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New report of the coral-associated decapods from the “Formazione di Castelgomberto” (early Oligocene) (Vicenza, NE Italy)

Abstract - A rich coral-associated decapod fauna has been recently described from the early Oligocene of Zaia of Castelgomberto (Monti Lessini Vicentini), Valmarana, and Soghe (Monti Berici) (Vicenza, NE Italy). The discovery of new decapods from some new and already known localities has increased the carcinologic knowledge of the Oligocene fauna of Vicenza area. The studied species are as follows: *Callianassa* sp. (Callianassidae Dana, 1852); *Galathea* cfr. *G. weinfurteri* Bachmayer, 1950, *Palaeomunida defecta* Lörenthey, 1901 (Galatheidae Samouelle, 1819), *Petrolisthes vicetinus* Beschin, De Angeli & Checchi, 2001 (Porcellanidae Haworth, 1825), *Pagurus* cfr. *P. latidactylus* Müller & Collins, 1991 (Paguridae Latreille, 1802), *Dromilites corvini* (Bittner, 1893), *Dynomene lessinea* Beschin, De Angeli & Checchi, 2001 (Dynomenidae De Haan, 1833), *Ethusa berica* De Angeli & Beschin, 2008 (Ethusidae Guinot, 1977), *Merocryptus altavillensis* n. sp. (Leucosiidae Samouelle, 1819), *Daira depressa* (A. Milne Edwards, 1865) (Dairididae Serène, 1965), *Corystites vicetinus* n. sp. (Corystidae Samouelle, 1819), *Euronectes grumiensis* (Beschin, De Angeli & Checchi, 2001) (Portunidae Rafinesque, 1815), *Branchioplax rossii* De Angeli & Beschin, 2008 (Mathildellidae Karasawa & Kato, 2003), *Palaeocarpilius aquitanicus* A. Milne Edwards, 1862 (Carpiliidae Ortmann, 1893), *Tetralia loerentheyi* (Müller, 1975) (Tetraliidae Castro, Ng & Ahyong, 2004), *Glabropilumnus granulatus* n. sp. (Pilumnidae Samouelle, 1819), *Bernuffius ornatus* n. gen., n. sp., *Actaeites lobatus* Müller & Collins, 1991, *Haydnella oligocenica* De Angeli & Beschin, 2008 (Xanthidae MacLeay, 1838), *Brachynotus oligocenicus* n. sp. (Varunidae H. Milne Edwards, 1853), *Daragrapsus trispinosus* Müller & Collins, 1991 (Grapsoidae MacLeay, 1838).

The decapod fauna includes crustaceans of small size living a coral-rich environment. Some of the studied species are also recorded from the late Eocene of Hungary. At present, 34 coral-associated decapod species are known from the early Oligocene of the Vicenza area. The study of this sample has pointed out that *Merocryptus altavillensis* n. sp. represents the first report in the fossil record ascribed to this genus while *Corystites vicetinus* n. sp. is the second species belongs to this genus, known to date only with the Hungarian type species.

Key words: Crustacea, Decapoda, coral environment, early Oligocene, NE Italy.

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Riassunto - Nuova segnalazione di crostacei decapodi associati a coralli della “Formazione di Castelgomberto” (Oligocene inferiore) (Vicenza, NE Italia).

Una ricca fauna di crostacei associati a coralli sono stati recentemente descritti per l’Oligocene inferiore delle località di Zaia di Castelgomberto (Monti Lessini Vicentini) e Valmarana e Soghe (Monti Berici) (Vicenza, Italia settentrionale). Il ritrovamento di nuovi decapodi nelle località già note e in alcune nuove località ci ha permesso di incrementare le conoscenze carcinologiche della fauna oligocenica del territorio vicentino. Le specie trattate sono: “*Callianassa*” sp. (Callianassidae Dana, 1852); *Galathea* cfr. *G. weinfurteri* Bachmayer, 1950, *Palaeomonida defecta* Lörenthey, 1901 (Galatheidæ Samouelle, 1819), *Petrolisthes vicetinus* Beschin, De Angeli & Checchi, 2001 (Porcellanidae Haworth, 1825), *Pagurus* cfr. *P. latidactylus* Müller & Collins, 1991 (Paguridae Latreille, 1802), *Dromilites corvini* (Bittner, 1893), *Dynomene lessinea* Beschin, De Angeli & Checchi, 2001 (Dynomeneidae De Haan, 1833), *Ethusa berica* De Angeli & Beschin, 2008 (Ethusidae Guinot, 1977), *Merocryptus altavillensis* n. sp. (Leucosiidae Samouelle, 1819), *Daira depressa* (A. Milne Edwards, 1865) (Dairididae Serène, 1965), *Corystites vicetinus* n. sp. (Corystidae Samouelle, 1819), *Euronectes grumiensis* (Beschin, De Angeli & Checchi, 2001) (Portunidae Rafinesque, 1815), *Branchioplax rossii* De Angeli & Beschin, 2008 (Mathildellidae Karasawa & Kato, 2003), *Palaeocarpilius aquitanicus* A. Milne Edwards, 1862 (Carpiliidae Ortmann, 1893), *Tetralia loerentheyi* (Müller, 1975) (Tetraliidae Castro, Ng & Ahyong, 2004), *Glabropilumnus granulatus* n. sp. (Pilumnidae Samouelle, 1819), *Bernuffius ornatus* n. gen., n. sp., *Actaeites lobatus* Müller & Collins, 1991, *Haydnella oligocenica* De Angeli & Beschin, 2008 (Xanthidae MacLeay, 1838), *Brachynotus oligocenicus* n. sp. (Varunidae H. Milne Edwards, 1853), *Daragrapsus trispinosus* Müller & Collins, 1991 (Grapsoidea MacLeay, 1838).

L’associazione carcinologica è rappresentata da crostacei di piccole dimensioni caratteristici di ambiente corallino. Alcune delle specie descritte sono presenti anche nell’Eocene superiore dell’Ungheria. Con queste nuove segnalazioni, salgono a 34 le specie di decapodi associati a coralli descritte per l’Oligocene inferiore del territorio vicentino. Questo studio ha messo in evidenza che *Merocryptus altavillensis* n. sp. rappresenta la prima specie segnalata nel record fossile appartenente a questo genere e che la scoperta di *Corystites vicetinus* n. sp. è molto importante in quanto costituisce la seconda specie attribuita a questo genere, conosciuto finora solo con la specie tipo ungherese.

Parole chiave: Crustacea, Decapoda, ambiente corallino, Oligocene inferiore, Italia settentrionale.

Introduction and geological setting

The coral-associated decapods from the early Oligocene of the Vicenza area were studied by Airaghi (1905) and Beschin *et al.* (2001) for Castelgomberto (Monti Lessini orientali), and by Beschin *et al.* (1985), Vicariotto & Beschin (1994), De Angeli & Garassino (2002), De Angeli & Beschin (2008) and De Angeli & Caporiondo (2010) for Soghe (Arcugnano) and Valmarana of Altavilla Vicentina (Monti Berici). The discovery of new Oligocene decapods from new and previously known localities (Fig. 1) increases the knowledge of some known species, and permits the description of five new species.

Zaia (Castelgomberto)

The carcinologic sample of Zaia was discovered in a digging made by a private person. The calcarenitic rocks, rich in nullipore and branched colonial corals, preserved decapod crustaceans (about 100 specimens were collected) belonging to 13 species, described by Beschin *et al.* (2001).

Bernuffi (Montecchio Maggiore)

The decapod crustaceans from Bernuffi were discovered within calcarenitic rocks rich in foraminifers, echinoids, nullipore, branched colonial corals, internal moulds of cypreids, and *Trochus lucasianus*.

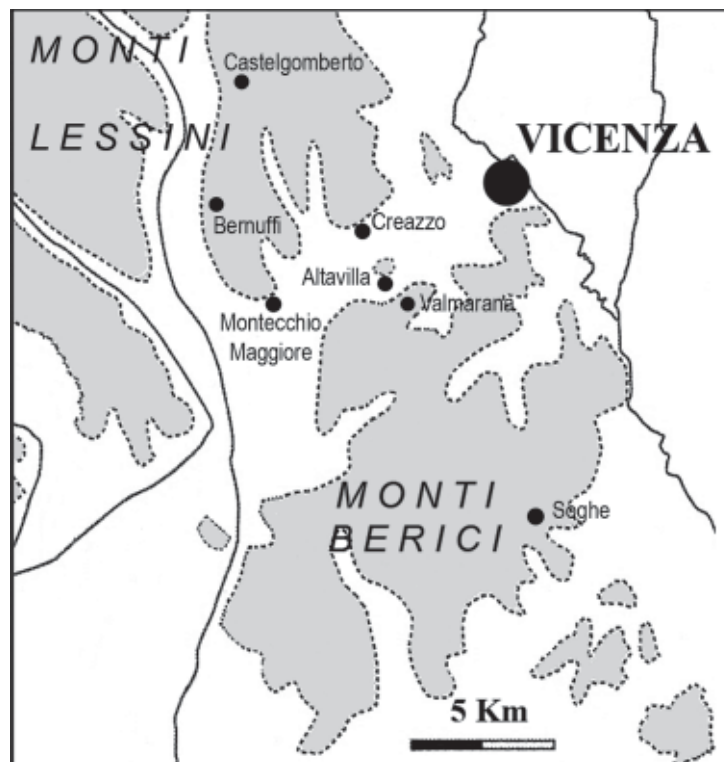


Fig. 1 - Map of the Vicenza territory with location of the fossiliferous localities. / Mappa del territorio di Vicenza con ubicazione delle località fossilifere.

Creazzo

The decapod crustaceans from Creazzo were collected along the road from Creazzo to Valdiezza. The whitish calcarenitic rocks are similar to those of Bernuffi and Zaia.

Valmarana and Altavilla Vicentina

The decapod crustaceans from Valmarana were collected on the northern side of the village in layers from the early Oligocene, located over the road from S. Agostino to Case Còvoli.

For this territory and for the close locality of Altavilla, Fabiani (1908, 1915) reported the stratigraphic succession, as follows:

- White limestones with corals, nummulites, and internal moulds of molluscs (*Natica crassatina*), overlain by limestones with corals, small nummulites, rare *Pecten*, and remains of decapods (*Galathea*).

- Yellowish limestones with small nummulites, remains of *Scutella*, and other echinoids (Oligocene).

- Siliceous sands and yellowish sandstones with *Scutella subrotundaeformis*, containing inferiorly nummulites (*N. bouillei*) (early Miocene).

The Oligocene levels of Valmarana preserve some decapod crustaceans, studied by Vicariotto & Beschin (1994), Beschin *et al.* (1985), De Angeli & Garassino (2002), Beschin & De Angeli (2006), De Angeli & Beschin (2008), and De Angeli & Caporiondo (2010).

The decapod crustaceans from Altavilla Vicentina instead were collected near Monti Berici, around Contrada Verlatò.

Soghe (Arcugnano)

The decapod crustaceans from Soghe were collected between Monte Lungo and Case Soghe, located on the eastern-central side of Monti Berici. The outcrops of this area are composed of whitish limestones, sparsely fossiliferous of lagoon origin. The overlying levels, reported by Fabiani (1908) and described by Rossi (1962) are formed by a series of arenaceous-clayey levels of volcanic origin, including a rich fauna of corals and molluscs, studied by Accorsi Benini (1971, 1974). Rare remains of terrestrial plants (Charrier, 1962) and rare decapod crustaceans (De Angeli & Beschin, 2000) from these levels have been discovered. The top of the series has formed by whitish limestones with remains of corals, some inner moulds of molluscs (*Trochus lucasianus* Brongn.), and remains of decapod crustaceans (De Angeli & Beschin, 2008).

Material

The studied sample includes 56 decapod crustaceans, housed in the Museo Civico “G. Zannato”, Montecchio Maggiore (Vicenza) (MCZ) and in the Museo di Storia Naturale di Milano (MSNM). The specimens are three-dimensionally preserved within a calcarenitic rock from the early Oligocene.

The infraorder Axiidea de Saint Laurent, 1979, includes *Callianassa* sp. (one specimen).

The infraorder Anomura H. Milne Edwards, 1832, includes *Galathea* cfr. *G. weinfurteri* Bachmayer, 1950 (six specimens), *Palaeomonida defecta* Lörenthey, 1901 (nine specimens), *Petrolisthes vicetinus* Beschin, De Angeli & Checchi, 2001 (three specimens), *Pagurus* cfr. *P. latidactylus* Müller & Collins, 1991 (one specimen).

The infraorder Brachyura Linnaeus, 1758, includes *Dromilites corvini* (Bittner, 1893 (one specimen), *Dynomene lessinea* Beschin, De Angeli & Checchi, 2001 (one specimen), *Merocryptus altavillensis* n. sp. (two specimens); *Ethusa berica* De Angeli & Beschin, 2008 (one specimen), *Daira depressa* (A. Milne Edwards, 1865) (one specimen), *Corystites vicetinus* n. sp. (three specimens); *Euronectes grumiensis* (Beschin, De Angeli & Checchi, 2001) (seven specimens), *Branchioplax rossii* De Angeli & Beschin, 2008 (one specimen), *Palaeocarpilius aquitanicus* A. Milne Edwards, 1862 (one specimen), *Tetralia loerentheyi* (Müller, 1975) (two specimens), *Glabropilumnus granulatus* n. sp. (one specimen), *Bernuffius ornatus* n. gen., n. sp. (one specimen), *Actaeites lobatus* Müller & Collins, 1991 (seven specimens), *Haydnella oligocenica* De Angeli & Beschin, 2008 (two specimens), *Brachynotus oligocenicus* n. sp. (two specimens), *Daragrapsus trispinosus* Müller & Collins, 1991 (two specimens).

In the text, in addition of the new species, we have figured some species already described by new specimens better preserved or by specimens coming from new fossiliferous localities.

The sizes of the specimens are expressed in millimetres (mm).

The systematic arrangement used in this paper follows the recent classifications proposed by Ng *et al.* (2008), De Grave *et al.* (2009), and Schweitzer *et al.* (2010).

Abbreviations: cl: carapace length; cw: carapace width; wo-f: width of orbito-frontal margin; wf: width of frontal margin; lp: length of palm (excluded fixed finger); hp: height of palm; tp: thickness of palm; ltp: length of propod (with fixed finger)

Systematic Palaeontology

Order Decapoda Latreille, 1802
 Infraorder Axiidea de Saint Laurent, 1979
 Family Callianassidae Dana, 1852
 Genus *Callianassa* Leach, 1814

Type species: *Cancer (Astacus) subterraneus* Montagu, 1808.

Callianassa sp.
 Fig. 2

Geological age: early Oligocene.

Material and measurements: one propodus of left cheliped from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27517).

MSNM i27517: lp: 5.8; hp: 5.6; tp: 9

Description. Subcylindrical right propodus, as long as high; palm with carpo-propodial articulation slightly oblique; upper margin of palm weakly convex and rimmed externally; lower margin straight and rimmed externally; outer surface of palm slightly rounded and smooth; some orifices present on lower part of outer surface; fixed finger relatively long, with a ridge on outer margin, extending partially also on palm.

Discussion. The studied propodus is partially preserved, not allowing a specific identification. It is ascribed in dubitative form to *Callianassa* for the morphological affinities with the numerous species ascribed to this genus, such as *Callianassa chalmasi* Brocchi, 1883, *C. rakosiensis* Lörenthey, 1897, and *C. pseudorakosiensis* Lörenthey in Lörenthey & Beurlen, 1929.

Even though, the shape of the palm and fixed finger, short and rimmed on outer surface, allows also a comparison with *Eucalliax vicetina* Beschin, Busulini, De Angeli & Tessier, 2002, from the middle Eocene of “Main” quarry of Arzignano (Beschin *et al.*, 2002: 10, Pl. 1, figs. 1-3), this species has a propodus bigger, with carpo-propodial articulation straight.

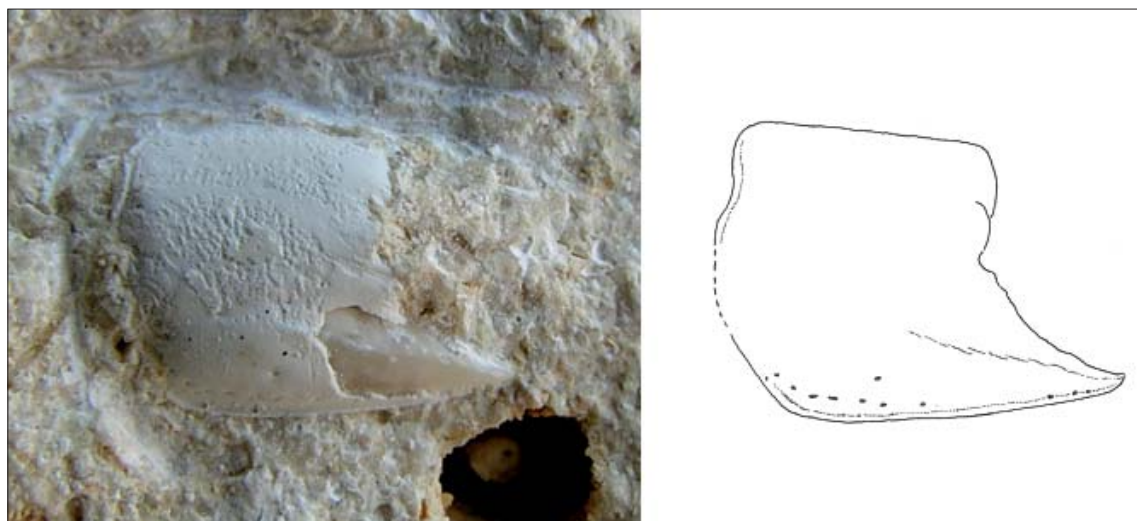


Fig. 2 - *Callianassa* sp. MSNM i27517. Photo and reconstruction of propodus. / Foto e ricostruzione del propodo. (x 4.5).

Infraorder Anomura McLay, 1838
 Superfamily Galatheoidea Samouelle, 1819
 Family Galatheidae Samouelle, 1819
 Genus *Galathea* Fabricius, 1793

Type species: *Cancer strigosus* Linnaeus, 1793.

***Galathea* cfr. *G. weinfurteri* Bachmayer, 1950**

- 2002 – *Galathea* cfr. *G. weinfurteri* Bachmayer in De Angeli & Garassino; p. 10, Text-fig. 7, Pl. 2 (figs. 2, 3)
 2003 – *Galathea* cfr. *G. weinfurteri* Bachmayer in De Angeli & Garassino; p. 99, fig. 1 (7)
 2006 – *Galathea* cfr. *G. weinfurteri* Bachmayer in De Angeli & Garassino; p. 21
 2008 – *Galathea* cfr. *G. weinfurteri* Bachmayer in De Angeli & Beschin; p. 17, Text-fig. 3, Pl. 1 (fig. 2)

Geological age: early Oligocene.

Material and measurements: six specimens with partially preserved carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27510, i27511, i27512, i27514, i27515).

MSNM i27510: cl: 6 (rostrum excluded); cw: 5

MSNM i27511: cw: 3.5

MSNM i27512: cw: 4

MSNM i27512: cw: 3.7

MSNM i27514: cl: 4 (rostrum excluded); cw: 3.8

MSNM i27515: cw: 2.8

Discussion. The studied specimens are similar to those previously described from Valmarana by De Angeli & Garassino (2002).

Genus *Palaeomunida* Lörenthey, 1901

Type species: *Palaeomunida defecta* Lörenthey, 1901.

***Palaeomunida defecta* Lörenthey, 1901**

- 1901 – *Palaeomunida defecta* Lörenthey; p. 807, Pl. 1 (fig. 3)
 1929 – *Palaeomunida defecta* Lörenthey in Lörenthey & Beurlen; p. 80; Pl. 3 (figs. 3-5)
 1929 – *Palaeomunida defecta* Lörenthey in Glaessner; p. 206
 1933 – *Palaeomunida defecta* Lörenthey in Di Salvo; p. 8, Pl. 2 (fig. 2 a-d)
 1969 – *Palaeomunida defecta* Lörenthey in Via Boada; p. 405
 1975 – *Galathea* sp. in Müller, p. 516, 520
 1991 – *Galathea (Palaeomunida) defecta* (Lörenthey) in Müller & Collins; p. 56, Text-fig. 2, Pl. 1 (figs. 12, 13), Pl. 2 (fig. 1)
 2000 – *Palaeomunida defecta* Lörenthey in Schweitzer & Feldmann; p. 158
 2001 – *Palaeomunida defecta* Lörenthey in Beschin *et al.*; p. 15, Pl. 1 (figs. 2, 3)
 2002 – *Palaeomunida defecta* Lörenthey in De Angeli & Garassino; p. 14, Text-fig. 11, Pl. 4 (figs. 2-5), Pl. 5 (fig. 1)
 2003 – *Palaeomunida defecta* Lörenthey in De Angeli & Garassino; p. 99, fig. 1 (3)
 2006 – *Palaeomunida defecta* Lörenthey in De Angeli & Garassino; p. 22
 2008 – *Palaeomunida defecta* Lörenthey in De Angeli & Beschin; p. 18, Text-fig. 4, Pl. 1 (fig. 3)

Geological age: early Oligocene.

Material and measurements: nine specimens with partially preserved carapaces from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27501, i27502, i27503, i27504, i27505 not measurable, i27506, i27507, i27508, i27509).

MSNM i27501: cl: 11.1 (rostrum excluded); cw: 10

MSNM i27502: cl: 6.5 (rostrum excluded); cw: 6.3

MSNM i27503: cw: 7.8

MSNM i27504: cl: 7.5; cw: 7

MSNM i27506: cw: 6

MSNM i27507: cl: 13.5 (rostrum excluded); cw: 12.8

MSNM i27508: cl: 7 (rostrum excluded)

MSNM i27509: cw: 11.7

Discussion. The studied specimens are similar to those from Zaia of Castelgomberto and Valmarana (Beschin *et al.*, 2001; De Angeli & Garassino, 2002). *Palaeomunida defecta* also has been reported from the late Eocene (Priabonian) of San Feliciano and Alonte (De Angeli & Garassino, 2002). Finally, this species has also known from the late Eocene of Hungary (Lörenthey & Beurlen, 1929; Müller & Collins, 1991).

Family Porcellanidae Haworth, 1825

Genus *Petrolisthes* Stimpson, 1858

Type species: *Porcellana violacea* Guérin-Méneville *in* Duperry, 1831.

Petrolisthes vicetinus Beschin, De Angeli & Checchi, 2001

Fig. 3

2001 – *Petrolisthes vicetinus* Beschin, De Angeli & Checchi; p. 416, Text-fig. 2, Pl. 1 (fig. 1)

2001 – *Petrolisthes vicetinus* Beschin *et al.* *in* De Angeli & Beschin; p. 12

2002 – *Petrolisthes vicetinus* Beschin *et al.* *in* De Angeli & Garassino; p. 24, Text-fig. 20, Pl. 9 (fig. 3)

2003 – *Petrolisthes vicetinus* Beschin *et al.* *in* De Angeli & Garassino; p. 99, Text-fig. 1 (15)

2006 – *Petrolisthes vicetinus* Beschin *et al.* *in* De Angeli & Garassino; p. 23

2008 – *Petrolisthes vicetinus* Beschin *et al.* *in* De Angeli & Beschin; p. 19, Pl. 1 (fig. 6)

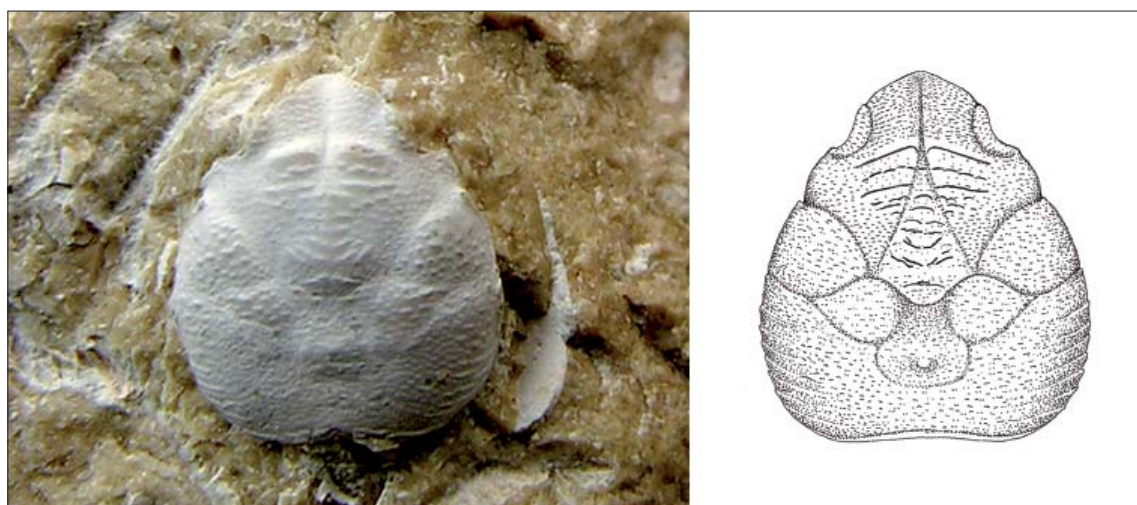


Fig. 3 - *Petrolisthes vicetinus* Beschin, De Angeli & Checchi, 2001. MCZ 3144-I.G.336877. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 4.3).

Geological age: early Oligocene.

Material and measurements: three specimens from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27496, i27497 not measurable, i27498) and one from Valmarana of Altavilla Vicentina (Vicenza) (MCZ 3144-I.G.336877).

MSNM i27596: cw: 5

MSNM i27498: cw: 7.5

MCZ 3144-I.G.336877: cl: 7.6; cw: 5.6

Discussion. *Petrolisthes vicetinus* has been described from the early Oligocene of Zaia of Castelgomberto, Creazzo, and Soghe (Beschin *et al.*, 2001, De Angeli & Garassino, 2002; De Angeli & Beschin, 2008)

Superfamily Paguroidea Latreille, 1802

Family Paguridae Latreille, 1802

Genus *Pagurus* Fabricius, 1775

Type species: *Cancer bernhardus* Linnaeus, 1758.

Pagurus cfr. *P. latidactylus* Müller & Collins, 1991

Fig. 4

1991 – *Pagurus latidactylus* Müller & Collins, p. 52, Text-fig. 2 c, Pl. 1 (figs. 7-9)

2008 – *Pagurus* cfr *P. latidactylus* Müller & Collins in De Angeli & Beschin, p. 19, Pl. 1 (fig. 4)

Geological age: early Oligocene.

Material and measurements: one right propodus from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27516).

MSNM i27516: lp: 3.7; hp: 3.8; ltp: 6.1

Description. Right propodus of small size, curved longitudinally; subcylindrical palm, strongly rounded and strongly granulated on outer surface; upper margin almost straight; lower margin convex; fixed finger long and strongly granulated.

Discussion. The shape and ornamentation of the studied propodus show morphological affinities with *Pagurus* cfr. *P. latidactylus* illustrated by Müller & Collins (1991, Pl. 1, fig. 7) from the late Eocene of Budapest (Hungary). One very similar propodus, but with a straight lower margin, and stronger fixed finger has been collected from the early Oligocene of Soghe (De Angeli & Beschin, 2008).

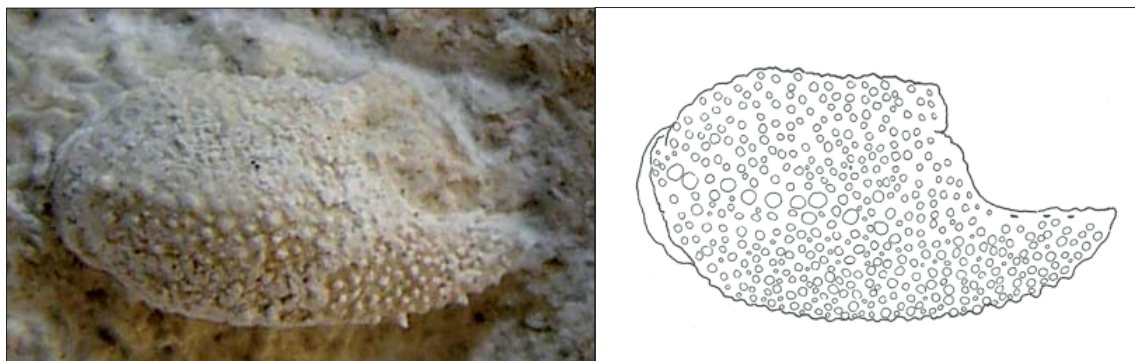


Fig. 4 - *Pagurus* cfr. *P. latidactylus* Müller & Collins, 1991. MSNM i27516. Photo and reconstruction of propodus. / Foto e ricostruzione del propodo. (x 6.8).

Infraorder Brachyura Linnaeus, 1758
 Section Dromiacea De Haan, 1833
 Superfamily Dromioidea De Haan, 1833
 Family Dromiidae De Haan, 1833
 Genus *Dromilites* H. Milne Edwards, 1837

Type species: *Dromia bucklandi* H. Milne Edwards, 1837.

Dromilites corvini (Bittner, 1893)

Fig. 5

- 1893 – *Dromia corvini* Bittner; p. 16, Pl. 2 (fig. 6)
 1898 – *Dromia corvini* Bittner in Lörenthey; p. 118
 1928 – *Dromia corvini* Bittner in Beurlen; p. 168
 1929 – *Dromia corvini* Bittner in Glaessner; p. 138
 1929 – *Dromilites corvini* (Bittner) in Lörenthey & Beurlen; p. 98, t. 4, ff. 6, 7
 2001 – *Dromilites corvini* (Bittner) in Beschin *et al.*; p. 17, fig. 3, t. 1, ff. 6, 7
 2001 – *Dromilites corvini* (Bittner) in De Angeli & Beschin; p. 13
 2006 – *Dromilites corvini* (Bittner) in De Angeli & Garassino; p. 31
 2008 – *Dromilites corvini* (Bittner) in De Angeli & Beschin; p. 19, Pl. 1 (fig. 8)

Geological age: early Oligocene.

Material and measurements: one specimen with incomplete carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27500).

MSNM i27500: cl: 9

Discussion. *Dromilites corvini* (Bittner, 1893) was described by the morphological characters of one specimen from the middle Eocene of Szucság (Hungary). Recently, this species also has been reported from the early Oligocene of Zaia of Castelgomberto and Valmarana (Beschin *et al.*, 2001; De Angeli & Beschin, 2008).

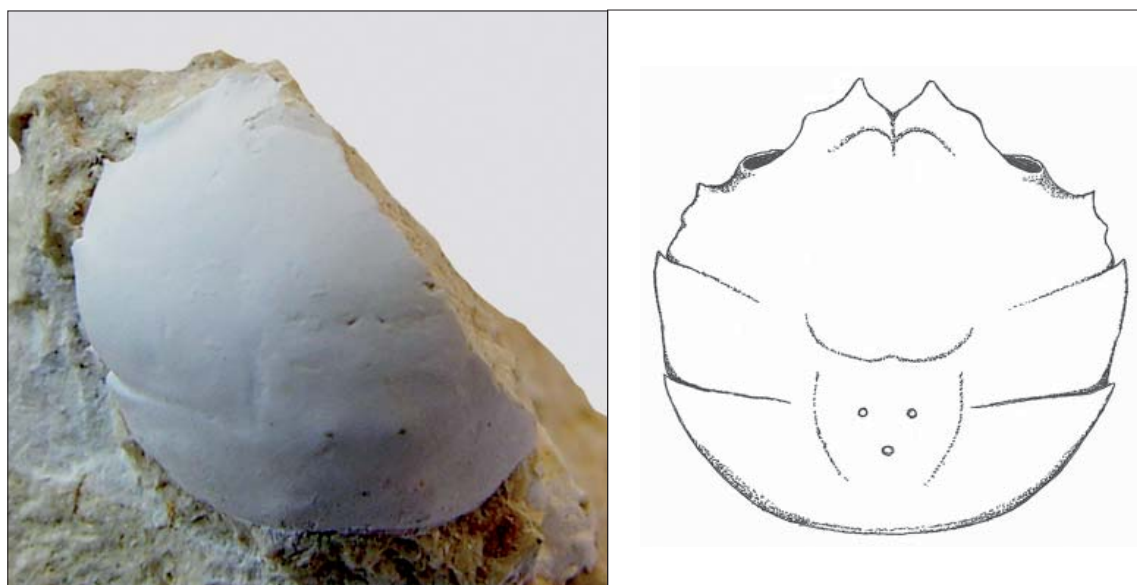


Fig. 5 - *Dromilites corvini* (Bittner, 1893). MSNM i27500. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 4.4).

Family Dynomenidae Ortmann, 1892
Genus *Dynomene* Desmarest, 1823

Type species: *Dynomene ispida* Guérin-Méneville, 1832.

Dynomene lessinea Beschin, De Angeli & Checchi, 2001
Fig. 6

2001 – *Dynomene lessinea* Beschin, De Angeli & Checchi; p. 17, Text-fig. 4, Pl. 1 (figs. 5, 8)
2001 – *Dynomene lessinea* Beschin, De Angeli & Checchi in De Angeli & Beschin; p. 14
2006 – *Dynomene lessinea* Beschin, De Angeli & Checchi in De Angeli & Garassino; p. 31
2008 – *Dynomene lessinea* Beschin, De Angeli & Checchi in De Angeli & Beschin; p. 20, Pl. 1 (fig. 7)

Geological age: early Oligocene.

Material and measurements: one specimen with a well-preserved carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27499).

MSNM i27499: cl: 6.1; cw: 6.4

Discussion. *Dynomene lessinea* was described on the basis of the morphological characters of five specimens from the early Oligocene of Zaia of Castelgomberto (Beschin *et al.*, 2001). Other specimens of this species have been reported from Soghe and Valmarana (De Angeli & Beschin, 2008).

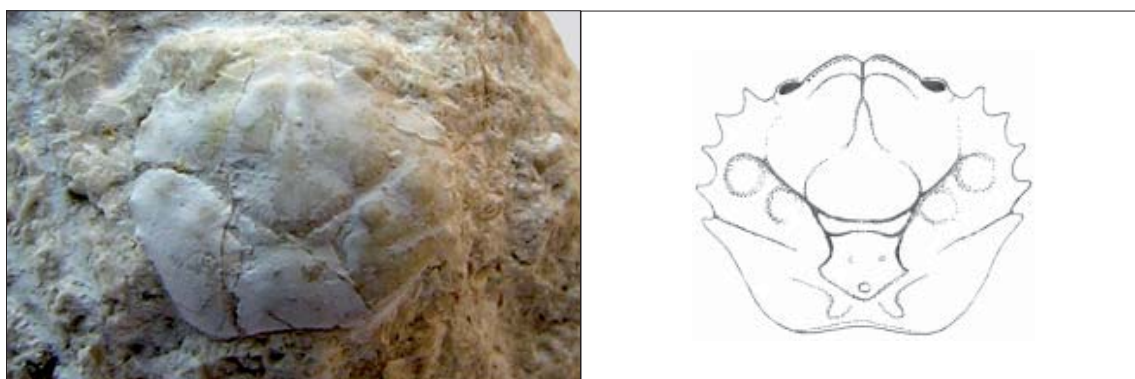


Fig. 6 - *Dynomene lessinea* Beschin, De Angeli & Checchi, 2001. MSNM i27499. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 5.3).

Section Eubrachyura de Saint Laurent, 1980
Subsection Heterotremata Guinot, 1977
Superfamily Dorippoidea MacLeay, 1838
Family Ethusidae Guinot, 1977
Genus *Ethusa* Roux, 1830

Type species: *Cancer mascarone* Herbst, 1785.

Ethusa berica De Angeli & Beschin, 2008
Fig. 7

2008 – *Ethusa berica* De Angeli & Beschin, p. 22, Text-fig. 5, Pl. 2 (figs. 1, 2)

Geological age: early Oligocene.

Material and measurements: one specimen with a well-preserved carapace from Valmarana of Altavilla Vicentina (Vicenza) (MCZ 3138-I.G.336871).

MCZ 3138-I.G.33687: cl: 5; cw: 4.8

Discussion. The studied specimen comes from the early Oligocene of Valmarana, type locality of this species (De Angeli & Beschin, 2008). The preservation of this specimen is better than that of the type specimens, revealing that of the four frontal spines the outer ones are longer than the spines previously described by De Angeli & Beschin (2008), and the dorsal regions are well defined by grooves.

In addition to *E. berica*, the other fossil species known to date are as follows: *E. evae* Müller & Collins, 1991 [late Eocene (Priabonian), Hungary]; *E. octospinosa* Müller, 2006 [middle Miocene (Badenian), Hungary]; *E. popognensis* De Angeli, Garassino, Pasini, 2009 [late Miocene (Messinian), Rio Popogna, Livorno, Italy]; *E. chibai* Karasawa, 1993 (early Pliocene, Japan), and *E. mascarone* (Herbst, 1785) extant species, reported also in the fossil record from the Miocene (Messinian) of Santa Pola (Alicante, Spain) by Vía Boada (1988).

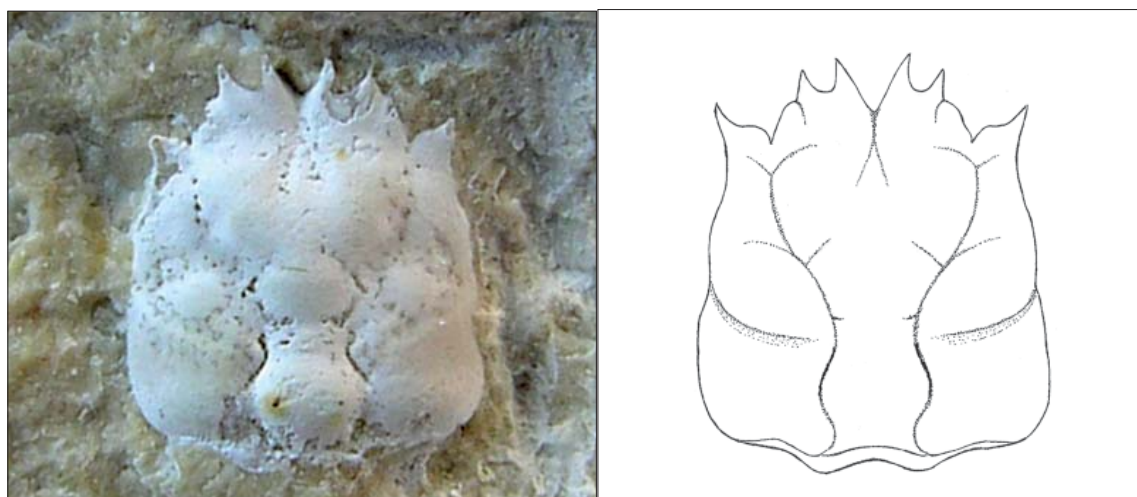


Fig. 7 - *Ethusa berica* De Angeli & Beschin, 2008. MCZ 3138-I.G.33687. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 6.5).

Superfamily Leucosioidea Samouelle, 1819

Family Leucosiidae Samouelle, 1819

Subfamily Ebaliinae Stimpson, 1871

Genus *Merocryptus* A. Milne Edwards, 1873

Type species: *Merocryptus lambriformis* A. Milne Edwards, 1873.

***Merocryptus altavillensis* n. sp.**

Fig. 8

Diagnosis: rhomboidal carapace strongly convex and granulated, with three distinct projections on each hepatic margin; midlateral margin with wing-like lateral projections; concave posterolateral margin; posterior margin with hemispherical tubercle; bilobate frontal margin; dorsal regions distinct; cardiac region well marked and strongly rounded; one tubercle on each protogastric region and two tubercles on each branchial region.

Etymology: the trivial name alludes to Altavilla Vicentina where the studied specimens were discovered.

Holotype: MCZ 3139-I.G.336872.

Paratype: MCZ 3140-I.G.336873.

Geological age: early Oligocene.

Type locality: Altavilla Vicentina (Vicenza).

Material and measurements: two specimens with well-preserved carapace (MCZ 3139-I.G.336872, MCZ 3140-I.G.336873).

MCZ 3139-I.G.336872: cl: 7.8; cw: 8.7

MCZ 3140-I.G.336873: cl: 6.1; cw: 6.2

Description. Rhomboidal carapace of small size, with dorsal surface strongly rounded, with maximum width medially. Fronto-orbital margin long about 1/3 of maximum width of carapace; front with median longitudinal depression and bilobate margin; small, rounded orbits, with two narrow supraorbital fissures; antero-

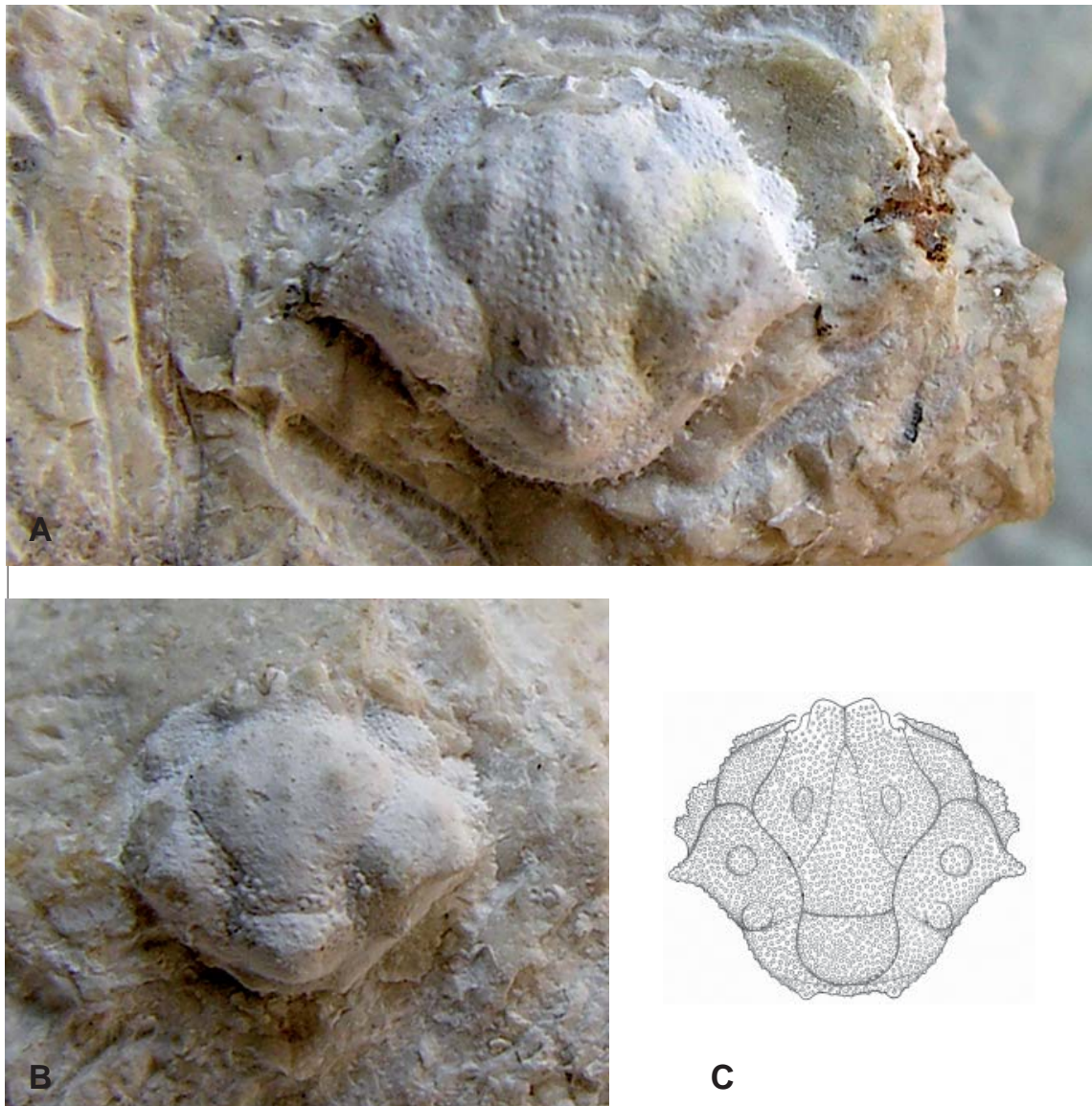


Fig. 8 - *Merocryptus altavillensis* n. sp. A) MCZ 3139-I.G.336872. Holotype. / Olotipo. (x 4.8). B) MCZ 3140-I.G.336873. Paratype. / Paratipo. (x 5). C) Reconstruction of carapace. / Ricostruzione del carapace.

lateral margin diverging posteriorly, convex, with three distinct granulated projections; midlateral margin with wing-like lateral projections; posterolateral margins converging posteriorly, slightly concave; posterior margin relatively narrow, with hemispherical tubercle on each angle; dorsal regions distinct; protogastric regions with conical median elevation; meso- metagastric regions forming one subpentagonal lobe; anterior mesogastric process located between protogastric regions; cardiac region well marked by branchiocardiac grooves and one gastric groove; suboval cardiac region strongly rounded; hepatic regions elongated longitudinally; branchial regions developed longitudinally, with two granulated elevations; dorsal surface with thick granulation.

Discussion. *Merocryptus* is known with four extant species: *M. boletifer* A. Milne Edwards & Bouvier, 1894, *M. durandi* Serène, 1955, *M. lambriiformis* A. Milne Edwards, 1873, *M. obsoletus* A. Milne Edwards & Bouvier, 1898 (Ng *et al.*, 2008) (Indo-Pacific, Australia, northeastern Atlantic Ocean and Mediterranean Sea). *Merocryptus boletifer* and *M. obsoletus* are also present in the European seas (northeastern Atlantic Ocean and Mediterranean Sea) (Türkay, 2001).

Merocryptus altavillensis n. sp. shows morphological characters typical of this genus. The rhomboidal carapace, the presence of three distinct anterolateral projections, and the midlateral margin with wing-like lateral projections. The specimens from Altavilla are distinct from the extant species in having the lateral projection of the midlateral margin scarcely developed, forming an acute projection on the median part of the carapace. Moreover, the studied specimens have two elevations on each branchial region and a thick granulation of the dorsal surface of the carapace.

Merocryptus altavillensis n. sp. represents the first report in the fossil record ascribed to this genus.

Superfamily Dairoidea Serène, 1965
Family Dairidae Serène, 1965
Genus *Daira* De Haan, 1833

Type species: *Cancer perlatus* Herbst, 1790.

Daira depressa (A. Milne Edwards, 1865)

- 1865 – *Phlyctenodes depressus* A. Milne Edwards; p. 367, Pl. 33 (fig. 2)
- 1877 – *Phlyctenodes depressus* A. Milne Edwards in Bittner; p. 446
- 1883 – *Phlyctenodes depressus* A. Milne Edwards in Bittner; p. 311
- 1896 – *Pilumnus* sp. in Ristori; p. 506, Pl. 12 (fig. 10)
- 1905 – *Phlyctenodes depressus* A. Milne Edwards in Airaghi; p. 204, Pl. 4 (fig. 3)
- 1910 – *Phlyctenodes depressus* A. Milne Edwards in Fabiani; p. 25
- 1915 – *Phlyctenodes depressus* A. Milne Edwards in Fabiani; p. 285
- 1929 – *Phlyctenodes depressus* A. Milne Edwards in Glaessner; p. 135
- 1969 – *Daira depressa* (A. Milne Edwards) in Via Boada; p. 373
- 2001 – *Daira depressa* (A. Milne Edwards) in Beschin *et al.*; p. 20, Pl. 2 (figs. 2, 4)
- 2001 – *Daira depressa* (A. Milne Edwards) in De Angeli & Beschin; p. 28
- 2004 – *Daira depressa* (A. Milne Edwards) in Beschin *et al.*; p. 115
- 2005 – *Daira depressa* (A. Milne Edwards) in Beschin *et al.*; p. 21, 22
- 2006 – *Daira depressa* (A. Milne Edwards) in De Angeli & Garassino; p. 50
- 2006 – *Daira depressa* (A. Milne Edwards) in Busulini *et al.*; p. 358, Text-fig. 3.8
- 2007 – *Daira depressa* (A. Milne Edwards) in Beschin *et al.*; p. 33
- 2008 – *Daira depressa* (A. Milne Edwards) in De Angeli & Beschin, p. 25, Pl. 2 (figs. 5-7)

Geological age: early Oligocene.

Material and measurements: one specimen with incomplete carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27495).

MSNM i27495: cw: 23.8

Discussion. This species already has been described from the early Oligocene of the Vicenza area. Many well-preserved specimens have been reported from Monte Grumi of Castelgomberto (A. Milne Edwards, 1865; Airaghi, 1905; Beschin *et al.*, 2001) and Soghe (De Angeli & Beschin, 2008).

Superfamily Corystoidea Samouelle, 1819

Family Corystidae Samouelle, 1819

Genus *Corystites* Müller, 1984

Type species: *Corystites latifrons* (Lörenthey in Lörenthey & Beurlen, 1929).

Included fossil species: *C. latifrons* (Lörenthey in Lörenthey & Beurlen, 1929).

***Corystites vicetinus* n. sp.**

Fig. 9

Diagnosis: oval, convex carapace; frontal margin with two distally rounded lobes; orbits distinct; anterolateral margin with four spines (extraorbital spine excluded); posterolateral margin long, converging posteriorly, with two small spines; regions well marked by shallow grooves; cardiac region with two tubercles; granulated epibranchial ridge located subsequently to fourth anterolateral spine.

Etymology: the trivial name alludes to Vicenza province where the studied specimens were discovered.

Holotype: MCZ 3136-I.G.336869.

Paratype: MCZ 3135-I.G.336868, MCZ 3137-I.G.336870.

Geological age: early Oligocene.

Type locality: Valmarana of Altavilla Vicentina (Vicenza).

Material and measurements: two specimens from Valmarana of Altavilla Vicentina (Vicenza) (MCZ 3135-I.G.336868, MCZ 3136-I.G.336869) and one from Soghe (Arcugnano, Vicenza) (MCZ 3137-I.G.336870).

MCZ 3135-I.G.336868: cl: 10

MCZ 3136-I.G.336869: cl: 8; cw: 6.8

MCZ 3137-I.G.336870: cw: 4

Description. Oval, convex carapace, longer than wide (cl/cw = 0.85); orbito-frontal margin wide; front bilobate, with two strong lobes, rounded distally (frontal lobes more elongated in the specimens of great size); wide orbits; supraorbital margin well marked by frontal lobes; preorbital tooth raised, well marked by a narrow, short supraorbital fissure; subtriangular extraorbital tooth; anterolateral margins convex, with four spines (extraorbital spine excluded); posterolateral margins long, converging; granulated ridge, located posteriorly to fourth anterolateral spine, extending onto branchial regions dorsally; posterolateral margins with two small spines; posterior margin relatively long, almost straight, with a granulated ridge; dorsal regions well marked by smooth grooves; frontal region wide, with a median longitudinal depression; epigastric reliefs well marked; oval protogastric regions well marked; mesogastric region marked posteriorly by a convex groove

within which two gastric pits are present; anterior mesogastric region narrow, elongated between protogastric regions; metagastric region wide, convex; oval cardiac region well marked by branchiocardiac grooves; cardiac region with two median, granulated elevations; triangular hepatic regions well marked; branchial regions developed longitudinally, with one epibranchial relief and one transverse granulated ridge; dorsal regions strongly granulated, marked by smooth grooves; anterior part of carapace with rounded granulations; posterior part of carapace with oval granulations, located transversely; ventral parts and pereiopods not preserved.

Discussion. *Corystites* was described by Müller (1984) in substitution for *Microcorystes* Lörenthey in Lörenthey & Beurlen, 1929, a name pre-occupied by *Microcorystes* Fritsch, 1893.

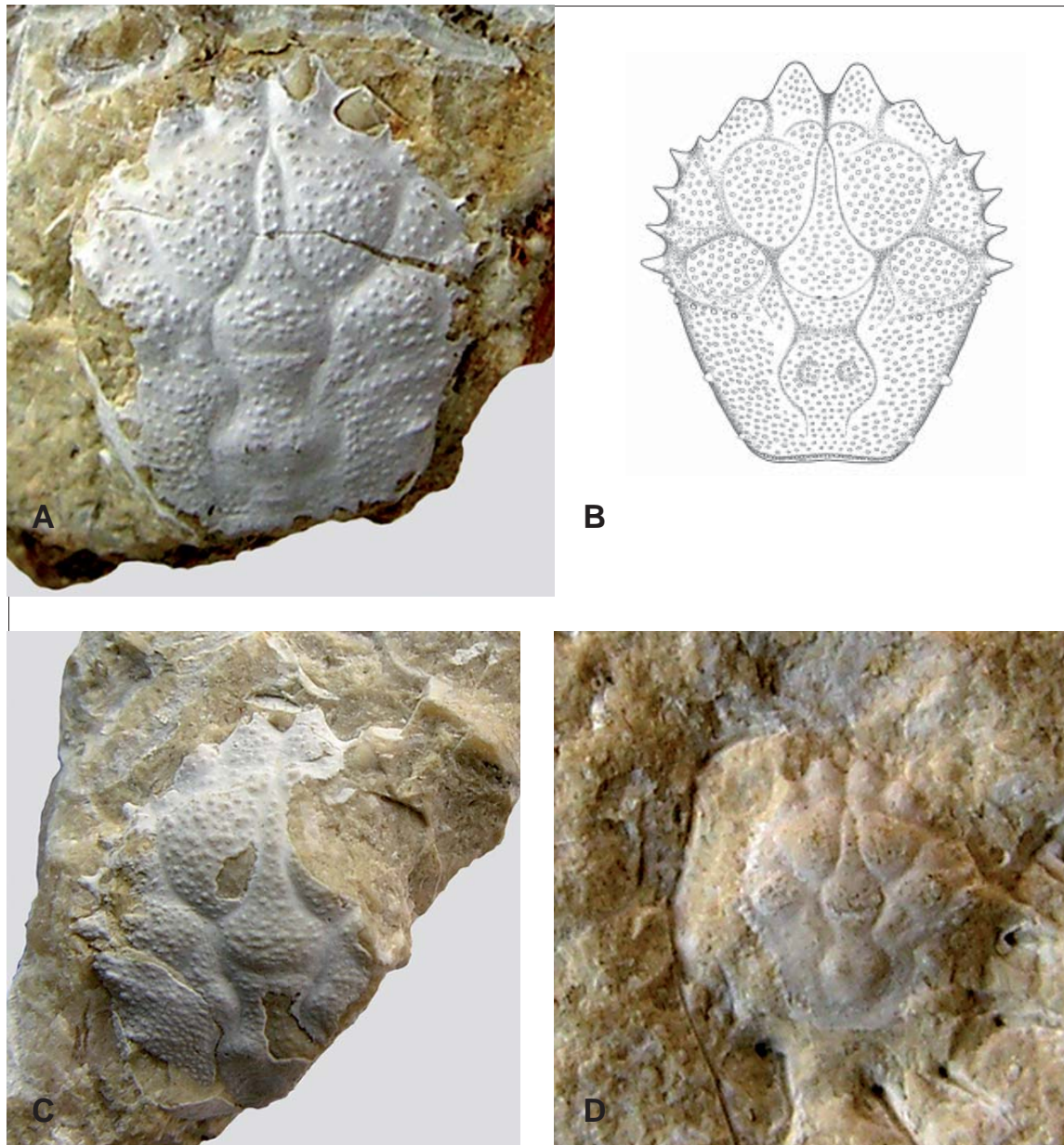


Fig. 9 - *Corystites vicetinus* n. sp. A) MCZ 3136-I.G.336869. Holotype / Olotipo. (x 5.6). B) Reconstruction of carapace. / Ricostruzione del carapace. C) MCZ 3135-I.G.336868. Paratype / Paratipo. (x 4.5) D) MCZ 3137-I.G.336870. Paratype / Paratipo. (x 7).

Corystites is known to date by the type species *C. latifrons* (Lörenthey in Lörenthey & Beurlen, 1929) (Miocene, Budafok, Hungary). At present, the holotype described by Lörenthey is broken or lost (Müller, 1984: 75), making the comparison with *C. vicetinus* n. sp. difficult, comparable only with the illustration by Lörenthey in Lörenthey & Beurlen (1929, Pl. 8, figs. 4 a-d).

Corystites latifrons has a carapace of small size (cw: 4; lw: 5) as the specimen of *C. vicetinus* n. sp. reported from Soghe (Fig. 9), while the other two specimens of the same species from Valmarana are larger. *Corystites vicetinus* n. sp. is distinguished from *C. latifrons* in having posterolateral margins more converging and less convex; moreover the dorsal surface is strongly granulated, without tubercles on gastric and branchial regions in *C. vicetinus*.

The discovery of *C. vicetinus* n. sp. expands the fossil record of *Corystites* from the early Oligocene-middle Miocene.

Superfamily Portunoidea Rafinesque, 1815

Family Portunidae Rafinesque, 1815

Subfamily Atoportuninae Šterčić, 2005

Genus *Euronectes* Karasawa, Schweitzer & Feldmann, 2008

Type species: *Rakosia grumiensis* Beschin, De Angeli & Checchi, 2001.

Euronectes grumiensis (Beschin, De Angeli & Checchi, 2001)

2001 – *Rakosia grumiensis* Beschin, De Angeli & Checchi; p. 23, Text-fig. 7, Pl. 2 (figs. 3, 6)

2001 – *Rakosia grumiensis* Beschin *et al.* in De Angeli & Beschin; p. 31

2006 – *Rakosia grumiensis* Beschin *et al.* in De Angeli & Garassino; p. 61

2008 – *Euronectes grumiensis* (Beschin *et al.*) in Karasawa, Schweitzer & Feldmann, p. 103

2008 – *Euronectes grumiensis* (Beschin *et al.*) in De Angeli & Beschin; p. 28, Pl. 3 (figs. 4-6)

Geological age: early Oligocene.

Material and measurements: seven partially preserved specimens from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27485, i27486, i27487, i27488, i27489 not measurable, i27490, i27491 not measurable).

MSNM i27485: cl: 10.6; cw: 16.3

MSNM i27486: cl: 9.2

MSNM i27487: cl: 10

MSNM i27488: cl: 16.8; cw: 18

MSNM i27490: cl: 6.2; cw: 8.8

Discussion. *Euronectes grumiensis* has been described on the basis of the morphological characters of many specimens from the early Oligocene of Monte Grumi of Castelgomberto (Beschin *et al.*, 2001). Previously the species was ascribed to *Rakosia* Müller, 1984, for the strict morphological affinities with *R. carupoides* Müller, 1984, from the Miocene of Hungary. Recently, Karasawa *et al.* (2008) proposed the new genus *Euronectes* for this species on the basis of presence of nine anterolateral teeth instead of eight as in *Rakosia*.

This species is common in the Oligocene rocks from the Vicenza area; in fact many specimens have been reported from Soghe and Valmarana (De Angeli & Beschin, 2008) and at present also from Bernuffi.

Superfamily Goneplacoidea MacLeay, 1838
 Family Mathildellidae Karasawa & Kato, 2003
 Genus *Branchioplax* Rathbun, 1916

Type species: *Branchioplax washingtoniana* Rathbun, 1916.

Branchioplax rossii De Angeli & Beschin, 2008

2008 – *Branchioplax rossii* De Angeli & Beschin, p. 29, Text-fig. 8, Pl. 4 (fig. 3)

Geological age: early Oligocene.

Material and measurements: one specimen with incomplete carapace from Creazzo (Vicenza) (MCZ 3146-I.G.336879).

MCZ 3146-I.G.336879: cw: 9.3

Discussion. *Branchioplax* was described by the morphological characters of *B. washingtoniana* Rathbun, 1916 (= *Neopilumnoplax hannibalanus* Rathbun, 1926b) from the middle Eocene of Washington (United States) and Oligocene of Alaska (Rathbun, 1916, 1926). Besides the type species, the genus includes eight species, as follows: *B. ballingi* Remy in Remy & Tessier, 1954 (Paleocene, Senegal); *B. concinna* Quayle & Collins, 1981 (Eocene, Great Britain); *B. sulcata* Müller & Collins, 1991 [Eocene (Ypresian and Priabonian), Italy and Hungary]; *B. parva* Beschin, Busulini, De Angeli & Tessier, 2007 [early Eocene (Ypresian), Italy]; *B. carmanahensis* (Rathbun, 1926) (Oligocene, N America); *B. pentagonalis* (Yokoyama, 1911) (middle Eocene, Japan), *B. albertii* De Angeli & Beschin, 2002 (middle, late Eocene, Italy), and *B. rossii* De Angeli & Beschin, 2008 (early Oligocene, Italy). Even though the studied specimen lacks the posterior part of the carapace, the morphological characters are similar to those of the holotype, reported from Valmarana (De Angeli & Beschin, 2008: 29).

Superfamily Carpilioidea Ortmann, 1893
 Family Carpiliidae Ortmann, 1893
 Genus *Palaeocarpilius* A. Milne Edwards, 1862

Type species: *Cancer macrochelus* Desmarest, 1822.

Palaeocarpilius aquitanicus A. Milne Edwards, 1862

1847 – *Cancer Boscii* in Burquet; p. 280

1850 – *Cancer Boscii* in d'Archiac; p. 448

1862 – *Palaeocarpilius aquitanicus* A. Milne Edwards; p. 57, Pl. 4 (figs. 4, 4 a)

1929 – *Palaeocarpilius aquitanicus* A. Milne Edwards in Glaessner; p. 292

1996 – *Palaeocarpilius macrochelus* (Desmarest) in Beschin *et al.*; p. 16, Text-fig. 4, Pl. 2 (figs. 1, 2)

2001 – *Palaeocarpilius macrochelus* (Desmarest) in Beschin *et al.*; p. 24, Pl. 3 (figs. 1 a-b)

2003 – *Palaeocarpilius aquitanicus* A. Milne Edwards in Schweitzer; p. 1112

2006 – *Palaeocarpilius aquitanicus* A. Milne Edwards in De Angeli & Garassino; p. 62

2006 – *Palaeocarpilius aquitanicus* A. Milne Edwards in Beschin & De Angeli; p. 15, Text-fig. 3, Pl. 2 (figs. 1, 2 a-c), Pl. 3 (figs. 1 a-c, 2 a-b, 3), Pl. 4 (fig. 1)

2008 – *Palaeocarpilius aquitanicus* A. Milne Edwards in De Angeli & Beschin; p. 30, Pl. 4 (figs. 1 a-b)

Geological age: early Oligocene.

Material and measurements: one left cheliped from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27518).

MSNM i27518: lp: 53.5; hp: 47.2; tp: 27.2

Discussion. *P. aquitanicus* has already been reported from the early Oligocene of some localities of the Vicenza area (Beschin & De Angeli, 2006). This species has been also reported from the Oligocene of France (A. Milne Edwards, 1862).

Superfamily Pilumnoidea Samouelle, 1819

Family Pilumnidae Samouelle, 1819

Subfamily Pilumninae Samouelle, 1819

Genus *Glabropilumnus* Balss, 1932

Type species: *Xantho dispar* Dana, 1852.

Included fossil species: *G. fossatus* Müller, 1996; *G. kamiyai* Karasawa, 1991; *G. laevis* (Dana, 1852); *G. soghensis* De Angeli & Beschin, 2008.

***Glabropilumnus granulatus* n. sp.**

Fig. 10

Diagnosis: carapace transversely oval, wider than long, moderately convex; front wide and bilobate; orbits with supraorbital margin continuous and raised; anterolateral margins with three spines; regions not distinct; dorsal surface entirely granulated.

Etymology: the trivial name alludes to the ornamentation of the dorsal surface of the carapace.

Holotype: MCZ 3134-I.G.336867.

Geological age: early Oligocene.

Type locality: Valmarana of Altavilla Vicentina (Vicenza).

Material and measurements: one well-preserved specimen (MCZ 3134-I.G.336867).

MCZ 3134-I.G.336867: cl: 6.8; cw 8.6; wo-f: 5.8

Description. Oval carapace, moderately convex, wider than long (ratio between length and width = 0.79); orbitofrontal margin wide (ratio between orbitofrontal and width = 0.67); front weakly bilobate, grooved medially; frontal margin finely granulated; orbits relatively wide; supraorbital margin concave, granulated; supraorbital areas slightly raised and distinct from the front; anterolateral margins convex, with three short spines (extraorbital spine excluded), the third one very small; posterolateral margins longer than anterolateral ones, converging posteriorly; posterior margin relatively wide and rimmed superficially; regions not marked; frontal region grooved by a weak median longitudinal groove; weak transversae gastric depression with two evident gastric pits; dorsal surface entirely granulated.

Discussion. The morphological characters of *Glabropilumnus* Balss, 1932, have been reviewed by Galil & Takeda (1988). As reported by Ng *et al.* (2008) the genus includes six extant species, some of these living in coral reef environments, as the type species *G. dispar*, widespread in Philippines, Indonesia, Malay Peninsula, and Australia (Galil & Takeda, 1988).

Glabropilumnus granulatus n. sp. has morphological affinities with *G. fossatus* Müller, 1996 (middle Miocene, Hungary and Poland) in regard to the outline of the carapace and anterolateral margins with three short spines. However *G. fossatus*

has an almost smooth dorsal surface of the carapace and an evident gastric groove (Müller, 1984, 1996). The carapace is more rounded in *G. kamiyai* Karasawa, 1991 (Miocene, Japan), the dorsal surface of the carapace is smooth, and the anterolateral spines are more developed (Karasawa, 1991). *Glabropilumnus soghensis* De Angeli & Beschin, 2008 (early Oligocene, Soghe, Vicenza, Italy) has anterolateral margins with three short spines, each composed of the union of two tubercles, and exhibits dorsal ornamentation with small tubercles and many orifices (De Angeli & Beschin, 2008). *Glabropilumnus* sp. aff. *G. laevis* (Dana, 1852) has been reported from the Pleistocene of Ryukyu Group (Japan) (Karasawa, 2000). Finally *Glabropilumnus* sp. reported by Müller (2006: 44, Pl. 2, fig. 4) includes one poorly preserved carapace from the middle Miocene (Badenian) of Budapest (Hungary).

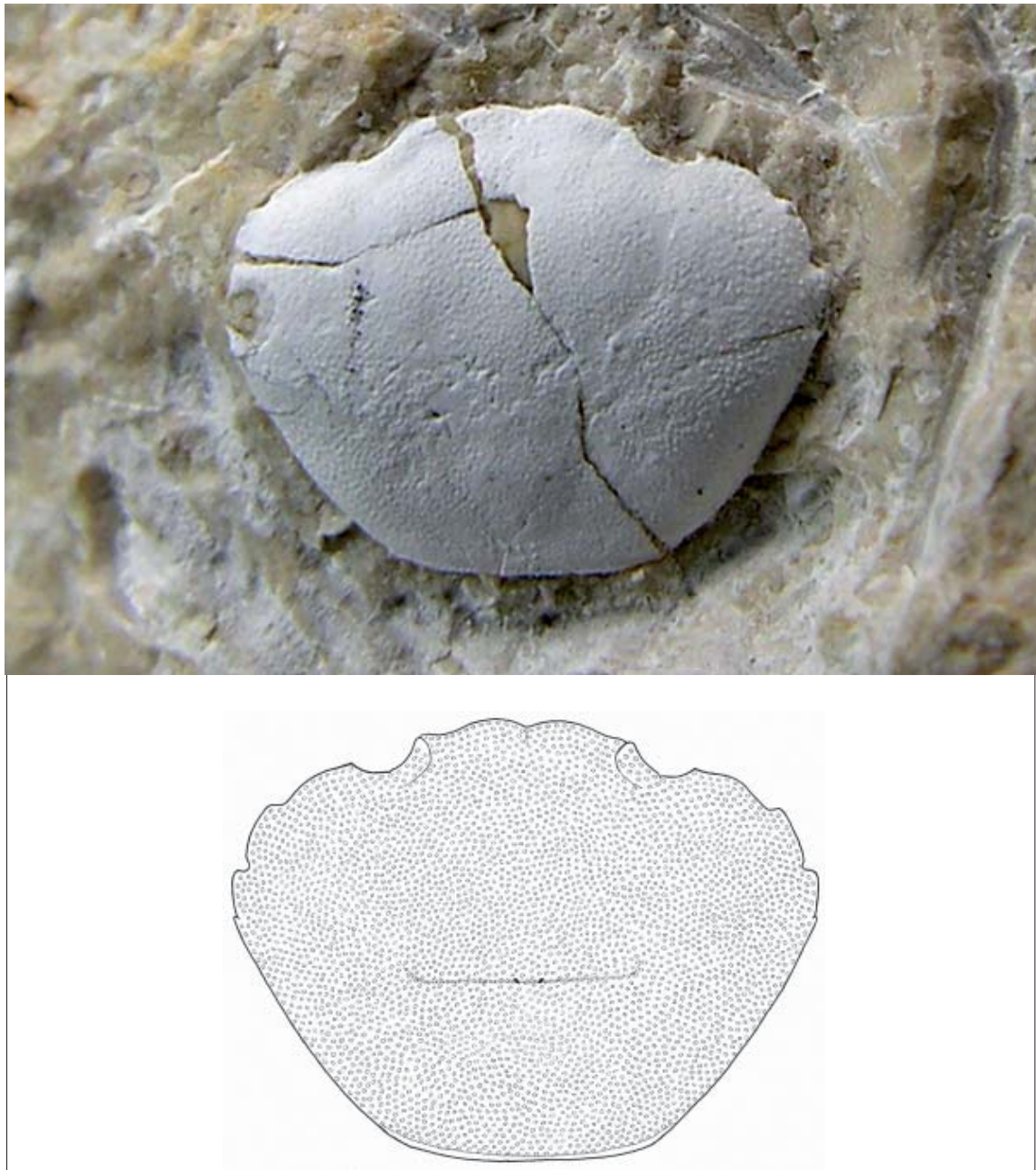


Fig. 10 - *Glabropilumnus granulatus* n. sp. MCZ 3134-I.G.336867. Holotype / Olotipo. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 7.7).

Superfamily Trapezioidea Miers, 1886
Family Tetraliidae Castro, Ng & Ahyong, 2004
Genus *Tetralia* Dana, 1851

Type species: *Cancer glaberrimus* Herbst, 1790.

Tetralia loerentheyi (Müller, 1975)
Fig. 11

1975 – *Trapezia loerentheyi* Müller; p. 516, 520, Pl. 1 (fig. 1)

1991 – *Tetralia loerentheyi* (Müller) in Müller & Collins; p. 82, Text-fig. 4 m, Pl. 6 (figs. 9, 12, 15)

Geological age: early Oligocene.

Material and measurements: one incomplete carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MCZ 3132-I.G.336865) and one complete carapace from Altavilla Vicentina (Vicenza) (MCZ 3143-I.G.336876).

MCZ 3132-I.G.336865: cl: 6.2

MCZ 3143-I.G.336876: cl: 6.1; cw: 6.5

Discussion. The studied specimens have a wide, convex, and denticulated frontal margin, and anterolateral margins with two small spines. These characters are typical of *Tetralia loerentheyi* (Müller, 1975) reported from the late Eocene (Priabonian) of Budapest (Hungary) (Müller, 1975; Müller & Collins, 1991) to which the studied specimens are assigned. *Tetralia loerentheyi* is reported for the first time in Italy, enlarging the fossil record of this species from the early Oligocene-middle Miocene.

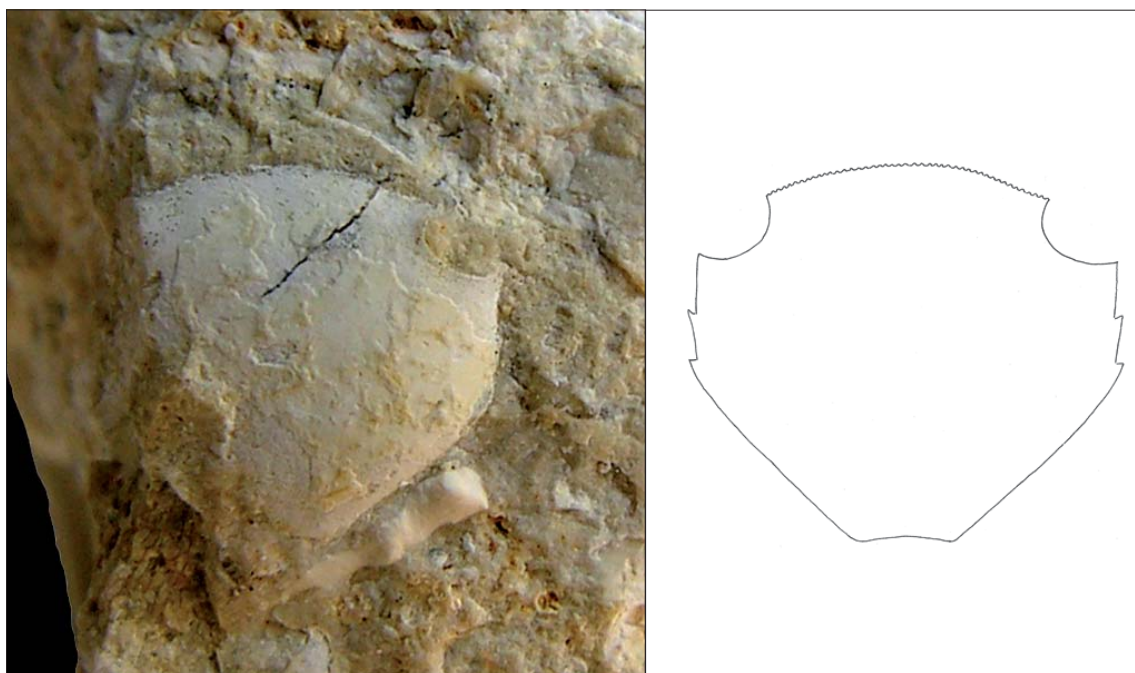


Fig. 11 - *Tetralia loerentheyi* (Müller, 1975). MCZ 3132-I.G.336865. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 5).

Superfamily Xanthoidea MacLeay, 1838
 Family Xanthidae MacLeay, 1838

Genus *Bernuffius* nov.

Diagnosis: subovate carapace, convex, wider than long; front straight, grooved medially; anterolateral margins with four flat teeth, reducing in size posteriorly; fourth anterolateral tooth with a ridge, extending onto branchial region; regions distinct with granulations and sinuous ridges interlace to create an elegant dorsal sculpture.

Etymology: from Bernuffi where the studied specimen was discovered.

Type species: *Bernuffius ornatus* n. sp.

Description: as for the type species.

Bernuffius ornatus n. sp.

Fig. 12

Diagnosis: as for the genus.

Etymology: the trivial name alludes to the dorsal ornamentation, typical of this species.

Holotype: MCZ 3133-I.G.336866.

Geological age: early Oligocene.

Type locality: Bernuffi (Montecchio Maggiore, Vicenza).

Material and measurements: one specimen with well-preserved carapace (MCZ 3133-I.G.336866).

MCZ 3133-I.G.336866: cl: 8.3; cw: 12; wf-o: 5.1

Description. Subovate carapace, convex, wider than long (cl/cw = 0.69); orbitofrontal margin relatively long (wo-f/cw = 0.42); front with straight, granulated margin, grooved medially; supraorbital margin concave, raised, and granulated; anterolateral margins convex, with four flat, wide teeth (extraorbital tooth not considered), finely granulated; anterolateral teeth reducing in size posteriorly; fourth anterolateral tooth smallest, ridged superficially; posterolateral margin converging posteriorly, slightly concave not far from posterior angle; posterior margin narrow and rimmed; regions well distinct; frontal region with a longitudinal median groove; protogastric regions with heart-shaped circular ridge extending onto epigastric lobes; meso-, meta- and urogastric regions joined to form a subpentagonal lobe; anterior mesogastric process with one narrow, elongate ridge branching posteriorly on mesogastric region; metagastric region with one curved ridge located on posterior part; cardiac region distinct laterally and defined by deep branchiocardiac grooves; anterior part of cardiac region with one anteriorly curved ridge; branchial regions with some ridges interlaced among them; posterior ridge extending transversely to fourth anterolateral tooth; one ridge located also not far from posterolateral and posterior margins; dorsal surface with small granulations; pereopods and ventral parts not preserved.

Discussion. Some morphological characters of this species are usually present in the xanthids. In fact, the studied specimen has a widened oval, convex carapace with four anterolateral teeth as in some species of Liomerinae Sakai, 1976. *Liomera caelata* (Odhner, 1925) also has one narrow, elongate anterior mesogastric process and transverse relief on the regions. However *B. ornatus* n. gen., n. sp.

differs in having four wide, flat teeth, reducing in size posteriorly and granulated margins. Moreover, this species has unusual ornamentation comprised of sinuous ridges interlaced to form a curious dorsal sculpture.

Among the fossil species, *Sculptoplax rigida* Müller & Collins, 1991, from the Priabonian of Budapest (Hungary) has regions strongly demarcated by ridges, but the carapace of the Hungarian species is narrower than that of *B. ornatus* n. gen., n. sp., and the ridges on the median and posterior part of the carapace are located transversely (Müller & Collins, 1991, fig. 5g, Pl. 8, fig. 13). The particular dorsal ornamentation of *B. ornatus* n. gen., n. sp., seems not comparable with any extant and fossil species known to date.

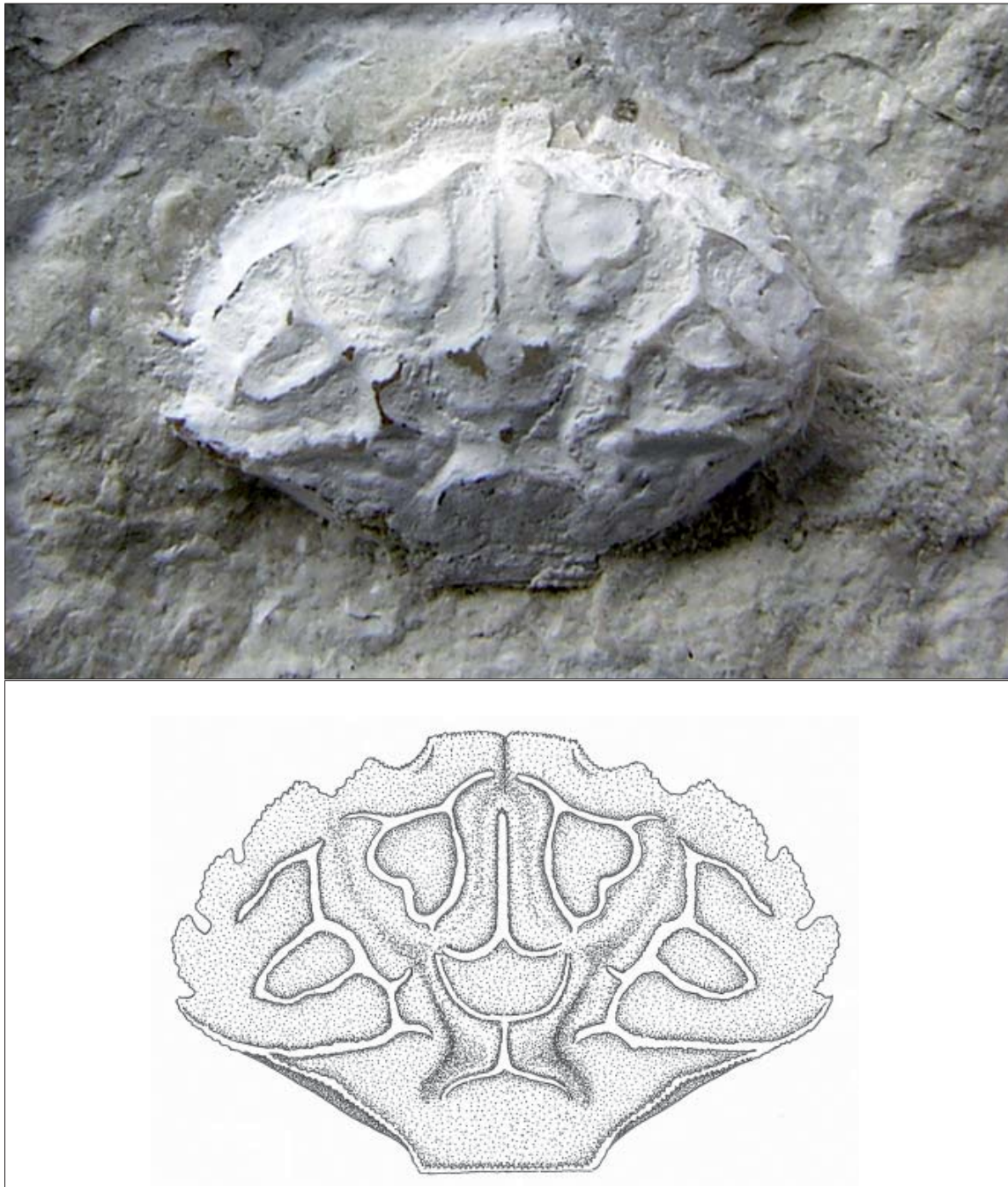


Fig. 12 - *Bernuffius ornatus* n. gen., n. sp. MCZ 3133-I.G.336866. Holotype / Olotipo. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 6.5).

Genus *Actaeites* Müller & Collins, 1991Type species: *Actaeites lobatus* Müller & Collins, 1991.*Actaeites lobatus* Müller & Collins, 1991

Fig. 13

1991 – *Actaeites lobatus* Müller & Collins; p. 70, Text-fig. 4c, Pl. 4 (figs. 9, 10)2006 – *Actaeites lobatus* Müller & Collins in Karasawa & Schweitzer; p. 502007 – *Actaeites lobatus* Müller & Collins in Beschin *et al.*; p. 56, Pl. 9 (figs. 2 a, b, 3, 4)2008 – *Actaeites lobatus* Müller & Collins in De Angeli & Beschin; p. 32, Text-fig. 10, Pl. 4 (fig. 4)**Geological age:** early Oligocene.**Material and measurements:** seven partially preserved specimens from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27478, i27479, i27480, i27481, i27482, i27483, i27484).

MSNM i27478: cl: 5.5; cw: 6.8

MSNM i27479: cl: 8.3; cw: 10.1

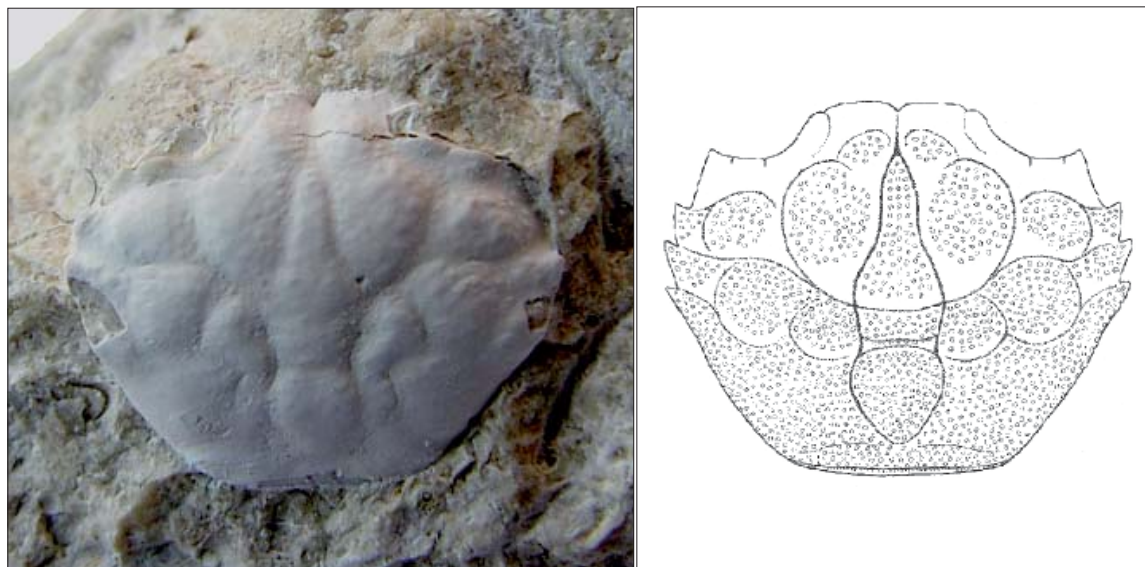
MSNM i27480: cl: 8.4; cw: 10.5

MSNM i27481: cl: 8.4; cw: 10.8

MSNM i27482: cl: 7.8; cw: 9.8

MSNM i27483: cl: 5.6; cw: 7.1

MSNM i27484: cl: 8.1; cw: 9.3

Discussion. *Actaeites lobatus* was described from the late Eocene (Priabonian) of Hungary (Müller & Collins, 1991). This species has been recently reported from the early Eocene (Ypresian) of Contrada Gecchelina of Monte di Malo and from the early Oligocene of Soghe (Beschín *et al.*, 2007; De Angeli & Beschín, 2008). The new specimens from Bernuffi have the morphological characters of this species, as confirmed also by the comparison with the cast of the Hungarian sample. In the new classification of the Xanthoidea *sensu lato*, *A. lobatus* has been included *incertae sedis* among the Xanthoidea (Karasawa & Schweitzer, 2006).Fig. 13 - *Actaeites lobatus* Müller & Collins, 1991. MSNM i27484. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 4.6).

Genus *Haydnella* Müller, 1984

Type species: *Haydnella steingeri* Müller, 1984.

Haydnella oligocenica De Angeli & Beschin, 2008

2001 – *Xantho* sp. in Beschin *et al.*; p. 26, Pl. 3 (fig. 4)

2001 – *Xantho* sp. in De Angeli & Beschin; p. 35

2006 – *Xantho* sp. in De Angeli & Garassino; p. 76

2008 – *Haydnella oligocenica* De Angeli & Beschin; p. 32, Text-fig. 11, Pl. 4 (fig. 2)

Geological age: early Oligocene.

Material: two partially preserved specimens from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27492, i27493).

Discussion. *Haydnella* Müller, 1984, has been described on the morphological characters of one carapace from the middle Miocene of Hungary. In addition to the type species, the genus includes *H. maladensis* Beschin Busulini, De Angeli & Tessier, 2007 [early Eocene (Ypresian) of Gecchelina of Monte di Malo, Vicenza]; *H. pulchellus* (A. Milne Edwards, 1864) (middle Cenozoic, France); *H. oligocenica* (early Oligocene, Soghe and Valmarana, Vicenza) and *Haydnella* sp. (early Miocene, Mexico) (A. Milne Edwards, 1864; Müller, 1984; Beschin *et al.*, 2007; De Angeli & Beschin, 2008; Vega *et al.*, 2009).

Even though *H. oligocenica* is similar to *H. steingeri*, the last one has a narrower carapace, without granulated ridges on anterior regions.

Subsection Thoracotremata Guinot, 1977

Superfamily Grapsoidea MacLeay, 1838

Family Varunidae H. Milne Edwards, 1853

Subfamily Varuninae H. Milne Edwards, 1853

Genus *Brachynotus* De Haan, 1833

Type species: *Goneplax sexdentatus* Risso, 1827.

Included fossil species: *B. februaryus* Müller, 1974; *B. corallinus* Beschin, Busulini, De Angeli & Tessier, 2007.

Brachynotus oligocenicus n. sp.

Fig. 14

Diagnosis: subrectangular carapace, wider than long, superficially flat; front wide, sinuous, grooved medially; orbits wide; supraorbital margins strongly concave; extraorbital tooth elongated anteriorly; anterolateral margins almost parallel, with three blunt teeth; regions weakly distinct; epigastric lobes wide and raised; gastric regions well defined posteriorly by a strong incision made by median part of cervical groove; dorsal surface with fine wavy-ridges.

Etymology: the trivial name alludes to Oligocene, the geological period of the studied specimens.

Holotype: MCZ 3141-I.G.336874.

Paratype: MCZ 3142-I.G.336875.

Geological age: early Oligocene.

Type locality: Valmarana (Altavilla Vicentina, Vicenza).

Material and measurements: two specimens, the holotype (MCZ 3141-I.G.336874) from Valmarana and the paratype (MCZ 3142-I.G.336875) from Altavilla Vicentina.

MCZ 3141-I.G.336874: cl: 4.4; cw: 5.2

MCZ 3142-I.G.336875: cw: 9.3

Description. Subrectangular carapace, slightly wider than long, superficially flat; orbitofrontal margin occupying all anterior part of carapace; front long about 0.57 of maximum width of carapace, slightly sinuous and grooved medially; frontal margin extending sinuous with preorbital tooth; orbits wide and deep; supraorbital margin strongly concave, grooved by a weak fissure and with one extraorbital spine extending anteriorly; lateral margins almost parallel, with three blunt teeth; posterolateral margins convergent posteriorly; posterior margin straight, half of maximum width of carapace; regions defined by weak grooves; frontal region wide and depressed in longitudinal median part; epigastric lobes wide and raised; meso-, meta-, and epigastric regions joined in one subpentagonal lobe; anterior mesogastric region narrow, extending between protogastric regions; gastric regions distinct posteriorly and defined by median part of cervical groove; cardiac region not marked by branchiocardiac groove; hepatic regions small, marked posteriorly by cervical groove; branchial regions marked by one weak postcervical groove; dorsal surface with a fine wavy-ridges typically grapsoid ornament.

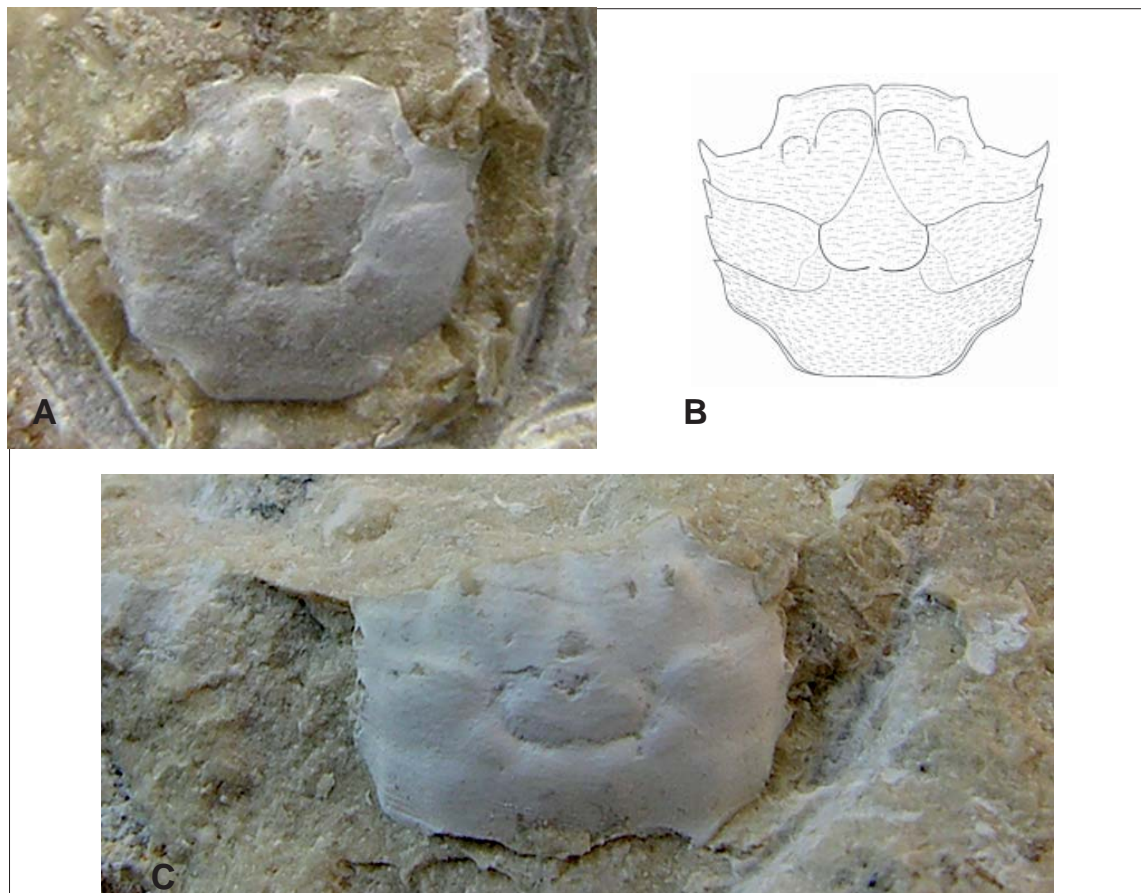


Fig. 14 - *Brachynotus oligocenicus* n. sp. A) MCZ 3141-I.G.336874. Holotype / Olotipo. (x 4.9). B) Reconstruction of carapace. / Ricostruzione del carapace. C) MCZ 3142-I.G.336875. Paratype / Paratipo. (x 3.8).

Discussion. As reported by Poore (2004) *Brachynotus* includes twelve extant species of which four live in the western Atlantic and Mediterranean Sea and the others in the Indo-West Pacific. At present, *B. corallinus* Beschin, Busulini, De Angeli & Tessier, 2007, from the early Eocene (Ypresian) of Gecchelina of Monte di Malo (Vicenza, Italy) and *B. februaryus* Müller, 1974, from the middle Miocene of Hungary are known in the fossil record. *Brachynotus corallinus* was described on morphological characters of the holotype which is poorly preserved in the anterior part (Beschin *et al.*, 2007). However this species differs from *B. oligocenicus* n. sp. in having the cardiac region wide and distinct defined by the branchiocardiac grooves, the branchial regions divided in transverse relief by grooves, and the dorsal surface smooth. *Brachynotus februaryus* has a more sinuous front and smooth dorsal surface (Müller, 1974). *Brachynotus oligocenicus* n. sp. represents the first report of this genus from the Oligocene.

Genus *Daragrapsus* Müller & Collins, 1991

Type species: *Daragrapsus trispinosus* Müller & Collins, 1991.

Daragrapsus trispinosus Müller & Collins, 1991

Fig. 15

- 1991 – *Daragrapsus trispinosus* Müller & Collins; p. 88, Text-fig. 5 h, Pl. 3 (figs. 9, 10, 12-14)
 2001 – *Daragrapsus trispinosus* Müller & Collins in Beschin *et al.*; p. 28, Text-fig. 9, Pl. 3 (figs. 5, 6)
 2001 – *Daragrapsus trispinosus* Müller & Collins in De Angeli & Beschin; p. 38
 2001 – *Daragrapsus trispinosus* Müller & Collins in Karasawa & Kato; p. 271, 272
 2006 – *Daragrapsus trispinosus* Müller & Collins in De Angeli & Garassino; p. 80
 2008 – *Daragrapsus trispinosus* Müller & Collins in De Angeli & Beschin; p. 34, Pl. 4 (fig. 7)

Stratigraphic range: early Oligocene.

Material and measurements: two specimens with well-preserved carapace from Bernuffi (Montecchio Maggiore, Vicenza) (MSNM i27494) and from Valmarana of Altavilla Vicentina, Vicenza) (MCZ 3145-I.G.336878).

MSNM i 27494: cl: 3,8; cw: 5

MCZ 3145-I.G.336878: cl: 9.9; cw: 14.2

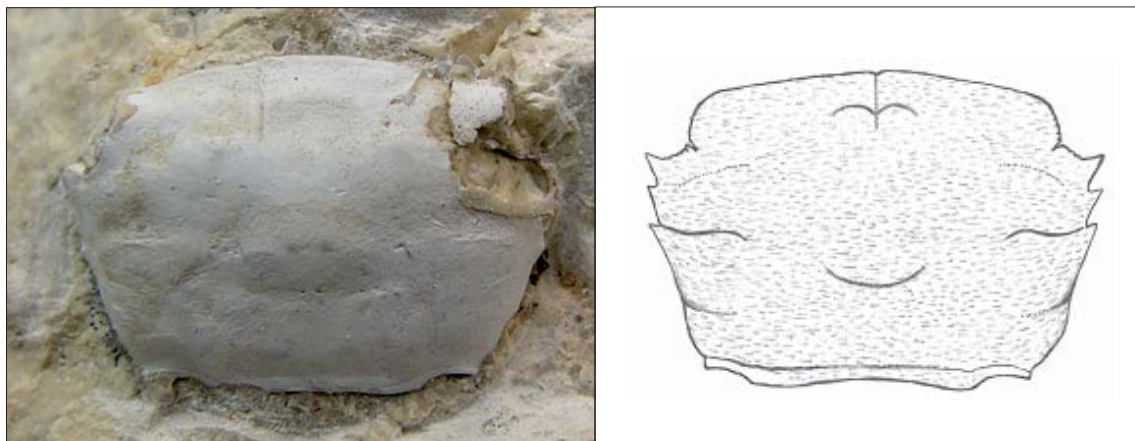


Fig. 15 - *Daragrapsus trispinosus* Müller & Collins, 1991. MCZ 3145-I.G.336878. Photo and reconstruction of carapace. / Foto e ricostruzione del carapace. (x 2.8).

Discussion. The studied specimens have the morphological characters of *Daragrapsus trispinosus* Müller & Collins, 1991, from the late Eocene of Budapest (Hungary). This species has been recently reported in the Vicenza area from the Oligocene of Zaia of Castelgomberto, Valmarana, and Soghe (Beschin *et al.*, 2001; De Angeli & Beschin, 2008). This species is included in the Grapsoidea as *incertae sedis* at family level (De Grave *et al.*, 2009).

Conclusion

The Oligocene sediments from the Vicenza area have different sedimentological aspects. The northern and eastern part is characterized by sandstones, marls, and conglomeratic clays, sometimes intercalated by limestones with lithotamns, while the southern and western part is characterized by marine rocks of lagoonal origin, very rich in algal and coral remains. This lagoonal environment was protected by the presence of a strong barrier reef (Frost, 1981) that has promoted the development of bioconstructed bodies, a refuge of different kind of organisms.

The recent discovery of coral-associated decapods from Zaia of Castelgomberto, Soghe, and Valmarana (Beschin *et al.*, 2001; De Angeli & Beschin, 2008) and at present from Bernuffi, Creazzo, and Altavilla Vicentina, has increased the carcinological knowledge of the Oligocene. This fauna includes mostly isolated small carapaces (exuviae), preserved within limestones rich in corals and molluscs remains.

The fauna includes 34 species of decapods (Tab. 1) of which twenty are reported for the first time from the Vicenza area. *Palaeomunida defecta*, *Pagurus* cfr. *P. latidactylus*, *Dromilites corvini*, *Priabonacarcinus gallicus*, *Tetralia loerentheyi*, *Actaeites lobatus*, and *Daragrapsus trispinosus* were already known from the Priabonian of Hungary (Müller & Collins, 1991); *Actaeites lobatus* and *Palaeomunida defecta* have been also reported from the Ypresian of Contrada Gecchelina of Monte di Malo and from the Priabonian of San Feliciano (Monti Berici) (Beschin *et al.*, 2007; De Angeli & Garassino, 2002).

Some decapods from these outcrops have relationship with the representatives in warm seas of the Indo-Pacific or Central America, living in coral reef environments (*Petrolisthes*, *Dynomene*, *Daira*, *Daldorfia*) or sometimes symbiotic with corals (*Tetralia*, *Jonesius*). *Galathea valmaranensis*, *G.* cfr. *G. weinfuteri*, and *Palaeomunida defecta* are very abundant from Valmarana and Soghe, while the brachyurans are rarer.

Corystites vicetinus n. sp. represents a very interesting report. This genus is known to date only by *C. latifrons* from the Miocene of Hungary, even though the type species, figured by Lörenthey in Lörenthey & Beurlen (1929), seems to be lost. The stratigraphic range of this genus is expanded from the early Oligocene to middle Miocene by this new report.

Merocryptus altavillensis n. sp. is a leucosiid of small size, with a very raised and richly granulated carapace. As regards the type species, *Merocryptus lambriiformis*, lives in the Indo-Pacific and Australia seas on sandy bottoms from 28 to 274 m (Sakai, 1976; Poore, 2004), the fossil species lived in a coral reef environment.

Glabropilumnus soghensis and *G. granulatus* n. sp. have affinities with the species from the Indo-Pacific and Australia. The two fossil species from Vicenza represent the oldest species of this genus and during the Miocene *Glabropilumnus* also lived in the Paratethys seas of Hungary and Poland by *G. fossatus* (Müller, 1984, 1996).

Tab. 1 - Comparison among the coral-associated decapods of the oligocenic outcrops of Castelgomberto, Bernuffi, Creazzo, Soghe, Altavilla Vicentina and Valmarana. / Confronto tra i decapodi associati a coralli dei giacimenti oligocenici di Castelgomberto, Bernuffi, Creazzo, Soghe, Altavilla Vicentina e Valmarana.

Early Oligocene coral-associated decapods from the Vicenza area	Castelgomberto	Bernuffi	Creazzo	Soghe	Valmarana, Altavilla Vic.
<i>“Callianassa”</i> sp.		•			
<i>Neocallichirus</i> cfr. <i>N. allegranzii</i> Beschin <i>et al.</i> , 2005				•	
<i>Galathea valmaranensis</i> De Angeli & Garassino, 2002				•	•
<i>Galathea</i> cfr. <i>G. weinfurteri</i> Bachmayer, 1950		•		•	•
<i>Palaeomunida defecta</i> Lörenthey, 1901	•	•		•	•
<i>Petrolisthes vicetinus</i> Beschin <i>et al.</i> , 2001	•	•	•	•	•
<i>Pagurus</i> cfr. <i>latidactylus</i> Müller & Collins, 1991		•		•	
<i>Dromilites corvini</i> (Bittner, 1893)	•	•			•
<i>Dynomene lessinea</i> Beschin <i>et al.</i> , 2001	•	•		•	•
<i>Kromtitis</i> sp.					•
<i>Ethusa berica</i> De Angeli & Beschin, 2008					•
<i>Merocryptus altavillensis</i> n. sp.					•
<i>Achaeus parvulus</i> De Angeli & Caporiondo, 2010					•
<i>Hyastenus corallinus</i> De Angeli & Beschin, 2008					•
<i>Micippa antiqua</i> Beschin <i>et al.</i> , 2001	•			•	
<i>Micromaia</i> sp.					•
<i>Phrynosolus italicus</i> De Angeli & Beschin, 2008				•	•
<i>Daldorfia fabianii</i> Beschin <i>et al.</i> , 2001	•				
<i>Daira depressa</i> (A. Milne Edwards, 1865)	•	•		•	
<i>Corystites vicetinus</i> n. sp.				•	•
<i>Euronectes grumiensis</i> Beschin <i>et al.</i> , 2001	•	•		•	•
<i>Branchioplox rossii</i> De Angeli & Beschin, 2008			•		•
<i>Palaeocarpilius aquitanicus</i> A. Milne Edwards, 1862	•	•		•	•
<i>Priabonacarcinus gallicus</i> Müller & Collins, 1991				•	
<i>Glabropilumnus soghensis</i> De Angeli & Beschin, 2008				•	
<i>Glabropilumnus granulatus</i> n. sp.					•
<i>Jonesius oligocenicus</i> (Beschin, <i>et al.</i> , 2001)	•				
<i>Tetralia loerentheyi</i> (Müller, 1975)		•			•
<i>Bernuffius ornatus</i> n. gen., n. sp.		•			
<i>Haydnella oligocenica</i> De Angeli & Beschin, 2008	•	•		•	•
<i>Acteites lobatus</i> Müller & Collins, 1991		•		•	
<i>Corallicarcinus</i> sp.	•				
<i>Brachynotus oligocenicus</i> n. sp.					•
<i>Daragrapsus trispinosus</i> Müller & Collins, 1991	•	•		•	•

Branchioplax is a genus known in the fossil record from the Paleocene-Oligocene; from Vicenza this genus has known by two Ypresian species (*B. parva* and *B. sulcata*), one species from middle Eocene (*B. albertii*) and one Oligocene species (*B. rossii*) (De Angeli & Beschin, 2002; Beschin *et al.*, 2007; De Angeli & Beschin, 2008).

Bernuffius ornatus n. gen., n. sp. is a xanthid with a particular ornamentation of the dorsal surface of the carapace, not comparable with any fossil and extant species. Probably this kind of ornamentation contributed to the camouflage of this species in the coral reef environment.

Brachynotus oligocenicus n. sp. is a brachyuran of small size, with fine wavy-ridges typically grapsoid ornament. *Brachynotus* was also widespread in the Miocene seas of the Paratethys of Hungary with *B. februarius* (Müller, 1984).

The main Cenozoic outcrops from Europe preserving coral-associated decapods have been reported by Müller (2004). The Paleocene faunas are famous for the rich samples from the Danian of Fakse (Denmark) (Collins & Jakobsen, 1994) and other localities of Denmark and Sweden; a coeval locality also has been reported from Austria (Verhoff *et al.*, 2007, 2009).

New decapod faunas from the early Eocene (middle Ilerdian), discovered in Huesca Province (Spain) are works in progress (Artal, pers. comm., 2009). The outcrop of Contrada Gecchelina of Monte di Malo also dates from the early Eocene (Ypresian), with its rich decapod fauna (48 species) (Beschinn *et al.*, 2007).

The Hungarian faunas reported by Müller & Collins (1991), the decapods described by Checchia-Rispoli (1905) and Di Salvo (1933) for Monreale (Palermo, Sicily), and the many anomurans from the Priabonian of Monte Berici (Vicenza) (De Angeli & Garassino, 2002) date from the late Eocene (Priabonian). The carcinologic fauna from Monti Berici has strict analogies with the Hungarian fauna.

The outcrops from the Oligocene are located mainly in the Vicenza area: Castलगomberto, Bernuffi, Creazzo, Soghe, and Valmarana (Beschinn *et al.*, 2001; De Angeli & Beschinn, 2008).

Important coral-associated decapods from the Miocene of the Paratethys are located in Austria (Glaessner, 1924, 1928; Bachmayer & Tollmann, 1953; Friebe, 1987; Müller, 1998), Poland (Müller, 1996; Górka, 2002), Hungary, Bulgaria, Slovenia (Lörenthey & Beurlen, 1929, Müller, 1979, 1984a) and The Hkrain (Radwański *et al.*, 2006).

Many species have been described from the early Miocene (late Burdigalian) of Olérdola and Can Sala (Catalunya, Spain) (Müller, 1993) and from the late Miocene (Messinian) of Santa Pola (Spain) (Müller, 1984b), Oran (Algeria) (Saint-Martin & Müller, 1988), Baleari (Garcia Socias, 1989-1990), Greek (Georgiades-Dikeoulia & Müller, 1984), and Malta (Gatt & De Angeli, in press).

Acknowledgements

We wish to thank R. Ghiotto and V. Frisone, Museo Civico "G. Zannato", Montecchio Maggiore (Vicenza), for the permission to study the specimens, and R. M. Feldmann, Kent State University, Ohio, for careful review and criticism.

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Ricevuto: 21 gennaio 2010

Approvato: 24 febbraio 2010