrada Paraspora; Crasquin et al. 2018) and Monte Gambanera (Crasquin et al. 2020). Overall, the Mufara ostracod assemblages provide a relatively faithful representation of their depositional environments, with the exception of the largely undersampled Torrente Cuba site.

### Diversity

The diversity of the ostracod assemblages across the studied sites exposing the Mufara Formation was assessed by two complementary indices (Fig. 6):

- the Shannon diversity index ( $H'$ ; Shannon & Weaver 1949), which is relatively insensitive to sample size and allows for a detailed assessment of species richness while accounting for the abundance of each species (given in Tab. 2),
- the Taxonomic Distinctness ( $\Delta^+$ ; Warwick & Clarke 1998), a phylogenetic diversity index that is independent of sampling effort and provides insight into the taxonomic structure of assemblages by incorporating higher taxonomic levels (up to the order level in this study).

In the present analysis,  $H'$  ranges from 2.5 at Torrente Cuba to 3.5 at Acquanova and  $\Delta^+$  ranges from 1.6 at Rocchette to 3.1 at Reali Celsi. Integrating the observations of Crasquin et al. (2018) into a composite Monte Scalpello community does not alter these values. To date, coupled analyses of  $H'$  and  $\Delta^+$  for Upper Triassic ostracod communities have only been applied at the Lime Peak locality in Canada (Norian; Forel et al. 2022), where  $H'$  values range from 1.6 to 3.5. It should be noted that the lowest  $H'$  value in the Mufara Formation corresponds to the undersampled Torrente Cuba site, where additional material would likely reveal higher diversity. Overall, the  $H'$  values recorded for the Mufara Formation indicate relatively rich communities. In contrast,  $\Delta^+$  values at Lime Peak range from 2.5 to 5.4, with a mean of approximately 4, whereas the Mufara communities exhibit lower  $\Delta^+$  values, averaging 2.1. This suggests that, although species richness is relatively high, the Mufara assemblages are comparatively less diversified at higher taxonomic levels. The contrasting complexity in taxonomic structures between Lime Peak and the Mufara Formation may partly reflect differences in paleoenvironmental condi-

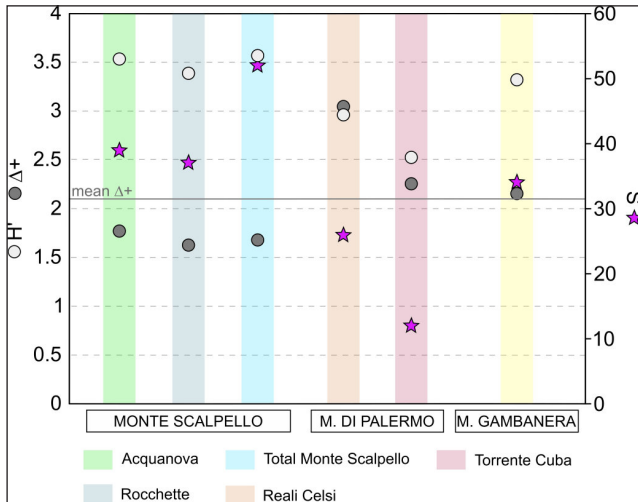


Fig. 6 - Species richness (S), Shannon Diversity (H') and Taxonomic Distinctness ( $\Delta^+$ ) of ostracod communities at each site exposing the Mufara Formation.

tions, with Lime Peak representing reef-associated settings.

When examining the six Mufara Formation communities, two groups emerge. The first includes the Monte Scalpello communities, which exhibit  $\Delta^+$  values below the mean, while the second comprises the Monti di Palermo (Reali Celsi and Torrente Cuba) and Monte Gambanera, characterized by variable  $\Delta^+$  values above the mean. Since the rarefaction curves for all communities have not reached saturation, additional sampling would likely accentuate the observed disparity between these groups. Consequently, the Monte Scalpello communities appear to be richer than those of Monti di Palermo and Monte Gambanera, yet they are significantly less diversified at higher taxonomic levels.

#### Paleoenvironmental implications: per site analysis

The dominance of Bairdiidae, both in terms of species richness and specimen abundance per family (Fig. 7), across all studied sites suggests a circalittoral depositional setting (e.g., Melnyk & Maddocks 1988). This preliminary conclusion is confirmed by the consistent presence of Healdiidae, which form secondary components at most sites. Healdiidae are generally considered shallow, normal-marine taxa: species with massive shells and short spines likely inhabited relatively nearshore, muddy neritic environments, whereas species with thin, elongated shells and long spines are typically associated with bathyal waters (e.g., Bless 1987;

Melnyk & Maddocks 1988; Crasquin et al. 2020). In the present case, all Healdiidae species indicate circalittoral water depths, corroborated by the absence of taxa characteristic of bathyal settings in the western Tethys during the Middle and Late Triassic (e.g., *Kozuria* Forel, 2022, Rectonariidae Gründel, 1962, and Tricorninidae Blumenstengel, 1965; Crasquin-Soleau & Grădinaru 1996; Sebe et al. 2013; Mette et al. 2015; Forel et al. 2019; Forel 2022). The thau-mathocypridid *Pokornyopsis* is a benthic genus with a maximum distribution depth of approximately 200 m (Aubrecht & Kozur 1995), consistent with the overall circalittoral interpretation of these assemblages, although it has not been recorded at Reali Celsi and Torrente Cuba.

Differences among sites are evident in the composition of associated taxa, reflecting variations in paleoenvironmental conditions. Mesozoic Cytherellidae are generally regarded as indicators of warm, inner infralittoral waters (e.g., Sohn 1962; Kornicker 1963; Ulrichs 1972; Whatley et al. 1995), and their presence at all studied sections supports the preliminary circalittoral interpretations. In terms of specimen abundance, Cytherellidae are extremely rare at Monte Gambanera, whereas they are proportionally more common at the other sites. This pattern aligns with the proposed intermediate to distal depositional position of Monte Gambanera relative to the Monte Scalpello sites, as suggested in previous studies (Carillat & Martini 2009; Crasquin et al. 2020).

During the Mesozoic, Cytheruridae were generally restricted to circalittoral water depths and are considered indicators of clear, well-oxygenated waters (e.g., Ballent & Whatley 2000, 2009), although some taxa also inhabited bathyal settings (e.g., Kozur 1970; Donze 1975; Forel et al. 2019, 2024). The consistent presence of *Judabella* at all Monte Scalpello and Monti di Palermo sites confirms their presence in shallow, low-energy shelf environments, whereas their absence at Monte Gambanera further distinguishes this site from the others. The cytherellid *Leviella* is characteristic of inner shelf environments (e.g., Sohn 1962; Kornicker 1963; Ulrichs 1972; Whatley et al. 1995), with *Leviella bentori* specifically reported from lagoonal facies in Jordan (Basha 1982). Its occurrence at all Monte Scalpello sites, and absence from Monte Gambanera, reinforces the interpretation of Monte Gambanera as deepest site. Interestingly, the Torrente Cuba as-

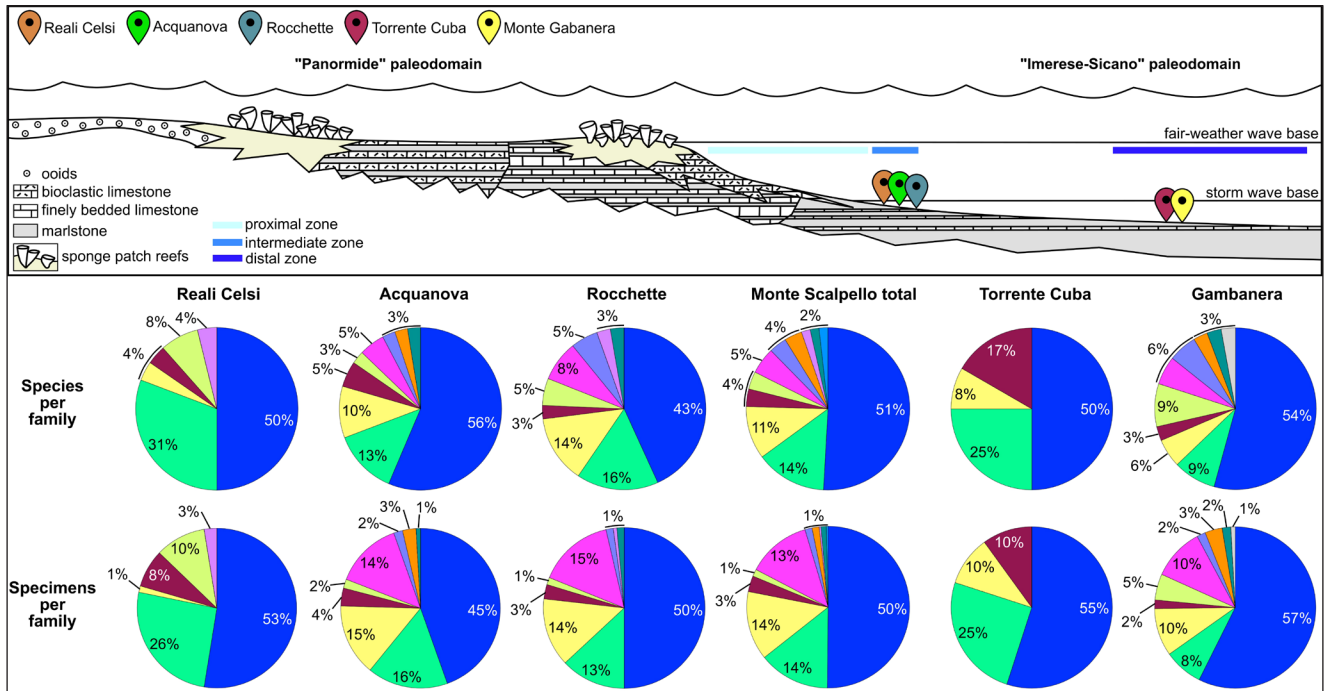


Fig. 7 - Depositional model of the Mufara Formation (modified from Carrilat & Martini 2009) and Pie charts of the composition of ostracod assemblages by number of species per family and number of specimens at each site. Color code refers to Fig. 6.

semblage yielded a single complete carapace of *Leviella bentori*, alongside *Judabella* specimens; additional material would be required to confirm whether this site reflects a relatively shallower setting compared to Monte Gambanera, which was considered as similar to Torrente Cuba in terms of water-depth (e.g., Carrilat & Martini 2009).

All communities, with the exception of the Mounti di Palermo sites (Reali Celsi and Torrente Cuba), contain the limnocytherids *Simeonella brotzenorum* and *Renngartenella sanctaerucis* (e.g., Kristan-Tollmann & Hamedani, 1973; Gerry et al. 1990; Forel et al. 2020; Tóth et al. 2024). The relationship between the typically Carnian *R. sanctaerucis* and salinity has been interpreted variably, ranging from stenohaline (Gerry et al. 1990) to euryhaline conditions (Monostori 1994). Monostori (1994) also suggested that the dominance of *R. sanctaerucis* may indicate smaller deviations in salinity compared to the dominance of *S. brotzenorum*. In the studied communities, limnocytherids, including *Lutkevichinella*, represent 14% and 15% of the specimens at Acquanova and Rocchette, 13% across all Monte Scalpello sites, and 10% at Monte Gambanera. Although neither abundant nor dominant, their presence may reflect short-term salinity fluctuations. The co-occurrence of typical normal-marine taxa, such as Bairdiidae, may

be explained either by these fluctuations being insufficiently pronounced to cause their disappearance, or by time-averaging of the assemblages. Importantly, there is no evidence suggesting that these limnocytherids, which are associated with distinct salinity regimes, were transported.

The ostracod assemblage from Reali Celsi represents the first paleontological analysis of this site. Most components of the assemblages at the two Reali Celsi stations (St. 1 and St. 2) are shared with other sections of the Mufara Formation in Monte Scalpello, Monti di Palermo and Monte Gambanera, supporting a Tuvalian age (Tab. 2). Additional analyses are needed to further constrain the age of Reali Celsi site, particularly due to the limited sampling (Fig. 5C). Nevertheless, the presence of *Leviella bentori* and Bythocytheridae, taxa previously reported from sites of the Monte Scalpello, suggests that Reali Celsi may be assigned to the *Tropites dilleri* zone (Fig. 3).

A similarity analysis of the studied ostracod assemblages was performed by constructing a symmetric similarity matrix following Q-mode analysis (e.g., Henderson & Heron 1976; Pielou 1979; Janson & Vegelius 1981; Digby & Kempton 1987), based on species occurrences per sample (Tab. 2). The matrix was analysed using the Jaccard's similarity coefficient (Jaccard 1912), selected because it em-

phasizes species presence rather than absence and is not influenced by differences in sample size (e.g., Cheetham & Hazel 1969; Baroni-Urbani & Buser 1976; Wolda 1981; Magurran 1988). Agglomerative clustering was conducted using the ‘unweighted pair group method with arithmetic mean’ (UPGMA), which calculates the unweighted arithmetic average between individuals (e.g., Hazel 1970; Anderberg 1973; Podam 1989; Shi 1993). All analyses were performed with the statistical software package PAST version 4.04 (Hammer et al. 2001; Hammer & Harper 2005). The resulting classifications of assemblages based on similarities in their ostracod species and genus composition are shown in Fig. 8A and Fig. 8B, respectively. The UPGMA dendrograms show high cophenetic correlation indices of 0.95 at the species level and 0.98 at the genus level, indicating an excellent representation of the similarity among assemblages. This analysis reveals that the Torrente Cuba community plots outside the main cluster at both taxonomic levels, highlighting its marked difference from other sites. However, as Torrente Cuba assemblage is the most undersampled (Fig. 5C), additional material is required to confirm this pattern. Within the main group, similarity relationships vary slightly between taxonomic levels, with generally higher values at the genus level. The highest similarity is observed between the Monti di Palermo sites (Acquanova and Rocchette), which cluster together and likely represent shallow, low-energy shelf environments.

## CONCLUSIONS

Ostracods of Tuvanian age (Carnian, Late Triassic) were recovered from samples collected in the Mufara Formation at the Monte Scalpello (Reali Celsi, Torrente Cuba) and Monti di Palermo (Acquanova, Rocchette), Sicily, Italy. These assemblages significantly enhance our understanding of Mufara ostracod communities and may contribute to broader discussions on the paleogeographic dynamics associated with major Triassic biotic events, including recovery following the end-Permian crisis and prior to the end-Triassic one. A total of 75 species are currently recognized from the Mufara Formation, distributed among 33 genera and 12 families, including two new species. The re-examination of previously unillustrated specimens from

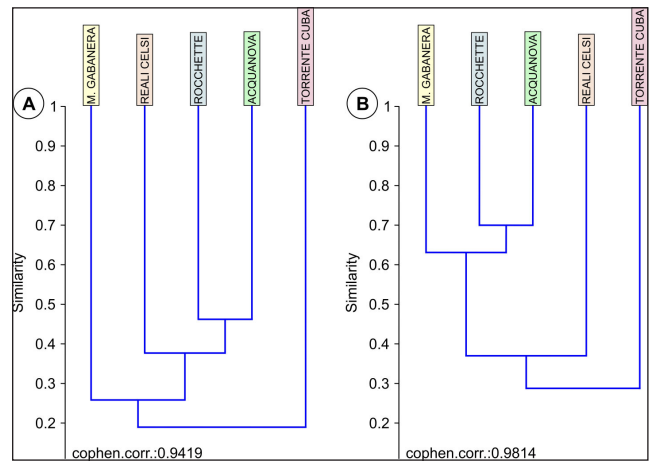


Fig. 8 - Dendrogram of UPGMA analysis based on the species (A) and genera (B) composition of the assemblages of ostracods obtained from Mufara Formation.

Monte Gambanera results in the reassignment of *Ptychobairdia indicaensis* to *Petasobairdia*, along with an emended diagnosis incorporating all diagnostic characters of this unique species. The Reali Celsi site is documented here for the first time from a paleontological perspective. Its ostracod assemblage suggests correlation with the *Tropites dilleri* zone. Integrated analysis of the assemblages from all studied sites combined with previously published data allows a refined paleoenvironmental interpretation. The results indicate predominantly circalittoral depositional settings, with possible short-term salinity fluctuations at the Monte Scalpello and Monte Gambanera sites.

**Data Availability Statement.** The data supporting the results of this research are available upon request. Interested researchers may contact the corresponding Author to obtain access.

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## REFERENCES

- Anderberg M.R. (1973) - Cluster Analysis for Applications. Academic Press, 359 pp.  
 Anderson F.W. (1964) - Rhaetic Ostracoda. *Bulletin of the Geological Survey of Great Britain*, 21: 133-174.  
 Apostolescu V. (1959) - Ostracodes du Lias du Bassin de Paris. *Revue de l'Institut français du Pétrole*, 14: 795-826.

- Arias C. & Lord A. (2000) - Upper Triassic Marine Ostracoda from the Queen Charlotte Islands, British Columbia, Canada. *Revista Española de Micropaleontología*, 32: 175-192.
- Aubrecht R. & Kozur H. (1995) - *Pokornypopsis* (Ostracoda) from submarine fissure fillings and cavities in the Late Jurassic of Czorsztyn Unit and the possible origin of the Recent anchialine faunas. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 196(1): 1-17.
- Ballent S.C. & Whatley R. (2000) - The composition of Argentinian Jurassic marine ostracod and foraminiferal faunas: environment and zoogeography. *Geobios*, 33(3): 365-376.
- Ballent S.C. & Whatley R. (2009) - Taxonomy and zoogeography of the Mesozoic cytherurid Ostracoda from west-central Argentina. *Palaeontology*, 52(1): 193-218.
- Baroni-Urbani C. & Buser M.W. (1976) - Similarity of binary data. *Systematic Zoology*, 25: 251-259.
- Basha S.H.S. (1982) - Microfauna from the Triassic rocks of Jordan. *Revue de micropaléontologie*, 25(1): 3-11.
- Basilone L., Frixa A., Trinciante E. & Valenti C. (2016). Permian-Cenozoic deep-water carbonate rocks of the Southern Tethyan Domain. The case of Central Sicily. *Italian Journal of Geosciences*, 135(2): 171-198.
- Becker G. (2001) - The Superfamily Bairdiacea Sars, 1888 - 1. Family Bairdiidae Sars, 1888 (Palaeozoic members only). Contributions to Palaeozoic Ostracod Classification [POC] 18. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 220(2): 267-294.
- Becker G. (2002) - Contributions to Palaeozoic Ostracod Classification [POC], no. 24, Palaeozoic Ostracoda: the standard classification scheme. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 226: 165-228.
- Bilan W. (1980) - Ostracod Zones in the Upper Triassic of the Eastern Margin of the Upper Silesian Coal Basin. *Bulletin de l'Académie polonaise des Sciences, série des sciences de la Terre*, 27(3-4): 185-192.
- Bless M.J.M. (1987) - Lower Permian ostracodes from Timor (Indonesia). *Proceedings of Koninklijke Nederlandse Akademie van Wetenschappen*, 90: 1-13.
- Blumenstengel H. (1965) - Zur Taxonomie und Biostratigraphie verkieselter Ostracodem aus dem Thüringer Oberdevon. *Freiberger Forschungshefte*, C183: 1-127.
- Bolz H. (1971a) - Late Triassic Bairdiidae and Healdiidae. In: Oertli H.J. (Ed.) - *Paléocologie Des Ostracodes. Bulletin du Centre de Recherche*, 5, Supplement: 717-745. Société nationale des pétroles d'Aquitaine, Pau.
- Bolz H. (1971b) - Die Zlambach-Schichten (alpine Obertrias) unter besonderer Berücksichtigung der Ostrakoden, 1: Ostrakoden der Zlambach-Schichten, besonders Bairdiidae. *Senckenbergiana letbaea*, 52: 129-283.
- Boomer I.D., Horne D.J. & Slipper I.J. (2003) - The use of ostracods in palaeoenvironmental studies or what can you do with an ostracod shell? *Paleontological Society Papers*, 9: 153-179.
- Bradfield H.H. (1935) - Pennsylvanian Ostracoda of Ardmore Basin, Oklahoma. *Bulletin of American Paleontology*, 22: 1-145.
- Brady G.S. (1880) - Report on the Ostracoda dredged by H.M.S. Challenger during the years 1873-1876. Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873-76. *Zoology* 1, (part 3): 1-184.
- Broquet P., Duée G., Masclé G. & Truillet R. (1984) - Evolution structurale alpine récente de la Sicile et sa signification géodynamique. *Revue de Géologie Dynamique et de Géographie physique*, 25: 75-85.
- Budai T., Haas J., Karadi V., Vadler E. & Tóth E. (2024) - Reconstruction of Middle Triassic platform drowning and basin evolution of the Balaton Highland: new micropaleontological constraints. *Földtani Közlemény*, 154(2): 115-132.
- Budurov V. & Stefanov S. (1965) - Gattung *Gondolella* aus der Trias Bulgariens. *Travaux sur la Géologie de Bulgarie, série Paléontologie*, 2: 115-127.
- Bunza G. & Kozur H. (1971) - Beiträge zur Ostracodenfauna der tethyalen Trias. *Geologisch-Paläontologische Mitteilungen Innsbruck*, 1: 1-76.
- Buratti N. & Carrillat A. (2002) - Palynostratigraphy of the Mufara Formation (Middle-Upper Triassic, Sicily). *Rivista Italiana di Paleontologia e Stratigrafia*, 108: 101-117.
- Cafiero B. & De Capoa Bonardi P. (1982) - Biostratigrafia del Trias pelagico della Sicilia. *Bollettino Società Paleontologica Italiana*, 21: 35-71.
- Carrillat A., 2001. Palaeoenvironmental reconstruction of the Mufara Formation (Upper Triassic, Sicily): biostratigraphy, organic facies, sedimentological and geochemical approach. Thèse Université de Genève, Terre et Environnement 27, 269 pp.
- Carrillat A. & Martini R. (2009) - Palaeoenvironmental reconstruction of the Mufara Formation (Upper Triassic, Sicily): High resolution sedimentology, biostratigraphy and sea-level changes. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 283: 60-76.
- Catalano R. & D'Argenio B. (1978) - An essay of palinspastic restoration across Western Sicily. *Geologica Romana*, 17: 149-159.
- Catalano R. & D'Argenio B. (1982) - Guida alla Geologia della Sicilia occidentale. Società Geologica Italiana, Guide Geologiche Regionali, 155 pp.
- Catalano R. & Di Maggio C. (1996) - Sovrapposizione tettonica delle Unità Imeresi sulle Panormidi nei Monti di Palermo (Sicilia). *Naturalista Siciliano*, 3-4: 147-166.
- Catalano R., D'Argenio B., Montanari L., Renda P., Abate B., Monteleone S., Macaluso T., Pipitone C., Di Stefano E., Lo Cicero G., Di Stefano P. & Agnesi V. (1978) - Contributi alla conoscenza della struttura della Sicilia occidentale. 1) Il profilo Palermo-Sciaccia. *Memorie Società Geologica Italiana*, 19: 485-493.
- Catalano R., Valenti V., Albanese C., Accaino F., Sulli A., Tinivella U., Morticelli G., Zanolla C. & Giustiniani, M. (2013) - Sicily's fold/thrust belt and slab rollback: The SI.RI.PRO. seismic crustal transect. *Journal of the Geological Society*, 170: 451-464.
- Cheetham A.H. & Hazel, J.E. (1969) - Binary (presence-absence) similarity coefficients. *Journal of Paleontology*, 43: 1130-1136.
- Chen D.Q. & Shi C.G. (1982) - Latest Permian Ostracoda from Nantong, Jiangsu and from Miannyang, Hubei. *Bulletin of Nanjing Institute of Geology and Palaeontology, Academia Sinica*, 4: 105-152.
- Colin J.-P., Babinot J.-F. & Grekoff N. (1983) - Trias. In: Oertli, H.J. (Ed.) - Atlas des Ostracodes de France. Mémoire Elf-Aquitaine 9: 89-99.
- Crasquin S. & Forel M.B. (2015) - Ostracods (Crustacea) through Permian-Triassic events. *Earth-Science Reviews*, 137: 52-64.
- Crasquin S., Sciuto F. & Reitano A. (2018) - Late Carnian (Tuvanian, *Tropites dilleri* zone) ostracods (Crustacea) from the Mufara Formation (Monte Scalpello, Central-Eastern Sicily, Italy). *Annales de Paléontologie*, 104: 129-142.

- Crasquin S., Sciuto F., Reitano A. & Coco R.M. (2020) - Late Triassic (Tuvalian-Carnian, *Tropites subbullatus*/*Anatropites spinosus* zones) ostracods from Monte Gambanera (Castel di Iudica, Central-Eastern Sicily, Italy). *BSGF - Earth Sciences Bulletin*, 190069.
- Crasquin-Soleau S. & Dépêche F. (1993) - Paleocology of ODP LEG 122 Triassic Ostracodes (Wombat Plateau, NW Australia). *Geobios*, 26(3): 331-344.
- Crasquin-Soleau S. & Teherani K. (1995) - Première découverte d'ostracodes triasiques dans la formation de Khaneh Kat, Montagne Michparvar (Ouest Iran). *Revue de Micropaléontologie*, 38: 27-36.
- Crasquin-Soleau S. & Grădinaru E. (1996) - Early Anisian ostracode fauna from the Tulcea unit (Cimmerian North Dobrogean orogeny, Romania). *Annales de Paléontologie*, 82: 59-116.
- Crasquin-Soleau S., Galfetti T. & Bucher H. (2006) - Early Triassic ostracods from South China. *Rivista Italiana di Paleontologia e Stratigrafia*, 112(1): 55-75.
- Crasquin-Soleau S., Galfetti T., Bucher H., Kershaw S. & Feng Q.L. (2007) - Ostracod fauna recovery in the aftermath of Permian-Triassic crisis: dating of the Palaeozoic-Mesozoic turnover. *Hydrobiologia*, 585: 13-27.
- Dal Sasso C., Insacco G., Chiarenza A.A., Di Franco D. & Reitano A. (2014) - First record of *Ichthyosaurus* in Sicily (Upper Triassic of Monte Scalpello, Catania province). *Rivista Italiana di Stratigrafia e Paleontologia*, 120(1): 71-82.
- Delo D.M. (1930) - Some upper Carboniferous ostracoda from the shale basin of Western Texas. *Journal of Paleontology*, 4: 152-178.
- Dépêche F. & Crasquin-Soleau S. (1992) - Triassic marine ostracodes of the Australian margin (Holes 759B, 760B, 761C, 764A and 764B). *Proceedings of Ocean Drilling Program, Scientific Results*, 122: 453-462.
- Di Paolo L., Aldega L., Corrado S. & Mastalerz M. (2012) - Maximum burial and unroofing of Mt. Judica recess area in Sicily: implication for the Apenninic-Maghrebian wedge dynamics. *Tectonophysics*, 530-531: 193-207.
- Di Stefano G. (1907) - I pretesi grandi fenomeni di carreggiamento in Sicilia. *Atti Accademia dei Lincei, Rendiconti*, 5(16): 258-271.
- Di Stefano P. & Gullo M. (1997) - Late Paleozoic-Early Mesozoic stratigraphy and paleogeography of Sicily. In: Catalano, E. (Ed.) - Time scales and basin dynamics. Sicily, the adjacent Mediterranean and other natural laboratories. Guidebook Field workshop in western Sicily, Palermo, pp. 87-99, Palermo.
- Di Stefano P., Grasso M. & Gullo M. (1998) - Nuovi dati stratigrafici sui terreni carnici di Monte Altesinella (Sicilia Centrale). *Bollettino Società Geologica Italiana*, 117: 73-86.
- Digby P.G.N. & Kempton, R. (1987) - Multivariate Analysis of Ecological Communities. Chapman & Hall, 206 pp.
- Donze P. (1975) - *Tethysia*, nouveau genre du ostracode bathyal du Jurassique supérieur-Crétacé inférieur mésogéen. *Geobios* 8: 185-190.
- Forel M.-B. (2022) - Thoughts on the Late Paleozoic-Early Mesozoic records of deep-sea ostracods. *Micropaleontology*, 68(3): 217-231.
- Forel M.-B. (2025) - Ostracods from the Cassian formation (Carnian, Late Triassic). *Revue de Micropaléontologie*, 87: 100840.
- Forel M.-B. & Crasquin S. (2011) - In the aftermath of the Permian-Triassic boundary mass extinction: Ostracod new species and genus from South Tibet. *Geodiversitas*, 33: 247-263.
- Forel M.-B. & Crasquin S. (2022) - Bounded by crises: an updated view of the evolution of marine ostracods during the Triassic. *Marine Micropaleontology*, 174, 101925.
- Forel M.-B. & Grădinaru E. (2018) - First report of ostracods (Crustacea) associated with Bithynian (Anisian, Middle Triassic) *Tubiphytes*-microbial reef in the North Dobrogean Orogen (Romania). *Papers in Palaeontology*, 4(2): 211-244.
- Forel M.-B. & Grădinaru E. (2020) - Rhaetian (Late Triassic) ostracods (Crustacea, Ostracoda) from the offshore prolongation of the North Dobrogean Orogen into the Romanian Black Sea shelf. *European Journal of Taxonomy*, 727: 1-83.
- Forel M.-B. & Grădinaru E. (2022) - A unique diversity hotspot for Polycopidae (Ostracoda) in the Triassic of North Dobrogea. *Historical Biology*, 34(6): 995-1018.
- Forel M.-B. & Moix P. (2020) - Late Triassic ostracods from the Lycian Nappes, southwestern Turkey: implications on taxonomy and palaeobiogeographical distribution. *Geodiversitas*, 191(30): 1-18.
- Forel M.-B., Ozsvárt P. & Moix P. (2018) - Carnian (Late Triassic) ostracods from the Sorgun Ophiolitic Mélange (Southern Turkey): Taxonomy, palaeoenvironment and evidence of predation. *Palaeontologia Electronica*, 21.2.26A: 1-23.
- Forel M.-B., Tekin U.K., Okuyucu C., Bedi Y., Tuncer A., Crasquin S. (2019) - Discovery of a longterm refuge for ostracods (Crustacea) after the end-Permian extinction: a unique Carnian (Late Triassic) fauna from the Mersin Mélange, southern Turkey. *Journal of Systematic Palaeontology*, 17(1): 9-58.
- Forel M.-B., Kolar-Jurkovšek T. & Jurkovšek B. (2020) - Ostracods from the "Raibl Beds" (Carnian, Late Triassic) of Belca section in Karavanke Mountains, northwestern Slovenia. *Geodiversitas*, 42(21): 377-407.
- Forel M.-B., Kershaw S., Lord A.R. & Crasquin S. (2021) - Applications of fossil taxonomy in palaeoenvironmental reconstruction: a case study of ostracod identification and diversity in Permian-Triassic boundary microbialites. *Facies*, 67(23).
- Forel M.-B., Del Piero N., Rigaud S. & Martini R. (2022) - Ostracods from the Late Triassic (Norian) of Yukon, Canada: new taxonomic and palaeobiogeographic insights. *Rivista Italiana di Paleontologia e Stratigrafia*, 128(2): 325-368.
- Forel M.-B., Poulet-Crovisier N., Korat L. & Maddocks R.F. (2024) - Ornate bairdiidae (Ostracoda) in 3 dimensions: exploring carapace morphology and pore canals of *Triebelina* van den Bold, 1946, *Nodobairdia* Kollmann, 1963 and *Mirabairdia* Kollmann, 1963. *Comptes Rendus Palevol*, 23(11): 137-159.
- Forel M.-B., McCartain E. & Haig D.W. (2025) - Triassic ostracods from the southeastern Tethys: the Timor-Leste record. *Alcheringa*: 1-40.
- Gemmellaro G.G. (1890) - I crostacei dei calcari con *Fusulina* della valle del fiume Sosio nella Provincia di Palermo in Sicilia. *Memorie della Società Italiana delle Scienze*, 8: 1-40.
- Gemmellaro G.G. (1904) - I Cefalopodi del Trias Superiore della regione occidentale della Sicilia. *Giornale di Scienze Naturali ed Economiche di Palermo*, 24: 1-319.
- Gemmellaro M. (1921) - Il "Trias" dei dintorni di Palermo. Parte I. La fauna triassica dei calcari delle cave di Bellolampo. *Giornale di Scienze Naturali ed Economiche di Palermo*,

- 33: 1-72.
- Gerry E., Honigstein A., Rosenfeld A., Hirsch F. & Eshet Y. (1990) - The Carnian salinity crisis: Ostracods and palynomorphs as indicators of palaeoenvironment. In: Whatley R. & Maybury C. (Eds.) - *Ostracoda and Global Events*: 87-99. Springer, Berlin.
- Goldfuss G.A. (1833-1841) - *Petrefacta germaniae tam ea, quae in Museo Universitatis Regiae Borussicae Fridericiae Wilhelmae rhenanae servantur quam alia quaecunque in Museis Hoeninghusiano, muensteriano aliisque extant, iconibus et descriptionibus illustrata. Erster Theil.* (Arnz & Comp.: Düsseldorf): 1-252.
- Gründel J. (1962) - Zur Taxonomie der Ostracoden der Gattendorfia—Stufe Thüringens. *Freiberger Forschungshefte*, 151: 51-105.
- Gründel J. (1964) - Zur Gattung *Healdia* (Ostracoda) und zu einigen verwandten Formen aus dem unteren Jura. *Geologie*, 13: 1-17.
- Gründel J. & Kozur H. (1971) - Zur Taxonomie der Bythocytheridae und Tricorninidae (Podocopida, Ostracoda). *Monatsberichte der Deutschen Akademie der Wissenschaften Berlin*, 13(10/12): 907-937.
- Gümbel C.W. (1869) - VII. Ueber Foraminiferen, Ostracoden und mikroskopische Thier-Ueberreste in den St. Cassianer und Raibler Schichten. *Jahrbuch der kaiserlich-königlichen geologischen Reichsanstalt*, 10: 175-186.
- Hammer Ø., Harper D.A.T. & Ryan P.D. (2001) - PAST: Palaeontological Statistics software package for education and data analysis. *Palaeontologia Electronica*, 4, 9.
- Hammer Ø. & Harper D.A.T. (2005) - Paleontological data analysis. Blackwell, Oxford, 368 pp.
- Haug E. (1894) - Les ammonites du Permien et du Trias. Remarques sur leur classification. *Bulletin de la Société Géologique de France*, série 3, 22: 385-412.
- Haussmann I.M. & Nützel A. (2015) - Diversity and palaeoecology of a highly diverse Late Triassic marine biota from the Cassian Formation of north Italy. *Lethaia*, 48: 235-255.
- Hazel J.E. (1970) - Binary coefficients and clustering in biostratigraphy. *Geological Society of America Bulletin*, 81: 3237-3252.
- Henderson R.A. & Heron M.L. (1976) - A probabilistic method of palaeobiogeographic analysis. *Lethaia*, 10: 1-15.
- Hillebrandt A.V., Krystyn L., Kürschner W.M., Bonis N.R., Ruhl M., Richoz S., Schobben M.A.N., Urlichs M., Bown P.R., Kment K., McRoberts C., Simms M. & Tomasovych A. (2013) - The Global Stratotype Sections and Point (GSSP) for the base of the Jurassic System at Kuhjoch (Karwendel Mountains, Northern Calcareous Alps, Tyrol, Austria). *Episodes*, 36(3): 162-198.
- Hirsch F. & Gerry E. (1974) - Conodont- and Ostracode Biostratigraphy of the Triassic in Israel. *Schriftenreihe der Erdwissenschaftlichen Kommissionen*, 2: 101-114.
- Horne D.J., Cohen A. & Martens K. (2002) - Taxonomy, morphology and biology of Quaternary and living Ostracoda. In: Holmes J.A. & Chivas A. (Eds.) - *The Ostracoda: Applications in Quaternary Research*, Geophysical Monograph: 5-36. American Geophysical Union, Washington DC.
- Huckriede R. (1958) - Die Conodonten der mediterranen Trias und ihr stratigraphischer Wert. *Paläontologische Zeitschrift*, 32: 10-14.
- Hyatt A. & Smith J.P. (1905) - The Triassic Cephalopod Genera of America. *Geological Survey professional paper*, 40: 1-394.
- Jaccard P. (1912) - The distribution of flora in the alpine zone. *The New Physiologist*, 11: 37-50.
- Janson S. & Vegelius J. (1981) - Measures of ecological association. *Oecologia*, 4: 371-376.
- Jenks J.F., Monnet C., Balini M., Brayard A. & Meier M. (2015) - Biostratigraphy of Triassic Ammonoids. - In: Klug C. et al. (Eds.) - *Ammonoid Paleobiology: from macroevolution to paleogeography*. *Topics in Geobiology*, 44: 329-388.
- Jones T.R. (1849) - A monograph of the Entomostraca of the cretaceous formation of England. *Monographs of the Palaeontographical Society*, 3: 1-40.
- Karadi V., Budai T., Haas J., Vörös A., Piros O., Dunkl I. & Tóth E. (2022) - Change from shallow to deep-water environment on an isolated carbonate platform in the Middle Triassic of the Transdanubian Range (Hungary). *Palaeogeography, Palaeoclimatology, Palaeoecology*, 587, 110793.
- Keim L., Brandner R., Krystyn L. & Mette W. (2001) - Termination of carbonate slope progradation: an example from the Carnian of the Dolomites, Northern Italy. *Sedimentary Geology*, 143: 303-323.
- Klie W. (1938) - Ostracoda, Muschelkrebse. In: Dahl. F. (Ed.) - *Die Tierwelt Deutschlands und der angrenzenden Meeresteile*, 34: 1-230, Jena.
- Kollmann K. (1960) - Ostracoden aus der alpinen Trias. I. *Parabairdia* n. g. und *Ptychobairdia* n. g. (Bairdiidae). *Jahrbuch der Geologischen Bundesanstalt*, 5: 79-105.
- Kollmann K. (1963) - Ostracoden aus der alpinen Trias. II. Weitere Bairdiidae. *Jahrbuch der Geologischen Bundesanstalt*, 106: 121-203.
- Kornicker L.S. (1963) - Ecology and classification of Bahamian Cytherellidae (Ostracoda). *Micropaleontology*, 9(1): 61-70.
- Kozur H. (1970) - Neue Ostracoden-Arten aus dem Obersten Anis des Bakonyhochlandes (Ungarn). *Berichte des Naturwissenschaftlich-Medizinischen Vereins in Innsbruck* 58: 384-428.
- Kozur H. (1971a) - Die Bairdiacea der Trias. Teil I: Skulpturierte Bairdiidae aus Mitteltriassischen Flachwasserablagerungen. *Geologisch-Paläontologische Mitteilungen Innsbruck*, 1(3): 1-27.
- Kozur H. (1971b) - Die Bairdiacea der Trias. Teil III: Einige neue Arten triassischer Bairdiacea und Bemerkungen zur Herkunft der Macrocyprididae (Cypridacea). *Geologisch-Paläontologische Mitteilungen Innsbruck*, 1(6): 1-18.
- Kozur H. (1972) - Die Bedeutung triassischer Ostracoden für stratigraphische und paläoökologische Untersuchungen. *Mitteilungen der Gesellschaft der Geologie und Bergbaustudenten in Österreich*, 21: 632-660.
- Kozur H. (1973) - Faunenprovinzen in der Trias und ihre Bedeutung für die Klärung der Paläogeographie. *Geologisch-Paläontologische Mitteilungen Innsbruck*, 3(8): 1-41.
- Kozur H. (1974) - Eine neue Gattung der Familie Polycopidae (Cladocopida, Ostracoda). *Zeitschrift für geologische Wissenschaften*, 2(7): 853-855.
- Kozur H. (1989) - Significance of events in conodont evolution for the Permian and Triassic stratigraphy. *Courier Forschungsinstitut Senckenberg*, 117: 385-408.
- Kozur H. (1991a) - Permian deep-water ostracods from Sicily (Italy) Part 1: Taxonomy. *Geologisch-Paläontologische Mitteilungen Innsbruck, Sonderband* 3: 1-24.
- Kozur H. (1991b) - Permian deep-water ostracods from Sicily (Italy). part 2: biofacial evaluation and remarks to the

- Silurian to Triassic paleopsychrospheric ostracods. *Geologisch-Paläontologische Mitteilungen Innsbruck, Sonderband 3*: 25-38.
- Kozur H. (1991c) - Neue Ostracoden-Arten aus dem oberen Mittelkarbon (höheres Moskovian), Mittel- und Oberperm des Bükk-Gebirges (N-Ungarn). *Geologisch-Paläontologische Mitteilungen Innsbruck, Sonderband 2*: 1-145.
- Kozur H. & Nicklas L. (1970) - Ostrakoden aus dem Plattenkalk-Niveau des Hauptdolomites (Rhätikon). In: Mostler H. (Ed.) - Beiträge zur Mikrofazies und Stratigraphie von Tirol und Vorarlberg: 309-320. Festband des Geologischen Institutes, 300-Jahr-Feier Universität Innsbruck.
- Kozur H., Kampschuur W., Mulder-Blanken C.W.H. & Simon O.J. (1974) - Contribution to the Triassic ostracode faunas of the betic zone (southern Spain). *Scripta Geologica*, 23: 1-56.
- Kristan-Tollmann E. (1969) - Zur stratigraphischen Reichweite der Ptychobairdien und Anisobairdien (Ostracoda) in der alpinen Trias. *Geologica et Palaeontologica*, 3: 81-95.
- Kristan-Tollmann E. (1970) - Einige neue Bairdien (Ostracoda) aus der alpinen Trias. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 135: 268-310.
- Kristan-Tollmann E. (1971a) - Weitere Beobachtungen an skulptierten Bairdiidae (Ostracod.) der alpinen Trias. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* 139: 57-81.
- Kristan-Tollmann E. (1971b) - Zur phylogenetischen und stratigraphischen Stellung der triadischen Healdiiden (Ostracoda). *Erdöl-Erdgas-Zeitschrift*, 87: 428-438.
- Kristan-Tollmann E. (1971c) - *Torobealdia* n. gen., eine charakteristische Ostracoden-Gattung der obersten alpinen Trias. *Erdöl-Erdgas-Zeitschrift*, 87: 50-54.
- Kristan-Tollmann E. (1972) - Die obertriadischen Arten der Ostracoden-Gattung *Kerocythere* Kozur & Nicklas, 1970, und ihr stratigraphischer Wert. *Erdöl-Erdgas-Zeitschrift*, 88: 43-49.
- Kristan-Tollmann E. (1978) - Bairdiidae (Ostracoda) aus den obertriadischen Cassianer Schichten der Ruones-Wiesen bei Corvara in Südtirol. *Schriftenreihe der Erdwissenschaftlichen Kommissionen, Oesterreichische Akademie der Wissenschaften*, 4: 77-104.
- Kristan-Tollmann E. (1982) - Bemerkungen zur triadischen Ostracoden-Gattung *Mostlerella*. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte* 9(1982): 560-572.
- Kristan-Tollmann E. (1986) - Beobachtungen zur Trias am Südostende der Tethys - Papua/Neuguinea, Australien, Neuseeland. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, 4(1986): 201-222.
- Kristan-Tollmann E. (1988) - Unexpected microfaunal communities within the Triassic Tethys. *Geological Society, London, Special Publications*, 37: 213-223.
- Kristan-Tollmann E. (1989) - Untersuchungen zum Schollbau triadischer Cytheracea (Ostracoda). *Courier Forschungsinstitut Senckenberg*, 113: 49-60.
- Kristan-Tollmann E. (1991) - Ostracods from the Middle Triassic Sina Formation (Aghdarband Group) in NE Iran. *Abhandlungen der Geologischen Bundesanstalt*, 38: 195-200.
- Kristan-Tollmann E. & Hamedani A. (1973) - Eine spezifische Mikrofaunen-Vergesellschaftung aus den Opponitzer Schichten des Oberkarn der niederösterreichischen Kalkalpen. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 143(2): 193-222.
- Kristan-Tollmann E. & Tollmann A. (1981) - Die Stellung der Tethys in der Trias und die Herkunft ihrer Fauna. *Mitteilungen der Österreichischen Geologischen Gesellschaft*, 74(75): 129-135.
- Kristan-Tollmann E. & Tollmann A. (1982) - Die Entwicklung der Tethystrias und Herkunft ihrer Fauna. *Geologische Rundschau*, 71(8): 987-1019.
- Kristan-Tollmann E., Tollmann A. & Hamedani A. (1979) - Beiträge zur Kenntnis der Trias von Persien. I. Revision der Triasgliederung. Rhätfazies in Raum von Isfahan und Kossener Fazieseinschlag bei Waliabad SE Abadeh. *Mitteilungen der österreichischen geologischen Gesellschaft*, 70: 119-190.
- Kristan-Tollmann E., Tollmann A. & Hamedani A. (1980) - Beiträge zur Kenntnis der Trias von Persien. II. Zur Rhätfazies von Bagerabad bei Isfahan (Korallen, Ostracoden). *Mitteilungen der Österreichischen Geologischen Gesellschaft*, 73: 163-235.
- Kristan-Tollmann E., Haas J. & Kovács S. (1991) - Karnische Ostracoden und Conodonten der Bohrung Zsámbék-14 im Transdanubischen Mittelgebirge (Ungarn). In: Lobitzer H. & Csaszar G. (Eds.) - Jubiläumsschrift 20 Jahre geologische Zusammenarbeit Österreich-Ungarn, Wien 1: 193-219. Geologische Bundesanstalt, Vienna.
- Lentini F. (1974) - Caratteri stratigrafici e strutturali della zona di Monte Judica (Sicilia Orientale). *Rivista Mineraria Siciliana*, 145-147: 71-96.
- Lentini F., Grasso M. & Carbone S. (1987) - Introduzione alla geologia della Sicilia e guida all'escursione. In: Congresso della Società Geologica Italiana - "Sistemi Avanfossa-Avampaese lungo la Catena Appenninico-Maghrebide": 1-60. Naxos-Pergusa, 22-25 april 1987.
- Lieberman H.M. (1979) - Die Bivalven- und Ostracodenfauna von Raibl und ihr stratigraphischer Wert. *Verhandlungen der Geologischen Bundesanstalt*, 1979: 85-131.
- Lucas S.G. (2010) - The Triassic timescale: an introduction. In: Lucas S.G. (Ed.) - The Triassic Timescale, 334: 1-16. Geological Society, London, Special Publications.
- Lüttig G. (1962) - Zoologische und paläontologische Ostracoden-Systematik. *Paläontologische Zeitschrift, H. Schmidt-Festband*: 154-184.
- McCoy F. (1844) - A Synopsis of the characters of the Carboniferous limestone fossils of Ireland. University Press, Dublin, 207 pp.
- Maddocks R.F. (1969) - Revision of recent Bairdiidae (Ostracoda). *Bulletin of the United States National Museum*, 295: 1-126.
- Maddocks R.F. (2013) - New and poorly known species of *Neonesidea* (Bairdiidae, Ostracoda, Crustacea) from French Frigate Shoals, the Hawaiian Islands. *Zootaxa*, 3608(6): 457-510.
- Magurran A.E. (1988) - Ecological Diversity and its Measurement. Cambridge University Press, 179 pp.
- Mandelstam M.I., Schneider G.F., Kuznetsova Z.V. & Katz F.I. (1957) - New genera of ostracodes in the families Cypridae and Cytheridae. *All-Union Palaeontological Society, Annual (Annals)*, 16: 166-192.
- Martini R., Zaninetti L., Abate B., Renda P., Doubinger J., Rauscher R. & Vrielynck B. (1991) - Données sédimentologiques et biostratigraphiques nouvelles sur le Trias (Formation Mufara) de Sicile (Italie). *Comptes Rendu Académie des Sciences Paris série 2*, (312): 1603-1608.
- Masclé G.H. (1979) - Étude géologique des Monts Sicani. *Rivista Italiana di Paleontologia e Stratigrafia*, 16: 1-431.
- McKenzie K.G. (1982) - Palaeozoic-Cenozoic Ostracoda of Tethys. *Bollettino della Società Paleontologica Italiana*, 21(2-3):

- 311-326.
- Méhes G. (1911) - Über Trias-Ostrakoden aus dem Bakony. Resultate der wissenschaftlichen Erforschung des Balatonsees. *Anhang zu Band 1, Teil 1. Paläontologie der Umgebung des Balatonsees*, 3: 1-38.
- Melnyk D.H. & Maddocks R.F. (1988) - Ostracode biostratigraphy of the Permo-Carboniferous of central and north-central Texas, part I: paleoenvironmental framework. *Micropaleontology*, 34: 1-20.
- Mette W. & Mohtat-Aghai P. (1999) - Ostracods and foraminifera from Upper Triassic intrashelf basin deposits in the Northern Calcareous Alps. *Geologisch Paläontologische Mitteilungen Innsbruck*, 24: 45-77.
- Mette W. & Moser M. (2025) - A high diversity deep marine ostracod assemblage from the Middle Triassic (early Ladinian) of the Northern Calcareous Alps (Austria). *Historical Biology*: 1-41.
- Mette W., Elsler A. & Korte C. (2012) - Palaeoenvironmental changes in the Late Triassic (Rhaetian) of the Northern Calcareous Alps: Clues from stable isotopes and microfossils. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 350-352: 62-72.
- Mette W., Honigstein A. & Crasquin S. (2015) - Deep-water ostracods from the Middle Anisian (Reifling Formation) of the Northern Calcareous Alps (Austria). *Journal of Micropalaeontology* 34, 71-91.
- Mirăuță E., Gheorghian D. & Bdiceanu M. (1993) - Données biostratigraphiques sur la Formation de Cataloi (Dobrogea de Nord, Roumanie). *Romanian Journal of Stratigraphy*, 75: 21-27.
- Moix P., Vachard D., Allibon J., Martini R., Wernli R., Kozur H.W. & Stampfli G.M. (2013) - Palaeotethyan, Neotethyan and Hugu-Pindos series in the Lycian Nappes (SW Turkey): Geodynamical implications. In: Tanner L.H., Spielmann J.A., Lucas S.G., eds. *The Triassic System. New Mexico Museum of Natural History and Science*, 61: 401-444.
- Mojsisovics E.V. (1873-1902) - Das Gebirge um Hallstatt I. *Abhandlungen der Kaiserlich-Königlichen Geologischen Reichsanstalt* 6(1): 1-356.
- Monostori M. (1994) - Ostracod evidence of the Carnian salinity crisis in the Balaton Highland, Hungary. *Neues Jahrbuch für Geologie und Paläontologie*, 193: 311-331.
- Monostori M. (1995) - Environmental significance of the Anisian Ostracoda fauna from the Forrás Hill near Felsőörs (Balaton Highland, Transdanubia, Hungary). *Acta Geologica Hungarica*, 39: 37-56.
- Monostori M. & Tóth E. (2013) - Ladinian (Middle Triassic) silicified ostracod faunas from the Balaton Highland (Hungary). *Rivista Italiana di Paleontologia e Stratigrafia*, 119: 303-323.
- Monostori M. & Tóth E. (2014) - Additional Middle to Upper Triassic ostracod faunas from the boreholes of Transdanubian central Range (Hungary). *Hantkeniana*, 9: 21-43.
- Montanari L. (1987) - Lineamenti stratigrafico-paleogeografici della Sicilia durante il ciclo alpino. *Memorie della Società Geologica Italiana*, 38: 361-406.
- Moore R.C. (1961) - Treatise on Invertebrate Paleontology. Arthropoda 3, Crustacea, Ostracoda. Geological Society of America and University of Kansas Press, 442 pp.
- Münster G.V. (1834) - Über das Kalkmergel-Lager von St. Cassian in Tyrol und die darin vorkommenden Ceratiten. *Neues Jahrbuch für Mineralogie, Geognostische Geologie, Petrefactenkunde*, 1834: 1-15.
- Nigro F. & Renda P. (1999) - Evoluzione geologica ed assetto strutturale della Sicilia centro-settentrionale. *Bollettino della Società Geologica Italiana*, 118: 375-388.
- Nützel A. & Keim A. (2014) - Diversity, palaeoecology and systematics of a marine fossil assemblage from the Late Triassic Cassian Formation at Settsass Scharte, N Italy. *Paläontologische Zeitschrift*, 88(4): 405-431.
- Oertli H.J. (1971) - The aspect of ostracode fauna - a possible new tool in petroleum sedimentology. In: Oertli H.J. (Ed.) - *Paléocologie Des Ostracodes*. Bulletin du Centre de Recherche, 5, Supplement: 137-151. Société nationale des pétroles d'Aquitaine, Pau.
- Pielou E.C. (1979) - Biogeography. John Wiley & Son, New-York, 351 pp.
- Podam J. (1989) - New combinational clustering methods. *Vegetatio*, 81: 61-77.
- Popov Y. (1961) - Triassic ammonoids of northeastern USSR. *Transactions, Scientific Research Institute for the Geology of the Arctic*, 79: 1-179.
- Reuss A.E. (1868) - Paläontologische beiträge (Zweite Folge). *Sitzungsberichte der mathematisch-naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften*, 57(1): 79-109.
- Rigo M., Mazza M., Karádi V. & Nicora A. (2018) - New Upper Triassic Conodont Biozonation of the Tethyan Realm. In: Tanner L.H. (Ed.) - *The Late Triassic World, Topics in Geobiology*, 46: 189-235.
- Rzehak A. (1885) - Bemerkungen über einige Foraminiferen der Oligocän Formation, *Verhandlungen des Naturforschenden Vereins in Brünn*, 23: 123-129.
- Salaj J. & Jendrejakova O. (1984) - Ecology and facial relation of some groups of Triassic foraminifers and ostracods of stratigraphic importance. *Geologica Carpathica*, 35: 231-240.
- Sars G.O. (1866) - Oversigt af Norges marine Ostracoder. *Forhandlinger i Videnskabs-Selskabet i Christiania*, 1865(1): 1-130.
- Scalia S. (1907) - I fossili del Trias superiore dell'Acquanova e di Paraspora. *Bollettino dell'Accademia Gioenia di Scienze Naturali in Catania*, 2(1-2): 10-12.
- Scalia S. (1908) - La fauna del Trias superiore del gruppo montuoso di Judica. *Bollettino dell'Accademia Gioenia di Scienze Naturali in Catania*, 2(4): 17-25.
- Scalia S. (1909) - Il gruppo di M. Judica. *Bollettino della Società Geologica Italiana*, 28: 269-340.
- Scalia S. (1910, 1912, 1914) - La fauna del Trias superiore del gruppo del M. Judica: Parti 1-3. *Atti dell'Accademia Gioenia di Scienze Naturali, Catania*, Serie 5, 3-5-7, 51+58+25.
- Schellwien E. (1898) - Die Fauna des karnischen Fusulinenkalks. *Palaeontographica*, 2(44): 237-282.
- Schmidt Di Friedberg P. (1965) - Litostratigrafia petrolifera della Sicilia. *Rivista Mineraria Siciliana*, 88-90(91-93): 1-80.
- Schneider G.F. (1956) - Ostracoda. In: Kiparisova L.D., Markovskogo B.P. & Radchenko G.P. (Eds.) - *Materialy Po Paleontologii*: 87-127. Novye Semeystva i Rody.
- Schneider G.F. (1960) - Fauna ostracod niznetriasovykh otlozenij Prikaspijskoj nizmennosti. *Trudy KJUGE* 5: 287-303.
- Schornikov E.I. (1990) - Evolution and classification of Bythocytheridae. *Courier Forschungsinstitut Senckenberg*, 123: 291-302.
- Sciuto F. (2014) - Two new species of Early Pleistocene marine ostracods from Southeast Sicily. *Carnets de Géologie*, 14(19): 429-437.
- Sciuto F. & Reitano A. (2021) - Early Pliocene ostracods from

- the Nocella River Mouth sedimentary succession (NW Sicily, Italy). *Revue de Micropaléontologie*, 73: 100530.
- Sciuto F., Baldanza A. & Reitano A. (2022) - First report of Early Pleistocene ostracods from the Agira sedimentary succession (Central Eastern Sicily, Italy). *Revue de Micropaléontologie*, 77: 100693.
- Sebe E.G., Crasquin S. & Grădinaru E. (2013) - Early and middle anisian deep-water ostracods (Crustacea) from North Dobrogea (Romania). *Revue de Paléobiologie*, 32: 509-529.
- Senowbari-Daryan B. & Abate B. (1986) - Zur Paläontologie, Fazies und stratigraphie der Karbonate innerhalb der "Formazione Mufara". (Obertrias, Sizilien). *Naturalista siciliano*, serie 4 (10): 59-104.
- Senowbari-Daryan B. & Di Stefano G. (2001) - Middle Triassic dasycladales in Sicily: Evidence of an Anisian<sup>2</sup>-Ladinian carbonate platform. *Acta Geologica Hungarica*, 44(1): 95-109.
- Shannon C.E. & Weaver W. (1949) - The Mathematical Theory of Communication. University of Illinois Press, Urbana, Illinois, USA.
- Shi G.R. (1993) - Multivariate data analysis in palaeology and palaeobiogeography, a review. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 105: 199-234.
- Sohn I.G. (1954) - Ostracoda from the Permian of the Glass Mountains, Texas. *United States Geological Survey Professional Paper*, 264-A: 1-24.
- Sohn I.G. (1962) - The ostracode genus *Cytherelloidea*, a possible indicator of paleotemperature. *United States Geological Survey Professional Paper*, 450-D: 144-147.
- Sohn I.G. (1968) - Triassic ostracodes from Makhtesh Ramon, Israel. *Bulletin of the Geological Survey of Israel*, 44: 1-71.
- Speranza F. & Minelli L. (2014) - Ultrathick Triassic dolomites control the rupture behavior of the central Apennine seismicity: Evidence from magnetic modeling of the L'Aquila fault zone. *Journal of Geophysical Research: Solid Earth*, 119(9): 6756-6770.
- Styk O. (1958) - Triassic microfauna in the neighbourhood of Chrzanow and the north- western part of the Mesozoic periphery of the Święty Krzyż Mts. *Micropalaeontological Researches in Poland*, 3: 163-176.
- Széles M. (1965) - Ostracodák a Bakonyi Nosztori-Volgy felsokarni rétegeiből. *Földtani Közlemény*, 45: 412-417.
- Tollmann A. (1976) - Analyse des klassischen nordalpinen Mesozoikums. *Monographie des Nördlichen Kalkalpen*, 2: 1-580.
- Tóth E. & Cséfan T. (2018) - Rare myodocopid ostracods from Mesozoic sections of Hungary: summary, revision and description of new taxa. *Zootaxa*, 4374(3): 350-374.
- Tóth E., Baranyi V., Karadi V., Jin X. & Budai T. (2024) - Ostracod turnover during the Carnian Pluvial Episode (Late Triassic) in the Western Neotethys. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 650: 112379.
- Tozer E.T. (1994) - Canadian Triassic Ammonoid Faunas. *Geological Survey of Canada Bulletin*, 467: 1-663.
- Triebel E. (1941) - Zur Morphologie und Ökologie der fossilen Ostracoden mit Beschreibung einiger neuer Gattungen und Arten. *Senckenbergiana*, 23: 294-400.
- Ulrich E.O. & Bassler R.S. (1923) - Paleozoic Ostracoda: their morphology, classification and occurrence. In: Maryland Geological Survey: 271-391, Silurian. Johns Hopkins Press, Baltimore.
- Urlichs M. (1971) - Variability of some ostracods from the Cassian Beds (Alpine Triassic) depending on the ecology. In: Oertli H.J. (Ed.) - Paléocologie Des Ostracodes. Bulletin du Centre de Recherche, 5, Supplement: 695-715. Société nationale des pétroles d'Aquitaine, Pau.
- Urlichs M. (1972) - Ostracoden aus den Kössener Schichten und ihre Abhängigkeit von der Ökologie. *Mitteilungen der Gesellschaft der Geologie- und Bergbaustudenten in Österreich*, 21: 661-710.
- Urlichs M. & Krystyn L. (2016) - Stratigraphic significance of the early Rhaetian ostracods from the proposed Norian/Rhaetian GSSP At Steinbergkogel (Late Triassic, Upper Austria). *Albertiana*, 43: 19-23.
- Warwick R.M. & Clarke K.R. (1998) - Taxonomic distinctness and environmental assessment. *Journal of Applied Ecology*, 35(4): 532-543.
- Whatley R.C. (1988) - Population structure of ostracods: some general principles for the recognition of palaeoenvironments. In: De Deckker P., Colin J.-P. & Peypouquet J.-P. (Eds.) - Ostracoda in the Earth Sciences, Elsevier: 245-256.
- Whatley R.C. & Mogueilevsky A. (1998) - The origins and early evolution of the Limnocytheridae (Crustacea, Ostracoda). What about Ostracodal Actes du 3e Congrès Européen des Ostracodologistes, 1996. *The Bulletin des Centres de Recherches Exploration-Production Elf-Aquitaine, Mempirs*, 20: 271-285. Pau, July 1st 1997.
- Whatley R.C. & Boomer I.D. (2000) - Systematic review and evolution of the early Cytheruridae (Ostracoda). *Journal of Micropalaeontology*, 19: 139-151.
- Whatley R.C., Cooke P.C.B. & Warne M.T. (1995) - Ostracoda from Lee Point on Shoal Bay, Northern Australia: part 1 - Cladocopina and Platycopina. *Revista española de Micropaleontología*, 27: 69-89.
- Wienholz E. & Kozur H. (1970) - Drei interessante Ostracodenarten aus dem Keuper im Norden der DDR. *Geologie*, 19(5): 588-592.
- Wolda H. (1981) - Similarity indices, sample size and diversity. *Oecologia*, 50: 296-302.
- Zia R. (1956) - Argille triassiche con *Trachyceras aon* nei dintorni di Marineo (Palermo). *Atti Società Toscana di Scienze Naturali Pisa*, serie A 63: 1-11.
- Zorn I. (2010) - Ostracodal type specimens stored in the paleontological collection of the Geological Survey of Austria. *Jahrbuch der Geologischen Bundesanstalt*, 150(1+2): 263-299.

