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RESEARCH PAPER

Bylesia gen. nov., a new genus of Darwin wasp (Hymenoptera: Ichneumonidae) from the Eastern Himalaya

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Abstract. A new genus of Cremastinae (Hymenoptera, Ichneumonidae), *Bylesia* gen. nov., and its type species, *B. brachyscleromamorpha* sp. nov., are described from the Eastern Himalaya, Yunnan, China. The new taxa are illustrated, diagnosed, and their relationships are discussed

Key words. Hymenoptera, Ichneumonidae, Cremastinae, biodiversity, Malaise trap, parasitoids, Jade Dragon Snow Mountain, Yunnan, China, Asia

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Introduction

The Darwin wasps of the subfamily Cremastinae Förster, 1869 (Hymenoptera: Ichneumonidae) are well represented in all major biogeographical regions and comprise 842 species in 35 genera to date (Yu et al. 2016, Klopfstein 2016, Vas 2016a, 2016b, 2025, Gadallah et al. 2017, Riedel 2019, Heydari et al. 2020, Sääksjärvi et al. 2022, Cuéllar-Ramírez et al. 2023, Fernandes et al. 2023, Omatsu & Konishi 2023). The majority of this diversity is known from the New World (Veijalainen et al. 2014, Yu et al. 2016, Sääksjärvi et al. 2022, Cuéllar-Ramírez et al. 2023, Fernandes et al. 2023), and only 53 species are known in the Oriental Region (Yu et al. 2016, Songvorawit et al. 2021). Cremastinae can be distinguished from other Darwin wasps by their middle and hind tibial spurs separated from the basitarsus by a sclerotized bridge, which divides the membranous area of tibial apex in two (Townes 1971, Gauld 2000, Quicke et al. 2009, Quicke 2015).

Townes (1971) revised the subfamily Cremastinae and included 23 genera, including the Afrotropical genus *Belesica* Waterston, 1929, based on its hind tibial spurs, which are separated from the basitarsus by a sclerotized bridge. Originally, the genus was described within the subfamily Ctenopelmatinae Förster, 1869 (Tosquinet 1896, Waterson 1929). Putatively, it might be related to *Eurygenys* Townes, 1971 (Quicke et al. 2009). Gauld (1984) suggested a monophyletic group Cremastinae + Tersilochinae Schmiedeknecht, 1910. In other recent studies Cremastinae was placed in a clade together with the Campopleginae Förster, 1869 and Nesomesochorinae Ashmead, 1905 within 'higher ophioniformes' (Quicke et al. 2000, 2009, Bennett et al. 2019), or Ophioninae Shuckard, 1840 and Campopleginae (Klopfstein et al. 2019), or rather notably together with Hybrizontinae Blanchard, 1845, that has varied widely in placement across all studies (Sharanowski et al. 2020). Phylogenetic relationships within Cremastinae are still unstudied. Several genera were described and added to the subfamily after Townes' (1971) revision (Dash 1979, Kolarov 1980, Gauld 1984, Narolsky 1990, 1994, 2002, Narolsky & Schönitzer 2001, 2003, Koçak & Kemal 2009, Rousse et al. 2011, Yu et al. 2016).

Generally, the species of Cremastinae whose biology is known are solitary (except for polyembryony case in *Tanychela* Townes, 1971 (Jamieson & Resh 1998)) koinobiont endoparasitoids of weakly concealed larvae of Lepidoptera (Gauld 2000, Gauld & Shaw 2006, Broad et al. 2018), including aquatic moths of the genera *Chilo* Zincken, 1817, *Nymphula* Schrank, 1802, *Occidentalia* Dyar & Heinrich, 1927, and *Petrophila* Guilding, 1830 (Crambidae) (Frohne 1939, Berg 1949, Jamieson & Resh 1998, Bright 2025). Species of *Temelucha* Förster, 1869 have been reared from weakly concealed larvae of Gelechiidae (Weiss 1917, Kerrich 1959, Dash 1979) and Tortricidae (Weed 1887, 1888, Allen 1962, Dash 1979). Species of the genus *Cremastus* Gravenhorst, 1829 are reported to attack relat-

ively active but weakly concealed hosts in silken tubes or silken cases. For example, *C. kratochvili* Šedivý1970 has been reared from *Scythris empetrella* Karsholt & Nielsen, 1976 (Scythrididae), and *C. cephalotes* Šedivý, 1970 from *Pachythelia villosella* (Ochsenheimer, 1810) (Psychidae) (Fitton & Gauld 1980). Also, there is a number of unusual records of Cremastinae from Papilionoidea, e.g. species of Neotropical *Creagrura* Townes, 1971 have been reared from Hesperiidae (Gauld 2000, Sääksjärvi et al. 2022). There are also records from Coleoptera (Townes 1965). African species *Belesica pictipennis* (Tosquinet, 1896), a parasitoid of Bushman arrow-poison beetle, *Diamphidia nigroornata* Stål, 1858 (Chrysomelidae: Galerucinae: Alticini) (Waterson 1929) that feeds on *Commiphora africana* (A. Rich.) Endl. (Chaboo et al. 2016). A Western Palaearctic species, *Dimophora evanialis* (Gravenhorst, 1829), is a parasitoid of *Cryptocephalus moraei* (Linnaeus, 1758) (Chrysomelidae: Cryptocephalinae) (Scholler 1999). The final instar parasitoid emerges from the host and either completes feeding externally (Haeussler 1930, Bradley & Burgess 1934, Rosenberg 1934, Hey 1935, Boyce 1947, Allen 1962, Athanassov et al. 1998) or spins its own cocoon within that of the host (Giraldo-Vanegas & García 1992, 1994, 1995).

Temelucha interruptor (Gravenhorst, 1829) have been reported as kleptoparasitoid of braconid wasp, *Orgilus obscurator* (Nees, 1812), within larva of *Rhyacionia buoliana* (Denis & Schiffermüller, 1775) (Arthur et al. 1964, Tsankov 1988, Schöder 1974) as well as *Pristomerus orbitalis* (Holmgren, 1860) from the same hosts (Schöder 1974). Number of species have been reared from economically important crop pests (Bartlett et al. 1978, Bennett 1960, Lever 1938, Patel et al. 1971, Zykoff 1911, He et al. 1996); however, further studies of Cremastinae biology are needed to make conclusions whether they are suitable candidates for use as biocontrol agents, or whether as kleptoparasitoids they may negatively affect the population of the primary parasitoids (Mills 2005). Thus, much of our knowledge of the biology of the Cremastinae is based on studies of a limited fraction of species which potentially do not represent overall biology traits of the subfamily.

Here I describe a new genus and species of Darwin wasp, *Bylesia brachyscleromamorpha* gen. & sp. nov., from Jade Dragon Snow Mountain, Northwestern Yunnan, China, based on recently collected material.

Material and methods

This work is based on material collected by The Queensland – Chinese Academy of Science Biodiversity Project, which was run by the XTBG (Xishuangbanna Tropical Botanical Garden, Yunnan, China). Researchers of the XTBG themselves studied elevation transects in the Yunnan Province of China (Ashton et al. 2016, Reshchikov et al. 2019, Reshchikov 2024). The elevation range was sampled with four Malaise traps per transect (Fig. 1B) spanning 3200–3800 m a.s.l. at Lijiang, and the material contained only a single specimen of *Bylesia* sampled at an elevation of 3365 m (Fig. 1). Vegetation of the sampling site is dominated by *Abies georgei*, *Quercus pannosa*, and *Rhododendron siderophyllum*.

In addition to the sampling efforts mentioned above, I examined further extensive samples obtained by the IEHBR (Institute of Eastern Himalaya Biodiversity Research) team in Northwestern Yunnan during 2017–2022. Multiple locations between 2000–3900 m a.s.l. were sampled with 63 Malaise traps, with sampling effort comprising over 900 trap/months and over 16,000 Darwin wasp specimens (Yang et al. 2024). I also examined samples obtained by the Tea Fauna Project (www.teafauna.com) in Northwestern Yunnan and Northern Thailand at locations ranging between 600–2000 m a.s.l. (Ranjith et al. 2024). No additional specimens of *Bylesia* were found in this material. There are only two specimens of the subfamily Cremastinae within the material collected by the IEHBR, and both belong to the genus *Pristomerus* Curtis, 1836.

The holotype is deposited in Kunming Institute of Zoology, Kunming, China (ISAS), curator Kaiqing Li.

The morphological terminology follows Broad et al. (2018), cuticular sculpture follows Harris (1979), and is aligned with the Hymenoptera Anatomy Ontology (HAO) (Yoder et al. 2010). The following morphometric abbreviations are used:

OD	maximum diameter of a posterior ocellus;
OOL	oculo-ocellar distance (the distance between the compound eye and a posterior ocellus);
POL	postero-ocellar distance (the distance between the posterior ocelli);
S1–6	metasomal sternites;
T1–6	metasomal tergites.

Host records were selected from the Taxapad databased (Yu et al. 2016); however material cited was not revised.

Images of the holotype specimen were taken using a Leica M205 C stereo microscope and the stacking software LAS ver. 4 at increments of 20–50 steps. Photographs were processed using Photoshop CS5.

Results

Family Ichneumonidae Latreille, 1802

Subfamily Cremastinae Förster, 1869

Genus *Bylesia* gen. nov.

Type species. *Bylesia brachyscleromamorpha* sp. nov., by present designation.

Differential diagnosis. *Bylesia* gen. nov. can be distinguished from other genera of Cremastinae by the following combination of character states: head unusually short, temples narrow (Fig. 2B); scape cylindrical (Fig. 2A); antenna short; occipital carina incomplete dorsally; middle tibia with two spurs; T1 ventrally not converging, S1 is visible (Fig. 3B); thyridium and gastrocoelus absent (Figs 2E, F, 3G); ovipositor slightly down-curved (Fig. 1A), with sinuous apex, distinct nodus and subapical notch (Fig. 2G). Fore wing in the new genus with closed areolet, which is a shared character with Holarctic *Dimophora* Förster, 1869 and Neotropical *Ptilobatus* Townes, 1971. However, *Dimophora* species have head longer and stout, and short ovipositor without sinuous apex (Klopfstein 2015, Omatsu & Konishi 2023), while *Ptilobatus* is characterized by T1

Fig. 1. *Bylesia brachyscleromamorpha* gen. & sp. nov., holotype, female (XTBG586, ISAS). A – habitus view; B – type locality at conifer forest on the Jade Dragon Snow Mountain (Lijiang, Yunnan Province of China), elevation 3365 m.

converging ventrally and covering S1 (Townes 1971, Gauld 2000).

Description. ***Female.*** Antenna short. Scape cylindrical (Fig. 2A). Head short (Fig. 2B). Mandible broad, not twisted, with dorsal edge forming flat area, without ventral flange but carinated ventrally, upper tooth slightly shorter than lower tooth (Fig. 2A). Labrum exposed beyond clypeus (Fig. 2A). Palp formula 5:4. Frons concave, without mid-longitudinal ridge. Occipital carina incomplete dorsally (Fig. 2B), ventrally joining hypostomal carina distinctly above mandibular base (Fig. 3C). Inner margins of eyes slightly diverging dorsally and ventrally (Fig. 2A). Pronotum without epomia but with short carina along its anterior edge (Fig. 2C). Notauli shallowly impressed, roundly joining medioposteriorly (Fig. 2D). Scutum with distinct lateral carina almost reaching posterior part of scutellum (Fig. 2D). Scutellum elongate (Fig. 2D). Epicnemial carina reaching anterior edge of mesopleuron (Fig. 2C). Postpectal carina complete (Fig. 3D). Propodeum with carinae complete (Fig. 2H), its posterior margin marginated (Fig. 2H). Tarsal claws pectinate, distal tooth divided in two (Fig. 3E). Middle tibia with two apical spurs (Fig. 1A), separated by sclerotized bridge from basitarsus (Fig. 3F). Femora compressed. Hind femur without ventral subapical tooth. Fore and middle trochantelli elongate and compressed, the former curved outwards, the latter curved inwards. Fore wing with vein *3rs-m* present. T1 ventral margins widely separated so that S1 is exposed over its entire length (Fig. 3B), glymma distinctly impressed in front of spiracle (Fig. 2E). T2 moderately stout, slightly depressed, without gastrocoelus and thyridium (Figs 2F, 3G). Laterotergites of T3–6 sclerotized, not folded (Fig. 1A). Ovipositor slightly down-curved (Fig. 1A), its apex slightly sinuous with distinct nodus and subapical notch (Fig. 2G).

Male. Unknown.

Etymology. The new genus is named after the Australian conservationist, pacifist, the first practising female solicitor in New South Wales, mountaineer, explorer and journalist, Marie Beuzeville Byles (1900–1979), in recognition of her efforts in conservation and her attempt to reach the summit of Jade Dragon Snow Mountain (Byles 1932, 1939, James 2015). Gender is feminine.

Biology. Unknown.

Species included. The genus is described as monotypic.

Bylesia brachyscleromamorpha sp. nov.

(Figs 1–3)

Type material examined. Holotype: ♀ (XTBG586), 'CHINA: Yunnan, Lijiang, Jade Dragon Snow Mountain, 27.167°N 100.227°E, 3365 m a.s.l.; 12-22.viii.2012, QCAS3400m site4, Malaise trap, Sample 1842, Akihiro Nakamura *et al. leg*. (ISAS).

Description. ***Female*** (Figs 1–3) main features indicated in description of genus. Body length approximately 15.0 mm, forewing length 11.7 mm. Main background colour black and reddish-yellow (Fig. 1A).

Head short, its width 3.6× its length, temples about 0.5× transverse width of eye, sparsely setose, abruptly narrowed behind eyes (Fig. 2B). Antenna short, 0.7× length of fore wing, with flagellum finely setose, with 34 flagellomeres, basal flagellomere transverse, oblique apically, median flagellomeres almost as long as broad, subapical transverse (Fig. 1A). Face 2.2× times as wide as high, coarsely reticulated, sparsely setose, with distinctly raised curved carina on edge of epistoma, edge of antennal socket raised and produced as carina between antennal socket and inner margin of eye that curves downwards (Fig. 2A). Clypeus almond-shaped, sparsely punctate with rough punctures dorsally, and impunctate ventrally. Mandible distinctly punctate, upper tooth slightly shorter than lower tooth (Fig. 2A). Malar space 0.8× times basal width of mandible. POL = 1.6 times of Od, OOL = 2.8 times of Od.

Mesosoma coarsely and sparsely punctate with rough punctures, setose (Figs 2C, D). Pronotum striate and sparsely punctate with rough punctures (Fig. 2C). Scutum roughly punctate, flat (Fig. 2D). Scutellum roughly punctate, flat, heavily setose (Fig. 2D). Speculum large, impunctate, shiny, slightly striate anterodorsally (Fig. 2C). Metapleuron with finer punctures. Legs stout, compressed, hind femur 4.3× as long as wide in its middle. Tarsal claws pectinate with high teeth slightly inclined medially (Fig. 3E). Propodeum short, heavily setose, area superomedia transverse, area petiolaris elongate (Fig. 2H). Propodeal spiracle elongate, 2× as long as wide, slightly closer to pleural carina than to lateral carina, connected to latter by ridge. Lateral longitudinal and posterior transverse carina forming small tooth where they meet. Area petiolaris longer than area superomedia, latter pentagonal, area basalis absent. Fore wing with pterostigma elongate, 3.6× as long as broad (Fig. 3A). Distal abscissa of *M* complete to wing margin, between *rs-m* and *2m-cu* longer than *rs-m*. Hind wing with distal abscissae of *Rs*, *M*, *Cu1* and *1A* distinct, *Cu&cu-a* is sharply broken (Fig. 3A). Wing membrane with dense short setae (Fig. 3A). Fore wing with *cu-a* postfurcal. Vein 2m-cu with single bulla.

Metasoma setose (Fig. 1A). T1–2 finely and sparsely punctate, T3–6 without punctures. T1 2.4× as long as apically broad (Fig. 2F). T1 with lateromedian carina defined, reaching spiracle, ventral carina distinct, with slight striation behind glymma (Fig. 2F). Ovipositor 1.8× as long as hind tibia (Fig. 1A).

Coloration (Figs 1A, 2, 3). Body black, following structures yellow: face, scape and pedicel, basal part of clypeus, malar space, pronotum dorsally, inner part of fore femur, fore tibia and tarsus, distal part of middle femur, middle tibia, proximal parts of middle tarsomeres 1–3, distal tip of hind femur, hind tibia except for its distal tip, tegula, auxillar sclerite, proximal part of T1, most of membranous part of S1, distal part of S2–3; following structures yellow-white: distal part of fore coxa and fore trochanter completely, middle coxa and trochanter; following structures reddish-yellow: hind femur except for its distal part, most of T1 except for its proximal part, T2–3 and T4 basally. Wing membrane infumate except proximally (Figs 1A, 3A).

Male. Unknown.

Etymology. The specific name is feminine adjective, derived from Darwin wasp genus name *Brachyscleroma*

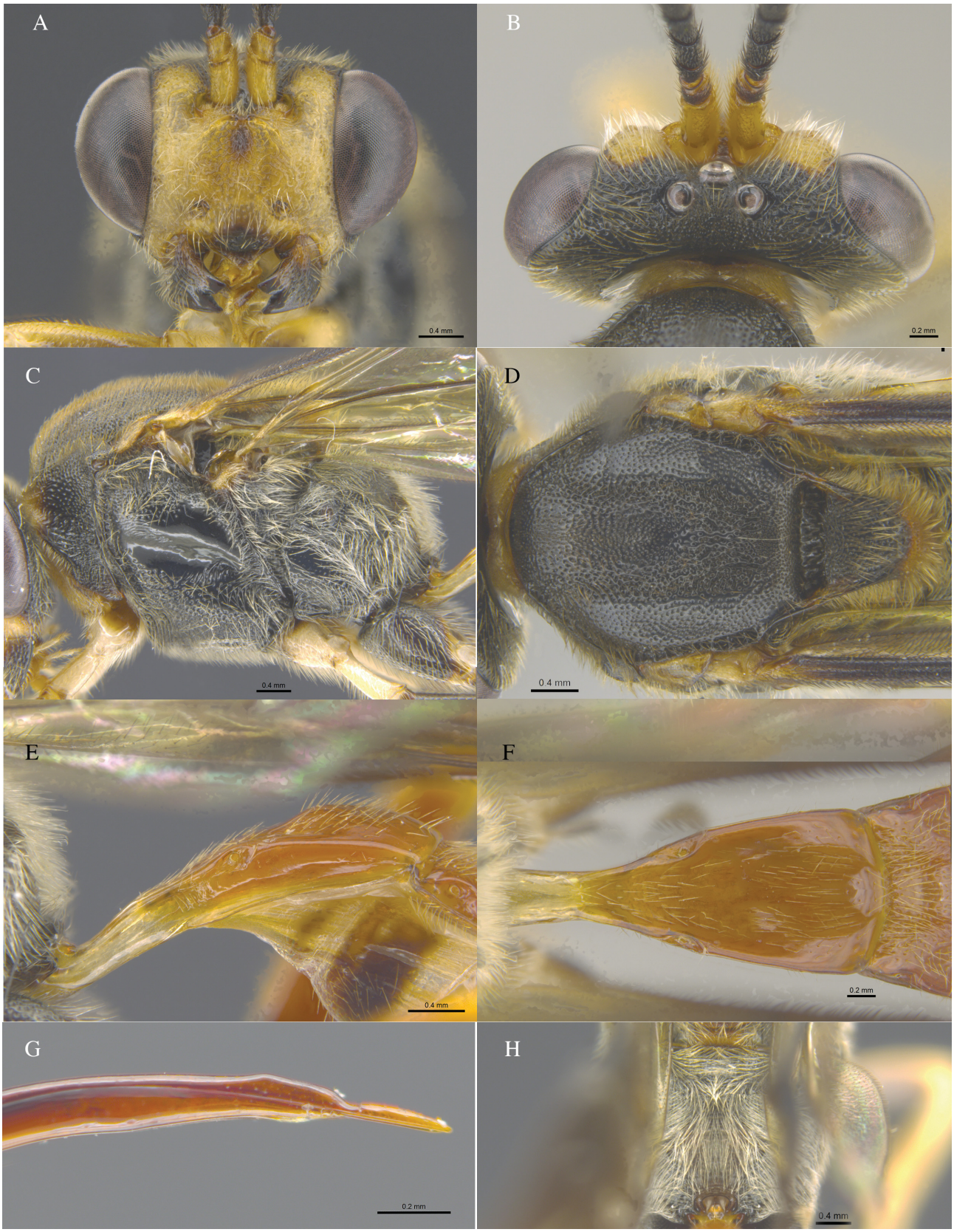

Fig. 2. *Bylesia brachyscleromamorpha* gen. & sp. nov., holotype, female (XTBG586, ISAS). A – face; B – head dorsally; C – mesosoma laterally; D – mesosoma dorsally; E – T1 laterally; F – T1 dorsally; G – ovipositor tip laterally; H – propodeum.

Cushman, 1940 of the subfamily Sisyrostolinae Seyrig, 1932, whose habitus resembles the described species, and the Greek *morpha* (μορφή, appearance).

Biology. Unknown.

Ecological note. Adult wasp was sampled at 3,365 m elevation on the Jade Dragon Snow Mountain (玉龍雪山), in conifer forest with dominant tree species *Abies georgei*, understory with *Quercus pannosa*, and *Rhododendron siderophyllum*.

Distribution. Currently known only from NW Yunnan (China).

Fig. 3. *Bylesia brachyscleromamorpha* gen. & sp. nov., holotype, female (XTBG586, ISAS). A – fore and hind wings; B – S1; C – occipital carina joining hypostomal carina; D – mesosoma ventrally; E – tarsal claw; F – hind tibia distally; G – T2.

Discussion

Bylesia brachyscleromamorpha gen. & sp. nov. belongs to Cremastinae and differs from all other known members of the subfamily (see Diagnosis). The closed areolet of the fore wing is a shared character with *Dimophora* and *Ptilobatus*, but whether these three genera are closely related is currently unclear. The sinuous ovipositor tip is a character of the new genus that is shared with some

species of *Pristomerus* Curtis, 1836, *Eiphosoma* Cresson, 1865, and *Xiphosomella* Szépligeti, 1905, and could be an adaptation to access hosts concealed within their tunnels (Quicke 1991). Interestingly, the new taxon resembles in habitus *Brachyscleroma* of the subfamily Sisyrostolinae. Furthermore, the body size of the new wasp is unusually large, 15.0 mm (Fig. 1A), which follows the general elevational pattern shown in other Darwin wasps obtained from the same XTBG sampling campaign (Alcantara et al. 2024).

Most cremastines are thought to inhabit relatively dry regions (Fitton & Gauld 1980, Gauld 1984, 2000, Narolsky 1990, 1994, Narolsky & Schönitzer 2001). However, the Jade Dragon Snow Mountain is characterized by glaciers and wet conditions, with precipitation around the sampling site during May–October recorded as 1884 mm (Xin et al. 2012). On the other hand, examples of Cremastinae records from other alpine regions with distinct wet conditions also contradict the assumption of dry region association mentioned above (Athanassov et al. 1998, Gauld 2000, Béguinot 2001, 2002, 2006, 2012). Further comprehensive analysis is needed to test climate specificity of the subfamily members.

Finally, at the only known locality, the new wasp species seems either to be very rare or not to be sampled easily by Malaise trapping, since I only found a single specimen from >60 years of Malaise trapping effort. This newly discovered Darwin wasp and the unique biodiversity hotspot of the sampling locality should encourage increased study of the Hymenoptera fauna of the Eastern Himalaya.

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References

ALCANTARA M. J. M., FONTANILLA A. M., ASHTON L. A., BURWELL C .J., CAO M., HAN H., HUANG H., KITCHING R. L., RESHCHIKOV A., SHEN X., TANG Y., WAN Y., XU Z. & NAKAMURA A. 2024: Bugs and Bergmann's rule: a cross-taxon large-scale study reveals idiosyncratic altitudinal and latitudinal body size patterns for different insect taxa. *Entomologia Generalis* **44 (3)**: 715–725.

ALLEN H. W. 1962: Parasites of the oriental fruit moth in the eastern United States. *United States Department of Agriculture Technical Bulletin* **1265**: 1–139.

ARTHUR A. P., STAINER J. E. R. & TURNBULL A. L. 1964: The interaction between *Orgilus obscurator* (Nees) (Hymenoptera: Braconidae) and *Temelucha interruptor* (Grav.) (Hymenoptera: Ichneumonidae), parasites of the pine shoot moth, *Rhyacionia buoliana* (Schiff.) (Lepidoptera: Olethreutidae). *Canadian Entomologist* **96**: 1030–1034.

ATHANASSOV A. Z., JEANNERET Ph., CHARMILLOT P. J. & RENARD D. 1998: Parasitoids of codling moth and other leafrollers (Lepidoptera, Tortricidae) in apple orchards and forests in south-west Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **71 (1–2)**: 153–162.

BARTLETT B. R., CLAUSEN C. P., DE BACH P., GOEDEN R. D., LEGNER E. F., McMURTRY J. A. & OATMAN E. R. 1978: Introduced parasites and predators of arthropod pests and weeds: A World review. *Agricultural Research Service. United States Department of Agriculture. Agriculture Handbook* **480**: 1–545.

BÉGUINOT J. 2001: Aperçu de la faune cécidogène (génératrice de galles) dans et autour de la zone d'aménagement "Coriolis" près gare TGV du Creusot. *Bulletin de la Société d'Histoire Naturelle du Creusot* **49**: 20–24.

BÉGUINOT J. 2002: Contribution au recensement de la fauna cécidogène d'altitude dans le bassin de l'Ubaye (Alpes sud-occidentales françaises). *Bulletin de la Société Linnéenne de Lyon* **71 (1)**: 404–409.

BÉGUINOT J. 2006: Premier aperçu de la faune cécidogène (inductrice de galles végétales) en Haute-Corrèze et régions voisines. *Bulletin de la Société Botanique du Centre-Ouest* **37**: 147–160.

BÉGUINOT J. 2012: Investigations sur la faune cécidogène d'altitude dans le Parc National des Ecrins. *Bulletin Mensuel de la Société Linnéenne de Lyon* **81 (5–6)**: 87–116.

BENNETT F. D. 1960: Parasites of *Ancylostomia stercorea* (Zell.) (Pyralidae, Lepidoptera), a pod borer attacking pigeon pea in Trinidad. *Bulletin of Entomological Research* **50**: 737–757.

BENNETT A. M. R., CARDINAL S., GAULD I. D. & WAHL D. B. 2019: Phylogeny of the subfamilies of Ichneumonidae (Hymenoptera). *Journal of Hymenoptera Research* **71**: 1–156.

BERG C. O. 1949: Limnological relations of insects to plants of the genus *Potamogeton*. *Transactions of the American Microscopical Society* **68**: 279–291.

BOYCE H. R. 1947: Native and imported parasites of the codling moth *Carpocapsa pomonella* L. in Canada. *Report of the Quebec Society for the Protection of Plants* **30**: 96–100.

BRADLEY W. G. & BURGESS E. D. 1934: The biology of *Cremastus flavoorbitalis* (Cameron), an Ichneumonid parasite of the European corn borer. *United States Department of Agriculture, Technical Bulletin* **441**: 1–16.

BRIGHT E. 2025: *Aquatic Insects of Michigan*. Available from: http://www.aquaticinsects.org (accessed 26 Mar. 2025).

BROAD G. R., SHAW M. R. & FITTON M. G. 2018: Ichneumonid wasps (Hymenoptera: Ichneumonidae): their classification and biology. *Handbooks for the Identification of British Insects* **7 (12)**: 1–418.

BYLES M. B. 1932: By Cargo Boat & Mountain. *Geographical Journal* **79 (3)**: 245–245.

BYLES M. B. 1939: The Sansato Massif. *New Zealand Alpine Journal* **26**: 18–25.

CHABOO C. S., BIESELE M., HITCHCOCK R. K. & WEEKS A. 2016: Beetle and plant arrow poisons of the Ju|'hoan and Hai||om San peoples of Namibia (Insecta, Coleoptera, Chrysomelidae; Plantae, Anacardiaceae, Apocynaceae, Burseraceae). *ZooKeys* **558**: 9–54.

CUÉLLAR-RAMÍREZ M., PASTRANA Y. & FERNANDES D. R. R. 2023: Five new species of *Eiphosoma* Cresson, 1865 (Ichneumonidae: Cremastinae) from Colombia, new records, and a key to Colombian species. *Zootaxa* **5330**: 451–491.

FERNANDES D. R. R., PÁDUA D., MAZARIEGOS L. & ARAUJO R. 2023: Two new Darwin wasp species of *Eiphosoma* Cresson,

1865 (Ichneumonidae: Cremastinae) from the northwestern Andes of Colombia. *Zootaxa* **5375**: 262–272.

FITTON M. G. & GAULD I. D. 1980: A review of the British Cremastinae (Hymenoptera: Ichneumonidae), with keys to the species. *Entomologist's Gazette* **31**: 63–71.

FROHNE W. C. 1939: Semiaquatic Hymenoptera in North Michigan Lakes. *Transactions of the American Microscopical Society* **58**: 228–240.

GADALLAH N. S., SOLIMAN A. M. & DHAFER H. M. 2017: First record of the genus *Eucremastus* Szépligeti, 1905 (Hymenoptera: Ichneumonidae: Cremastinae) from the Arabian Peninsula, with the description of three new species. *Zootaxa* **4216 (4)**: 339–354.

GAULD I. D. 1984: *An introduction to the Ichneumonidae of Australia*. British Museum (Natural History) Publication No. 895. British Museum (Natural History), London, 413 pp.

GAULD I. D. 2000: The Ichneumonidae of Costa Rica. Vol. 3. Introduction and keys to species of the subfamilies Brachyicyrtinae, Cremastinae, Labeninae and Oxytorinae, with an appendix on the Anomaloninae. *Memoirs of the American Entomological Institute* **63**: 1–453.

GAULD I. D. & SHAW S. R. 2006: Superfamily Ichneumonidea. *Memoirs of the American Entomological Institute* **77**: 443–525.

GAULD I. D. & SITHOLE R. 2002: Subfamily Metopiinae. Pp. 11–262. In: GAULD I. D., SITHOLE R., UGALDE-GÓMEZ J. & GODOY C. (eds): The Ichneumonidae of Costa Rica, 4. *Memoirs of the American Entomological Institute* **66**: 1–591.

GIRALDO-VANEGAS H. & GARCÍA J. L. 1992: Determinacion del numero de instares de *Eiphosoma vitticolle* Cresson (Hymenoptera: Ichneumonidae). *Boletín de Entomologia Venezolana* **7 (2)**: 133–137.

GIRALDO-VANEGAS H. & GARCÍA J. L. 1994: Comportamiento de los adultos de *Eiphosoma vitticolle* Cresson (Hymenoptera: Ichneumonidae) parasito de *Spodoptera frugiperda* (Smith) (Lepidoptera: Noctuidae). *Boletín de Entomologia Venezolana* **9 (1)**: 15–20.

GIRALDO-VANEGAS H. & GARCÍA J. L. 1995: The effect of nutrition on the reproductive capacity of *Eiphosoma vitticolle* Cresson (Hymenoptera: Ichneumonidae), a parasite of *Spodoptera frugiperda* (J.E. Smith). *Agronomia Tropical* **45 (2)**: 159–170.

HAEUSSLER G. J. 1930: Parasites of the Oriental peach moth, *Laspeyresia molesta* Busck, in North America. *Journal of Agricultural Research* **41 (5)**: 365–377.

HARRIS R. A. 1979: A glossary of surface sculpturing. *California Department of Food and Agriculture, Bureau of Entomology, Occasional Paper* **28**: 1–31.

HE J. H., CHEN X. X. & MA Y. 1996: *Hymenoptera: Ichneumonidae. Economic Insect Fauna of China*. Science Press, Beijing, China, 697 pp.

HEY G. L. 1935: A list of parasites bred from *Tortrix* and tineid hosts. *Entomologist's Monthly Magazine* **71**: 186–187.

HEYDARI M. Z., RAKHSHANI E., ROUSSE P., MOKHTARI A. & SCHWARZ M. 2020: A new species of *Pristomerus* Curtis, 1836 (Hymenoptera, Ichneumonidae, Cremastinae) and key to the known species in Iran. *Zootaxa* **4809 (1)**: 187–194.

JAMES P. 2015: The Eco-Buddhism of Marie Byles. *Journal of Buddhist Ethics* **22**: 215–245.

JAMIESON W. & RESH V. H. 1998: Biology of *Tanychela pilosa* (Hymenoptera: Ichneumonidae), a parasitoid of the aquatic moth *Petrophila confusalis* (Lepidoptera: Pyralidae). *Entomological News* **109**: 329–338.

KERRICH G. J. 1959: Description of new Cremastine Ichneumonidae (Hym.) from Australia, New Zealand and Thailand, with a consideration of the generic categories. *Annals and Magazine of Natural History, Series 2* **13**: 48–64.

KLOPFSTEIN S. 2015: Nine new species of *Dimophora* from Australia (Hymenoptera: Ichneumonidae): new insights on the distribution of a poorly known genus of parasitoid wasps. *Austral Entomology* **55 (2)**: 1–23.

KLOPFSTEIN S. 2016: Revising Australian *Pristomerus* (Hymenoptera, Ichneumonidae, Cremastinae): species with a tooth on the hind femur. *Zootaxa* **4168 (2)**: 201–238.

KLOPFSTEIN S., LANGILLE B., SPASOJEVIC T., BROAD G. R., COOPER S. J. B., AUSTIN A. D. & NIEHUIS O. 2019: Hybrid capture data unravel a rapid radiation of pimpliform parasitoid wasps (Hymenoptera: Ichneumonidae: Pimpliformes). *Systematic Entomology* **44**: 361–383.

KOÇAK A. O. & KEMAL M. 2009: Replacement names in the family Ichneumonidae (Hymenoptera). *Centre for Entomological Studies Miscellaneous Papers* **147–148**: 3–4.

KOLAROV J. A. 1980: A new Cremastine genus and species from Bulgaria. *Acta Zoologica Bulgarica* **16**: 90–92.

LEVER R. J. A. W. 1938: Some insect pests of the Tahitian chestnut. *Agricultural Journal (Department of Agriculture Fiji)* **9**: 22–23.

MILLS N. 2005: Selecting effective parasitoids for biological control introductions: Codling moth as a case study. *Biological Control* **34**: 274–282.

NAROLSKY N. B. 1990: New data on the taxonomy of Cremastine wasps (Hymenoptera, Ichneumonidae) from Kazakhstan and central Asia. *Entomological Review* **69 (7)**: 66–71.

NAROLSKY N. B. 1994: A new Palaearctic genus of the Ichneumonid wasp subfamily Cremastinae (Hymenoptera, Ichneumonidae. *Journal of the Ukrainian Entomological Society* **1 (2)**: 41–58 (in Ukrainian with English summary).

NAROLSKY N. B. 2002: *Tersoakus* gen. nov., a new genus of cremastine wasps from the Russian Far East (Hymenoptera: Ichneumonidae: Cremastinae). *Zoologische Mededelingen* (Leiden) **76 (1–16)**: 97–102.

NAROLSKY N. B. & SCHÖNITZER K. 2001: A new Palearctic genus of cremastine wasps from the flats of the Danube Delta (Hymenoptera: Ichneumonidae, Cremastinae). *Entomofauna* **22 (8)**: 197–204.

NAROLSKY N. B. & SCHÖNITZER K. 2003: Eine neue Art der Gattung *Pharetrophora* Narolsky aus dem Iran (Hymenoptera, Ichneumonidae, Cremastinae). *Spixiana* **26 (2)**: 155–158.

OMATSU Y. & KONISHI K. 2023: Revision of the genus *Dimophora* Förster (Hymenoptera: Ichneumonidae: Cremastinae) from Japan. *Zootaxa* **5278**: 537–554.

PATEL R. C., PATEL J. C. & PATEL J. K. 1971: New records of parasites of *Spodoptera exigna* Hb. and *Spodoptera litura* Fabricius from Gujarat. *Indian Journal of Entomology* **33 (1)**: 92–93.

QUICKE D. L. J. 1991: Ovipositor mechanics of the braconine wasp genus *Zaglyptogastra* and the ichneumonid genus *Pristomerus*. *Journal of Natural History* **25**: 971–977.

QUICKE D. L. J. 2015: *The Braconid and Ichneumonid Parasitoid Wasps: Biology, Systematics, Evolution and Ecology*. Wiley Blackwell, Chichester, 704 pp.

QUICKE D. L. J., FITTON M. G., NOTTON D. G., BROAD G. R. & DOLPHIN K. 2000: Phylogeny of the subfamilies of Ichneumonidae (Hymenoptera): a simultaneous molecular and morphological analysis. Pp. 74–83. In: AUSTIN A. D. & DOWTON M. (eds): *Hymenoptera: evolution, biodiversity and biological control*. CSIRO Publishing, Collingwood, 468 pp.

QUICKE D. L. J., LAURENNE N. M., FITTON M. G. & BROAD G. R. 2009: A thousand and one wasps: a 28S rDNA and morphological phylogeny of the Ichneumonidae (Insecta: Hymenoptera) with an investigation into alignment parameter space and elision. *Journal of Natural History* **43**: 1305–1421.

RANJITH A. P., QUICKE D. L. J., RESHCHIKOV A. & BUTCHER B. A. 2024: A new enigmatic genus of the ichneumonid subfamily Ctenopelmatinae (Hymenoptera, Ichneumonidae) from Thailand. *Journal of Hymenoptera Research* **97**: 491–504.

RESHCHIKOV A. 2024: Review of Oriental species of the genus *Atopotrophos* (Hymenoptera: Ichneumonidae). *Zootaxa* **5519 (1)**: 119–132.

RESHCHIKOV A., SANTOS B. F., LIU J. X. & BARTHÉLÉMY C. 2019: Review of *Palpostilpnus* Aubert (Hymenoptera, Ichneumonidae, Phygadeuontinae), with the description of ten new species. *European Journal of Taxonomy* **582**: 1–63.

RIEDEL M., AMERI A., TALEBI A. A. & EBRAHIMI E. 2019: Contribution to the Ichneumonidae (Hymenoptera) of Iran, with description of seven new species. *Linzer Biologische Beiträge* **51 (1)**: 361–390.

ROSENBERG H. T. 1934: The biology and distribution in France of the larval parasites of *Cydia pomonella*, L. *Bulletin of Entomological Research* **25 (2)**: 201–256.

ROUSSE P., VILLEMANT C. & SEYRIG A. 2011: Ichneumonid wasps from Madagascar. V. Ichneumonidae Cremastinae. *Zootaxa* **3118**: 1–30.

SHARANOWSKI B., RIDENBAUGH R., PIEKARSKI P., BROAD G., DEANS A., LEMMON A., LEMMON E., DIEHL G., WHITFIELD J. & HINES H. 2020: Phylogenomics of Ichneumonoidea (Hymenoptera) and implications for evolution of mode of parasitism and viral endogenization. *Molecular Phylogenetics and Evolution* **156 (107023)**: 1– 479.

SCHOLLER M. 1999: Field studies of Cryptocephalinae biology. Pp 421–436. In: COX M. L. (ed.): *Advances in Chrysomelidae biology*. *1*. Backhuys. Leiden, xii + 671 pp.

SCHÖDER D. 1974: A study of the interactions between the internal larval parasites of *Rhyacionia buoliana* (Lepidoptera: Olethreutidae). *Entomophaga* **19**: 145–171.

SÄÄKSJÄRVI I. E., KAUNISTO K. M., SHARKEY M., STEDENFELD S., SMITH M. A., HALLWACHS W. & JANZEN D. 2022: Cryptic biodiversity of tropical hesperiid caterpillar-attacking parasitoid wasps: three new species of *Creagrura* Townes (Hymenoptera, Ichneumonidae, Cremastinae) from Costa Rica and Perú. *Biodiversity Data Journal* **10 (e91486)**: 1–18.

TEA FAUNA 2025: www.teafauna.com (accessed 19 Mar. 2025).

TOWNES H. K. 1965: A new *Cremastus* (Ichneumonidae), parasitic on *Oberea*. *Papers of the Michigan Academy of Science Arts and Letters* **50**: 105–106.

TOWNES H. K. 1971: The genera of Ichneumonidae, Part 4. *Memoirs of the American Entomological Institute* **17**: 1–372.

TOSQUINET J. 1896: Contributions à la faune entomologique de l'Afrique. Ichneumonides. *Mémoires de la Société Entomologique de Belgique* **5**: 1–430.

TSANKOV G. 1988: The ichneumonoid parasites of the European Pine Shoot Moth caterpillars in Bulgaria (Hymenoptera: Ichneumonoidea). Pp. 391–393. In: GUPTA V. K. (ed.): *Advances in Parasitic Hymenoptera Research*. E. J. Brill, Leiden, 546 pp.

VAS Z. 2016a: A new species of *Temelucha* Förster from Malta with an updated and revised identification key to the Western Palaearctic *Temelucha* species (Hymenoptera, Ichneumonidae, Cremastinae). *Journal of Hymenoptera Research* **48**: 67–84.

VAS Z. 2016b: *Temelucha flavia* sp. n. from the Southern Mediterranean Region (Hymenoptera: Ichneumonidae: Cremastinae). *Ecologica Montenegrina* **8**: 38–44.

VAS Z. 2025: New species and records of Ichneumonidae II. (Hymenoptera). *Foli A Entomologica Hungarica* **86**: 31–53.

WATERSTON J. 1929: The bushman's arrow-poison beetle and its parasite. *Natural History Magazine* **2 (10)**: 74–80.

WEED C. M. 1887: On the parasites of the lesser apple leaf-roller, *Teras minuta* (Robs.). *Bulletin of the Illinois State Laboratory of Natural History* **3 (3)**: 39–44.

WEED C. M. 1888: On the Hymenopterous parasites of the strawberry leaf-roller, *Phoxopteris comptana* Fröl. *Entomologica Americana* **4**: 149–152.

WEISS H. B. 1917: Additions to insects of New Jersey, 5. *Entomological News* **28**: 214–221.

XIN H. J., HE Y. Q., LI Z. X., SHIJIN W., DU J. K., WANG C. F., PU T. & ZHANG W. 2012: Inter-annual variation of temperature and precipitation gradient at the eastern slope of Yulong Snow Mountain. *Earth Science - Journal of China University of Geosciences* **37**: 188–194.

YANG X., HUANG Z. P., CUI L. W., DAL POS D., RESHCHIKOV A. & XIAO W. 2024: A new record of *Coelichneumon rufofemoratus* (Cameron, 1903) (Hymenoptera: Ichneumonidae) from Eastern Himalayas, with a checklist of all the species of the genus from the Oriental region. *Journal of Insect Biodiversity* **50 (2)**: 32–50.

YODER M. J., MIK I., SELTMANN K. C., BERTONE M. A. & DEANS A. R. 2010: A gross anatomy ontology for Hymenoptera. *PlOS One* **5 (12) (e15991)**: 1–8.

YU D. S., VAN ACHTERBERG C. & HORSTMANN K. 2016: World Ichneumonoidea 2015: *Taxonomy, biology, morphology and distribution*. [Flash drive]. Taxapad®, Vancouver, Canada.

ZYKOFF W. P. 1911: Les parasites des Psychides (Lepidoptera, Psychidae). *Entomological Review* **11**: 213–218.