

# Atti

DELLA ACCADEMIA ROVERETANA DEGLI AGIATI

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**Classe di Scienze matematiche, fisiche e naturali**



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SCRIPTA EDIZIONI

Paolo Fontana, Carmine Iorio & Filippo Maria Buzzetti

First report for the Embioptera  
order in Emilia Romagna region  
(Northern Italy), with remarks on the species  
*Embia tyrrhenica* Stefani, 1953  
(Insecta, Embioptera, Embiidae)

**ABSTRACT:** Webspinners are the least studied and therefore least known order of insects in Italy. For a long time, it was believed that these insects lived in Italy only in the southern regions or in coastal environments but in recent decades they have also been found in northern Italy, both in the Euganean Hills (PD) and on the slopes of the Berici Hills (VI). Both of these reports, based on the anatomical examination of specimens now preserved in museum collection, refer to *Embia tyrrhenica* Stefani, 1953, a species described on specimens from Sardinia but also known from Lazio, Abruzzo and Istria (Croatia). Furthermore, the presence of this species in Sicily is confirmed for the first time. For about twenty years the presence of Embioptera in Emilia Romagna was known only on the basis of some photographs presented in various entomology web sites and forums, but only in 2021 it was possible to examine a winged male of these insects, collected in the town center of Bologna, which was identified with certainty as belonging to the species *Embia tyrrhenica* Stefani, 1953. The distribution and the variability of this species, known for having typically holopterous males but also micropterous or completely apterous ones, are discussed by the authors.

**KEY WORDS:** Embioptera, Webspinners, *Embia tyrrhenica*, distribution, wing forms, Italy, Croatia.

**RIASSUNTO:** Prima segnalazione in Emilia-Romagna (Nord Italia) per l'ordine Embioptera, con osservazioni sulla specie *Embia tyrrhenica* Stefani, 1953 (Insecta, Embiotteri, Embiidae).

Gli embiotteri sono l'ordine di insetti meno studiato e quindi meno conosciuto in Italia. A lungo si era ritenuto che questi insetti vivessero in Italia soltanto nelle regioni meridionali o in ambienti costieri ma negli ultimi decenni sono stati ritrovati anche in Italia settentrionale, sia nei Colli Euganei (PD) che alle pendici dei Colli Berici (VI). Entrambe queste segnalazioni, basate sull'esame anatomico di esemplari ora musealizzati, sono da riferirsi ad *Embia tyrrhenica* Stefani, 1953, una specie descritta su esemplari della Sardegna ma nota anche per il Lazio, l'Abruzzo e l'Istria. Viene inoltre confermata per la prima volta la presenza di questa specie in Sicilia. Da una ventina di anni la presenza degli embiotteri in Emilia-Romagna era basata soltanto su alcune fotografie presentate in vari siti e forum di entomologia, ma solo nel 2021 si è potuto esaminare un maschio

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Paolo Fontana, Fondazione Edmund Mach di San Michele all'Adige (Trento): paolo\_api.fontana@fmach.it  
Carmine Iorio, GRIO (Research group on Orthopteroid insects) - World Biodiversity Association: iorio-carmine01@gmail.com

Filippo Maria Buzzetti, Fondazione Museo Civico di Rovereto: buzzettifilippo@fondazionemcr.it.

alato di questi insetti, raccolto nel centro di Bologna, che è stato con certezza identificato come appartenente alla specie *Embia tyrrhenica* Stefani, 1953. Sono discusse dagli autori la distribuzione e la variabilità di questa specie, nota per avere maschi tipicamente olotteri ma anche microtteri o completamente atteri.

PAROLE CHIAVE: Embioptera, *Embia tyrrhenica*, distribuzione, forme alari, Italia, Croazia.

## Introduction

Webspinners are a small order of insects with interesting anatomical, biological and ethological characteristics (Figs. 1 and 2). They are insects with gregarious costumes, capable of weaving tubular tunnels with the silk secreted by their front legs (Fig. 3). They live mainly in tropical areas and in warm climate regions.

The Embioptera are lucifugal and hygrophilous insects, so much so that in countries with a very dry climate they complete their cycle in the wettest season and hinder dehydration by living in their silky tunnels, often built-in depth or leaning against the vegetation. In Europe they live exclusively in places with a warm microclimate. In nature, the diet of these insects is based on plants including mosses and lichens (phytophagy), bark and decaying leaves (saprophagy). Some Embioptera species show a sexual cannibalism by females towards males. Webspinners exhibit a social behavior which is evident in the formation of colonies consisting of a *gynopaedium*, that is, a female parent and her offspring, living together within a network of interconnected silk tunnels. The females show parental care both towards the eggs and towards the nymphs, in the same way as the Dermaptera (Ross, 2000; Fontana et al., 2002).

The study of Webspinners is simple both from a morphological and bio-ethological point of view, since they can be bred and therefore observed with great ease (Fontana et al., 2002). From the analysis of the concerning literature, the discovery of new species of Embioptera is very frequent, so much that many of these are still known only for the original description. In Europe and in the Mediterranean basin these insects are very little studied so that, except for the two species described by Fontana (2001 and 2002), all the others have been described before 1966 and are mainly due to the American entomologist Edward Shearman Ross (1915 –2016). Another prominent personality in the study of Embioptera was the Italian zoologist Renzo Stefani (1922-2007), author of many studies on the biology and ethology of these insects and of the description of some Mediterranean species.



1. Dorsal and lateral view of *Embia tyrrhenica* adult male (holopterous form); Italy, Emilia Romagna, Castel Maggiore (BO), June 2011, photos by Franziska Luthi. Images from the forum Natura Mediterraneo (<https://www.naturamediterraneo.com>).



2. Dorsal and lateral view of *Embia tyrrhenica* adult female; Italy, Emilia Romagna, Bologna airport garden (BO), 26 April 2007. Photos by Carmine Iorio.

## Methods

For the taxonomic study of Embioptera, specimens must be mounted on slides. The whole specimens, preserved in 70° alcohol, are immersed in a water solution of KOH at 10% for about 12 hours. From the potash the specimens are passed in distilled water for about 30 minutes and after this washing in water they are transferred to a bath in 70 ° alcohol for 10 minutes, then in 85 ° alcohol for another 10 minutes and then in 95 ° alcohol for 10 minutes too. After a further step in a xylene bath for 20 minutes, the specimens, perfectly clarified and dehydrated, are mounted on a slide by inclusion in Canadian Balm.

The specimens here illustrated and studied were mounted on the slide and the relative anatomical details were photographed with a binocular stereomicroscope Leika EZ4 HD with built-in digital camera.

The nomenclature adopted for the different anatomical parts of the Embioptera is that taken from the monograph by Ross (1966).

The specimens object of this study are those of the Paolo Fontana collection, preserved at the Fondazione Museo Civico di Rovereto (FMCR), and in particular in the entomological collections located in the Parolari Palace (Rovereto, Italy).

Examined material (only specimens mounted on slides)

*Embia tyrrhenica* Stefani, 1953: Italy, **Abruzzo**, Popoli (PE), Sorgenti del Pescara, 350 m a.s.l., 42° 9'52.44"N, 13°49'6.33"E, 3 males (holopterous) and 2 females, collected as nymph (10. 04.2000) and raised in laboratory (4.06.2000), leg. P. Fontana (FMCR); Italy, **Veneto**, Colli Euganei, Battaglia Terme (PD), 7 m a.s.l., 45°16'58.05"N, 11°46'27.11"E, 1 male (holopterous), 06.2001, leg. A. Cogo (FMCR); Italy, **Emilia-Romagna**, Bologna (BO), Parco Scandellara, 50 m a.s.l., 44°29'50.14"N, 11°23'10.49"E, 1 male (holopterous), 13.06.2021, leg. C. Iorio (FMCR); Italy, **Lazio**, Cisterna (LT), 1 male (holopterous), 16.06.1982, leg. G. Nardi (FMCR); Italy, **Lazio**, Ponza Island (LT), Piana d'Incenso, 18.07.2001, 1 male (micropterous), leg. C. Esposito (FMCR).

*Embia* sp.: Italy, **Sicily**, Carlentini, Borgo Rizza (SR), 365 m a.s.l., 37°13'32.11"N, 15° 1'27.09"E, 5 males (apterous) and 1 female, collected as nymph (28. 04.1999) and raised in laboratory (06.1999), leg. P. Fontana (FMCR); 1 male (apterous) and 1 female, collected as nymph (28. 04.1999) and raised in laboratory (6.04.2000), leg. P. Fontana (FMCR); 1 male apterous) and 2 females, collected as nymph (28. 04.1999) and raised in laboratory (06.2001), leg. P. Fontana (FMCR).

## The Embioptera in Italy and Europe

There are about 250 known species of Embioptera but at least another 750 have already been discovered and identified but still not described (Ross, 2000). In Italy only 7 species have been reported so far (Fontana, 2021), which nevertheless constitute the largest number in Europe.

The data on the distribution of Embioptera in Italy are very scarce, even if they are among the most abundant in Europe. Those relating not only to the presence at the level of order or genus and therefore based on an taxonomical identification at the level of species, are found in the works of Stefani (1953, 1955, 1956, 1960 and 1983), Ross (2000) and Fontana (2001, 2002 and 2021) and Fontana et al. (2002 and 2021), Buzzetti (2003), Battiston & Fontana (2007) and Cogo et al. (2002).

Checklist of the Embioptera of the Italian fauna (Fontana, 2021); N, S, Si and Sa indicate the presence of each species in Northern Italy, Southern Italy, Sicily and Sardinia while the E indicates the endemic species:



3. Part of the silky tunnels of a small colony of *Cleomia guareschii*; Pantelleria, Montagna Grande. Photo by Paolo Fontana.

Fam. **Embiidae**

*Embia* Latreille, 1825

*Embia ramburi* Rimsky-Korsakow, 1905

(S, Si)

*Embia nuragica* Stefani, 1953

(Sa; E)

*Embia tyrrhenica* Stefani, 1953

(N, S, Sa)

*Embia girolamii* Fontana, 2001

(S; E)

*Embia cynthiae* Fontana, 2002

(Sa; E)

*Cleomia* Stefani, 1953

*Cleomia guareschii* Stefani, 1953

(Sa; E)

Fam. **Oligotomidae**

*Haploembia* Verhoeff, 1904

*Haploembia solieri* Rambur, 1842

(N, S, Si, Sa)

Checklist of the Embioptera of Europe (Fauna Europaea: <https://fauna-eu.org/>):

Fam. **Embiidae**

*Cleomia* Stefani, 1953



*Cleomia guareschi* Stefani, 1953

***Embia*** Latreille, 1825

*Embia amadorae* Ross, 1966

*Embia cynthiae* Fontana, 2002

*Embia fuentei* Navàs, 1918

*Embia girolamii* Fontana, 2001

*Embia nuragica* Stefani, 1953

*Embia ramburi* Rimski-Korsakow, 1905

*Embia savignyi* Westwood, 1837

*Embia tyrrhenica* Stefani, 1953

Fam. **Oligotomidae**

***Haploembia*** Verhoeff, 1904

*Haploembia palaui* Stefani, 1955

*Haploembia solieri* (Rambur, 1842)

***Oligotoma*** Westwood, 1837

*Oligotoma nigra* (Hagen, 1866)

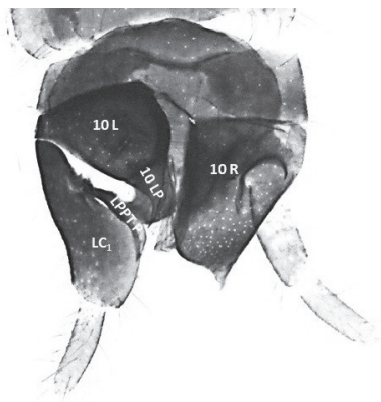
*Oligotoma saundersii* (Westwood, 1837)

*Embia tyrrhenica* Stefani, 1953

*Embia tyrrhenica* have been described on male holopterous specimens but the author also cites in the description (Stefani, 1953) micropterous as well apterous males. The main characters for the identification of the Embioptera must be searched in the extremity of the abdomen of the males (Fig. 4), a set of structures defined as a whole as *terminalia* (Ross, 1966).

*Embia tyrrhenica* is characterized by having, adopting the morphological nomenclature of Ross (1966), a subtrapezoidal right hemitergite of tenth segment (10 R), a strongly and acuminate hooked process of the left hemitergite of tenth segment (10 LP), the basal segment of the left cercus (LC<sub>1</sub>) abruptly dilated in the distal portion which appears to have some scattered denticles on the internal side (Figs. 5 and 6). The process of left paraproct (LPPT P), sharp and slightly curved outwards, is also very characteristic. Although this structure, often not very visible in microscopic preparations, is not adequately illustrated by Ross (1966) who probably illustrated this detail from an apterous individual, according to the original description by Stefani (1953) and on the basis of the examination of several specimens of some Italian localities, the process of left paraproct is one of the most stable and best diagnostic character to identify *E. tyrrhenica*.





- 10 R : right hemitergite of tenth segment  
 10 L : left hemitergite of tenth segment  
 10 LP : process of left hemitergite of tenth segment  
 LPPT P : process of left paraproct  
 LC1 : basal segment of left paraproct

4. Morphological details of male terminalia, according to Ross's nomenclature (1966), of a male of *Embia tyrrhenica*; Italy, Abruzzo, Popoli (PE), Sorgenti del Pescara (FMCR). Photo by Paolo Fontana.

In the description of *Embia tyrrhenica*, Stefani (1953) designates as holotype and allotype a holopterous male and a female (obviously apterous) respectively, from Gonnesa (Italy, Sardinia, SU) which is therefore the type locality of the species. The specimens designated as paratypes are from Gonnesa but also from Rome (Italy, Lazio) and all males are of the holopterous form. In addition to the males of the holopterous form, Stefani (1953) also describes males of the micropterous and apterous forms. All the localities mentioned in the original description refer to males of only one of the wing forms, except for the locality of Pula (Italy, Sardinia), where both the micropterous and apterous forms seem to coexist (Fig. 7).

Describing the apterous form of *E. tyrrhenica* Stefani (1953) writes: "In addition to the nominal form there is also a form characterized by the complete absence of wings, with relative imposing modification of the morphological complex of the thorax. I attribute these wingless individuals to the species *Embia tyrrhenica* n. sp. because apart from the absence of wings, they do not have any other morphological character, within the limit of individual variations, which differentiates them from the nominal form"<sup>1</sup>.

<sup>1</sup> Original Italian text: "Oltre alla forma nominale esiste pure una forma caratterizzata dalla completa assenza di ali, con relativa imponente modificazione del complesso morfologico del torace. Attribuisco tali individui atteri alla specie *Embia tyrrhenica* sp. n. perché tranne l'assenza di ali, essi non presentano alcun altro carattere morfologico, nel limite delle variazioni individuali, che li differenzi dalla forma nominale".

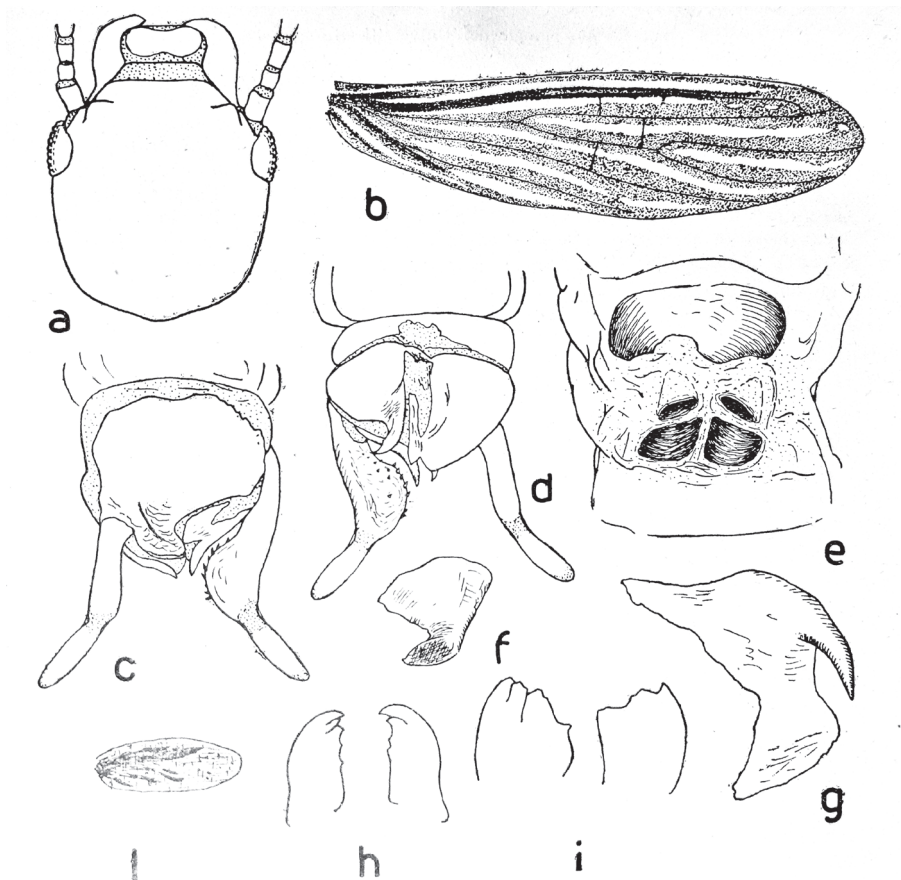


Fig. 1. - *Embia tyrrhenica* sp. n. - Olotipo ♂: a, capo; b, ala anteriore destra; c, terminalia dal ventre; d, terminalia dal dorso; f, emitergite sinistra aberrante di un es. dei Sette Fratelli (Sardegna); g, cercobasipodite sinistro visto di fianco; h, mandibole; l, ala anteriore destra della forma microptera. - Allotipo ♀: e, ottavo urosterno con piastra subgenitale sollevata; i, mandibole. (Tutte allo stesso ingrandimento tranne la lettera g ingrandita del doppio, e la lettera b ridotta alla metà rispetto alle altre. In questa figura e nelle seguenti, le parti membranose sono punteggiate, le parti sclerificate in bianco).

5. Plate from the original description of *Embia tyrrhenica* by Stefani (1953).

Starting from the consideration that the apterous form was never found by him together with the holopterous one, Stefani (1953) suggests that this geographic isolation of the two wing forms could derive from a certain degree of differentiation between the populations, but he concludes that the data are insufficient to establish a subdivision at the subspecific level.

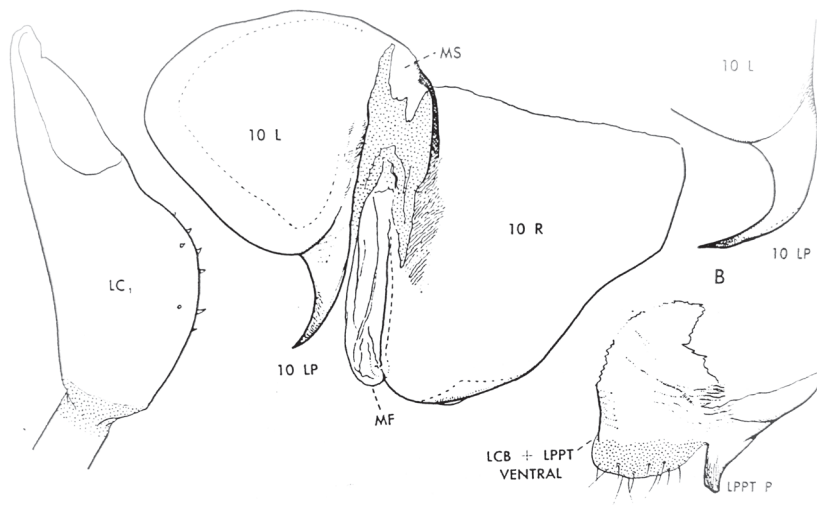


FIG. 8. *Embia tyrrhenica* Stefani. Important characters of terminalia of male topoparatype.

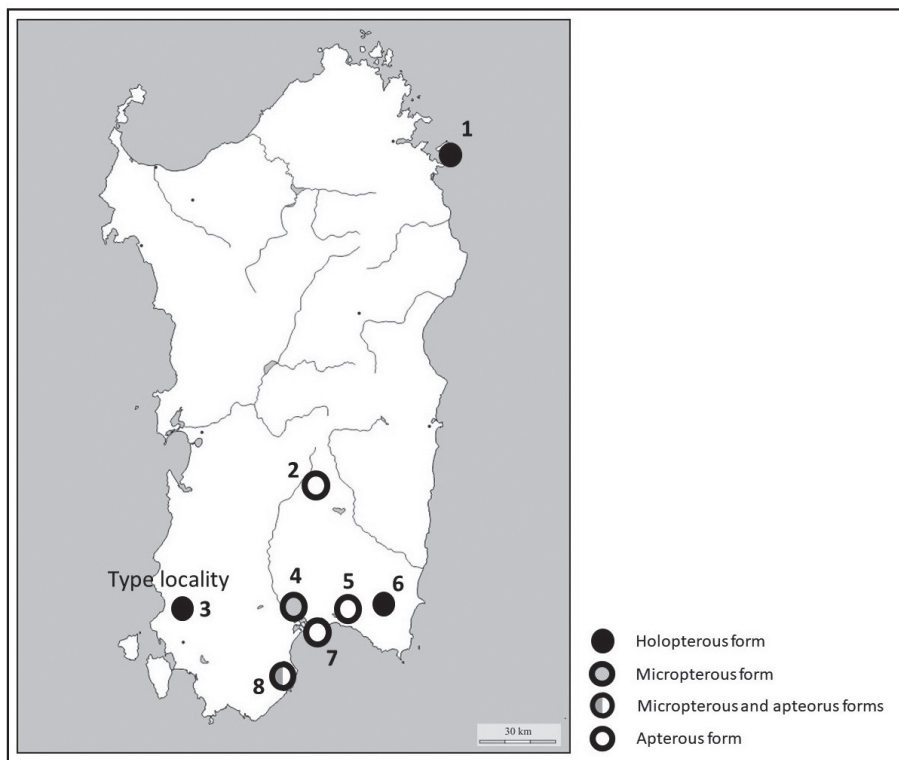
8B. Left tergal process of paratype from Mandas, Sardinia.

Explanation of symbols on page 279.

#### 6. Plate from the description of *Embia tyrrhenica* by Ross (1966).

Stefani (1953) also attributes to *Embia tyrrhenica* some males characterized by a consistent reduction of the wings (micropterous form), stating that this wing form is known to him only from localities where the other males have been found characterized only by the apterous form. Actually, in the material listed for the different wing forms, the locality reported simply as “Cagliari” would be characterized only by an apterous male and that of San Bartolomeo (a locality very close to Cagliari) by a single micropterous male (Fig. 7).

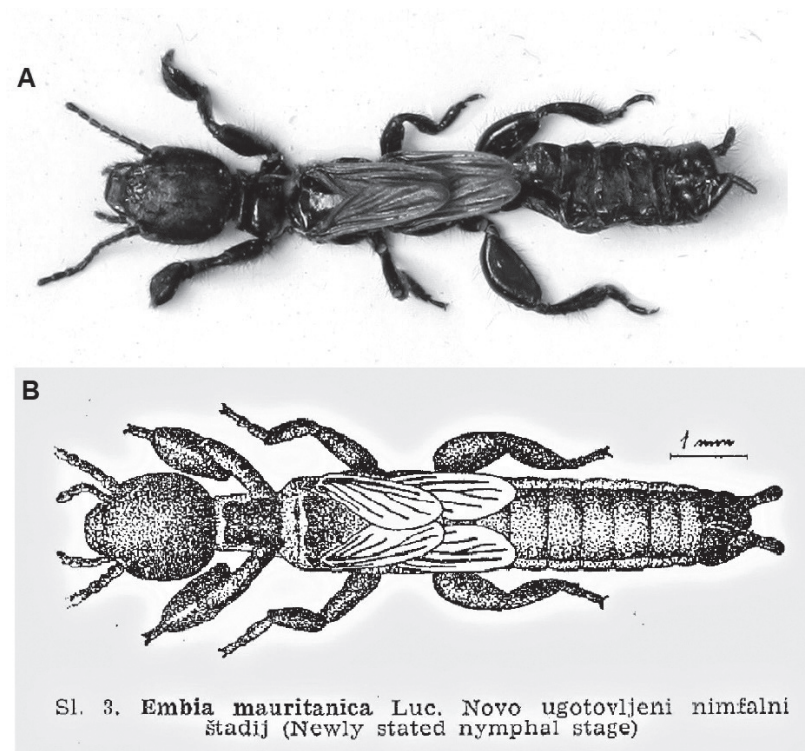
In a subsequent paper, Stefani (1960) attributes to *Embia tyrrhenica* some specimens collected in Croatia and identified by Micheli (1956) as *Embia mauritanica* Lucas, 1849. One of these specimens, collected from Krk Island (Croatia), is of the micropterous form (identified by Micheli as a juvenile stage) while in Rovinj (Croatia, Istria) the species would be present with winged males (Fig. 8 B). Among the reports available on the internet, we found one relating to a micropterous male (Fig. 8 A) most likely belonging to *E. tyrrhenica*, photographed by Petr Horsák in Ribarica (Croatia, Bay of Kvarne) and recorded in the Biolib website (<https://www.biolib.cz/en/taxon/id100323/9>).



7. Distribution in Sardinia (Italy) of the holopterous, micropterous and apterous forms of *Embia tyrrhenica*, from Stefani (1953): **1**) Molara Island (SS); **2**) Mandas (SU); **3**) Gonnesa (SU); **4**) Cagliari (CA); **5**) Italy, Sardinia, Simbrizzi (CA); **6**) Massiccio di Sette Fratelli (CA); **7**) San Bartolomeo (CA); **8**) Pula (CA).

In the Paolo Fontana collection (FMCR) there is a micropterous male (Italy, Lazio, Ponza Island, LT) which, although in not perfect conservation conditions, due to the characteristics of the terminalia must be assigned to *Embia tyrrhenica* (Figs. 11 D, 12 D and 13 D). Current knowledge on the geographic location of the micropterous form of *E. tyrrhenica* therefore strongly supports the specific identity of at least the holopterous and micropterous forms.

Regarding the different wing forms of *Embia tyrrhenica*, Ross (1966) remarks: “Stefani described completely apterous as well as macropterous forms of this species from southern Sardinia. Before me are three apterous males from Mandas, an interior locality in Southern Sardinia (Gonnesa is on the S.W. coast). These differ from my three Gonnesa paratypes in having the left tergal



8. Micropterous form of *Embia tyrrhenica*: **A**) Ribarica (Croatia), from Biolib website (<https://www.biolib.cz/en/taxon/id100323/9>). Photo by Petr Horsák; **B**) Illustration from Micheli (1956).

process (Text-fig. 8b) longer, more acuminate and abruptly curved outward at 90° before the apex. Also, the lobe of the left cercus is smaller and more narrowly rounded. Close study may reveal that *tyrrhenica* breaks up into distinguishable populations, or even a complex of races or weak species" (Fig. 6).

It was not possible to examine Sardinian specimens of the apterous form and therefore, also for biogeographical considerations based on the distribution of the different wing forms of *E. tyrrhenica* in Sardinia (fig. 7), it is believed to confirm the assignment of these specimens to *Embia tyrrhenica* according to Stefani (1953). To definitively establish the identity of *Embia tyrrhenica*, especially as regards to Sardinia, it will be necessary to examine further material using not only the morphological approach but also the molecular one.

A Sicilian population (Italy, Sicily, Carlentini, Borgo Rizza (SR) of *Embia*, collected and reared for three years by the first author and characterized by only apterous male, shows such morphological characteristics that, even if it is similar to *Embia tyrrhenica*, it must be assigned to a new species. In a letter sent on May 21, 2001 to the first author, Ross, who had been sent some photos of living as well mounted males from the Carlentini population, wrote: "Those from Carlentini, Sicily, appear to be a beautiful new species with terminalia quite similar to *tyrrhenica*. However, they are more robust, much darker in color (black), with a faint bluish luster. Apparently, there are species, or subspecies differences, based in size and color even when the terminalia are almost identical". The population of Carlentini therefore differs from *Embia tyrrhenica* for the significantly larger size of the adults (Fig. 11) and in particular for the relative size of the males, only slightly smaller than females (Fig. 9). Furthermore, the structures of the head, characterized in the males by relatively shorter and stockier mandibles, and above all some structures of the terminalia (in particular the process of the left paraproct) concur to confirm the belonging of this population to a new species, which is being described soon.

As regards to the winged male collected in Bologna in the Scandellara Park (Italy, Emilia-Romagna), the morphological examination before (in alcohol) and after its preparation on slide (FMCR), based on the descriptions of Stefani (1953) and Ross (1966) and thanks to the comparison with other Italian specimens, it can be assigned to *Embia tyrrhenica* (Figs 11, 12 and 13). The male (Fig. 1) photographed by Franziska Luthi at Castel Maggiore (Italy, Emilia-Romagna, BO) and the female (Fig. 2) photographed by Carmine Iorio at the Bologna airport, both reported on Natura Mediterraneo forum, are also assigned to *Embya thyrrhenica*.

### Distribution up to date known for *Embia tyrrhenica*

*Embia tyrrhenica* is one of the species of Italian Embioptera of which a fair number of data are available regarding its distribution. All the localities cited in the literature for *E. tyrrhenica* and the respective wing forms found in them, are listed below:

#### **Stefani (1953)**

Holopterous form:

Italy, Sardinia, Gonnese (SU)

Italy, Sardinia, Massiccio di Sette Fratelli (CA)





9. Adult apterous male (above) and adult female of *Embia* sp. from Italy, Sicily, Carlentini, Borgo Rizza (SR). Photo by Paolo Fontana.



10. Adult holopterous male of a species resembling *E. tyrrhenica*, from an unspecified location on the slopes of Etna Mountain (Italy, Sicily, CT). Photo by Toni Puma.





11. Mounted *E. tyrrhenica* adult males in toto (A-D): **A)** Italy, Veneto, Battaglia Terme (PD); **B)** Italy, Abruzzo, Popoli, Sorgenti del Pescara (PE); **C)** Italy, Emilia-Romagna, Bologna, Parco Scandellara (BO); **D)** Left anterior tegmina of a specimen from Italy, Lazio, Ponza Island (LT); **E)** *Embia* sp. apterous adult male in toto from Italy, Sicily, Carlentini, Borgo Rizza (SR). Photos by Paolo Fontana.

Italy, Lazio, Rome, Giardino Zoologico

Italy, Lazio, Acilia (Roma)

Micropterous form:

Italy, Sardinia, Pula (CA)

Italy, Sardinia, Cagliari, San Bartolomeo (CA)

Apterous form:

Italy, Sardinia, Mandas (SU)

Italy, Sardinia, Simbirizzi (CA)

Italy, Sardinia, Pula (CA)

Italy, Sardinia, Cagliari (CA)

### **Micheli (1956) and Stefani (1960)**

Holopterous form:

Croatia, Istria, Rovinj

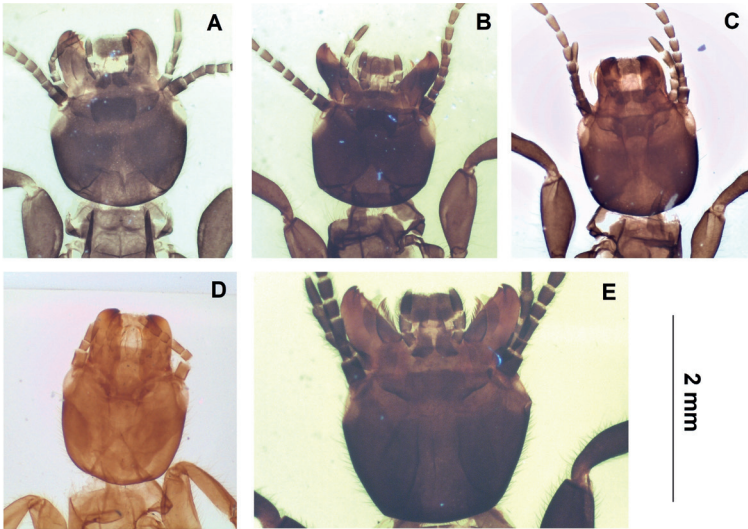
Micropterous form:

Croatia, Bay of Kvarne, Krk Island

### **Fontana (2002)**

Holopterous form:

Italy, Abruzzo, Sorgenti del Pescara (PE)



12. Mounted *E. tyrrhenica* adult males heads (A-D): **A)** Italy, Veneto, Battagli Terme (PD); **B)** Italy, Abruzzo, Popoli, Sorgenti del Pescara (PE); **C)** Italy, Emilia-Romagna, Bologna, Parco Scandellara (BO); **D)** Italy, lazio, Ponza Island (LT); **E)** *Embia* sp. apterous adult male head from Italy, Sicily, Carlentini, Borgo Rizza (SR). Photos by Paolo Fontana.



13. Mounted *E. tyrrhenica* adult males terminalia (A-D): **A)** Italy, Veneto, Battaglia Terme (PD); **B)** Italy, Abruzzo, Popoli, Sorgenti del Pescara (PE); **C)** Italy, Emilia-Romagna, Bologna, Parco Scandellara (BO); **D)** Italy, lazio, Ponza Island (LT); **E)** *Embia* sp. apterous adult male terminalia from Italy, Sicily, Carlentini, Borgo Rizza (SR). Photos by Paolo Fontana.

Italy, Lazio, Cisterna (LT)  
Micropterous form:  
Italy, Lazio, Ponza island (LT)

**Cogo et al. (2002)**

Holopterous form:  
Italy, Veneto, Euganean Hills, Battaglia Terme (PD)

**Buzzetti (2003)**

Holopterous form:  
Italy, Veneto, Vicenza, railway station (VI)

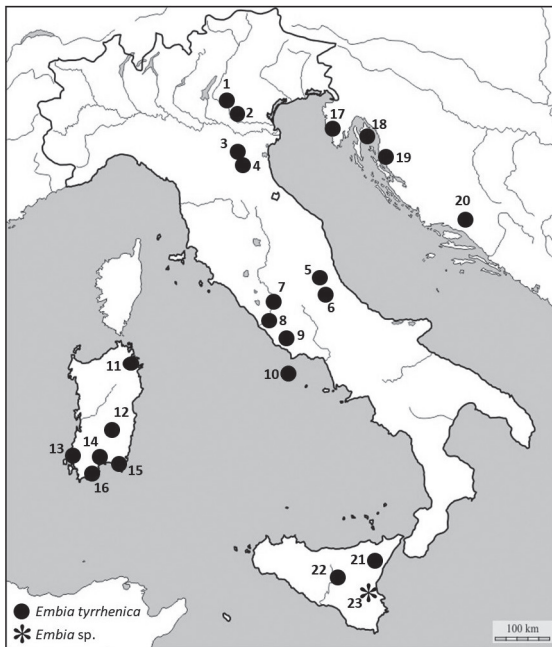
**Battiston & Fontana (2007)**

Holopterous form:  
Italy, Sardinia, Molara Island (SS)

In addition to the published data, it is possible to add further localities for *E. tyrrhenica*, on the basis of specimens preserved in the Ross collection at the California Academy of Science (San Francisco, California, USA) and of some records and photos available on entomological forums and websites. In a previously cited letter, Edward S. Ross provided some interesting data relating to specimens collected, bred and identified by himself. In addition to the classic Sardinian localities already mentioned by Stefani, Ross collected, during his visit in Italy, one single holopterous male of *E. tyrrhenica* in Sicily and precisely “3 miles NW” Calascibetta (reported by Ross as Calcibetta) at about 450 m a.s.l., in the province of Enna. Another locality by Ross is relating to the city of Rome: “I also collected *tyrrhenica* within the Roman Forum, Rome. The males are alate and unusually large. *Ramburi* occurred under the same stones. I collected when the guards weren’t looking!”. Another Italian figure of *E. tyrrhenica* from the Ross collection is related to Abruzzo and precisely Capestrano (Italy, Abruzzo, L’Aquila), at 390 m a.s.l.

Ross collected also the micropterous form in Croatia: “In Yugoslavia, on a hill near Sestanouvac, 375 m, I cultured a series of perhaps subspecies of *tyrrhenica* which has miniature wings. This is convergent to Stefani’s «forma microptera» from S. Bartolomeo, Sardinia (although perhaps convergently evolved)”.

Regarding the reports on the internet, the attribution to *E. tyrrhenica* of these images can be in some way confirmed by direct examination of specimens or by literature data relating to neighboring areas. The holopterous



14. Known distribution of *Embia tyrrhenica* (1-22) and *Embia* sp. (23). *E. tyrrhenica*:

- 1) Italy, Veneto, Vicenza, railway station (VI);
- 2) Italy, Veneto, Euganean Hills, Battaglia Terme (PD);
- 3) Italy, Emilia-Romagna, Castel Maggiore (BO);
- 4) Italy, Emilia Romagna, Bologna airport (BO); Bologna, city center (BO);
- 5) Italy, Abruzzo, Capestrano (AQ);
- 6) Italy, Abruzzo, Sorgenti del Pescara (PE);
- 7) Italy, Lazio, Rome, Giardino Zoologico; Rome, Roman Forum;
- 8) Italy, Lazio, Acilia (Rome);
- 9) Italy, lazio, Cisterna (LT);
- 10) Italy, Lazio, Ponza island (LT);
- 11) Italy, Sardinia, Molara Island (SS);
- 12) Italy, Sardinia, Mandas (SU);
- 13) **TYPE LOCALITY**: Italy, Sardinia, Gonnese (SU);
- 14) Italy, Sardinia, Simbrizzi (CA); Cagliari (CA); San Bartolomeo (CA);
- 15) Italy, Sardinia, Massiccio di Sette Fratelli (CA);
- 16) Italy, Sardinia, Pula (CA);
- 17) Croatia, Istria, Rovinj;
- 18) Croatia, Bay of Kvarne, Krk island;
- 19) Croatia, Ribarica;
- 20) Cratia, Splitsko-dalmatinska županija, Šestanovac;
- 21) Italy, Sicily, unspecified location on the slopes of Etna Mountain (CT);
- 22) Italy, Sicily, calascibetta (EN). *Embia* sp.:
- 23) Italy, Sicily, Carlentini, Borgo Rizza (SR).

male (Fig. 1) photographed by Franziska Luthi on 4 June 2011 in Castel Maggiore (Italy, Emilia-Romagna, BO) and the female (fig. 2) photographed by Carmine Iorio on 26 April 2007 at the airport of Bologna (Italy, Emilia-Romagna, BO) recorded in the Natura Mediterraneo forum as well the micropterous male (Fig. 7 A) photographed by Zdeněk Chalupa in Ribarica (Croatia, Istria) reported on the Biolib website (<https://www.biolib.cz/en/taxon/id100323/9>) are therefore attributed to *E. tyrrhenica*. On the other hand, the holopterous male (Fig. 9) photographed on 1 June 2006 (Toni Puma personal communication) in an unspecified location on the slopes of Etna Mountain (Italy, Sicily, CT) and reported on Natura Mediterraneo forum, also very similar to *E. tyrrhenica*, can be attributed with some certainty to this species, since the Sicilian specimen collected and studied by Ross and reported above.

Considering the literature and collection data, the new Bologna data and the reports on the internet, it is finally possible to define an updated distribution map of *E. tyrrhenica*. This species therefore shows a distribution that could suggest its presence at least throughout the whole Italian peninsula, Sardinia and the eastern coast of the northern Adriatic (Fig. 13).

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