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CONTRIBUTION TO THE KNOWLEDGE OF
MEDITERRANEAN *EMBIIDINA* WITH
DESCRIPTION OF A NEW SPECIES OF THE GENUS
EMBIA LATREILLE, 1825 FROM SARDINIA (ITALY)
(*Insecta Embiidina*)

ABSTRACT - FONTANA P., 2002 - Contribution to the knowledge of Mediterranean *Embiidina* with description of a new species of the genus *Embia* Latreille, 1825 from Sardinia (Italy) (*Insecta Embiidina*)

Atti Acc. Rov. Agiati, a. 252, 2002, ser. VIII, vol. II, B: 39-50.

The Author presents new data concerning *Embiidina* collected in Italy and in the Mediterranean Basin. New data on the distribution of *Embia ramburi* Rimsky-Korsakov, 1905, *Embia tyrrhenica* Stefani, 1953 and *Haploembia solieri* (Rambur, 1842) are given and *Embia cynthiae* sp. n., from Sardinia (Italy), Capo Ceraso near Olbia (Sassari,) is described. The new species is characterised by the structures of the male terminalia and in particular by the left cercus, the process of the left hemitergite of 10th segment, the left paraproct and the process of right hemitergite of 10th segment. The adult male of the new species is apterous and pitch-black in colour. The female, bigger than the male, is dark mahogany-brown in colour. The knowledge on Italian *Embiidina* is also summarised and discussed.

KEY WORDS - *Insecta*, *Embiidina*, *Embia ramburi* Rimsky-Korsakov, 1905, *Embia tyrrhenica* Stefani, 1953, *Embia cynthiae* sp. n., *Haploembia solieri* (Rambur, 1842).

RIASSUNTO - FONTANA P., 2001 - Contributo alla conoscenza degli *Embiidina* del Mediterraneo con descrizione di una nuova specie del genere *Embia* Latreille, 1825, della Sardegna (Italia) (*Insecta Embiidina*).

L'Autore rende noti i risultati delle sue raccolte in Italia e nel bacino del Mediterraneo, relative agli *Embiidina*. I dati esposti sono relativi ad *Embia ramburi* Rimsky-

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Korsakov, 1905, *Embia tyrrhenica* Stefani, 1953 ed *Haploembia solieri* (Rambur, 1842). Viene inoltre descritta *Embia cynthiae* sp. n., rinvenuta dall'Autore in Sardegna (Italia) a Capo Ceraso, presso Olbia (Sassari). La nuova specie è caratterizzata per la conformazione dei terminalia del maschio ed in particolare del cerco sinistro, del processo dell'emitergite sinistro del decimo segmento, del paraprocto sinistro e del processo dell'emitergite destro del decimo segmento. Il maschio adulto della nuova specie è attero e da vivo è di colore nero piceo. La femmina, di taglia maggiore, è invece di colore mogano molto scuro. Sono inoltre sintetizzate le attuali conoscenze sugli *Embiidina* in Italia.

PAROLE CHIAVE - *Insecta, Embiidina, Embia ramburi* Rimsky-Korsakov, 1905, *Embia tyrrhenica* Stefani, 1953, *Embia cynthiae* sp. n., *Haploembia solieri* (Rambur, 1842).

INTRODUCTION

During researches carried out in Sardinia in May 1995, I collected under a little stone, three specimens of Embiid: an apterous blackish adult male, a brown adult female and a whitish immature individual. These specimens were the first adult Embiidina I had ever seen before. After this find, my interest on Embiidina increased and since then I started to study these insects and to collect them, during each entomological excursions throughout the Italian peninsula and along the Mediterranean Basin. Encouraged by Prof. E. S. Ross, I recently described a new Italian species from the Tyrrhenian coast (FONTANA, 2001) and now, before studying the material that I kindly received from several Italian Museums, I decided to publish the data concerning the material I collected up to date and that I received by colleagues. In this article I present the data of my collection and a description of a new species of the genus *Embia* Latreille, 1825 from Sardinia. The specimens on which the new species is described, are the first adult Embiidina I collected in Sardinia during 1995: a very lucky beginning.

METHODS

Specimens are preserved in alcohol and many of them, after clarifying them in KOH 10% solution, were mounted on slides in Canadian balm (FONTANA *et al.*, 2002). The nomenclature adopted for the morphological characteristic of mounted specimens follows ROSS (1966 and 2000). Most of the specimens listed below were obtained after rearing: in fact, young individuals are most frequently founded and adult males, indispensable for specific identification, usually have a very short life.

RESULTS

Fam. **Embiidae** Burmaister, 1839

Embia ramburi Rimsky-Korsakov, 1905

Type locality: FRANCE, Villefranche sur Mer (near Russian Zoological Station).

EXAMINED MATERIAL: ITALY, Tuscany (Lucca), Viareggio, Marina di Levante, 20.IX.2000 (nymphs), 1.V.2001-2.VI.2001 (adults raised in captivity), 6 males (4 on slides and 2 in alcohol), leg. and rearing P. Fontana, coll. P. Fontana. FRANCE, Montpellier, Montferrier sur Lez, 12.III.2001 (nymphs), 12. V.2001 (adults raised in captivity), 3 males (on slides), leg. and rearing P. Fontana, coll. P. Fontana.

Distribution: Mediterranean species, known up to date only from Southern France, Spain, Italy and certain island of western Mediterranean (ROSS, 1966).

Notes: *Embia ramburi* was recorded from Sardinia by ROSS (1966) after the assumption that *Embia kraussi* Krausse, 1911 is a junior synonym of *Embia ramburi*. KRAUSSE (1911) described *E. kraussi* on immature individuals collected in central Sardinia, in the locality of Asuni (Oristano district). A few years later, on the basis of new material, KRAUSSE (1914) himself synonymised his species with *Embia ramburi*. On the other hand, according to STEFANI (1953) *E. ramburi* is not present in Sardinia, where it is replaced by relative endemic taxa. Consequently, FAILLA *et al.* (1994) excluded the presence of *Embia ramburi* from Sardinia. Since Krausse's material seems to be definitely lost (ROSS, 1966) and after the possibility that different species of Embiidina live in the same locality, it is very difficult to establish the identity of *E. kraussi*, not even on the basis of topotypical material. After that, *E. kraussi* should not be considered, at present, as a junior synonym of *Embia ramburi* and must be listed in the Italian fauna. Further researches will provide new material, indispensable in the investigation of the relationships between the different species of the genus *Embia* living in central Sardinia.

The presence of *E. ramburi* in Sicily, recorded by KRAUSS (1911) and reported by FAILLA *et al.* (1995) cannot be confirmed. In fact, VENTURA (1963) reports for Sicily only *Haploembia solieri* (Rambur, 1842) and an indeterminate species of the genus *Embia* Latreille, 1825. During research carried out in Sicily, I collected in Carlentini (Siracusa district), several individuals of a species of the genus *Embia*, character-

ised by apterous blackish males, that cannot be assigned to *E. ramburi* or to other known species (Edward Ross, personal communication). This new species of the genus *Embia* will be soon described (FONTANA & COGO, in preparation).

FAILLA *et al.* (1995) consider *E. ramburi* as present in Northern Italy though any literature data is apparently available. In Italy *E. ramburi* is known up to date only from Lazio region (STEFANI, 1953; PASCUAL, 1997), and Tuscany (FONTANA, 2001).

Some specimens of *E. Ramburi* from Tunisia (Ain Draham), collected and identified by Edward Ross, are present in the collection of the Museo Civico di Storia Naturale «G. Doria» in Genova (Roberto Poggi, *in litteris*). After that *E. ramburi* demonstrated to cover a wider range within the Mediterranean region.

Embia tyrrhenica Stefani, 1953

Type locality: ITALY, Sardinia, Gonnese (Cagliari).

EXAMINED MATERIAL: ITALY, Abruzzo region, Popoli (Pescara district), Sorgenti del Pescara, 10.IV.2000 (nymphs), 4.VI.2001 (adults raised in captivity), 12 olopterous males (3 on slides and 9 in alcohol) and 1 female (on slide), leg. and rearing P. Fontana, coll. P. Fontana; same locality, 30.IX.2000 (adults raised in captivity), 1 female (in alcohol), leg. and rearing P. Fontana, coll. P. Fontana; same locality, 11.X.2000 (adults raised in captivity), 2 females (in alcohol), leg. and rearing P. Fontana, coll. P. Fontana; Lazio region, Ponza island (Latina district), loc. Piana d'Incenso, 18.VII.2001, 1 micropterous male (in alcohol), leg. C. Esposito, coll. P. Fontana; Lazio region, Cisterna (Latina district), 16.VI.1982, 1 olopterous male (in alcohol), leg. G. Nardi, coll. P. Fontana.

Distribution: Mediterranean species, known up to date for few localities in Italy and in Croatia (ROSS, 1966; FONTANA *et al.*, 2002).

Notes: *Embia tyrrhenica* has been recently recorded from Northern Italy (FONTANA *et al.*, 2002 and COGO *et al.*, 2002) and now for central Apennine. After that *E. tyrrhenica* shows to have a wider geographical and ecological range as supposed and could have a wider distribution too. *Embia tyrrhenica* is up to date the only Italian *Embiidina* with winged males and most of the males are characterised in having wings as long as abdomen (olopterous males). STEFANI (1953) described also apterous (forma *aptera*) and micropterous (forma *microptera*) males. Apterous males are known up to date only from inner Southern-Sardinia. Micropterous males are more widely known and have been recorded



Fig. 1. *Embia ramburi*, adult male, Viareggio, Marina di Levante; photo P. Fontana.



Fig. 2. *Embia tyrrhenica*, adult male, Popoli, Sorgenti del Pescara; photo P. Fontana.

from Italy (Sardinia and Ponza island) and Croatia (Veglia Island). Ross (1966) outlined (on the basis of material received by Renzo Stefani) some differences in male terminalia features between apterous and olopterous males of *E. tyrrhenica*, supposing the possibility of a differentiation in distinct populations or even distinct species.

Embia cynthiae sp. n.

Type material: Male holotype on slide, female allotype in alcohol, are preserved in the Paolo Fontana private collection, Isola Vicentina, Vicenza (Italy).

Type data: Italy, North-eastern Sardinia (Sassari), Capo Ceraso, Olbia, 24.V.1995, leg. P. Fontana.

Description of holotype (male). Living appearance: medium-large size, apterous; living specimen uniformly pitch-black with dark hairs.

Mounted specimen: Cranium sub-rectangular, scarcely elongate, devoid of dorsal pattern (Fig. 3A). Antennae (incomplete) dark brown with apex of each antennal segment colourless. First antennal segment clearly larger than the following. Third antennal segment about twice as long as the second one. Eyes very small, not projecting. Labium with anterior margin straight and apical half darker than basal half. Submentum rectangular, with largely concave anterior margin. Mandibles elongate with three pointed teeth on the left mandible and two on the right one. Maxilla with lacinia light brown, thin and sharp and characterised by two apical tooth; galea colourless.

Terminalia (Fig. 3B) with caudal margin of left hemitergite of tenth segment (10 L) straight. Left process (10 LP) very short, conical, with acute apex slightly out-curved (Fig. 3C). Right hemitergite (10 R) large. Right process (10 RP) rounded inward not visible from above (Fig. 3 B, E). Median flap (MF) short, 0,29 mm long, well-sclerotized and darkly pigmented. Left paraproct (LCB + LPPT) large, well-sclerotized and darkly pigmented except for the rounded apex that is membranous and bears some hairs; process of left paraproct (LPPT P) with a sub-apical rounded dilatation in the outer-inferior margin (Fig. 3D). Basal segment of left cercus (LC₁) stout and short, with inner side gradually expanded to the apex that is densely echinulate (Fig. 3B). Apical segment of left cercus (LC₂) subconical, 0,79 time long as LC₁. Left and

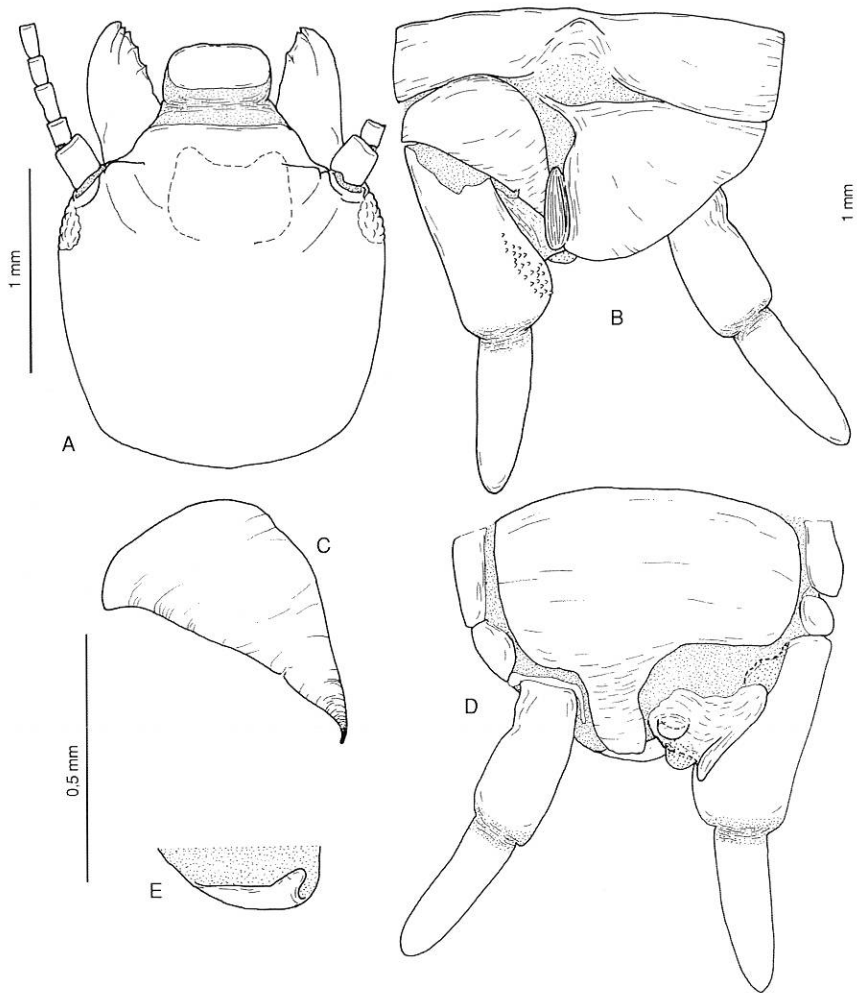


Fig. 3 (A-E). Holotype (male) of *Embia cynthiae* sp. N.. A: head. B: terminalia from above. C: left hemitergite of tenth segment (10 L). D: terminalia from venter. E: process of right hemitergite of tenth segment (10RP) from venter. Author's drawings (hairs omitted).

right cerci with long hairs, longer than cercus diameter; LC1 with hairs only in outer side. Hind basitarsus, with one papilla (as usual in *Embia*) distinctly projecting.

Dimensions (on slide): body length 12,40 mm; head 2,04 mm long and 1,59 mm wide.

Female. Resembling male but bigger, living specimen uniformly mahogany brown.

Dimensions (in alcohol): body length 15,91 mm; head 1,92 mm long and 1,63 mm wide.

Derivatio nominis. I'm delighted to name the new species after my dear wife Cinzia, who accompanies me in several entomological excursions and in particular was with me at Capo Ceraso in may 1995.

Habitat: The only known specimens of *Embia cynthiae* were found under a little stone in a sandy habitat along the eastern coast (about ten metres from the sea shore) of the Capo Ceraso promontory, in front of Tavolara Island (Fig. 4). The habitat in the type locality was characterised by large rounded rocks, sandy soil and scattered vegetation: *Pinus halepensis* Miller, *Juniperus phoenicea* L., *Calycotome villosa* (Poiret), *Lotus creticus* L., *Pistacia lentiscus* L., *Olea europaea* L. var. *oleaster* (Hoffmanns & Link), *Ammophila littoralis* (Beauv.) and Gramineae ind.. Only 1 male, 1 female and 1 immature individual were collected under the same stone, within very weak silk galleries.

Affinities: *Embia cynthiae* sp. n. is well characterised by its morphological features but, within the Mediterranean and European species of the genus *Embia*, it seems to be related to *E. ramburi* Rimsky-Korsakow, 1905, and to *E. girolamii* Fontana, 2001, for the terminalia structures and in particular for the process of left paraproct (LPPT P) with a sub-apical rounded dilatation in the outer-inferior margin. The shape of the left process (10 LP) and the stout and short basal segment of left cercus (LC₁) are very peculiar. The affinity of *Embia cynthiae* sp. n. with *E. ramburi*, confirms the opinion of STEFANI (1953) that the last species is replaced in Sardinia by relative but distinct endemic taxa.



Fig. 4. Habitat of *Embia cynthiae* sp. n. (the Author collecting), Italy, North-eastern Sardinia, Capo Ceraso, Olbia (Sassari district), 24.V.1995; photo Cinzia Vivian.

Fam. **Oligotomidae** Enderlein, 1909

Haploembia solieri (Rambur, 1842)

Type locality: FRANCE, Marseille.

EXAMINED MATERIAL: ITALY, Abruzzo region, Vasto, loc. S. Nicola, 2.V.1995, 12 nymphs (in alcohol) leg. P. Fontana, coll. P. Fontana; same locality, 10.V.1999, 5 nymphs (in alcohol), leg. P. Fontana, coll. P. Fontana; Lazio region, S. Felice Circeo, 12.IV.2000 (nymphs), 2 adult females raised in captivity (on slide), leg. and rearing P. Fontana, coll. P. Fontana; Puglia region, Corato (Bari district), 21.VI.2000, 1 male (on slide), leg. and rearing P. Fontana, coll. P. Fontana; Puglia region, Gravina in Puglia (Bari district), 23.VI.2000, 1 male (on slide), leg. and rearing P. Fontana, coll. P. Fontana; Sicily, Palermo, XI.2000 (nymphs), V.2001 (adult raised in captivity), 1 male on slide, leg. and rearing P. Fontana, coll. P. Fontana; Sicily, Nebrodi mountains, Randazzo, Piani di Rummolo, 8.VI.2002, 1 male, 1 female and 1 nymph, leg. and rearing P. Fontana; FRANCE, Montpellier, Montferrier sur Lez, 12.III.2001 (nymphs), 12. V.2001 (adults raised in captivity), 3 males (in alcohol), leg. and rearing P. Fontana, coll. P. Fontana; CROATIA, Istra, Pula, Prematura, 12.VI.2000, 1 male (on slide), leg. P. Fontana, coll. P. Fontana.



Fig. 5. *Haploembia solieri*, adult male, Istra, Prematura, 18.VI.2000; photo P. Fontana.

Distribution: *Haploembia solieri* is widely distributed in the Mediterranean basin and have been introduced in U.S.A. (California, Arizona and Texas). This species is known up to date from Portugal, Ca-

nary Island, Madeira, Spain, Marocco, France, Italy, islands of Tyrrhenian Sea, ex Yugoslavia, Albania, Greece, Crete, Bulgaria, southern Russia, Turkey and Egypt. The species range must have been artificially extended in man's commerce and it is difficult to determine its region of endemicity or origin (ROSS, 1966).

Notes: Some western Mediterranean islands are populated by exclusively parthenogenetic populations of *Haploembia solieri*. These parthenogenetic populations have small peculiar morphological features (STEFANI & CONTINI, 1961) but cannot be considered as distinct from typical *H. solieri*. The parthenogenetic form is known from Corsica, Sardinia, Elba, Giglio, Argentario, Capri, Canary Islands, Madeira, California, Arizona and Texas (ROSS, 1966).

CONCLUSION

The Embiidina fauna of Mediterranean Basin and in particular that from Sardinia (6 species known up to date), appears to be extremely rich but only partially known. The presence of Embiidina populations not only along the coasts but also in xeric habitats in the Apennines or in the Colli Euganei (Veneto region) in Northern Italy (FONTANA *et al.*, 2002; COGO *et al.*, 2002) extends the range of where to search for these insects and increases the possibility of finding new interesting results. The high biogeographical and ecological value of Embiidina suggests the importance of gaining a deeper knowledge about this order of Insects, both for the study of the biodiversity of the Mediterranean Basin and the protection of micro-habitats, where rare or endemic species are still present.

ACKNOWLEDGEMENTS

Sincere thanks are due to Prof. Giuseppina Pellizzari for the organisation of the entomological excursion in Sardinia during 1995 and to Dr. Andrea Cogo for his help in rearing and mounting some of the specimens. Sincere thanks to Robertso Poggi (Museo Civico di Storia Naturale «G. Doria», Genova) for the data concerning the material of *E. Ramburi* from Tunisia. Many thanks to Gianluca Nardi for his kind in providing me the Embiidina of his collection and to Filippo Maria Buzzetti for his help in searching for Embiidina during several field trips along the Italian peninsula.

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