

STEFANO TAITI <sup>a,b,\*</sup> - PIETRO GARDINI <sup>c</sup>

## THE FAMILY OLIBRINIDAE IN ITALY (MALACOSTRACA ISOPODA ONISCIDEA)

<sup>a</sup> *Istituto di Ricerca sugli Ecosistemi Terrestri, Consiglio Nazionale delle Ricerche, Via Madonna del Piano 10, 50019 Sesto Fiorentino (Florence), Italy*<sup>b</sup> *Museo di Storia Naturale dell'Università di Firenze, Sezione di Zoologia "La Specola", Via Romana 17, 50125 Florence, Italy*<sup>c</sup> *Dipartimento di Biologia e Biotecnologie "Charles Darwin", Sapienza Università di Roma - Viale dell'Università 32, 00185, Rome, Italy*

\*Corresponding Author. Email: stefano.taiti@cnr.it

Taiti S., Gardini P. – The family Olibrinidae in Italy (Malacostraca Isopoda Oniscidea).

Among the Oniscidea, the family Olibrinidae is still poorly known and was not yet recorded from Italy. The genus *Castellanethes* Brian, 1952, previously included in the family Trichoniscidae, is transferred to the family Olibrinidae, representing the first record of this family for Italy. *Castellanethes sanfilippoi* Brian, 1952 is redescribed from specimens collected in a cave in Apulia, Italy, close to the type locality. The genus *Adoniscus* Vandel, 1955 is considered to be a junior synonym of *Castellanethes*. *Castellanethes soloisensis* (Vandel, 1959) from Morocco is also figured. A diagnosis of the genus, key to species and distribution map are given.

KEY WORDS: Olibrinidae, *Castellanethes*, Apulia, Italy, cave, *Adoniscus*, synonymy.

## INTRODUCTION

At present, the family Olibrinidae comprises four genera with species occurring in littoral or cavernicolous habitats (TAITI, 2004): *Olibrinus* Budde-Lund, 1913, *Adoniscus* Vandel, 1955, *Paradoniscus* Taiti & Ferrara, 2004, and *Namiboniscus* Schmidt, 2001. *Olibrinus*, of which *Marinoniscus* Nunomura, 1986 is a junior synonym (TAITI & FERRARA, 1991a), comprises 13 amphibian species distributed along the coasts of the Indian and Pacific oceans, with one species recorded also from Brazil (SCHMALFUSS, 2003; KAZMI, 2004; NUNOMURA, 2014). As pointed out by TAITI & FERRARA (2004), most probably only two species belong to this genus, i.e., *O. antennatus* (Budde-Lund, 1902) and *O. truncatus* Taiti & Ferrara, 1991, while all the other 11 species described by NUNOMURA (1983, 1986, 1990, 1992, 1999, 2014) and KAZMI (2004) are junior or senior synonyms of either one or the other of the above-mentioned two species. However, these synonymies cannot be stated because of the poor descriptions. Also *Styloniscus longistylis*, described by DANA (1853) from Fiji, most probably belongs to *Olibrinus* (see comments in TAITI & FERRARA, 1991b, 2004). Four species are presently included in the genus *Adoniscus*: two cavernicolous species from Lebanon (*A. velox* Vandel, 1955) and Morocco [*A. soloisensis* (Vandel, 1959)], one riparian species from Socotra Island, Yemen (*A. fluviatilis* Taiti & Ferrara, 2004), and one littoral species from the coasts of the Indian and western Pacific oceans (*A. insularis* Taiti, Ferrara & Kwon, 1992) (VANDEL, 1955, 1959; TAITI *et al.*, 1992; TAITI & FERRARA, 2004). *Paradoniscus* is known for only two stygobiotic species from the Socotra Archipelago, *P. aquaticus* Taiti & Ferrara, 2004, and *P. degeesti* Taiti & Ferrara,

2004, described from two caves on Samha and Socotra islands, respectively (TAITI & FERRARA, 2004). *Namiboniscus* comprises a single littoral species, *N. brevicornis* Schmidt, 2001, from the coast of Namibia (SCHMIDT, 2001).

Some specimens collected from a cave in Apulia, southern Italy, are here identified as *Castellanethes sanfilippoi* Brian, 1952. BRIAN (1952) tentatively included the new genus and species in the family Trichoniscidae, where they have been kept until now (SCHMALFUSS, 2003; TAITI, 2015). The examination of this species showed that it belongs instead to the family Olibrinidae and that the genus *Adoniscus* Vandel, 1955 has to be considered a junior synonym of *Castellanethes* Brian, 1952. A new diagnosis of the genus *Castellanethes* and a re-description of *C. sanfilippoi* are given. The poorly known *Castellanethes soloisensis* (Vandel, 1959) from Morocco is here illustrated to facilitate comparisons. A key to all the species and a distribution map of the genus are also provided.

## MATERIALS AND METHODS

The specimens were stored in 70% ethanol and identification was made on morphological characters. The species was illustrated with the aid of a camera lucida mounted on Wild M5 and Wild M20 microscopes and figures were digitally drawn following the method by MONTESANTO (2015, 2016). The specimens of *Castellanethes sanfilippoi* from Apulia here examined are deposited in the collection of the Museo di Storia Naturale, Sezione di Zoologia "La Specola" of the University of Florence, Italy (MZUF). The type specimens of *Adoniscus soloisensis* from the Grotte de Gorane, Morocco,

deposited in the Muséum National d'Histoire Naturelle, Paris (MNHN), were also examined.

## RESULTS

Class Malacostraca Latreille, 1802  
 Order Isopoda Latreille, 1817  
 Suborder Oniscidea Latreille, 1802  
 Family Olibrinidae Budde-Lund, 1913

Genus *Castellanethes* Brian, 1952

SYNONYM - *Adoniscus* Vandel, 1955, n. syn.

TYPE SPECIES - *Castellanethes sanfilippoi* Brian, 1952, by monotypy.

DIAGNOSIS - Small isopods trichoniscid-like, unable to conglobate. Dorsum smooth or granulated. Noduli laterales absent. Cephalon with suprantennal line and no frontal line, eyes present or absent. Pleon distinctly narrower than pereon; pleonal epimera with reduced posterior points. Telson very short with trapezoidal, rounded or triangular distal part. Antennula with three articles bearing two to nine aesthetascs at apex, either petaliform or not. Antenna with flagellum of three to seven articles. Mandibles with molar penicil consisting of one to four setae. Maxillula with outer branch bearing 11 or 12 teeth; inner branch with apex sometimes bearing some setae but no penicils. Maxilliped very slender and elongate (as in the other Olibrinidae); palp with no lobes and many long setae near apex, proximal article with two setae; endite triangular, elongate, distally setose and bearing a long penicil at apex. Pereopod dactylus with a long simple claw, dactylar seta distally bifid and setose; pereopod 7 basis with distinct water-conducting system. Male pleopod 1 exopod with more or less developed posterior point, endopod with triangular apical part; male pleopod 2 endopod styliform, much longer than exopod. Uropod protopod conical, not grooved laterally; endopod inserted proximally to exopod.

REMARKS - When describing *Castellanethes*, BRIAN (1952) included the genus in the family Trichoniscidae with some doubts, pointing out some characters that did not match with the family, in particular the shape of the buccal pieces. When describing the mandibles, he mistook the outer part of the appendages for the pars molaris (actually not present) and noticed that the maxillular inner branch did not bear the three penicils typical of Trichoniscidae. In fact, these characters are present in the family Olibrinidae and the genus undoubtedly belongs to this family and the section Crinocheta.

The above diagnosis is based on the characters present in the type species *Castellanethes sanfilippoi* (see below) and the four species previously included in the genus *Adoniscus* (VANDEL, 1955, 1959; TAITI *et al.*, 1992; TAITI & FERRARA, 2004). All the characters previously listed for the genus *Adoniscus* are present also in the species of

*Castellanethes*, therefore we consider *Adoniscus* Vandel, 1955 to be a junior synonym of *Castellanethes* Brian, 1952 according to Article 23 of the International Code of Zoological Nomenclature (ICZN, 1999). Moreover, the examination of the type specimens of *Trichoniscus soloisensis* from Morocco (1 dissected ♂, 13 ♀♀, MNHN-IU-2017-9150 (not 13 ♂♂, 1 ♀ as recorded by VANDEL, 1959), Grotte de Gorane, à 1500 m du Cap Cantin, au nord de Safi, 23.IX.1953, leg. P. Remy), transferred to *Adoniscus* by TAITI & FERRARA (2004), confirmed this species to belong to the genus *Castellanethes*.

*Castellanethes* differs from *Olibrinus* and *Namiboniscus* in having the maxillipedal palp not lobed apically and the male pleopod 1 exopod with a long triangular posterior point instead of being ovoidal; from *Olibrinus* also in the male pleopod 1 endopod with acute instead of rounded apex, and male pleopod 2 endopod long and styliform instead of short with excised apex; from *Namiboniscus* also in the smooth or granulated instead of hirsute dorsum, the maxillular inner branch without penicils and outer branch with normal instead of reduced teeth (cf. VANDEL, 1959; TAITI *et al.*, 1992; SCHMIDT, 2001, 2002; TAITI & FERRARA, 2004). *Castellanethes* shows closest affinities with *Paradoniscus* from which it differs in the presence of a bifid dactylar seta, presence of a distinct water-conducting system on the pereopods 7, and pleopod exopods not fringed with long setae on margins (cf. TAITI & FERRARA, 2004).

At present, the genus *Castellanethes* comprises five species: *C. sanfilippoi* Brian, 1952, *C. velox* (Vandel, 1955), *C. soloisensis* (Vandel, 1959), *C. insularis* (Taiti, Ferrara & Kwon, 1992), and *C. fluviatilis* (Taiti & Ferrara, 2004).

### *Castellanethes sanfilippoi* Brian, 1952

Figs I–III, VI

*Castellanethes sanfilippoi* BRIAN, 1952: 3, figs I, II; SCHMÖLZER, 1965: 8, figs 351, 352; ARGANO *et al.*, 1982: 133; 1995: 15; ROSSI & INGUSCIO, 2001: 62; INGUSCIO & ROSSI, 2007: 170; TAITI, 2015: 60, fig. 4.78.

*Castellanethes* [sic!] *sanfilippoi*; SCHMALFUSS, 2003: 77.

MATERIAL EXAMINED - Italy, Apulia: 2 ♂♂, 6 ♀♀ (MZUF 9899), Grotta di Santa Barbera, 871 Pu/BA, 40°58'13.4"N 17°14'32.2"E, 53 m, Polignano a Mare, Prov. Bari, 4.IX.2005, leg. S. Inguscio & E. Rossi.

PREVIOUS RECORDS - Italy, Apulia, Bari, Grave di Castellana, Grotta Bianca, 8 Pu/BA (BRIAN, 1952).

RE-DESCRIPTION - Maximum length: ♂, 1.6 mm; ♀, 2.0 mm (according to BRIAN, 1952 the body length varies from 2 to 2.5 mm). Body (Fig. I, 1) colourless, with pleon distinctly narrower than pereon. Dorsum distinctly granulated, granules more evident on pereonites; each granule bearing small fan-shaped scale-seta on top (Fig. I, 2). Cephalon (Fig. I, 3) with suprantennal line straight; lateral lobes rounded, not protruding; eyes absent. Pleonites 3-5

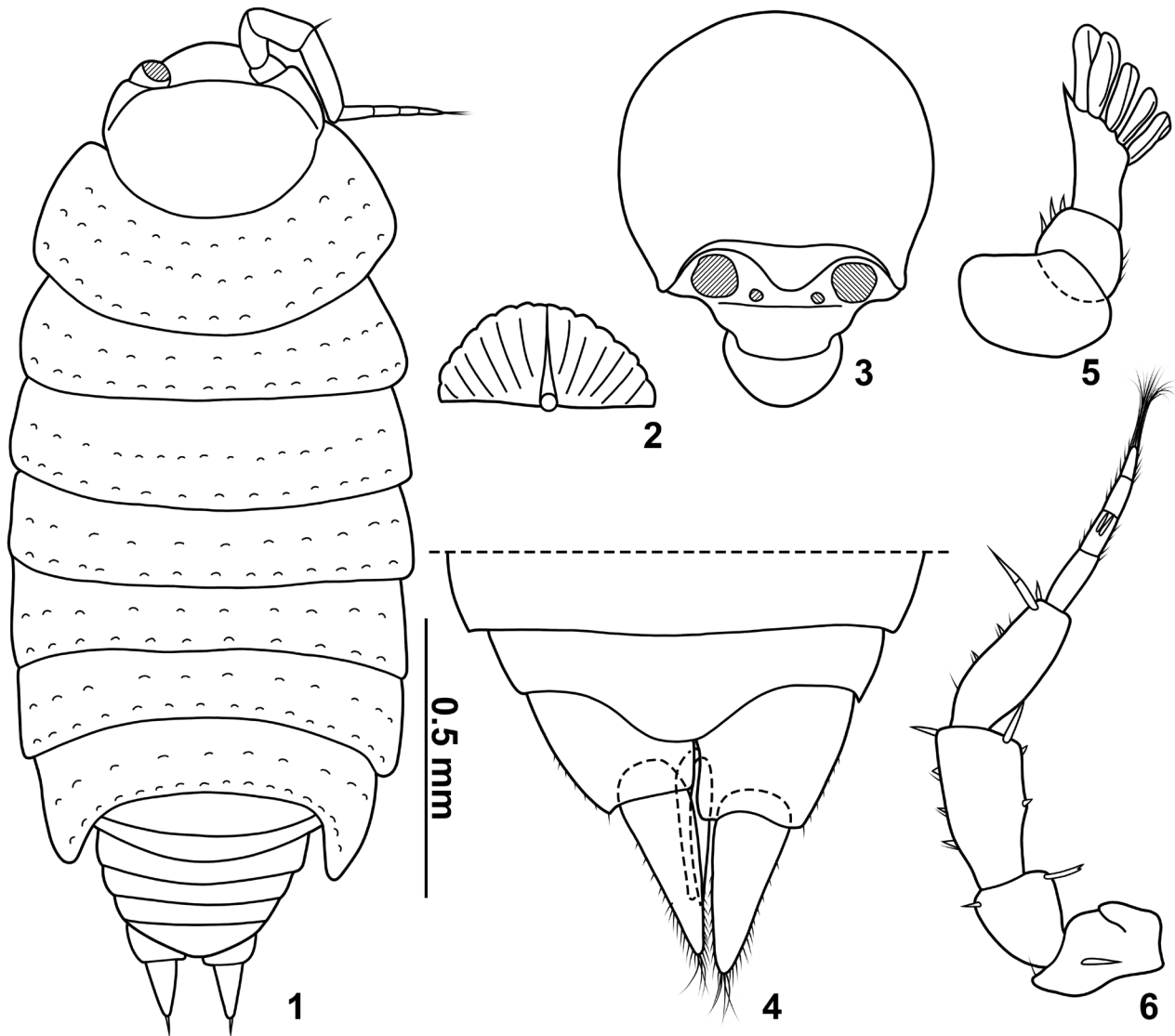


Fig. I – *Castellanethes sanfilippoi* Brian, 1952, female specimen from Grotta di Santa Barbera: 1) Adult specimen, dorsal. 2) Dorsal scale-seta. 3) Cephalon, frontal. 4) Telson and uropods. 5) Antennula. 6) Antenna.

with epimera reduced, adpressed. Telson (Fig. I, 4) more than four times wider than long, distal part very short, with concave sides and broadly rounded apex. Antennula (Fig. I, 5) with first and third articles subequal in length, second shorter; three to five long and thickset aesthetascs and a triangular spine at apex. Antenna (Fig. I, 6) with flagellum longer than fifth article of peduncle; flagellum with four articles, second article bearing a row of two aesthetascs. Mandibles (Fig. II, 1-2) with molar penicil consisting of two setae, one more than twice longer than other; left mandible with 2 + 1 and right mandible with 1 + 1 free penicils. Maxillula (Fig. II, 3) with outer branch bearing 11 teeth, all simple; inner branch without penicils or setae at apex. Maxilla (Fig. II, 4) with apical part not bilobate, bearing a row of several long aesthetascs subapically. Maxilliped (Fig. II, 5) very slender and elongate; palp with three free groups of setae on medial margin and tuft of setae apically; endite triangular, elongate, with strong seta and long penicil at apex. Pereopods 6 and 7 with distinct water-conducting system. Uropod (Fig. II, 6) with protopod about as long as wide; thickset exopod,

as long as endopod; endopod inserted proximally and bearing two strong setae at apex.

MALE. Pereopods (Fig. III, 1-3) without distinct sexual specializations. Genital papilla (Fig. III, 4) distally bilobate. Pleopod 1 (Fig. III, 5) exopod triangular, elongate, with pointed distal part slightly bent medially, no fringe of setae along margins; endopod straight with narrow apical part, pointed and bearing some scales on outer margin. Pleopod 2 (Fig. III, 6) exopod subtriangular, with one subapical seta, outer margin slightly sinuous; endopod of two articles, more than twice as long as exopod, with flagelliform distal part.

DISTRIBUTION - *Castellanethes sanfilippoi* is endemic to caves in Bari Province, Apulia, southern Italy.

REMARKS - *Castellanethes sanfilippoi* was described by BRIAN (1952) on the basis of 2 ♂♂ and 1 ♀ from Castellana Cave, Apulia. The specimens examined by us from Santa Barbera Cave are certainly conspecific with

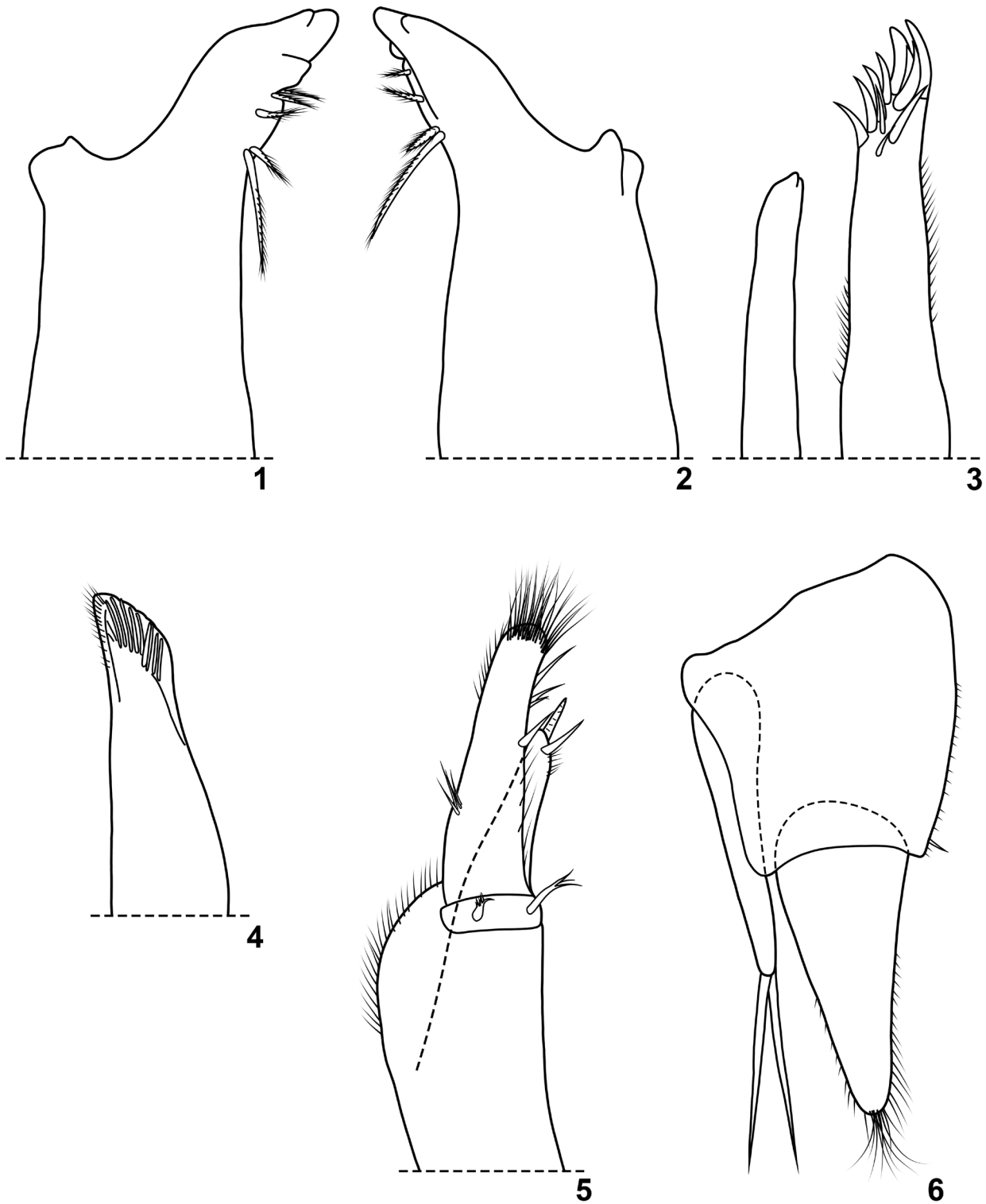


Fig. II – *Castellanethes sanfilippo* Brian, 1952, female specimen from Grotta di Santa Barbera: 1) Left mandible. 2) Right mandible. 3) Maxillula. 4) Maxilla. 5) Maxilliped. 6) Uropod.

the type specimens, according to the figures provided by BRIAN. Both caves are located in the same karst area of the Bari Province and are only ca. 6 km apart from each other. The male pleopods 1 and 2 in our specimens are identical to the ones figured by BRIAN (1952) but he mistook the male pleopod 1 for pleopod 2 and vice versa.

*Castellanethes sanfilippo* differs from *C. velox* in having the telson with rounded instead of triangular dis-

tal part, antennal flagellum with four instead of seven articles, the male pleopod 1 endopod with shorter and thicker distal part; from *C. insularis* in lacking pigment and eyes, telson with rounded instead of trapezoidal distal part, molar penicil of the mandible with two instead of four penicils, antennula with thickset instead of thin apical aesthetascs, distal part of the male pleopod 1 exopod less bent outwards; from *C. fluviatilis* in having smaller

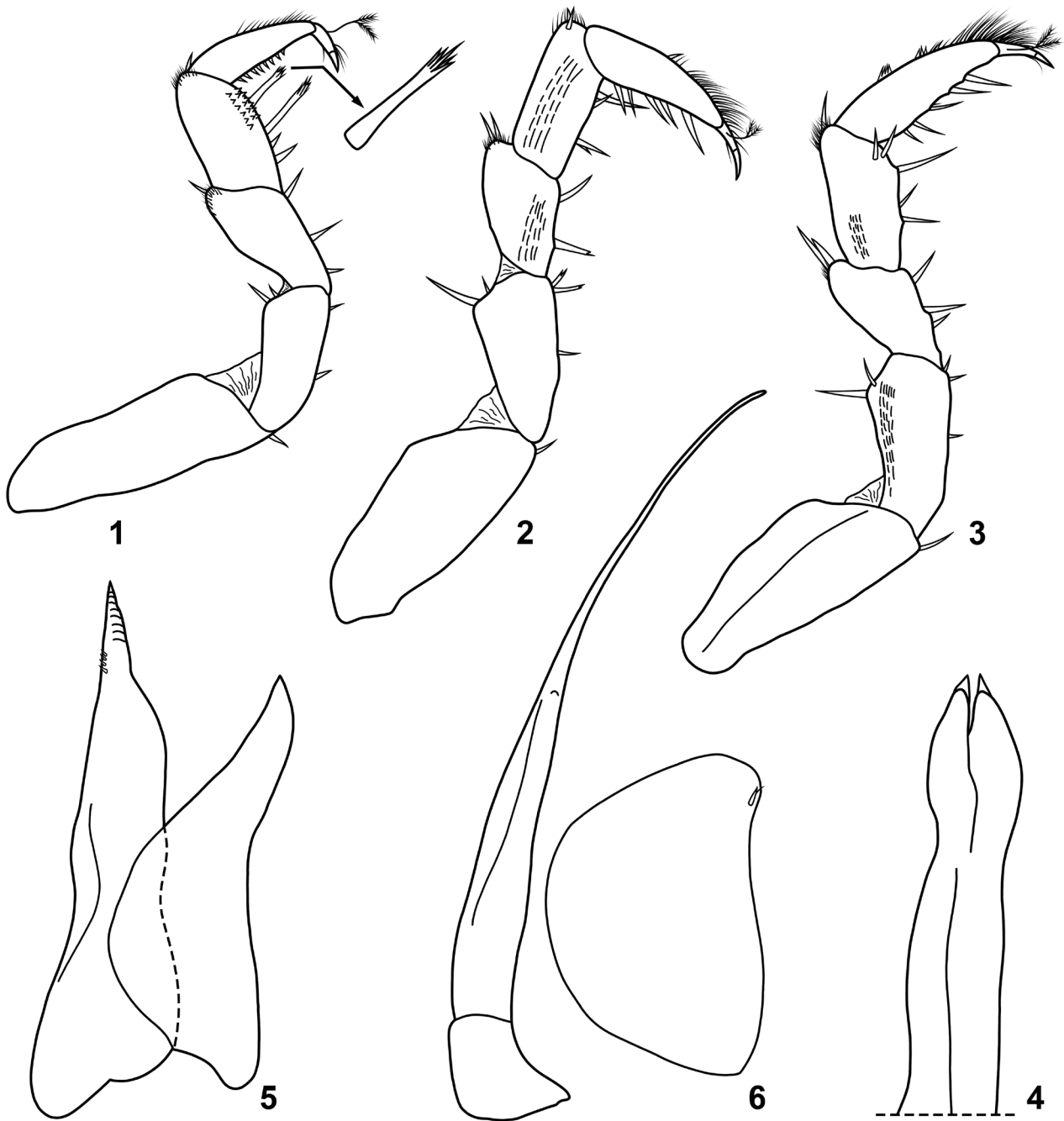


Fig. III – *Castellanethes sanfilippo* Brian, 1952, male specimen from Grotta di Santa Barbera: 1) Pereopod 1. 2) Pereopod 2. 3) Pereopod 7. 4) Genital papilla. 5) Pleopod 1. 6) Pleopod 2.

dorsal granulations on the pereonites, the antennula with three to five instead of two thickset aesthetascs, the antennal flagellum of four instead of three articles; from *C. soloisensis* in having the antennula with less numerous and thickset instead of thin aesthetascs, the antennal flagellum with four instead of eight articles, the male pleopod 1 exopod with longer distal point. *Castellanethes soloisensis* is here figured on the type specimens from Grotte de Gorane, Morocco, to allow comparisons (Figs IV, V).

#### DISCUSSION

The present distribution of the five species in the genus *Castellanethes* is summarized in Fig. VI. The species show different ecology: *Castellanethes insularis* is a hal-

ophilic littoral species recorded from shores of the Toggian Islands, Sulawesi, Indonesia, and from a mangrove near Malindi, Kenya; *C. fluviatilis* occurs along the banks of a stream on Socotra Island, Yemen, while *C. velox*, *C. sanfilippo* and *C. soloisensis* are troglotrophic species recorded from caves in Lebanon, Apulia, and Morocco, respectively. Most probably the genus *Castellanethes* originally included littoral species, like the genera *Olibrinus* and *Namiboniscus* in the same family Olibrinidae, and it was distributed along the coasts of the Tethys Ocean. *Castellanethes insularis* is still a littoral species along the Indian and southern Pacific oceans.

The presence of this genus in Apulia is probably very old, since part of this region, i.e., the Apulian Carbonate Platform (ACP), is considered already widely emerged

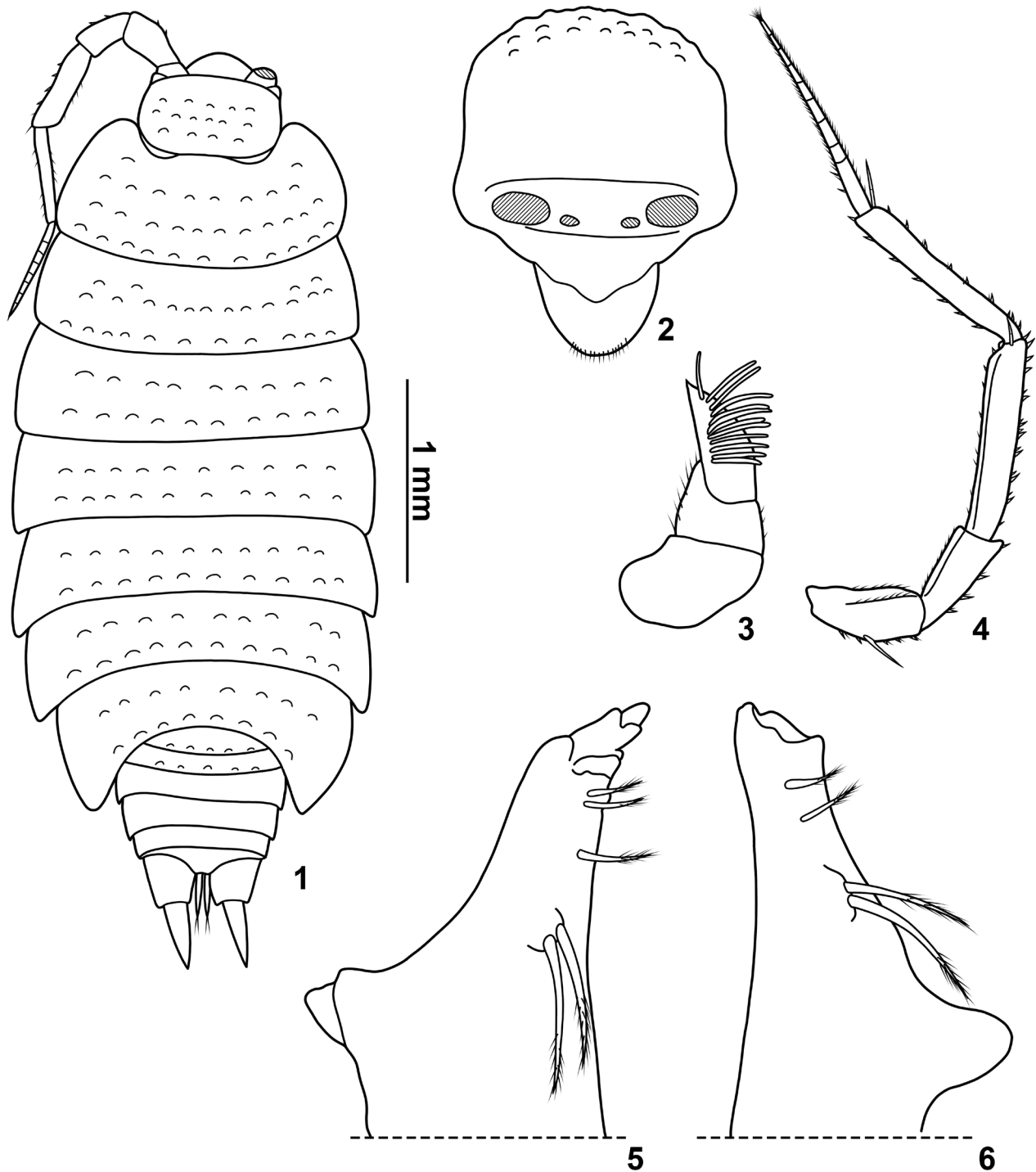


Fig. IV – *Castellanethes soloisensis* (Vandel, 1959), female syntype from Grotte de Gorane: 1) Adult specimen, dorsal. 2) Cephalon, frontal. 3) Antennula. 4) Antenna. 5) Left mandible. 6) Right mandible.

at the beginning of the Oligocene (~34-32 Mya) (POPOV *et al.*, 2004; PETRULLO *et al.*, 2017). The ACP was one of the so-called peri-Adriatic carbonate platforms made of Jurassic-Upper Cretaceous shallow-water carbonates and represented a major paleogeographic element of the southern margin of the Mesozoic Tethys Ocean (BORGOMANO, 2000; BOSELLINI, 2002; DELLE ROSE & PARISE, 2010; PETRULLO *et al.*, 2017). Throughout its history, the ACP has undergone several lifting and lowering phases. During the Messinian Salinity Crisis (5.97-5.33 Mya), the whole region emerged and was subject to intensive

dismantling and karst processes that have produced a dense network of cavities and conduits, most of which are located in the Gargano promontory, in the Murge plateau and in the Salento peninsula (DELLE ROSE & PARISE, 2010). After the marine transgression at the end of the Messinian, from the beginning of the Pliocene (~5.3 Mya) to the Early Pleistocene (~0.8 Mya) the area looked like a wide archipelago affected by several stages of marine regression/transgression with the consequent emersion/submersion of part of the platform. The whole Apulia region, as it appears today, finally emerged dur-

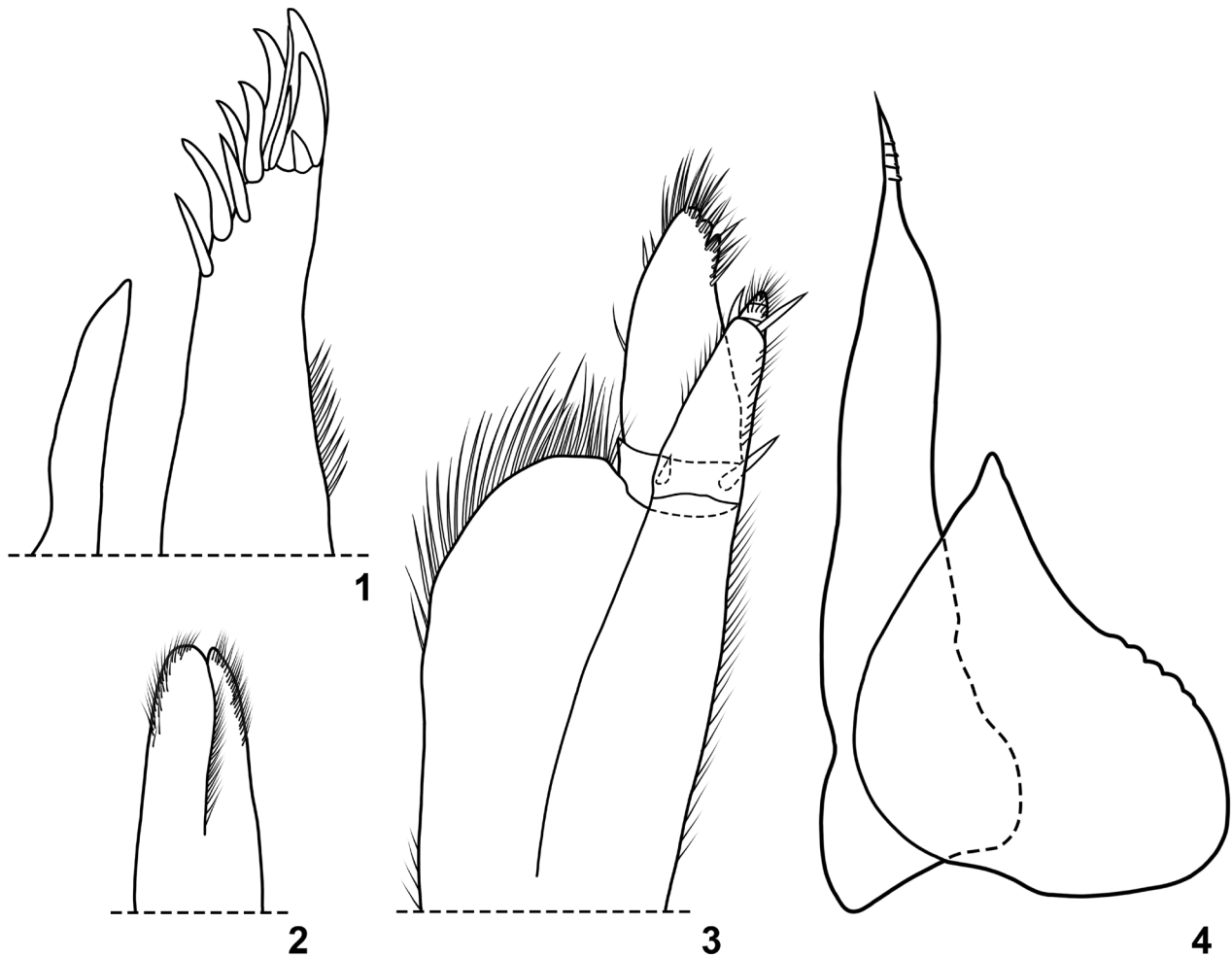


Fig. V – *Castellanethes soloisensis* (Vandel, 1959), female syntype from Grotte de Gorane: 1) Maxillula. 2) Maxilla. 3) Maxilliped. Male syntype: 4) Pleopod 1, redrawn from VANDEL (1959).

ing the Middle-Late Pleistocene through a gradual uplift together with eustatic sea level changes due to glacial/interglacial cycles (DE GIULI *et al.*, 1987; DOGLIONI *et al.*, 1996; PETRULLO *et al.*, 2017). Given the paleogeographic history of the region, it can be hypothesized that *C. sanfilippo*, one of the three troglolithic species, derives from a littoral ancestor once distributed along the southern margin of the Tethys Ocean. Similarly, the other two troglolithic species could also have evolved from littoral species, which would later become extinct due to the great environmental changes that affected the Mediterranean basin after the complete closure of the Tethys Ocean (~20-21 Mya) (TORFSTEIN & STEINBERG, 2020). However, this is only a hypothesis that requires a more in-depth examination to be confirmed. An analysis based on molecular data would provide valuable information about the relationships between all the species in the genus and their divergence times, which may be very useful for the correct evaluation of the above-mentioned hypothesis.

KEY TO THE SPECIES OF *CASTELLANETHES*

- 1. Eyes present, each eye with six large ommatidia; body pigmented .....*C. insularis*
- Eyes and pigment absent .....2
- 2. Antennula with two to five distal petaliform aesthetascs; antennal flagellum with three to seven articles .....3
- Antennula with nine to 12 thin aesthetascs arranged near lateral margin of third article; antennal flagellum with eight articles..... *C. soloisensis*
- 3. Dorsal surface of pereon smooth; antennal flagellum with seven articles .....*C. velox*
- Dorsal surface of pereon tuberculated; antennal flagellum with three or four articles..... 4
- 4. Antennula with two distal aesthetascs; antennal flagellum with three articles..... *C. fluviatilis*
- Antennula with three to five distal aesthetascs; antennal flagellum with four articles ...*C. sanfilippo*

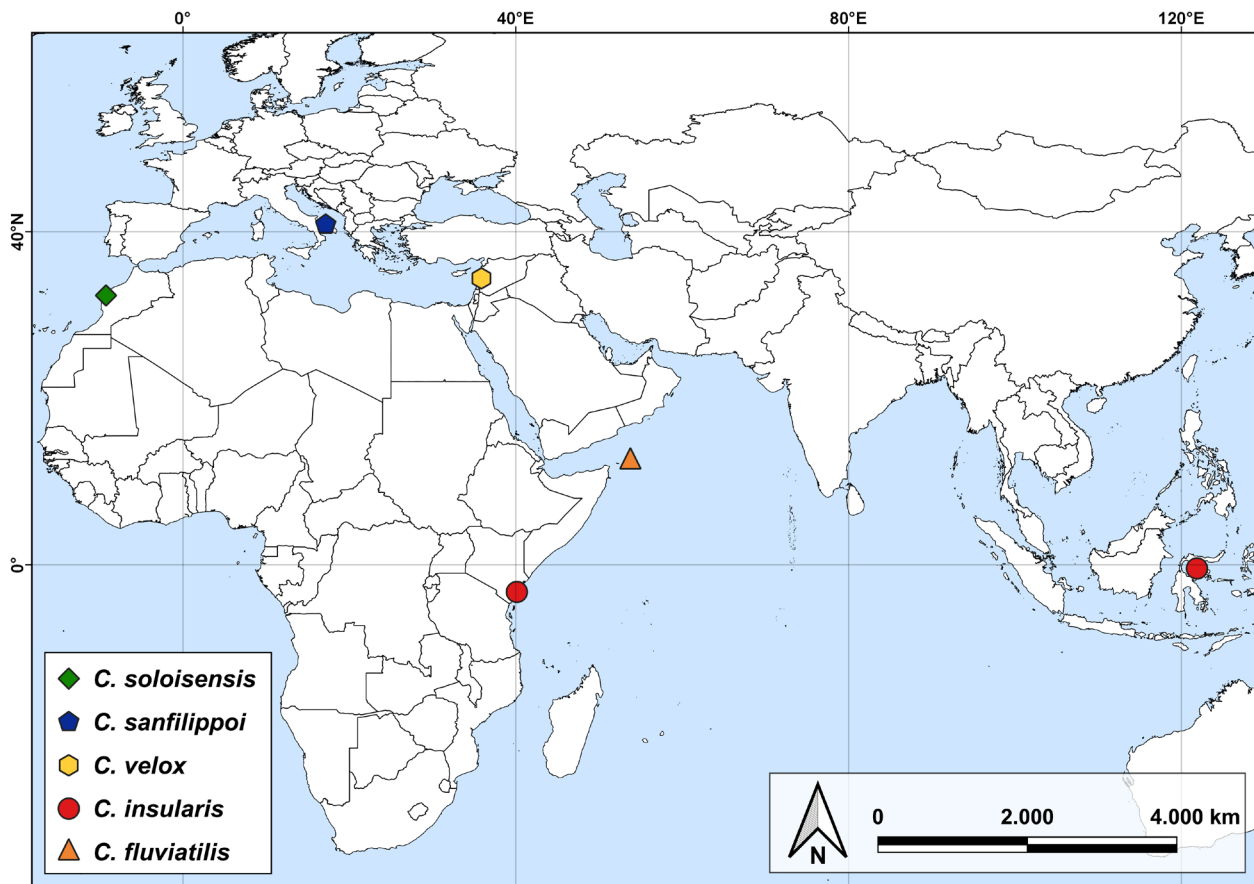


Fig. VI – Distribution of the genus *Castellanethes*.

#### ACKNOWLEDGEMENTS

We wish to thank Drs Salvatore Inguscio and Emanuela Rossi, Nardò, Lecce, who collected the specimens of *C. sanfilippoii*, and Dr. L. Corbari (NMNH) for the loan of the type material of *C. soloisensis*.

#### REFERENCES

- ARGANO R., BALDARI F., MANICASTRI C., 1982 – *Isopodi sotterranei italiani (Crustacea, Malacostraca)*. – Lavori della Società italiana di Biogeografia, Nuova Serie, 7 (1): 119-137.
- ARGANO R., FERRARA F., GUGLIELMO L., RIGGIO S., RUFFO S., 1995 – 30. *Crustacea Malacostraca II (Tanaidacea, Isopoda, Amphipoda, Euphausiacea)*. In: Minelli A., Ruffo S., La Posta S. (Eds). Checklist delle specie della fauna italiana. *Calderini, Bologna*, pp. 1-52.
- BORGOMANO J.R.F., 2000 – *The Upper Cretaceous carbonates of the Gargano-Murge region, southern Italy: a model of platform-to-basin transition*. – *AAPG Bulletin*, 84 (10): 1561-1588. <https://doi.org/10.1306/8626BF01-173B-11D7-8645000102C1865D>.
- BOSELLINI A., 2002 – *Dinosaurs “re-write” the geodynamics of the eastern Mediterranean and the paleogeography of the Apulia Platform*. – *Earth-Science Reviews*, 59: 211-234. [https://doi.org/10.1016/S0012-8252\(02\)00075-2](https://doi.org/10.1016/S0012-8252(02)00075-2).
- BRIAN A., 1952 – *Intorno a due interessanti e nuovi trichoniscidi (Isopodi terrestri) raccolti dal Sig. Nino Sanfilippo nella Grave di Castellana (Bari) (Crustacea: Isopoda)*. – *Bollettino della Società entomologica italiana*, 82: 3-8.
- DANA J.D., 1853 – *Crustacea, Part II. Isopoda*. In: United States exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842 under the Command of Charles Wilkes, U.S.N.. *Sherman, Philadelphia*. 14: 696-805, pl. 46-53.
- DE GIULI C., MASINI F., VALLERI G., 1987 – *Paleogeographic evolution of the Adriatic area since Oligocene to Pleistocene*. – *Rivista italiana di Paleontologia e Stratigrafia*, 93 (1): 109–126.
- DELLE ROSE M., PARISE M., 2010. – *Water management in the karst of Apulia, southern Italy*. In: Bonacci O. (Ed.). *Proceedings of the International Interdisciplinary Scientific Conference “Sustainability of the karst environment. Dinaric karst and other karst regions”*. – Series on Groundwater, 2: 33-40. *UNESCO, Paris*.



- DOGLIONI C., TROPEANO M., MONGELLI F., PIERI P., 1996 – *Middle-Late Pleistocene uplift of Puglia: an “anomaly” in the Apenninic foreland*. – *Memorie della Società Geologica Italiana*, 51: 101-117.
- ICZN, 1999 – *International Code of Zoological Nomenclature, 4th edition*. XXIX + 306 pp.
- INGUSCIO S., ROSSI E., 2007 – *Capitolo V. La vita nelle grotte. Biospeleologia*. In: Inguscio S., Lorusso D., Pascali V., Ragone G., Savino G. (Eds). *Grotte e carsismo in Puglia. Ficarra & Mastrosimini snc, Castellana Grotte (Bari)*, pp.167-171.
- KAZMI Q., 2004 – *Two new species of littoral isopods (Crustacea) from Pakistan belonging to the genera Olibrinus and Armadilloniscus*. – *Pakistan Journal of Marine Sciences*, 13 (1-2): 41-48.
- MONTESANTO G., 2015 – *A fast GNU method to draw accurate scientific illustrations for taxonomy*. – *ZooKeys*, 515: 191-206. <https://doi.org/10.3897/zookeys.515.9459>.
- MONTESANTO G., 2016 – *Drawing setae: a GNU way for digital scientific illustrations*. – *Nauplius*, 24: e2016017. <https://doi.org/10.1590/2358-2936e2016017>.
- NUNOMURA N., 1983 – *Studies on the terrestrial isopod crustaceans in Japan. I. Taxonomy of the families Ligiidae, Trichoniscidae and Olibrinidae*. – *Bulletin of the Toyama Science Museum*, 5: 23-68.
- NUNOMURA N., 1986 – *Studies on the terrestrial isopod crustaceans in Japan. III. Taxonomy of the family Scyphacidae (continued), Marinoniscidae, Halophilosciidae, Philosciidae and Oniscidae*. – *Bulletin of the Toyama Science Museum*, 9: 1-72.
- NUNOMURA N., 1990 – *Studies on the terrestrial isopod crustaceans in Japan. V. Taxonomy of the families Armadillidiidae, Armadillidae and Tylidae, with taxonomic supplements to some other families*. – *Bulletin of the Toyama Science Museum*, 13: 1-58.
- NUNOMURA N., 1992 – *Studies on the terrestrial isopod crustaceans in Japan. VII. Supplements to the taxonomy 3*. – *Bulletin of the Toyama Science Museum*, 15: 1-23.
- NUNOMURA N., 1999 – *Sea shore isopod crustaceans collected from Izu Islands, Middle Japan*. – *Bulletin of the Toyama Science Museum*, 22: 7-38.
- NUNOMURA N., 2014 – *Isopod crustaceans from Shikoku, western Japan-2. Specimens from Kochi, Tokushima and Kagawa Prefectures*. – *Bulletin of the Toyama Science Museum*, 38: 55-94.
- PETRULLO A., AGOSTA F., PROSSER G., RIZZO E., 2017 – *Cenozoic tectonic evolution of the northern Apulian Carbonate Platform (southern Italy)*. – *Italian Journal of Geosciences*, 136(2): 296-311. <https://doi.org/10.3301/IJG.2017.08>.
- POPOV S.V., RÖGL F., ROZANOV A.Y., STEININGER F.F., SHCHERBA I.G., KOVAC M., 2004 – *Lithological-Palaeogeographic maps of Paratethys*. – *Courier Forschungsinstitut Senckenberg*, 250: 1-46.
- ROSSI E., INGUSCIO S., 2001 – *Animalia tenebrarum. Biospeleologia pugliese*. Ideemultimediali, Nardò (Lecce), 95 pp.
- SCHMALFUSS H., 2003 – *World catalog of terrestrial isopods (Isopoda: Oniscidea)*. – *Stuttgarter Beiträge zur Naturkunde, Serie A*, 654: 1-341.
- SCHMIDT C., 2001 – *Description of a new genus and species of littoral Crinocheta (Isopoda, Oniscidea) from Namibia, with discussion of its phylogenetic position*. – *Mitteilungen aus dem Museum für Naturkunde in Berlin, Zoologische Reihe*, 77: 119-130. <https://doi.org/10.1002/mmnz.20010770118>.
- SCHMIDT C., 2002 – *Contribution to the phylogenetic system of the Crinocheta (Crustacea, Isopoda). Part 1 (Olibrinidae to Scyphacidae s. str.)*. – *Mitteilungen aus dem Museum für Naturkunde in Berlin (Zoologische Reihe)*, 78: 275-352. <https://doi.org/10.1002/mmnz.20020780207>.
- SCHMÖLZER K., 1965 – *Bestimmungsbücher zur Bodenfauna Europas. Ordnung Isopoda (Landasseln)*. Lieferung 4 and 5. Akademie-Verlag, Berlin, VI + 468 pp.
- TAITI S., 2004 – *Crustacea: Isopoda: Oniscidea (woodlice)*. Pp. 265-267. In: Gunn J. (Ed). *Encyclopedia of Caves and Karst Science. Fitzroy Dearborn, New York*, 902 pp.
- TAITI S., 2015 – 4. *Isopodi*. In: Latella L., Gobbi M. (Eds). *La fauna del suolo, tassonomia, ecologia e metodi di studio dei principali gruppi di invertebrati terrestri italiani*. – *Quaderni del Museo delle Scienze*, 3: 49-74.
- TAITI S., FERRARA F., 1991a – *Terrestrial Isopods (Crustacea) from the Hawaiian Islands*. – *Bishop Museum Occasional Papers*, 31: 202-227.
- TAITI S., FERRARA F., 1991b – *New species and records of terrestrial isopods (Crustacea) from the Arabian Peninsula*. – *Fauna of Saudi Arabia*, 12: 209-224.
- TAITI S., FERRARA F., 2004 – *The terrestrial Isopoda (Crustacea: Oniscidea) of the Socotra Archipelago*. – *Fauna of Arabia*, 20: 211-325.
- TAITI S., FERRARA F., KWON D.H., 1992 – *Terrestrial Isopoda (Crustacea) from the Togian Islands, Sulawesi, Indonesia*. – *Invertebrate Taxonomy*, 6: 787-842. <https://doi.org/10.1071/IT9920787>.
- TORFSTEIN A., STEINBERG, J., 2020 – *The Oligo-Miocene closure of the Tethys Ocean and evolution of the proto-Mediterranean Sea*. – *Scientific Reports*, 10 (1): 1-10. <https://doi.org/10.1038/s41598-020-70652-4>.
- VANDEL A., 1955 – *Biospeologica LXXV. Mission Henri Coiffait au Liban (1951). 8. Isopodes terrestres*. – *Archives de Zoologie expérimentale et générale*, 91: 455-531.
- VANDEL A., 1959 – *Les Stytoniscidae et les Trichoniscidae de l’Afrique du nord (Crustacés; Isopodes terrestres)*. – *Bulletin du Muséum national d’Histoire naturelle, Paris, 2e Série*, 31: 159-167.

