

ENTOMOLOGY

New records on some Tetrastichinae (Hymenoptera: Eulophidae) from Italy, with description of a new species of *Aprostocetus*

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Abstract

New records of Tetrastichinae from Italy are given. The Italian species of *Aprostocetus* (*Ootetrastichus*) are revised, a new species is described, and a key to their identification is given.

Introduction

The Tetrastichinae is the largest subfamily of the Eulophidae (Hymenoptera: Chalcidoidea) in which several taxonomic and biological aspects wait to be investigated. One of the most important contribution on their reclassification was given by

Graham (1987; 1991), but the characterization of several species and groups remains uncertain. This happens in the wide genus *Aprostocetus* Westwood, subgenus *Ootetrastichus* Perkins (1906), distributed in several regions of the world, where many species have been, even recently, poorly described. The species included in the mentioned subgenus are egg-parasitoids of Hemiptera (Delphacidae and Cicadellidae), Orthoptera (Gryllidae), Odonata and Coleoptera Dytiscidae (Graham, 1987). According to Graham (1987) the 17 European species included in the subgenus *Ootetrastichus* may represent several species-groups, but their definition should await a wider treatment of the subgenus. The species recorded from Italy are the following: *eupatorii* Kurdjumov, *micerinus* (Walker), *ovivorax* (Silvestri), *crino* (Walker) and *percaudatus* (Silvestri). Recently *A. crino* was recorded as egg-parasitoid of the invasive planthopper *Ricania speculum* (Walker) (Hemiptera Ricaniidae) in several locations in Liguria (Laudonia *et al.*, 2017). In the present paper new records of Tetrastichinae from Italy are given, the Italian species of *Aprostocetus* (*Ootetrastichus*) are revised and a new species is described.

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Dedication: This paper is dedicated to the memory of Prof. Giovanni Mineo, colleague and friend, who collected part of the studied material.

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Materials and Methods

Some dried specimens of Tetrastichinae (Hymenoptera: Eulophidae) on pins, mostly collected by the author in Campania, were studied. Other examined specimens have been collected by G. Mineo using sticky yellow dishes located among the grasses growing at the borders of an artificial small lake near vineyards in Alcamo (Sicily, TP). The latter specimens were retrieved by using white petroleum in which the glue of traps was soluble (Mineo, 2017).

The specimens studied were slide-mounted in Canada balsam phenol, but some of them were kept and examined also on pin cards. All the material was examined under a Leica stereoscope and a Zeiss Axiophot with phase contrast. Both instruments were used also to take pictures by a Canon Powershot 545 camera.

The following abbreviations of nomenclature are used: C1-3 = clava segments; F1-3 = funicle segments; OOL = ocell-ocular distance; POL = post-ocellar distance.

Results

Aprostocetus (*Ootetrastichus*) *ovivorax* (Silvestri)

DISTRIBUTION. Croatia, Czech Republic, ex Czechoslovakia (pre 1993), France, Germany, Hungary, Italy, Russia (Astrakhan'

Oblast, Ul'yanovsk Oblast), Sweden, Yugoslavia (pre 1991) (Noyes, 2020).

NEW RECORDS. The following records are added to those by Silvestri (1920): Italy (Campania): 11♀ and 5♂, Avella, vi. 1971, ex eggs of *Oecanthus pellucens* Scopoli, coll. G. Viggiani.

HOSTS. Eggs of *Oecanthus* spp.

Aprostocetus (Ootetrastichus) percaudatus (Silvestri)

DISTRIBUTION. Bulgaria, Croatia, Czech Republic, ex Czechoslovakia (pre 1993), France, Germany, India (Bihar, Kerala, Uttar Pradesh), Italy, Macedonia, Moldova, Montenegro, Romania, Serbia, Slovakia, Spain, Ukraine, Yugoslavia (Federal Republic), Yugoslavia (pre 1991) (Noyes, 2020).

NEW RECORDS. The following records are added to those by Silvestri (1920): Italy (Campania): 3♀, Vico Equense, 18.vi.1968; 1♀, same data, 21.vi.1968; 2♀, same data, 12.vii.1968, coll. G. Viggiani; 3♀, Capua, iv-v. 1971, ex eggs of *O. pellucens*, coll. G. Viggiani.

HOSTS. Eggs of *Oecanthus* spp.

Aprostocetus (Ootetrastichus) pseudopodiellus (Bakkendorf)

Tetrastichus pseudopodiellus Bakkendorf, 1953. Entomologische Meddelelser 26: 558.

Gyrolachnus longulus Erdős, 1954. Eulophidae hungaricae indescriptiones. Annales historico-naturales Musei Nationalis hungarici (S. N.) 5: 365. **Syn. n.**

Aprostocetus (Ootetrastichus) longulus (Erdős), Graham. 1987. Bulletin of the British Museum (Natural History) (Entomology) 55(1): 101-102.

FEMALE. Body black with green tint on thorax; antennae brownish, with dorsal margin of the scape darker (Figure 1A); wings hyaline with grey veins; legs yellow, frequently with some brownish on femur and tibia, hind coxa at least partially black, and distal 1-2 tarsomeres brown. Length: 1.6-1.7 mm. Head as wide as thorax, 1.8× as wide as long; POL slightly longer than OOL, eye length 0.6× the distance between the internal margin of two eyes; malar space 0.3× the eye height, malar sulcus straight; vertex with numerous suberect setae. Antenna (Figure 2B) inserted at the level of the ventral margin of the eye; radicula as long as wide, scape elongate, 4.0-5.0× (n = 7) as long as wide, well surpassing vertex, pedicel as long as F1 or slight shorter or longer, 4 anelli of which first and fourth transverse, subrectangular in profile, and the intermediates smallest and cuneiform; funicular segments subcylindrical, subequal in length, F1 3.6-4.0× as long as wide, F2 2.6-3.2× as long as wide, slightly longer than F1, F3 2.0-2.5× as long as wide, slightly shorter and wider than the preceding segment, clava 2.0-3.0× as long as wide, with C1 well separate from the subsequent segments, 1.5-2.3× as long as wide, slightly shorter than F3, C2+C3 at least partially fused, 2.2-3.1× as long as wide, longer than C1 (22:14), with apical spine and seta very short. All antennal segments with setae rather long, but not longer than the segments on which they are inserted; funicle and clava segments with some linear sensoria partially extruded externally, like robust setae. Mandible with two strong pointed external teeth and an internal rather blunt tooth. Maxillary and labial palpi one-segmented. Thorax moderately convex; pronotum campaniform, with several setae on the posterior margin. Mid lobe of mesoscutum as long as broad, with 3 adnotaular setae on each side, rarely 4+3, the longest around 0.8× the basal margin of the lobe; scutellum wider than long (35:30), with 2 pairs of long setae, about 2/3 of the scutellum length, submedian line nearer to the sublateral line than to each other (10:15); mid lobe of mesoscutum and scutellum with

a very shallow longitudinal reticulation. Dorsellum of metanotum transverse, ovoidal, about twice as wide as long. Propodeum medially slight longer than dorsellum, distal margin in the middle deeply hollow, with a median carina increasingly enlarged to the distal margin, callus with 3-4 setae (n=7), some as long as those on mesoscutum. Fore wing (Figure 1C) 3.2-3.3× as long as wide; costal cell narrow, slight longer than submarginal vein; the latter 4.5× as long as the premarginal vein; marginal vein 5 × the stigmal vein; postmarginal vein undeveloped; 2 setae on the submarginal vein and 12-15 main setae on the front edge of the marginal vein, each as long as the stigma vein; speculum lacking or extremely reduced; cubital vein and subcubital vein reaching the basal vein; blade densely pilose; fringe longest setae 0.20-0.25× as long as discal width. Hind wing narrow, distally pointed, blade sparsely setose from the base of the marginal vein, fringe longest setae slightly longer than discal width. Legs long and slender, mid and hind tibia spurs 0.5× the length of basitarsus, tarsomeres subequal, about 4× as long as wide, distal tarsomere of fore leg not swollen. Gaster conic, 1.2-1.3× as long as head plus thorax, distally pointed; petiole very short and transverse; tergites with numerous and rather long setae; cercoid (Figure 1D) with longest seta at least twice as long as the shortest; last tergite postcercal as long as half of the longest cercoid seta, 0.4× as long as the length of the last tergite; ovipositor inserted near the base of gaster, slightly exerted, not more than the length of the distal hind tarsomere, 1.8-2.3× as long hind tibia, third valvula 0.6× as long as the total ovipositor length; hypopygium reaching one-third of the basal gastral length.

MALE (Figure 1E). Body dark, frequently with green luster mostly on thorax; antennae normally with scape, except a brown dorsal

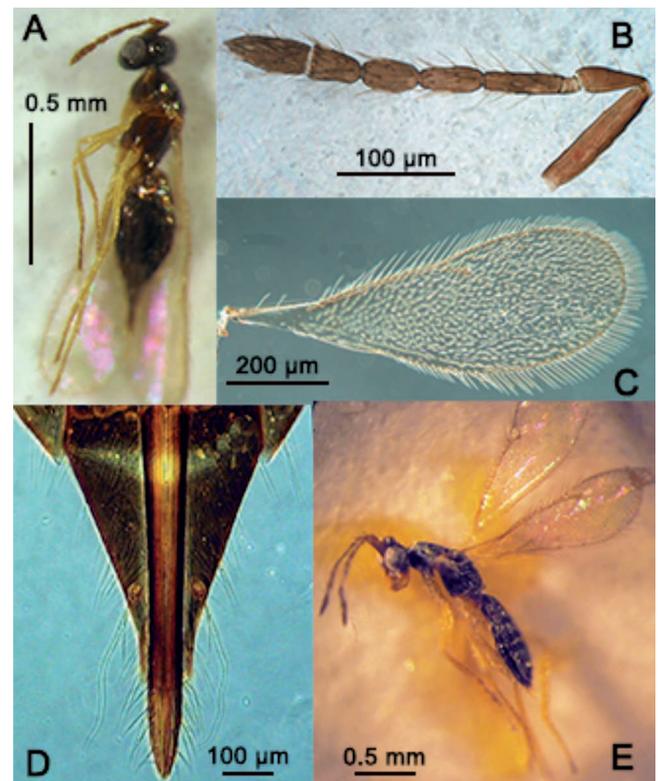


Figure 1. A) *Aprostocetus (Ootetrastichus) pseudopodiellus* (Bakkendorf), female; B) female antenna; C) female fore wing; D) distal part of gaster and ovipositor; E) male.

margin, pedicel and basal funicle segments, yellow; head anteriorly below toruli level, sometimes also part of frons, and posteriorly below foramen magnum, yellow; legs yellow, rarely with light infuscation on femur and tibia, and last segments of tarsomeres brown; wings hyaline with greyish veins. Head as in the female. Length: 1.2-1.3. Antenna (Figure 2A) with scape elongate (Figure 2B), 4.0-5.0 \times as long as wide, with an inconspicuous, linear ventral plaque, extended along almost the entire ventral margin and showing 20-22 sensorial elements, pedicel 2.5-2.8 \times as long as wide, 3 cuneiform anelli of which the first and the third more developed than the second, funicular segments cylindrical, F1 3.3-4.0 \times as long as wide, F2 2.5-3.6 \times as long as wide, slightly shorter than F2, F3-F4 subequal to F2, gradually shorter and wider; clava (Figure 2C) markedly 3-segmented, 1.2-1.6 \times as long as wide, C1 and C2 subequal 1.1-1.6 \times as long as wide, C3 slightly longer than C2 with short terminal spine and seta; funicular and clava segments with setae and sensilla as in the female. Thorax, fore wing and legs as in the female. Gaster oblong, 1.2-1.4 \times as long as thorax. Genitalia (Figure 2D) length 0.22-0.23 mm, phallobase basally pointed, 2.7-2.9 \times as long as wide, about as long as aedeagus, with short parameres bearing a terminal seta and laminar volsellae with a digital spine; aedeagus body as long as the apodemes.

TAXONOMIC REMARKS. In the key to the identification of the European species of *Aprostocetus* (subg. *Ootetrastichus*) by Graham (1987) the female of the studied material runs near *A. longulus* (Erdős), known only from the female sex. The male runs near *A. pseudopodiellus* (Bakkendorf) in the male key of the same author. The description of *A. pseudopodiellus* was based on a single male type. Of the supposed female sex was given only a sketch of antenna and abdomen taken from a pupa. Graham (1987), based on the description of the male, not examined, described the supposed female of *A. pseudopodiellus*. Our male specimens fit in *A. pseudopodiellus*, but the corresponding females collected in the same place and dates should be linked to *A. longulus*. Consequently *A. longulus* (Erdős, 1954), as junior name, is synonymized under *A. pseudopodiellus* (Bakkendorf, 1953). The match of the female of *Aprostocetus* (*Ootetrastichus*) *pseudopodiellus* described by Graham (1987), with the male described by Bakkendorf (1953) remains uncertain. To the original description of the male of *A. pseudopodiellus* should be added the following variations of characters: scape 4.0-5.0 \times as long as wide (6 \times in the original description), 1-2 dorsal setae on the submarginal vein (1 in the original description) and 3-4 setae on callus of propodeum (character not mentioned in the original description).

DISTRIBUTION. Hungary, Moldova, USSR (pre 1991) (Noyes, 2020) and Italy.

MATERIAL EXAMINED. Italy, Sicily: 5♀ and 4♂, Alcamo (TP), 26-30.viii.2011, 14♀ and 5♂, same data, 20-30. ix.2011; 5♀ and 2♂, same data, 10-30. xii. 2011 by yellow traps, coll. G. Mineo.

Aprostocetus (*Ootetrastichus*) *uromeni* Viggiani, sp. nov.

DIAGNOSIS. Antenna with solid clava and subequal funicular segments, thorax not depressed, gaster longer than thorax.

FEMALE (Figure 2E). Body dark, without metallic luster, with antennae testaceous to dark, wings hyaline with greyish veins, legs with coxae and femura dark, the latter with basal and distal end yellowish, tibiae and tarsomeres mostly light dark. Length: 1.0-1.2 mm. Head about as high as wide, POL 1.3 \times than OOL, malar space 0.6 \times as long as the length of eye, malar sulcus not curved.

Antennal toruli placed at level or slightly above the level of ventral

margin of eyes. Antenna (Figure 2F) with scape, including radicle, as long as eye length, reaching vertex, 2.8-3.7 as long as wide, pedicel 2.0-2.7 \times as long as wide, 0.6-0.7 \times as long as scape; 4 discoidal anelli; funicle with segments slightly widen distad, F1 0.4-0.6 \times as long as pedicel, subcylindrical, 1.4-1.7 as long as wide, F2 about as long as F1 or slightly longer, F3 1.1-1.3 \times as long as wide, clava solid (Figure 2G), without any trace of segmentation, ovoidal, markedly broader than F3, 2.5 \times as long as F3, 2.2 \times as long as wide, 1.1-1.4 \times as long as F2+F3, terminal spine and seta very short; linear sensilla on F1 (2), F2 (2), F3 (2-3) and clava (2+2+3-4). Setae on the antennal segments rather long, on flagellum not longer than the corresponding segments. Thorax slightly wider than head, moderately convex; mid lobe of mesoscutum subtrapezoidal, wider than long (35:30), without median line; with a shallow reticulation of narrow areoles, 2 pairs of rather long setae, as long as about one-third of the basal margin of the corresponding sclerite; scutellum markedly convex, 1.3-1.4 \times as wide as long, with submedian lines weak, and 2 pairs of setae about as long as on those on the mid lobe. Dorsellum rather prominent, about half as long as propodeum; the latter with a median carina, without apparent sculpture on the surface, spiracle subcircular, placed near its anterior margin, with a diameter of about one-third of the middle propodeum length, callus with a rather long seta outside the spiracle and a short one on the hind corner. Fore wing (Figure 3A) 2.4-2.6 \times as long as wide; costal cell narrow, slightly longer than the submarginal vein, with a single row of setae in its distal half; submarginal vein (Figure 3B) with 2

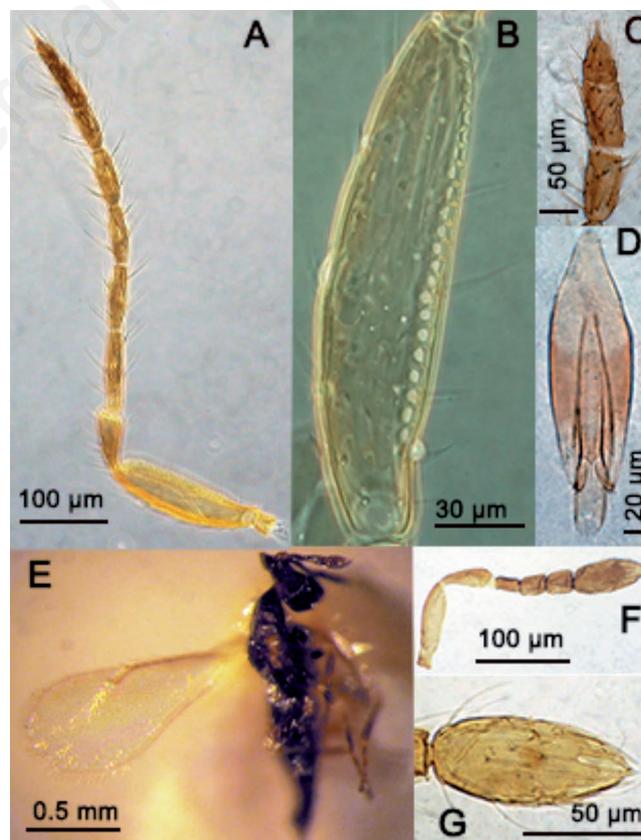


Figure 2. A) *Aprostocetus* (*Ootetrastichus*) *pseudopodiellus* (Bakkendorf), male antenna; B) antennal scape; C) last funicular segment of antenna and clava; D) genitalia; E) *Aprostocetus* (*Ootetrastichus*) *uromeni* Viggiani, sp. nov., female; F) female antenna; G) antennal clava.

dorsal setae, premarginal vein slightly shorter than stigma vein; marginal vein around 1.3× as long as the costal cell, with 9-10 main setae on the front margin; postmarginal vein not developed; stigmal vein 0.2-0.3× as long as the marginal vein, rather narrow, gradually widen to the distal end, with a narrow stigma bearing 4 discoidal sensilla; speculum rather small, subtriangular, ending at level of distal submarginal vein; cubital vein reaching the basal vein and subcubital vein ending at level of distal margin of speculum; blade densely pilose; fringe rather short, about one-seventh of the discal width. Hind wing knife-shaped, 7× as long as wide, with blade regularly pilose from the basal level of the marginal vein; longest setae of the fringe one-eighth of the discal width. Legs normal with basitarsomeres slightly shorter than the subsequent segments, middle spur about as long as middle basitarsus. Gaster conic-ovate, 3.5× as long as wide, 1.5-1.6× as long as thorax, with a transverse, narrow and small petiole, and normally hairy; longest cercal seta twice as the next ones (Figure 3C); hypopygium reaching the half of gaster; ovipositor inserted near the base of gaster and barely extruded, 2.8× as long as hind tibia, third valvula 0.28× as long as the total ovipositor length and 1.7× as long as the narrow, triangular, postcercal.

MALE. Unknown.

TAXONOMIC REMARKS. The species shows the characters of *Aprostocetus* (subgenus *Ootetrastichus*) and the clava solid as in *A. askewi* Graham (1987). This species, described on a single female, is known only from France. The new species *A. uromeni* differs from *A. askewi* mostly from the following characters: thorax not strongly depressed, funicle with F2 about as long as F1 or slightly longer, clava longer than F2+F3, fore wing wider, and gaster longer than thorax.

ETYMOLOGY. The name refers to the host genus.

MATERIAL EXAMINED. Holotype: ♀ (on slide). Italy (Sardegna): Guspini, vi.1934. Paratypes: 4♀ (on slide), same data; 4♀ (on pin-

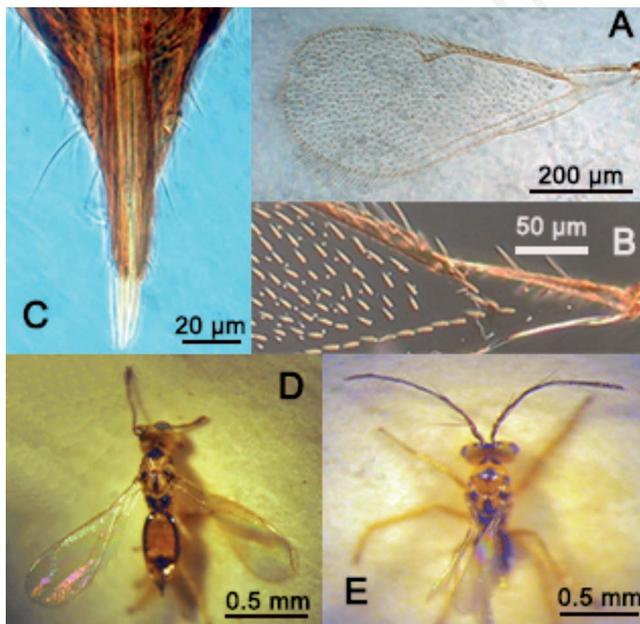


Figure 3. A) *Aprostocetus* (*Ootetrastichus*) *uromeni* Viggiani, sp. nov., female fore wing; B) basal part of fore wing; C) distal part of gaster and ovipositor; D) *Neotrichoporoides dispersus* Graham, female; E) the same, male.

card), same data. Holotype and paratypes will be deposited in the entomological collection of the Dipartimento di Agraria dell'Università degli Studi "Federico II", Portici, Napoli, Italy.

HOST. Eggs of *Uromenus brevicollis* (Fischer) (Orthoptera: Bradyporidae).

Key to the identification of the Italian species of *Aprostocetus* (subg. *Ootetrastichus*)

Females

- 1 - Antenna with solid clava *uromeni* Viggiani
- Antenna with clava at least two segmented 2
- 2 - Gaster long and narrow, about 4-5× longer than head + thorax; ovipositor sheaths lengthily exerted, at least 0.7× of the gaster and 2× of the hind tibia; submarginal vein with 3-5 dorsal setae *percaudatus* (Silvestri)
- Gaster shorter and wider, lanceolate or conic-ovate; extruded part of the ovipositor at most half of the hind tibia; submarginal vein normally with 2 dorsal setae 3
- 3 - F1 6-7× as long as wide. *eupatorii* Kurdjumov
- F1 at most 5× as long as wide 4
- 4 - Fore wing 2.0-2.2× as long as wide *micerinus* (Walker)
- Fore wing narrower 2.3- 3.2× as long as wide 5
- 5 - Fore wing 2.3- 2.5× as long as wide. *ovivorax* (Silvestri)
- Fore wing at least 2.6× as long as wide. 6
- 6 - Fore wing at least 2.6-3.2× as long as wide; longest setae of the fringe 0.6-0.75 of the discal width *crino* (Walker)
- Fore wing at least 3.3× as long as wide; longest setae of the fringe 0.22 of the discal width *pseudopodiellus* (Bakkendorf)

Males

- 1 - Antennal scape elongate 2
- Antennal scape enlarged or swollen 4
- 2 - F1 narrow, 7-8× as long as wide, markedly longer than F2 *eupatorii* Kurdjumov
- F1 wider, at most 4-5× as long as wide and subequal to F2. 3
- 3 - Submarginal vein with 3-4 dorsal setae *percaudatus* (Silvestri)
- Submarginal vein with 1-2 dorsal setae; antennal scape very narrow, 4-4.6× as long as wide, with an inconspicuous, linear ventral plaque, extended along the entire ventral margin. *pseudopodiellus* (Bakkendorf)
- 4 - Antennal scape with ventral plaque extended at least in distal half of the ventral margin of scapus *crino* (Walker)
- Antennal scape with sensorial plaque shorter 5
- 5 - Antennal scape rather short, about 2.6× as long as wide, with ventral plaque well pronounced, slightly longer than distal half of the ventral margin *micerinus* (Walker)
- Antennal scape longer, 3.3× as long as wide, with ventral plaque shorter, on the distal one-third of the ventral margin *ovivorax* (Silvestri)

Neotrichoporoides dispersus Graham

DISTRIBUTION. Canary Islands, Italy, Madeira, Russia (Karachai-Cherkess AR), Spain, United Arab Emirates, Yugoslavia (pre 1991) (Noyes, 2020). In Italy the species is recorded from Campania (Sorrento-Meta), Liguria (Ceriale near Albenga) and Sardinia (Villasimius) (Graham, 1986; 1987).

NEW RECORDS. Italy (Campania): 2♀ and 5♂, Vico Equense, 18-21.vi.1968, coll. G. Viggiani; 1♀ and 1♂, same data, 12.vii. 1968; 1♂, Raito, 9.v.1968, coll. G. Viggiani

HOST. Unknown.

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