

Pristocera masii: rediscovery of the holotype and its transfer to *Acrepyris* (Hymenoptera: Bethylidae)

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Abstract. We report the rediscovery of the holotype of *Pristocera masii* Soika, 1933 (Hymenoptera: Bethylidae: Pristocerinae), originally described from a single male from Venice, Italy. The holotype was considered lost but during a scientific visit at the Museo Civico di Storia Naturale “Giacomo Doria” in Genova, Italy we were able to find the holotype. Here we provide a detailed redescription, with photographs and drawings of the main diagnostic characters delimiting this species. *Pristocera masii* is transferred into *Acrepyris* Kieffer, 1905 because its hypopygium is simple, not deeply divided as in *Pristocera* Klug, 1808, and its aedeagus has three distinct valvae, a remarkable and exclusive feature of *Acrepyris*. The resulting new combination, *Acrepyris masii* (Soika, 1933), is established here.

Key words. Hymenoptera, Bethylidae, Pristocerinae, *Acrepyris*, *Pristocera*, new combination, holotype, Italy, Palaearctic Region

Introduction

The genus *Pristocera* was described by KLUG (1808) and while *Acrepyris* Kieffer, 1905 was described by KIEFFER (1905), both of them belong to the subfamily Pristocerinae (Hymenoptera: Bethylidae). YASUMATSU (1955) split *Pristocera* into two subgenera, *Pristocera* sensu stricto and *Neopristocera* Yasumatsu, 1955. Based on the morphology of the genitalia and especially hypopygium EVANS (1963) proposed synonymy between the subgenus *Neopristocera* and the genus *Acrepyris*, so *Acrepyris* became the junior subjective synonym of *Pristocera*. Finally, TERAYAMA (1996) reestablished the status of *Acrepyris* as a valid genus and ZAMPROGNO & AZEVEDO (2014) confirmed this act by cladistic analysis.

The genus *Acrepyris* is currently represented by 37 species. According to TERAYAMA (1995, 1996) and TERAYAMA et al. (2002), *Acrepyris* is recorded as especially species rich in the New World, and only a few species occur in the Oriental and Palaearctic Regions (see Table 1). Like all Pristocerinae flat wasps, *Acrepyris* shows distinct sexual dimorphism (TERAYAMA

Table 1. List of *Acrepyris* species and their distribution worldwide. Species distributed at the boundaries between biogeographical regions and impossible to be attributed to only one of them are marked by an asterisk (*).

Species	Distribution
<i>Acrepyris agraensis</i> (Kurian, 1952)	Oriental (India)
<i>Acrepyris antennatus</i> (Magretti, 1897)	Oriental (Myanmar)
<i>Acrepyris armiferus</i> (Say, 1828)	Nearctic (U.S.A.)
<i>Acrepyris ater</i> (Klug, 1810)	Nearctic+Neotropical (U.S.A., Mexico)
<i>Acrepyris bridwelli</i> (Evans, 1963)	Nearctic (U.S.A.)
<i>Acrepyris californicus</i> (Evans, 1963)	Nearctic (U.S.A.)
<i>Acrepyris chihuahua</i> (Evans, 1963)	Nearctic (U.S.A., Mexico)
<i>Acrepyris cockerelli</i> (Evans, 1963)	Nearctic (U.S.A.)
<i>Acrepyris dreisbachi</i> (Evans, 1977)	Neotropical (Mexico)
<i>Acrepyris erythropodus</i> (Cameron, 1888)	Neotropical (Panama, Costa Rica)
<i>Acrepyris fraternus</i> (Evans, 1963)	Nearctic (U.S.A.)
<i>Acrepyris hyalinus</i> (Brues, 1906)	Nearctic (U.S.A.)
<i>Acrepyris intermedius</i> (Evans, 1963)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris ishigakiensis</i> (Yasumatsu, 1955)	Oriental+Palaeartic (Japan*)
<i>Acrepyris japonicus</i> (Yasumatsu, 1955)	Oriental+Palaeartic (Japan*)
<i>Acrepyris masii</i> (Soika, 1933) comb. nov.	Palaeartic (Italy)
<i>Acrepyris mieae</i> (Terayama, 1995)	Oriental (Taiwan)
<i>Acrepyris minutus</i> (Yasumatsu, 1955)	Oriental+Palaeartic (Japan*)
<i>Acrepyris nebulosus</i> (Evans, 1963)	Neotropical (Guatemala)
<i>Acrepyris orihime</i> Terayama, 1999	Oriental+Palaeartic (Japan*)
<i>Acrepyris oriplanus</i> (Kieffer, 1911)	Neotropical (Mexico*)
<i>Acrepyris orizabae</i> (Cameron, 1897)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris otomi</i> (Evans, 1963)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris palliditarsis</i> (Cameron, 1897)	Neotropical (Mexico, Panama)
<i>Acrepyris parkeri</i> (Evans, 1977)	Nearctic (U.S.A.)
<i>Acrepyris porteri</i> (Evans, 1964)	Neotropical (Belize)
<i>Acrepyris quiroga</i> (Evans, 1964)	Nearctic (Mexico)
<i>Acrepyris rugicollis</i> (Kieffer, 1905)	Oriental (Malaysia)
<i>Acrepyris rugifrons</i> (Cameron, 1888)	Neotropical (Guatemala)
<i>Acrepyris rugulosus</i> Terayama, Xu & He, 2002	Palaeartic+Oriental (China*)
<i>Acrepyris ryukyensis</i> Terayama, 1999	Palaeartic+Oriental (Japan*)
<i>Acrepyris sinaloa</i> (Evans, 1963)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris sinensis</i> Terayama, Xu & He, 2002	Palaeartic+Oriental (China*)
<i>Acrepyris tainanensis</i> (Terayama, 1995)	Oriental (Taiwan)
<i>Acrepyris takasago</i> (Terayama, 1995)	Oriental (Taiwan)
<i>Acrepyris tenochca</i> (Evans, 1963)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris varidens</i> (Cameron, 1904)	Nearctic+Neotropical (Mexico*)
<i>Acrepyris zhejiangensis</i> Terayama, Xu & He, 2002	Palaeartic+Oriental (China*)

et al. 2002), which makes the male-female association difficult to recognize based only on morphological features. Most species are therefore known only by their male sex. The few biological data known indicate that *Acrepyris* is a parasitoid of wireworms (Coleoptera: Elateridae) according to YASUMATSU (1955) and EVANS (1964).

Pristocera masii Soika, 1933 was described based on a single male specimen from Venice, Italy (SOIKA 1933). This specimen was considered “lost” in the Bethylinidae Catalog of GORDH & MÓCZÁR (1990). Now, we rediscovered the holotype in Museo Civico di Storia Naturale “Giacomo Doria”. When SOIKA (1933) described *P. masii*, he did not study its genitalia. Due to this fact we have suspected the placement of the species is probably mistaken. The discovery is reported herein and the taxonomic status of the species is resolved. We here propose *Acrepyris masii* (Soika, 1933) as a new combination for *Pristocera masii* Soika, 1933.

Material and methods

The nomenclature of the integument generally follows HARRIS (1979). The terminology of the external morphology generally follows EVANS (1963, 1964), AZEVEDO (1999), ALENCAR & AZEVEDO (2013), and KAWADA et al. (2015). For the wing venation terminology, we used RAMOS & AZEVEDO (2012).

Photographs were taken under a Leica Z16 APO stereomicroscope coupled with a Leica DFC 2 video camera (Leica Microsystems, Switzerland). Two different software programs were used to combine the images: Leica Application Suite V3.6.0 by Leica Microsystems (Switzerland), using the parameters maximum process, precision optimize, and 15–40 patch size, and Helicon Focus (HeliconSoft), using the parameters A, B or C method; 100% full resolution; 1–4 radius; 1 smoothing; Modular Dome Illumination System by KAWADA & BUFFINGTON (2016), and 300 dpi.

The drawings were made under a Leica DM 2500 microscope with transmitted light and camera-lucida, and the pencil lines were made on paper and then scanned at 600 dpi. After scanning, the drafts of images were digitalized with Adobe Illustrator.

Taxonomy

Acrepyris Kieffer, 1905

Acrepyris Kieffer, 1905: 109, 118–119. Type species: *Acrepyris rugicollis* Kieffer, 1905, by subsequent designation by KIEFFER (1914: 421).

Neopristocera Yasumatsu, 1955: 248. Type species: *Pristocera japonica* Yasumatsu, 1955 by original designation. Synonymized by EVANS (1963a: 250).

Acrepyris masii (Soika, 1933) comb. nov.

Pristocera masii Soika, 1933: 99–101 (male). GORDH & MÓCZÁR (1990): 240 (catalog).

Material examined. HOLOTYPE: ♂, ‘Venezia / Lido / 24.VIII.1931 // *Pristocera masii* n sp. / GIORDANI SOIKA DET. // Typus // HOLOTYPE // *Pristocera masii* / A. Giordani Soika, 1933 // Museo Civico di Genova’. The holotype is deposited in Museo Civico di Storia Naturale “Giacomo Doria” in Genova, Italy.

Redescription. Holotype (male). Body length 7.2 mm. Length of forewing (LFW) 3.8 mm.

Color. Head, clypeus and mesosoma black except for antenna, pronotal collar and posterior end of pronotal disc that are dark castaneous; mandible, metasoma and legs castaneous, wings hyaline.

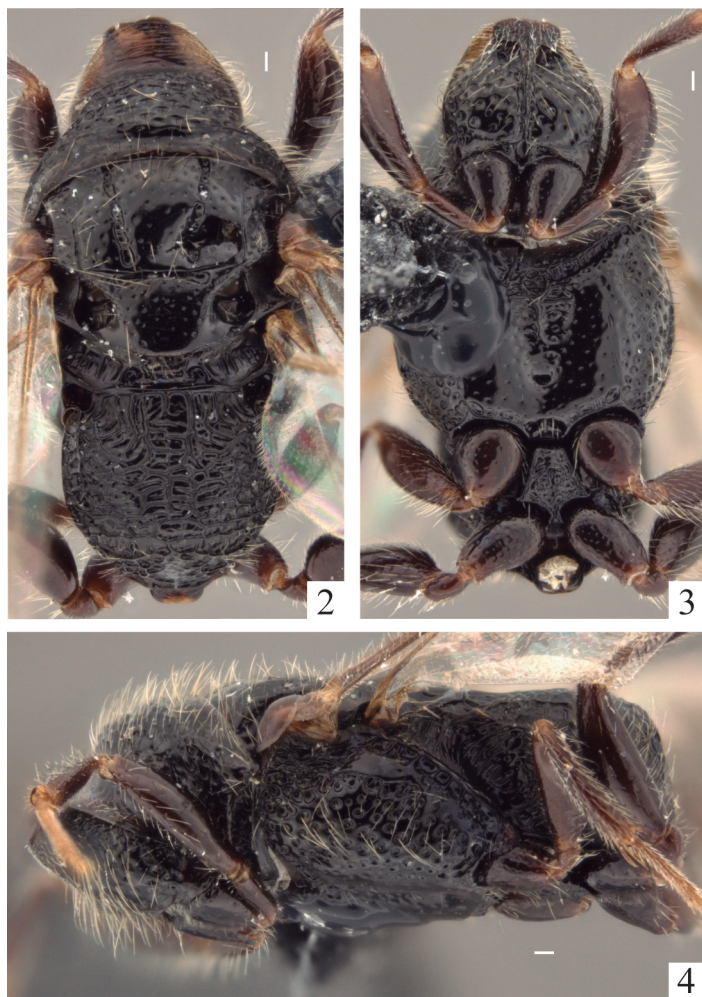
Head (Fig. 1). Mandible with five sharpened distal teeth, upper ones almost equally sized, upper tooth turned inwards. Clypeus short, with median lobe rectangular and apical margin slightly convex; median carina conspicuous, high and arched in profile. Antenna broken, left side with only first 11 antennomeres, scape arched, widened distad; flagellomeres long, basal flagellomeres (I–IV) wider than others; pubescence erect, setae short. Frons densely punctate. Ocellar triangle elevated, frontal angle acute, ocelli of normal size. Anterior ocellus placed posterior to imaginary line of eye top. Vertex convex; corner rounded. Temple slightly convergent posteriorly. Occipital carina complete, present ventrally and dorsally.

Mesosoma (Figs 2–4). Thorax dorsum shining, punctate, setae long. Pronotal disc trapezoidal; side slightly concave; anterior region elevated, rugulose-lacunose. Notaulus conspicuous, complete, convergent posteriorly, narrow, scrobiculate inside, reaching anterior and posterior margin of mesoscutum. Parapsidal furrow incomplete, conspicuous anteriorly, almost straight, narrow, shallow. Lateral area of mesoscutum elevated. Mesoscuto-scutellar sulcus deep, narrow, straight. Metanotum with large median elevation; median fovea sub-trapezoidal; metanotal groove foveolate laterally, first one oval. Metapectal-propodeal complex as long as wide, transverse anterior carina wide laterally and narrow medially, metapostnotal area rugulose; spiracle arched with rounded ends, placed completely at disc. Lateral surface of propodeum strigulate to areolate posteriorly. Propodeal declivity weak, convex in lateral view, areolate. Mesopleuron punctate except mesopleural callus elevate, polished and shining; subtegular groove dilated anteriorly and uniformly narrow posteriorly, foveolate inside; episternal groove continuous to subtegular one, foveolate, foveae opened; mesopleural pit small and deep. Pleurosternum with heart-shaped large groove; acetabular carina wide medially, followed by large foveae; latero-posterior foveolate groove, foveae opened, present near mesocoxa. Tarsal claws trifid, teeth acute. Forewing with r-rs+Rs very long and slightly curved forward; R1b short; R1a truncate and inclined; pterostigma lanceolate and large. Hind wing with six apical hamuli.

Metasoma (Figs 5–9). Hypopygium not divided, median stalk long, posterior margin dentate (Fig. 5). Genitalia (Figs 6–9). Paramere wide, shorter than basiparamere; apical margin convex dorsally and inclined dorsally in lateral view; ventral and dorsal margin almost straight, with weak concavity medially; external surface

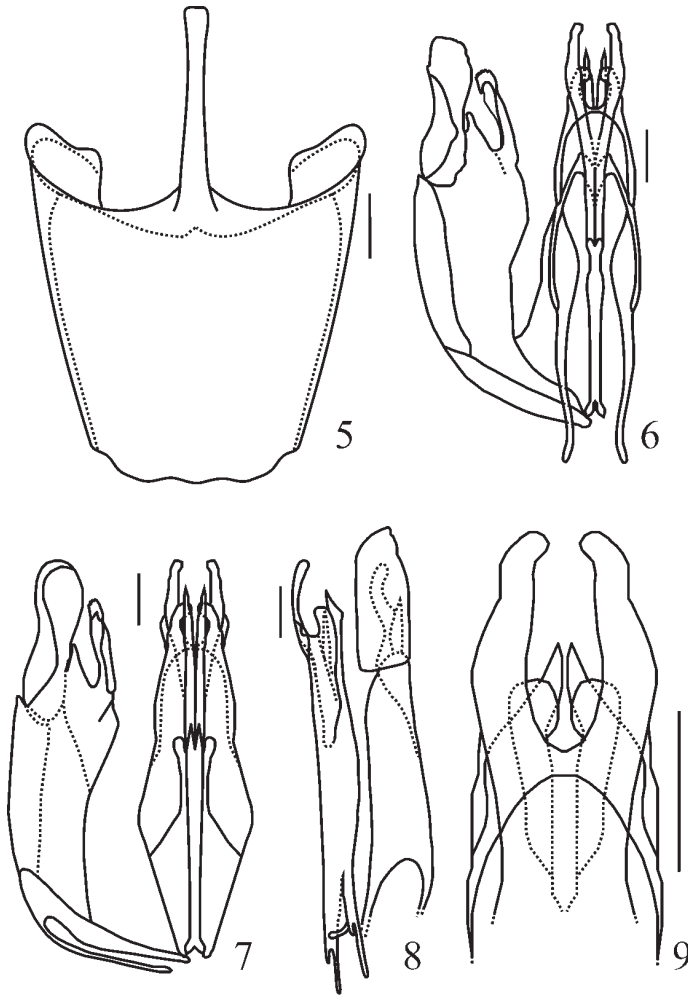


Fig. 1. *Acrepyris masii* (Soika, 1933), holotype, male. – Head, dorsal view. Scale bars = 100 μ m.



Figs 2–4. *Acrepyris masii* (Soi-
ka, 1933), holotype, male.
Mesosoma (2 – dorsal view, 3
– ventral view, 4 – lateral view).
Scale bars = 100 μ m.

densely setose. Basiparamere with dorsal margin convex apically and concave basally. Basivolsella long, margin strongly convex with some long setae. Digitus short, apical margin dentate, apex convex. Cuspid longer than digitus, arched, base with projection dorsad, apex convex. Aedeagus divided into three valves; dorsal valves as long as ventral ones, apex not divided, apical lobe narrow and curved ventrad, apex weakly rounded; middle valves as short as ventral ones, gradually widening basally, apical region with ventral concavity, apex projected ventrad, strongly rounded; ventral valves longer than middle valves and shorter than dorsal valves, apical region weakly pointed. Genital ring narrow. Basal ring reduced. Apodeme extending beyond genital ring.



Figs 5–9. *Acrepyris masii* (Soika, 1933), holotype, male. 5 – hypopygium, ventral view; 6 – genitalia, dorsal view; 7 – genitalia, ventral view; 8 – genitalia, lateral view; 9 – aedeagal valves, dorsal view. Scale bars = 15 μ m (5–7) and 30 μ m (8–9).

Differential diagnosis. Within the *Pristocerinae*, there are several characters that place this species in *Acrepyris*, such as undivided hypopygium without lamellar lobes and aedeagus with three pairs of valves. The latter two characters are the most important to conclude that this species belongs to *Acrepyris*, because they distinguish it from related genera, e.g., *Pristocera* and *Apenesia* Westwood, 1874. The aedeagal valves of this species are similar to that of *A. orizabae* (Cameron, 1897) because the dorsal valves are as long as the ventral ones, the apex

is not divided and the apical lobe is narrow and curved ventrad; the middle valves are almost as short as the ventral ones and strongly rounded, and the ventral valves are longer than the middle valves and shorter than the dorsal valves, apical region weakly pointed. However, the paramere of *A. masii* is wide; basivolsella long; digitus with apical margin dentate, whereas *A. orizabae* has paramere short; basivolsella short and digitus without apical margin dentate.

Discussion

The rediscovery of the holotype of *Pristocera masii*, previously thought to be lost, combined with an updated description and new illustrations of the most important characters, including photographs and drawings, enabled a more accurate taxonomic analysis of its identity. We emphasize here that the original description made by SOIKA (1933) did not provide enough taxonomic information to allow the identification of new specimens belonging to *P. masii*. Many features that are considered to be the most important nowadays were not even analyzed such as the genitalia. Here, we dissected the genitalia of the holotype and provided the description and illustration of the hypopygium and the genitalia. Based on the observation of a set of unique characteristics such as aedeagus consisting of three valves (ventral, middle and dorsal) and the digitus of genitalia forming slender, curved rods (as said by TERAYAMA 1996), we propose the transfer of *Pristocera masii* to *Acrepyris*. Differing from *Acrepyris*, *Pristocera* has the aedeagus simple or with two valves and the digitus in the form of a broad and truncate plate. For more information on the morphological differences between the two genera see TERAYAMA (1996).

Acrepyris and *Pristocera* were first defined as different genera (TERAYAMA 1996). EVANS (1963) and YASUMATSU (1955) suggested that *Acrepyris* was a lineage of *Pristocera* and treated it as its subgenus. However, TERAYAMA (1996) showed that phylogenetically *Acrepyris* and *Pristocera* are distinct genera. ZAMPROGNO & AZEVEDO (2014) confirmed the taxonomic and cladistic delimitation of *Pristocera* as a distinct genus outside *Acrepyris* by the characters related to the hypopygium, consisting of two plates in *Pristocera* and a single plate in *Acrepyris*, and aedeagus with three valves in *Acrepyris* and a single valva in *Pristocera*, which are shown as autapomorphies. Both genera have specimens of larger than the average size for Bethyilidae, which at first look may lead to their misidentification. The main diagnostic characters of these genera are structure of hypopygium and male genitalia, *Acrepyris* always presents long antennae which exceed the posterior margin of pronotum, whereas *Pristocera* has always short antennae that at most reach the posterior margin of the pronotum.

Irrespective of the factors determining the boundaries of zoogeographic regions, some regions and especially subregions have faunas that are transitional between two neighboring regions (Wallacean, Central American, La Plata, Sino-Himalayan), albeit still characterized by strong endemic components (PROCHES & RAMDHANI 2012). In the case of Guizhou (China) for *Acrepyris sinensis* Terayama, Xu & He, 2002 and Zhejiang (China) for *Acrepyris zhejiangensis* Terayama, Xu & He, 2002, their inclusion in the Palearctic Region was truly borderline because they could be almost equally well incorporated in the Oriental fauna. Although the occurrence of *Acrepyris* in the Palearctic Region was already registered in the past, we now have an evidence of its possible wider occurrence. Here we report *Acrepyris masii* as the first

record of *Acrepyris* occurring in Europe. *Acrepyris* is a rare genus, difficult to be collected and with known distribution in the Nearctic, Neotropical, Oriental, and Palearctic Regions. Currently, there are no records of *Acrepyris* from the Afrotropical and Australian Regions, and from South America. On the other hand, *Pristocera* occurs in the Afrotropical and Oriental Regions, the latter being the only shared sympatric area with *Acrepyris*.

Finally, we believe that a taxonomic revision of *Acrepyris* and *Pristocera* should be carried out in addition to the expansion of collection methods, thereby allowing that the knowledge of the species within the genus is extended and possible problems are resolved.

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