

Giovanni Pasini\* & Alessandro Garassino\*\*

## First record of *Maja squinado* (Herbst, 1788) (Decapoda, Brachyura, Majidae) from the Pliocene of Masserano, Biella (Piemonte, NW Italy)

**Abstract** - The record of *Maja squinado* (Herbst, 1788) (Majidae Samouelle, 1819) from the Pliocene of Masserano, Biella (NW Italy) is the first for this family in Piemonte. The discovery increases the knowledge of the carcinologic assemblage in the area and documents a wider geographical distribution of the species in the Pliocene. *Maja squinado* (Herbst, 1788) was previously reported from the Pliocene of Emilia Romagna, Lazio, Puglia and Sardegna. Moreover, its presence in the NW of the Mediterranean Sea (Paleo-Adriatic Basin) also indicates the northern limit of its spread into the old Pliocene padanian Gulf.

**Key words:** Decapoda, Brachyura, Majidae, Pliocene, Italy.

**Riassunto** - Prima segnalazione di *Maja squinado* (Herbst, 1788) (Decapoda, Brachyura, Majidae) nel Pliocene di Masserano, Biella (Italia nord-occidentale).

La scoperta di *Maja squinado* (Herbst, 1788) (Majidae Samouelle, 1819) nel Pliocene di Masserano, Biella (Italia nord-occidentale) è la prima segnalazione della famiglia nel bacino piemontese, che non solo incrementa le conoscenze carcinologiche dell'area, ma amplia anche la distribuzione geografica della specie nel Pliocene. *M. squinado* (Herbst, 1788) è stata precedentemente segnalata nel Pliocene dell'Emilia Romagna, Lazio, Puglia e Sardegna. La sua presenza nel NO del Mediterraneo (Bacino Paleo-Adriatico) rappresenta il limite più settentrionale di diffusione della specie all'interno dell'antico golfo Pliocenico padano.

**Parole chiave:** Decapodi, Brachyura, Majidae, Pliocene, Italia.

### Introduction and geological setting

Recently, Garassino *et al.* (2004) recorded the presence of brachyurans and anomurans from several localities of the Cenozoic of Piemonte (NW Italy). In this study the following brachyurans were reported, *Calappa granulata* Linnaeus, 1758, *Ilia pliocenica* Ristori, 1819, *Eriphia* sp. as well as one anomuran, *Pagurus* sp., from the Pliocene of Masserano (Biella) (Fig. 1).

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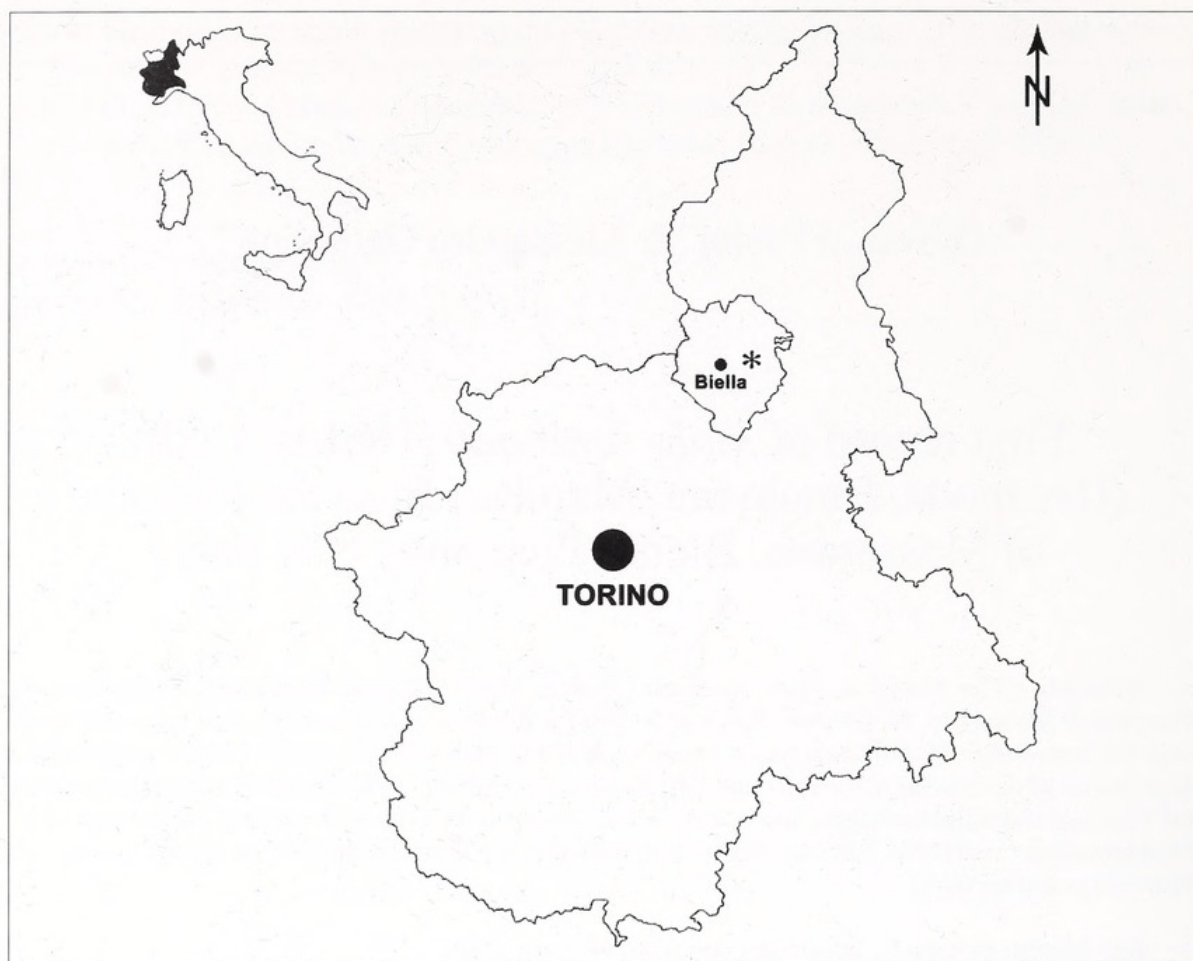


Fig. 1 – Map of the Piemonte with the fossiliferous locality (\*). / Regione Piemonte, con la località fossilifera (\*).

The new record of *Maja squinado* (Herbst, 1788) increases the faunal assemblage of this area, enlarging the carcinological record from the Cenozoic of Piemonte. The Pliocene levels of Masserano also preserve a very rich and well documented malacological fauna, in addition to echinoderms and rare teeth of teleostean and chondrichthyan fishes (Pasini & Garassino, 2006).

The fossiliferous levels crop out along the eroded banks of the Osterla River. These levels consist of more or less compact coarse sands and grey siltstone-micaeous sands, alternating with arenaceous levels of Pliocene age, 4 meters thick (Garassino *et al.*, 2004).

The studied specimen comes from a level of compact micaceous siltstone, with associated disarticulate pelecypod mollusc shells and gastropod casts.

### Previous reports of *Maja squinado* in Italy

*Maja squinado* (Herbst, 1788) was previously reported from the Pliocene of Arda River, (Piacenza, Emilia Romagna), Monte Mario, Farnesina (Roma, Lazio), Rocca Vecchia (Lecce, Puglia), and Alghero (Sardegna) (Meneghini, 1857; Ristori, 1891; Varola, 1981; Garassino & De Angeli, 2004; De Angeli & Garassino, 2006) (Fig. 2). Gemmellaro (1914) reported this species from the younger levels of the Pleistocene of Monte Pellegrino (Palermo, Sicilia).





Fig. 2 – Paleogeographic reconstruction of Italy in the Pliocene, with the fossiliferous localities of *M. squinado* (Herbst, 1778) (in grey lands above sea level) (modified, by Pinna, 1976). / Ricostruzione paleogeografia dell'Italia durante il Pliocene con le località di rinvenimento di *M. squinado* (Herbst, 1778) (in grigio le terre emerse) (modificata, da Pinna, 1976). 1) Masserano (Biella). 2) Arda River (Piacenza). 3) Monte Mario, Farnesina (Roma). 4) Rocca Vecchia (Lecce). 5) Alghero (Sardegna).

## Material

One incomplete carapace is preserved in a compact little block of hard siltstone also including scattered moulds of shells belonging to different molluscs. The specimen is preserved as a natural three-dimensional cast with only small remains of the original external cuticle. Originally the specimen was partially covered by sediment and the preparation was made by air gravers, due to the hard nature of the surrounding rock.



The specimen is housed in the Paleontological Collections of the Museo di Storia Naturale di Milano (MSNM).

The measurements are expressed in millimetres.

The systematic palaeontology used in this paper follows the recent classification proposed by Martin & Davis (2001).

### Systematic Palaeontology

Superfamily Majoidea Samouelle, 1819

Family Majidae Samouelle, 1819

Genus *Maja* Lamarck, 1801

*Maja squinado* (Herbst, 1788)

Figs. 3, 4

Type species: *Cancer squinado* Herbst, 1788, by original designation.

**Geological age:** Pliocene.

**Occurrence and measurements:** Masserano, Biella (Piemonte, NW Italy).  
One incomplete, well-preserved specimen in dorsal view.

MSNM i27212: length of carapace, 69; width of carapace, 70.



Fig. 3 – *Maja squinado* (Herbst, 1778), MSNM i27212 (x 1.2).



**Description.** Carapace, nearly complete excluding the frontal area, compressed and broken in the left posterior part, wide and more inflated posteriorly, pear-shaped in outline, longer than wide (when complete). Smooth granulate and spiny ornamentation on dorsal surface and five alternate main prominent spines along each lateral margin, decreasing in size and length from anterior to middle outline. Only first left anterior postorbital spine partially preserved in frontal area. Anterior postorbital spine stronger than lateral ones. Main spines slightly divergent from axis and directed upward. Branchial regions developed and inflated, well marked by the sinuous grooves, with a well developed central spine on each side, ranged horizontally with the 4<sup>th</sup> metagastric axial spine, similar in size. Only three posterior axial spines preserved among original five. Metagastric, cardiac, and intestinal regions inflated, distinct and bulbous, with about-central developed smooth spines located along longitudinal median axis. Pereiopods not preserved except for fragmentary remains of P4, broken and located along latero-posterior side of carapace. P4 straight and elongate with merus longer than other elements.

**Discussion.** Even though the specimen lacks the frontal region, chelipeds and almost all pereiopods, it shows many affinities with the morphology of *Maja* Lamarck 1801, and the peculiar characters of the living species *Maja squinado* (Herbst, 1788), as follows: piriform outline and size; form, arrangement and general distribution of the smooth spines and granulate tubercles of the carapace that is enlarged frontally and posteriorly but not distinctly humped; the lateral and the five axial spines are smaller and are facing in different ways than that in the other fossil and Recent species.

Therefore, on the basis of the above-mentioned characters, the studied specimen has been assigned to *M. squinado*. Moreover the evidence of a lateral

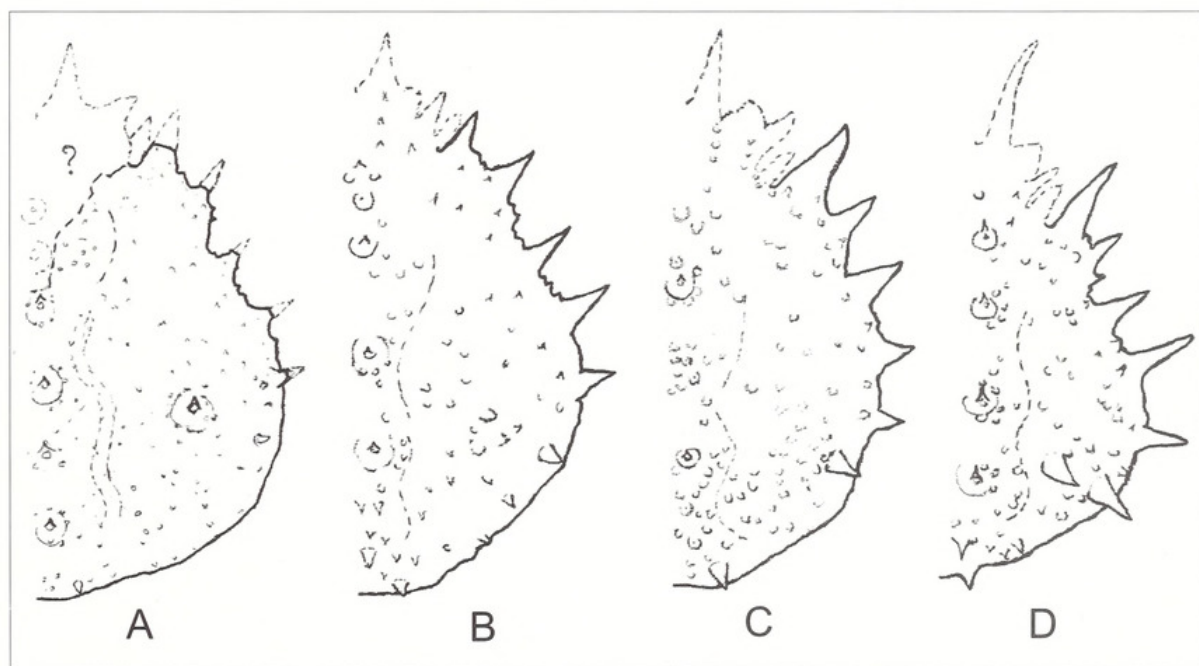


Fig. 4 – Comparison among the carapace outlines of the studied specimen and the Recent species of *Maja* living in the Mediterranean Sea (different scales). / (Confronto fra i profili del carapace dell'esemplare studiato e le specie viventi di *Maja* presenti nel Mediterraneo) (scale differenti). A) MSNM i27212. B) *M. squinado*. C) *M. crispata*. D) *M. goltziana*.



branchial spine on either side of the axial 4<sup>th</sup> may be explained as natural intra-specific variability or as related to the growth stage in living forms (G. P., pers. comm. 2008). However, the lack of more complete specimens does not allow more detailed discussion because the above-mentioned character is visible just on one single, incomplete specimen.

A further comparison was also made between the fossil coeval specimen (MG0603, housed in the Museo Geologico di Castell'Arquato, Piacenza, see Garassino & De Angeli, 2004) and with the two other Recent species of the genus, *M. crispata* Risso, 1827, and *M. goltziana* d'Oliveira, 1888, that are widespread in Mediterranean Sea. Both lack fossil records (Fig. 4). *Maja crispata* differs from the studied specimen in having stronger lateral spines, different tuberculate ornamentation, a carapace with five slightly spiny axial bulbous tubercles, a sharper and more pointed frontal region, different outline form and humped carapace, and a smaller body size in all growth stages. *Maja goltziana* differs in the general distribution and development of ornamentation of the humped carapace, with very long and pointed lateral spines, five elongated and proversed axial spines with two peculiar lateral ones on either side of the 4<sup>th</sup> spine, that is longer than the others, and arranged to form a cross-like form with the arms downward. The frontal region is stretched, and the body size is smaller, especially in adults specimens (d'Oliveira, 1888).

## Conclusion

Even though the Recent *M. squinado* (Herbst, 1788) is considered today as the exclusive species widespread in the Mediterranean Sea, present in the distal and inner sublittoral zone on sandy, detritic or rocky bottoms and ranged about between 20 to 120 meters in depth, *Maja* is also represented by two other Mediterranean species, *M. crispata* Risso, 1827 (= *M. verrucosa* H. Milne Edwards, 1834), living in the north-east Atlantic between the Biscay Gulf to the western Morocco and in the Mediterranean Sea on soft and hard bottoms ranged from 0 to around 30 meters, and *M. goltziana* d'Oliveira, 1888, eurybathic species of subtropical origin (d'Udekem d'Acoz, 1999), widespread in the eastern Atlantic from Portugal to West Africa and South Mediterranean Sea.

Until the last century *M. squinado* was considered to be also distributed in the eastern Atlantic but today, the similar larger Atlantic specimens are ascribed to a different species, *M. brachydactyla* Balss, 1922, as confirmed by the review of all species of the genus conducted by Neumann (1998), and Sotelo *et al.* (2008) based on nonclinal morphological character differences of the first gonopods and multivariate analyses of morphometric measurements and genetic study. Therefore on the basis of these systematic evidences by Neumann (1988), the assignment of fossil specimens to *M. squinado* from the Pliocene and Pleistocene extra-Mediterranean area of North Europe (e.g. The Netherlands and northern Belgium), as reported by Holthuis (1949) and van Bakel *et al.* (2003), could be assigned to the eastern Atlantic species or to different undescribed species.

Finally, based upon the nature of preservation, kind and size, the studied specimen could represent an alloctonous moulting stage (exuvia) belonging to a sub-adult specimen. Moreover this fossil record indicates a widespread distribution of the species in all the Mediterranean Sea from the Pliocene.



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