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Short Communication

First records of the Hymenoptera superfamilies and families Mymarommatoidea: Mymarommatidae and Stephanoidea: Stephanidae in Georgia

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Abstract

We record for the first time the families Stephanidae and Mymarommatidae and the corresponding superfamilies Stephanoidea and Mymarommatoidea in Georgia. A single female of *Stephanus serrator* (Fabricius, 1798) was collected in Kakheti, Lagodekhi Protected Area (LPA), in the east, and five individuals of *Mymaromma anomalum* (Blood & Kryger, 1922) were collected in Achara, Kintrishi National Park (KNP), in the west of Georgia. Each of the studied wasp species is complemented by DNA (CO1) barcode sequences. Vouchers are deposited at Museum Koenig Bonn (LIB, ZFMK) and the Entomology Collection of the Agricultural University of Georgia (ECAUG).

Key words: Caucasus, CO1 barcode, new record, parasitoid wasps

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Introduction

The hymenoptera fauna of Georgia is still largely unknown. Recent progress has added numerous taxa to the list (Japoshvili and Haris 2022; Japoshvili and Ljubomirov 2021, 2023; Riedel et al. 2018, 2023; Riedel and Japoshvili 2021), but more taxa are expected to be present, in particular within the parasitoid wasps. The collaboration of Georgian and German researchers within the Caucasus Barcode of Life (CaBOL) project (https://ggbc.eu/) yielded records of the families/superfamilies Stephanidae (Stephanoidea) and Mymarommatidae (Mymarommatoidea) new to Georgia, which are presented herein.

Stephanidae Leach, 1815, is a species-poor family with around 360 described extant species worldwide (Aguiar 2004; Ge et al. 2021). Stephanids are rarely collected, with about 95% of all identified species being represented by singletons (Aguiar 2004; Binoy et al. 2020; Gupta and Gawas 2020; Ge et al. 2023). They are characterized by five crown-like teeth encircling the median ocellus on their spherical head, an elongated pronotum, a long ovipositor, and a swollen metafemur equipped with ventral teeth (van Achterberg and Yang 2004; Hong et al. 2011). Species with documented life histories are solitary idiobiont ectoparasitoids, primarily of wood-boring insect larvae, particularly those of Ceram-

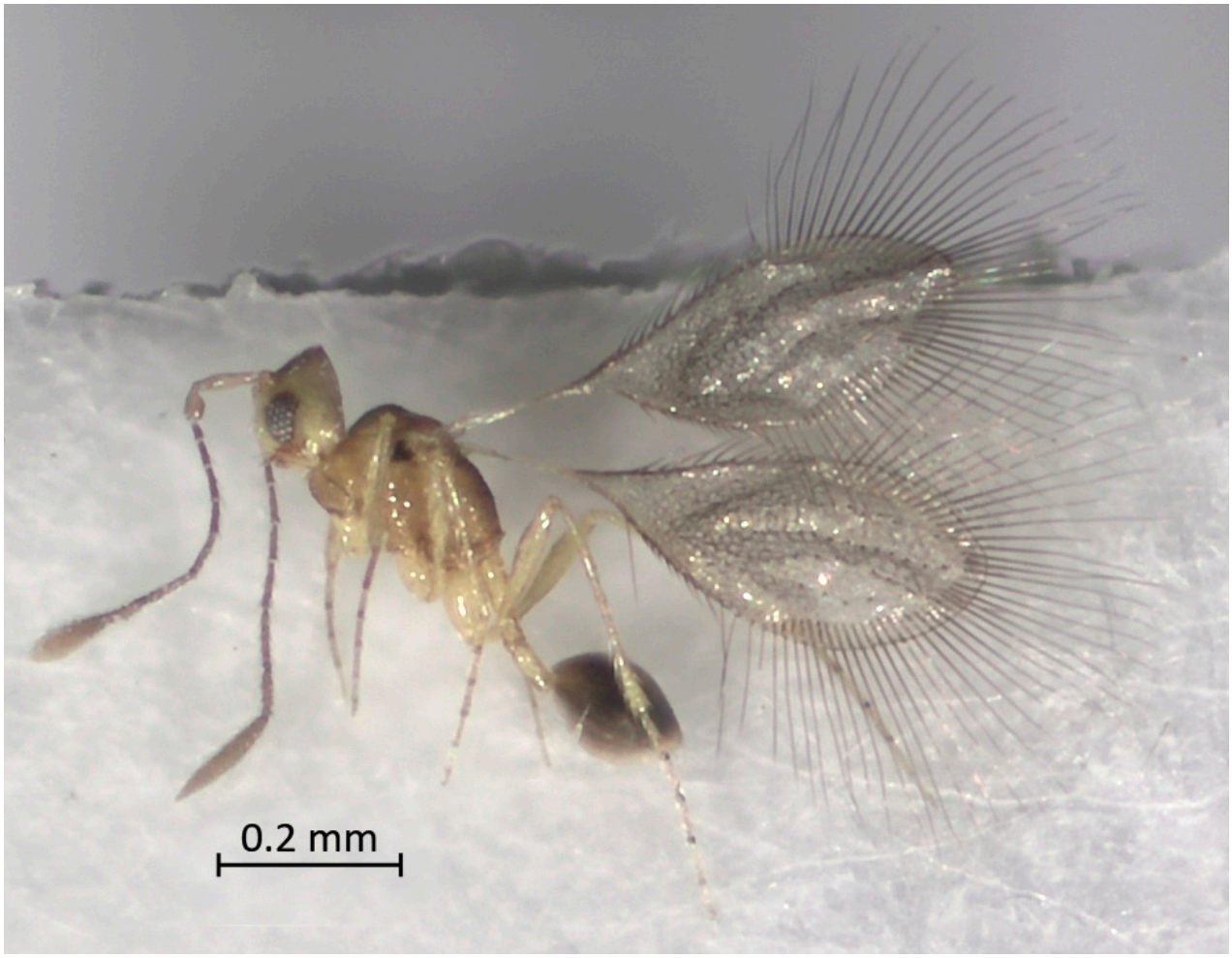
bycidae and Buprestidae (Coleoptera), with few additional host records from Siricidae and Apoidea (Hymenoptera) (Berland 1951; Kirk 1975; Aguiar 2004). The widespread species *Stephanus serrator* (Fabricius, 1798), a parasitoid of cerambycid beetles such as *Clytus arietis* (Linnaeus, 1758), *Pogonocherus eugeniae* Ganglbauer, 1891, *Rhopalopus femoratus* (Linnaeus, 1758), *R. macropus* (Germar, 1824), *Saperda similis* Laicharting, 1784, *Xylotrechus antilope* (Schönherr, 1817), and *X. arvicola* (Olivier, 1795) (Hausl-Hofstätter and Bojar 2016), has been recorded from several countries in Europe, including the Caucasus region (Azerbaijan, Türkiye, and Russia (Ceccolini 2021)). In 2022, we collected a single female specimen via sweep net at Lagodekhi Protected Area (LPA), Kakheti, which was stored in 96% ethanol and later examined morphologically and DNA barcoded.

Mymarommatidae Debauche, 1948 is also rarely collected, even more species-poor family (with 19 described extant species), though having worldwide distribution (Gibson et al. 2007; Mohanraj and Kamalanathan 2015; Ayyamperumal and Manickavasagam 2017; Honsberger et al. 2022; Villemant et al. 2023). Mymarommatids are small-sized (0.3-0.8mm) and display striking morphological characters. They are distinguished by their exodont mandibles, a head with a pleated membrane connecting the frontal and occipital plates, pedunculate forewings with a mesh-like pattern on the wing disc and long fringe setae, stalk-like hindwings, and a two-segmented petiole (Gibson et al. 2007). *Mymaromma menehune* Honsberger & Huber, 2022, is a solitary endoparasitoid of eggs of *Lepidopsocus* Enderlein, 1903 (Psocoptera: Lepidopsocidae) and the only species within the family with a confirmed host association (Honsberger et al. 2022). Mymarommatidae have been recorded from several countries in the Palaearctic, particularly the widespread species *Mymaromma anomalum* (Blood & Kryger, 1922), which can be found in the Palaearctic, Nearctic, and Indomalayan regions (Gibson et al. 2007; Hovorka et al. 2022; Villemant et al. 2023). In 2018, we collected five female specimens of *M. anomalum*, with a malaise trap in Kintrishi National Park (KNP), Ajara (Fig. 1). The trap sample was stored in 96% ethanol and later sorted, and specimens were examined morphologically and DNA barcoded.

Morphological examinations of the specimens were carried out with a Leica M205C stereomicroscope with a Leica Planapo 1.0x, M-series (WD 61.5mm) objective, and Leica PI 10x/23 oculars, also with a Zeiss stemi508 stereomicroscope, and the image of *M. anomalum* was taken with a Zeiss Axiocam 208.

DNA extraction and COI barcode amplification were performed in the LIB (ZFMK) molecular laboratory following the protocol described in Jafari et al. (2023). The Sanger sequencing was carried out by BGI BIO Solutions Co., Ltd. (Hong Kong). For *S. serrator*, a 658 bp long sequence was generated, using primers LCO 1490-JJ and HCO 2198-JJ (Astrin and Stüben 2008). For *M. anomalum* a 338 bp long sequence was generated using the primers Heloridae-CV-F and HCO 2198-JJ (Rehberger et al. 2024).

Identification of *S. serrator* is straightforward. The species is very distinctive and the only species known of the genus from the Western Palaearctic (van Achterberg and Yang 2004). Additionally, comparing the DNA barcode to records in the BOLD database (https://www.boldsystems.org/; Ratnasingham and Hebert 2007) resulted in four published matches with 100% identity to *S. serrator* (accessed on 18.03.2024).



Figures 1–7. Habitus of female *Mymaromma anomalum* (Blood & Kryger, 1922) in lateral view (HYM1000201). Scale bar: 200 µm.

The third author identified the individuals of *M. anomalum* (Blood & Kryger, 1922) four of them are deposited in the Entomology Collection of the Agricultural University of Georgia (ECAUG) and one in the Museum Koenig Bonn (LIB, ZFMK). The comparison of the DNA barcode region fragment generated herein to the BOLD database did not result in an unambiguous species identity (accessed on 18.03.2024).

Specimen data

Order Hymenoptera Linnaeus, 1758
Family Stephanidae Leach, 1815
Genus *Stephanus* Jurine, 1807

***Stephanus serrator* (Fabricius, 1798)**

Materials examined. GEORGIA • 1 female; Lagodekhi Protected Area (LPA), Kakheti; 41°48.55'N, 46°19.34'E; 500 m a.s.l.; 30. May. 2022; leg. T Salden; sweep net; ZFMK-Hym-00040197 (BOLD Process ID: GBHYG4494-24).

Family Mymarommatidae Debauche, 1948
Genus *Mymaromma* Girault, 1920

***Mymaromma anomalum* (Blood & Kryger, 1922)**

Marterials examined. GEORGIA • 1 female; Kintrishi National Park (KNP), Ajara; 41°44.23'N, 41°58.75'E; 404 m a.s.l.; 27. July - 10. August. 2018, leg. CaBOL team; Malaise trap; HYM1000200. • 3 females; Kintrishi National Park (KNP), Ajara; 41°44.23'N, 41°58.75'E; 404 m a.s.l.; 10-24. August. 2018; leg. CaBOL team; Malaise trap; HYM1000198, HYM1000199, ZFMK-HYM-00040198 (BOLD Process ID: GEMYM001-24). • 1 female; Kintrishi National Park (KNP), Ajara; 41°43.77'N, 42°4.65'E; 1020 m a.s.l.; 10-24. August. 2018; leg. CaBOL team; Malaise trap; HYM1000201.

Both species serve as notable new records for the Georgian fauna, as they represent new records of families and superfamilies and therefore complement our knowledge of the Georgian wasp fauna on a high taxonomic level. We hope that this will contribute to the generation of additional distribution data for these two spectacular, yet often overlooked or neglected, parasitoid wasp taxa from Georgia and other countries.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

TS wrote the manuscript with support from RSP, and collected and identified provided specimens. BM conducted the DNA barcoding. GJ and AU collected and identified provided specimens. GJ contributed to the writing of the manuscript. NH planned and organized the collecting event.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

References

Achterberg C van, Yang Z (2004) New species of the genera *Megischus* Brullé and *Stephanus* Jurine from China (Hymenoptera: Stephanoidea: Stephanidae), with a key to world species of the genus *Stephanus*. Zoologische Medelingen Leiden 78: 101–117

Aguiar AP (2004) World catalog of the Stephanidae (Hymenoptera: Stephanoidea). Zootaxa 753: 1–120. https://doi.org/10.11646/zootaxa.753.1.1

Astrin JJ, Stüben PE (2008) Phylogeny in cryptic weevils: molecules, morphology and new genera of western Palaearctic Cryptorhynchinae (Coleoptera : Curculionidae). Invertebrate Systematics 22: 503–522. https://doi.org/10.1071/IS07057

Ayyamperumal M, Manickavasagam S (2017) Four New Species of *Mymaromma* Girault (Hymenoptera: Mymarommatidae) from India with a Key to Indian Species. Transactions of the American Entomological Society 143: 589–599. https://doi.org/10.3157/061.143.0304

Berland L (1951) Super-famille des Ichneumonoidea (Konow). In: Grassé PP (Ed.) Traité de Zoologie. Anatomie, systématique, biologie 10. Insectes supérieurs et Hémiptèroides, Paris, 902–931.

Binoy C, Achterberg C van, Kumar PG, Santhosh S, Sheela S (2020) A review of Stephanidae (Hymenoptera: Stephanoidea) from India, with the description of five new species. Zootaxa 4838: 1–51. https://doi.org/10.11646/zootaxa.4838.1.1

Ceccolini F (2021) New records for crown wasps in Europe (Hymenoptera, Stephanidae). Arxius de Miscel·lània Zoològica 19: 249–259. https://doi.org/10.32800/amz.2021.19.0249

Ge S-X, Ren L-L, Tan J-L (2023) A new species and a new record species of *Megischus* Brullé (Hymenoptera, Stephanidae) from Vietnam. Journal of Hymenoptera Research 96: 723–734. https://doi.org/10.3897/jhr.96.107502

Ge S-X, Shi H-L, Ren L-L, Tan J-L (2021) Description of a new species of *Megischus* Brullé (Hymenoptera, Stephanidae), with a key to the species from China. ZooKeys 1022: 65–77. https://doi.org/10.3897/zookeys.1022.62833

Gibson GAP, Read J, Huber JT (2007) Diversity, Classification and Higher Relationships of Mymarommatoidea (Hymenoptera). Journal of Hymenoptera Research 16: 51–146.

Gupta A, Gawas SM (2020) A new species of the genus Foenatopus Smith (Hymenoptera: Stephanoidea: Stephanidae) from India. Zootaxa 4801: 389–394. https://doi.org/10.11646/zootaxa.4801.2.13

Hausl-Hofstätter U, Bojar H-P (2016) Behaviour, biology and morphology of *Stephanus serrator* (Fabricius, 1798) (Hymenoptera: Stephanidae). Joannea Zoologie 15: 15–38.

Hong C, Achterberg C van, Xu Z (2011) A revision of the Chinese Stephanidae (Hymenoptera, Stephanoidea). ZooKeys 110: 1–108. https://doi.org/10.3897/zookeys.110.918

Honsberger DN, Huber JT, Wright MG (2022) A new *Mymaromma* sp. (Mymarommatoidea, Mymarommatidae) in Hawai'i and first host record for the superfamily. Journal of Hymenoptera Research 89: 73–87. https://doi.org/10.3897/jhr.89.77931

Hovorka T, Holy K, Macek J (2022) Distribution of *Mymaromma anomalum* (Hymenoptera: Mymarommatidae) in the Czech Republic. Klapalekiana 58: 69–76.

Jafari S, Müller B, Rulik B, Rduch V, S. Peters R (2023) Another crack in the Dark Taxa wall: a custom DNA barcoding protocol for the species-rich and common Eurytomidae (Hymenoptera, Chalcidoidea). Biodiversity Data Journal 11: e101998. https://doi.org/10.3897/BDJ.11.e101998

Japoshvili G, Haris A (2022) Sawflies (Hymenoptera: Symphyta) of Kintrishi National Park, south-west Georgia (Sakartvelo). Annals of Agrarian Science 20: 12–27.

Japoshvili G, Ljubomirov T (2021) Wasps of the families Ampulicidae, Bembicidae, Bethylidae, Chrysididae, Crabronidae, Evanidae, Gasteruptidae, Heloridae, Pemphredonidae, Pompilidae, Psenidae, Sphecidae and Vespidae (Hymenoptera) of Lagodekhi protected areas, from Georgia (Sakartvelo). Annals of Agrarian Science 19: 269–287.

Japoshvili G, Ljubomirov T (2023) Apoidea (Hymenoptera, Apiformes and Spheciformes) of Northwestern Georgia with new records for the country. Journal of Insect Biodiversity and Systematics 9: 399–418. https://doi.org/10.52547/jibs.9.2.399

Kirk AA (1975) Siricid woodwasps and their associated parasitoids in the southwestern United States. Pan-Pacific Entomologist 51: 57–61.

Mohanraj P, Kamalanathan V (2015) A New Species of *Mymaromma* Girault (Hymenoptera: Mymarommatoidea: Mymarommatidae) from India. Entomological News 124: 325–330. https://doi.org/10.3157/021.124.0504

Ratnasingham S, Hebert PDN (2007) BOLD: The Barcode of Life Data System www.barcodinglife.org). Molecular Ecology Notes 7: 355–364. https://doi.org/10.1111/j.1471-8286.2007.01678.x

Rehberger S, Vogel J, Müller B, Vasilita C, Krogmann L, Schmidt S, Peters RS (2024) The obligate fig-pollinator family Agaonidae in Germany (Hymenoptera, Chalcidoidea). Deutsche Entomologische Zeitschrift 71(1): 177–183. https://doi.org/10.3897/dez.71.117640

Riedel M, Diller E, Japoshvili G (2018) The Ichneumonid fauna (Hymenoptera: Ichneumonidae) of Lagodekhi Reserve, Sakartvelo (Georgia), with descriptions of four new species. Linzer biologische Beiträge 50: 1447–1507.

Riedel M, Japoshvili G (2021) New records of Ichneumonidae from Northwestern Sakartvelo (Georgia), with additions to the fauna of Lagodekhi reserve. Linzer biologische Beiträge 53: 241–288.

Riedel M, Penigot W, Schwarz M, Diller E, Johansson N, Japoshvili G (2023) Darwin wasps (Hymenoptera, Ichneumonidae) of the Kintrishi National Park, Sakartvelo (Georgia), with descriptions of six new species. Linzer Biologische Beitrage, 55: 61–153.

Villemant C, Álvarez-Parra S, Santos BF (2023) Mymarommatidae, new family and superfamily of parasitoid wasps for Corsica (Hymenoptera, Mymarommatoidea). Bulletin de la Société Entomologique de France 128: 411–419. https://doi.org/10.32475/bsef_2295