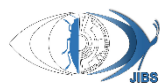


Original Article 

New records and an updated checklist of Helconini (Hymenoptera: Braconidae, Helconinae) from Italy

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ABSTRACT. New faunistic and host association data on four species of braconid wasps belonging to the tribe Helconini (Hymenoptera: Braconidae, Helconinae) from Italy are provided, focusing on the genera *Helcon* Nees von Esenbeck, 1812 and *Helconidea* Viereck, 1914. The record in Italy of the rare *Helcon claviventris* Wesmael, 1835 is documented for the first time. The presence of *Helconidea meridionalis* van Achterberg, 1987, previously known from a single Italian record, is confirmed based on new material collected from Emilia-Romagna and Tuscany. *Helconidea annulicornis* Nees von Esenbeck, 1834 is removed from the checklist of Italian fauna since it is a synonym of *Wroughtonia spinator* (Lepeletier & Audinet-Serville, 1827). The distribution of *Helcon angustator* Nees von Esenbeck, 1812, and *Helconidea dentator* (Fabricius, 1804) in Italy is significantly elucidated and expanded with new records from Trentino-Alto Adige, Emilia-Romagna, Tuscany, Umbria, and Sicily. Furthermore, novel host-parasitoid associations for *H. meridionalis* are documented as a parasitoid of the larvae of two longhorn beetles (Coleoptera: Cerambycidae): *Anastrangalia dubia* (Scopoli, 1763) and *Hylotrupes bajulus* (Linnaeus, 1758). Diagnostic morphological traits and photographic documentation are provided to facilitate species identification. Finally, an updated summary of the current knowledge of the Italian Helconini is compiled, including eight species, serving as a critical amendment and supplement to the checklist of Italian fauna.

KEYWORDS: Biodiversity, Distribution, New hosts, Wood-boring beetles, parasitoids**Citation:** Turrise, G.F., Papi, R., Lisa, T. & Altadonna, G. (2026) New records and an updated checklist of Helconini (Hymenoptera: Braconidae, Helconinae) from Italy. *Journal of Insect Biodiversity and Systematics*, 12 (04), 831–848.

INTRODUCTION

The Braconidae represents one of the most species-rich insect families and the second largest group within the Hymenoptera after Ichneumonidae, together forming the hyper-diverse superfamily Ichneumonoidea. Braconids include approximately 20,000 described species worldwide across 45 subfamilies (Yu et al. 2016), though global richness estimates range between 40,000 and 50,000 species (Quicke 2015; Yu et al. 2016). These wasps are primary parasitoids of other insects, attacking predominantly the larval stages of holometabolous orders, as well as hemimetabolous insects (Shaw & Huddleston 1991; Wharton 1993; Quicke 2015). Consequently, they act as effective biological control agents of pest populations and are crucial components of sustainable agricultural practices (Godfray 1994; Quicke 2015). Both ecto- and endoparasitoids are common within the family; the latter frequently exhibit complex physiological adaptations to enhance larval survival within the host, including the co-option of endosymbiotic polydnviruses to compromise host immune defenses (Quicke 1997, 2015). Despite their abundance and economic importance, braconid wasps remain significantly understudied, leaving their taxonomy and geographical distribution fragmentary, even in relatively well-researched areas such as Europe.

In Italy, a chronic paucity of studies and taxonomic expertise has resulted not only in an underestimated species richness, currently standing at around 850 species (Bergamasco et al. 1995), but also in incomplete and vague faunistic and distributional data. Furthermore, knowledge is markedly asymmetrical at a regional scale: data are more substantial for northern territories, whereas knowledge of southern regions and islands remains extremely fragmentary, with few exceptions involving the Aphidiinae and other economically relevant groups (Bergamasco et al. 1995). Most contributions on Italian braconids were published between the late nineteenth and early twentieth centuries (see Bergamasco et al. 1995). In recent decades, significant additions or comprehensive revisionary treatments have been lacking, meaning these historical data require a thorough taxonomic and distributional update.

The small tribe Helconini (Hymenoptera: Braconidae, Helconinae) comprises 109 species in 15 genera worldwide (Hovorka & Janšta 2024). Members of Helconini are medium- to large-sized wasps, readily recognized by the following combination of diagnostic characters: ventral rim of the antennal sockets situated near the level of the lower third of the eyes; presence of three transverse anal veins (1–3A) in the forewing; outer spur of the mid and hind tibiae thicker and longer, subequal to the inner spur; and the hind femur partly rugose ventrally, featuring an irregular carina and a ventral tooth in the genera *Helconidea* Viereck, 1914 and *Wroughtonia* Cameron, 1899. Most species of this tribe occur in the East Palaearctic, with a moderate richness in the West Palaearctic and Nearctic regions (Yu et al. 2016; Yan et al. 2017). According to van Achterberg (1987) and Bergamasco et al. (1995), the Italian Helconini fauna comprises only seven species in three genera: *Helconidea* Viereck, 1914 (three species), *Helcon* Nees von Esenbeck, 1812 (three species), and *Wroughtonia* Cameron, 1899 (one species). The few and mostly historical records from Italy were published by Nees von Esenbeck (1834), Marshall (1896), Roberti et al. (1965), van Achterberg (1987), Campadelli and Scaramozzino (1994), Campadelli (1996), and Pesarini (2009), frequently providing vague locality data. Members of these genera are koinobiont endoparasitoids of wood-boring beetle larvae (Coleoptera) (van Achterberg 1987; Hovorka & Janšta 2024), but their biology remains poorly known, particularly regarding host records.

In the present contribution, we provide new data on Italian Helconini that increase the number of recorded species, refine their geographical distribution, and improve our knowledge of host associations. Additionally, a comprehensive review of the faunistic composition of this tribe in Italy is provided.

MATERIALS AND METHODS

Material examined and identification. The present study is based on the examination of 113 indeterminate specimens of Helconini deposited in public and private collections, including 67 indeterminate specimens previously mentioned by Pesarini (2009) (see depositories below). Baseline data on the Italian Helconini fauna were sourced from Bergamasco et al. (1995) and Yu et al. (2016). All specimens were identified by G.F. Turrisi using the revision of European Helconini by van Achterberg (1987), supplemented by the recent review by Hovorka and Janšta (2024). A small reference collection provided by Tomáš Hovorka was also used for comparative purposes.

Morphological examination and imaging. Specimens were examined using a Zeiss® Discovery V8 stereomicroscope. Measurements were taken either manually using an eyepiece micrometer (for body and forewing lengths) or digitally using the Zen® Lite 4.3 software suite coupled with the stereomicroscope. Digital habitus photographs were captured with an Olympus® Stylus TG-6 Tough (12.0-megapixel) digital camera in "microscope mode" utilizing the internal focus-stacking function. Diffused illumination was provided by a custom white plastic light chamber equipped with two LED spotlights. Additional detailed images were acquired using a Zeiss Axiocam 208 color digital camera mounted on the aforementioned stereomicroscope and operated via Zen Lite 4.3 software using the manual extended focus tool, under a similar lighting setup. Final images were cropped and adjusted for contrast and brightness using Microsoft Photos (Windows 11®). Photographic plates were assembled using Microsoft PowerPoint®, exporting the final composites at a minimum resolution of 600 dpi. Morphological terminology follows van Achterberg (1993).

Depositories. The material belongs to the following museum and private collections:

- MZUF** Museo di Storia Naturale “La Specola”, University of Florence, Italy (General Collection; Camillo Rondani Collection; Ferdinando Maria Piccioli Collection; Giuseppe Fabrizio Turrisi Collection)
MSNF Museo Civico di Storia Naturale di Ferrara, Italy (Guido Campadelli Collection)
NMPC Natural History Museum, National Museum, Prague, Czech Republic
AGCA Giovanni Altadonna Collection, San Giovanni Valdarno, Arezzo, Italy
LTCF Tommaso Lisa Collection, Florence, Italy
PRCA Rossano Papi Collection, Castelfranco Piandiscò, Arezzo, Italy.

RESULTS

The material examined belongs to four distinct species distributed across two genera: *Helcon* Nees von Esenbeck, 1812 and *Helconidea* Viereck, 1914. Within the West Palaearctic fauna, and specifically within the Italian context, members of these genera represent a not specialized group of medium- to large-sized braconids associated with forest ecosystems. The genus *Helconidea* is readily distinguished from *Helcon* by a prominent, tooth-like process situated medially on the ventral margin of the hind femur, as well as by the presence of short, erect specialized setae at the apex of the ovipositor sheath. Conversely, in *Helcon*, the ventral margin of the hind femur is completely unarmed, and the ovipositor sheath lacks any erect apical setae.

Although not represented in the material collected during the present study, the genus *Wroughtonia* Cameron, 1899, the third helconine genus known from Italy, closely resembles *Helconidea* due to its possession of a toothed hind femur. However, *Wroughtonia* (in the old sense) can be easily differentiated by distinct coloration patterns and macro-morphological characters: its antennae and tarsi feature prominent light yellow to whitish bands, and its occipital carina is straight ventrally rather than distinctly curved when the head is viewed in lateral aspect.

The species treated herein represent significant additions to the local faunistic framework, including a new record for the Italian fauna and several regional updates that fill extensive distribution gaps. For each species, comprehensive data regarding the material examined, diagnostic taxonomic and faunistic remarks, updated distributions, and confirmed or novel host-parasitoid associations are detailed below.

Class Insecta Linnaeus, 1758

Order Hymenoptera Linnaeus, 1758

Superfamily Ichneumonoidea Latreille, 1802

Family Braconidae Nees von Esenbeck, 1812

Subfamily Helconinae Förster, 1863

Tribe Helconini Förster, 1863

Genus *Helcon* Nees von Esenbeck, 1812

The genus *Helcon* includes four species in Europe (van Achterberg 1987; Hovorka & Janšta 2024), three of which were previously recorded from Italy (Bergamasco et al. 1995; Pesarini 2009) and one newly recorded in the present contribution.

Helcon angustator Nees von Esenbeck, 1812 [Figs 1A–B, 3]

Helcon angustator Nees von Esenbeck, 1812:219. ♀. – Italy.

Material examined. 87 specimens. ITALY: 2♀♀, Emilia-Romagna: Bologna, 29.V.1949 (MSNF); 1♂, same data, 4.VI.1949; 1♀, same locality, 17.V.1950 (MSNF); 1♀, same locality, 6.VI.1968 (MSNF); 1♂, Emilia-Romagna: Zocca, Modena, 6.VII.1968 (MSNF); 4♂♂, same locality, 8.VII.1968 (MSNF); 3♂♂, same locality, 9.VII.1968 (MSNF); 2♀♀, 19♂♂, same locality, 10.VII.1968; 16♂♂, same locality, VII.1968

(MSNF); 1♀, Tuscany, Florence province, Figline e Incisa Valdarno, Gaville, locality: Cinipetta, 420 m, 43°34'16.83"N 11°25'17.13"E, VI.1986, L. Bartolozzi leg., reared from wood (MZUF); 3♀♀, 4♂♂, same locality and collector, VII.1986 (MZUF); 1♀, Tuscany, Florence, "in laboratorio" [= "in laboratory", museum?], June 1910, collector unknown (MZUF); 1♀, Tuscany, Florence, "vetrate del museo" [= windows of the museum], 2.VII.1932, G. Pons leg. (MZUF); 1♀, Umbria, Perugia province, Monte Santa Maria Tiberina, locality: Lippiano, 400 m, 43°27'41.18"N 12°07'12.72"E, S.D. [= "senza data", translated: "without data"] 1935, A. Andreini leg. (MZUF); 1♀, Tuscany, Arezzo province, Castelfranco Piandiscò, Caspri, 600 m, 12.VI.2024, R. Papi leg., Malaise trap close to a pile of dead wood of *Ulmus* sp. (PRCA); 1♀, 2♂♂, Tuscany, Grosseto province, locality: Valpiana, G.F. Turrisi leg., ex larva reared from wood collected 28.XI.1992 (MZUF); 1♀, Sicily, Catania province, Etna volcano, Linguaglossa (town), 550 m, 15.VI.1998, G. Costa leg. (MZUF); 1♀, same data, 16.VI.1998 (MZUF); 1♀, Sicily, Catania province, Etna volcano, Bronte, Fontanamurata, locality: Contrada Nave, 1000 m, 25.VI.2000, G.F. Turrisi leg. (MZUF); 1♂, same data, 16.VI.2002 (MZUF); 7♂♂, Sicily, Catania province, Etna volcano, Maletto, locality: Demanio Trentasalme, 1200 m (Olm oak wood), 16.VI.2002, G.F. Turrisi leg. (MZUF); 7♀♀, 1♂, locality unknown, material not labelled (likely from Tuscany), Coll. F.M. Piccioli (MZUF); 3♀♀, locality unknown, material not labelled (likely from Tuscany), Coll. C. Rondani (MZUF).

Diagnosis. The species (Fig. 1A–B) can be recognized for the following features: body length: 8.0–13.0 mm (♀: excluding ovipositor); fore wing length: 6.0–9.5 mm; colour mainly black, legs reddish orange with hind femur darker and hind tibiae and tarsi dark brown; tegula and humeral plate concolor, brownish; wings hyaline with veins brown, costal and subcostal veins and pterostigma darker; antenna with 40–46 antennomeres; malar space extensively rugose-punctate; mesoscutellum flattened, not protruding dorsally (lateral view); disc of mesoscutellum polished with coarse, deep and moderately dense punctures; fore wing with subbasal cell largely glabrous with sparse setae in middle; marginal cell of hind wing parallel-sided apically; propleuron flattened; lateral carinae of propodeum produced in a weak lamella; metasomal tergite 1 subparallel-sided, rugose-reticulate with dorsal carinae weakly developed, parallel-sided extended to two third of the length; ovipositor 2.5–2.7 × hind tibia length.

Distribution. This species exhibits a wide trans-Palaearctic distribution, spanning latitudinally from northern Europe (including Scandinavia and Finland) to western Asia (Turkey, Azerbaijan, and Iran), and longitudinally across Eurasia to the Korean Peninsula and Japan. Although this extensive range implies a broad ecological tolerance, its presence in several intermediate regions remains poorly documented and warrants further field surveys. To date, published records confirm its occurrence in the following countries: Austria, Azerbaijan, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Turkey, Serbia, Slovakia, Sweden, Switzerland (van Achterberg 1987; Riedel & Hansen 2014; Belokobylskij et al. 2019; Doychev et al. 2019; Müller 2019; Ghahari et al. 2022; Hovorka & Janšta 2024).

Faunistic remarks. *Helcon angustator* is one of the most widespread and frequently collected species of the genus *Helcon* across Europe. However, its distribution within Italy has long been poorly understood. Bergamasco et al. (1995) considered its status undefined due to the vagueness of historical data (Table 1). Until now, the only precise published record for the country was provided by Pesarini (2009) regarding Emilia-Romagna (Bologna, 15.VI.1929, 1♂, det. E. Clément). In the present study, *H. angustator* is newly recorded from Tuscany, Umbria, and Sicily, significantly refining its distributional framework in central and southern Italy. Although current data primarily highlight its presence in these regions, the species is likely more widely distributed across the Italian peninsula, including the northern territories (Fig. 3). From an ecological perspective, Hovorka and Janšta (2024) noted that *H. angustator* predominantly inhabits lowland woodlands and humid areas at low elevations, typically ranging between 250 and 400 m a.s.l. In this context, the new record from Sicily (Maletto, Etna volcano), collected at an altitude of 1200 m a.s.l., is particularly noteworthy. This high-altitude occurrence is likely correlated with the lower latitude of the Mediterranean region, where sub-montane forest belt dynamics often replicate environmental conditions found at lower elevations in Central Europe (the "meridional shifting" phenomenon).

Host associations. The host range of *H. angustator* is remarkably broad, predominantly associated with wood-boring beetle larvae. According to Yu et al. (2016), Doychev et al. (2019), and Hovorka and Janšta (2024), its confirmed hosts include two species of Buprestidae and 14 species of Cerambycidae. Additionally, an isolated and unusual host record from *Cydia pomonella* (Linnaeus, 1758) (Lepidoptera: Tortricidae) was reported by Tiensuu (1952) and reared by Naantali in 1936 from the overwintered larvae, though this atypical association requires further biological validation (Hovorka & Janšta 2024).

Helcon claviventris Wesmael, 1835 (Figs 1C–D, 2, 3)

Helcon claviventris Wesmael, 1835:184. sex unknown, fig. 6

Material examined. 2 specimens. ITALY: 1♀, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, Foresta della Lama, 712 m, 29.VI.1991, G. Campadelli leg. (MSNF); 1♀, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, Le Cullacce (Campigna), 1043 m, 20.VII.1991, G. Campadelli leg. (MSNF).

Diagnosis. The species (Figs 1C–D, 2), can be recognized for the following features: body length: 9.0–10.0 mm (♀: excluding ovipositor); fore wing length: 7.5–8.0 mm; colour predominantly black, antenna with base and apex brown-yellowish, legs reddish orange with hind tibiae and tarsi dark brown; tegula and humeral plate concolor, brownish; wings hyaline with veins brown, apex of costal and subcostal veins and pterostigma weakly darker; antenna with 34–37 antennomeres; malar space rugose-punctate apically, polished-punctate otherwise; occipital carina ventrally curved (lateral view) (Fig. 2C); mesoscutellum moderately protruding dorsally (lateral view) convex, disc polished with coarse, deep and scattered punctures (Figs 2D, E); fore wing with subbasal cell uniformly setose; marginal cell of hind wing widened distally (Fig. 2F); propleuron flattened; lateral carinae of propodeum produced in a weak lamella; hind femur slender, $3.4 \times$ longer than broad (Fig. 2G); metasomal tergite 1 distinctly widened toward apex, rugulose-punctate with dorsal carinae strongly developed, distinctly arcuate (i.e., bow-shaped), with the minimum distance between them at the middle, extended to $3/4$ of its total length (Fig. 2H); following tergites polished; ovipositor $1.7 \times$ hind tibia length.

Distribution. Within Europe, the species exhibits a fragmented distribution, with documented records from Austria, Belgium, Croatia, Czechia, France, Germany, Hungary, Poland, Slovakia, Sweden, Switzerland, and the United Kingdom (van Achterberg 1987; Belokobylskij et al. 2003; Yu et al. 2016; Broad et al. 2016; Shaw & Mendel 2017; Holý 2018; Hovorka & Janšta 2024). In the British Isles, its presence is supported both by historical museum collections and recent rearing data provided by Shaw and Mendel (2017). Outside the European continent, its range extends to Iran (Hedwig 1957; Farahani et al. 2016; Gadallah et al. 2016; Ghahari et al. 2022), China, and Taiwan (Chou & Hsu 1998). Nevertheless, the taxonomic identification of the East Asian populations remains under debate and has been questioned by Yan et al. (2017).

Faunistic remarks. Here, we report the first record of this species for Italy (Table 1, Fig. 3). Literature indicates that it is rarely collected (van Achterberg 1987; Shaw & Mendel 2017; Hovorka & Janšta 2024). Specifically, Shaw and Mendel (2017) reared a specimen from a dead, bark-bearing beech (*Fagus*) branch collected from the high canopy of a standing tree. This microhabitat preference strongly suggests that *H. claviventris* is a canopy-dwelling species. Its reliance on the upper canopy, rather than lower strata, likely allows it to evade standard entomological sampling methods, thereby accounting for its apparent rarity.

Host associations. According to Hovorka and Janšta (2024), the host range of *H. claviventris* includes four species: two Cerambycidae, *Saperda perforata* (Pallas, 1773) and *Xylotrechus rusticus* (Linnaeus, 1758), and two Melandryidae, *Melandrya caraboides* (Linnaeus, 1760) and *Phloiodya vaudoueri* (Mulsant, 1856). However, the host association with the latter species was inferred from co-occurrence data and requires further empirical confirmation (Shaw & Mendel 2017).

Notes. According to Yan et al. (2017), this species belongs to the genus *Wroughtonia* Cameron, 1899, based on the variation encountered in the East Palaearctic Region. For the same reason, *Helconidea meridionalis* van Achterberg should be included in *Wroughtonia* (van Achterberg, pers. comm.).

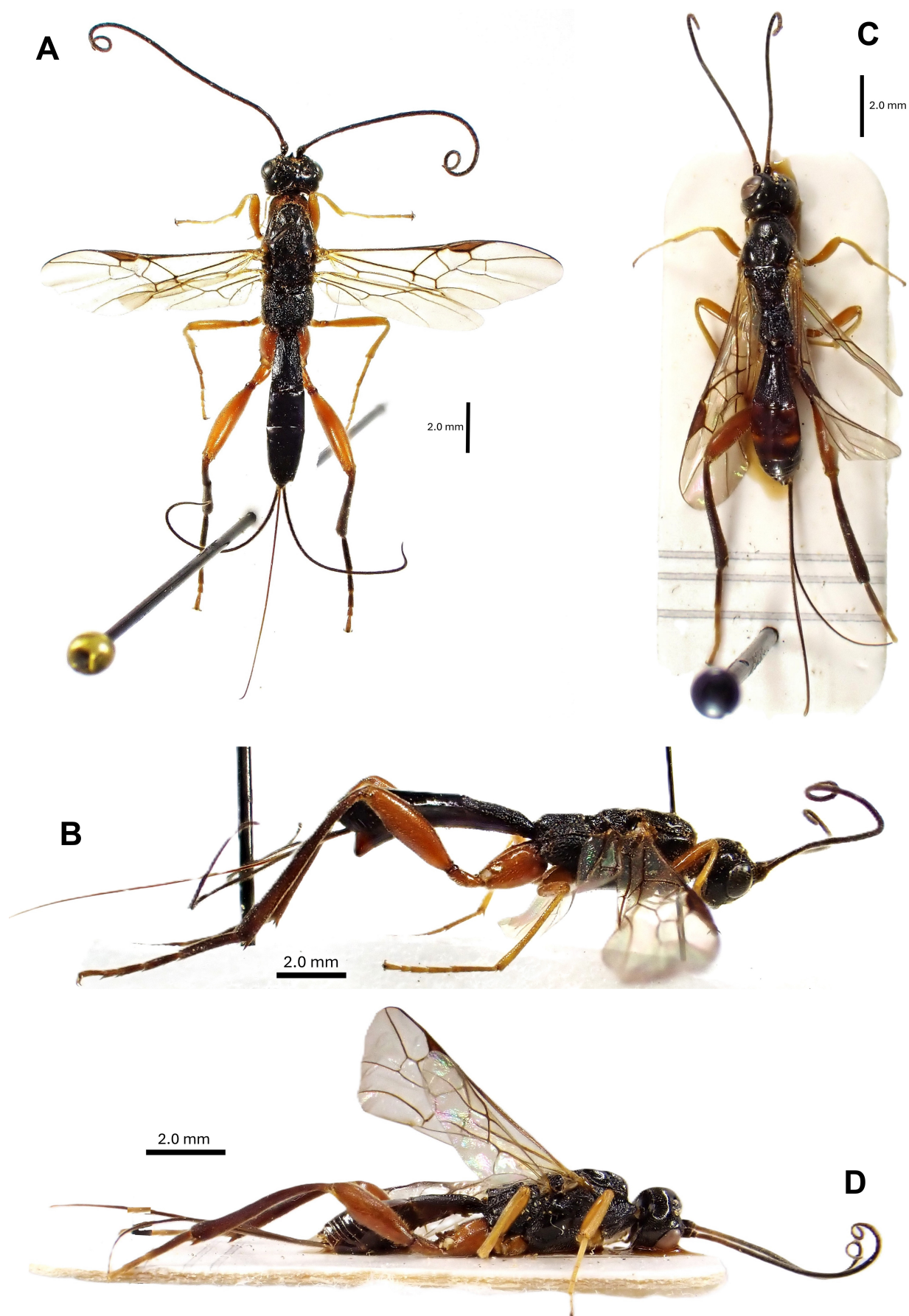


Figure 1. *Helcon* species. **A–B.** *Helcon angustator* Nees von Esenbeck, 1812 ♀; **C–D.** *Helcon claviventris* Wesmael, 1835 ♀. **A, C.** Habitus, dorsal view; **B, D.** Habitus, lateral view.

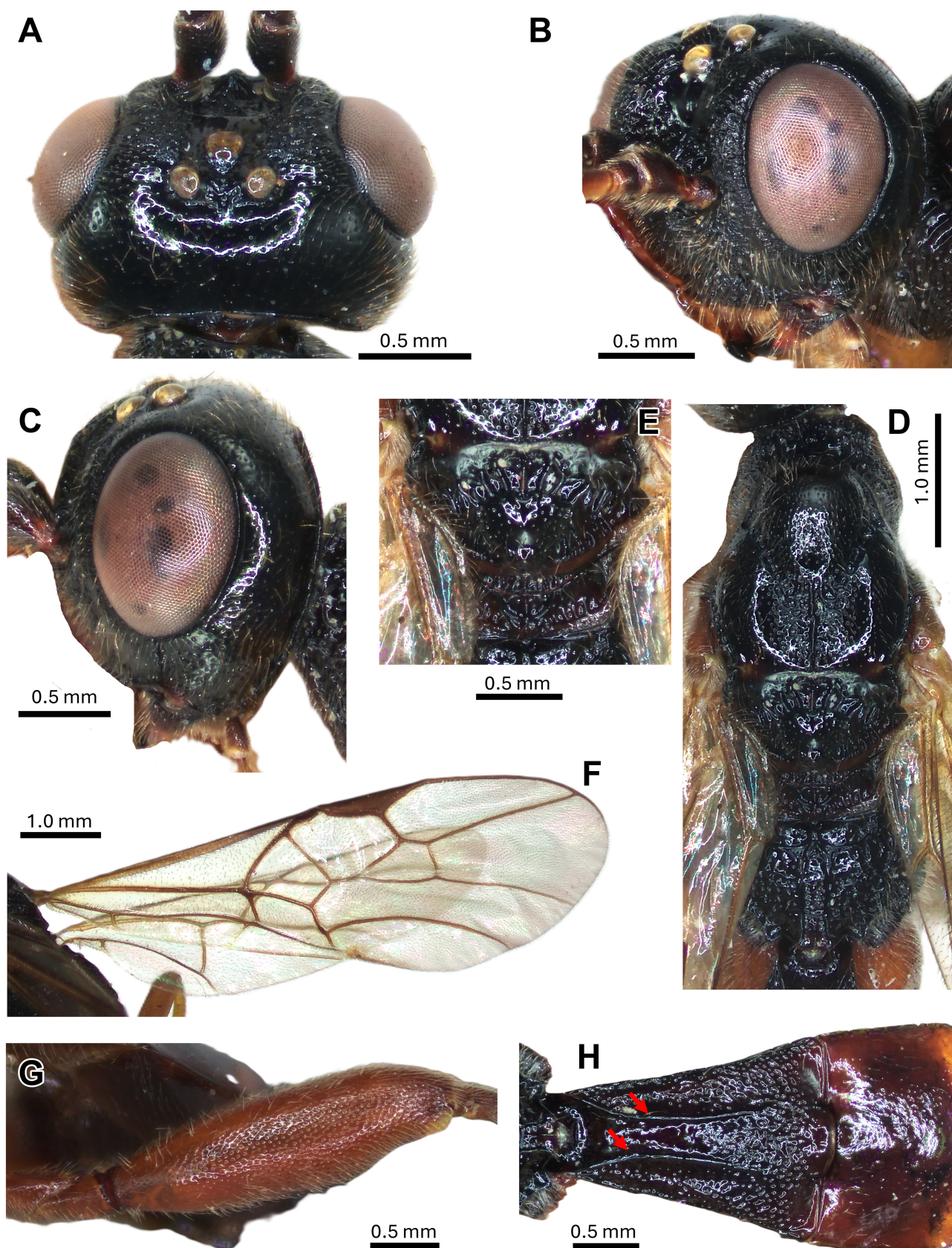


Figure 2. *Helcon claviventris* Wesmael, 1835 ♀. **A.** Head, dorsal view; **B.** Head, fronto-lateral view; **C.** Head, lateral view; **D.** Mesosoma, dorsal view; **E.** Mesoscutellum, dorsal view; **F.** Wings; **G.** Hind femur, lateral view (triangles indicate the crenulate ventral margin); **H.** First metasomal tergite, dorsal view (arrows indicate the strong lateral carinae).



Figure 3. Distribution of the treated species of *Helcon* in Italy based on data from literature and the present contribution.

Genus *Helconidea* Viereck, 1914

The genus *Helconidea* includes four species in Europe (van Achterberg 1987; Hovorka & Janšta 2024), three of which are known from Italy (Bergamasco et al. 1995; present contribution).

Helconidea dentator (Fabricius, 1804) (Figs 4A–B, 6)

Pimpla dentator Fabricius, 1804:114. ♀.– Moravia.

Material examined. 10 specimens. ITALY: 4♀, 1♂, Trentino-Alto Adige, Bolzano province, Brixen, emerged V.1987, G. Campadelli leg. (MSNF); 1♂, Trentino-Alto Adige, Bolzano and Trento provinces, summer 1969; 1♂, same locality, summer 1970; 1♀, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, Poggio Palaio, 1231 m, 26.VI.1997, G. Campadelli leg. (MSNF); 1♀, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, La Stretta, 1275 m, 4.V.1997, G. Campadelli leg. (MSNF); 1♀, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, Foresta della Lama, 720 m, 6.VII.1997, G. Campadelli leg. (MSNF).

Diagnosis. The species (Figs 4A–B) can be recognized for the following features: body length: 11.0–14.5 mm (♀: excluding ovipositor); fore wing length: 9.5–11.0 mm; colour predominantly black, legs reddish orange, with hind and mid tarsi yellowish and dorsal surface of hind coxa and hind femur, tibia and tarsus dark reddish orange; tegula and humeral plate concolor, light brown; wings hyaline with veins brown, apex of costal and subcostal veins and pterostigma weakly darker; antenna with 41 antennomeres; malar space widely and densely rugulose; mesoscutellum flattened, not protruding dorsally (lateral view), disc polished with coarse, deep and dense punctures; marginal cell of hind wing parallel-sided apically; nervulus (cu-a +1CU) and anal vein (1-1A) of hind wing joining at an acute angle; propleuron mostly convex, flattened only apically; lateral carinae of propodeum produced in a weak lamella; hind femur slender, $3.5 \times$ longer than broad; metasomal tergite 1 moderately widened toward apex, rugose-reticulate-punctate with dorsal carinae weakly developed, not clearly indicated; ovipositor $3.3\text{--}3.5 \times$ hind tibia length.

Distribution. The species is widely distributed across the Palearctic region. According to Van Achterberg (1987) and Yu et al. (2016), *H. dentator* is recorded in Europe in Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, and the United Kingdom. Outside of Europe, it is known from China, Georgia, Iran, Japan, and the Russian Far East (Hedqvist 1967; Yu et al. 2016; Yan et al. 2017; Belokobylskij et al. 2019).

Faunistic remarks. Historical literature data and recent contributions provide only vague indications regarding the presence of this species in Italy (Table 1, Fig. 6), with the sole exception of Pesarini (2009), who recorded it in Trentino-Alto Adige. Our new findings confirm its occurrence in the country and provide additional distribution records, thereby significantly extending and refining the known range of the species in Italy (Fig. 6).

Host associations. The host range of *H. dentator* comprises Cerambycidae, as is typical for most species within this tribe. Currently, thirteen host species are documented for this parasitoid (Yu et al. 2016; Hovorka & Janšta 2024). As with other Helconini species, however, some host records should be approached with caution due to a lack of precise details regarding collection and rearing.

Helconidea meridionalis van Achterberg, 1987 (Figs 4C–D, 5, 6)

Helconidea meridionalis van Achterberg, 1987:274. Holotype ♀. – France, Isère, Tréminis, 1100 m.

Material examined. 11 specimens. ITALY: 1♀, 1♂, Emilia-Romagna, Forlì-Cesena province, Foreste Casentinesi, Le Cullacce (Campigna), 1043 m, 20.VII.1991, G. Campadelli leg. (MSNF); 2♀, Tuscany, Florence province, Reggello, Vallombrosa, locality: San Miniato in Alpe, 850 m, 43°45'17.1"N 11°33'28.9"E, 23.VI.2025, G. Altadonna leg. (AGCA); 1♀, Tuscany, Florence province, Reggello, Vallombrosa, 800 m, 43°44'25.8"N 11°33'12.8"E, June 2025, T. Lisa leg. (LTCE); 1♀, 2♂♂, Tuscany, Arezzo province, Loro Ciuffenna, Chiassaia, locality: Campomaggi, 863 m, 1.VI.2025, ex larva, reared from *Pinus* sp. together with *Anastrangalia dubia* (Scopoli, 1763) (PRCA); 1♀, 1♂, same data, July 2025, R. Papi leg., ex larva, reared from *Pinus* sp. together with *Hylotrupes bajulus* (Linnaeus, 1758) (PRCA); 1♂, Tuscany, Arezzo province, Castelfranco di Sopra, Caspri, locality: Sommassi, 575 m, 2.VII.2025, R. Papi leg., at light (PRCA).

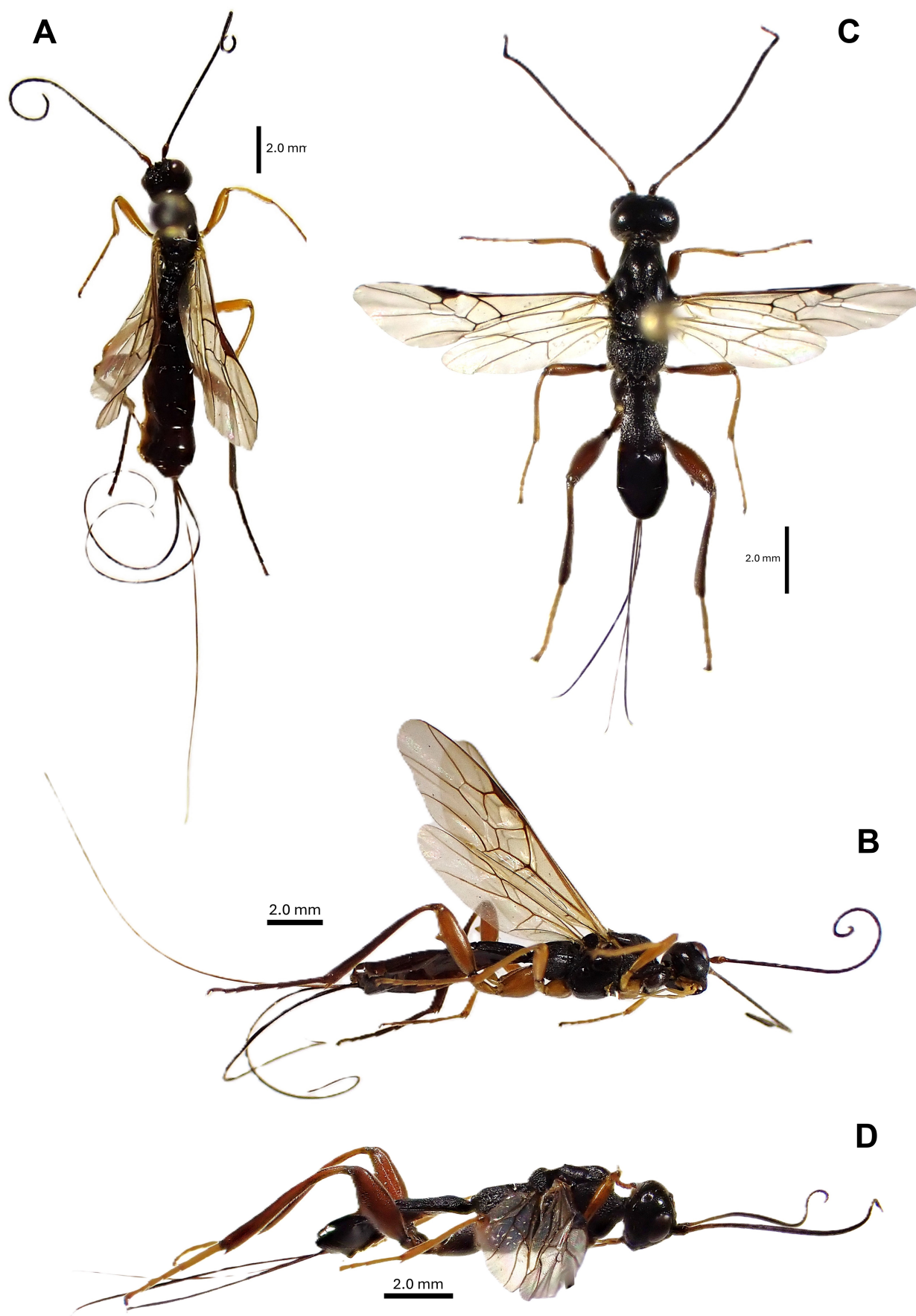


Figure 4. *Helconidea* species. **A–B.** *Helconidea dentator* (Fabricius, 1804) ♀; **C–D.** *Helconidea meridionalis* van Achterberg, 1987, ♀. A, C. Habitus, dorsal view; B, D. Habitus, lateral view.

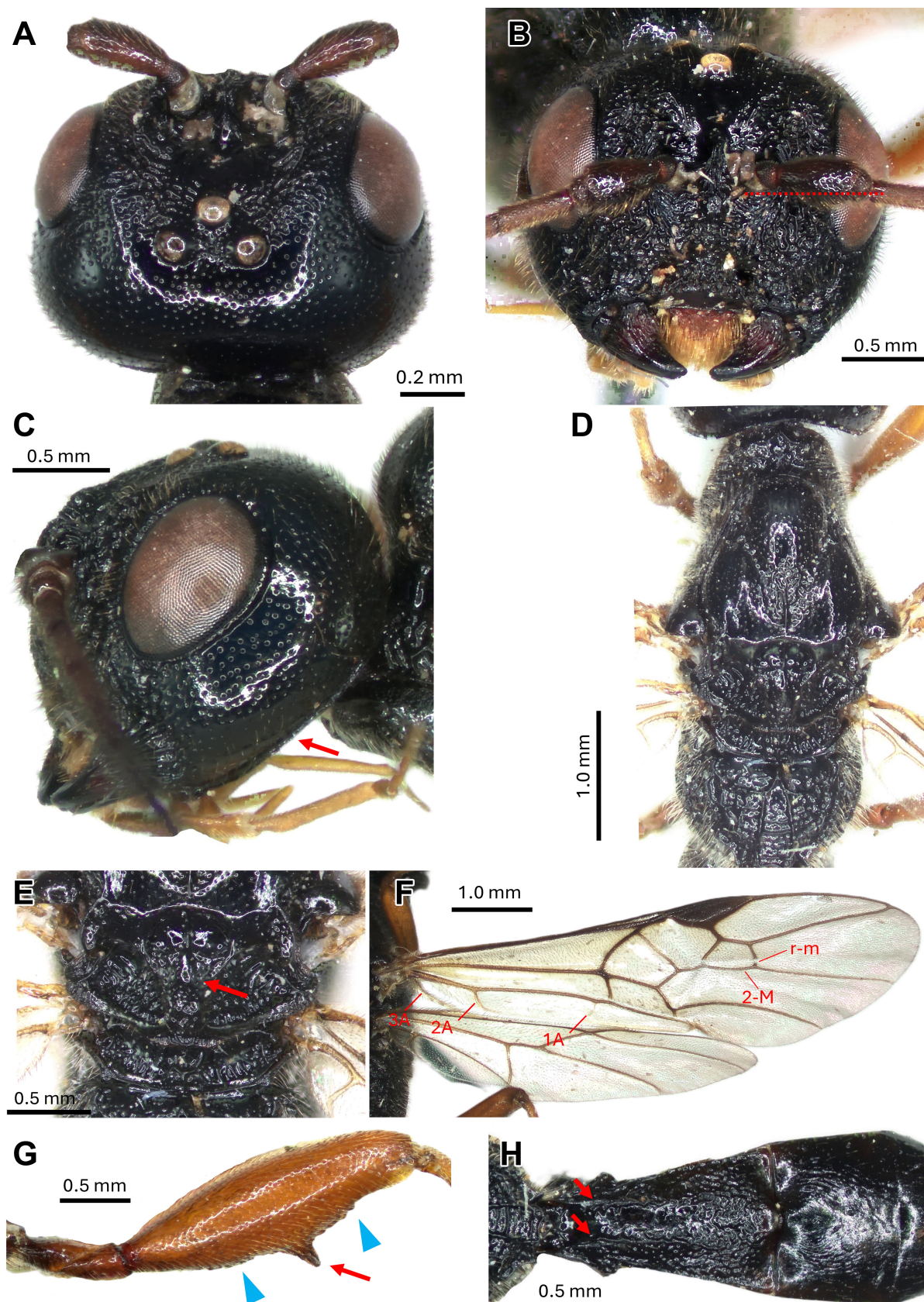


Figure 5. *Helconidea meridionalis* van Achterberg, 1987, ♀. **A.** Head, dorsal view; **B.** Head, frontal view (dotted line indicates level of the lower rim of antennal insertion); **C.** Head, lateral view (arrow indicates shape of the occipital carina); **D.** Mesosoma, dorsal view; **E.** Mesoscutellum, dorsal view (arrow indicates the discal part); **F.** Wings (with character of veins discussed in the text); **G.** Hind femur, lateral view (arrow indicates the tooth-like process; triangles indicate the crenulate ventral margin); **H.** First metasomal tergite, dorsal view (arrows indicate the weak lateral carinae).



Figure 6. Distribution of the treated species of *Helconidea* in Italy based on data from literature and the present contribution.

Diagnosis. The species (Figs 4C–D, 5) is known from the original description (13 specimens including holotype, see van Achterberg 1987), and only an imprecise number of specimens has been subsequently

added by Campadelli and Scaramozzino (1994) for Italy (Emilia-Romagna), reared from conifer wood. Based on both the original description and especially on the new material of both sexes, the species can be recognized for the following features: body length: 9.0–11.0 mm (♀: excluding ovipositor); fore wing length: 7.0–8.0 mm; colour mainly black, legs reddish to brownish except fore and mid coxae and trochanters darker and hind coxa and trochanter blackish, hind femur darker and hind tarsus yellowish orange (Fig. 4C–D); wings hyaline with costal and subcostal veins and pterostigma of fore wing dark brown, remaining veins brownish (Figs 4C, 5F); antenna with 33 antennomeres; malar space regularly longitudinally carinulate; mesoscutellum not protruding dorsally (lateral view), disc not rugose but irregular, with coarse, deep and scattered punctures (Fig. 5D–E); vein r-m of fore wing not inclivous, forming an angle of about 90° at base with vein 2-M (Fig. 5F); hind femur with a well-developed tooth-like process submedian process (Fig. 5G); dorsal carinae of metasomal tergite 1 well developed and strikingly extended beyond the middle (Fig. 5H); ovipositor 1.8 × as long as hind tibia.

Distribution. Southern France, Northern Switzerland, Northern Macedonia, Central Greece (van Achterberg 1987), Italy (Campadelli & Scaramozzino 1994; present paper).

Faunistic remarks. This species was originally reported from Italy by Campadelli and Scaramozzino (1994) based on an unspecified number of specimens collected in Emilia-Romagna (Forlì-Cesena province, Bagno di Romagna, Foresta della Lama, 712 m a.s.l.). Notably, those authors did not explicitly recognize their finding as the first record for the Italian fauna. Concurrently, the species was omitted from the subsequent national checklist by Bergamasco et al. (1995) (Table 1). Later, Pesarini (2009) attempted to verify the historical material but was unable to locate the specimens within the Campadelli Collection (currently housed at MSNF), although we have found two specimens among the unidentified material. Consequently, the specimens examined in the present contribution represent the only available and verifiable material confirming the occurrence of this species in Italy, thereby validating its presence in the country. Furthermore, our new findings slightly expand the known distribution of the species within the Italian peninsula; currently, its range appears geographically restricted to Central Italy, although further systematic sampling will likely demonstrate a wider distribution than currently ascertained (Table 1, Fig. 6).

Host associations. Regarding its biology, Campadelli and Scaramozzino (1994) originally reared their specimens from wood of the European silver fir, *Abies alba* Miller, in association with an undetermined longhorn beetle of *Anastrangalia* Casey, 1924 (Coleoptera: Cerambycidae). During our research, specimens of this parasitoid were reared in June from branches alongside *Anastrangalia dubia* (Scopoli, 1763). Furthermore, two males of *Helconidea meridionalis* successfully emerged in July from branches infested by the house longhorn beetle, *Hylotrupes bajulus* (Linnaeus, 1758), adding a new host association. These synchronized emergence events provide valuable insights into the phenology of the species in Mediterranean forest ecosystems.

DISCUSSION

This contribution provides novel data on four Helconini species belonging to the genera *Helcon* and *Helconidea* (*sensu lato*). Consequently, the updated checklist of Italian Helconini now comprises eight species across three genera, up from the seven species documented by Bergamasco et al. (1995) (Table 1). This taxonomic revision follows the first country record of *Helcon claviventris*, which remarkably expands the European range of this rare and highly localized species. It also includes the removal of *Helconidea annulicornis*, currently recognized as a synonym of *Wroughtonia spinator*, and the definitive confirmation of the presence of *H. meridionalis*. Furthermore, the geographical distributions of *Helcon angustator* and *Helconidea dentator* within Italy, hitherto only vaguely known, are significantly clarified and redefined (Figs 3, 6). These findings underscore that the species richness of Italian braconid wasps remains heavily underestimated. Our results highlight a critical requirement for targeted field surveys to address extensive distributional gaps, particularly since several species appear relatively common in forest ecosystems. Historically, the checklist by Bergamasco et al. (1995) has served as the benchmark reference for Italian Braconidae. However, the systematic framework of the subfamily Helconinae has undergone profound revisions, with several genera transferred to

Brachistinae (Sharanowski et al. 2011; Chen & van Achterberg 2018). These updates fundamentally alter the faunal baseline established by Bergamasco et al. (1995). Given the chronic paucity of historical data, often limited to vague regional records, we synthesize these recent taxonomic shifts and integrate our new findings to provide an updated, critical checklist of Italian Helconini, aiming to formally outline prevailing knowledge gaps in their national distribution (Table 1).

The ecological role of Helconini in regulating the population dynamics of wood-boring beetles might be substantially underestimated based on current data (Hovorka & Janšta 2024). Comprising relatively large species, frequently exhibiting a body length of 10.0 mm or more, these wasps are functionally prominent in wooded areas. They are regularly encountered and reared by coleopterists investigating xylophagous beetles (as demonstrated in the present study), alongside other large, specialized parasitoids belonging primarily to the family Ichneumonidae. Despite their ecological salience, the composition and structure of Ichneumonidea parasitoid communities in Italy remain largely unknown. Extensive systematic investigations are strongly recommended to bridge these gaps, particularly to elucidate ecological interactions critical for the management of nature reserves, national parks, and economically managed forests.

Although the specific impact of these braconids as natural regulators of xylophagous beetle populations requires further empirical quantification, their potential as biological control agents against native and invasive wood-boring pests is highly promising. This is exemplified by successful classical biocontrol frameworks established for high-profile invasive pests, such as the Asian longhorn beetle, *Anoplophora glabripennis* (Motschulsky, 1853) (Wang & Aparicio 2020; Johnson et al. 2025).

Table 1. Revised checklist of Italian Helconini, based on Bergamasco et al. (1995). Format and abbreviations as adopted in the Checklist of the Italian Fauna (<https://www.faunaitalia.it/checklist/>), N: Northern Italy, including Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige, Lombardy, Valle d'Aosta, Piedmont, Liguria, Emilia-Romagna. S: Peninsular Italy, including Tuscany, Marche, Umbria, Lazio, Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria. Si: Sicily and smaller islands. Sa: Sardinia and smaller islands.

Taxon	Distribution	References/Remarks
097.0 <i>Helcon</i> Nees von Esenbeck, 1812		
001.0 <i>angustator</i> Nees von Esenbeck, 1812	N S Si	Nees von Esenbeck (1834); Marshall (1896); Pesarini (2009); present contribution. Distribution in Italy redefined
002.0 <i>claviventris</i> Wesmael, 1835	N	Present contribution; new addition to the checklist
003.0 <i>nunciator</i> (Fabricius, 1793)	N	van Achterberg (1987); Yu et al. (2016)
004.0 <i>tardator</i> Nees von Esenbeck, 1812	N	Roberti et al. (1965); van Achterberg (1987)
098.0 <i>Helconidea</i> Viereck, 1914		
001.0 <i>annulicornis</i> Nees von Esenbeck, 1834	N	Synonym of <i>W. spinator</i> according to van Achterberg (1987); removed from the checklist
001.0 <i>dentator</i> (Fabricius, 1804)	N	Nees von Esenbeck (1834); Marshall (1896); Szépligeti (1904); Pesarini (2009); present contribution
002.0 <i>meridionalis</i> van Achterberg, 1987	S	Recorded by Campadelli and Scaramozzino (1994), quoted in Pesarini (2009); not included in Bergamasco et al. (1995); present contribution; new addition to the checklist
003.0 <i>ruspator</i> (Linnaeus, 1758)	?	Bergamasco et al. (1995); distribution in Italy not defined
102.0 <i>Wroughtonia</i> Cameron, 1899		
001.0 <i>spinator</i> (Lepeletier & Audinet-Serville, 1827)	N	Bergamasco et al. (1995)

In this context, the new data acquired regarding the putative hosts of *H. meridionalis* are of remarkable significance, establishing biological links with two longhorn beetles: *Anastrangalia dubia* and *Hylotrupes bajulus*. The latter, commonly known as the house longhorn beetle, represents a major structural pest of dry coniferous timber (e.g., *Pinus*, *Picea*, *Abies*) in Europe (EPPO 2026), having achieved a cosmopolitan distribution due to international trade (Cocquempot & Lindelöw 2010; Danilevsky 2026). *Hylotrupes bajulus* exerts a devastating impact on processed wood across the West Palaearctic, typically infesting the sapwood of structural timber and causing severe, long-term degradation to building frames and historical furniture over multi-year larval cycles while leaving the outer wooden layers superficially intact (Martín & López 2023). The novel record of *H. meridionalis* as a putative parasitoid of *H. bajulus* suggests that this wasp may function as a key natural regulatory agent of this pest, not only within natural forest ecosystems but potentially also in managed timberlands and wood storage facilities. Consequently, we emphasize the urgency of implementing coordinated, long-term monitoring programs in both natural woodlands and commercial forestry areas. Such efforts are essential to systematically map xylophagous insects and their associated parasitoid complexes, thereby clarifying the true ecological footprint and biocontrol efficacy of *H. meridionalis* on a broader geographic scale.

Finally, it is worth noting that these significant additions to the Italian helconine fauna stem directly from recent sampling in historically renowned forest habitats, such as the Vallombrosa Forest in Tuscany (Cecconi 1898; Moriondo & Tiberi 2000; Tiberi & Roversi 2005), and targeted rearing from coarse woody debris during saproxylic biodiversity assessments (e.g., Pratomagno, Tuscany). These field data were successfully integrated with the critical revision of historical museum accessions. Collectively, these new insights confirm a wider, predictive distribution for the Helconini across Italian forest ecosystems and highlight their valuable ecological role as specialized natural enemies of wood-boring insects.

AUTHOR CONTRIBUTIONS

The authors confirm their contributions to the paper as follows: G.F. Turrisi: Conceived and designed the study; G. Altadonna, T. Lisa, and R. Papi: Conducted field sampling. G.F. Turrisi: performed the laboratory work, taxonomic identifications, data acquisition, imaging, and bibliographic research, and prepared the original manuscript draft. All authors contributed to data interpretation and critical revision of the manuscript. All authors have read and approved the final version of the manuscript for submission.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited partly in public collections and partly in private collections. They are available through the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

GENERATIVE AI STATEMENT

No generative AI tools were used in the preparation of this paper.

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گزارش‌های جدید و فهرست روزآمد زنبورهای قبیله Helconini (Hymenoptera: Braconidae, Helconinae) از ایتالیا

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چکیده: داده‌های جدید از پراکنش و روابط میزبانی در مورد چهار گونه زنبور براکونید متعلق به قبیله Helconini (Hymenoptera: Braconidae, Helconinae) در ایتالیا ارایه شد. تمرکز این پژوهش بر سرده‌های *Helcon* Nees von Esenbeck, 1812 و *Helconidea* Viereck, 1914 بود. حضور گونه کمپاب *Helcon claviventris* Wesmael, 1835 برای نخستین‌بار از ایتالیا گزارش می‌شود. حضور گونه *Helconidea meridionalis* van Achterberg, 1987 که پیش‌تر تنها بر اساس یک گزارش محدود از ایتالیا شناخته شده بود، با نمونه‌های جدید گردآوری‌شده در امیلیا-رومانیا و توسکانی تأیید شد. گونه *Helconidea annulicornis* Nees von Esenbeck, 1834 از فهرست فون ایتالیا حذف شد، زیرا این نام، مترادف *Helcon angustator* Nees von Wroughtonia spinator (Lepelletier & Audinet-Serville, 1827) است. پراکنش *Helconidea dentator* (Fabricius, 1804) در ایتالیا با رکوردهای جدید از ترنتینو-آلتو آدیجه، امیلیا-رومانیا، توسکانی، اومبریا و سیسیل به‌طور چشمگیری روشن‌تر و گسترده‌تر شد. همچنین، روابط میزبان - پارازیتوئید جدید برای *H. meridionalis* ثبت شد. این گونه، پارازیتوئید لارو دو گونه از سوسک‌های شاخک‌بلند (Coleoptera: Cerambycidae)، یعنی *Anastrangalia dubia* (Scopoli, 1763) و *Hylotrupes bajulus* (Linnaeus, 1758)، است. برای تسهیل شناسایی گونه‌ها، ویژگی‌های ریخت‌شناختی افتراقی و مستندات تصویری ارایه شد. در نهایت، خلاصه‌ای روزآمد از دانش کنونی درباره گونه‌های قبیله Helconini در ایتالیا، شامل هشت گونه، تدوین شده است که اصلاحیه‌ای انتقادی و تکمیلی بر فهرست فون ایتالیا به‌شمار می‌رود.

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واژگان کلیدی: تنوع زیستی، پراکنش، میزبان‌های جدید، سوسک‌های چوب‌خوار، پارازیتوئیدها