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Homolobus luciae sp. nov. (Hymenoptera, Braconidae, Homolobinae) a new species from Tuscan vineyards, Italy

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Abstract

A two years survey on Tuscan vineyards biodiversity was carried out between 2012 and 2013. Among the captures emerged 27 specimens of a new braconid species: *Homolobus* (*Apatia*) *luciae* sp. nov. (Braconidae, Homolobinae). This paper reports the description of both sexes of this species, supported by illustrations and the data of the trends of its captures. An identification key of the three Italian species of the subgenus *Apatia* Enderlein, 1920, is included.

Key words: new species, Hymenoptera, Braconidae, parasitoid, agro-ecosystem.

Introduction

The subfamily Homolobinae (Hymenoptera Braconidae) is a fairly small subfamily with world-wide distribution and comprising relatively large species (Shaw, 2010). The tribe Homolobini includes only two genera: *Exasticolus* van Achterberg 1979 and *Homolobus* Foerster 1863 (van Achterberg, 1979). As far as known, species are solitary koinobiont parasitoids in lepidopterous larvae (van Achterberg, 1979; Shaw, 2010; Yu *et al*., 2016). Hosts of *Homolobus* species are mainly exposed larvae of Geometridae and Noctuidae (Lepidoptera) (van Achterberg, 1979; Yu *et al*., 2016). The colouration of *Homolobus* species ranges from brownish yellow to entirely black (van Achterberg, 1979). The more or less pale coloured species ("ophionoid facies"; Gauld and Huddleston, 1976) show nocturnal behaviour and are synchronous with the activity of their larval hosts (Gauld and Huddleston, 1976; Quicke, 2015).

Homolobus is the only genus of Homolobinae recorded in Europe and its species are divided among five different subgenera (van Achterberg, 1979). To date, six *Homolobus* species are recorded from Italy: *H. annulicornis* (Nees 1834), *H. discolor* (Wesmael 1835), *H. infumator* (Lyle 1914), *H. meridionalis* van Achterberg 1979, *H. truncatoides* van Achterberg 1979 and *H. truncator* (Say 1828) (van Achterberg, 2013).

In the present paper, a new species of the subgenus *Apatia* from vineyards in Tuscany, Pisa Province, central Italy, is described and illustrated. This subgenus is characterized by having simple tarsal caws (i.e. without any protuberance and hind tibial spurs of male rounded and pigmented apically, without a sharp and hyaline apex.

Materials and methods

During the years 2012 and 2013, six Malaise traps were operated simultaneously, one pair in each of the three different vineyards in Pisa Province (Tuscany, Italy). The vineyards are located in the district of Crespina, between 15 and 50 meters above sea level and within an area of 3 kilometres in diameter (central position between the three vineyards 43.591409N, 10.554003E). The traps had both similar weather and topographical conditions, the latter characterized by a fragmented landscape matrix rich in woody and wild, open field areas. Each trap was located at least 60 m of distance from each other, one approximately in the centre and the other near one edge of the vineyard. They worked continuously from the end of May to the first week of October in 2012 and from the middle of May to the first week of October in 2013. The six Malaise traps were coded with the first letter of the locality and the numbers 1 (for west position) and 2 (for east position), respectively. Their geographical coordinates are given in table 1.

Table 1. Geographical coordinates of Malaise traps. Positions did not change in both years.

Locality	Code of Malaise trap	Geographical coordinates
Ceppaiano	C1	43.596522, 10.535369
Ceppaiano	C2	43.596468, 10.538820
la Serra	S1	43.584479, 10.537757
la Serra	S2	43.584875, 10.536960
Poggio a Casone	P1	43.596262, 10.569412
Poggio a Casone	P2	43.594572, 10.572476

Samples were collected every two weeks covering the main flying season of the hymenopterous parasitoids (Fraser *et al*., 2007). The position of the two Malaise traps and the numerous temporal replications represented a good combination in determining the space-temporal composition of the braconid community in the vineyards. Braconidae were sorted from other insects, organized them on the base of their subfamily and stored them in 70% ethanol at the Department of Agriculture, Food and Environment of Pisa University (DISAAA), Pisa, Italy. Three males and 17 females are micro-pinned and the others remained stored in alcohol 70%. One male and two female paratypes are deposited in the Naturalis Biodiversity Center (RMNH) (Leiden, Netherlands), the remaining types (including the holotype) are conserved by the collection of the Department of Agriculture, Food and Environment of Pisa University (Pisa, Italy). For the terminology used in this paper, see van Achterberg (1979; 1988).

The following abbreviations are used in the paper: POL postocellar line; OOL ocular-ocellar line; Od maximum diameter of lateral ocellus. Wing venation nomenclature follows van Achterberg (1993).

Results

A total of 27 specimens of the new species, 24 females and three males, where collected. First specimens were captured on June 28th in 2012 and on June 13th in 2013. The last capture occurred on October 4th in 2012 and August 13th in 2013 (figure 1). In both the years the captures showed only a peak in July or August (figure 2).

Taxonomy

Family Braconidae Nees 1811
Subfamily Homolobinae van Achterberg 1979
Genus *Homolobus* Foerster 1863
Subgenus *Apatia* Enderlein 1920

Homolobus (Apatia) luciae Loni et van Achterberg sp. nov.

(figures 3-5).

C o m p a r a t i v e d i a g n o s i s

This new species runs in the keys by van Achterberg (1979; 2014) to the group of *H. ophioninus* (Vachal 1907), *H. pallidistigmus* (Cameron 1911) and *H. truncatoides* van Achterberg 1979. The Afrotropical *H. pallidistigmus* shares the comparatively slender fourth labial palp segment (8-9 times longer than wide) and the narrow and pectinate hind tarsal claws, but differs as follows (van Achterberg, 2014): the first metasomal tergite is 2.8-3.4 times longer than its apical width (2.0-2.8 times in *H. luciae*), the hind tibial spurs of the male are slender (comparatively wide) and the mandible narrow subbasally (distinctly widened subbasally). *H. ophioninus* and *H. truncatoides* share the short fourth labial segment (in females 4-5 times longer than wide), but differ as far as the malar space which results 0.3-0.5 times the basal width of mandible in *H. ophioninus* and 0.7-1.1 times in *H. truncatoides* respectively, and for the maximum width of temple, resulting 3.4 times malar space in *H. ophioninus*, *versus* 1.7-2.2 in *H. truncatoides.*

H. luciae shares the malar space and the maximum width of temple with *H. truncatoides*, but differs for the longer fourth labial segment, 8-9 times longer than wide and by having the hind coxa smooth medio-dorsally (punctate-rugose or rugose in *H. truncatoides*), the hind tarsal claws narrow and rather pectinate subbasally (wider and only setose or indistinctly pectinate subbasally in *H. truncatoides*), the antenna with 48–54 segments (39–44 segments in *H. truncatoides*), the hind femur 4-5 times longer than wide (6-7 times in *H. truncatoides*) and the eye 1.4 times as wide as maximum width of temple in lateral view (1.5 times in *H. truncatoides*).

T y p e m a t e r i a l

Holotype, ♀ "Italy: Crespina (Pisa), 12.vii.2012, Malaise trap (Mt) C2, 43.596468, 10.538820, (43°35'47.3"N 10°32'19.8"E), No. 21, A. Loni" (Unipi). Paratypes (23 ♀, 3 ♂): with same locality data but 1 ♀, 28.vi.2012, Mt S2; 1 ♀, 12.vii.2012, Mt C2; 1 ♀, 12.vii.2012, Mt C1; 2 ♀, 12.vii.2012, Mt P2; 1 ♂, 12.vii.2012, Mt C2; 1 ♂, 24.vii.2012, Mt C2; 1 ♀, 09.viii.2012, Mt C1; 7 ♀, 23.viii.2012, Mt P2; 1 ♀, 12.ix.2012, Mt C2; 1 ♀, 20.ix.2012, Mt C1; 1 ♀, 20.ix.2012, Mt C2; 1 ♂, 04.x.2012, Mt P2; 2 ♀, 13.vi.2013, Mt C1; 2 ♀, 02.vii.2013, Mt C2; 2 ♀, 16.vii.2013, Mt P1; 1 ♀, 13.viii.2013, Mt P2.

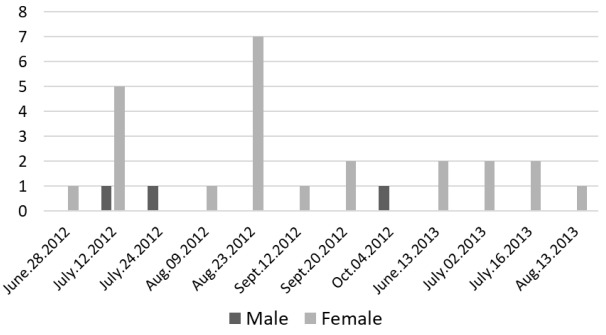

Figure 1. Distribution of captures of both sexes of *H. luciae* specimens in 2012 and 2013 in vineyards of the district of Crespina, Pisa (Tuscany).

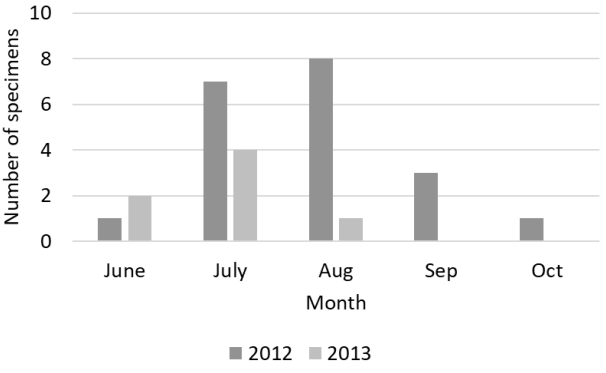

Figure 2. Differences in captures of *H. luciae* in 2012 and 2013 in vineyards of the district of Crespina, Pisa (Tuscany).

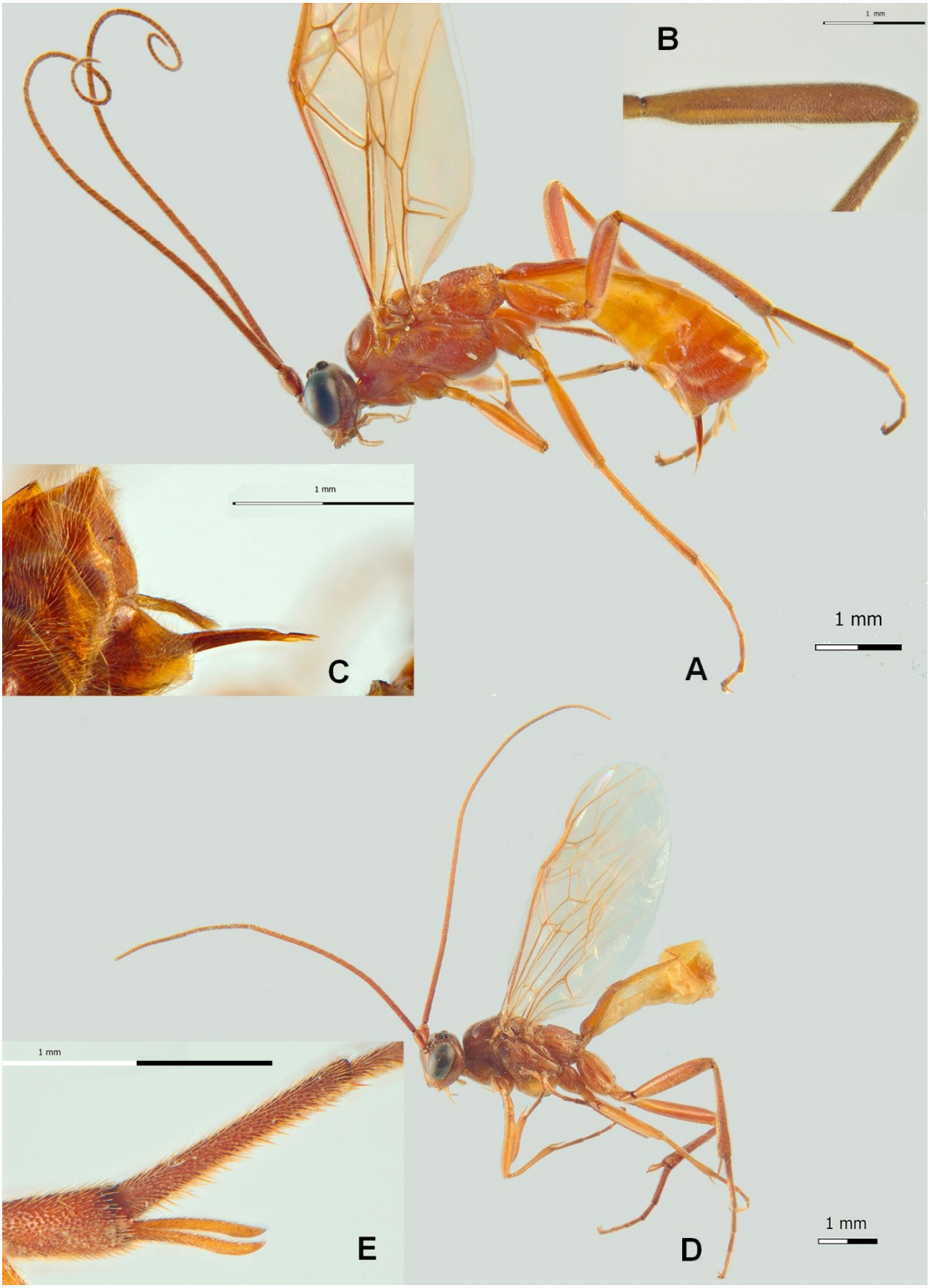

Figure 3. A-C, *H. luciae* holotype female: **(A)** body lateral view (lv), **(B)** hind femur lv, **(C)** ovipositor and ovipositor sheath lv. **D-E**, *H. luciae* male: **(D)** body lv, **(E)** hind tibia spurs.

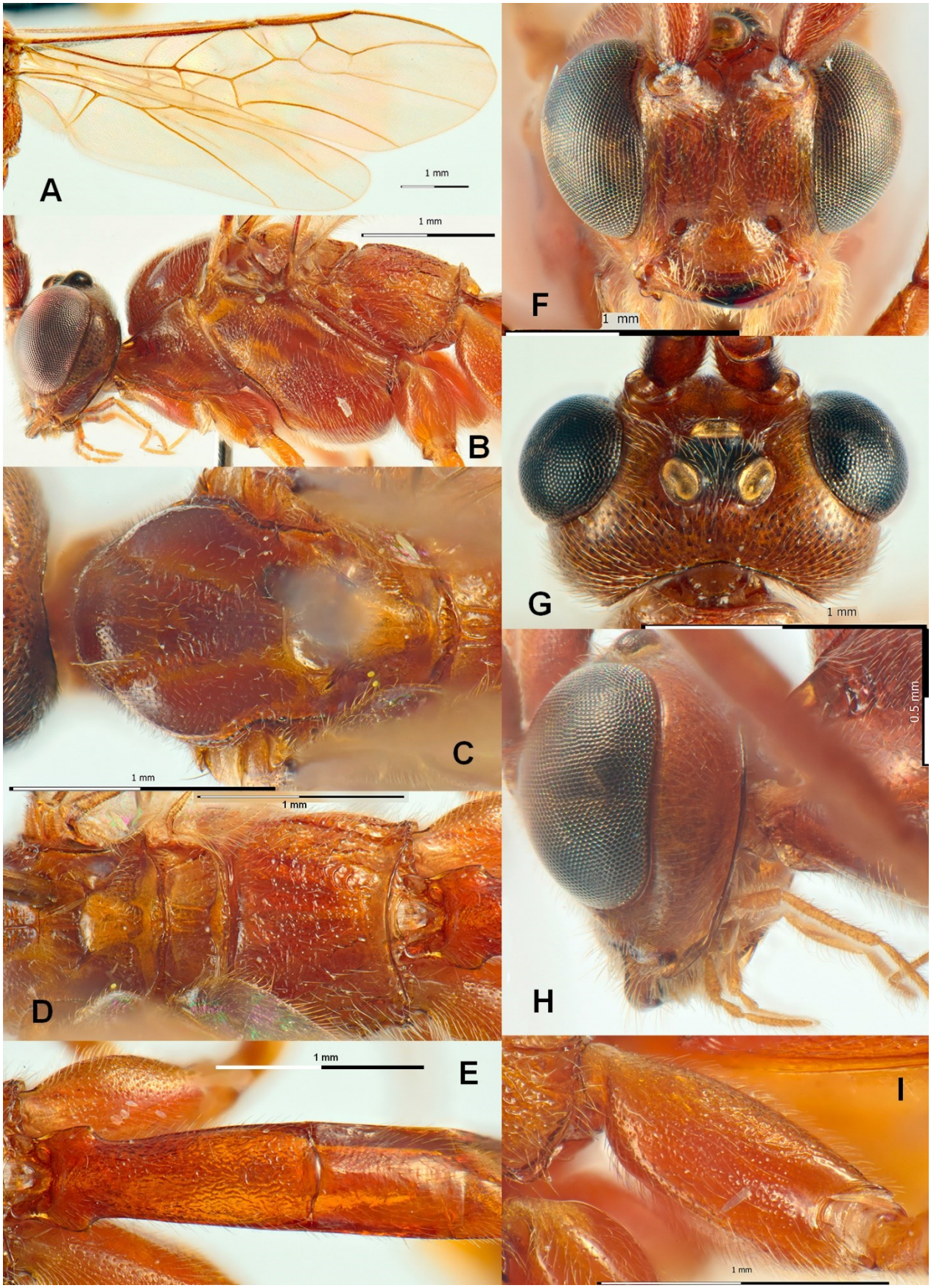

Figure 4. A-I, *H. luciae* holotype: **(A)** wings, **(B)** mesosoma lv, **(C)** mesosoma dorsal view (dv), **(D)** metanotum and propodeum dv, **(E)** metasoma, 1st and 2nd tergites dv, **(F)** head anterior view (fv), **(G)** head dv, **(H)** head lv, **(I)** hind coxa lv.

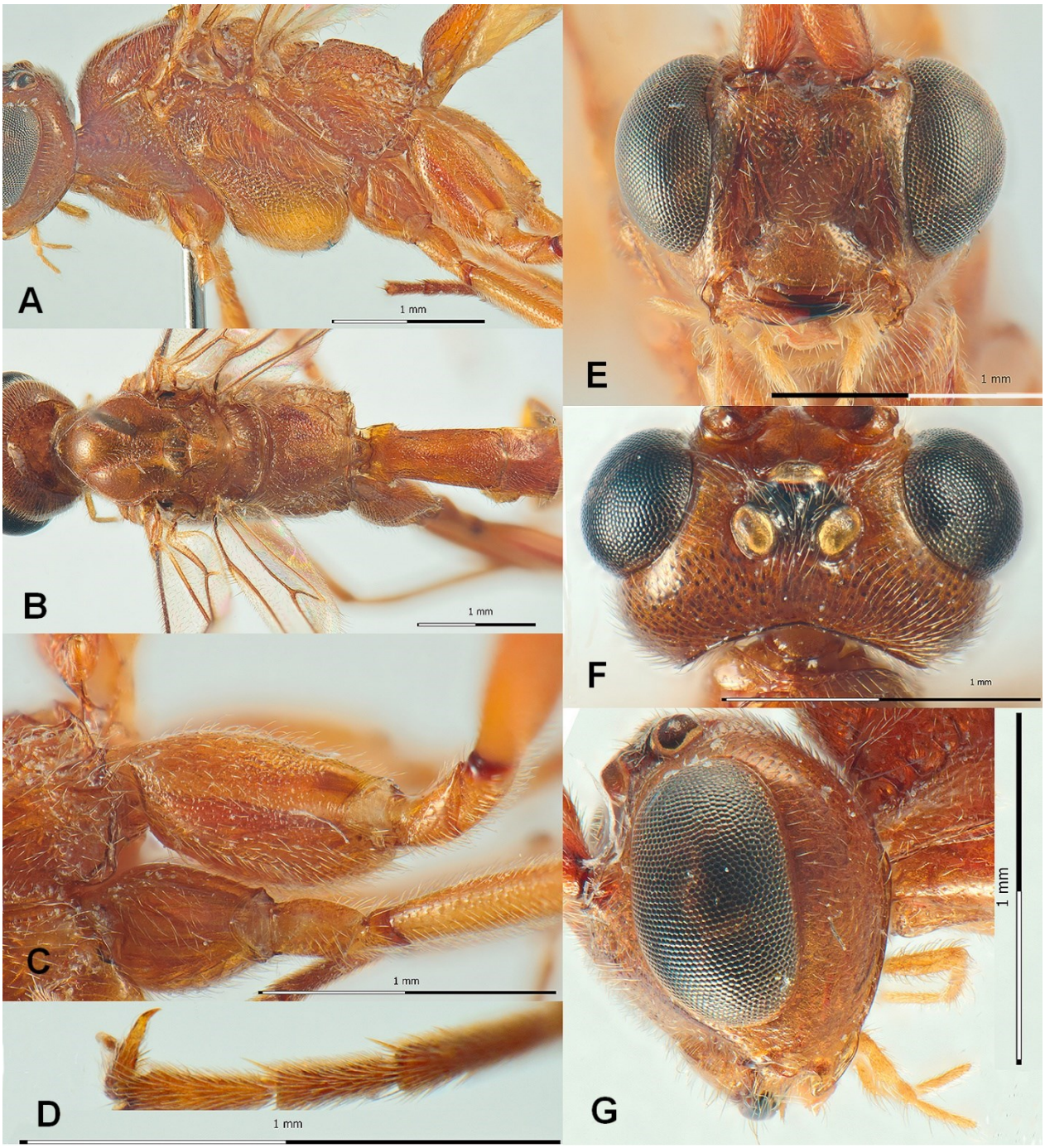

Figure 5. A-G, *H. luciae* male: **(A)** mesosoma lv, **(B)** mesosoma and metasoma, 1st and 2nd tergites dv, **(C)** hind coxa lv, **(D)** tarsal claw, **(E)** head fv, **(F)** head dv, **(G)** head lv.

D e s c r i p t i o n

Holotype, ♀, length of body 7.2 mm and fore wing 7.2 mm.

Head - antennal segments 50 (ranging in type series 48-54, 74% of specimens with 50-52 segments) (table 2); length of third segment subequal to fourth segment; length of third and fourth segments 2.9 and 2.7 times their width, respectively; length of both penultimate segments twice as long as wide; length of fourth segment of labial palp ranging from 2.1 to 2.3 times longer than third segment and 8-9 times longer than wide (figure 4H); length of maxillary palp about equal to height of head (figure 4B);

Table 2. Number of antennal segments of *H. luciae* with complete antennae (20 females and 3 males).

Antennal segments	Number of specimens	Percentage	Cumulative%
48	3	13.04	13.04
49	1	4.35	17.39
50	6	26.09	43.48
51	5	21.73	65.22
52	6	26.09	91.30
54	2	8.70	100.00
Total	23	100.00	

eyes weakly emarginate at inner side opposite of toruli; dorsal length of eye 1.5 times temple; eye in lateral view 2.6 times longer than maximum width of temple (figure 4H); POL : Od : OOL 15 : 19 : 17 (figure 4G); frons slightly concave, rugose near base of toruli; vertex coriaceous anteriorly, near stemmaticum, posteriorly smooth up to occipital carina; face rather flat, transversely and weakly rugulose, punctulate at base of setae (figure 4F); clypeus rather convex, punctate; apical margin of clypeus straight medially, not differentiated from clypeus; length of malar space 0.7 times basal width of mandible; upper condyles of mandibles near lower level of eyes (figure 4F).

Mesosoma - length of mesosoma 1.6 times its height; side of pronotum mainly smooth and punctulate because of setae, medially crenulated and posteriorly reticulate-rugose; epicnemial area and precoxal suture rugose-foveate (figure 4B); remainder of mesopleuron smooth; pleural suture crenulated; mesosternum smooth; metapleural flange medium-sized, rounded and with a narrow carina apically; metapleuron anteriorly mainly smooth, ventrally foveate and moderately crenulate posteriorly (figure 4B); notauli deeply crenulated, confluent in a deep crenulated depression, covering posterior part of central lobe; mesoscutal lobes smooth, weakly punctulate because of setosity; central lobe anteriorly smooth and punctulate, posteriorly rugose (figure 4C); surface of propodeum densely reticulate-rugose, with a very short median carina anteriorly (figure 4D).

Wings - fore wing, r : 3-SR : SR1 = 8 : 13 : 51; SR1 almost straight, but slightly curved anteriorly; cu-a weakly inclivous, postfurcal; 1-CU1 : 2-CU1 = 2 : 20; 2-SR : 3-SR : r-m = 10 : 12 : 7; 2A proximally sclerotized, until half of distance to wing border; area basally of 2A uniformly setose. Hind wing, r absent; SR sinuate, its basal fifth straight and distinctly pigmented, only basally narrowly sclerotized, remainder of the vein weakly sclerotized, SC + R1 curved; 2-SC + R transverse (figure 4A).

Legs - hind coxa punctate, but dorsally mainly rugose; hind tarsal claws pectinate and narrow subbasally (figure 4I); length of femur, tibia and basitarsus of hind leg 8.6, 9.4, and 9.5 times their width, respectively; length of spurs of hind tibia 0.6 and 0.46 times basitarsus (figure 3A).

Metasoma - length of first tergite 2.4 times its apical width, its surface uniformly reticulate-rugose; (N = 24, average rate 2.43, ds 0.28); dorsal carinae of first tergite absent (figure 3E); length of ovipositor sheath about 0.08 times fore wing, its sheath apically truncate (figure 3C).

Colour - uniformly brownish yellow; antenna, tarsi, middle of mesoscutal lobes, metanotum partly, first and second tergites, brownish infuscate; wing membrane hyaline; pterostigma light brown.

Male - similar to female (antennal segments of three males 48, 50 and 52, respectively) with fourth segment of labial palp 2.3 times longer than third segment and both segments shorter than in female. The males differs as follows: spurs of hind tibia comparatively wide and obtuse apically and sinuate (figure 3E), length of fourth labial palp segment approximately 8 times longer than wide (figure 5G), length of first tergite 2.1 times its apical width (N = 3, average rate 2.1, ds 0.1), and its surface uniformly reticulate-rugose (figure 5B).

A simplified key for the identification of the three Italian species of the subgenus *Apatia* Enderlein is included.

Key of Italian species of the subgenus *Apatia* Enderlein of *Homolobus* Foerster

1 - Fourth segment of labial palp 4.0-5.5 times longer than its tiny third segment (figure 6A) . . . . . *H. truncator* (Say 1828)

-- - Fourth segment of labial palp 1.6-2.5 times as long as third segment and third segment medium-sized (figures 4H, 5G, 6B) 2

2 - Fourth labial segment in females 4.0-4.5 times longer than wide; antenna with 39-44 segments; hind tarsal claws comparatively wide and only setose or indistinctly pectinate subbasally . . . . . *H. truncatoides* van Achterberg 1979

-- - Fourth labial segment in females 8-9 times longer than wide (figures 4H, 5G); antenna with 48-54 segments (figure 3A); hind tarsal claws narrower and pectinate subbasally (figure 5D) . . . . . *H. luciae* sp. nov.

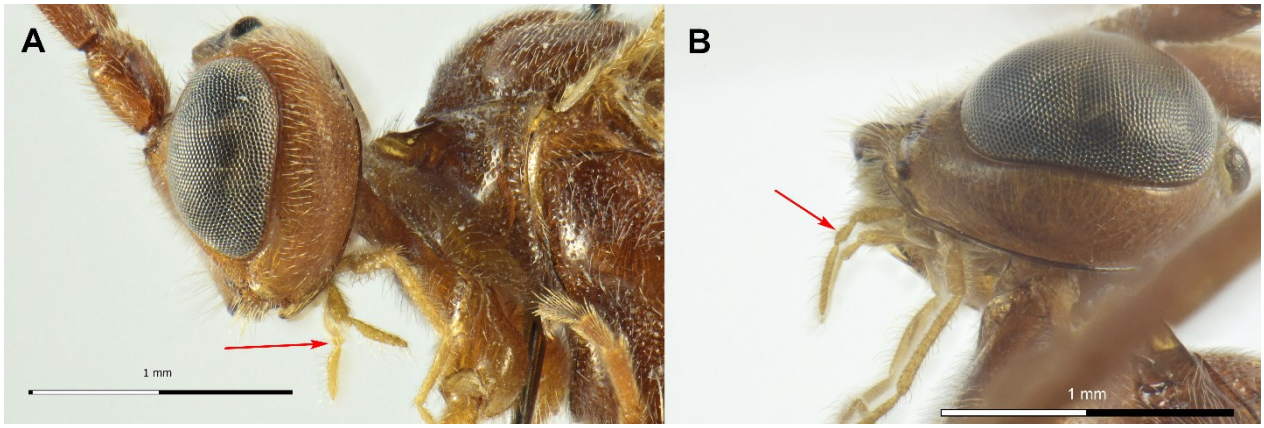

Figure 6. (A) *H. truncator* head lv. **(B)** *H. luciae* head lv. Arrows indicate the third segment of labial palp.

H o s t s

Unknown.

D i s t r i b u t i o n

Italy.

R e m a r k s

The single peak of captures in the middle of summer suggests a univoltine lifecycle.

E t y m o l o g y

The specific name is in honour to first author's wife Lucia. There is a popular saying: "Say it with flowers", this is the occasion for the first author to coin: "Say it with insects".

Discussion

Together with *H. luciae* a higher number of specimens belonging to the closely related *H. truncator* (Say) were captured in the same traps (47 and 32 in 2012 and 2013, respectively). The main hosts of *H. truncator* are larvae of Noctuidae and Geometridae (Lepidoptera). The sharing of the same habitat by these two closely related species during the same season is likely possible by having a different host.

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