Zootaxa 5565 (1): 001–066
https://www.mapress.com/zt/
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Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5565.1.1
http://zoobank.org/urn:lsid:zoobank.org:pub:4AD61A11-9DB5-4AD1-9F66-0D612476B273

ZOOTAXA

5565

The Palaearctic types of Chrysididae (Insecta, Hymenoptera) deposited in the Linsenmaier collection. Part 5. Elampini: genus *Holopyga* Dahlbom, 1845

PAOLO ROSA[1,2,4,*], CHRISTIAN FELSNER[3,5], RENÉ HEIM[1,6], MICHAEL GREEFF[3,7], DENIS MICHEZ[2,8,] & MARCO VALERIO BERNASCONI[1,9]

[1]*Natur-Museum Luzern, Kasernenplatz 6, CH-6003 Luzern, Switzerland.*
[2]*University of Mons, Research Institute for Biosciences, Laboratory of Zoology, Place du parc 20, 7000, Mons, Belgium.*
[3]*ETH Zürich, Institute of Agricultural Sciences, Biocommunication and Entomology, Schmelzbergstrasse 9/LFO, 8092 Zürich, Switzerland*
[4] *paolo.rosa@umons.ac.be; https://orcid.org/0000-0003-2919-5297*
[5] *christian.felsner@usys.ethz.ch; https://orcid.org/0009-0005-1084-7955*
[6] *rene.heim@bluewin.ch; https://orcid.org/0000-0002-6011-5200*
[7] *michael.greeff@usys.ethz.ch; https://orcid.org/0000-0002-2697-6330*
[8] *denis.michez@umons.ac.be; https://orcid.org/0000-0001-8880-1838*
[9] *Marco.Bernasconi@lu.ch; https://orcid.org/0000-0003-0993-8049*
**Corresponding author*

Magnolia Press
Auckland, New Zealand

Accepted by C.O. Azevedo: 12 Nov. 2024; published: 6 Jan. 2025

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(*Zootaxa* 5565)

66 pp.; 30 cm.

6 Jan. 2025

ISBN 978-1-77973-255-2 (paperback)

ISBN 978-1-77973-256-9 (Online edition)

FIRST PUBLISHED IN 2025 BY

Magnolia Press

P.O. Box 41-383

Auckland 1041

New Zealand

e-mail: magnolia@mapress.com

https://www.mapress.com/zt

© 2025 Magnolia Press

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

An illustrated catalogue of the Palaearctic types of species and subspecies of *Holopyga* Dahlbom, 1845 described by Walter Linsenmaier is presented. Linsenmaier described 48 species and subspecies of *Holopyga* and most of the primary types are deposited in the collection of the Natur-Museum in Luzern, Switzerland, with the exception of five holotypes which are deposited in other public and private collections. This catalogue includes the list of the described species, photographs of 41 holotypes and a synthesis of the recent changes in the taxonomy of *Holopyga* to update Linsenmaier's classification. New synonymies are proposed for the subgenus *Chamaeholopyga* Linsenmaier, 1987 **syn. nov.** of *Pseudolopyga* Krombein, 1969 and for two species: *Holopyga unitasculpta* Linsenmaier, 1968 **syn. nov.** of *H. solskyi* (Radoszkowski, 1877) and *H. jurinei* Chevrier, 1862 **syn. nov.** of *H. lucida* (Lepeletier, 1806). Additionally, a new species, *Holopyga dichroica* Rosa **sp. nov.**, formally referred to as *H. jurinei sensu* Linsenmaier 1959a is described.

Key words: Chrysidinae, Elampini, subgenera, catalogue, synonyms, new species

Introduction

The present article is the fifth contribution dedicated to the Palaearctic types of Chrysididae deposited at Walter Linsenmaier's collection (1917–2000) currently housed at the Natur-Museum in Luzern, Switzerland (Rosa *et al.* 2020a, 2022a, 2022b, 2023). An introductory work on the entire collection was previously published (Rosa *et al*. 2015b). Preceding illustrated catalogues were focused on *Cleptes* Latreille, 1802 (Rosa *et al*. 2020a), *Hedychridium* Abeille de Perrin, 1878, including the subgenus *Prochridium* Linsenmaier, 1968 (Rosa *et al.* 2022a), *Hedychrum* Latreille, 1802 (Rosa *et al*. 2022b), and *Omalus* Panzer, 1801, along with related subgenera *Omalus s.str.*, *Holophris* Mocsáry, 1890, *Philoctetes* Abeille de Perrin, 1879, *Chrysellampus* Semenov-Tian-Shanskij, 1932, and *Elampus* Spinola, 1806, previously named *Notozus* Förster, 1853 until Linsenmaier 1994 (Rosa *et al*. 2023).

Walter Linsenmaier described more than 700 new species and subspecies, 48 of which belong to *Holopyga* Dahlbom, 1845 (Linsenmaier 1959a, 1959b, 1968, 1987, 1994, 1997, 1999). Linsenmaier's collection also contains primary and secondary types of taxa described by Enslin (1939), Semenov-Tian-Shanskij & Nikol'skaya (1954), Zimmermann (1956), Móczár (1967a), Arens (2004) and Rosa (2018). As noted in other genera, some specimens in his collection were labelled as types by Linsenmaier despite laking actual type status (e.g. *H. effrenata*). Several taxa in the collection are *nomina in collection* (never formally described), one of which (*H. noskiewiczi*) was later described as *H. lucens* by Rosa (2018).

Linsenmaier (1959a) was the first to introduce the concept of species group within the genus *Holopyga*. Initially, he proposed three species groups (Linsenmaier 1959a: 36): the *fervida* group, the *miranda* group, and the *gloriosa* group. Subsequently, the name *Holopyga gloriosa* group was replaced by the *amoenula* group by Rosa & Pavesi (2020) because the name *gloriosa* Fabricius, 1793 was suppressed by the International Commission on Zoological Nomenclature (ICZN, 1998) and is therefore invalid. Linsenmaier (1999: 32) later established a fourth species group, the *deserticola* group, which is apparently based on the misidentication of *Holopyga deserticola* du Buysson, 1898.

The final discussion provides comments on the current status of several taxa and recents changes in the taxonomy of Palaearctic *Holopyga* updating Linsenmaier's classification of this genus.

Materials and methods

Linsenmaier's collection comprises approximately 56,750 specimens, including 4,529 *Holopyga* specimens. The collection consists of specimens collected in more than 150 countries (Rosa *et al.* 2015b).

The present catalogue focuses on the species described by Linsenmaier (1959a, b, 1968, 1987, 1994, 1997, 1999) in *Holopyga* s.str. and in the subgenus *Chamaeholopyga* Linsenmaier, 1987. We follow the classification proposed by Linsenmaier in the mentioned works, with notes on type specimens and synonymies when necessary. As for previous publications on Linsenmaier's types, the first part of this catalogue reports all type specimens deposited in his collection, offering a synthesis of Linsenmaier's fragmented work, accompanied by a commentary. The second part includes modifications to Linsenmaier's classification published in recent years, due to an extensive number of taxonomic and nomenclature changes. This updated list is presented to facilitate the correct identification of the Western Palaearctic *Holopyga* for the users of Linsenmaier's keys and publications.

All data observed for primary and secondary types deposited at the collection are reported here. Species are listed alphabetically according to subgenus and species names, with the following data provided: category of the type, number and sex of specimens, and complete label data as they are written or printed on the labels. A single slash (‘’/’’) indicates information handwritten on the back of the label, while double slashes (‘’//’’) separate different labels.

Linsenmaier adopted the subgeneric system for *Holopyga* starting from 1987, when he described the subgenus *Chamaeholopyga*. In 1999, he added the subgenus *Haba* Semenov-Tian-Shanskij, 1954. All species described before 1987 and those described in 1994 were described without mentioning subgenera, but in Linsenmaier’s final classification all these species are included in the subgenus *Holopyga* s.str.

As explained by Rosa *et al*. (2015b), Linsenmaier often added a colour label (grey or light blue) between the insects or transparent labels and the locality labels. These colour labels, which typically indicate only a generic locality (e.g. Helvetia, Mongolia, etc.), were added by Linsenmaier for decorative purposes and not to provide any relevant information; therefore, they have been omitted from the list of labels associated with the type specimens.

We follow Linsenmaier (1968, 1987, 1997, 1999) for the geographic concept of ‘’Palestine’’, defined as the area currently comprising the modern State of Israel, the West Bank, and the Gaza Strip. In this context, ‘’Palestine’’ is considered as the geographical region in Western Asia, without any reference to the current political claims by the State of Palestine.

The definitions of holotype, neotype, lectotype, etc. are used in accordance with the International Code for Zoological Nomenclature (ICZN 1999, fourth edition).

The terminology for chrysidids follows Kimsey & Bohart (1991) and the terminology for sculpture follows largely Harris (1979). The following abbreviations are used: AT (allotype): cat. (catalogue); descr. (description); design. (designation); diagn. (diagnosis); distr. (distribution); DMHF (dimethyl hydantoin formaldehyde); F1, F2, F3, etc. = flagellomeres 1, 2, 3, etc., respectively; fig. (figure); HT (holotype); MOD = anterior ocellus diameter (measured in frontal view); MS = malar space, the shortest distance between base of mandible and lowest margin of compound eye; OOL = oculo-ocellar line, the shortest distance between posterior ocellus and compound eye; P = pedicel; pag. (page); PLT (paralectotype); POL = posterior ocellar line, the shortest distance between posterior ocelli); PT (paratype) s. str. (*sensu stricto*); tax. (taxonomic discussion); S = metasomal sternum; T = metasomal tergum.

Photographs of the type specimen of *Holopyga jurinei* and *H. dichroica* were taken with an Olympus OMD E-M1 Mark II photo camera (Olympus Corporation, Shinjuku, Tokyo, Japan) using the Olympus Zuiko 60 mm objective and a Marumi lens (Marumi Optical Co., Tokyo, Japan) for general habitus shots, and a Mitutoyo Plan Achromatic Lens LWD 5× (Mitutoyo Corporation, Kanagawa, Japan); images were stacked with the Helicon© software (Helicon Soft Ltd., Oakland, CA, USA) and then enhanced with Adobe Photoshop© CS6 (Adobe Inc., San Jose, CA, USA).

Photographs of Linsenmaier’s types were taken with a photo camera Basler ace L acA4112-30uc and with lenses Schneider Kreuznach PYRIT 2.8/28 V38 reverse and Schneider Kreuznach PYRIT 2.8/50 V38 reverse. Images captured using the Basler ace camera are obtained through a specialized machine designed for the three-dimensional reconstruction of small, pinned specimens. This process utilizes a prototype system, the DISC3D, developed by the Technische Universität Darmstadt and deployed at ETH Zurich (ETHZ) since 2021. The DISC3D system integrates multi-view imaging with depth-of-field (DOF) imaging in an automated workflow, offering significant advantages in terms of the speed and consistency of image acquisition. The system’s high image acquisition rate is achieved through the movement of the camera during image capture. It is capable of capturing up to 62,000 DOF images within one hour. Following acquisition, these DOF images are immediately stacked into an extended depth-of-field (EDOF) image on an operational computer. A gimbal mechanism positions the specimen across a 360-degree range, allowing for comprehensive imaging from virtually any angle. The DISC3D machine uses a distinctive method for image stacking that ensures the accurate scaling of each DOF image, thereby facilitating successful three-dimensional reconstruction. Any alteration in the magnification of the optical system necessitates a meticulous calibration process to ensure the correct scale of each DOF image. The system generates 400 EDOF images from diverse angles within one hour, guaranteeing high-quality, detailed three-dimensional reconstructions of the specimens. The images possess a high level of detail but are constrained by the resolution of the system’s camera. While close-up imaging of specimens is feasible, the setup time for individual shots may be significantly longer compared to a dedicated macro photography system. Although the system is primarily engineered for three-dimensional reconstruction, the EDOF images capture fine details. These images were used for the present publication while the 3D images of all Linsenmaier’s types will be publicly available by 2025.

Molecular analyses

For the description of *Holopyga dichroica* Rosa, **sp. nov.** we applied integrative taxonomy using both morphological and molecular data. In the last three years, *Holopyga* specimens and some other hundreds Chrysididae were sampled in all South and Central Europe for genetic barcoding, in order to generate a barcode library for the European fauna. For all specimens, a single metaleg was removed from pinned specimens and sent to the Canadian Center for DNA barcoding (CCDB) in Guelph, Canada, for DNA extraction and sequencing (Ivanova *et al.* 2006). Specimens were sequenced following standardised high-throughput protocols. Both LCO1490 and Nancy primers were used (Folmer *et al.* 1994, Simon *et al.* 2006) to target the COI-5 region. All sequences are published on the Barcode of Life Database (BOLD) website.

Phylogenetic trees were supplemented with additional sequences downloaded from Genbank and the Barcode of Life Database. Trees were also significantly enriched with (i) sequences produced during the initiatives Barcoding Fauna Bavarica and German Barcode of Life (Schmid-Egger *et al.* 2024) with DNA extraction and sequencing perfomed at Guelph, and (ii) sequences produced by the Centro de Investigação em Biodiversidade e Recursos Genéticos (CIBIO, Portugal) as part of a collaboration to barcode the Portuguese bee fauna, and sequences will be available on BOLD. Sequences beginning with the code 'IBIHM' were generated by CIBIO. Sequences were aligned using MAFFT (Katoh & Standley 2013). Aligned sequences were analysed in Seaview (Gouy *et al*. 2010) using a maximum likelihood analysis which was run with 1000 bootstraps. Intra- and interspecific distances were calculated using MEGA-X (Kumar *et al*. 2018). *Parnopes unicolor* Gribodo, 1879 was selected as outgroup in order to ensure a species more basal to those selected for focused study.

Acronyms of museums and collections

MCZL—Musée cantonal de zoologie, Lausanne (Switzerland)
MHNG—Muséum d'histoire naturelle, Geneve (Switzerland)
MSNM—Museo civico di Storia naturale, Milan (Italy)
MTPC—Marc Tussac private collection (Auvillar, France)
NHMUK—Natural History Museum, London (UK)
NMLU—Natur-Museum, Luzern (Switzerland)

Species and subspecies of *Holopyga* described by Linsenmaier

Linsenmaier (1959a, 1959b, 1968, 1994, 1997, 1999) described one subgenus *Chamaeholopyga*, 33 species and 15 subspecies of *Holopyga* (see the list below). In his collection there are primary and/or secondary types of almost all taxa described, excluding those holotypes given in parenthesis in the following list.

Holopyga amoenula occidenta Linsenmaier, 1959a
Holopyga amoenula oriensa Linsenmaier, 1959a
Holopyga amoenula virideaurata Linsenmaier, 1951
Holopyga arabica Linsenmaier, 1994
Holopyga (*Holopyga*) *assecula* Linsenmaier, 1999
Holopyga austrialis Linsenmaier, 1959a
Holopyga bifigurata Linsenmaier, 1968
Holopyga biskrana Linsenmaier, 1959a
Holopyga (*Holopyga*) *caireana* Linsenmaier, 1999
Holopyga chrysonota appliata Linsenmaier, 1959a
Holopyga chrysonota discolor Linsenmaier, 1959a (MCZL)
Holopyga (*Holopyga*) *clancula* Linsenmaier, 1999
Holopyga cypruscula cypruscula Linsenmaier, 1959a
Holopyga cypruscula detrita Linsenmaier, 1959a
Holopyga cypruscula turca Linsenmaier, 1987
Holopyga (*Holopyga*) *densata* Linsenmaier, 1999
Holopyga duplicata Linsenmaier, 1997

Holopyga enslini Linsenmaier, 1959a
Holopyga fascialis Linsenmaier, 1959a
Holopyga gloriosa calida Linsenmaier, 1951 (MCZL)
Holopyga guadarrama Linsenmaier, 1987
Holopyga ignea Linsenmaier, 1968
Holopyga ignicollis granadana Linsenmaier, 1968
Holopyga ignicollis padri Linsenmaier, 1987
Holopyga intersa Linsenmaier, 1959a (MCZL)
Holopyga (*Holopyga*) *liliputana* Linsenmaier, 1999
Holopyga mattheyi Linsenmaier, 1959a (MCZL)
Holopyga (*Holopyga*) *meknesia* Linsenmaier, 1999
Holopyga minuma Linsenmaier, 1959a
Holopyga mlokosiewitzi hemisimpla Linsenmaier, 1959a
Holopyga mlokosiewitzi spartana Linsenmaier, 1968
Holopyga naefi Linsenmaier, 1959a
Holopyga ovata effrenata Linsenmaier, 1959b
Holopyga ovata proviridis Linsenmaier, 1959a
Holopyga (*Chamaeholopyga*) *parvicornis* Linsenmaier, 1987
Holopyga pseudovata Linsenmaier, 1987
Holopyga pulawskii Linsenmaier, 1968
Holopyga punctatissima reducta Linsenmaier, 1959a
Holopyga (*Holopyga*) *rubra* Linsenmaier, 1999
Holopyga (*Chamaeholopyga*) *rubrinigra* Linsenmaier, 1999
Holopyga speculiventre Linsenmaier, 1994
Holopyga subglabrata Linsenmaier, 1994 (NHMUK)
Holopyga tenuitarsis Linsenmaier, 1969
Holopyga trapeziphora Linsenmaier, 1987
Holopyga (*Holopyga*) *tussaci* Linsenmaier, 1999 (MTPC)
Holopyga unitasculpta Linsenmaier, 1968
Holopyga vicissituda Linsenmaier, 1994
Holopyga vigora Linsenmaier, 1959a

Clarification of taxonomic authorship

Historically, there were some misinterpretations about the correct citation of some authors important for the study of Chrysididae. Some of these cases were already discussed in previous publication. For clarity we use the correct spelling as written in the original publications, even if sometimes the same author published multiple articles with different spellings, as in the case of Russian authors)

We summarise here some cases found in Linsenmaier's literature, listed according to the oldest authority: the family name of Johann Reinhold Forster (1729–1798) was misspelled in Förster by Linsenmaier (1959a) and Kimsey & Bohart (1991). Arnold Förster (1810–1884) was an active German hymenopterist, and the two family names are not homonyms. Abeille de Perrin is the full family name of Elzéar Emmanuel Arène and it was always abbreviated in Abeille by Linsenmaier (all publications) and Kimsey & Bohart (1991); we use the full name as given by the author himself. The correct family name of Sándor Mocsary used by Linsenmaier (all articles) is Mocsáry, and we use it as such. The family name Radoszkowski was spelled as Radoszkovsky by Linsenmaier (1959a) and Radoszkowsky by Linsenmaier (1968, 1999). We use the name Radoszkowski (1877) and Radoszkowsky (1877) for two different publications, as given by the author himself. The full family name of Robert du Buysson (1861–1946) includes the "du" as he always used in his publications and identification labels and we cite his name as such. The name García Mercet was standardised by Linsenmaier (1959a) and other authors in "Mercet", but we use the full family name as written in the original papers by the author, whose full name is derived from the family name of the father—García—and family name of the mother—Mercet. The name Semenov-Tian-Shanskij was spelled as Semenow by Linsenmaier (1959a, 1968) and Semenov by Linsenmaier (1999). We use the full family name as given in the original publications. Finally, the name Lepeletier (1806) was correctly reported by Linsenmaier (all) and Kimsey & Bohart (1991). The full name of this notable French author is Amédée Louis Michel Lepeletier, comte de Saint-Fargeau. However, in the paper published in 1806 the name of the author is only "M. [= Monsieur] Lepeletier" and for this reason it is here cited as "Lepeletier" and not as "Lepelletier", "Le Pelletier", "Le Peletier", "Amédée

Louis Michel Lepeletier", or "Amédée Louis Michel Lepeletier, comte de Saint-Fargeau" as he named himself in other publications. Therefore, as for the other cases in this MS, we remain strict to the authority as originally given in the article.

Results

Genus *Holopyga* Dahlbom, 1845

Holopyga Dahlbom, 1845: 4. Type species: *Holopyga amoenula* Dahlbom, 1845: 4, by subsequent designation of Ashmead 1902.

Holopyga Dahlbom, 1845 is the third largest genus in the tribe Elampini, following *Hedychridium* Abeille de Perrin, 1878, and *Hedychrum* Latreille, 1802. The genus includes approximately 117 valid species globally, with 90 species occurring in the Palaearctic region (Kimsey & Bohart 1991; Strumia 1995; Linsenmaier 1997, 1999; Rosa *et al.* 2017a, 2020b). The European fauna includes 30 species and nine subspecies, some of which may warrant species rank, as in the case of other chrysidid taxa treated as subspecies by Linsenmaier (Mitroiu *et al*. 2015).

The genus *Holopyga* comprises robust species, with body lengths ranging from 4.0 to 8.0 mm. The key morphological features for identifying this genus include the following: a sharply angulate median vein of the forewing, a setaceous median cell, multidentate tarsal claws, a carinate and angulate mesopleuron, an angulate postocular region, and a cross-ridged scapal basin (Kimsey & Bohart 1991). This genus exhibits sexual dimorphism in the shape of third metasomal tergum and in colour pattern in some Palearctic species (Linsenmaier 1959a).

Linsenmaier (1987) described the subgenus *Chamaeholopyga*; for the taxonomic treatment of *Holopyga* see the dedicated paragraph below. Linsenmaier (1997) considered *Haba* Semenov-Tian-Shanskij, 1954 as subgenus of *Holopyga*.

Catalogue of *Holopyga* types described by Linsenmaier deposited at his collection

Holopyga amoenula occidenta Linsenmaier, 1959a

(Fig. 1A–1F)

Holopyga amoenula ssp. *occidenta* Linsenmaier, 1959a: 31 (descr.), 186 (cat.).

Type locality. France, Spain: "Spanien, Süd-Frankreich. Selten. ♂ Type, ♀ Allotype (Süd-Frankreich, Carpentras, VII.–VIII.1951/53, leg. Verhoeff) und Paratypen Coll. m.".

Holotype, ♂: [Fr]ance [Vau]cluse Carpentras 30.–31.VII.1951 PMF Verhoeff // ♂ Type *Holopyga* Dhlb. *amoenula occidenta* Lins. Linsenmaier det. 1959 // 35 // NML_ENT GBIF_Chr0003410 // (ex type-collection).

Allotype, ♀: France Var Callian Dr. Berland coll. Linsenmaier // ♀ Allotype *Holopyga* Dhlb. *amoenula* D. *occidenta* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003411 (ex type-collection).

Paratypes, 1♂: Soria 11.–13.7.57 Almenar Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *amoenula* Dhlb. *occidenta* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003384; 1♂: Spanien 18.VII.49 Prov. Orense La Gudina leg. Dr. W. Marten Coll. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *amoenula* ssp. *occidenta* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003385.

Remarks. Linsenmaier (1959a) reported that the holotype male and allotype female were collected at Carpentras by Verhoeff in July and August 1951 and 1953, respectively. However, the specimen labeled as the allotype in collection was collected at Callian by Berland. This locality and collector were not mentioned in the original description. Nonetheless, we consider this specimen as part of the paratype series because Linsenmaier's handwritten label and the year of identification align with the rest of the type series.

Conversely, there are three other specimens not labeled as paratypes but matching the original collecting events described by Linsenmaier (1959a). These includes two females and one male with the following labels: 1♀: France Vaucluse Carpentras 30.–31.VII.1951 PMF Verhoeff / *Holopyga* Dhlb. *amoenula occidenta* Lins. Linsenmaier det. 1959; 1♂ and 1♀: France Vaucluse Carpentras 1.–3.VIII.1953 PMF Verhoeff / *Holopyga* Dhlb. *amoenula*

occidenta Lins. Linsenmaier det. 1963. One female was identified in 1959 and the two other specimens in 1963. It is possible that the female collected in 1951 could be the actual allotype mentioned in Linsenmaier (1959a) but was not correctly labelled.

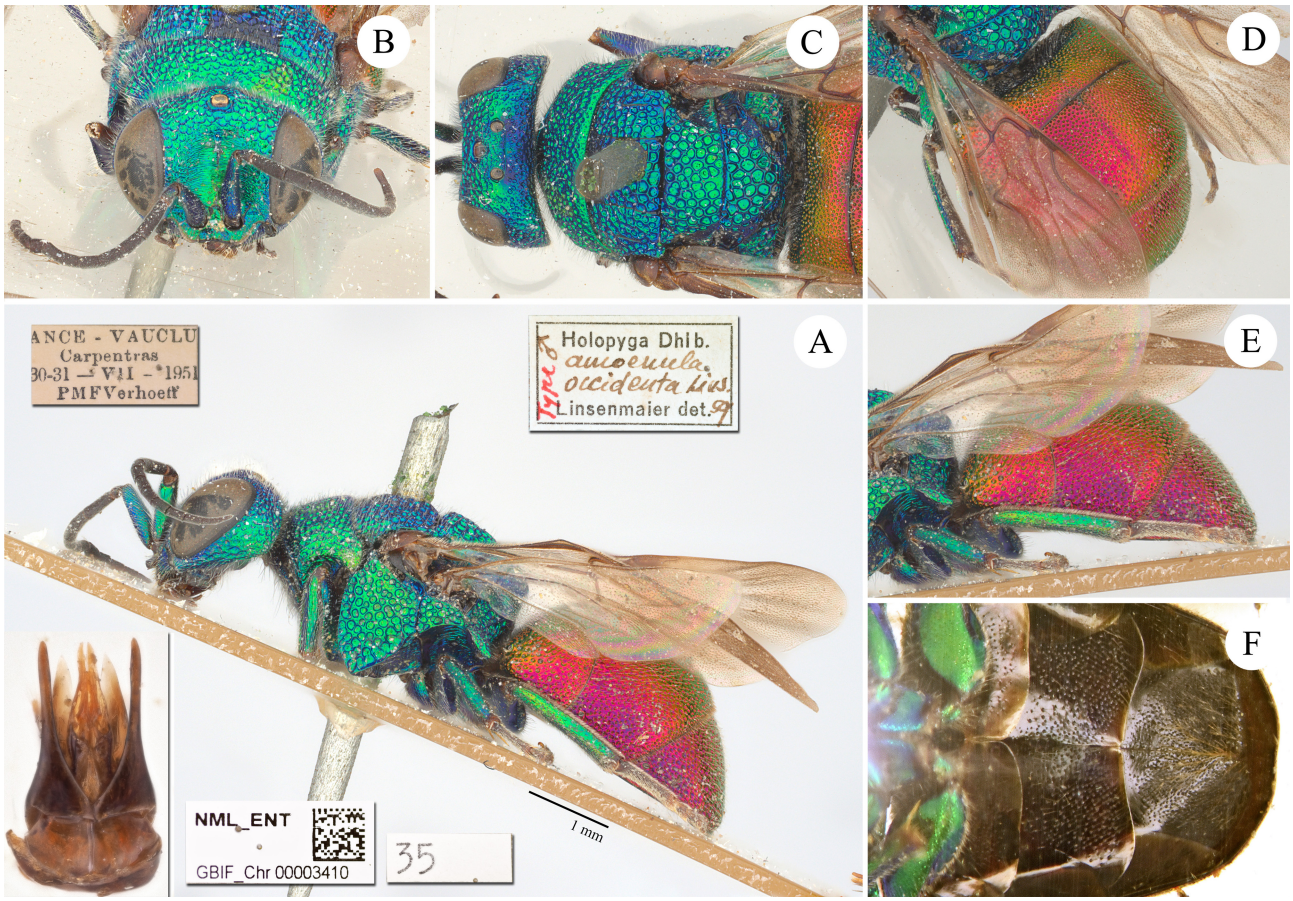

FIGURE 1. *Holopyga amoenula occidenta* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, dorsal view. E) Metasoma, lateral view. F) Metasoma, ventral view.

Holopyga amoenula oriensa **Linsenmaier, 1959a**
(Fig. 2A–2F)

Holopyga amoenula ssp. *oriensa* Linsenmaier, 1959a: 31 (descr.), 186 (cat.).

Type locality. Greece, Iran, Turkey, Palestine, Syria: "Griechenland, Klein-Asien, Syrien, Palästina, Persien. ♂ Type, ♀ Allotype (Klein-Asien, Akschehir und Pithion, VI.1955, leg. Seidenstücker) und Paratypen Coll. m.".

Holotype, ♂: Akschehir 1.–12.6.55 Seidenstücker // ♂ Type *Holopyga* Dhlb *amoenula oriensa* Lins. Linsenmaier det. 1958 // 34 // NML_ENT GBIF_Chr0003372 (ex type-collection).

Allotype, ♀: Pithion 18.–20.6.55 Seidenstücker //♀ Allotype *Holopyga amoenula* Dhlb. *oriensa* Lins. Linsenmaier det. 1958 // NML_ENT GBIF_Chr0003373 (ex type-collection).

Paratypes, 1♂: L. Konia Turkey 8.8.1957 leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *amoenula* Dhlb. *oriensa* Lins. Linsenmaier det. 1958 // NML_ENT GBIF_Chr0003332 (ex synoptic collection); 1♀: Graecia 20.7.52 Seidenstücker / Phytion // Paratype *Holopyga* Dhlb. *amoenula* Dhlb. *oriensa* Lins. Linsenmaier det. 1958 // NML_ENT GBIF_Chr0003334 (ex synoptic collection); 1♀: Benjamina Palestine 29.V.1948 leg. Bytinski-Salz // Paratype *Holopyga* Dhlb. *amoenula* Dhlb. *oriensa* Lins. Linsenmaier det. 1958 // NML_ENT GBIF_Chr0003362.

Remarks. The following female specimen, labelled: Skoplje Umg. Süd-Serbien F. Baldia 1939 // ♀ Paratype *Holopyga* Dhlb. *amoenula* Dhlb. *oriensa* Lins. Linsenmaier det. 1958 // NML_ENT GBIF_Chr0003333 was not reported in the original type series, although it was initially labeled alongside the other type specimens. Despite this,

the specimen is here considered as a paratype according to Art. 72.4.1.1. of the ICZN (''For a nominal species or subspecies established before 2000, any evidence, published or unpublished, may be taken into account to determine what specimens constitute the type series''). In this case, the evidence provided is the handwritten type label by Linsenmaier.

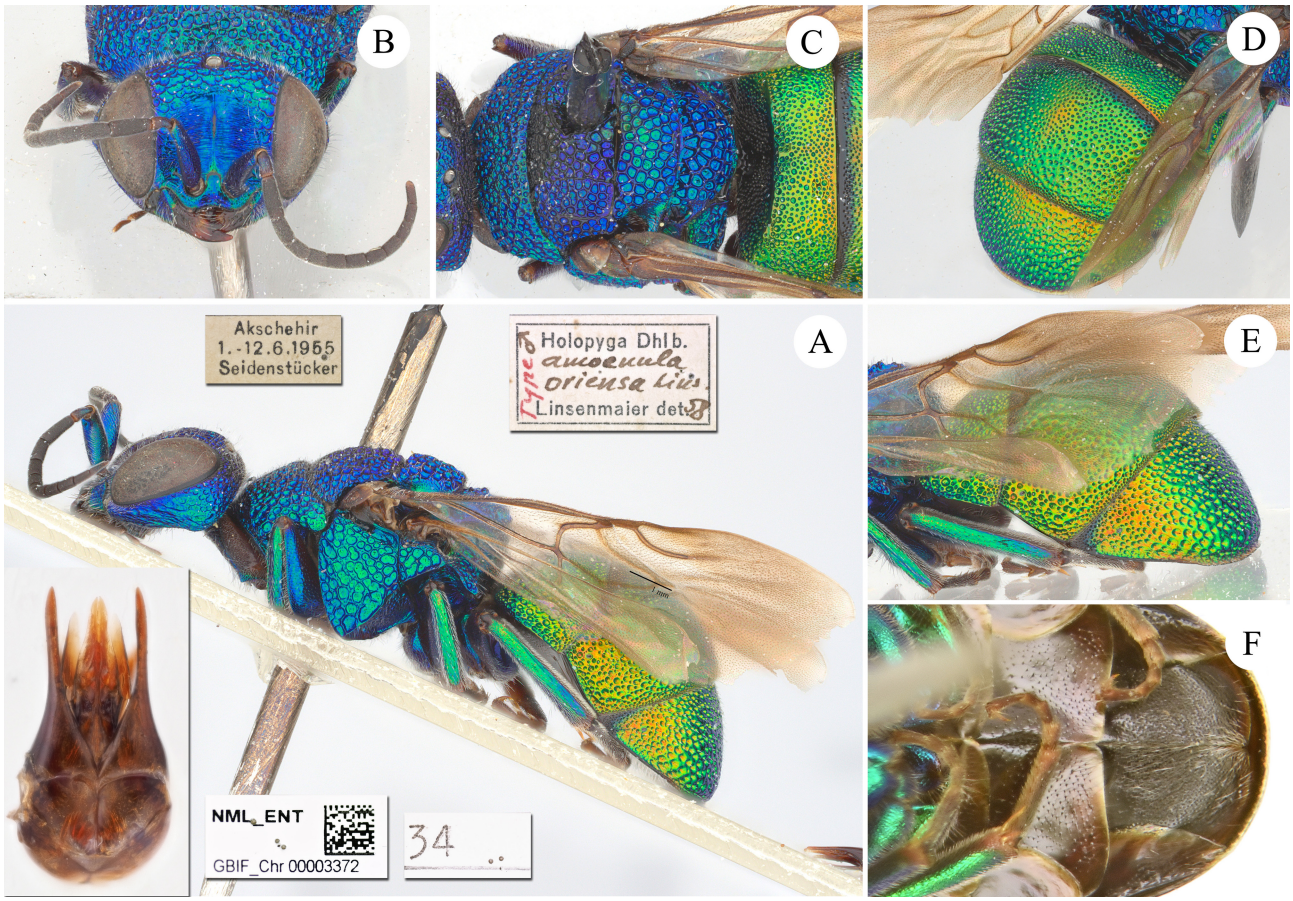

FIGURE 2. *Holopyga amoenula oriensa* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, dorsal view. E) Metasoma, lateral view. F) Metasoma, ventral view.

Holopyga amoenula virideaurata **Linsenmaier, 1951**

(Fig. 3A–3F)

Holopyga amoenula var. *virideaurata* Linsenmaier, 1951: 16 (descr.)
Holopyga ovata virideaurata: Linsenmaier 1959a: 31.
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga generosa virideaurata: Arens 2004: 33 (reinstated).

Type locality. South-East Europe, Greece (Rhodes), North Africa: "Südwesteuropa, Rhodos, Nordafrika. Type in meiner Sammlung, ♀ (Rhodos), Cotypen in meiner Sammlung u. in Coll. Naef (Maroc, Südfrankreich)".

Holotype, ♀: Rodi, Egeo Mai 1939 Dr. R. Meyer // Type ♀ *Holopyga* Dhbl. *amoenula* v. *virideaurata* det. Linsenmaier 1951// 1 // NML_ENT GBIF_Chr0003242 (ex Type-collection).

Remarks. As in other cases, Linsenmaier (1959a: 31) changed the species concept for this taxon and excluded specimens from France and Morocco from the type series. He removed the original labels from these specimens and today these paratypes are considered lost within the collection and have been identified as different taxa.

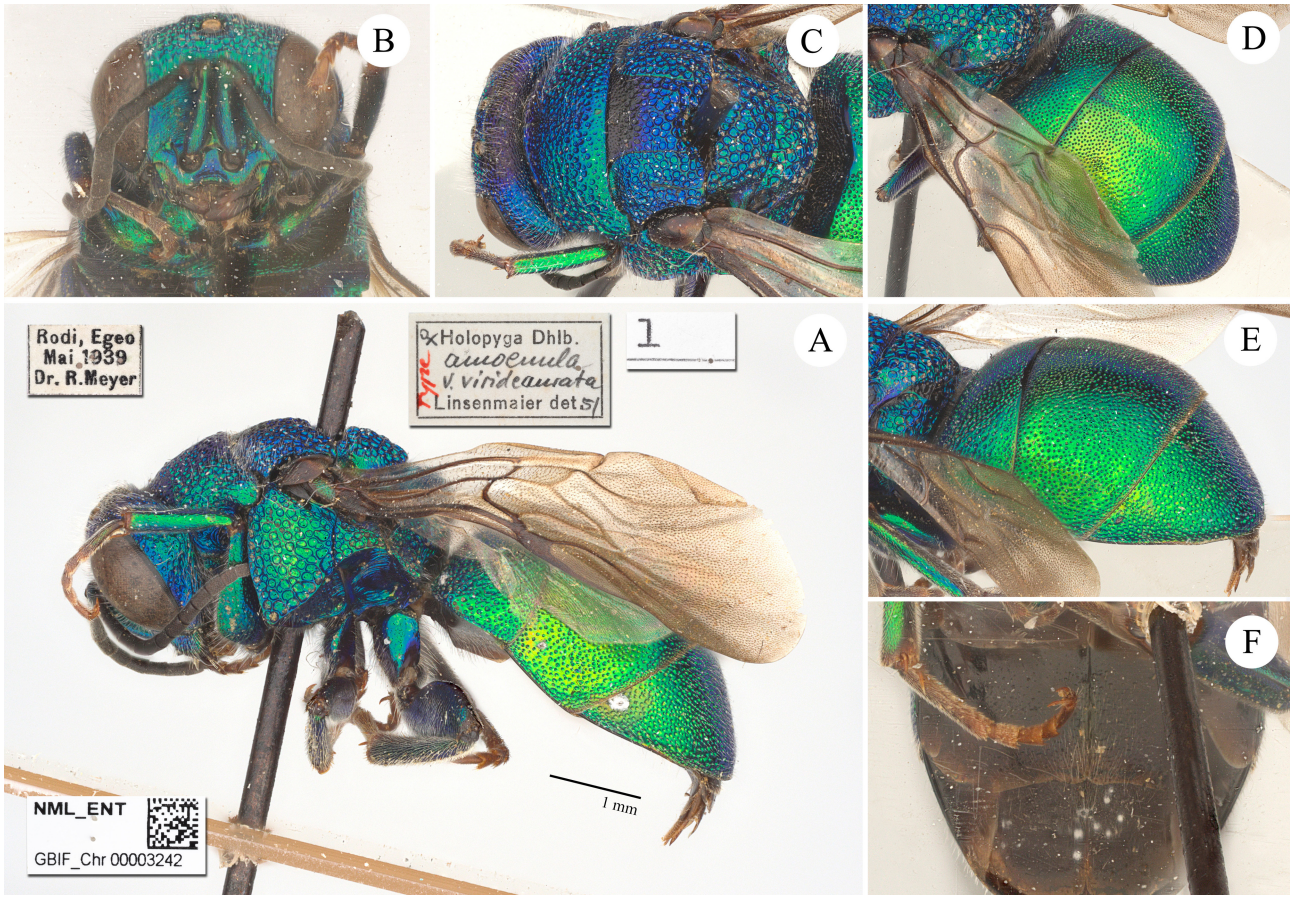

FIGURE 3. *Holopyga amoenula virideaurata* Linsenmaier, 1951, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, dorsal view. E) Metasoma, lateral view. F) Metasoma, ventral view.

Holopyga arabica Linsenmaier, 1994

(Fig. 4A–4F)

Holopyga arabica Linsenmaier, 1994: 152 (figs. 13, 14), 153 (key), 155 (descr.).

Type locality: "Holotype: ♀, 15.X.1958, with ♂ allotype 8.IV.1959 and 5♂♂, 3♀♀ paratypes, Saudi Arabia: Riyadh, III, IV, VI & X. 1959, Diehl, WLC.—Paratypes: Saudi Arabia: 1♀, Wadi Hanifa, IV.1976, Wittmer & Büttiker; 1♂, Talf, 1600 m, IV.1980, Guichard.—U.A.E.: 1♀, Khos Fakkan, III.1987, Hamer; 1♂, W. Asimah, III.1987, Hamer; 1♀, Fagsha, III.1987, Hamer.—Yemen: 1♂, 1♀, Usalfira, XII. 1937, Britton, WLC; 1♂, 1♀, Wadi Siham, VI.1987, Mühle (Schmidt Collection, Linz).—Oman: 1♂, W. Khabb, 23.II.1990, Hamer".

Holotype, ♀: Saudi-Arabien El Riyadh 15.X.58 leg. dr. Diehl Coll. Linsenmaier // ♀ *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♀ Type *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // 457 // NML_ENT GBIF_Chr0005378 (ex type-collection).

Allotype, ♂: Saudi-Arabien El Riyadh 8.IV.59 leg. Dr. Diehl Coll. Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb Linsenmaier det. 1966 // ♂ Allotype *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005379 (ex type-collection).

Paratypes, 1♂: Saudi-Arabien El Riyadh 15.X.58 leg. Dr. Diehl Coll. Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♂ Paratype *Holopyga* Dhlb. *arabica* det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005368 (ex synoptic-collection); 2♀♀: Saudi-Arabien El Riyadh 6.VI.1959 leg. Dr. Diehl Coll. Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♀ Paratypen *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005369 (ex synoptic-collection); 1♂: Saudi-Arabien El Riyadh 15.X.58 leg. Dr. Diehl Coll. Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb. det. Linsenmaier 1966 // ♂ Paratype *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005370; 1♂: Saudi-Arabien El Riyadh 23.III.59 leg. Dr. Diehl Coll.

Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♂ Paratype *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005371; 2♂♂: Saudi-Arabien El Riyadh 1.VI.59 leg. Dr. Diehl Coll. Linsenmaier // ♂ *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♂ Paratypen *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005372; 1♀: Saudi-Arabien El Riyadh 25.VI.59 leg. Dr. Diehl Coll. Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005373; 1♂, 1♀: Yemen, Usaifira, 1 mile N. of Ta'izz ca. 4,500 ft 21.XII.1937 // B.M. Exp. to S.W. Arabia H. Scott E.B. Britton, B.M.1938-246. // ♂ ♀: *Holopyga* Dhlb. *janthina* Dhlb. Linsenmaier det. 1966 // ♂♀ Paratypen *Holopyga* Dhlb. *arabica* det. Linsenmaier 89 // NML_ENT GBIF_Chr0005374–5375; 1♂, 1♀: N Yemen Wadi Siham 7.VI.1987 leg. Mühle // ♂ ♀ Paratypen *Holopyga* Dhlb. *arabica* Lins. det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005376–5377.

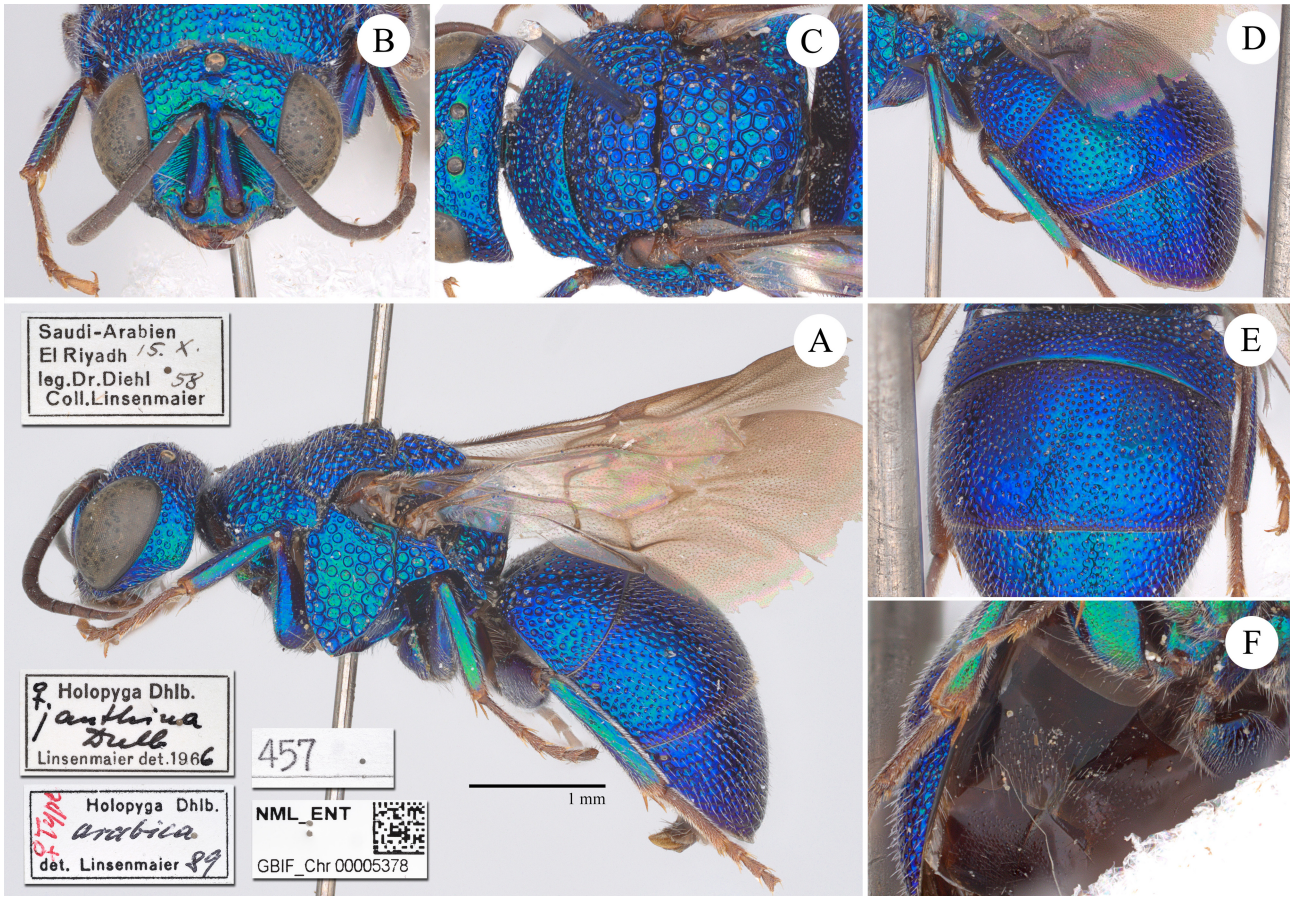

FIGURE 4. *Holopyga arabica* Linsenmaier, 1994, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Metasomal second tergum, dorsal view. F) Metasoma, ventral view.

***Holopyga* (*Holopyga*) *assecula* Linsenmaier, 1999**
(Fig. 5A–5F)

Holopyga (*Holopyga*) *assecula* Linsenmaier, 1999: 39 (descr.), 40 (fig. 69).

Type locality. Egypt: "Ägypten, El Giza V.1988, Sidler, ♀ Type (Holotypus) Coll. m.".

Holotype, ♀: Aegypten, El Giza, 5.88, R. Sidler // ♀ Type *Holopyga* Dhlb. *assecula* det. Linsenmaier 97 // 494 // NML_ENT GBIF_Chr0005411 (ex type-collection).

Remarks. Linsenmaier (1959a, 1968) misidentified specimens of *Holopyga beaumonti* Balthasar, 1953 and *H. assecula* as *H. colonialis* Mocsáry, 1911 (Linsenmaier 1999). Subsequently, Strumia (2016) transferred *Holopyga colonialis* in the genus *Haba* Semenov-Tian-Shanskij, 1954. However, *Holopyga assecula* and *H. beaumonti* are correctly classified as *Holopyga* species, as they lack prehensile tarsomeres.

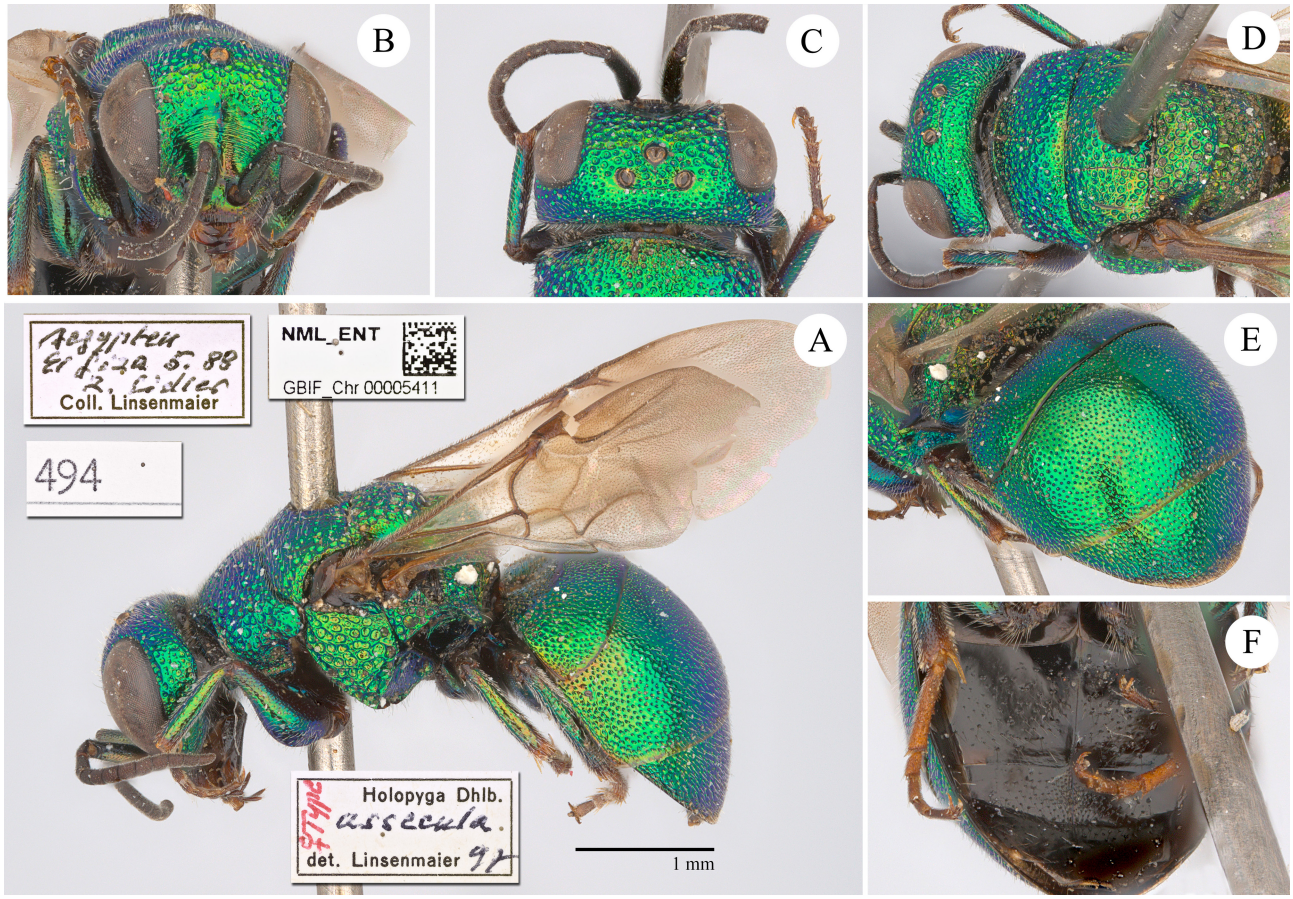

FIGURE 5. *Holopyga assecula* Linsenmaier, 1999, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head, dorsal view. D) Head and mesosoma, dorsal view. E) Metasoma, latero-posterior view. F) Metasoma, ventral view.

Holopyga austrialis Linsenmaier, 1959a

(Fig. 6A–6F)

Holopyga austrialis Linsenmaier, 1959a: 29 (key), 32 (descr., ♂), 186 (cat.), 197 (figs 36–38).
Holopyga austrialis: Linsenmaier 1987: 135 (descr., ♀).
Holopyga australis: Kimsey & Bohart 1991: 229. Incorrect subsequent spelling.
Holopyga ignicollis Dahlbom, 1854: Kunz 1994: 20 (synonymised).
Holopyga austrialis: Strumia 1995: 3 (reinstated).

Type locality. Austria: "Nieder-Österreich, ♂ Type und Paratype Coll. m., ♂ Paratype Coll. Verhoeff; Deutschland (Mecklenburg), Coll. m.".

Holotype, ♂ and 2 **paratypes,** ♂♂ (glued on the same plastic board): N. Österreich D. Altenburg 25.6.39 Blühweiss Coll. Linsenmaier // Type u. Paratypen ♂♂ *Holopyga* Dhbl. *austrialis* Lins. Linsenmaier det. 1957 // Type links // 39 // NML_ENT GBIF_Chr0004196 (ex type-collection).

Paratype, ♂: Mecklenburg Coll. Dr. Enslin Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *austrialis* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004190.

Remarks. Linsenmaier glued the holotype and two paratypes together on the same plastic transparent board. The holotype is the one on the left. Linsenmaier (1987: 135) provided the description of the female, which is coloured like *Holopyga inflammata* (Förster, 1853) but exhibits the sculpture and pilosity characteristic of the male of *H. austrialis*.

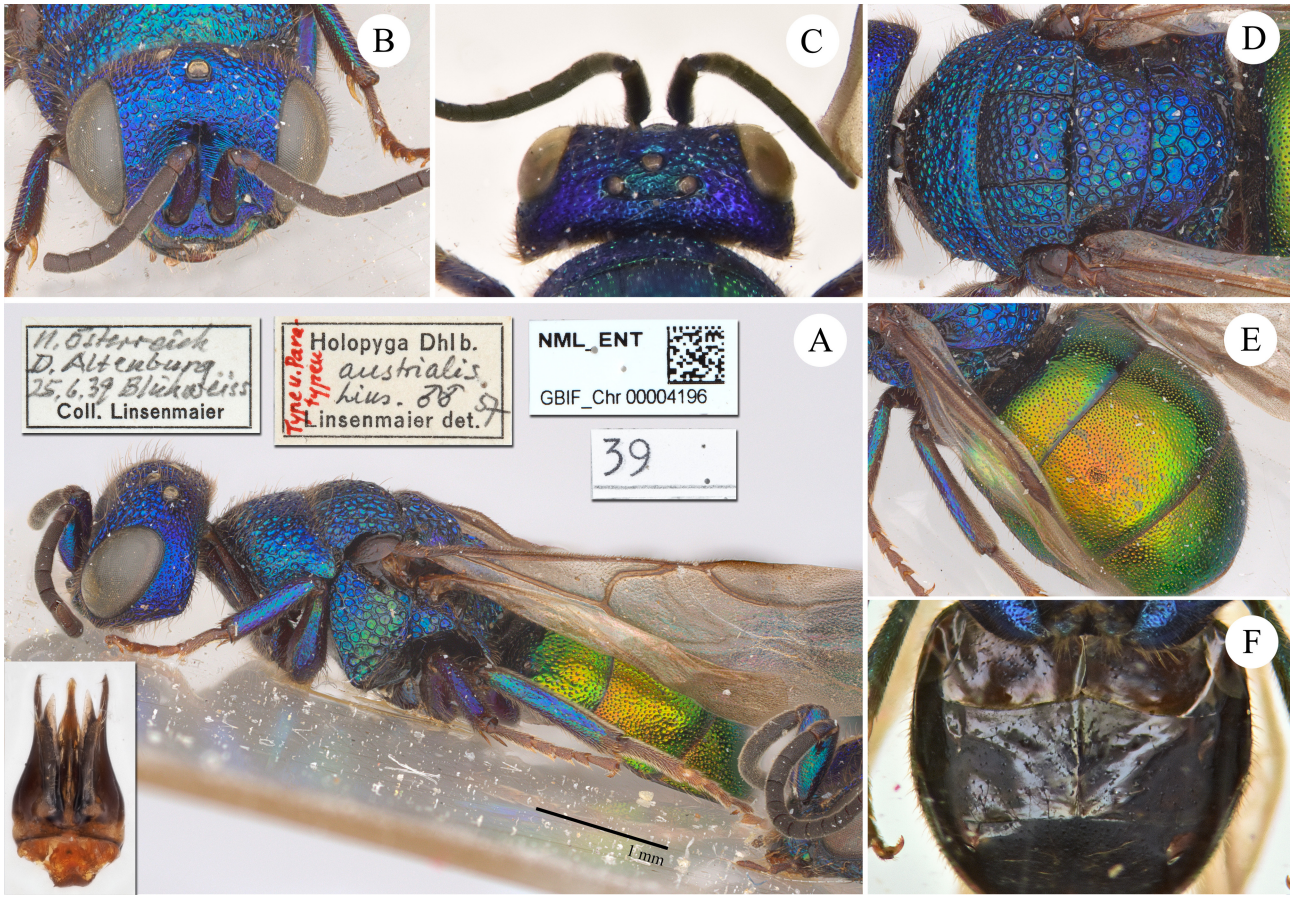

FIGURE 6. *Holopyga austrialis* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Head, dorsal view. D) Mesosoma, dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga bifigurata **Linsenmaier, 1968**

(Fig. 7A–7F)

Holopyga bifigurata Linsenmaier, 1968: 19 (descr.).

Type locality. Iran, Palestine, Turkey: "Palästina, Klein-Asien, Persien. ♀ Type, ♂ Allotype von Tel Aviv, leg. Bytinski-Salz, in Coll. m., Paratypen Coll. Bytinski-Salz, Coll. Verhoeff, Coll. m.".

Holotype, ♀: Israel Abū Kabir [locality in the province of Tel Aviv] 18.6.1961 leg. Bytinski-Salz // ♀ Type *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // 208 // NML_ENT GBIF_Chr0004925 (ex type-collection).

Allotype, ♂: Israel Abu Kabir 16.6.1961 leg. Bytinski-Salz // ♂ Alloype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004926 (ex type-collection).

Paratypes, 1♂: Palestine Tel Aviv 15.V. leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004892 (ex synoptic-collection); 1♀: Israel Abu Kabir 16.6.1961 leg. Bytinski-Salz // ♀ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004893 (ex synoptic-collection); 1♂: Israel Abu Kabir 14.6.1961 leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004917; 1♂: Ramat Gan Palestine 22.5.1944 leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004918; 1♂: Palästina 19.–26.4.34 Dr. R. Stich / Jericho // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004919; 1♂: Israel Jaffa 3.V.1951 P.M.F. Verhoeff // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004920; 1♂: Israel Abu Kabir 14.7.1961 leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT

GBIF_Chr0004921; 1♂, 1♀: Israel Ramat Gan 4.V.1951 P.M.F. Verhoeff // ♂ ♀ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004923–4924; 1♂: Kamal Abad 28.8.55 Coll. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *bifigurata* Lins. Linsenmaier det. 1964 // NML_ENT GBIF_Chr0004927.

Remarks. Linsenmaier (1959a) identified specimens of *Holopyga bifigurata* as *H. pygmaea* du Buysson, 1898.

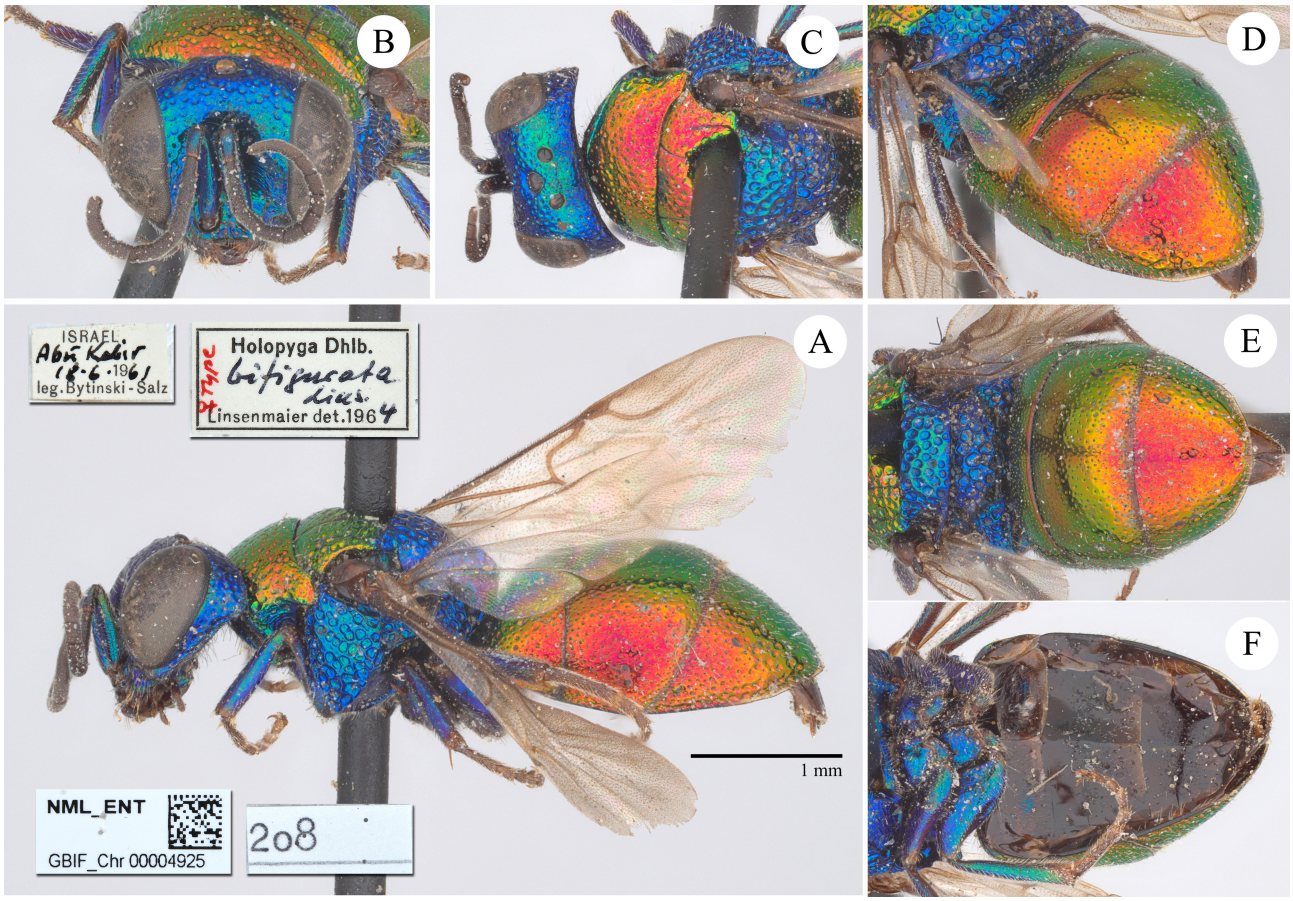

FIGURE 7. *Holopyga bifigurata* Linsenmaier, 1968, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, posterior view. F) Metasoma, ventral view.

Holopyga biskrana Linsenmaier, 1959a

(Fig. 8A–8F)

Holopyga biskrana Linsenmaier, 1959a: 28 (descr.), 186 (cat.).
Holopyga (*Holopyga*) *biskrana*: Linsenmaier 1999: 29 (key), 37 (diagn.), 41 (figs 51, 52).

Type locality. Algeria: "Algerien (Biskra), ♀ Type Coll. Naef, ♂ Allotype Coll. m. (VI.1948, leg. Naef)".

Holotype, ♀: Biskra, Algerie, 4.VI.1948 collect. Naef // Type ♀ *Holopyga* Dhlb. *fascialis* Lins. ssp. *biskrana* Lins. Linsenmaier det. 58 // 32 // NML_ENT GBIF_Chr0005337 (ex type-collection).

Allotype, ♂: Biskra, Algerie, 4.VI.1948 collect. Naef // Allotype ♂ *Holopyga* Dhlb. *biskrana* Lins. Linsenmaier det. 59 // NML_ENT GBIF_Chr0005338 (ex type-collection).

Remarks. In the Naef collection, which has now been merged with the Linsenmaier collection, there are additional specimens of *H. biskrana* Linsenmaier collected at Biskra in June 1948, including specimens collected on the 4th of June, similar to the type and allotype. However, these specimens are notconsidered part of the type series because Linsenmaier only identified them in 1979, after acquiring the Naef collection. Furthermore, the type series is restricted to the holotype and allotype, thereby excluding other specimens.

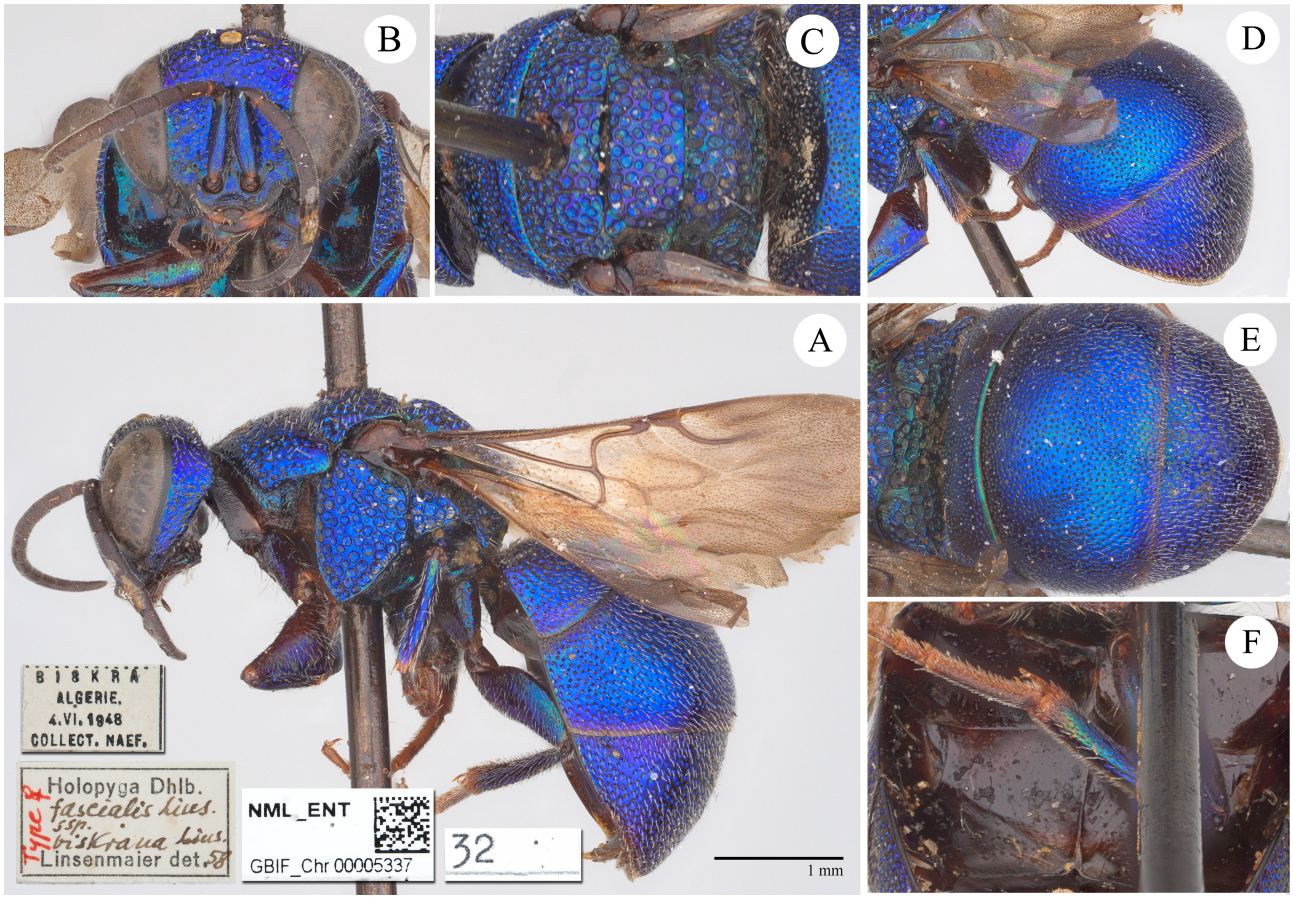

FIGURE 8. *Holopyga biskrana* Linsenmaier, 1959a, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

***Holopyga* (*Holopyga*) *caireana* Linsenmaier, 1999**

(Fig. 9A–9F)

Holopyga (*Holopyga*) *caireana* Linsenmaier, 1999: 30 (key), 37 (descr.), 41 (figs 57–59).

Type locality. Egypt: "Ägypten, Gizera 24.9.1992, Hauser, ♂ Type (Holotypus) Coll. m., ♂ Paratype Coll. Hauser".

Holotype, ♂: Ägypten, Kairo, 24.9.92, Gizera, leg.: M. Hauser // ♂ Type *Holopyga* Dhlb. *caireana* det. Linsenmaier 1997 // 492 // NML_ENT GBIF_Chr0005170 (ex type-collection).

Paratype, 1♂: Ägypten, Kairo, 24.9.92, Gizera, leg.: M. Hauser // ♂ Paratype *Holopyga* Dhlb. *caireana* det. Linsenmaier 1997 // NML_ENT GBIF_Chr0005169 (ex type-collection).

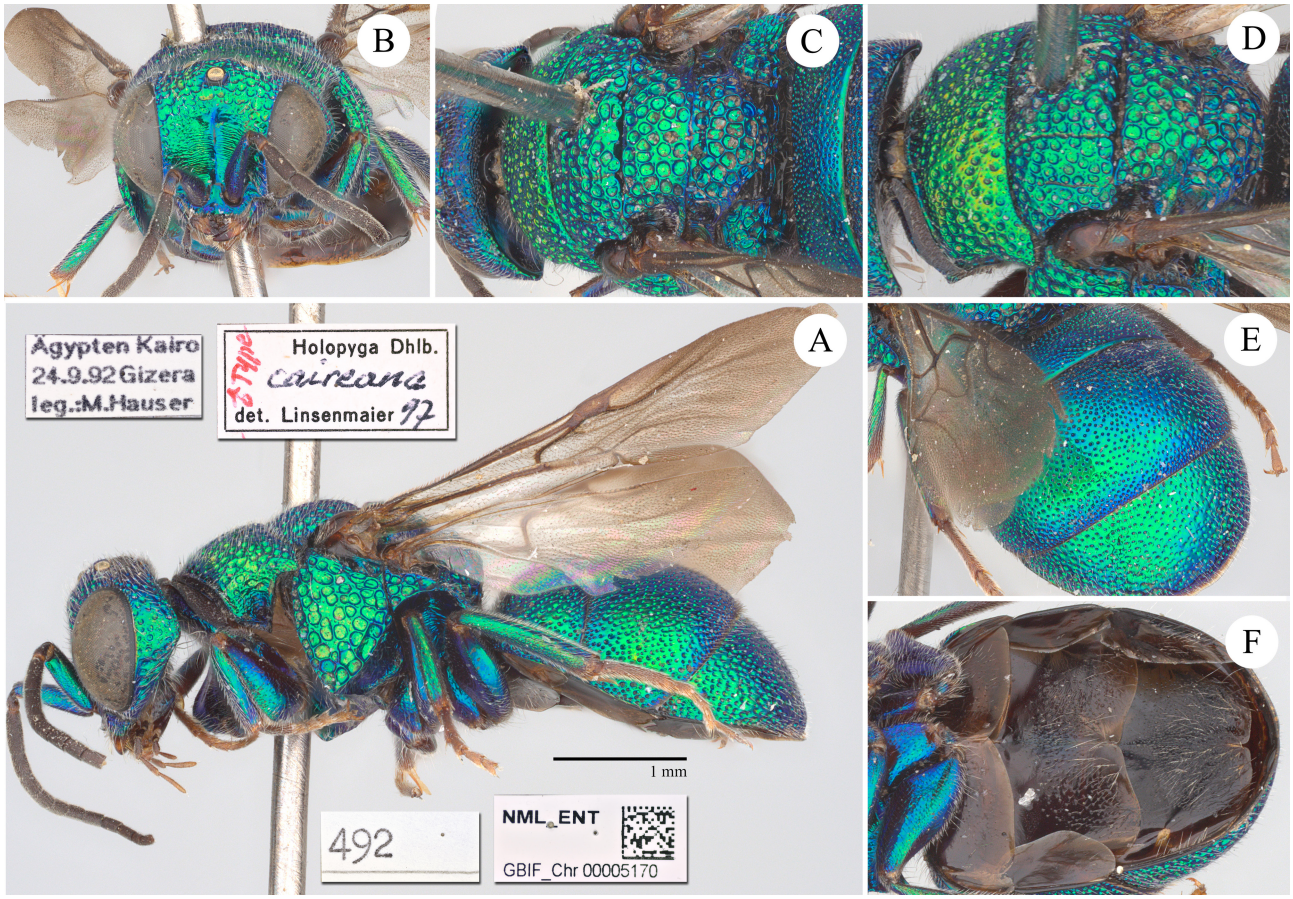

FIGURE 9. *Holopyga caireana* Linsenmaier, 1999, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Mesosoma, dorsal view. D) Mesosoma, dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga chrysonota appliata Linsenmaier, 1959a

(Fig. 10A–10F)

Holopyga chrysonota ssp. *appliata* Linsenmaier, 1959a: 32 (descr., ♀), 186 (cat.). Linsenmaier 1968: 17 (descr., ♂).

Type locality. Caucasus, Greece, Palestine, Turkey: "Griechenland, Klein-Asien, Palästina, Kaukasus. ♀ Type (Palästina. Jaffa V.1947, leg. Bytinski-Salz) und Paratypen Coll. m.".

Holotype, ♀: Palestine Jaffa 6.V.1947 leg. Bytinski-Salz // Type ♀ *Holopyga* Dhlb. *chrysonota appliata* Lins. Linsenmaier det. 1959 // 40 // NML_ENT GBIF_Chr0004096 (ex type-collection).

Paratypes, 1♂: Turkey 1948 // Paratype *Holopyga* Dhlb. *chrysonota* Frst. *appliata* Lins. Linsenmaier det. // NML_ENT GBIF_Chr0004051 (ex synoptic-collection); 1♀: Graecia 20.7.52 Seidenstücker / Phytion // Paratype *Holopyga* Dhlb. *chrysonota appliata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004053; 1♀: Kaukasus Prov. D'Elisabethpol 1910 Gook Tapa Lins. L. Mesmin // Paratype *Holopyga* Dhlb. *chrysonota appliata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004085.

Remarks. Linsenmaier (1959a) described *Holopyga chrysonota appliata* apparently based on females only, without designating an allotype. However, the collection contains a male specimen from Turkey labelled as a paratype. This male likely corresponds to the specimen collected in the locality "Klein-Asien" mentioned in the original description. Additionally, the identification label matches those of the other paratypes in the series. For these reasons we consider this male to be a paratype.

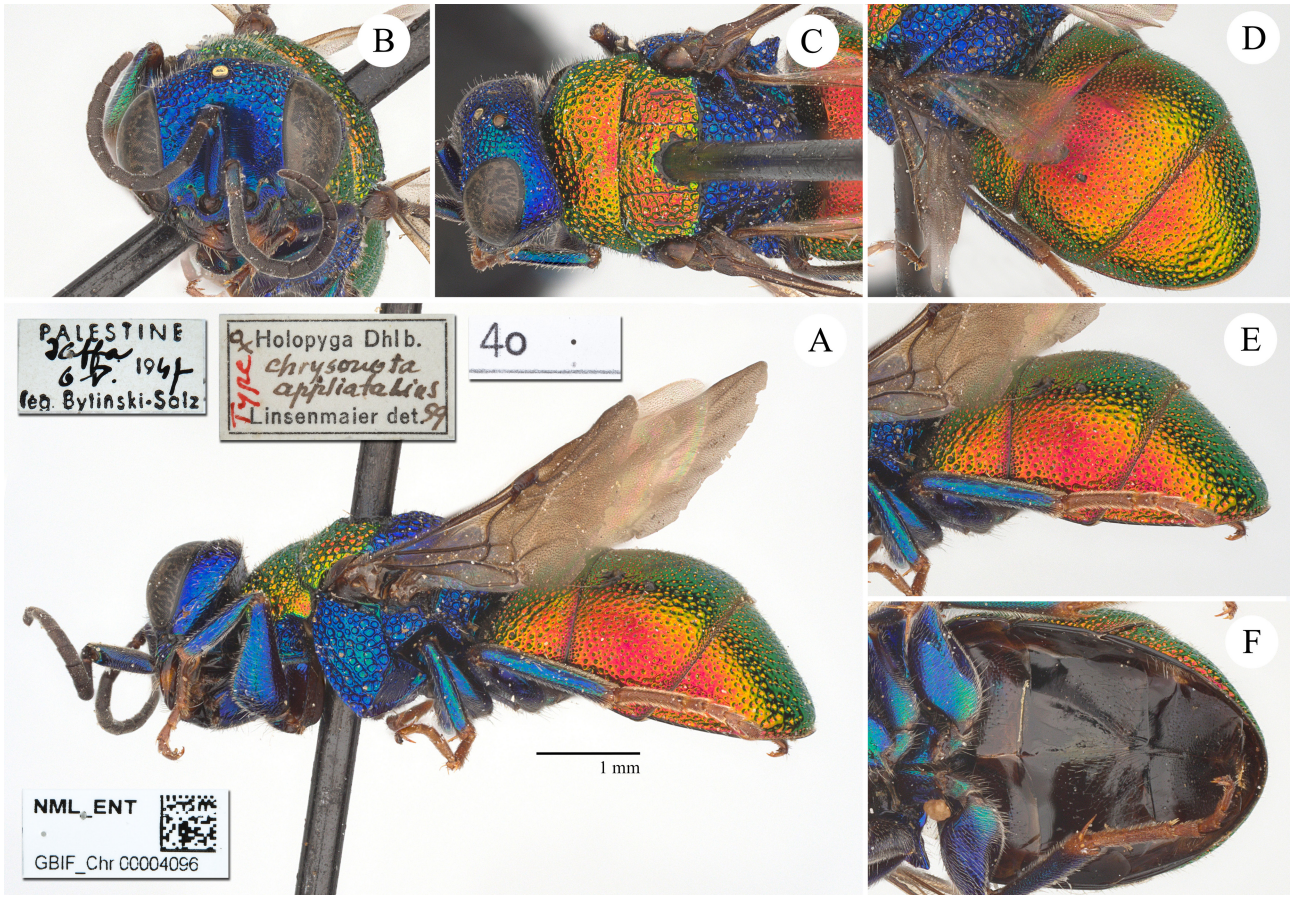

FIGURE 10. *Holopyga chrysonota appliata* Linsenmaier, 1959a, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, dorsal view. E) Metasoma, lateral view. F) Metasoma, ventral view.

Holopyga chrysonota discolor Linsenmaier, 1959a

Holopyga chrysonota ssp. *discolor* Linsenmaier, 1959a: 29 (key), 32 (descr.), 186 (cat.).

Type locality. Morocco: "Marocco. ♂ Type Coll. de Beaumont, ♀ Allotype Coll. m., Paratypen Coll. de Beaumont, Coll. Naef, Coll. m. (Marrakech, Moyen Atlas, V.–VI)".

Allotype, ♀: Marrakech 17.5.47 de Beaumont ♀ Allotype Coll. Linsenmaier // *Holopyga* Dhlb. *chrysonota* F. ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004136 (ex type-collection).

Paratypes, 1♂: Beni Mellal, Moy. Atlas, Maroc, 26.V.1937 Collect. Naef // Paratype *Holopyga* Dhlb. *chrysonota* F. ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004097 (ex synoptic-collection); 1♀: Marrakech, Oued Tensift, Maroc 15.V.1947 leg. Naef // Paratype *Holopyga* Dhlb. *chrysonota* F. ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004098 (ex synoptic-collection); 1♂: Beni Mellal, Moy. Atlas, Maroc, 25.V.1937 Collect. Naef // ♂ Paratype *Holopyga* Dhlb. *chrysonota discolor* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004108; 1♀: Marrakech, Oued Tensift, Maroc 15.V.1947 Collect. Naef // ♀ Paratype *Holopyga* Dhlb. *chrysonota* ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004114; 1♀: Marrakech, Oued Tensift, 16.V.1947 Collect. Naef // ♀ Paratype *Holopyga* Dhlb. *chrysonota* ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004115; 1♀: Maroc, Ifrane Moyen Atlas 28.VI.1947 leg. Naef // Paratype *Holopyga* Dhlb. *chrysonota* F. ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004116; 1♀: Ifrane, Moyen Atlas, Maroc 24.VI.1947 Collect. Naef // ♀ Paratype *Holopyga* Dhlb. *chrysonota* ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004127; 1♂: Port Lyautey, Maroc, 25.V.1947 Collect. Naef // ♂ Paratype *Holopyga* Dhlb. *chrysonota* ssp. *discolor* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004128.

Remarks. The Naef collection contains several specimens with the same locality labels and dates as the paratypes. However, these specimens are not considered paratypes because they were identified by Linsenmaier as *Holopyga chrysonota discolor* only in 1979.

The locality referred to in the text as "Moyen Atlas" corresponds to Ifrane and Beni Mellal. Although Port Lyautey was not mentioned in the original description, we consider the specimen collected by Naef to be part of the type series, because the paratype label on this specimen matches those of the other specimens in the series (Art. 72.4.1.1).

Holopyga (*Holopyga*) *clancula* Linsenmaier, 1999

(Fig. 11A–11F)

Holopyga (*Holopyga*) *clancula* Linsenmaier, 1999: 29 (key), 39 (descr.), 41 (figs 70, 71).

Type locality. Palestine: "Palästina, ♀ Type (Holotypus) Abu Kabir 16.VI.1969, Bytinski; ♂ Allotype Jericho 30.IV.1942, Bytinski, Coll. m.—Möglicherweise auch in Ägypten.".

Holotype, ♀: Israel, Abu Kabir, 16.6.1961, leg. Bytinski-Salz // ♀ Type *Holopyga* Dhlb. *clancula* det. Linsenmaier 1997 // 495 // NML_ENT GBIF_Chr0005412 (ex type-collection).

Allotype, ♂: Jericho, Palestine, 30.4.1942, leg. Bytinski-Salz // ♂ Allotype *Holopyga* Dhlb. *clancula* det. Linsenmaier 1997 // NML_ENT GBIF_Chr0005413 (ex type-collection).

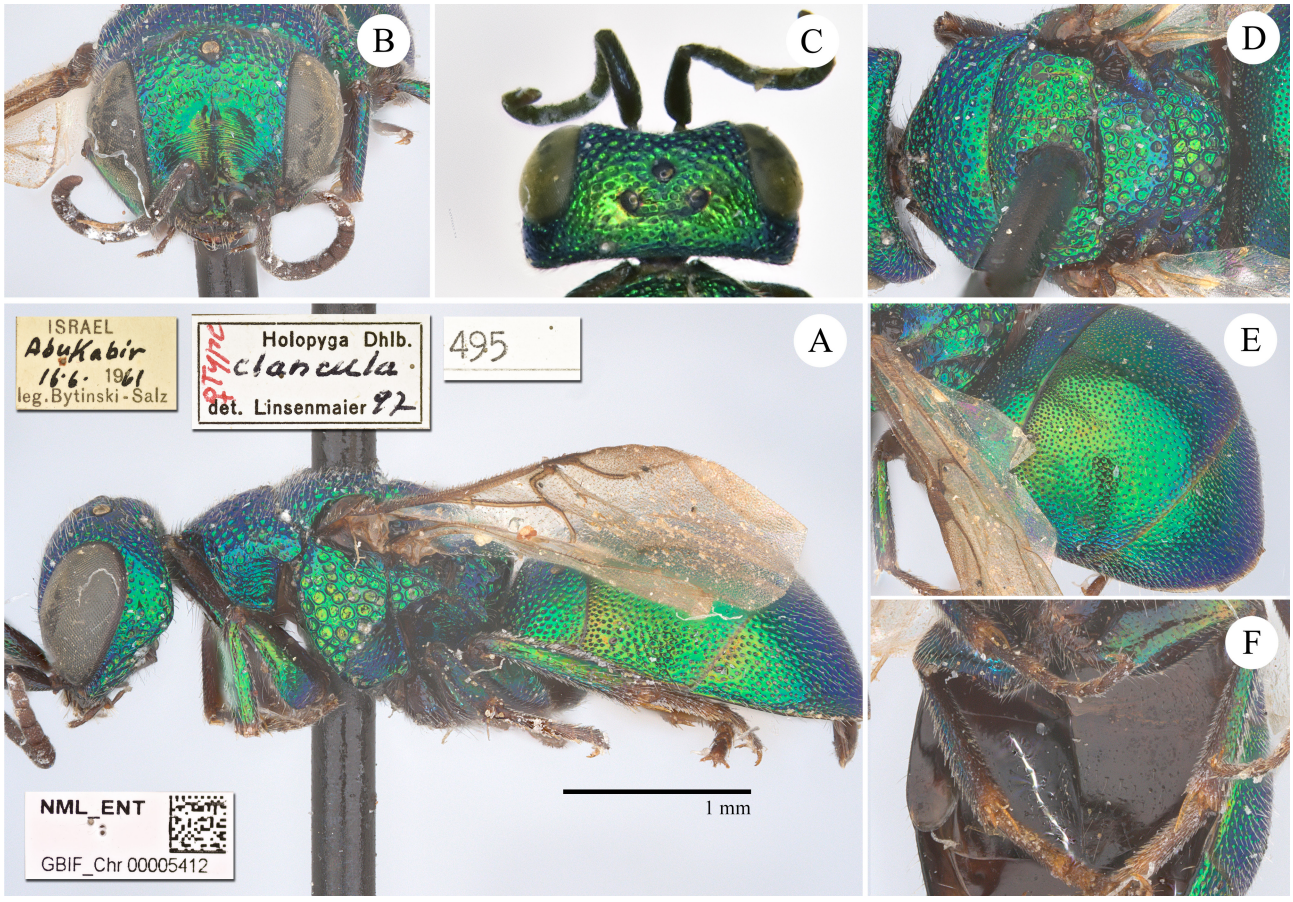

FIGURE 11. *Holopyga clancula* Linsenmaier, 1999, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head, dorsal view. D) Mesosoma, dorsal view. E) Metasoma, latero-dorsal view. F) Metasoma, ventral view.

***Holopyga cypruscula cypruscula* Linsenmaier, 1959a**
(Fig. 12A–12F)

Holopyga cypruscula Linsenmaier, 1959a: 30 (key), 34 (descr.), 186 (cat.), 196 (figs 28–29).

Type locality. Cyprus: "Cypern, ♀ Type, ♂ Allotype und Paratypen Coll. m. Häufig.".

Holotype, ♂ and **paratype,** 1♂: Cypern 15.9.44 Cherkes Mavromoust. Coll. Dr. Enslin // Type oben *Holopyga* Dhlb. *cypruscula* Lins. ♂ Linsenmaier det. 1957 // 41 // NML_ENT GBIF_Chr0004950 (ex type-collection).

Allotype, ♀: Cypern 6.9.44 Cherkes Mavromoust. Coll. Dr. Enslin // Allotype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004951 (ex type-collection).

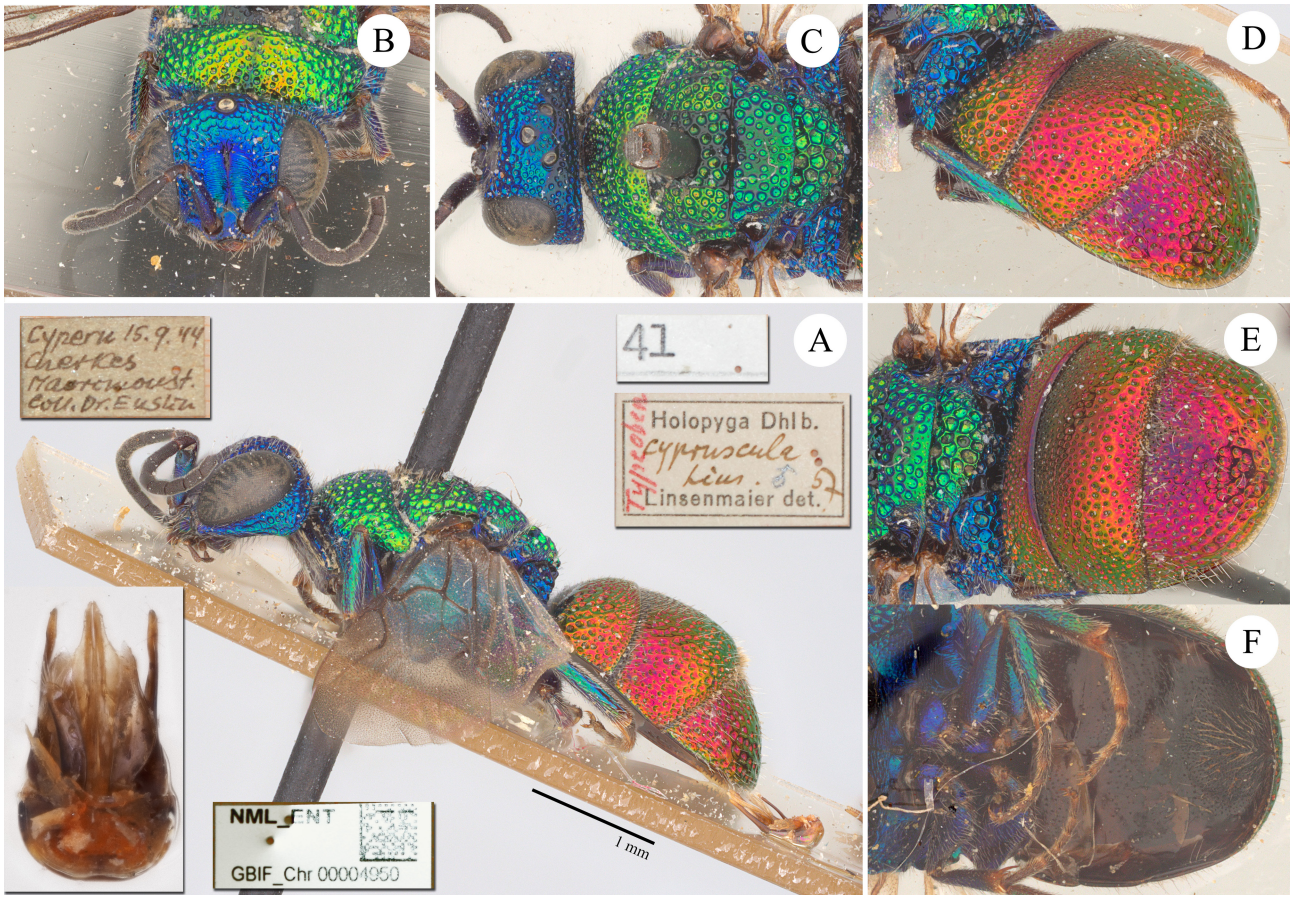

FIGURE 12. *Holopyga cypruscula cypruscula* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, posterior view. F) Metasoma, ventral view.

Paratypes, 1♂: Cypern 4.10.40 Limassol Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004933 (ex synoptic-collection); 1♀: Cypern 25.5.39 Limassol Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004934 (ex synoptic-collection); 1♂: Cypern 4.10.40 Limassol Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004938; 2♀♀: Cypern 1.5.40 Fassouri Mavromoust. Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004939–4940; 1♀: Cypern 3.5.40 Fassouri Mavromoust. Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004941; 1♀: Cypern 26.6.44 Cherkes Mavromoust. Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004942; 1♀: Cypern 8.9.44 Cherkes Mavromoust. Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004943; Paratypes 3♀♀: Cypern 11.9.44 Cherkes Mavromoust. Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier

det. 1957 // NML_ENT GBIF_Chr0004944–4946; 2♀♀: Cypern 15.9.44 Cherkes Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004947–4948; 1♀: Cypern 14.11.46 Limassol Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *cypruscula* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0004949.

Remarks. Linsenmaier (1959a) did not provide a specific type locality or detailed collecting data in the original description, only noting a generic locality ‘’Cyprus’’. He described the female holotype and the male allotype. However, in the collection, the holotype specimen (Type) is a male and the allotype is a female. We here follow Linsenmaier’s interpretation as preserved in his collection and consider that the sexes were erroneously reversed in the original description, a *lapsus calami* already observed in other cases (Rosa *et al.* 2015b).

Holopyga cypruscula detrita **Linsenmaier, 1959a**

(Fig. 13A–13F)

Holopyga cypruscula ssp. *detrita* Linsenmaier, 1959a: 34 (descr.), 186 (cat.).

Type locality. Iran, Palestine: "Iran, Palästina. ♂ Type und ♂♂ Paratypen Coll. m. (Iran, Kamal Abad und Kazwin, VIII.1956)".

Holotype, ♂, Kamal Abad 28.8.55 Coll. Linsenmaier // Type ♂ *Holopyga* Dhlb. *cypruscula* ssp. *detrita* Lins. Linsenmaier det. 1959 // 191 // NML_ENT GBIF_Chr0005010 (ex type-collection).

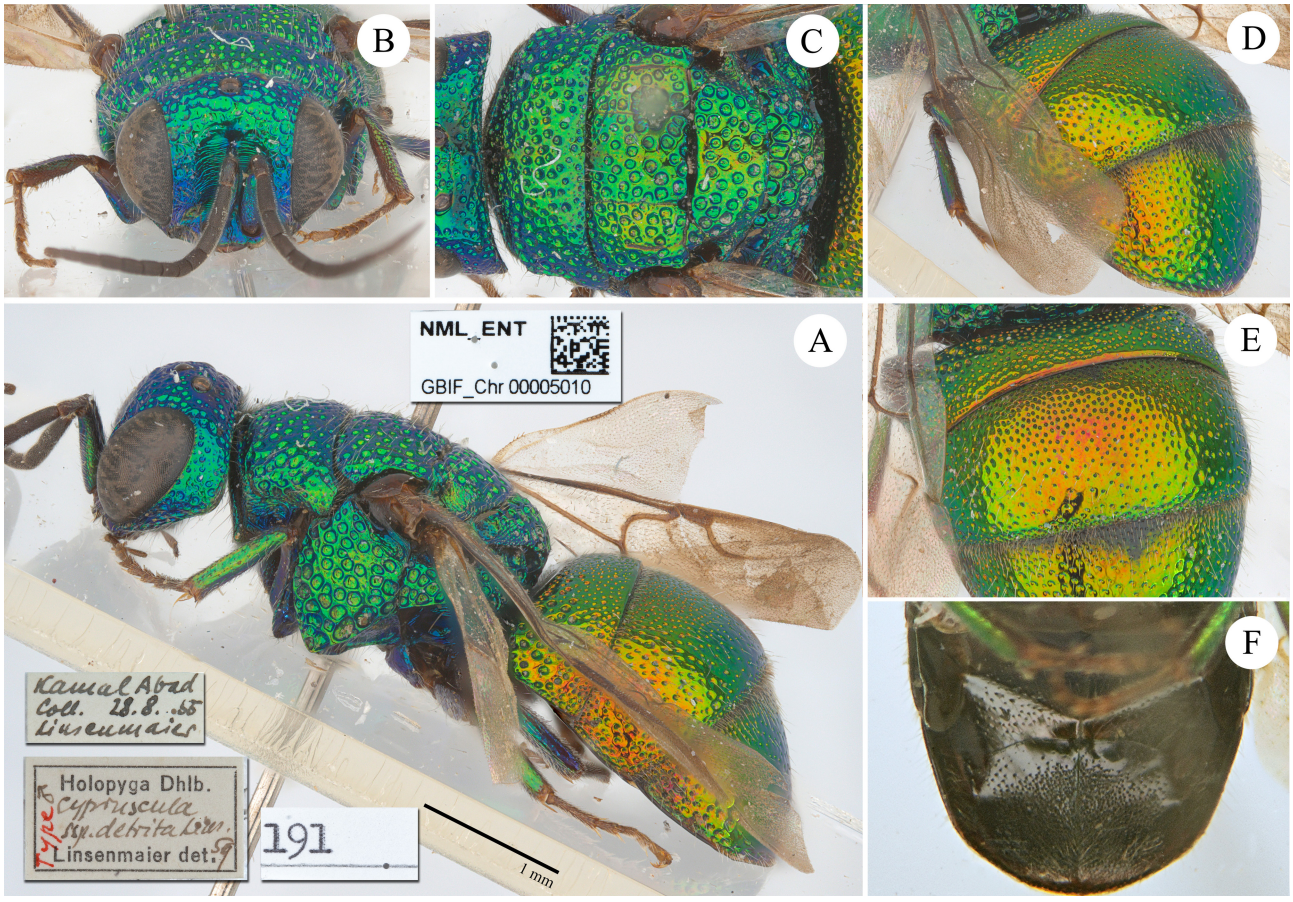

FIGURE 13. *Holopyga cypruscula detrita* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Mesosoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Paratypes, 1♂, Kazwin 10.8.56 Coll. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *cypruscula* Lins. *detrita* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004954 (ex synoptic-collection); 1♂: Palestine Elon 9.7. 19 [?] leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *cypruscula* ssp. *detrita* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004996; 1♂: Kamal Abad 28.8.55 Coll. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *cypruscula* ssp. *detrita* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0005000.

Remarks. In the type-collection, Linsenmaier designated a female specimen as allotype with the following labels: Israel Abu Kabir 10.7.1961 leg. Bytinski-Salz // ♀ Allotype *Holopyga* Dhlb. *cypruscula detrita* Lins. Linsenmaier det. 1967 // No type P. Rosa det. 2010. This specimen was collected after the original description and can not be considered part of the type series.

Holopyga cypruscula turca Linsenmaier, 1987

(Fig. 14A–14F)

Holopyga cypruscula ssp. *turca* Linsenmaier, 1987: 136 (descr.).

Type locality. Turkey: "Turkey, (Schmidt), ♀ Type Urfa, ♂ Allotype Konya Coll. m., Paratypen Coll. m. und Coll. Schmidt".

Holotype, ♀: Urfa As. Türkei 14–17.VI.1977 leg. Jos. Schmidt // ♀ Type *Holopyga* Dhlb. *cypruscula turca* Lins. det. Linsenmaier 1978 // 411 // NML_ENT GBIF_Chr0005017 (ex type-collection).

Allotype, ♂: Konya Umgbg. As Türk. 15.VI.1969 leg. Jos. Schmidt // ♂ Allotype *Holopyga* Dhlb. *cypruscula turca* Lins. det. Linsenmaier 1978 // NML_ENT GBIF_Chr0005018 (ex type-collection).

Paratype, 1♂: Konia Turkey 8.8.1951 leg. Bytinski-Salz // ♀ Paratype *Holopyga* Dhlb. *cypruscula turca* Lins. det. Linsenmaier 1978 // NML_ENT GBIF_Chr0005012 (ex synoptic-collection).

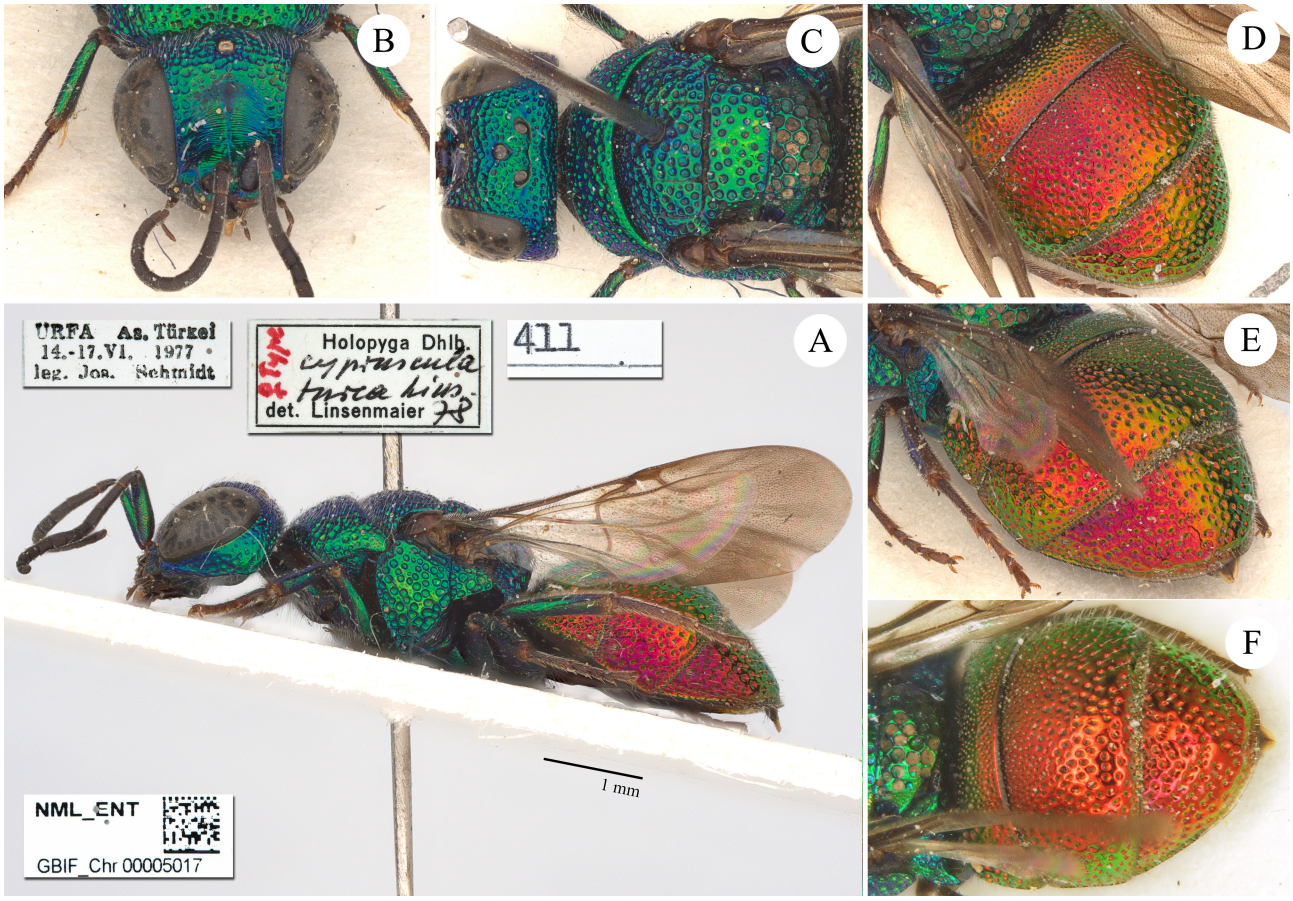

FIGURE 14. *Holopyga cypruscula turca* Linsenmaier, 1987, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D, F) Mesosoma, dorsal view. E) Metasoma, latero-posterior view.

Holopyga (*Holopyga*) *densata* Linsenmaier, 1999

(Fig. 15A–15F)

Holopyga (*Holopyga*) *densata* Linsenmaier, 1999: 30 (key), 38 (descr.), 40 (figs 61–66).

Type locality. Morocco: "Marokko, M-Atlas, Ifrane 24.VI.1947, Naef, ♂ Type (Holotypus) Coll. m.".

Holotype, ♂: Ifrane Moyen Atlas Maroc, 24.VI.1947 Collect. Naef // ♂ Type *Holopyga* Dhlb. *densata* det. Linsenmaier 1997 // 493 // NML_ENT GBIF_Chr0005410 (ex type-collection).

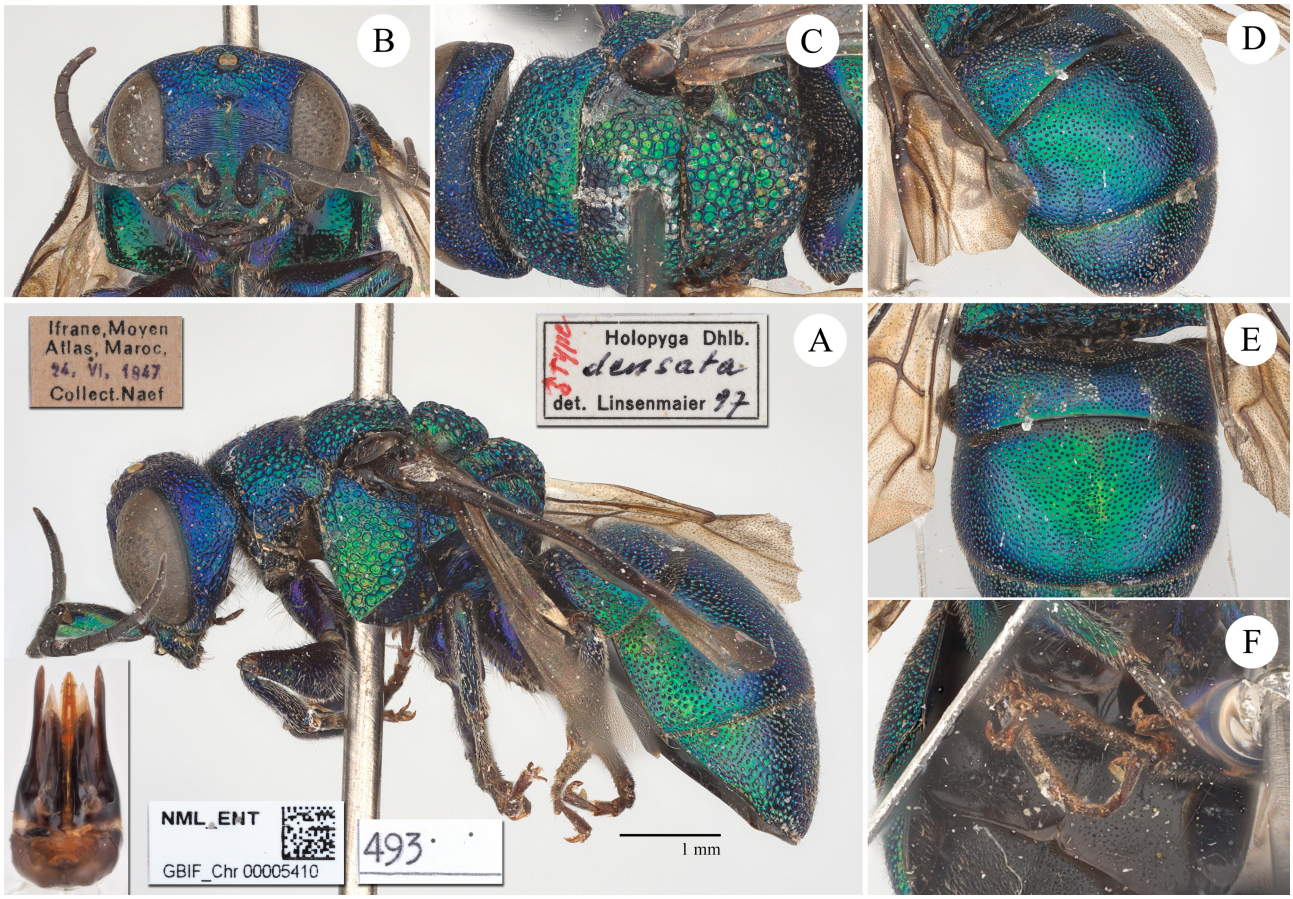

FIGURE 15. *Holopyga densata* Linsenmaier, 1999, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Metasomal second tergum, dorsal view. F) Metasoma, ventral view.

Holopyga duplicata Linsenmaier, 1997

(Fig. 16A–16F)

Holopyga (*Holopyga*) *duplicata* Linsenmaier, 1997: 251 (descr.), 288 (fig. 19).

Type locality. Spain: "Spanien, Provinzen Soria, Madrid, Segovia, ♀ Type (Holotypus) Soria 7.VII.91, 40 ♀♀ Paratypen VI., VII., leg. und Coll. m. Auf einem Platz bei Soria auf *Ferula* gehäuft auftretend, zusammen mit einigen wenigen *Hol. intermedia* Mercet".

Holotype, ♀: Spanien Soria C 7.7.91 Linsenmaier // ♀ Type *Holopyga* Dhlb. *duplicata*. det. Linsenmaier 1993 // 463 // NML_ENT GBIF_Chr0004682 (ex type-collection).

Paratypes, 4♀♀: Spanien Soria T 9.7.91 Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *duplicata*. det. Linsenmaier 1993 // NML_ENT GBIF_Chr0004656 (ex synoptic-collection); 3♀♀: Spanien Soria 16.–23.VI.64 Linsenmaier // ♀♀ Paratypen *Holopyga* Dhlb. *duplicata*. det. Linsenmaier 1992 // NML_ENT GBIF_Chr0004659–4660; 1♀: Spanien Soria 15.–20.VII.79 Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *duplicata* det. Linsenmaier 1992 // NML_

ENT GBIF_Chr0004661; 2♀♀: Spanien Madrid El Escorial 16.6.85 leg. Linsenmaier // ♀♀ Paratypen *Holopyga* Dhlb. *duplicata* det. Linsenmaier 1992 // NML_ENT GBIF_Chr0004662; 1♀: Spanien Madrid El Escorial 24.6.91 leg. Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *duplicata* Lins. det. Linsenmaier 1991 // NML_ENT GBIF_Chr0004663; 22♀♀: Spanien Soria 9.7.91 Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *duplicata* det. Linsenmaier 1991 // NML_ENT GBIF_Chr0004664–4670; 4♀♀: Spanien Segovia Coca 27.6.91 Linsenmaier // ♀♀ Paratypen *Holopyga* Dhlb. *duplicata* Lins. det. Linsenmaier 1992 and 1993 // NML_ENT GBIF_Chr0004671–4672; 1♀: Spanien Soria T. 17.6.95 Linsenmaier // Paratype ♀ *Holopyga* Dhlb. *duplicata* Lins. det. Linsenmaier 1995 // NML_ENT GBIF_Chr0004673.

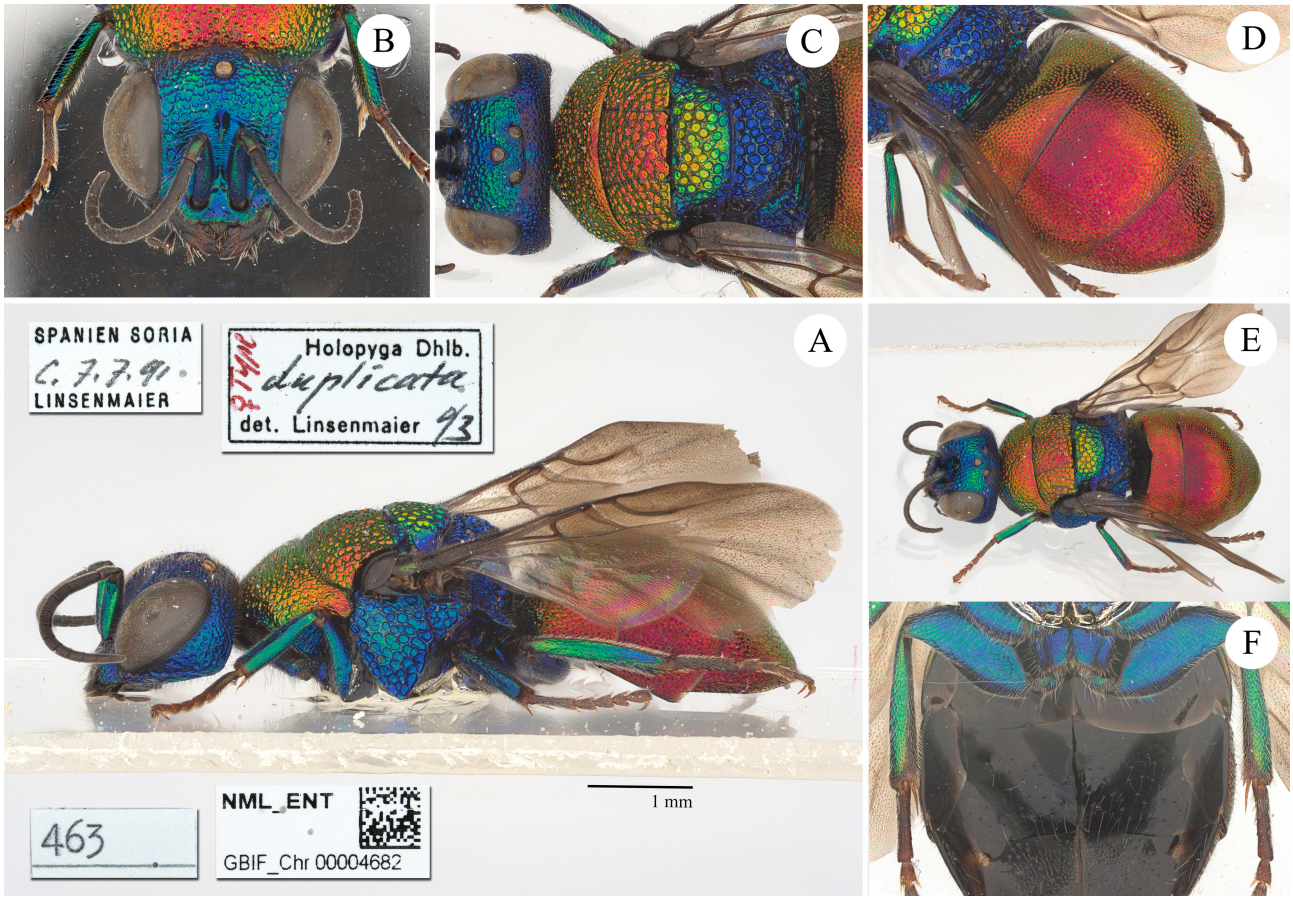

FIGURE 16. *Holopyga duplicata* Linsenmaier, 1997, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, dorsal view. E) Habitus, dorsal view. F) Metasoma, ventral view.

Holopyga enslini **Linsenmaier, 1959a**

(Fig. 17A–17F)

Holopyga enslini Linsenmaier, 1959a: 27 (descr., *miranda* group), 197 (figs 52, 53).

Type locality. Turkey, Palestine: "Klein-Asien, ♂ Type (Ulu Kizlar, VII.1952, leg. Seidenstücker), Coll. m., Palästina, ♂ Paratypen Coll. Bytinski-Salz und Coll. m.".

Holotype, ♂: Asia minor 5.7.52 Seidenstücker / Ulu Kizlar // Type *Holopyga* Dhlb. *enslini* Lins. ♂ Type Linsenmaier det. 1957 // 29 // NML_ENT GBIF_Chr0002728 (ex type-collection).

Paratype, ♂: Palestine Beersheba 10.4. leg. Bytinski-Salz // Paratype ♂ *Holopyga* Dhlb. *enslini* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0002725.

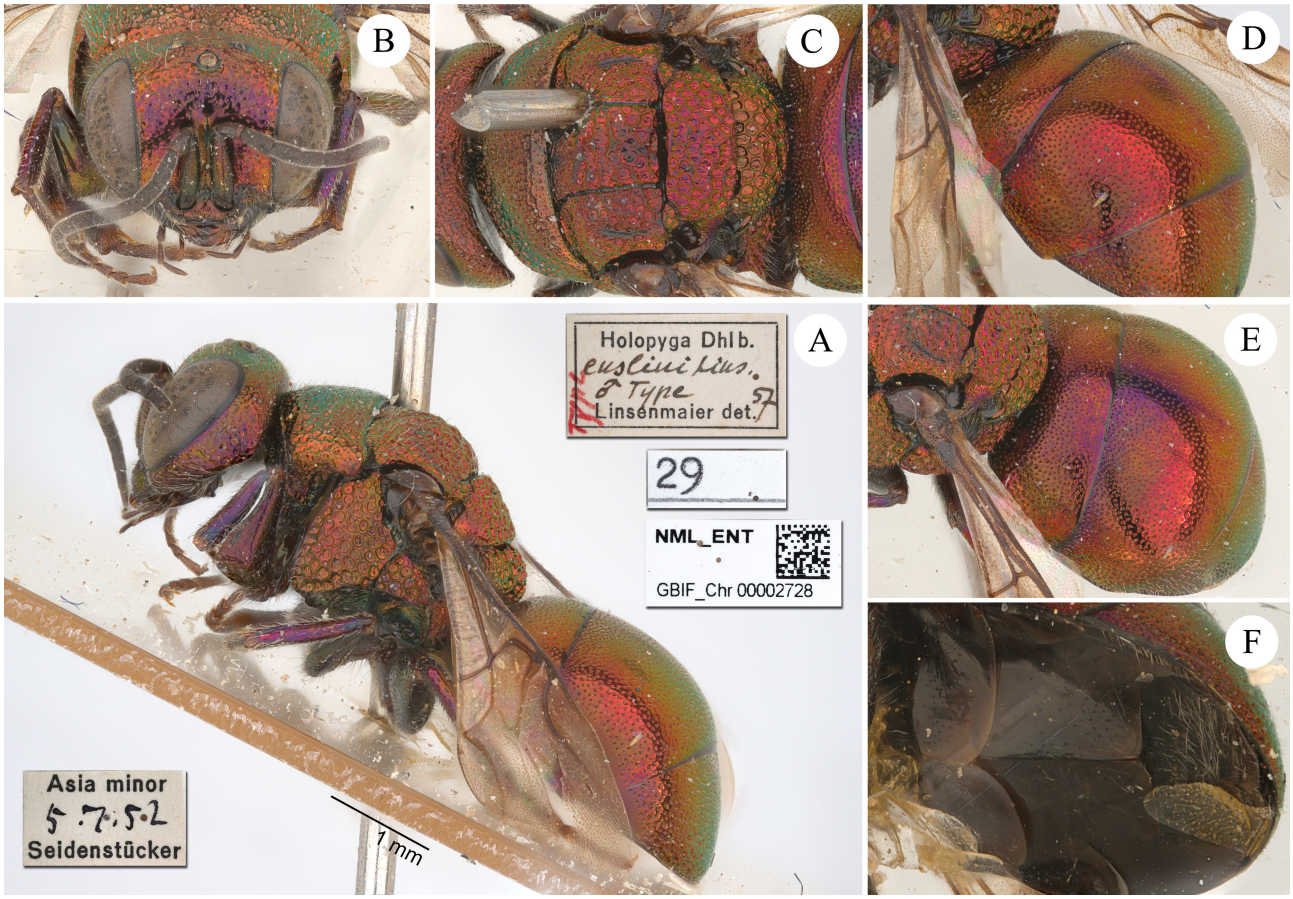

FIGURE 17. *Holopyga enslini* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Metasoma, latero-anterior view. F) Metasoma, ventral view.

Holopyga fascialis Linsenmaier, 1959a

(Fig. 18A–18F)

Holopyga fascialis Linsenmaier, 1959a: 28 (descr.), 186 (cat.), 197 (figs 44, 45).
Holopyga (*Holopyga*) *fascialis* Linsenmaier 1999: 29–30 (key), 37 (diagn.), 40 (figs. 53, 54).

Type locality. Palestine: "Palästina. ♂ Type (Beersheba, IV.1940, leg. Bytinski-Salz), ♀ Allotype Coll. m., ♀ Paratype Coll. Bytinski-Salz".

Holotype, ♂: Palästina Beersheba 28.4.40 Bytinski Coll. Linsenmaier // *Holopyga* Dhlb. *fascialis* Lins. ♂ Type Linsenmaier det. 1957 // 31 // NML_ENT GBIF_Chr0005309 (ex type-collection).

Allotype, ♀: Palästina Beersheba 28.4.40 Bytinski Coll. Linsenmaier // *Holopyga* Dhlb. *fascialis* Lins. ♀ Allotype Linsenmaier det. 1957 // NML_ENT GBIF_Chr0005310 (ex type-collection).

Holopyga gloriosa calida Linsenmaier, 1951

Holopyga gloriosa var. *calida* Linsenmaier, 1951: 13 (key), 15 (descr.).
Holopyga generosa calida: Linsenmaier, 1959a: 27.
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga gogorzae calida: Linsenmaier 1999: 33 (reinstated).
Holopyga calida: Rosa & Pavesi 2020: 42 (upgraded to species rank).

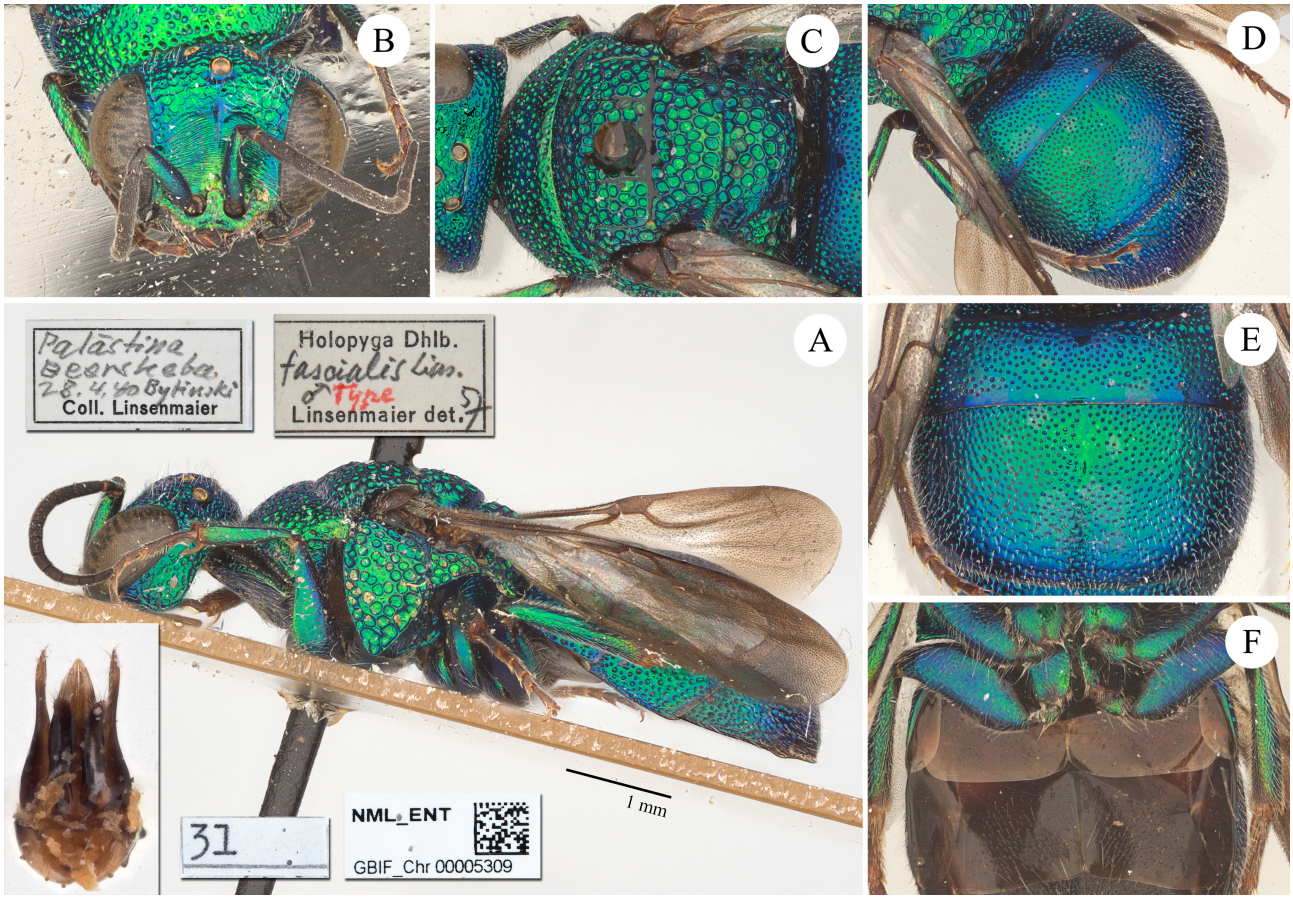

FIGURE 18. *Holopyga fascialis* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Mesosoma, dorsal view. D-E) Metasoma, dorsal view. F) Metasomal, ventral view.

Type locality. Armenia, Egypt, Morocco, Palestine: "Armenien, Palästina, Ägypten, Marokko". "Type in Coll. de Beaumont aus Maroc, ebenso Cotypen in Coll. Naef und in meiner Sammlung, alle ♀. Allotype ♂ und Cotypen im Museum Paris (Coll. Buysson)".

Paratypes, 2♀: Marrakech, Oued Tensif, Maroc, 14.VI.1947, Collect. Naef // ♀ Paratype *Holopyga* Dhlb. *gogorzae* Tr. ssp. *calida* Lins. Linsenmaier det. 1957 // ML_ENT GBIF_Chr0002705; 1♀: Marrakech, Oued Tensif, Maroc, 16.V.1947, Collect. Naef // *Holopyga* Dhlb. *gogorzae* Tr. ssp. *calida* Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002706; 1♀: Marrakech, Oued Tensif, 17.V.1947, Collect. Naef // *Holopyga* Dhlb. *gogorzae* Tr. ssp. *calida* Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002714; 1♀: Marrakech, Oued Tensif, 19.V.1947, Collect. Naef // *Holopyga* Dhlb. *gogorzae* Tr. ssp. *calida* Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002715.

Remarks. The holotype female (from Morocco) is housed at the Musée Zoologique in Lausanne, collection de Beaumont. According to Linsenmaier (1951), the allotype male and some female paratypes (locality unknown) should be at the Museum National d'histoire naturelle in Paris; these types have not been located neither in general collection nor in the material returned by Linsenmaier and still stored in the separated boxes n°69–75 (Rosa 2024), and they are likely misplaced elsewhere.

Linsenmaier (1957) revised his collection, removing and rewriting the labels of specimens identified in 1951. During this process, he issued new labels based on his revised interpretation of the taxon (Linsenmaier, 1959a: 27; 1999: 33), in which only the North African specimens were retained in this taxon, excluding specimens from Armenia, Egypt and Palestine. Paratypes from these excluded localities currently lack type labels, are identified under different names and may be considered lost.

***Holopyga guadarrama* Linsenmaier, 1987**
(Fig. 19A–19F)

Holopyga (*Holopyga*) *guadarrama* Linsenmaier, 1987: 135 (decr.).

Type locality. Spain: "Spanien, ♂ Type ♀ Allotype und Paratypen El Escorial, Madrid, Paratypen Navacerrada, Aranjuez, Albarracin (Aragon) Coll. m.".

Holotype, ♂ and **allotype,** ♀: Spanien Madrid El Escorial 12.6.83 Linsenmaier // ♂ Type ♀ Allotype *Holopyga* Dhlb. *guadarrama* det. Linsenmaier 1985 // 409 // NML_ENT GBIF_Chr0004187 (ex type-collection).

Paratypes, 3♂♂ and 3♀♀: Spanien Madrid El Escorial 2.–3.VII.1980 Linsenmaier // Paratypen ♂ ♀ *Holopyga* Dhlb. *guadarrama*. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004138–4139 (ex synoptic-collection); 1♂: Spanien 12.V.64 Aranjuez leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004140; 5♂♂ and 22♀♀: Spanien Madrid El Escorial 2.–3.VII.1980 Linsenmaier // Paratypen *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004141–4156; 1♀: Spanien Teruel Albarracin 20.VI.1983 Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004157; 1♂, 24♀♀: Spanien Madrid El Escorial 12.VI.1983 Linsenmaier // Paratypen *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004158–4163; 6♂♂ and 2♀♀: Spanien Madrid El Escorial 14.VI.1983 Linsenmaier // Paratypen *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004164–4165; 6♀♀: Spanien Madrid El Escorial 17.VI.1983 Linsenmaier // Paratypen *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004166; 3♂♂ and 3♀♀: Spanien Madrid Navacerrado [sic] 16.6.83 Linsenmaier // Paratypen *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004171, 4172; 1♀: Spanien 15.6.83 Guadarrama Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004175; 1♀: Spanien Madrid El Escorial 2.–3.VII.80 Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *guadarrama* Lins. det. Linsenmaier 1985 // NML_ENT GBIF_Chr0004184 (ex Perraudin-collection).

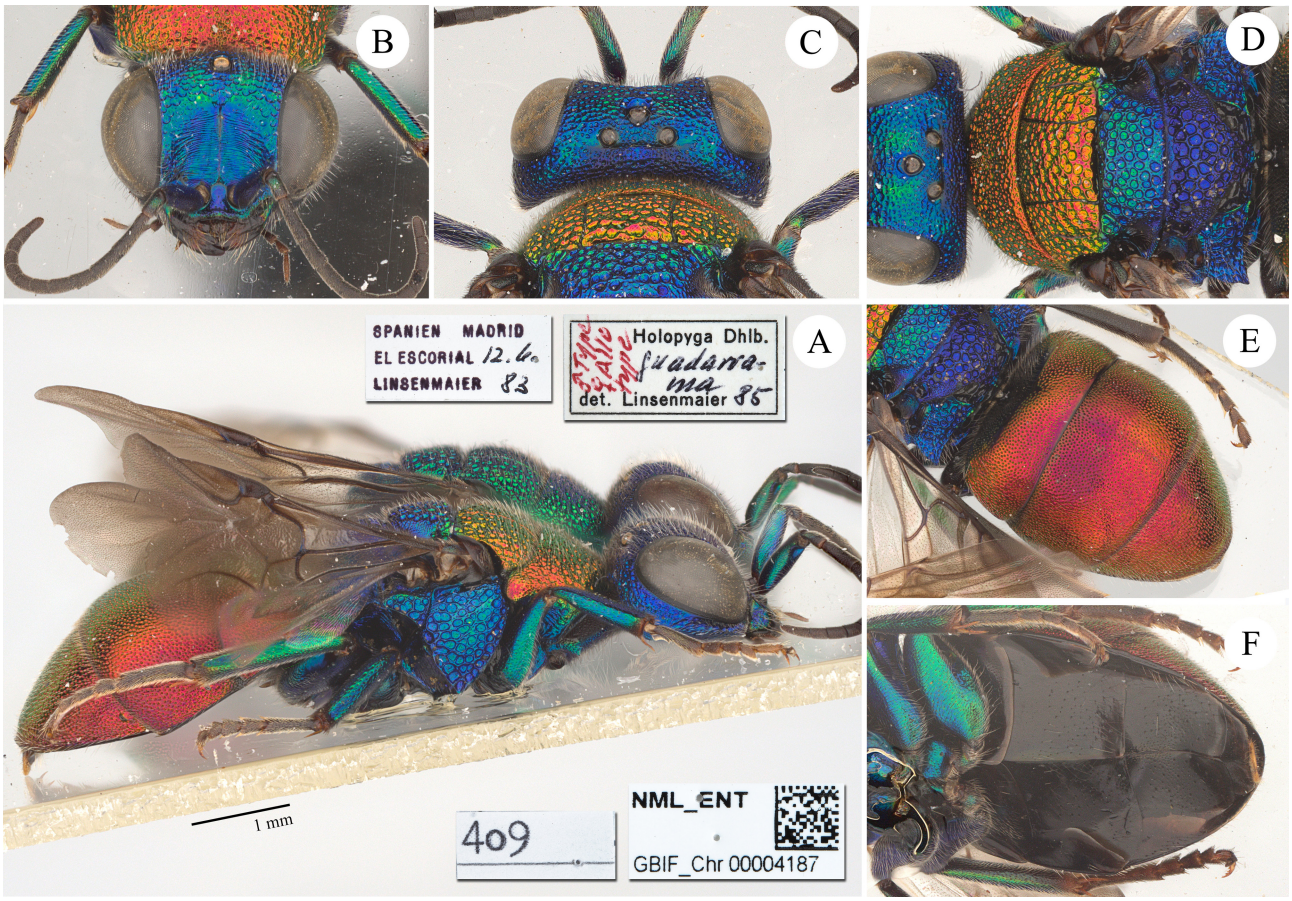

FIGURE 19. *Holopyga guadarrama* Linsenmaier, 1987, allotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head, dorsal view. D) Head and mesosoma, dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga ignicollis granadana Linsenmaier, 1968
(Fig. 20A–20F)

Holopyga ignicollis ssp. *granadana* Linsenmaier, 1968: 17 (descr.).

Type locality. Spain: "Spanien Provinz Granada, ♀ Type, ♂ Allotype und Paratypen von Estepona in Coll. m.".

Holotype, ♀: Spanien 8.VII.63 Granada Estepona leg. Linsenmaier // ♀ Type *Holopyga* Dhlb. *ignicollis granadana* Lins. det. Linsenmaier 1965 // 207 // NML_ENT GBIF_Chr0004591 (ex type-collection).

Allotype, ♂: Spanien 8.VII.63 Granada Estepona leg. Linsenmaier // ♂ Allotype *Holopyga* Dhlb. *ignicollis granadana* Lins. Linsenmaier det. 1965 // NML_ENT GBIF_Chr0004592 (ex type-collection).

Paratypes, 2♂♂: Spanien 8.VII.63 Granada Estepona leg. Linsenmaier // ♂♂ Paratype *Holopyga* Dhlb. *ignicollis granadana* Lins. Linsenmaier det. 1965 // NML_ENT GBIF_Chr0004583 (ex synoptic-collection); 5♂♂ and 1♀: Spanien 8.VII.63 Granada Estepona leg. Linsenmaier // ♂♂ Paratype *Holopyga* Dhlb. *ignicollis granadana* Lins. Linsenmaier det.1965 // NML_ENT GBIF_Chr0004585–4590.

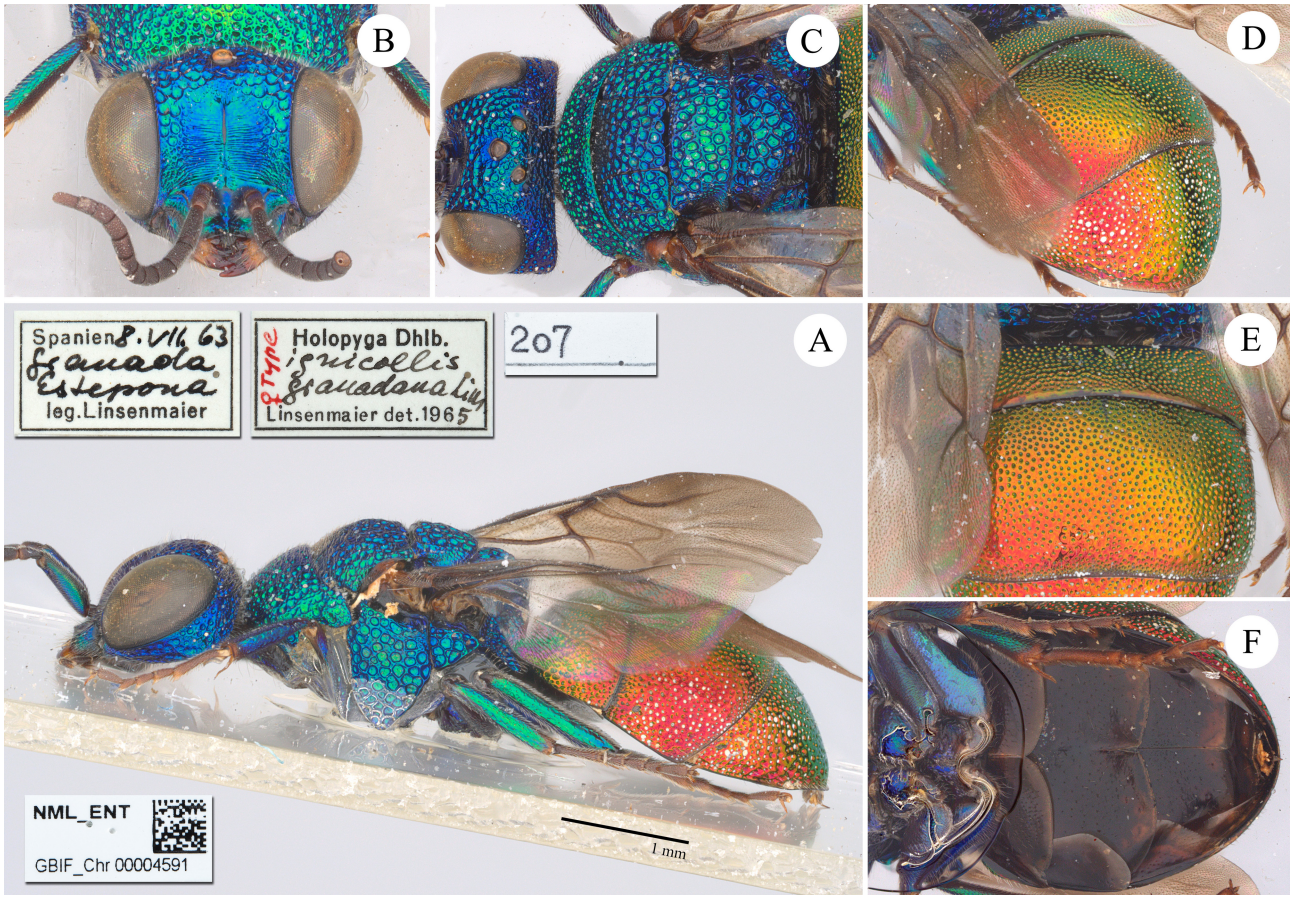

FIGURE 20. *Holopyga ignicollis granadana* Linsenmaier, 1968, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasomal second tergum, dorsal view. F) Metasoma, ventral view.

Holopyga ignicollis padri Linsenmaier, 1987
(Fig. 21A–21F)

Holopyga ignicollis ssp. *pádri* Linsenmaier, 1987: 136 (descr.).

Type locality. Slovakia: "Tschechoslowakei, Chotin VII.–VIII. 1961–62 (Pádr), ♂ Type ♀ Allotype Coll. m., Paratypen Coll. m. und Coll. Pádr".

Holotype, ♂: Chotín ČSR 1.8.1960 lgt. Dr. Pádr // ♂ Type *Holopyga* Dhlb. *ignicollis padri* det. Linsenmaier 1982 // 410 // NML_ENT GBIF_Chr0004581 (ex type-collection).

Allotype, ♀: Chotin ČSSR 28.7.1961 lgt. Dr. Pádr // ♀ Allotype *Holopyga* Dhlb. *ignicollis padri* Lins. det. Linsenmaier 1982 // NML_ENT GBIF_Chr0004582 (ex type-collection).

Paratypes, ♂: Chotín-ČSR 1.8.60 lgt. Dr. Pádr // ♂ Paratype *Holopyga* Dhlb. *ignicollis padri* Lins. det. Linsenmaier 1982 // NML_ENT GBIF_Chr0004538 (ex synoptic-collection); 1♀: Chotín-ČSSR 13.7.62 lgt. Dr. Pádr // ♀ Paratype *Holopyga* Dhlb. *ignicollis padri* Lins. det. Linsenmaier det. 1982 // NML_ENT GBIF_Chr0004539 (ex synoptic-collection); 1♂: Chotín ČSSR 30.7.1962 lgt. Dr. Pádr // ♂ Paratype *Holopyga* Dhlb. *ignicollis padri* Lins. det. Linsenmaier 1982 // NML_ENT GBIF_Chr0004540.

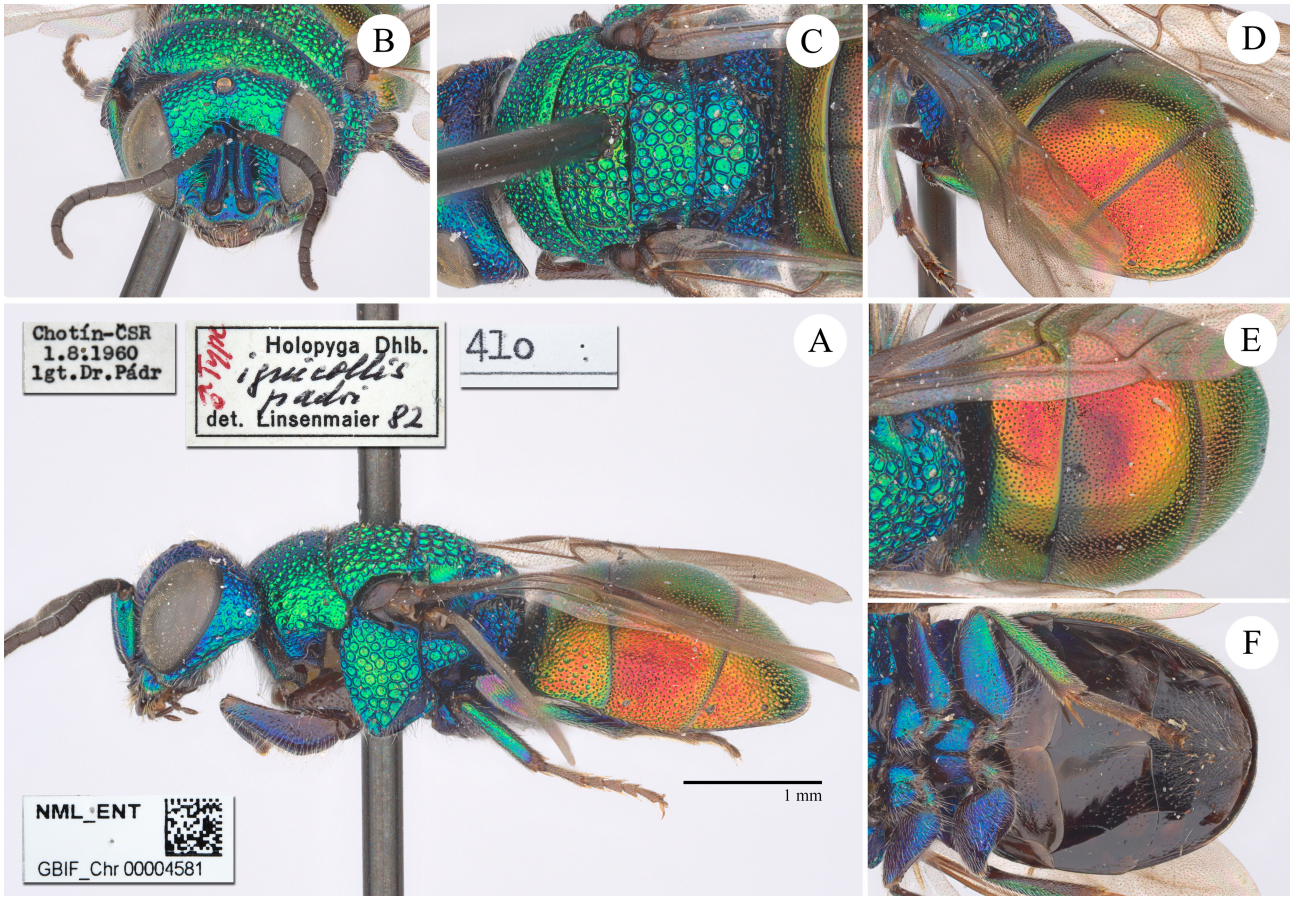

FIGURE 21. *Holopyga ignicollis padri* Linsenmaier, 1987, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga intersa Linsenmaier, 1959a

Holopyga intersa Linsenmaier, 1959a: 29–30 (key), 33 (descr.), 186 (cat.), 196 (figs 19–21).
Holopyga (*Holopyga*) *intersa*: Linsenmaier 1999: 28 (key), 35 (diagn.), 40 (figs 49, 50).

Type locality. Morocco: "Marocco, ♀ Type Coll. de Beaumont, ♂ Allotype Coll. m. (Marrakech, V.1947), Paratypen Coll. de Beaumont, Coll. Naef, Coll. m.".

Allotype, ♂: Maroc V.47 Marrakech de Beaumont Coll. Linsenmaier // ♂ Allotype *Holopyga* Dhlb. *intersa* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0004932 (ex type-collection).

Paratypes, 1♀: Marrakech, Oued Tensift, 16.V.1947 de Beaumont // Paratype // *Holopyga* Dhlb. *intersa* Lins. Linsenmaier det. 1957 // ♀ *Holopyga* Dhlb. *intermedia* M. det. Linsenmaier 1999 // NML_ENT GBIF_Chr0004601 (ex synoptic-collection); 1♂: Marrakech, Oued Tensift, Maroc, 15.V.1947 Collect. Naef // ♂ *Holopyga* Dhlb. *intersa* Lins. Linsenmaier det. 1957 / Paratype // ♂ *Holopyga* Dhlb. *ignicollis* Dahlbom Linsenmaier det. // NML_ENT GBIF_Chr0004442.

Possible paratypes, 1♀, Marrakech, Oued Tensift, Maroc, 15.V.1947 Collect. Naef // NML_ENT GBIF_Chr0004930; 1♀, Marrakech, Oued Tensift, Maroc, 16.V.1947 Collect. Naef // NML_ENT GBIF_Chr0004929.

Remarks. Identifying all the specimens originally included in the type series is challening. We considered two specimens from the Naef collection as possible paratypes. These two specimens collected at Marrakech in May 1947 by Naef were likely moved by Linsenmaier into his general collection during his revision of Northern African species (Linsenmaier 1999). Although they correspond to the type series described by Linsenmaier, they lack his typical handritten label. Linsenmaier only identified them in 1991. Nevertheless, they could be considered as paratypes because Linsenmaier listed some paratypes in the Naef Collection (‘’Paratypen Coll. Naef”).

Additionally, there is one specimen in the general collection collected by de Beaumont in May 1947 at Ijoukak, which was identified in 1991. This specimen could also belong to the original type series based on the description and the material sent by de Beaumont and retained by Linsenmaier (‘’Coll. m.”). In fact, Linsenmaier retained the holotype and likely this female specimen, which is labelled: Maroc, Gd Atlas Ijoukak 9.V.1947 J. de Beaumont // NML_ENT GBIF_Chr0004931.

Holopyga (*Holopyga*) *liliputana* Linsenmaier, 1999

(Fig. 22A–22F)

Holopyga (*Holopyga*) *liliputana* Linsenmaier, 1999: 29 (key), 41 (descr.).

Type locality. Morocco: "Marokko, 30 km südlich Zagora, Val Draa 28.V.1996, M. Hauser, ♂ Type (Holotypus) Coll. m.".

Holotype, ♂: Marokko Draa-Tal 30 km S Zagora leg. Hauser 28.05.1995 M-Zat // ♂ Type *Holopyga* Dhlb. *liliputana* det. Linsenmaier 1997 // 496 // NML_ENT GBIF_Chr0005414 (ex type-collection).

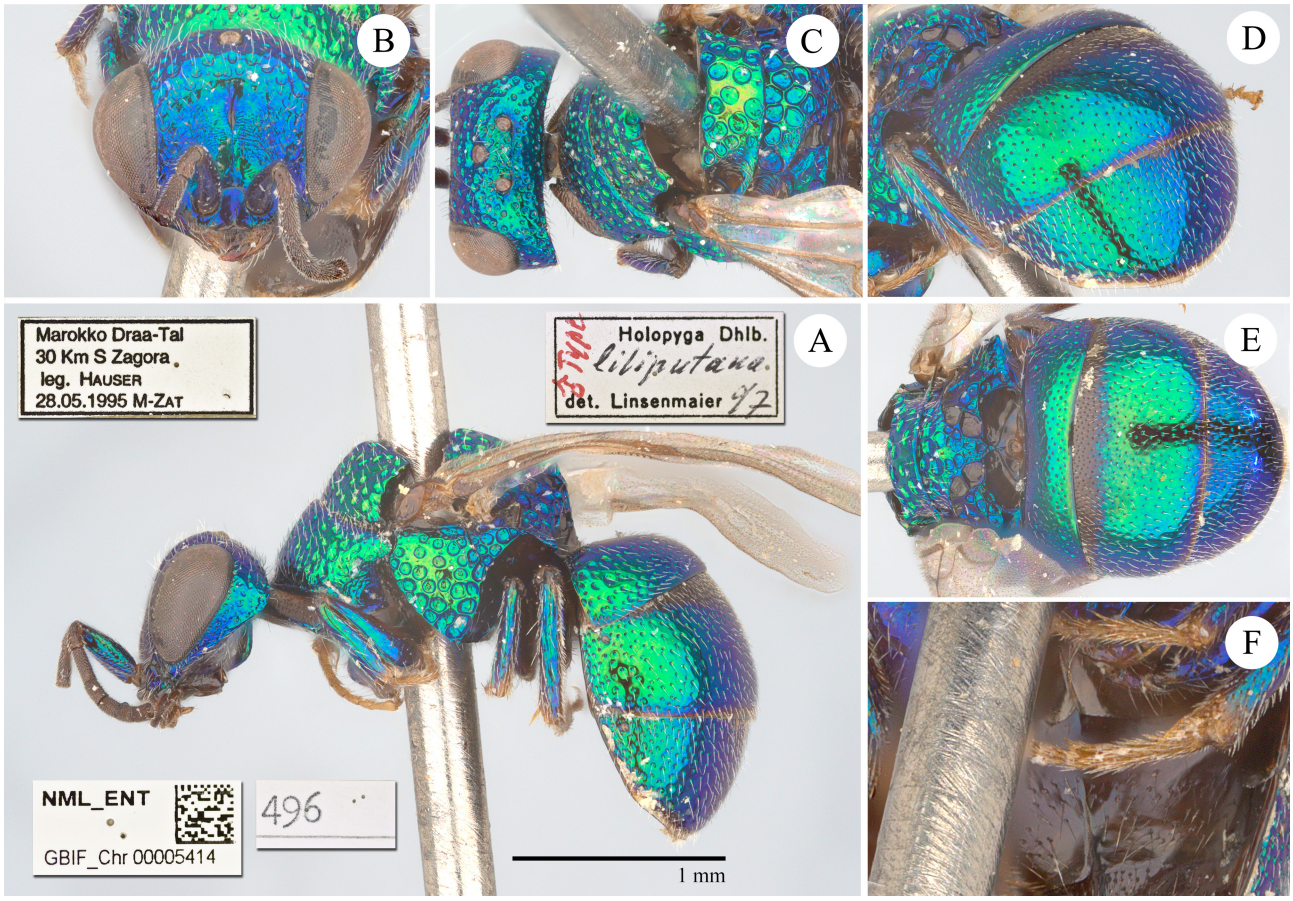

FIGURE 22. *Holopyga liliputana* Linsenmaier, 1999, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga mattheyi Linsenmaier, 1959a

Holopyga mattheyi Linsenmaier, 1959a: 27 (descr.), 186 (cat.), 197 (figs 54, 55).
Holopyga (*Holopyga*) *mattheyi*: Linsenmaier 1999: 28 (key), 33 (diagn.), 40 (figs 45, 46).

Type locality. Morocco: "Marocco, ♀ Type Coll. de Beaumont, ♀♀ Paratypen Coll. Naef und Coll. m. (Marrakech, V.1947)".

Paratypes, 1♀: Marrakech, Oued Tensift, 17.V.1947 de Beaumont // Paratype // *Holopyga* Dhlb. *mattheyi* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002730 (ex synoptic-collection); 1♀: Marrakech, Oued Tensift, Maroc 14.V.1947 de Beaumont // ♀ Paratype *Holopyga* Dhlb. *mattheyi* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002731; 1♀: Marrakech, Oued Tensift, 19.V.1947 de Beaumont // *Holopyga* Dhlb. *miranda* Ab. Det. Bischoff // ♀ Paratype *Holopyga* Dhlb. *mattheyi* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002732; 2♀♀: Fedala (Casabl.) Marokko 5.V.1937 Collect. Naef // Paratype *Holopyga* Dhlb. *mattheyi* Lins. Linsenmaier 1957 det. // NML_ENT GBIF_Chr0002733–2734; 1♀: Marrakech, Oued Tensift, Maroc 15.V.1947 Collect. Naef // ♀ Paratype *Holopyga* Dhlb. *mattheyi* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002735.

Holopyga (*Holopyga*) *meknesia* Linsenmaier, 1999

(Fig. 23A–23F)

Holopyga (*Holopyga*) *meknesia* Linsenmaier, 1999: 28 (key), 31 (descr.), 40 (figs 31, 32).

Type locality. "Marokko. ♂ Type (Holotypus) Meknes 12.VI.1964; ♀ Allotype westlich Fès 14.V.1965; Paratypen mit gleichen Daten leg. und Coll. m.".

Holotype, ♂: Maroc 12.VI.64 Meknes leg. Linsenmaier // ♂ Type *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // 490 // NML_ENT GBIF_Chr0002632 (ex type-collection).

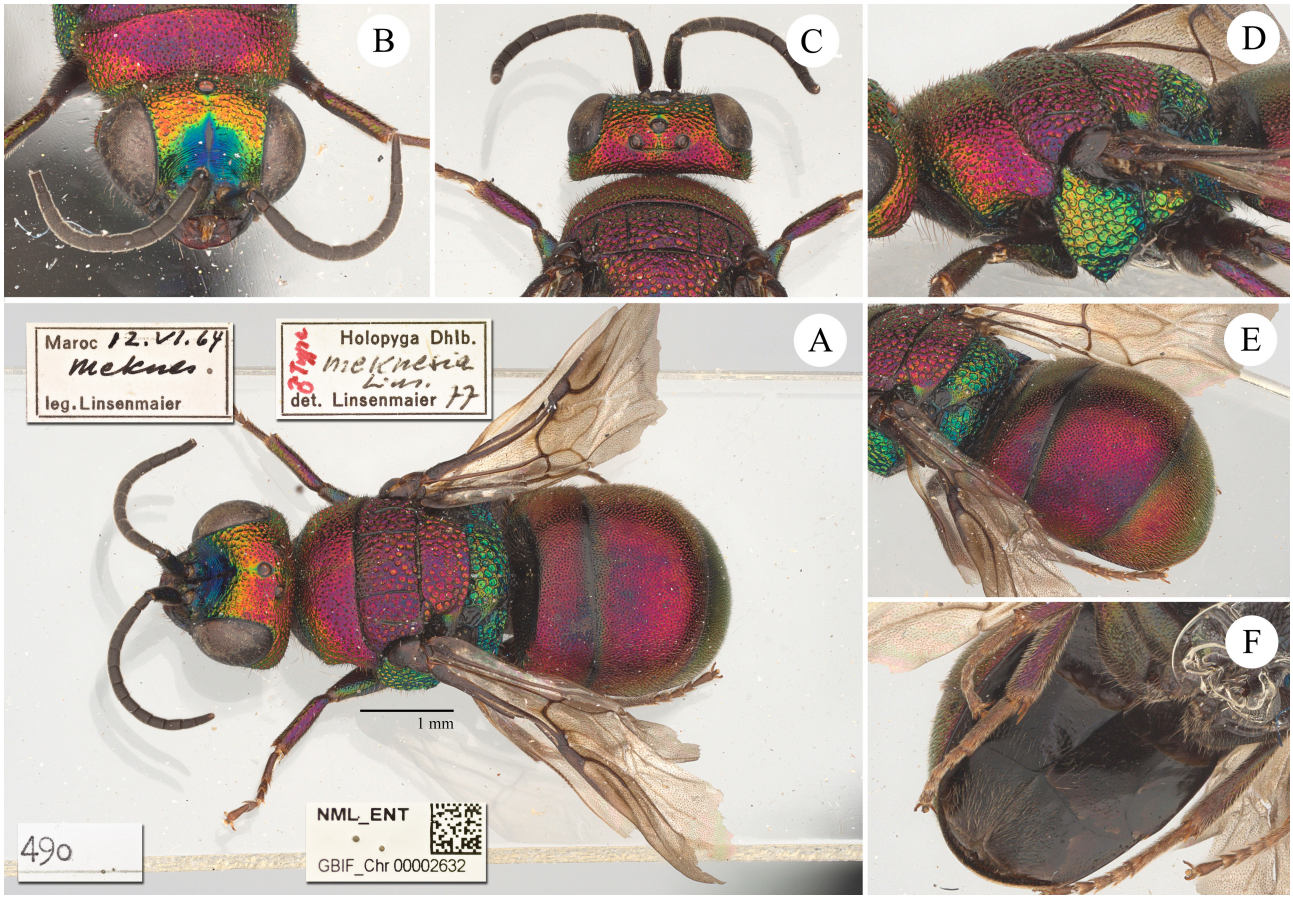

FIGURE 23. *Holopyga meknesia* Linsenmaier, 1999, holotype, male. A) Habitus, dorsal view. B) Head, frontal view. C) Head, dorsal view. D) Mesosoma, latero-dorsal view. E) Metasoma, latero-dorsal view. F) Metasoma, ventral view.

Allotype, ♀: Maroc 14.V.65 30 km westl. Fès leg. Linsenmaier // ♀ Allotype *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002633 (ex type-collection).

Paratypes, 2♂♂: Maroc 22.VII.63 Meknes leg. Linsenmaier // ♂ Paratypen *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002619 (ex synoptic-collection); 2♀♀: Maroc, 14.V.65, 30 km westl. Fès, leg. Linsenmaier // ♀ Paratypen *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002620 (ex synoptic-collection); 1♀: Meknès 10.–12 Juin 1918 // ♀ Paratype *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002621; 16 ♂♂: Maroc 22.VII.63 Meknes leg. Linsenmaier // ♂ Paratypen *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002622–2629; 1♀: Maroc 31.V.64 Meknes leg. Linsenmaier // ♀ Paratype *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002630; 1♂: Maroc, 14.V.65, 30 km westl. Fès, leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *meknesia* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002631.

***Holopyga minuma* Linsenmaier, 1959a**

(Fig. 24A–24F)

Holopyga minuma Linsenmaier, 1959a: 29 (key), 31 (descr.), 186 (cat.)
Holopyga minuma: Linsenmaier 1987: 135 (distr.).

Type locality. Turkey: "Klein-Asien, ♀ Type, ♂ Allotype, ♀ Paratype Coll. m. (Nigde VI.1958, Ciftehan, Akschehir V.–VI.1955, leg. Seidenstücker)".

Holotype, ♀: Ulukischla (Nigde) 14.6.58 Seidenstücker // Type *Holopyga* Dhlb. *minuma* Lins. ♀ Linsenmaier det. 1959 // 37 // NML_ENT GBIF_Chr0003794 (ex type-collection).

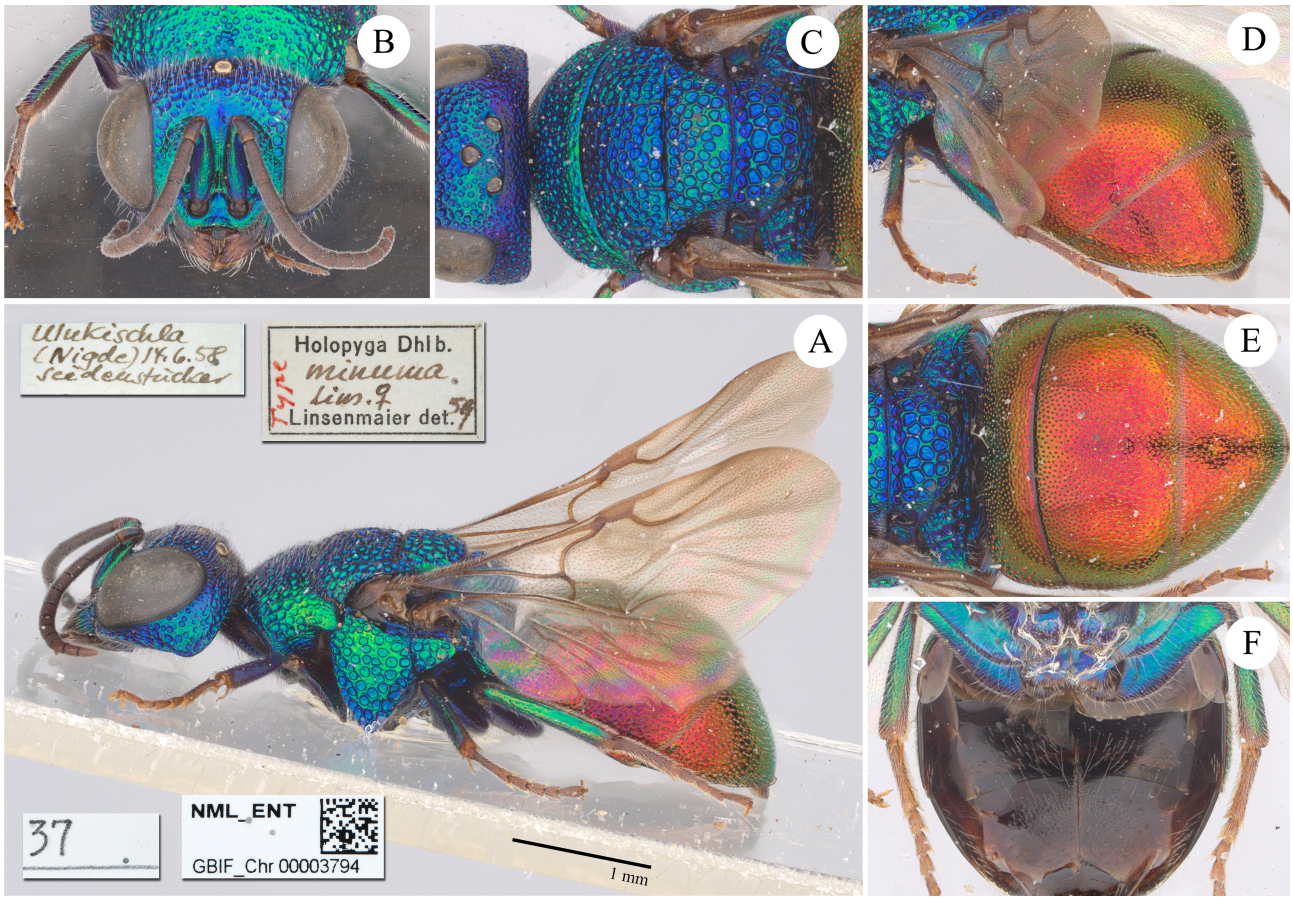

FIGURE 24. *Holopyga minuma* Linsenmaier, 1959a, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Allotype, ♂: Çiftehan 27.–31.5.55 Seidenstücker // Allotype *Holopyga* Dhlb. *minuma* Lins. ♂ Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003795 (ex type-collection).

Paratype, 1♀: Akschehir 1.–12.6.1955 Seidenstücker // Paratype *Holopyga* Dhlb. *minuma* Lins. ♀ Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003710 (ex synoptic-collection).

Holopyga mlokosiewitzi hemisimpla Linsenmaier, 1959a

(Fig. 25A–25F)

Holopyga mlokosiewitzi ssp. *hemisimpla* Linsenmaier, 1959a: 27 (descr.), 186 (cat.).

Type locality. "Klein-Asien. ♂ Type, ♀ Allotype (Konia und Eregli, VII.1952, leg. Seidenstücker) und ♂ Paratype Coll. m.".

Holotype, ♂: Türkei 15.6.58 Eregli Seidenstücker coll. Linsenmaier // ♂ Type *Holopyga* Dhlb. *mlokosiewitzi hemisimpla* Lins. Linsenmaier det. 1959 // 30 // NML_ENT GBIF_Chr0005233 (ex type-collection).

Paratype, 1♂: Asia minor 14.7.52 Seidenstücker / Konia // ♂ Paratype *Holopyga* Dhlb. *mlokosiewitzi* R. ssp. *hemisimpla* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0005215.

Remarks. Linsenmaier included three specimens in the type-series: the male holotype, the female allotype, and a male paratype with an unspecified locality. The allotype is missing from the collection; however, another specimen in the type-collection is labeled as allotype with the following labels: Türkei 20.VI.1960 Ankara leg. Seidenstücker coll. Linsenmaier // Allotype *Holopyga mlokosiewitzi* Rad. ssp. *hemisimpla* Lins. det. Linsenmaier 1965. NML_ENT GBIF_Chr0005234. This specimen cannot be considered a type because it was collected and identified years after the original description. No other specimens in the collection can be indentified as the missing allotype.

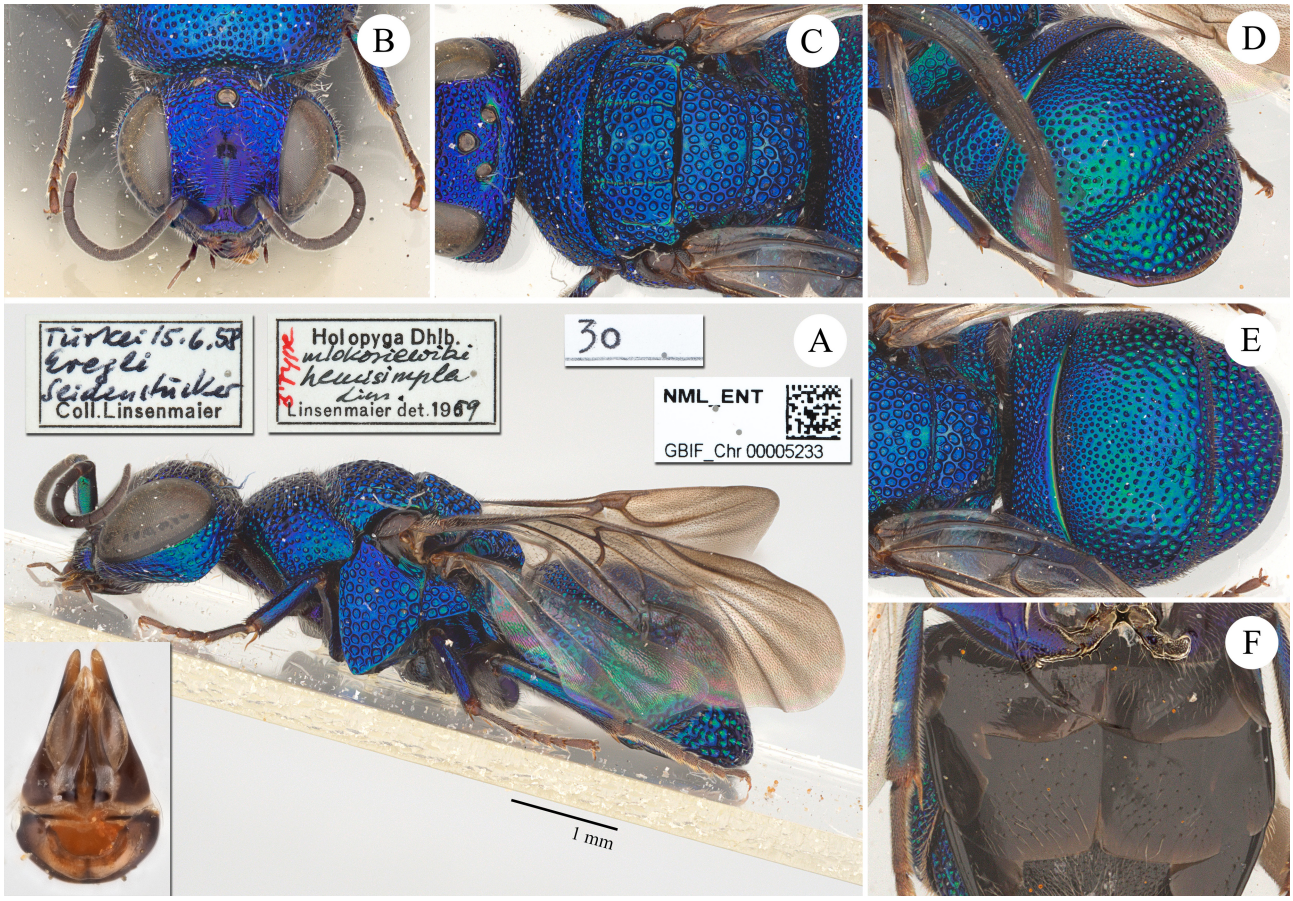

FIGURE 25. *Holopyga mlokosiewitzi hemisimpla* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

From the original description, it seems that the type locality is Konia and the collecting locality for the allotype and paratype is Eregli, based on the sequence of the localities given in parentheses. However, the specimen labelled as Type is from Eregli, and the paratype from Konia. We prioritised the handwritten labels by Linsenmaier over the published data from 1959a.

Holopyga mlokosiewitzi ignea Linsenmaier, 1968

(Fig. 26A–26F)

Holopyga mlokosiewitzi ssp. *ignea* Linsenmaier, 1968: 15 (descr.)

Type locality. Palestine: "Palästina, ♂ Type von Jericho, leg. Houska, ♀ Allotype von Ein Geddi, leg. Schlaefle, und Paratypen in in Coll. m. (von Balthasar als *bifrons* Ab. aufgeführt)".

Holotype, ♂: Wadi El Kelt Jericho Palestine Houska lgt. 5.V.1946 // ♂ Type *Holopyga* Dhlb. *mlokosiewitzi ignea* Lins. det. Linsenmaier 1965 // 205 // NML_ENT GBIF_Chr0005212 (ex type-collection).

Allotype, ♀: Israel En Gedi 16.6.65 leg. W. Schlaefle // ♀ Allotype *Holopyga* Dhlb. *mlokosiewitzi ignea* Lins. Linsenmaier det. 1966 // NML_ENT GBIF_Chr0005213 (ex type-collection).

Paratypes, 1♂: Beersheba Israel 25.VI.1954 leg. Bytinski-Salz // ♂ Paratype *Holopyga* Dhlb. *mlokosiewitzi ignea* Lins. Linsenmaier det. 1965 // NML_ENT GBIF_Chr0005210 (ex synoptic-collection); 1♂ and 1♀: ♂ Palestine Bir Rechun 14.VI leg. Bytinski-Salz // ♀ Palestine Beersheba 25.V leg. Bytinski-Salz // ♂♀ Paratypen *Holopyga* Dhlb. *mlokosiewitzi ignea* Lins. Linsenmaier det. 1966 // NML_ENT GBIF_Chr0005211 (ex synoptic-collection).

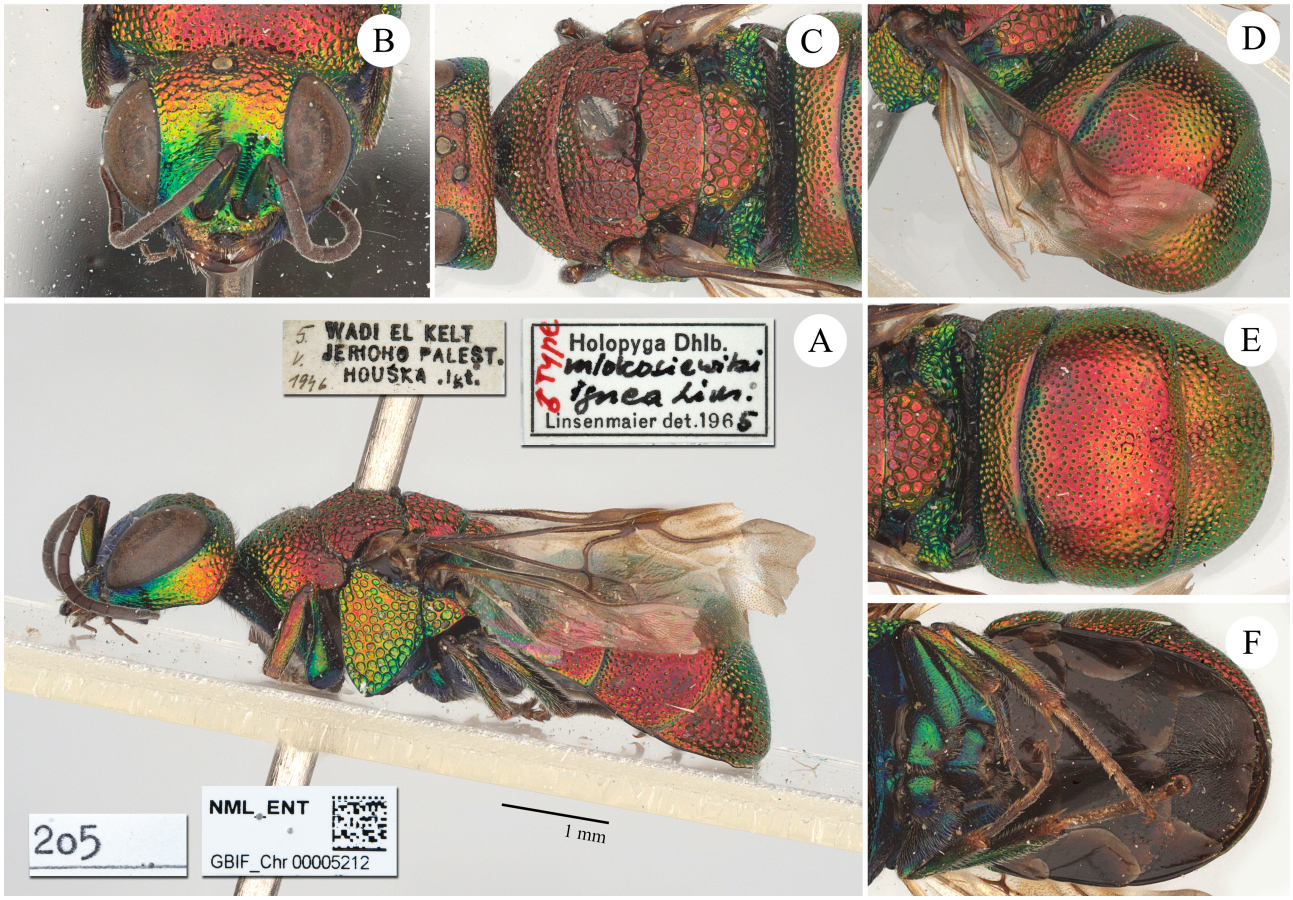

FIGURE 26. *Holopyga mlokosiewitzi ignea* Linsenmaier, 1968, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga mlokosiewitzi spartana Linsenmaier, 1968

(Fig. 27A–27F)

Holopyga mlokosiewitzi ssp. *spartana* Linsenmaier, 1968: 16 (descr.).

Type locality. Greece: "Griechenland, ♂ Type und Paratypen von Sparta, ♂ Paratype von Levadhia in Coll. m., ♂♂ Paratypen von alt-Korinth in Coll. Schmidt, Coll. Gusenleitner".

Holotype, ♂ and **paratypes,** 2♂♂: Graecia, Pelop. Sparta 15.–17.V.62 leg. Linsenmaier u. Pochon // ♂ Type vorn Paratypen *Holopyga* Dhlb. *mlokosiewitzi spartana* Lins. Linsenmaier det. 1963 // 206 // NML_ENT GBIF_Chr0005208 (ex type-collection).

Paratype, 1♂: Graecia 4.VI.66 Levadhia leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *mlokosiewitzi spartana* Lins. Linsenmaier det. 1966 // NML_ENT GBIF_Chr0005207 (ex synoptic-collection).

Remarks. Linsenmaier designated one female specimen as allotype with the following labels: Graecia, Pelop. Patras 3.–4.7.92 leg. Linsenmaier // ♀ Allotype *Holopyga* Dhlb. *mlokosiewitzi spartana* Lins. Linsenmaier det. 1993. This specimen was collected and identified years after the original description and cannot be considered as part of the type series.

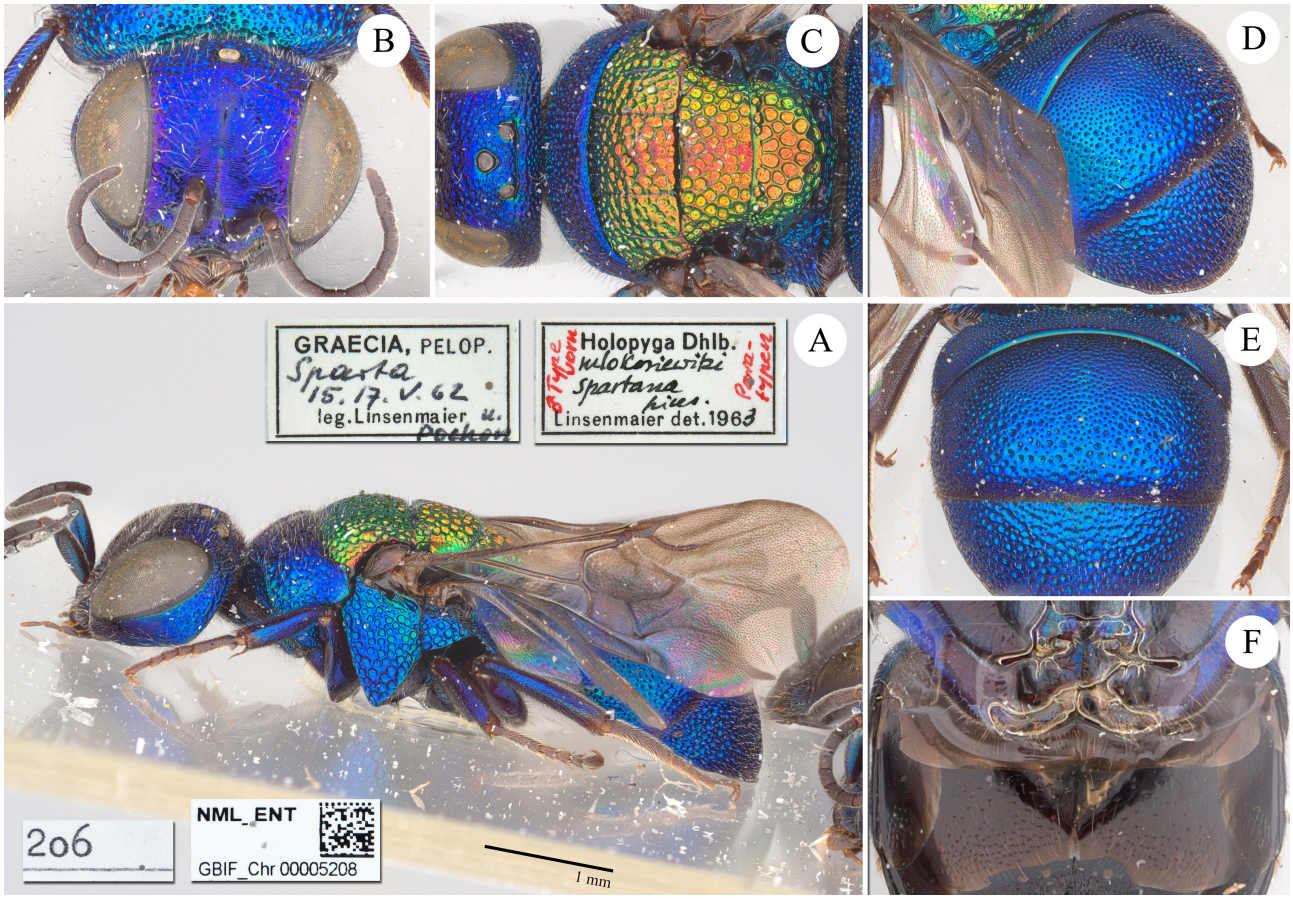

FIGURE 27. *Holopyga mlokosiewitzi spartana* Linsenmaier, 1968, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, posterior view. F) Metasoma, ventral view.

Holopyga naefi Linsenmaier, 1959a

(Fig. 28A–28F)

Holopyga naefi Linsenmaier, 1959a: 26 (descr.), 186 (cat.), 200 (figs 196, 197).
Holopyga (*Holopyga*) *naefi*: Linsenmaier 1999: 28 (key), 32 (diagn.), 40 (figs 37, 38).

Type locality. Morocco: "Marocco, ♂ Type, ♀ Allotype, ♂ Paratype Coll. Naef, ♂ Paratype Coll. m. (Casablanca, V.1937, leg. Naef)".

Holotype, ♂: Fedala (Casabl.) Marokko, 5.V.1937 Collect. Naef // ♂ Type *Holopyga* Dhlb. *naefi* Lins. det. Linsenmaier 1957 // NML_ENT GBIF_Chr0002723 (ex type-collection).

Allotype, ♀: Fedala (Casabl.) Marokko, 5.V.1937 Collect. Naef // ♀ Allotype *Holopyga* Dhlb. *naefi* Lins. det. Linsenmaier 1957 // NML_ENT GBIF_Chr0002724 (ex type-collection).

Paratypes, 1♂: Fedala (Casabl.) Marokko, 5.V.1937 Collect. Naef // ♂ Paratype *Holopyga* Dhlb. *naefi* Lins. Linsenmaier det. 1957 // NML_ENT GBIF_Chr0002716 (ex synoptic-collection); 1♂: Fedala (Casabl.) Marokko, 5.V.1937 Collect. Naef // ♂ Paratype *Holopyga* Dhlb. *naefi* Lins. det. Linsenmaier 1957 // NML_ENT GBIF_Chr0002721 (ex Naef-collection).

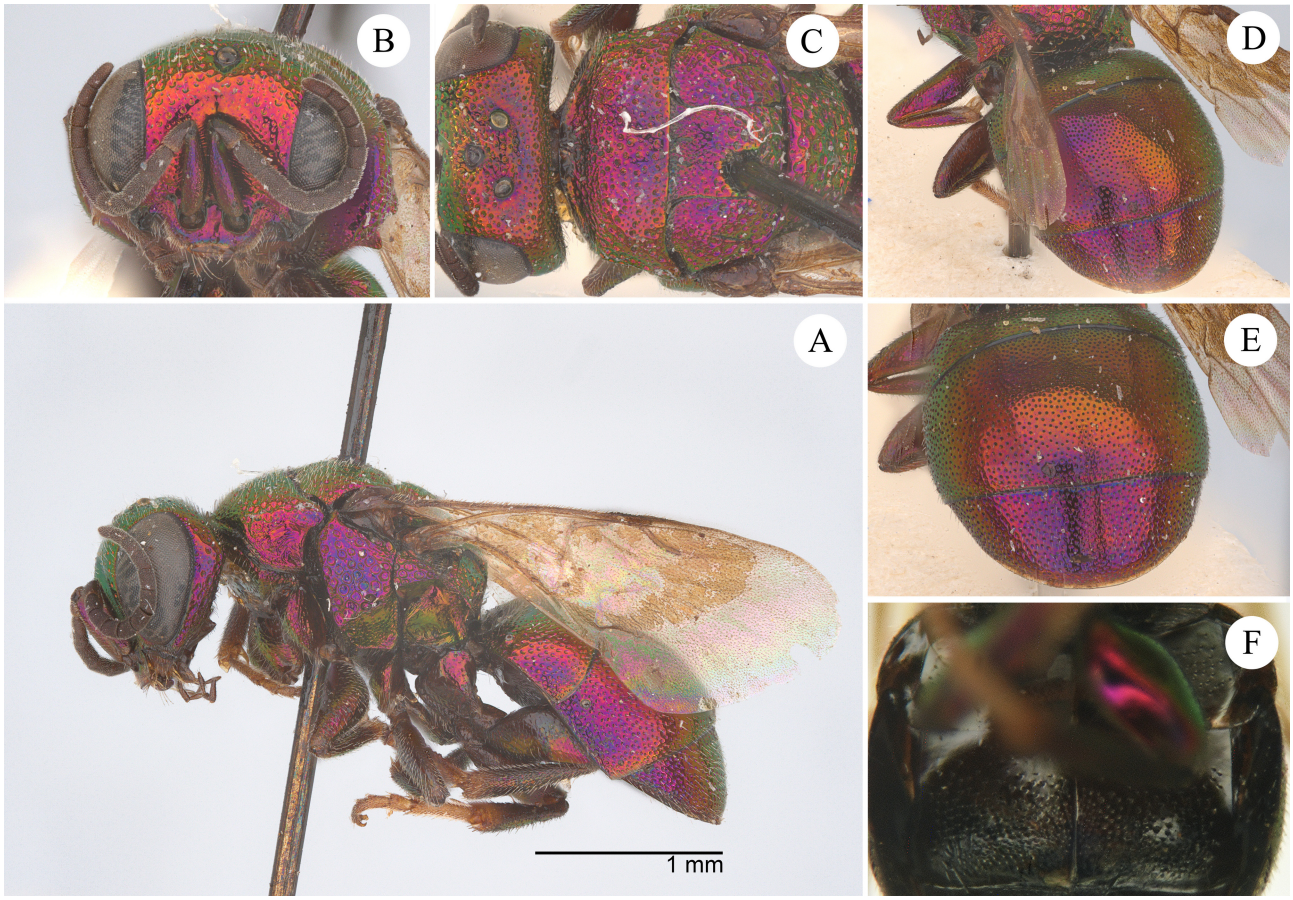

FIGURE 28. *Holopyga naefi* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, posterior view. F) Metasoma, ventral view.

Holopyga ovata effrenata **Linsenmaier, 1959b**

(Fig. 29A–29F)

Holopyga ovata ssp. *effrenata* Linsenmaier, 1959b: 234 (descr.).
Holopyga ovata effenata: Kimsey & Bohart 1991: 229. Incorrect subsequent spelling.
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga crassepuncta effrenata: Arens 2004: 37 (reinstated).
Holopyga turkestanica effrenata: after Rosa *et al.* 2017c: 111.

Type locality. Cyprus: "Cypern, ♂ Type, ♀ Allotype (Limassol, leg. Mavromoustakis) und Paratypen Coll. m.".

Holotype, ♂ and **allotype,** ♀: Cypern 26.5.49 Limassol Mavromoustakis // ♂ Type ♀ Allotype *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // 180 // NML_ENT GBIF_Chr0003284 (ex type-collection).

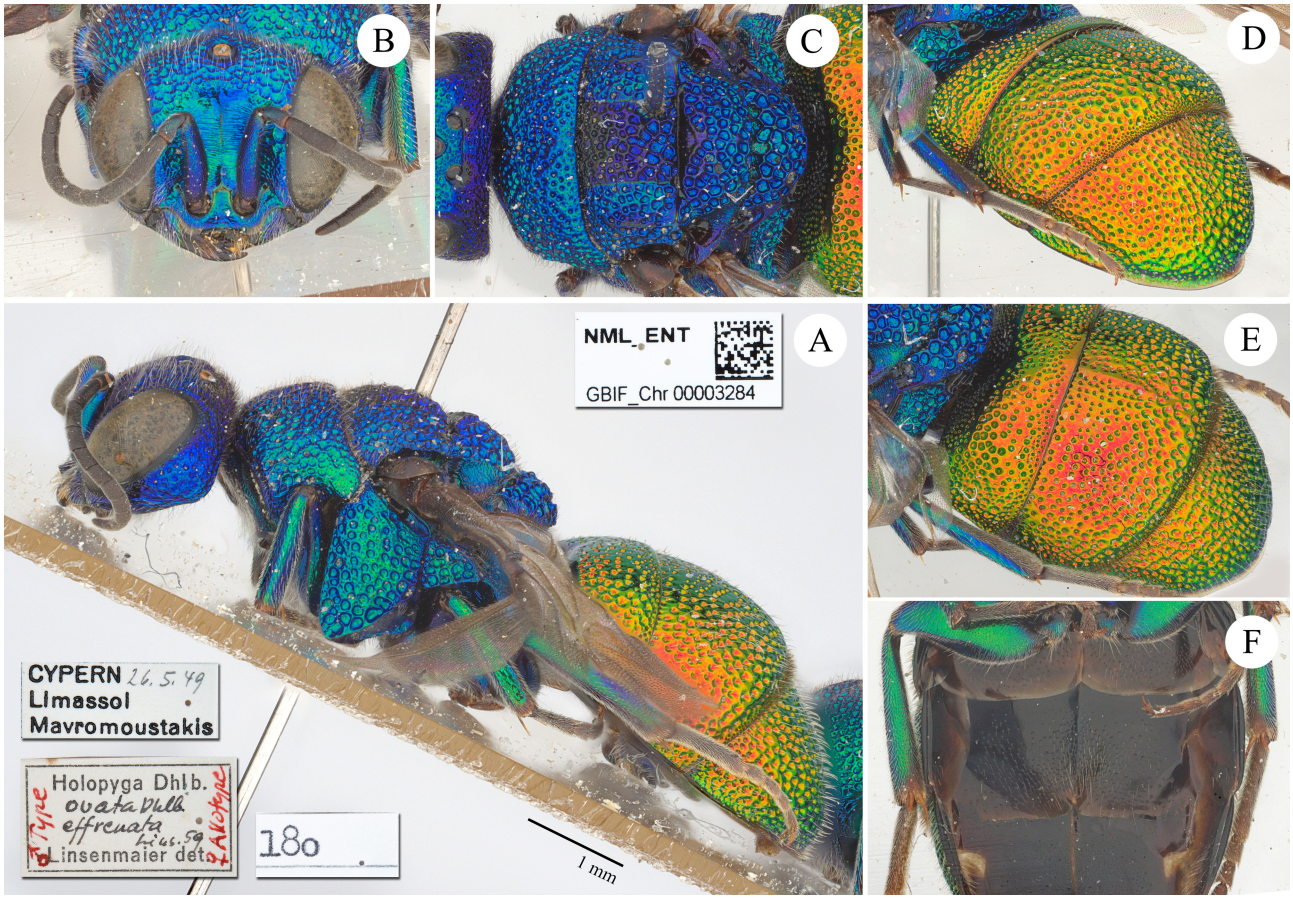

FIGURE 29. *Holopyga ovata effrenata* Linsenmaier, 1959b, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, latero-dorsal view. F) Metasoma, ventral view.

Paratypes, 2♂♂ and 1♀: Cypern 26.5.49 Limassol Mavromoustakis // Paratypen *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // *Holopyga* Dhlb. generosa effrenate Lins. Dte Linsenmaier 1988 // *Holopyga* Dhlb. *crassepuncta effrenata* Lins. det. Linsenmaier 1999 // NML_ENT GBIF_Chr0003266 (ex synoptic-collection); 5♂♂ and 7♀♀: Cypern 26.5.49 Limassol Mavromoustakis // Paratypen *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003271–3276; 1♀: Cypern 5.6.34 Cherkes Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003267; 1♀: Cypern 6.9.44 Cherkes Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003268; 1♂: Cypern 4.3.39 Limassol Mavromoust. Coll. Dr. Enslin Linsenmaier // Paratype *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003269; ♀: Cypern 27.5.50 near Zakaki Mavromoustakis // Paratype ♀ *Holopyga* Dhlb. *ovata* Dhlb. *effrenata* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003270.

Remarks. Two other specimens with the labels: Cypern 6.V.1963 Limassol leg. Mavromoustakis Coll. Linsenmaier // NML_ENT GBIF_Chr0003283 were labelled as holotype and allotype by Linsenmaier. However, they cannot be considered as part of the type series because they were collected years after the date of the original description.

Holopyga ovata proviridis Linsenmaier, 1959a

(Fig. 30A–30F)

Holopyga ovata ssp. *proviridis* Linsenmaier, 1959a: 31 (descr.), 186 (cat.).

Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga ovata proviridis: Strumia 1995: 3 (reinstated).
Holopyga fastuosa proviridis: Linsenmaier 1999: 36.
Holopyga generosa asiatica Trautmann, 1926: Rosa *et al*. 2017b 9 (synonymised).

Type locality. Russia (Siberia), Iran, Palestine, Syria, Turkey: "Klein-Asien, Syrien, Palästina, Persien, Sibirien. ♂ Type (Syrien), ♀ Allotype (Klein-Asien), leg. Seidenstücker V.1952, und Paratypen Coll. m.".

Holotype, ♂: Syrien 9.5.52 Seidenstücker / Homs // Type ♂ *Holopyga* Dhlb. *ovata proviridis* Lins. Linsenmaier det. 1959 // 36 // NML_ENT GBIF_Chr0003254 (ex type-collection).

Allotype, ♀: Tarsus 5.5.58 Seidenstücker // ♀ Allotype *Holopyga ovata* Dhlb. *proviridis* Lins. Linsenmaier det. 1959 // NML_ENT GBIF_Chr0003255 (ex type-collection).

Paratype, ♂ Minusinsk // ~~Paratype~~ *Holopyga ovata*. *proviridis* Lins. Linsenmaier det. 1959 // *Holopyga amoenula occidenta* Lins. Linsenmaier det. 1963 // NML_ENT GBIF_Chr0003405; 1♂: Palestine Jerusalem 15.V. leg. Bytinski-Salz // Paratype *Holopyga ovata* Dahlb. *proviridis* Lins. Linsenmaier det. 1959 // ♂ *Holopyga* Dhlb. *fastuosa* Luc. det. Linsenmaier 1993 // NML_ENT GBIF_Chr0002858; 1♂: Teheran Keredj // Paratype *Holopyga* Dhlb. *ovata proviridis* Lins. Linsenmaier det. 1959 // *Holopyga* Dhlb. *generosa proviridis det* Linsenmaier 1988 // ♂ *Holopyga* Dhlb. *amoenula oriensa* Lins. det. Linsenmaier 1994 // NML_ENT GBIF_Chr0003361

Remarks. In 1963, Linsenmaier deleted the word 'paratype' from the identification label of the Siberian specimen and re-identified it as *Holopyga amoenula occidenta* Linsenmaier. However, even if originally misidentified, this specimen retains the type status of *Holopyga ovata proviridis*.

One specimen from Palestine was found in the Naef collection and could potentially be the missing paratype from "Palästina", though there is no conclusive evidence to confirm it.

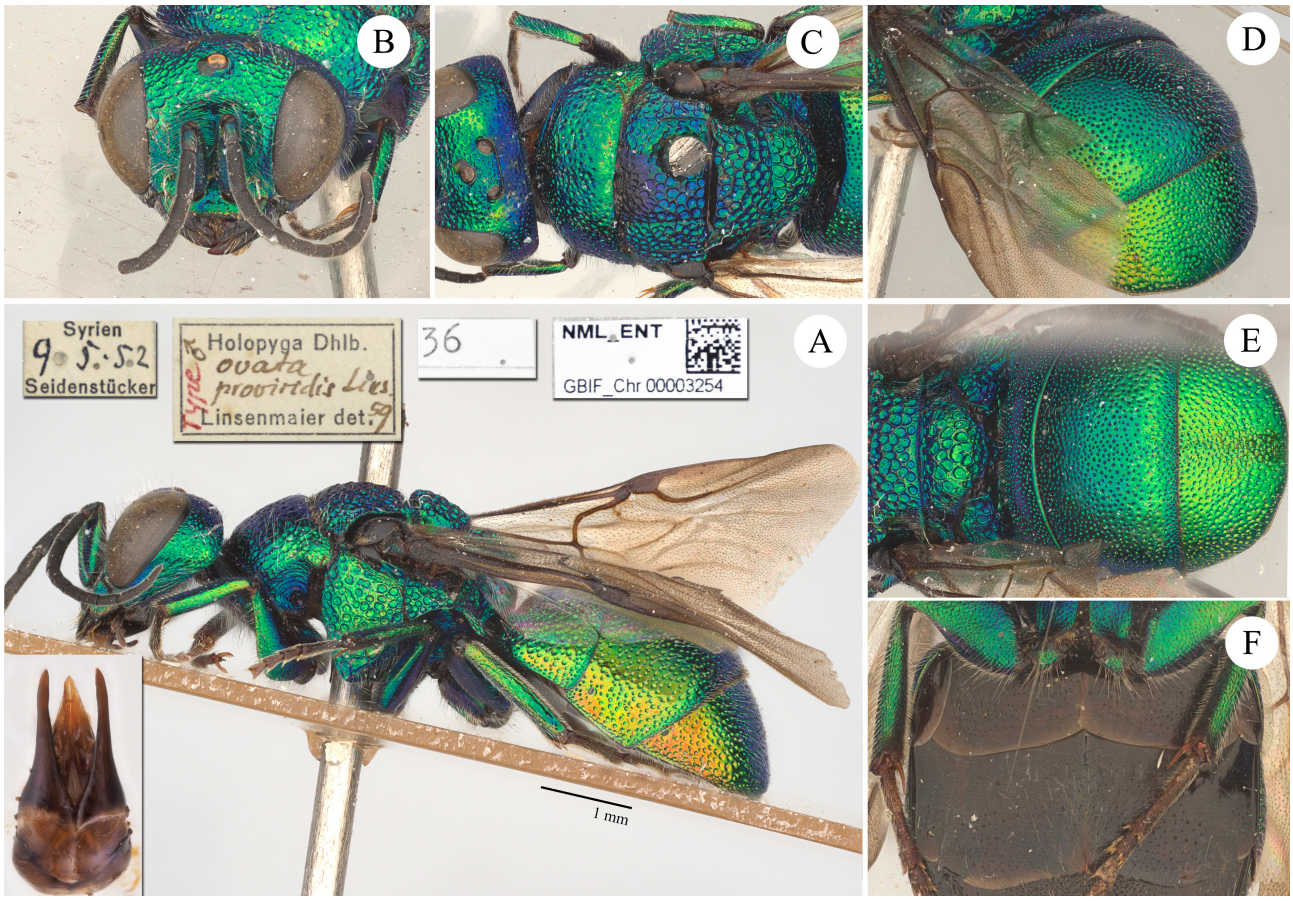

FIGURE 30. *Holopyga ovata proviridis* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

***Holopyga pseudovata* Linsenmaier, 1987**
(Fig. 31A–31F)

Holopyga pseudovata Linsenmaier, 1987: 135 (descr.).

Type locality. Spain: "Spanien, Badajoz, Merida (Verhoeff), ♀ Type ♂ Allotype Coll. m., Paratypen Leiden".

Holotype, ♀: Espana—Badajoz Merida 29.–30.VI.1968 PMF Verhoeff // ? *ignicoll. granadana* // ♀ Type *Holopyga* Dhlb. *pseudovata* Lins. Linsenmaier det. 1969 // 408 // NML_ENT GBIF_Chr0003286 (ex type-collection).

Allotype, ♂: Espana—Badajoz Merida 29.–30.VI.1968 PMF Verhoeff // ♂ Allotype *Holopyga* Dhlb. *pseudovata* Lins. det. Linsenmaier 1969 // NML_ENT GBIF_Chr0003287 (ex type-collection).

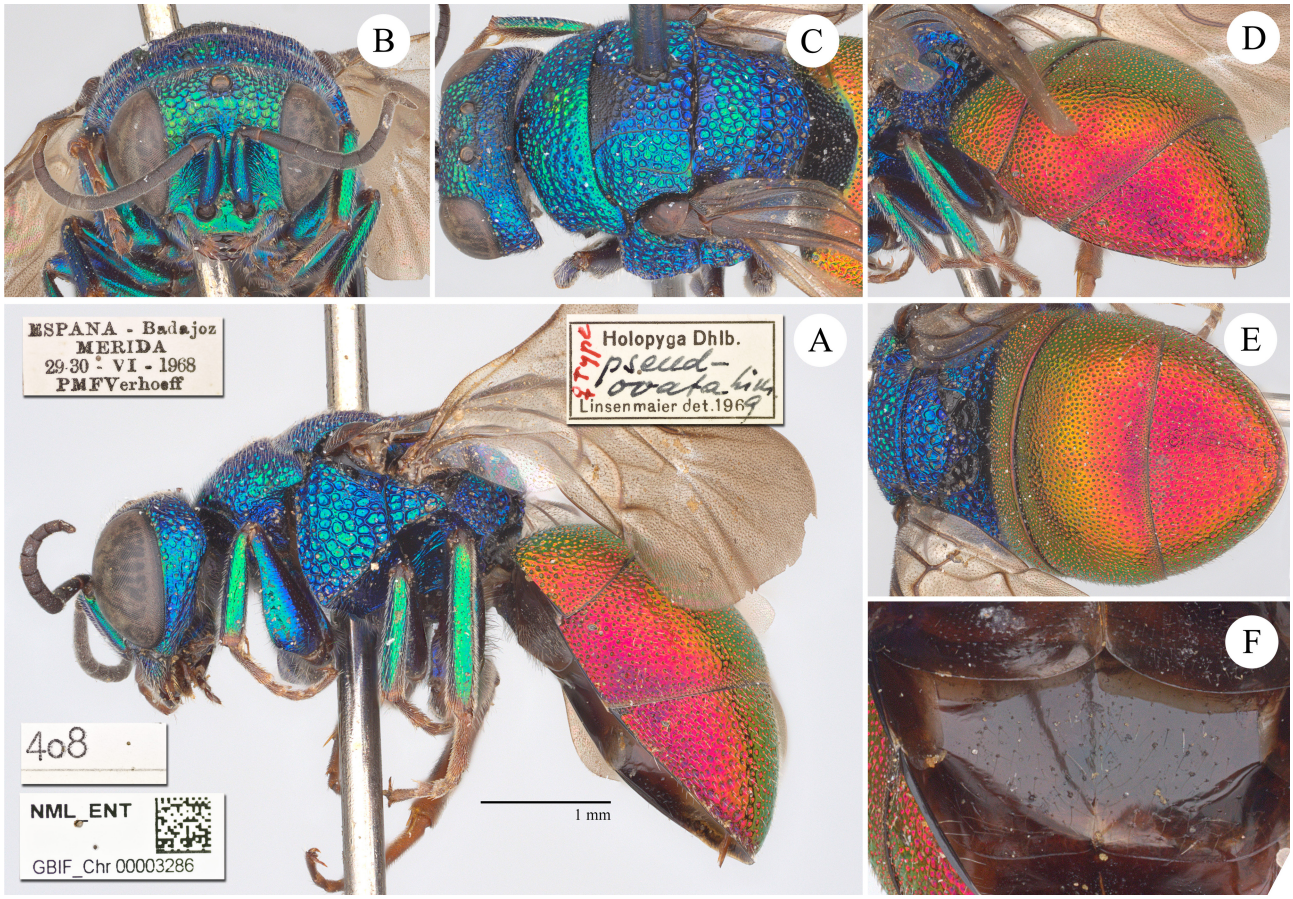

FIGURE 31. *Holopyga pseudovata* Linsenmaier, 1987, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, posterior view. F) Metasoma, ventral view.

***Holopyga pulawskii* Linsenmaier, 1968**
(Fig. 32A–32F)

Holopyga pulawskii Linsenmaier, 1968: 14 (descr.).

Type locality. Turkmenistan: "Süd-Russland, ♀ Type, ♂ Allotype von Turkmenien, nördlich Askhabad, V.64, leg. Pulawski, ♂ Paratype in Coll. m.".

Holotype, ♀: Turkmenia Kary Kul 65 km N Askhabad 16–18.V.1964 leg. WJ Pulawski // ♀ Type *Holopyga* Dhlb. *pulaswkii* Lins. Linsenmaier det. 1965 // 203 // NML_ENT GBIF_Chr0005270 (ex type-collection).

Allotype, ♂: Turkmenia Tedshen tugai 24.V.1964 leg. WJ Pulawski // ♂ Allotype *Holopyga* Dhlb. *pulaswkii* Lins. Linsenmaier det. 1965 // NML_ENT GBIF_Chr0005271 (ex type-collection).

Paratype, 1♂: Khiva 18.VI.927 Gussakowskji [in cyrillic] // *Holopyga solskii* Rad. Nikolskaja det. // ♂ Paratype *Holopyga* Dhlb. *pulaswkii* Lins. Linsenmaier det. 1966 // NML_ENT GBIF_Chr0005249 (ex synoptic-collection).

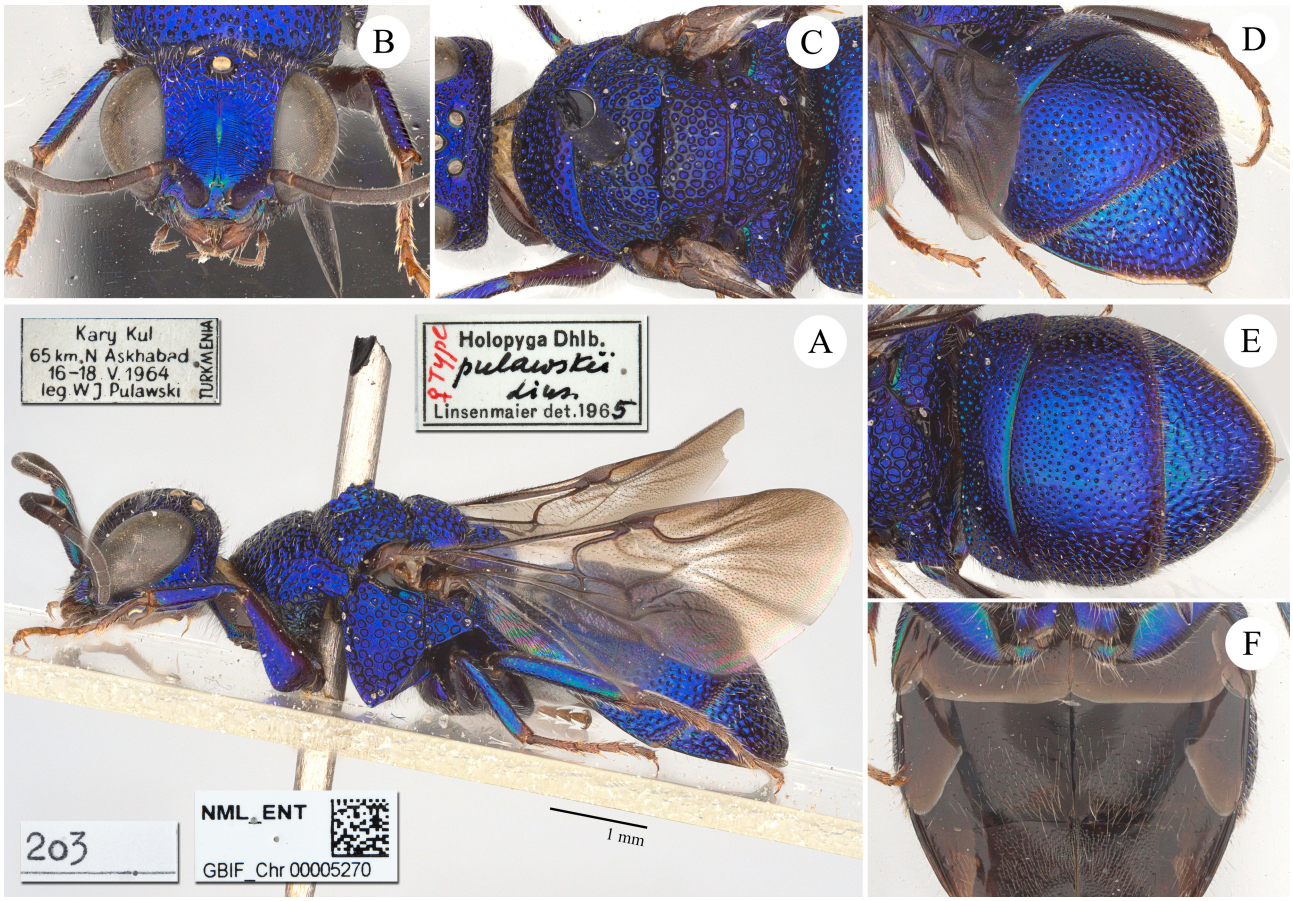

FIGURE 32. *Holopyga pulawskii* Linsenmaier, 1968, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga punctatissima reducta Linsenmaier, 1959a

(Fig. 33A–33F)

Holopyga punctatissima ssp. *reducta* Linsenmaier, 1959a: 30 (descr.), 186 (cat.).
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga punctatissima reducta: Strumia 1995: 3 (reinstated).

Type locality. France: "Süd-Frankreich, sehr selten. ♂ Type, ♂ Paratype (Fréjus, VII.1949) Coll. m., Paratype (Hérault) Coll. Naef".

Holotype, ♂ and **paratype,** ♂: France Var St. Aygulf M[Mitte].7.49 leg. Linsenmaier // Type u. Paratype *Holopyga* Dhlb. *punctatissima* D. ssp. *reducta* Lins. ♂♂ Linsenmaier det. 1957 // 33 // NML_ENT GBIF_Chr0003619 (ex type-collection).

Remarks. Saint-Aygulf is a small town close to Fréjus. The paratype from Hérault was not located in the collection.

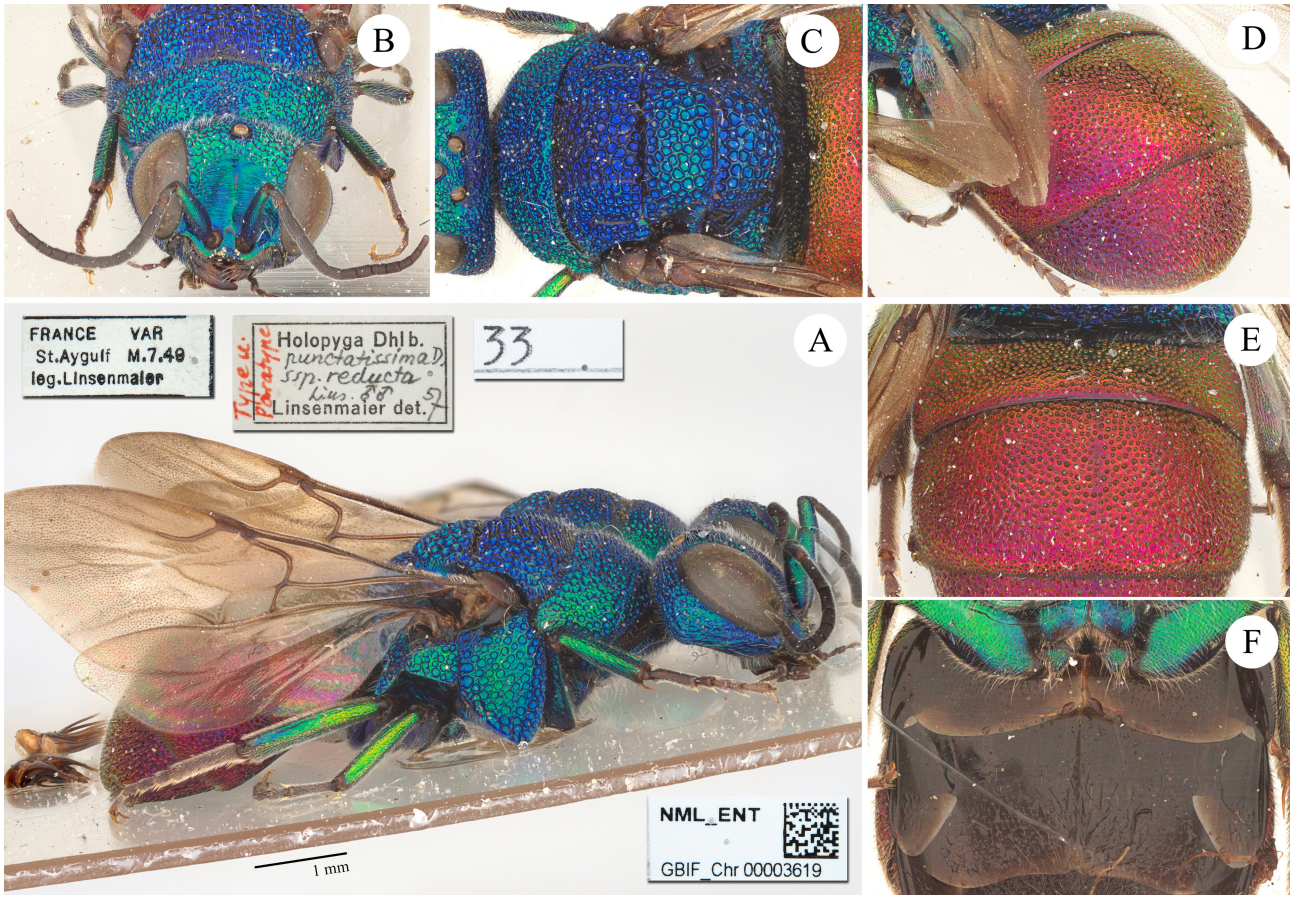

FIGURE 33. *Holopyga punctatissima reducta* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga (*Holopyga*) *rubra* Linsenmaier, 1999

(Fig. 34A–34F)

Holopyga (*Holopyga*) *rubra* Linsenmaier, 1999: 28 (key), 31 (descr.), 40 (figs. 33–35).

Type locality. Portugal, Spain, Morocco: "Marokko. ♀ Type (Holotypus), ♂ Allotype westlich Fès 14.V.1965; Paratypen mit gleichen Daten leg. und Coll. m.—S-Spanien, Portugal, Paratypen Coll. m.".

Holotype, ♀ and **paratype,** ♀: Maroc, 14.V.65, 30 km westl. Fès, leg. Linsenmaier // ♀ Type hinten *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1965 // 491 // NML_ENT GBIF_Chr0002644 (ex type-collection).

Allotype, ♂ and **paratype,** ♂: Maroc, 16.V.65, westl. Fès, leg. Linsenmaier // ♂ Allotype hinten *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1965 // NML_ENT GBIF_Chr0002645 (ex type-collection).

Paratypes, 1♂ and 1♀: Maroc 14.V.65 30 Km westl. Fès leg. Linsenmaier // ♂♀ Paratypen *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1965 // NML_ENT GBIF_Chr0002634 (ex synoptic-collection); 2♂♂: Maroc 31.V.64 Meknes leg. Linsenmaier // ♂ Paratypen *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1965 // NML_ENT GBIF_Chr0002639; 13♀♀: Maroc 14.V.65 30 km west. Fès leg. Linsenmaier // ♀ Paratypen *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1965 // NML_ENT GBIF_Chr0002640–2642; 1♂: Maroc 15.V.65 Kenitra leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002643; 1♂: Spanien 14.V.64 östl. Sevilla leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002635; 1♂: Spanien 16.V.64 Jerez leg. Linsenmaier // ♂ Paratype *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002636; 4♂♂: Spanien 24.IV.65 östl. Sevilla leg. Linsenmaier // 4♂ Paratypen *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002637; 1♂: Caparica

(Portug. S) 22.5.1955 leg. N.F. d'Andrade // ♂ Paratype *Holopyga* Dhlb. *rubra* Lins. det. Linsenmaier 1977 // NML_ENT GBIF_Chr0002638.

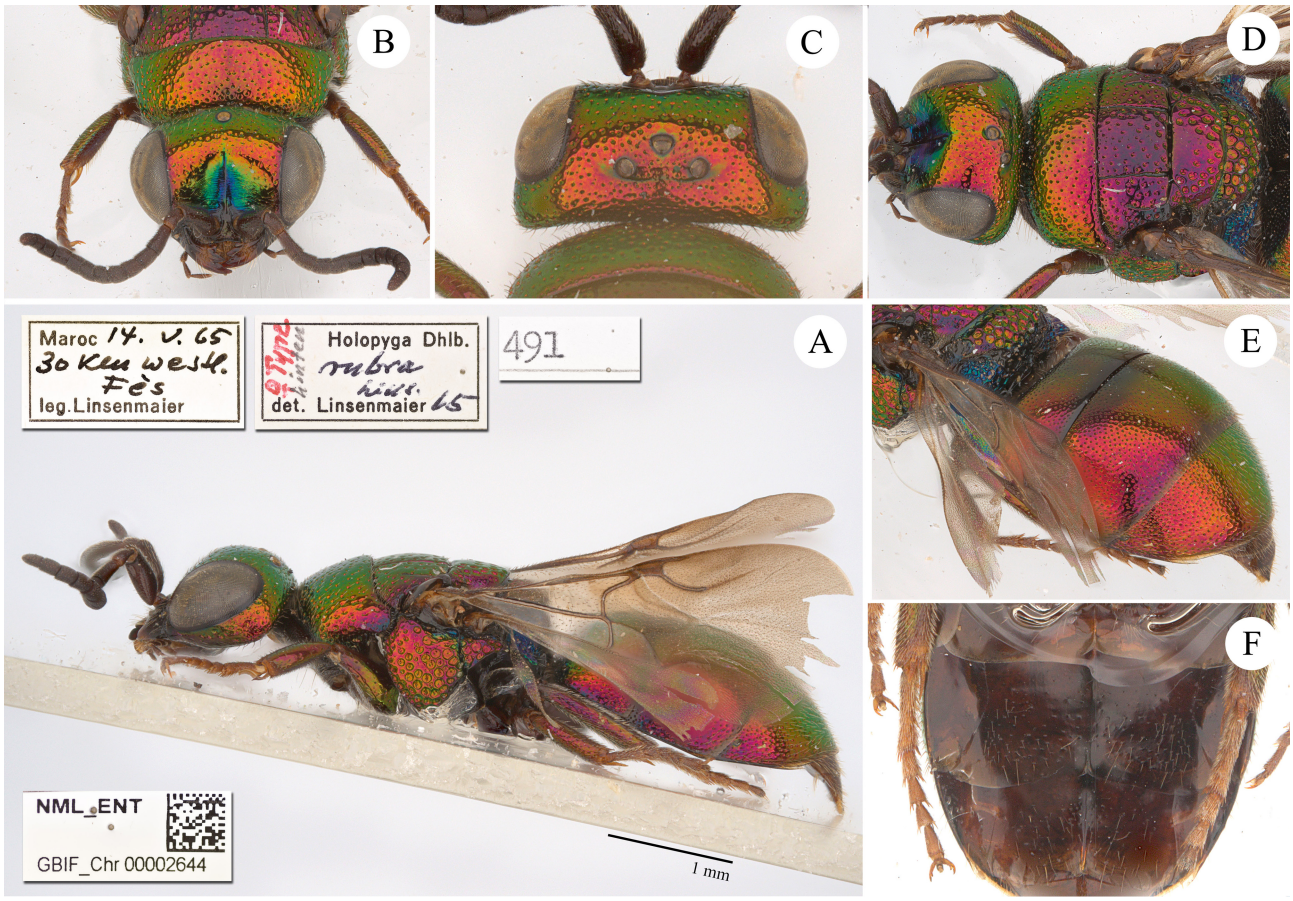

FIGURE 34. *Holopyga rubra* Linsenmaier, 1999, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head, dorsal view. D) Head and mesosoma, antero-dorsal view. E) Metasoma, latero-posterior view. F) Metasoma, ventral view.

Holopyga speculiventre Linsenmaier, 1994

Holopyga speculiventre Linsenmaier, 1994: 152 (figs 7–9), 153 (key),154 (descr.).

Type locality. Saudi Arabia: "Holotype: ♂, Saudi Arabia: Wadi Majarish, 13.II.1983, Guichard, BMNH [= NHMUK].—Paratype 1♂, same data as holotype, WLC".

Paratype, ♂: S. Arabia W. Majarish 13.2.83 K. Guichard // ♂ Paratype Holopyga Dhlb. *speculiventre* det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005397 (ex synoptic-collection).

Holopyga tenuitarsis Linsenmaier, 1969
(Fig. 35A–35F)

Holopyga tenuitarsis Linsenmaier, 1969: 350 (cat., distr.), 372 (descr.).

Type locality. Palestine: "Beersheba 20.V.66 leg. Bytinski-Salz, ♀ Type in coll. m.".

Holotype, ♀: Israel 14 km S Beersheba 22.V.1966, leg. Bytinski-Salz // ♀ Type *Holopyga tenuitarsis* Lins. det. Linsenmaier 1969 // 309 // NML_ENT GBIF_Chr0005493 (ex type-collection).

Remarks. The collecting date on the label is different from the date given in the text (20.V.1966). We considered this a case of *lapsus calami*.

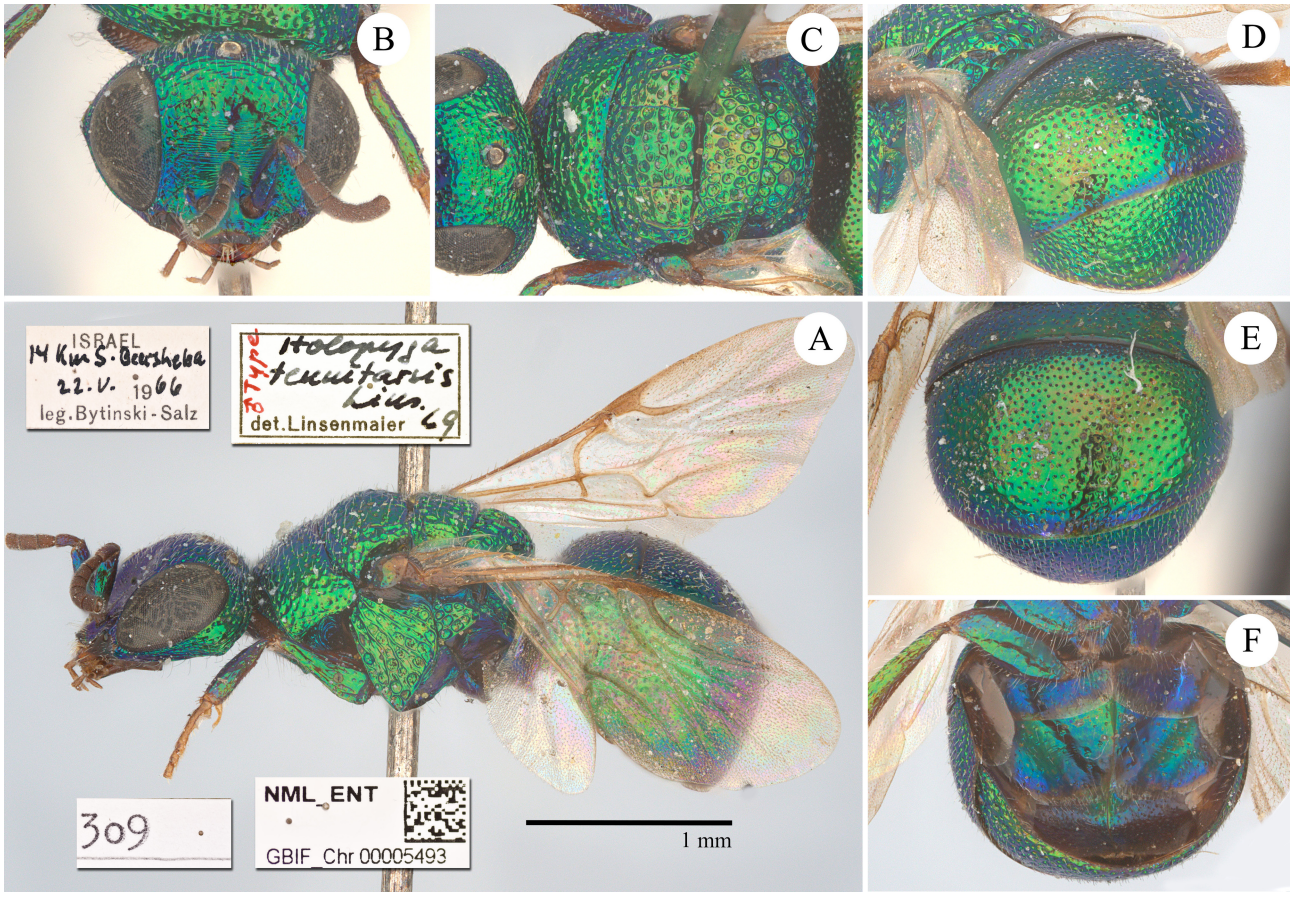

FIGURE 35. *Holopyga tenuitarsis* Linsenmaier, 1969, holotype, male. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Holopyga trapeziphora Linsenmaier, 1987

(Fig. 36A–36F)

Holopyga trapeziphora Linsenmaier, 1987: 136 (descr.), 138 (fig. 1).

Type locality. Morocco: "Maroc, El Jadida ♀ Type Coll. m.; Portugal, Milfontes ♀ Paratypen Coll. m. und Coll. Tussac".

Holotype, ♀: Maroc El Jadida V.1918 Coll. Linsenmaier // ♀ Type *Holopyga* Dhlb. *trapeziphora* Lins. det. Linsenmaier 1977 // 410a // NML_ENT GBIF_Chr0005020 (ex type-collection).

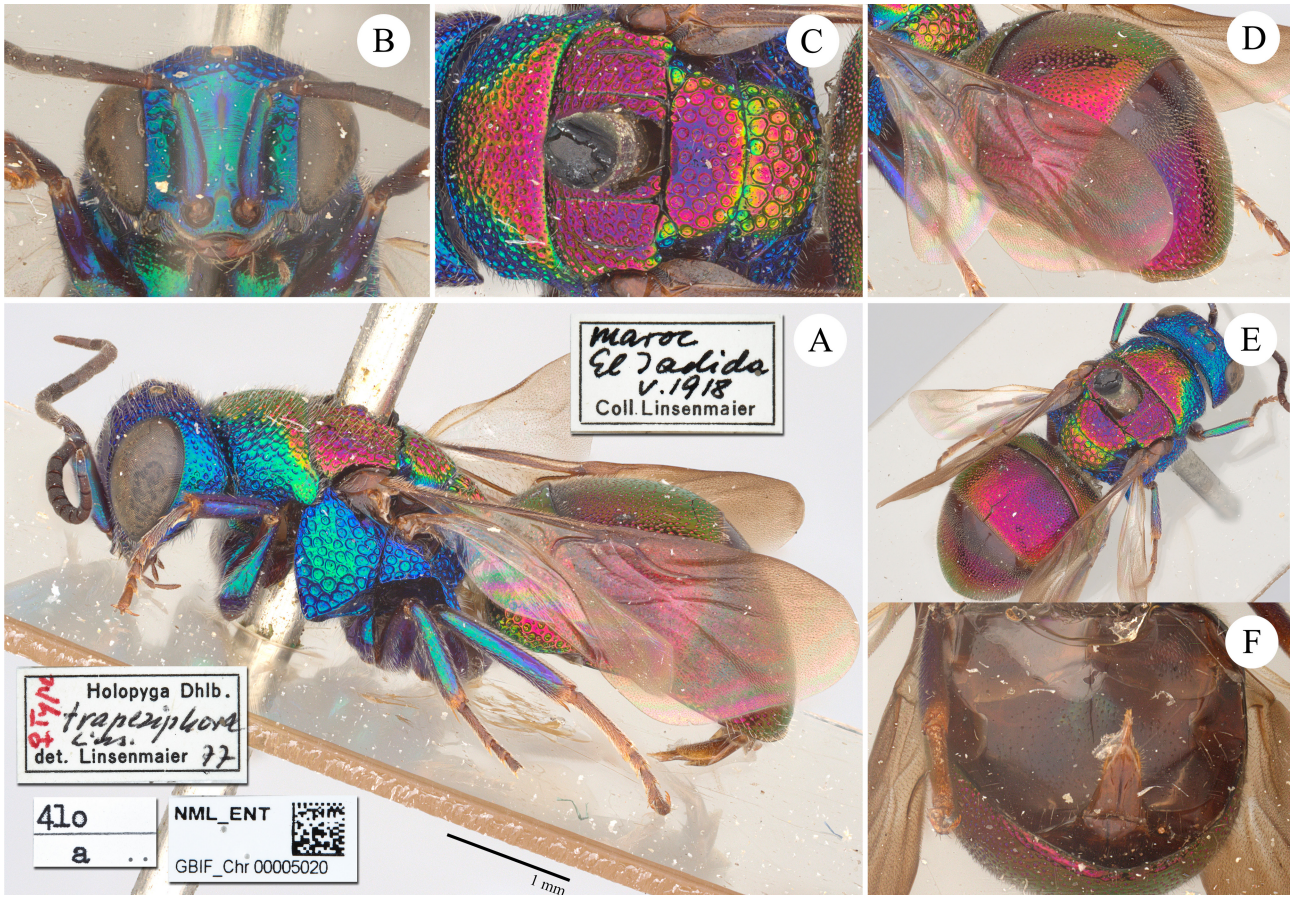

FIGURE 36. *Holopyga trapeziphora* Linsenmaier, 1987, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Habitus, dorsal view. F) Metasoma, ventral view.

Holopyga unitasculpta Linsenmaier, 1968

(Fig. 37A–37F)

Holopyga unitasculpta Linsenmaier, 1968: 14 (descr.).
Holopyga solskyi (Radoszkowski, 1877): present paper (**new synonymy**).

Type locality. Turkmenistan: "Turkmenien, Tedshen, V.64, leg. Pulawski, ♂ Type in Coll. m.".

Holotype, ♀ [not ♂]: Turkmenia Tedshen tugaï 25.V.1964 leg. W.J. Pulawski // ♀ Type *Holopyga* Dhlb. *unitasculpta* Lins. Linsenmaier det. 1966 // 204 // NML_ENT GBIF_Chr0005247 (ex type-collection).

Remarks. The holotype is a female, rather than a male as stated in the original description. *Holopyga unitasculpta* is here considered a junior subjective synonym of *Holopyga solskyi* (Radoszkowski, 1877). The types of *Holopyga solskyi* and of another junior synonym, *H. vespera* Semenov-Tian-Shanskij, 1967, were examined and images published in Rosa *et al*. (2015a, 2017a). They share the same size, habitus, colour and the peculiar punctation of the metasoma. Linsenmaier (1968) misidentified *Holopyga solskyi*, describing it as a species with small punctures on the metasoma. *Holopyga unitasculpta* was compared by Linsenmaier (1968) with *H. mlokosiewitzi hemisimpla* Linsenmaier, which is charaterised by a light blue to green body colour instead of dark blue to violet in *H. solskyi*, and double punctation on the second metasomal tergum, with dense and small punctures basally becoming larger and sparser in the second half of the tergum rather than sparser throughout, including basally in *H. solskyi*.

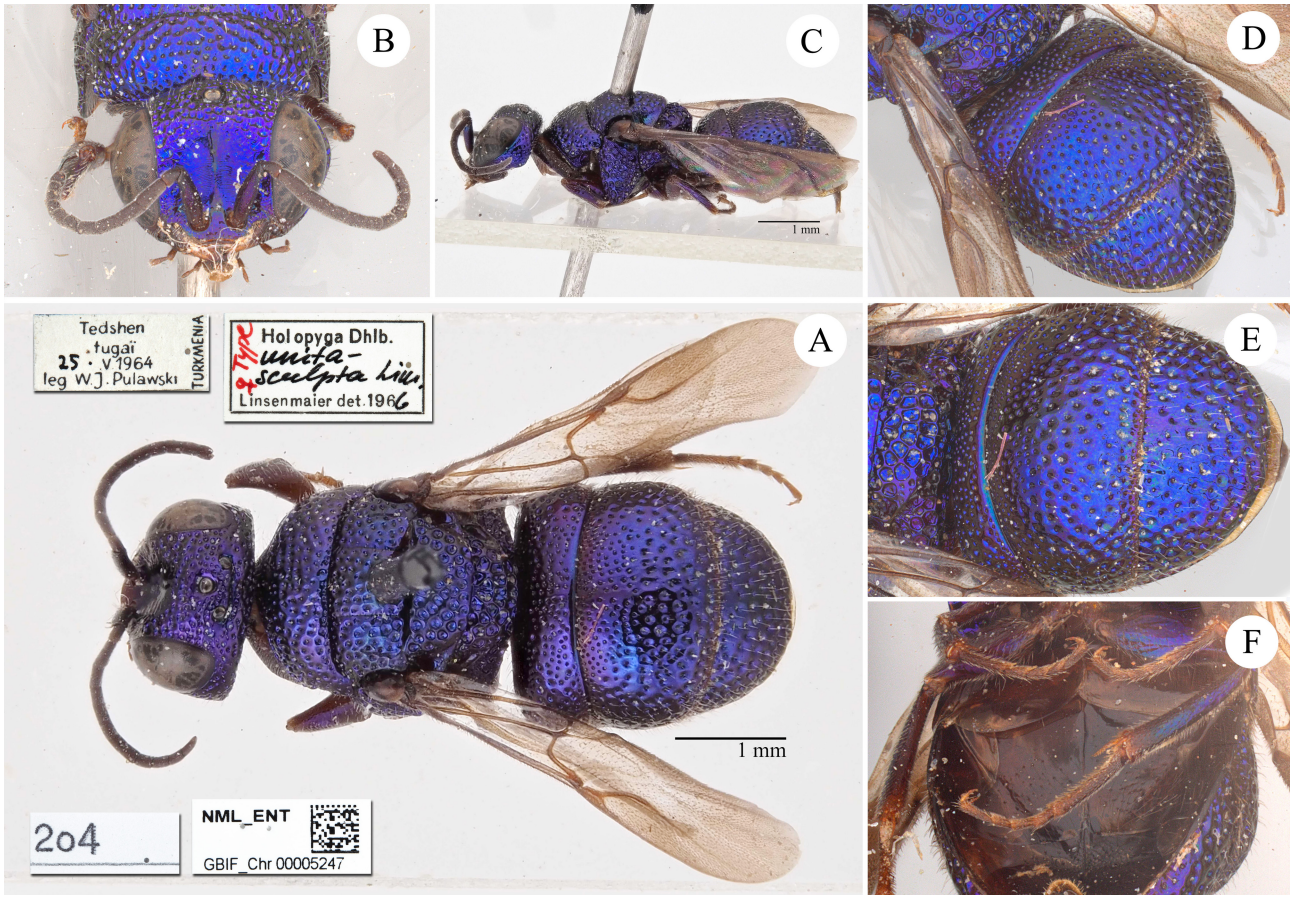

FIGURE 37. *Holopyga unitasculpta* Linsenmaier, 1968, holotype, female. A) Habitus, dorsal view. B) Head, frontal view. C) Habitus, lateral view. D) Metasoma, latero-dorsal view. E) Metasoma, posterior view. F) Metasoma, ventral view.

Holopyga vicissituda Linsenmaier, 1994

(Fig. 38A–38F)

Holopyga vicissituda Linsenmaier, 1994: 155

Type locality. Oman, Saudi Arabia, United Arab Emirates: "Holotype: ♀, Saudi Arabia: Al Jubail (Arabian Gulf), XI.1986, Menrad, WLC.—Allotype: 1♂, same data as holotype, WLC.—Paratypes: 1♂, 1♀, same data as holotype, WLC; 1♂, Wadi Majarish, II.1983, Guichard; 1♂, Abu Arish, I.1983, Guichard.—U.A.E.: 2♂♂, Abu Dhabi, III & IV. 1988, Hamer; 1♂, J. Ali Hotel, IV. 1989, Hamer.—Oman: 1♂, Samail Gap, II.1976, Guichard; 1♂, Dhofar, X.1977, Guichard".

Holotype, ♀: Saudi-Arabien Al Jubail 2.XI.86 coll. Menrad coll. W. Perraudin // ♀ Type *Holopyga* Dhlb. *vicissituda* Lins. det. Linsenmaier 1989 // 456 // NML_ENT GBIF_Chr0005366 (ex type-collection).

Allotype, ♂: Saudi-Arabien 2.XI.86 Al Jubail coll. Menrad coll. W. Perraudin / 80 km N. von Dahrarnoad Persisch. Golf // ♂ Allotype *Holopyga* Dhlb. *vicissituda* Lins. det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005367 (ex type-collection).

Paratypes, 1♂: Dhofar 670m S N Road, K. 48 6.10.1977 K. Guichard // ♂ Paratype *Holopyga* Dhlb. *vicissituda* det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005360 (ex synoptic-collection); 1♀: Saudi Arabien 2.XI.1986 Al Jubail Coll. Menrad Coll. W. Perraudin / 80 km von Nord Dahrar Persische Golf // ♀ Paratype *Holopyga* Dhlb. *vicissituda* Lins. det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005361 (ex synoptic-collection); 1♂: Oman Samail Gap 600m 29.II.1976 K. Guichard // ♂ Paratype *Holopyga* Dhlb. *vicissituda* det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005362 (ex synoptic-collection); 1♂: UAE Abu Dhabi (m) 1.IV.1988 I.L. Hamer // ♂ Paratype *Holopyga* Dhlb. *vicissituda* det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005363; 1♂ and 1♀: Saudi Arabien

2.XI.1986 Al Jubail Coll. Menrad Coll. W. Perraudin / 80 km von Nord Dahrar Persische Golf // ♂♀ Paratypen *Holopyga* Dhlb. *vicissituda* Lins. det. Linsenmaier 1989 // NML_ENT GBIF_Chr0005364–5365

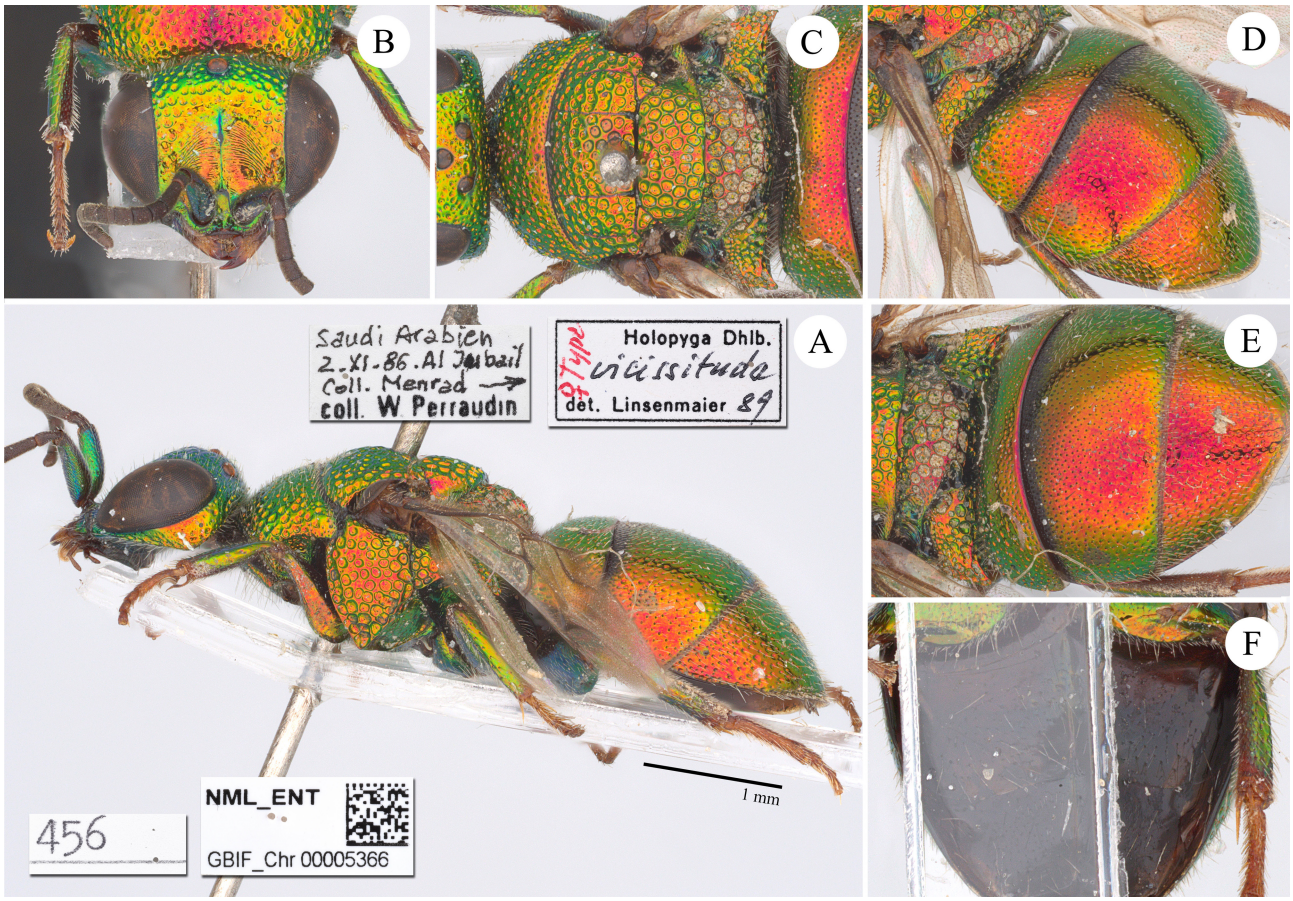

FIGURE 38. *Holopyga vicissituda* Linsenmaier, 1994, holotype, female. A) Habitus, lateral view. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

***Holopyga vigora* Linsenmaier, 1959a**

(Fig. 39A–39F)

Holopyga vigora Linsenmaier, 1959a: 29 (key), 31 (descr.), 186 (cat.).

Type locality. Turkey: "Klein-Asien, ♂ Type, ♂ Paratype Coll. m. (Akschehir, VI.1955, leg. Seidenstücker)".

Holotype, ♂ and **paratype,** 1♂: Akschehir 1.–12.6.1955 Seidenstücker // Type ♂ links Paratype rechts *Holopyga* Dhlb. *vigora* Lins. Linsenmaier det. 1959 // 38 // NML_ENT GBIF_Chr0003706 (ex. Type-collection).

Remarks. Linsenmaier designated a female as allotype in the type-collection with the following labels: Graecia, Pelop. Mistras 6.VI.61 leg. Linsenmaier // ♀ Allotype *Holopyga Dhlb. vigora* Lins. Linsenmaier det 1963 // No Type Rosa det. 2010. This specimen is not part of the type series because it was collected and identified years after the description, so that it cannot be considered an allotype.

Subgenus *Chamaeholopyga* Linsenmaier, 1987

Chamaeholopyga Linsenmaier, 1987: 137 (as subgenus of *Holopyga* Dahlbom, 1845). Type species: *Holopyga* (*Chamaeholopyga*) *parvicornis* Linsenmaier, 1987: 137.

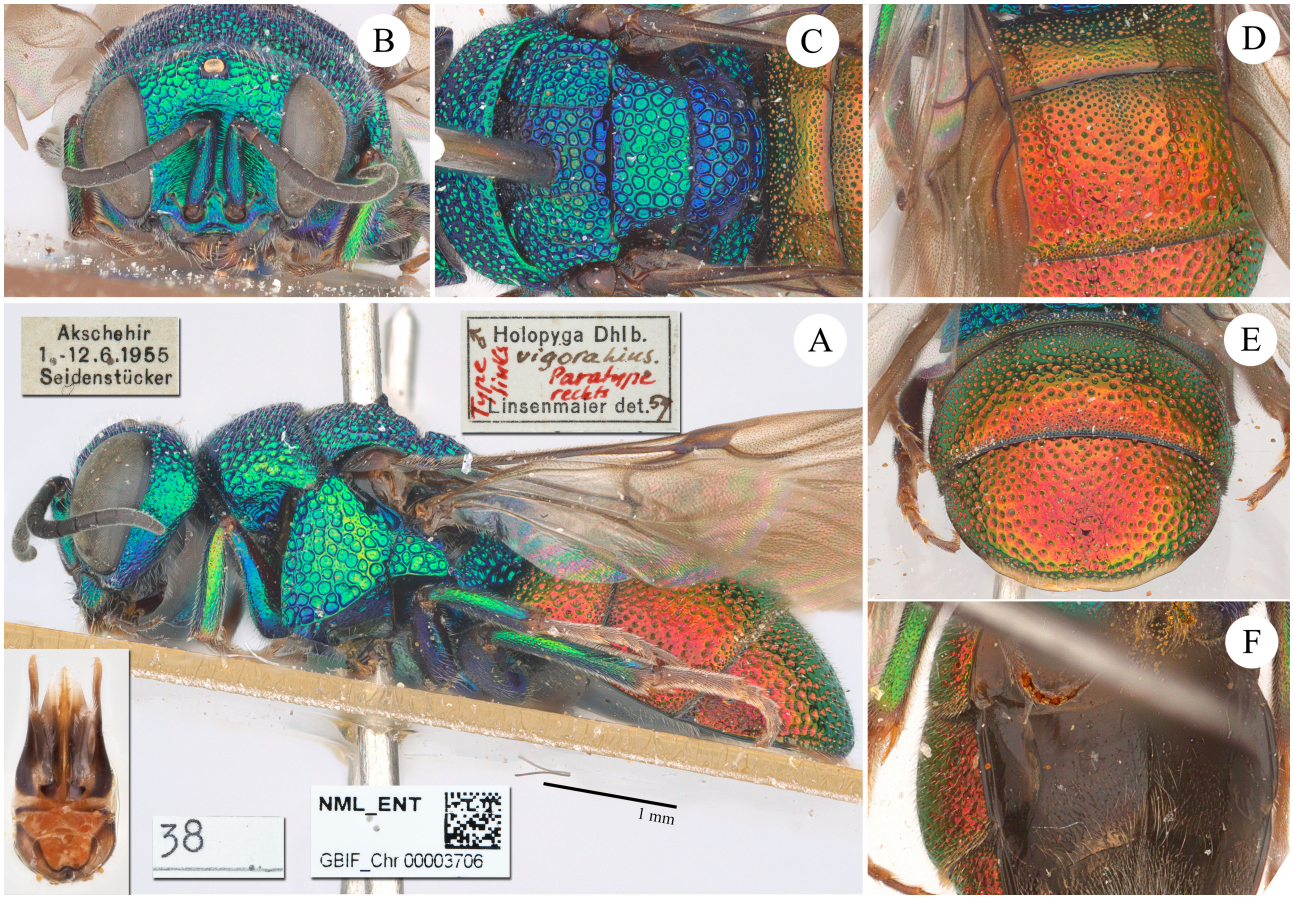

FIGURE 39. *Holopyga vigora* Linsenmaier, 1959a, holotype, male. A) Habitus, lateral view; inset: genital capsule. B) Head, frontal view. C) Mesosoma, dorsal view. D) Metasoma, dorsal view. E) Metasoma, posterior view. F) Metasoma, ventral view.

***Holopyga* (*Chamaeholopyga*) *parvicornis* Linsenmaier, 1987**

(Fig. 40A–40F)

Holopyga (*Chamaeholopyga*) *parvicornis* Linsenmaier, 1987: 137 (descr.).
Chamaeholopyga parvicornis: Strumia *et al*. 2010: 181 (cat.).

Type locality. Spain: "Spanien, Castilien VII. 1987, ♀ Type ♂ Allotype Soria, ♀ Paratype Navacerrada (Madrid) Coll. m.".

Holotype, ♀: Spanien Soria 9.VII.87 Linsenmaier // ♀ Type *Chamaeholopyga parvicornis* Lins. det. Linsenmaier 1987 // 412 // NML_ENT GBIF_Chr0005488 (ex type-collection).

Allotype, ♂: Spanien Soria 9.VII.87 Linsenmaier // ♂ Allotype *Chamaeholopyga parvicornis* Lins. det. Linsenmaier 1987 // NML_ENT GBIF_Chr0005489 (ex type-collection).

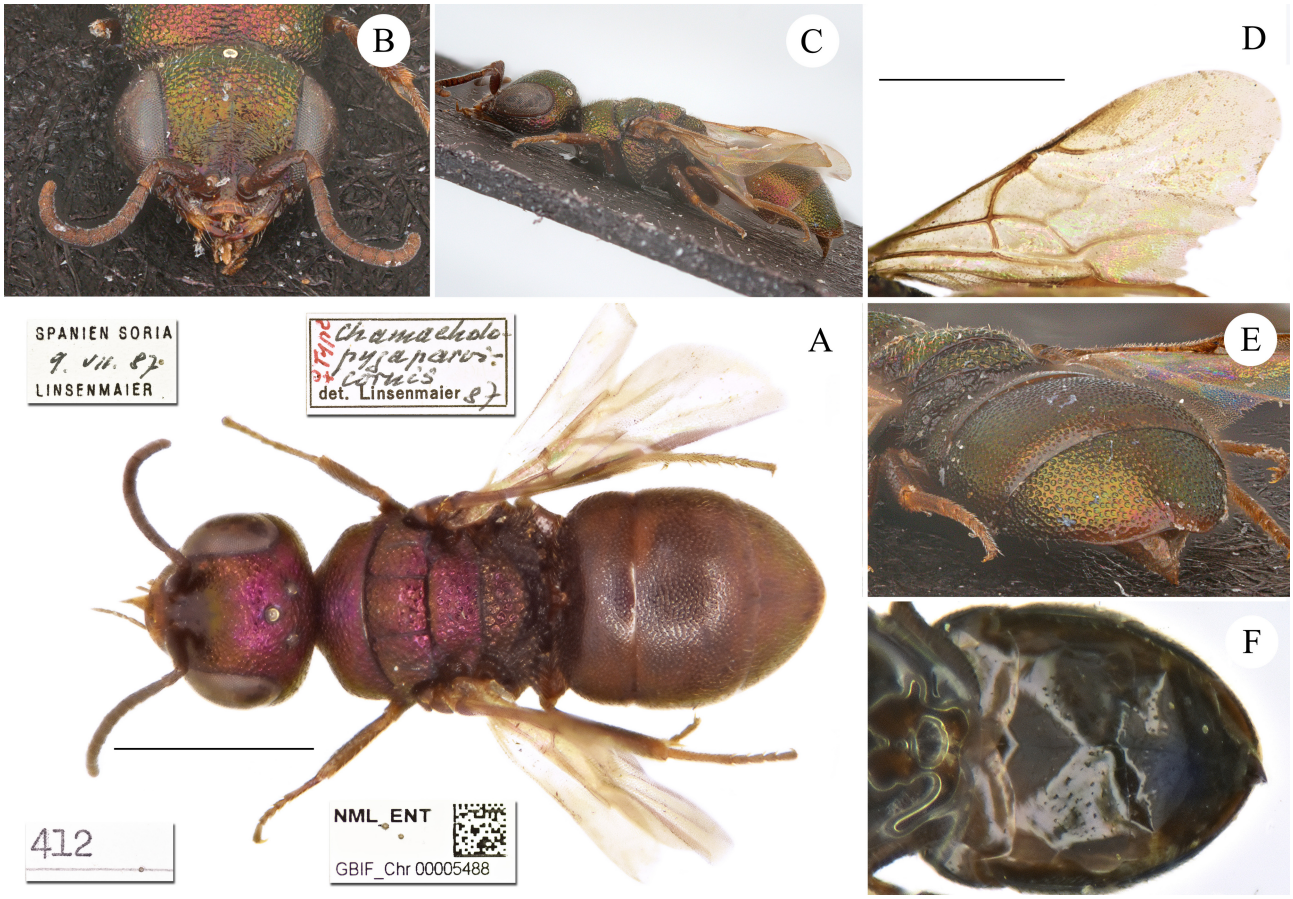

FIGURE 40. *Holopyga* (*Chamaeholopyga*) *parvicornis* Linsenmaier, 1987, holotype, female. A) Habitus, dorsal view. B) Head, frontal view. C) Habitus, lateral view. D) Forewing. E) Metasoma, posterior view. F) Metasoma, ventral view. Scale bar 1.0 mm.

Holopyga (*Chamaeholopyga*) *rubrinigra* Linsenmaier, 1999

(Fig. 41A–41D)

Holopyga (*Chamaeholopyga*) *rubrinigra* Linsenmaier, 1999: 42 (descr.).
Chamaeholopyga rubra (sic): Linsenmaier 1999: 69 (fig. 84–86).

Type locality. Tunisia: "Tunesien, Sbeitla 11.V.1973, Gusenleitner, ♂ Type (Holotypus) und ♂ Paratype Coll. m.".

Holotype, ♂: Tunisien, Sbeitla, 11.5.1973, leg. J. Gusenleitner // ♂ Type *Holopyga* Dhlb. *Chamaeholop. rubrinigra* det. Linsenmaier 1998 // 497 // NML_ENT GBIF_Chr0005490 (ex type-collection).

Paratype, 1♂: Tunisien, Sbeitla, 11.5.1973, leg. J. Gusenleitner // ♂ Paratype *Holopyga* Dhlb. *Chamaeholopyga rubrinigra* det. Linsenmaier 1998 // *Chamaeholop. rubrinigra* // NML_ENT GBIF_Chr0005491 (ex synoptic-collection).

Other Palaearctic types of *Holopyga* housed in the Linsenmaier collection

Holopyga crassepuncta Semenov-Tian-Shanskij in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (1 PLT)
Holopyga impressopunctata Arens, 2004 (1 PT)
Holopyga kaszabi Móczár, 1967a (2 PT)
Holopyga lucens Rosa, 2018 (1 PT)
Holopyga mavromoustakisi Enslin, 1939 (HT, AT, 2 PT)
Holopyga vigoroidea Arens, 2004 (1 PT)

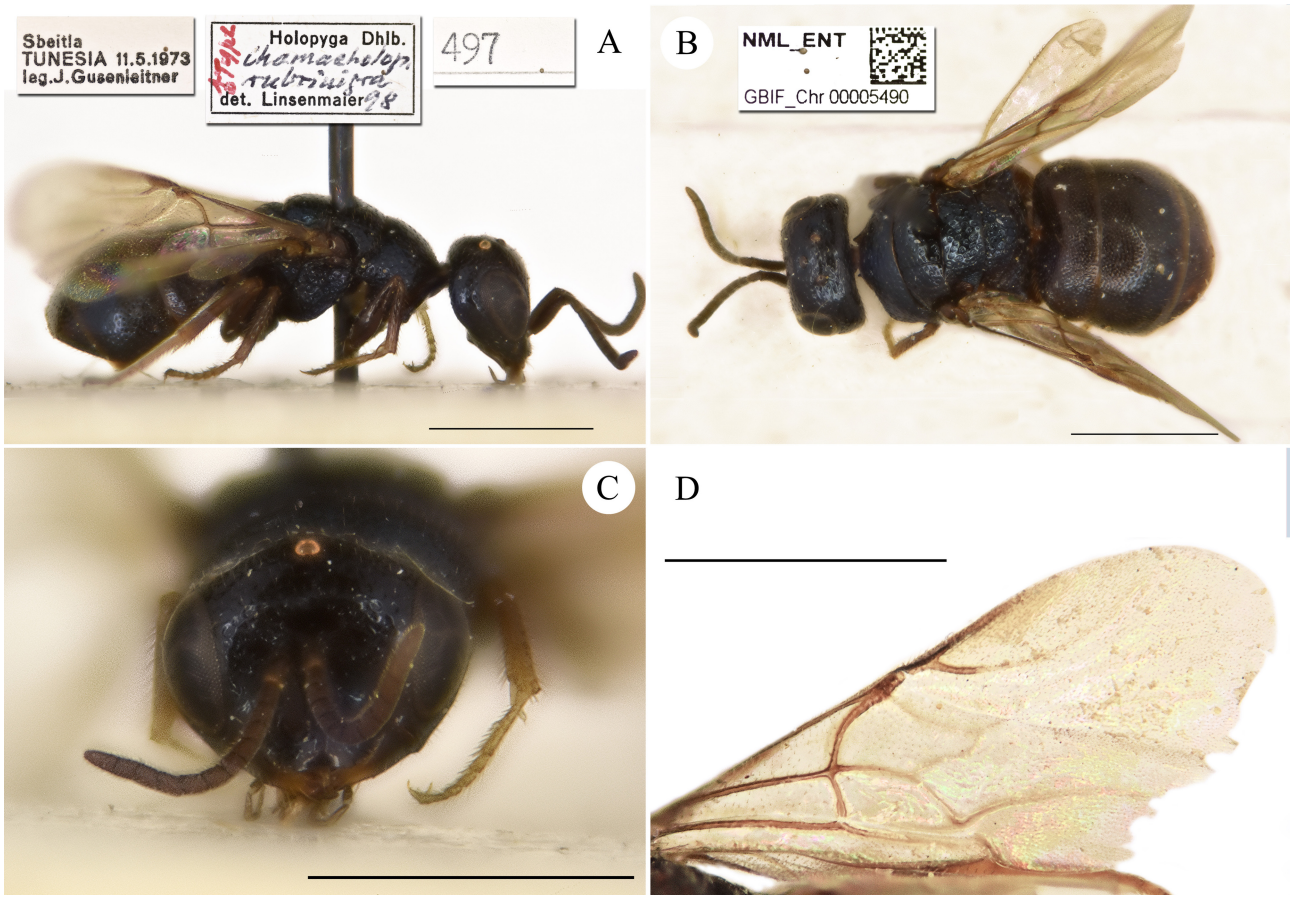

FIGURE 41. *Holopyga* (*Chamaeholopyga*) *rubrinigra* Linsenmaier, 1999, holotype, male. A) Habitus, lateral view. B) Habitus, dorsal view. C) Face, frontal view. D) Forewing. Scale bar 1.0 mm.

Discussion

Holopyga is the genus within the Palaearctic Chrysididae that has undergone the most changes in recent years compared to all the other genera. Many of these changes have significantly impacted Linsenmaier's taxonomy and other changes are expected in the near future based on new and unpublished molecular studies. We summarise here the most important changes related to species names and concepts as used by Linsenmaier (1959a, 1968, 1987, 1997, 1999).

Changes to Linsenmaier's taxonomy of the genus *Holopyga*

Holopyga amoena Mocsáry, 1911

Holopyga amoena Mocsáry, 1911: 446 [not described as a variety of *H. mlokosiewitzi*]. Holotype ♂; Palestine: Jericho (type depository: Budapest) (type examined). Linsenmaier 1959a: 29, 1969: 350 (cat.).
Hedychridium amoenum: Rosa *et al*. 2017c: 103 (*roseum* group), 104 (type, plate 78).

Remarks. Linsenmaier (1959a, 1969) classified *Holopyga amoena* as a member of *Holopyga*. However, Rosa *et al*. (2017c) transferred *Holopyga amoena* to *Hedychridium* Abeille de Perrin, 1878, specifically to the *roseum* group.

Holopyga buyssoni García Mercet, 1902

Holopyga fervida var. *Buyssoni* García Mercet, 1902: 221. Holotype ♀; Turkey [not Syria]: Alexandretta [= İskenderun] (type depository: Madrid) (examined on pictures).
Holopyga buyssonii: Dalla Torre 1892: 23. Incorrect subsequent spelling.
Holopyga buyssoni: Boustani & Rosa 2022: 7. Upgraded to species rank.
Hedychrum chloroideum Dahlbom, 1854: 66. Syntypes ♂; Austria; Greece; Poland: Slesia; Turkey (Type depositories: Turin, Berlin, Vienna).
Holopyga chloroidea: Kimsey 1986: 108. Lectotype designation; France: Paris (type depository: Paris).
Hedychrum chloroideum: Rosa & Xu 2015: 54. Lectotype designation: ♂; Austria (type depository: Turin).

Remarks. Linsenmaier (1959a, 1968, 1969) used the subspecific name *Holopyga fervida chloroidea* to identify a taxon similar to *Holopyga fervida*, which is distributed in the Middle East, but has double punctation on the metasoma and punctures becoming larger in the second half of the second tergum. However, Dahlbom's (1854) original description was based on males of *Holopyga fervida*, which are chromatically sexually dimorphic (hence the name) and not related to any distinctive punctation or any other morphological feature. Rosa & Xu (2015) considered the previous lectotype designation of *H. chloroidea* by Kimsey (1986) invalid and designated a new lectotype based on an Austrian specimen examined by Dahlbom in Spinola's collection, thereby fixing the synonymy with *H. fervida* (Fabricius). The first available name for the taxon identified by Linsenmaier as *Holopyga fervida chloroidea* is therefore *Holopyga buyssoni* García Mercet, 1902 (Boustani & Rosa 2022).

Holopyga caucasica Mocsáry, 1889

Holopyga (*Holopyga*) *gloriosa* var. *Caucasica* Mocsáry, 1889: 131. Holotype [sex unknown]; Azerbaijan: Helenendorf [= Goygol] (type lost).
Holopyga (*Holopyga*) *gloriosa caucasica* = *Holopyga amoenula* Dahlbom, 1845: Kimsey & Bohart 1991: 229.
Holopyga gloriosa caucasica: Rosa *et al.* 2020b: 117. Neotype designation: ♀; Azerbaijan: Ganja (type depository: Vienna).
Holopyga caucasica: Rosa *et al.* 2020b: 117. Taxon reinstated and upgraded to species rank.

Remarks. *Holopyga caucasica* Mocsáry was initially considered a variety of *Holopyga gloriosa* by Linsenmaier (1951) and later a subspecies of *H. inflammata* (Linsenmaier 1959a). Rosa *et al.* (2020b) deemed the original type specimen described by Mocsáry in Vienna as lost and designated a neotype, elevating this taxon to species rank.

Holopyga chrysonota (Förster, 1853)

Ellampus chrysonotus Förster, 1853: 347. Holotype ♀; Hungary (type depository: Berlin) (examined).
Holopyga chrysonota: auctorum.

Remarks. *Holopyga chrysonota* is a common and widespread European species, primarily found in the southern and central parts of Europe. Linsenmaier (1959a) described two subspecies of *H. chrysonota*, namely *H. c. appliata* Linsenmaier, 1959a and *H. c. discolor* Linsenmaier, 1959a.

The type of *Holopyga chrysonota* (Förster, 1853), housed in Berlin, is a female that matches the description of *Holopyga ignicollis* as interpreted by Linsenmaier (1959a) (Rosa *et al.* 2020b). Consequently, *Holopyga ignicollis* Eversmann, 1858 (= *H. ignicollis* Dahlbom, 1854 in Linsenmaier 1959a) has been synonymised with *Holopyga chrysonota* (Förster, 1853) by Rosa *et al*. (2020b), as previously already stated by Mocsáry (1889). The first available name for *Holopyga chrysonota sensu* Linsenmaier (1959a) is *Holopyga similis* Mocsáry, 1889, with the type examined in Budapest and illustrated in Rosa *et al.* (2017c, 2020b). The two subspecies of *Holopyga chrysonota* described by Linsenmaier (1959a) are now considered subspecies of *H. similis*. However, the actual status remains to be evaluated through morphological and genetic studies.

Holopyga cribrata (Klug, 1835)

Elampus cribratus Klug, 1835: 90. Holotype ♂; Spain: Andalucia (type depository: Berlin) (type examined).

Remarks. Mocsáry (1889: 129), Dalla Torre (1892: 24), Bischoff (1913: 12), and Kimsey & Bohart (1991: 230) listed *Holopyga cribrata* (Klug, 1835) as a valid species, whereas Linsenmaier (1951, 1959a, 1959b, 1968, 1987) did not mention it. Linsenmaier (1997) eventually acknowledged that *Holopyga cribrata* has the priority, but noted that without a type specimen and with a poor diagnosis it was not possible to assign it to a valid species. Examination of the type in Berlin confirms that *Holopyga cribrata* is conspecific with *Holopyga inflammata* (Förster, 1853) and has priority over the latter. The species group is currently under revision. Considering the confusing use of the name *H. gloriosa* and its varieties in the Western Palaearctic until recent time, we suggest using the senior name *H. cribrata* in place of *H. inflammata* following the Principle of Priority (ICZN 1999).

Holopyga deserticola du Buysson, 1898

Holopyga gloriosa var. *deserticola* du Buysson, 1898: 125. Holotype ♂; Algeria: Ghardaia (type depository: Paris) (examined).
Holopyga deserticola: Linsenmaier 1959a: 34 (*gloriosa* group).
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga deserticola: Linsenmaier 1999: 32 (reinstated).

Remarks. *Holopyga deserticola* is a valid species. However, Linsenmaier's (1999) interpretation was incorrect as he used a species of *Holopyga* with a ventrally metallic metasoma, whereas the sterna of *H. deserticola* are non-metallic brown. Linsemaier (1999) established the *deserticola* group, but we could not locate any specimen identified by the author in his collection. Therefore, we cannot provide any further comment on the species examined by Linsenmaier and this allegedly distinct species group.

Holopyga generosa (Förster, 1853)

Ellampus generosus Förster, 1853: 349. Holotype ♂; Germany: Aachen (type depository: Berlin) (examined).
Holopyga generosa (Förster, 1853) = *Holopyga chrysonota* (Förster, 1853): Kimsey & Bohart 1991: 230.
Holopyga generosa: Kunz 1994: 86.
Holopyga fastuosa generosa: Linsenmaier 1997: 250.
Holopyga generosa: Niehuis 2001: 121. Reinstated.

Remarks. In the last years, the name of this species has been changed at least four times. For a long time, in European literature, this species was confused with *Holopyga amoenula* Dahlbom, 1845 and *Holopyga gloriosa* (Fabricius, 1793). Linsenmaier (1959a) identified and keyed this species for the first time with the name *Holopyga ovata* Dahlbom, 1854. Later, Linsenmaier (1987) noticed that the name *Holopyga generosa* (Förster, 1853) had priority, and finally (Linsenmaier 1997) considered it as the European subspecies of norther African *Holopyga fastuosa* (Lucas, 1849), another name with priority. Kimsey & Bohart (1991) placed *Holopyga fastuosa* and *Holopyga ovata* in synonymy with *Holopyga amoenula*, while they placed *Holopyga generosa* in synonymy of *Holopyga chrysonota*, which is clearly in error (Rosa 2006). Presently, the name mostly used in European literature is *Holopyga generosa* (Niehuis 2001; Rosa 2006; Rosa & Soon 2012; Paukkunen *et al*. 2014, 2015).

After examination of all related types, Paolo Rosa found that *Holopyga nitidula* Dahlbom, 1845, described from France is the first available name for *Holopyga generosa sensu auctorum* and should be used as the valid name for this species because it has priority over all the other names. Moreover, no other specific name can be considered as the accepted name because of all the changes occurred in the last years. It should be noted that the situation in this group is also complicated by the presence of sibling species as suggested by multiple BINs (Barcode Index Number) associated to this taxon (Schmid-Egger *et al.* 2024). Therefore, to avoid confusion between several names used in literature, we suggest naming this taxon *Holopyga nitidula*, the name with priority, that would consent to restart almost from scratches the taxonomy of this complicated subgroup of species.

Holopyga gloriosa (Fabricius, 1793)

Chrysis gloriosa Fabricius, 1793: 242. Holotype ♀; Barbaria (type lost).
Holopyga gloriosa auctorum.
Omalus gloriosus: Kimsey 1988: 271.
Chrysis gloriosa Fabricius, 1793. ICZN 1998: Opinion 1906: suppression of the name by the International Commission on Zoological Nomenclature.

Remarks. The name *Holopyga gloriosa* (Fabricius, 1793), which was originally described as *Chrysis gloriosa*, was suppressed by the Commission on ICZN (1998, Opinion 1906). This name was a pillar in the classification of Linsenmaier, who used it to define the largest species group in the genus (the *gloriosa* group). Numerous species were described or treated as variations or subspecies of *gloriosa* by various authors, including Mocsáry, du Buysson, García Mercet, Trautmann, and Linsenmaier. All the previous identifications of *Holopyga gloriosa* should now be attributed to similar species in this group such as *Holopyga cribrata* (Klug) [= *H. inflammata* (Förster, 1853)] or *Holopyga lucida* (Lepeletier, 1806). As a result of this nomenclatural act, Rosa & Pavesi (2020) proposed replacing Linsenmaier's *gloriosa* group with the name *amoenula* group.

Holopyga gogorzae Trautmann, 1926

Holopyga gloriosa var. *gogorzae* Trautmann, 1926: 5. Holotype ♂; Spain: Castilia (type depository: Berlin) (type examined).
Holopyga gogorzae: Linsenmaier 1959a: 26 (diagn., *miranda* group).
Holopyga gogorzea: Tussac 1994: 261. Incorrect subsequent spelling.
Holopyga gogorzae: Rosa & Pavesi 2020: 41 (*fervida* group).

Remarks. *Holopyga gogorzae* Trautmann, 1926 was misidentified by Linsenmaier (1959a) and subsequent authors (see the detailed history in Rosa & Pavesi 2020). *Holopyga gogorzae* Trautmann, whose female is still unknown, is a valid species in the *fervida* group and not in the *miranda* group as supposed by Linsenmaier (1959a). *Holopyga gogorzae* is closely related to *H. rubra* Linsenmaier, 1999, based on the genital capsule and tarsal claws (Rosa & Pavesi 2020). The first available name for *Holopyga gogorzae sensu* Linsenmaier (1959a) is *Holopyga calida* Linsenmaier, 1951.

Holopyga ignicollis Eversmann, 1858 [= *Holopyga ignicollis* Dahlbom *sensu* Linsenmaier]

Holopyga ovata var. h Dahlbom, 1854: 53. Syntypes ♂, ♀ [not holotype]; Austria; Greece: Rhodes Is. (type depositories: Vienna, Berlin) (examined). Unavailable name.
Holopyga ignicollis Eversmann, 1858: 549. Lectotype ♀ designated by Rosa *et al.* 2020b: 100. Russia: [locality unreadable] "*campis Orenburgensibus et in promontor Uralensib*." (type depository: Kraków).
Holopyga ignicollis Dahlbom: Linsenmaier 1959a: 32.
Holopyga chrysonota Förster, 1853: Kimsey & Bohart 1991: 230 (synonymised).
Holopyga ignicollis: Mingo 1994: 72 (reinstated).
Holopyga chrysonota Förster, 1853: Rosa *et al.* 2020b: 100 (synonymised).

Remarks. Dahlbom's (1854) *Holopyga ignicollis* originally described as var. h, so that it is an invalid manuscript name. Eversmann (1858: 549) was the first author to treat "var. *ignicollis* Klug", a name given by Dahlbom (1854) to one of the specimens examined in Berlin, as a valid subspecific name, thus making the name available as a species group name (ICZN 1999: Article 45.6). As a result, Eversmann (1858) was recognised as the author of the name (Rosa *et al*. 2020b), not Dahlbom (1854).

Since the original type series included both males and females of *Holopyga chrysonota* and females of *H. ignicollis*, all sharing the same body colour pattern, Rosa *et al.* (2020b) designated a female of *H. ignicollis sensu* Linsenmaier (1959a) as the lectotype, and synonymised this species with *H. chrysonota* (Förster, 1853) (see above). Consequently, *Holopyga ignicollis sensu* Linsenmaier (1959a) is *H. chrysonota* (Förster, 1853) and *H. chrysonota sensu* Linsenmaier (1959a) is *H. similis* Mocsáry, 1889.

Holopyga intermedia García Mercet, 1904

Holopyga gloriosa var. *intermedia* García Mercet, 1904: 85 *nec* Dahlbom, 1845. Syntypes ♂, ♀; Spain: Madrid, Montarco, El Escorial, Los Molinos (type depository: Madrid) (examined).
Holopyga intermedia: Linsenmaier 1959a: 30 (key), 33 (diagn.), 186 (cat.), 196 (fig. 30).
Holopyga intermedia: Kimsey & Bohart 1991: 232.
Hedychrum intermedium Dahlbom, 1845: Linsenmaier 1997: 251.
Hedychrum intermedium Dahlbom, 1845 = *Holopyga fervida* (Fabricius, 1781): Rosa & Xu 2015: 60.

Remarks. Linsenmaier (1959a, 1968) considered *Hedychrum intermedium* Dahlbom, 1845 and *Holopyga intermedia* García Mercet, 1904 to be two valid species in two different genera. Morgan (1984) discovered that the type of *Hedychrum intermedium* Dahlbom, 1845 is actually a member of the genus *Holopyga*. Consequently, Kimsey renamed *Holopyga intermedia* García Mercet, 1904 as *H. merceti* Kimsey in Kimsey & Bohart, 1991, since it had become a junior secondary homonym of *Holopyga intermedia* (Dahlbom, 1845). Linsenmaier (1997, 1999) did not agree with the interpretation of the types provided by Morgan (1984) and Kimsey & Bohart (1991) and continued to use *Hedychrum intermedium* and *Holopyga intermedia* as valid species names in two different genera. Rosa & Xu (2015) confirmed that the type of *Hedychrum intermedium*, which is preserved in Lund (and not in Paris), is actually a member of the *Holopyga fervida* complex, and the correct species name for *H. intermedia* García Mercet is therefore *H. merceti* Kimsey in Kimsey & Bohart, 1991.

Holopyga jurinei Chevrier, 1862
(Fig. 42A–42F)

Holopyga Jurinei Chevrier, 1862: 95. Syntypes ♂ [not ♀]; Switzerland: Geneva Lake (type depository: Geneva) (examined).
Holopyga jurinei Chevrier, 1862 = *Holopyga chrysonota* (Förster, 1853): Kimsey & Bohart 1991: 230.
Holopyga jurinei: Strumia 1995: 3. Reinstated.
Holopyga jurinei Chevrier, 1862 = *Holopyga lucida* (Lepeletier, 1806): present paper. **New synonymy**.

Remarks. The only type (syntype) of *Holopyga jurinei* deposited at MHNG does not match neither Linsenmaier's (1959a) species concept nor the synonymy proposed by Kimsey & Bohart (1991) with *H. chrysonota*. Linsenmaier (1959a) was the first author to provide a modern species concept of *H. jurinei*, a species with strong chromatic dimorphism. The male has a green head and mesosoma, a dark to blackish median area anteriorly on the mesoscutum, and a red metasoma, in contrast with the female, which is blue on the head and mesosoma, with a flame-red pronotum, mesonotum, metanotum and dorsal metasoma.

However, when Linsenmaier (1959a) associated this name with specimens in his collection, he was misled by Chevrier's original description, which stated that the type series was based solely on females. Presently, the only specimen deposited in Chevrier's collection and labelled as a type is a male (Fig. 42). This specimen is considered the type from Chevrier's collection at MHNG. It is the only specimen bearing Chevrier's handwritten identification label, along with a label "TYPE", like other types by Chevrier deposited in the collection.

Chevrier (1862) apparently described *Holopyga jurinei* based on a syntype series. At the end of the description, he added: "*Se montre rarament, dans les localités chaudes et pierreuses, principalement sur les fleurs des petits Sedum*". With this statement, he clearly indicated that the species is found occasionally on *Sedum* flowers in various localities, using the plural form and suggesting multiple observations. In the original description, he wrote "*Femelle*" (singular) providing the description of the female sex only, with no mention of the number of specimens examined. In case of uncertainty, ICZN Article 73, Recommendation 73F ("Avoidance of assumption of holotype"), advises that a syntype series should be considered instead of a holotype.

The type specimen lacks the locality label and bears only a number, possibly referring to a code in a now-lost diary. Chevrier collected specimens only around the Lake Geneva, in Clémenty (a quartier or Nyon), and often did not pin any locality label (Hollier *et al*., 2024). Nevertheless, we are confident that this specimen is one of the syntypes studied by Chevrier. In fact, no specimen of *Holopyga jurinei sensu* Linsenmaier (1959a) was found in Chevrier's collection, and all the other specimens of *Holopyga* with red mesosoma collected in the area of the Geneva Lake by Chevrier and Tournier have been correctly indentified by Linsenmaier as *H. lucida*. Only two species of *Holopyga* in Switzerland share the same red colour pattern in males: *H. lucida* (Lepeletier, 1806) and *H. cribrata* [= *H. inflammata* (Förster, 1853)]. The specimen labelled as type of *Holopyga jurinei* has a genital capsule

similar to *H. lucida* but deeper and denser body punctation on the mesosoma. Despite this difference in sculpture, we consider it conspecific with *H. lucida*, and it is distinguishable from the other red species, *H. cribrata*, by the scattered punctures on the second sternum, which are denser in *H. cribrata*.

Linsenmaier's (1959a) species concept of *H. jurinei* is, therefore, incongruent with this red male, whose body punctation on the mesosoma and sterna also does not match the body sculpture of *H. jurinei sensu* Linsenmaier. Therefore, we cannot argue for a case of chromatic aberration. Even if we contend that this male is not a true syntype because the type series was based on females, there is no clear evidence that the females described by Chevrier belong to *H. jurinei sensu* Linsenmaier. In fact, the main diagnostic characters, such as the bicoloured pronotum, the sculpture of the second sternum and the shape of the head in dorsal view are not mentioned by Chevrier. Since all the other specimens collected around the Lake belong to *H. lucida*, and no specimen of *H. jurinei sensu* Linsenmaier was found in the collection, we are confident that the specimens described by Chevrier belong to *H. lucida*, which Chevrier (1862) mentioned in the synonymic list of newly described *H. jurinei*.

With this synonymisation, the species previously identified as *Holopyga jurinei sensu* Linsenmaier (1959a) remains undescribed. Therefore, we describe this taxon here with the name *Holopyga dichroica* Rosa, **sp. nov.**

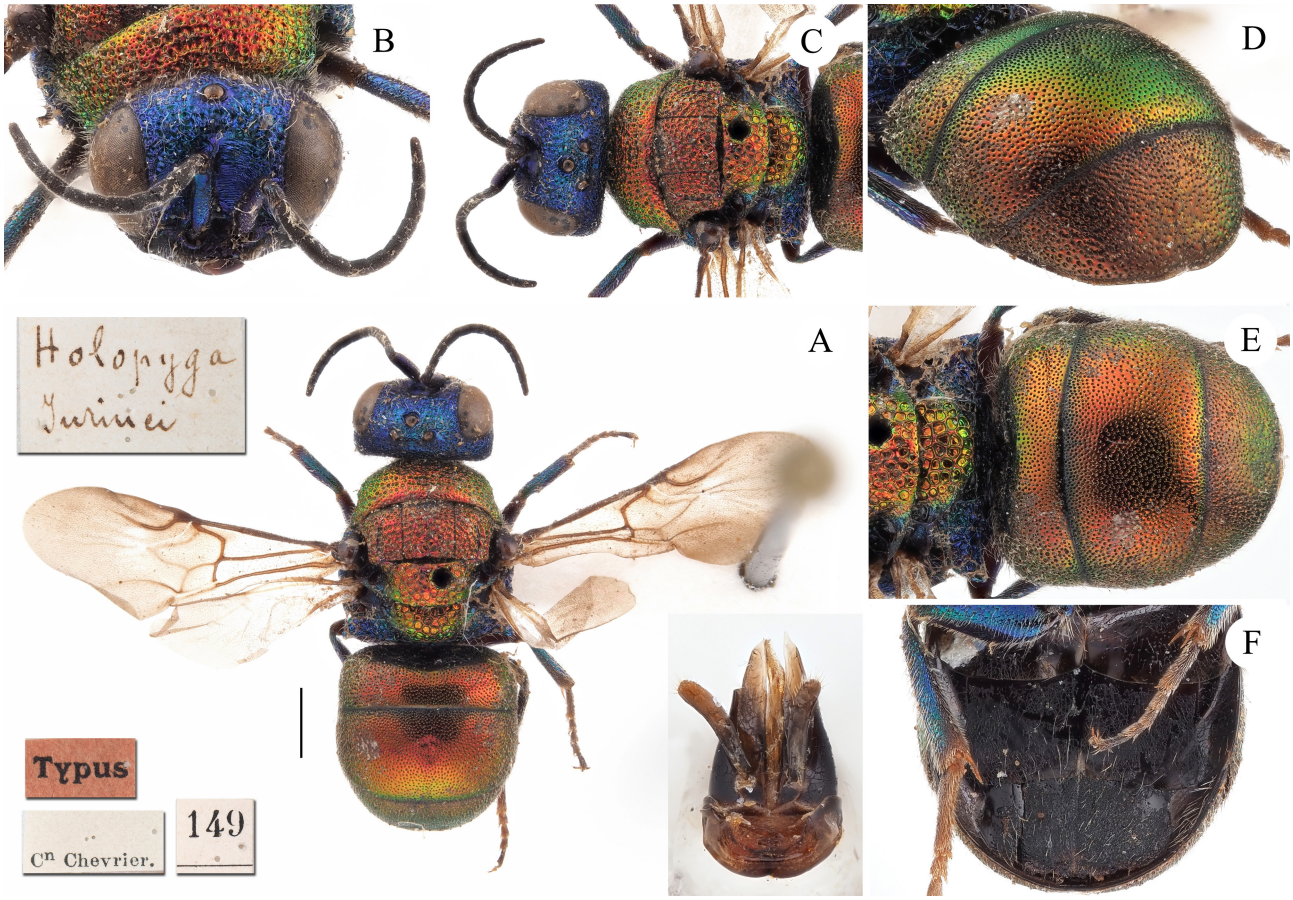

FIGURE 42. *Holopyga jurinei* Chevrier, 1862, syntype, male. A) Habitus, dorsal view; inset: genital capsule. B) Head, frontal view. C) Head and mesosoma, dorsal view. D) Metasoma, latero-posterior view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

***Holopyga dichroica* Rosa, sp. nov.**

urn:lsid:zoobank.org:act:A58BF7CB-D0AC-42B8-ADC2-26A6500BBB48

(Figs 43A–43I, 44A–44F)

Material examined. Holotype: ♂, Italy: Lazio, Viterbo province: Norchia, 42.3383 11.9497, 160m, 11.VIII.2022, leg. M. Selis (Type depository: MSNM) (BIN: BOLD:AFA8977).

Diagnosis. *Holopyga dichroica* **sp. n.** is characterised by strong sexual dimorphism, with the male having a green head and mesosoma and a dorsally red metasoma (Fig. 43), while the female has a blue head and mesosoma,

with a red pronotum, mesonotum and metanotum (Fig. 44). Other dimorphic characters are the elongate, ovoid shape of the third tergum in the female and slightly more acute and divergent temples in the male, which are dimorphic traits known in other *Holopyga* species. The male can be superficially confused with males of several species in the Western Palaearctic. However, the combination of the following characters allows for relatively easy identification: dense punctures on the second sternum (Fig. 43I); fine and dense punctures on the metasoma, without double punctation (Fig. 43E, H); simple and spaced, round punctures on the scutellum (Fig. 43C); the pronotum is greenish or lighter blue along the basal margin; the median area of mesoscutum is darker to black antero-medially (Fig. 43C); the elongate genital capsule with slender narrow gonostile and volsellae, is characterised by the greatly expanded digitus. The enlarged digitus, with different shapes, is also found in two related species, *H. cypruscula* Linsenmaier, 1959 and *H. mlokosiewitzi* Radoszkowsky, 1877, and in an undescribed species from Iberia, currently under revision. The dense punctation of the second sternum distinguishes *H. dichroica* **sp. n.** from similar species such as *H. lucida* (Lepeletier, 1806), *H. chrysonota* (Förster, 1853), *H. austrialis* Linsenmaier, 1959a and *H. minuma* Linsenmaier, 1959a. Its relatively small size (4.5–6 mm), light blue to greenish head and mesosoma, and round punctures on the scutellum differentiate it from the common *H. generosa* (Förster, 1853) (normally larger, 6–9 mm; with a bluish to dark bluish head and mesosoma, and large, polygonal punctures without interspaces in *H. generosa*). The simple sculpture of the metasoma distinguishes ***H. dichroica* sp. nov.** from *H. amoenula* Dahlbom, 1845, *H. cypruscula* Linsenmaier, 1959a and its subspecies *detrita* and *turcica*, *H. mlokosiewitzi hemisimpla* Linsenmaier, 1959a, *H. punctatissima* Dahlbom, 1854, *H. turkestanica* Mocsáry, 1909, and species characterised by metasomal double punctation. The body colour pattern of the male separates this species from *H. lucida*, *H. similis* Mocsáry, 1889, *H. merceti*, *H. duplicata* and all taxa related to *H. lucida* and *H. cribrata* which have two or more red segments on mesosoma. The identification of the female is easier for its unique body colour pattern; the head, mesosoma and anterior corner of pronotum are blue, while the rest of the pronotum, mesonotum and metasoma is dorsally flame-red. All other similar red species lack bluish anterior corners, whereas *H. trapeziphora* has a largely extended blue area laterally on pronotum (Fig. 36).

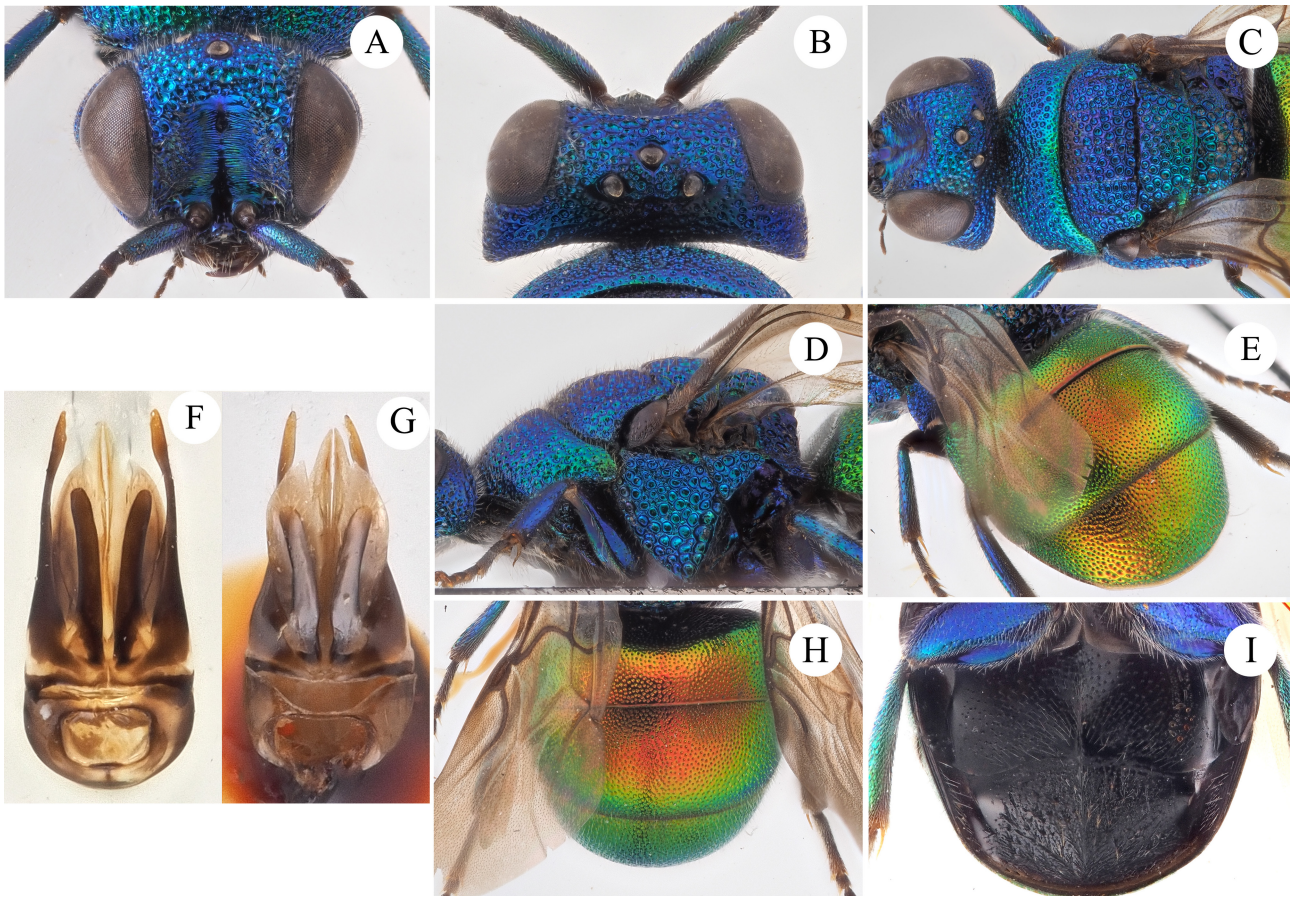

FIGURE 43. *Holopyga dichroica* Rosa, **sp. nov.**, holotype, male. A) Head, frontal view. B) Head, dorsal view. C) Head and mesosoma, dorsal view. D) Mesosoma, lateral view. E) Metasoma, latero-posterior view. F) Genital capsule (paratype, preserved in a glue of DMHF). G) Genital capsule (paratype, dry). H) Metasoma, dorsal view. I) Metasoma, ventral view.

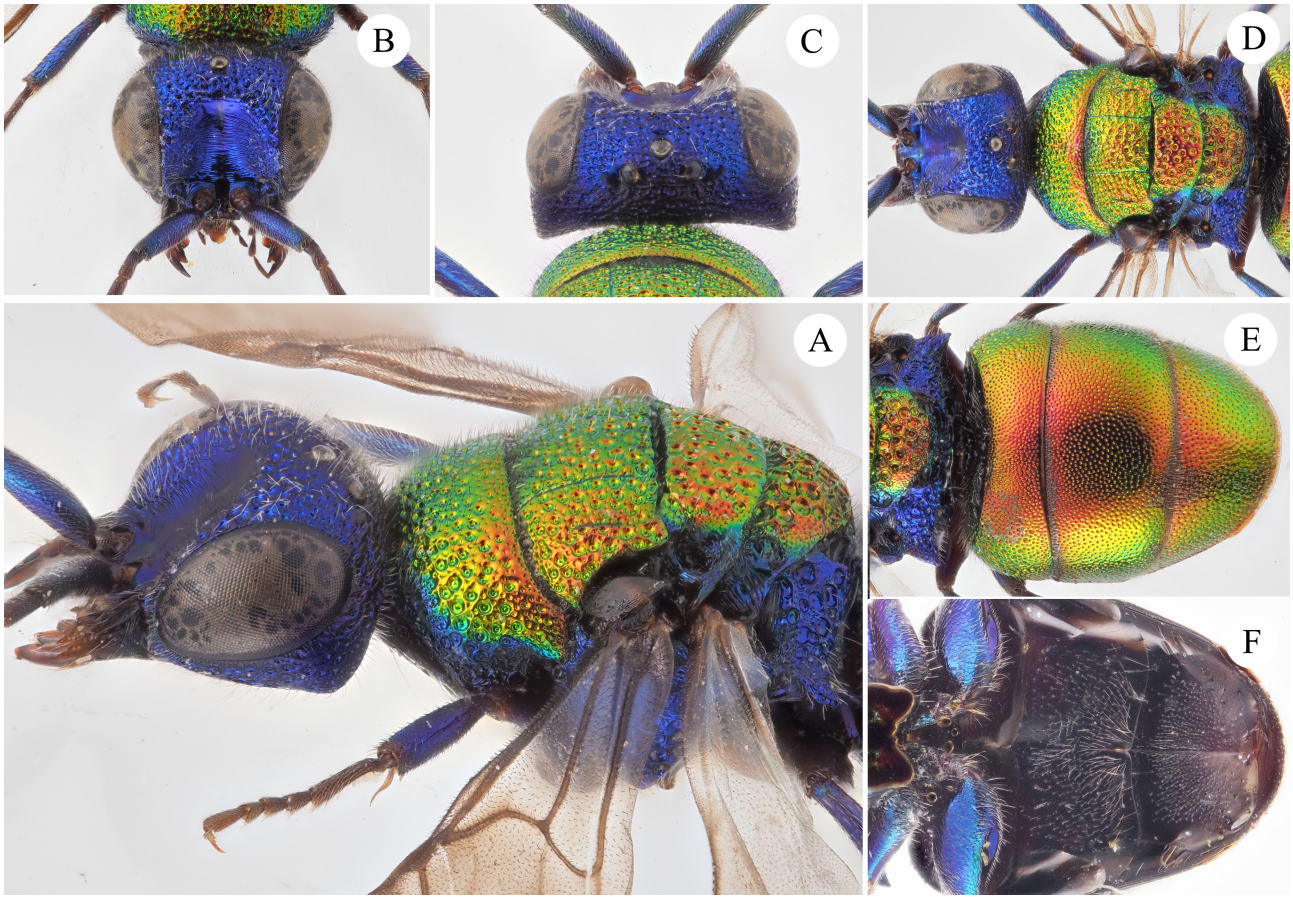

FIGURE 44. *Holopyga dichroica* Rosa, **sp. nov.**, paratype, female. A) Head and mesosoma, latero-dorsal view. B) Head, frontal view. C) Head, dorsal view. D) Head and mesosoma, dorsal view. E) Metasoma, dorsal view. F) Metasoma, ventral view.

Description. *Male* holotype. Body length 6.1 mm. Forewing length 3.9 mm.

Head. Frons with punctures of variable size, with polished interspaces; punctures on vertex and ocellar triangle smaller; ocellar triangle isosceles, with deep ocellar line connecting posterior ocelli; posterior ocelli with wide, polished lateral area; temple with small and scattered punctures; profile of temples subparallel in dorsal view; scapal basin polished on dorsal part and medially, deeply wrinkled at sides, with wrinkles sporadically reaching midline. Subantennal space short, less than 0.5× MOD. Clypeal apical margin bordered by narrow, darker rim. Mandible bidentate. OOL = 2.0× MOD; POL = 2.4× MOD; MS = 0.3× MOD; relative length of P:F1:F2:F3 = 1.0:2.1:1.3:1.1. Subantennal space = 0.6× MOD. Shortest distance between toruli = 1.0× MOD. Shortest distance between anterior margin of anterior ocellus and scapal basin = 2.0× MOD.

Mesosoma. Pronotum with double punctation; small, even punctures, separated by tiny punctures on interstices; mesoscutum with larger punctures, up to 0.8× MOD, irregularly shaped baso-medially, increasing in diameter basad, with polished interspaces and scattered dots in between; notauli fine, basally enlarged, as triangle; parapsidal lines deep; mesoscutellum with relatively smaller, rounded punctures and wider polished interspaces; mesopleuron acute, with dense punctures, larger on apical half than those on mesoscutum; metanotum with dense, irregular, and large foveate punctures, up to 1× MOD, longitudinally elongate anteriorly, with micropunctate interspaces at sides; propodeal teeth short, triangular, pointing slightly laterad.

Metasoma. Metasomal terga with even and minute punctures (Fig. 43E, H), equally spaced dorsally, 1–2 puncture diameter apart; apical margin of first tergum widely impunctate; apical margin of third tergum bearing narrow hyaline rim. Second and third sterna with dense, minute punctures (Fig. 43I). Genital capsule elongate, with slender, narrow gonostile and volsellae, characterised by greatly expanded digitus (Fig. 43F, G).

Coloration. Head and mesosoma green to bluish-green, with pronotal basal margin lighter, median area of mesoscutum darker to black anteriorly. Mandible brown; scape metallic blue, pedicel and flagellum brown. Tegula non-metallic brown; wings slightly smoky, veins brown.

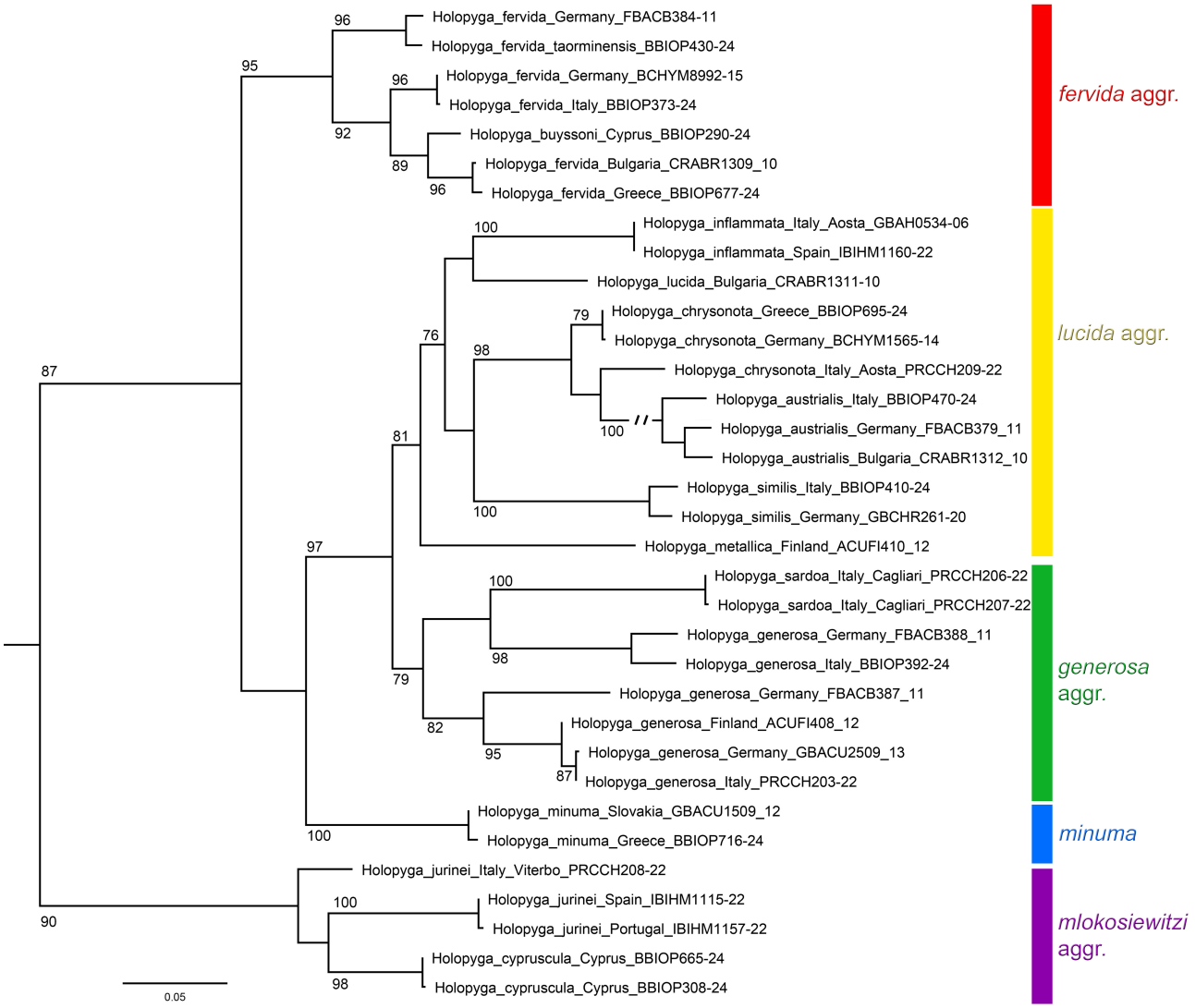

FIGURE 45. Phylogenetic tree (maximum likelihood) of the European *Holopyga* aggregates based on mitochondrial COI gene. [*H. dichroica* Rosa (= *H. jurinei* sensu Linsenmaier) placed in *mlokosiewitzi* aggr., the most basal compared to the other European groups. *Parnopes unicolor* Gribodo not visible is the outgroup. Numbers adjacent to branches represent bootstrap support (values of <75 are omitted)].

Vestiture. Head and mesosoma with short, <1 MOD, whitish, and erectsetae; setae longer than 1 MOD on femora basally; metasoma with dense and short setae laterally; setae relatively dense on second and third sterna.

Female. Chromatically distinct from male, with pronotum, mesonotum and metanotum flame red. Other dimorphic characters include a more rounded head profile in frontal view (Fig. 44B); head in dorsal view with temples less angled and subparallel (Fig. 44C); mesoscutellum normally more sparsely punctate, though this may vary with denser punctures in some specimens. Metasomal punctation similar to male, with dense, even punctures on terga and dense, small punctures on sterna.

Variability. The size varies from 4.6 to 7.4 mm. In males, the mesonotum and scutellum are more or less sparsely punctate with mostly flat intervals, but in some specimens they may be significantly more densely punctate with narrow, sometimes ridge-like intervals. The head and mesosoma are normally green with darker to black area on median area of mesonotum anteriorly, but occasionally they can be green-bluish to light bluish, always with the black antero-median area. The extension of the digitus in the genital capsule may vary depending on preparation and can be more or less visible. In Figure 43F the genital capsule is inglobate in a drop of DMHF and mounted on a transparent plastic board, while in Figure 43G, the genital capsule is dry and mounted on a cardboard, giving a different optical shape of the capsule, digitus and volsella. In some cases, the digitus remains attached to the

edeagus, remaining partially hidden. Expanded digiti can be found in other species, such as *Holopyga cypruscula* (Fig. 12A) and *Holopyga mlokosiewitzi hemisimpla* (Fig. 25A). Females size varies from 5.6 mm to 6.1 mm; the colour of the head and mesosoma laterally and ventrally can range from green to blue.

Molecular data. We barcoded over 150 specimens of European *Holopyga* including *H. dichroica* Rosa **sp. nov.** (listed as *H. jurinei* in BOLD) and related species such as *H. austrialis* Linsenmaier, 1959, *H. chrysonota* (Förster, 1853), *H. cypruscula* Linsenmaier, 1959, *H. inflammata* (Förster, 1853), *H. lucida* (Lepeletier, 1806), *H. minuma* Linsenmaier, 1959, and *H. similis* Mocsáry, 1889. The results are presented in a syntetic phylogram (Fig. 45) illustrating the major clades. COI barcodes of *Holopyga dichroica* (= *H. jurinei sensu* Linsenmaier in the tree) place *H. dichroica* in a distinct clade, here named the *mlokosiewitzi* aggregate, based on the name of the closest species with a similar genital capsule structure. The genetic distance between *H. dichroica* and *H. lucida*, the species with similarly coloured females, is 20.7%.

In the same clade of *H. dichroica*, *H. cypruscula* from Cyprus and an unknown cryptic taxon from Portugal and Spain are also grouped; these taxa will be discussed further in a separate paper on barcoding European species. The phylogenetic relationship between the two species is morphologically supported by similarities in male genitalia structure. The COI barcode of the Italian *H. dichroica* (here designated as the holotype of this species) clusters separately from the Iberian species initially identified as *H. jurinei*, with a substantial genetic distance of 7.8% and 9.4%. This barcode divergence is remarkably high, confirming the presence of a cryptic species. Morphological analysis of these Iberian specimens shows differences in genital morphology and metasomal sculpture. Since all *H. jurinei* specimens examined in this study were identified by Linsenmaier (NMLU), the first authors and other colleagues before genetic analyses, we cannot reliably separate them without an integrative study. Therefore, all examined specimens of *H. jurinei sensu* Linsenmaier are listed in the "Material examined" section rather than as paratypes.

Before Linsenmaier (1959a), female specimens of *H. dichroica* (= *jurinei sensu* Linsenmaier) were often misidentified with *H. lucida* (more specifically under the unavailable name *H. gloriosa* (Fabricius)), while males were misidentified with *H. generosa* (Förster, 1853) or other similar species. The genetic distance between *H. dichroica* and *H. lucida* is 20.7%, leaving no doubt about their lack of affinity. The genetic distance between *H. dichroica* and *H. generosa* is even greater, ranging from 22.9% to 24% (based on 30 specimens examined from across Europe). The different BINs (Barcode Index Number) for *H. fervida* and *H. generosa* in the phylogram (Fig. 45) were already noted by Schmid-Egger *et al.* (2024) suggesting additional cryptic species that warrant further study in these molecular and integrative analyses.

Distribution. Western Palaearctic, from the Iberian Peninsula to Central Asia. We have examined material from Armenia, Austria, Bosnia-Herzegovina, Bulgaria, Czech Rep., Croatia, France, Greece, Hungary, Italy, Kazakhstan, Kyrgyzstan, Lebanon, Montenegro, North Macedonia, Romania, Portugal, Russia, Slovakia, Slovenia, Spain, Switzerland, Türkiye, Ukraine. All specimens were identified as *Holopyga jurinei sensu* Linsenmaier (1959a) by Linsenmaier himself (NMLU), by P.R., and by other colleagues listed in the Acknowledgments. These specimens are excluded from the type series because recent molecular analyses based on COI revealed that at least two Iberian specimens identified as *H. jurinei sensu* Linsenmaier actually belong to an undescribed taxon (Fig. 45). A recent study on German Chrysididae (Schmid-Egger *et al.* 2024) found that some common *Holopyga* species are associated with numerous BINs (Barcode Index Numbers), suggesting the possibility of multiple cryptic species, a scenario that may also apply to *H. dichroica*. Pending an integrative morphological and molecular revision of the European species, we do not designate as paratypes these specimens previously identified as *H. jurinei* using Linsenmaier's (1959a) keys for the risk of having cryptic species hidden in the list. We selected as the holotype one specimen matching Linsenmaier's species concept for *H. jurinei* (Linsenmaier 1959a).

Etymology. The specific epithet *dichroica* (adjective), from the Greek *dikhroos* (from *di-* 'twice' + *khrōs* 'colour'), refers both to the different colouration of the male and female and to the dichroic colour of the female pronotum, which is red with blue anterior margins.

Hosts. Unknown.

Ecology. In the literature, this species (under the name *H. jurinei*) is reported on *Ferula communis* (Mingo & Gayubo 1986); *Seseli tortuosum* (Mingo *et al.* 1988); *Daucus carota*, *Pimpinella* sp., *Foeniculum* sp., and *Pastinaca* sp. (Rosa 2005) and it is listed as common on raspberry leaves, brambles, and various other shrubs at the edges of meadows (Rosa 2006).

Remarks. More diagnoses, detailed descriptions of morphological characters, keys, colour photographs and even SEM photographs of *Holopyga dichroica* **sp. nov.** are found in Rosa (2006), Arens (2004) and Wiesbauer *et al.* (2020), always under the name *H. jurinei*.

Holopyga sardoa Invrea, 1954

Holopyga amoenula var. *sardoa* Invrea, 1954: 222. Holotype ♂; Italy: Sardinia (type depository: Genoa) (examined).
Holopyga ovata sardoa: Linsenmaier 1968: 234 (tax.).
Holopyga generosa sardoa: Linsenmaier 1987: 135 (tax.).
Holopyga sardoa: Strumia 1995: 4 (upgraded to species rank).

Remarks. *Holopyga sardoa* was elevated to species rank by Strumia (1995). Molecular analyses are currently ongoing on European species allied to *H. generosa*.

Holopyga turkestanica Mocsáry, 1909

Holopyga punctatissima var. *turkestanica* Mocsáry, 1909: 1. Lectotype ♂ designated by French in Bohart & French 1986: 341; Turkmenistan [not Kazakhstan]: Mt. Karatau (type depository: Budapest) (examined).
Holopyga ovata crassepuncta Semenov-Tian-Shanskij in Semenov-Tian-Shanskij & Nikol'skaya, 1954: Linsenmaier 1968: 17.
Holopyga generosa crassepuncta: Linsenmaier 1987: 135.
Holopyga amoenula Dahlbom, 1845: Kimsey & Bohart 1991: 229 (synonymised).
Holopyga turkestanica: Rosa *et al*. 2017c: 110.

Remarks. The taxon named *Holopyga crassepuncta* Semenov-Tian-Shanskij, 1954 by Linsenmaier (1968, 1987) was synonymised with *H. turkestanica* Mocsáry, 1909 by Rosa *et al.* (2017c).

Species currently included in the genus *Haba* Semenov-Tian-Shanskij, 1954

The following species were included by Linsenmaier (1959a) in the genera *Holopyga* Dahlbom, 1854 and *Hedychridium* Abeille de Perrin, 1878. Linsenmaier (1999) finally recognised *Haba* Semenov-Tian-Shanskij, 1954 as a subgenus of *Holopyga* after Kimsey & Bohart (1991) provided a detailed review of the genus *Haba* with a checklist including three species. For convention, we also consider *Haba* as a valid genus. Almost all these taxa were unknown to Linsenmaier [e.g. "*Mir nicht in natura bekannt*" for *H. biroi* and *H. pygmea* (Linsenmaier 1999) and "*Wenig bekannt*" for *H. almasyana* (Linsenmaier 1959a)] who probably based keys and diagnoses on the original descriptions only.

Haba almasyana (Mocsáry, 1911)

Holopyga almasyana Mocsáry, 1911: 445. Lectotype ♀ designated by French in Bohart & French (1986); Palestine: Jericho (type depository: Budapest) (examined).
Holopyga almasyana: Linsenmaier, 1959a: 28.
Haba almasyana: Kimsey & Bohart 1991: 177.

Haba biroi (Mocsáry, 1911)

Holopyga biroi Mocsáry, 1911: 445. Holotype ♀; Palestine: Jericho (type depository: Budapest) (examined).
Hedychridium (*Hedychridium*) *biroi*: Linsenmaier 1959a: 44 (key), 47 (diagn.), 187 (cat.).
Haba almasyana: Kimsey & Bohart 1991: 177 (cat.).
Holopyga (*Haba*) *biroi*: Linsenmaier 1999: 42 (diagn.).

Haba pygmea (du Buysson, 1898)

Holopyga gloriosa var. *pygmaea* du Buysson, 1898: 125. Lectotype ♂ designated by Kimsey in Kimey & Bohart 1991:235; Algeria: Mecheria (type depository: Paris) (examined).

Holopyga pygmaea: Linsenmaier 1959a: 27.
Holopyga (*Holopyga*) *pygmaea*: Linsenmaier 1999: 41.
Haba pygmea: Rosa 2024: 402.

Haba subtilis (Mocsáry, 1914)

Holopyga subtilis Mocsáry, 1914: 4. Holotype ♂; Uzbekistan: Tashkent (type depository: Budapest) (examined).
Hedychridium (*Hedychridium*) *subtilis*: Linsenmaier 1959a: 44 (key), 47 (diagn.), 187 (cat.), 197 (fig. 58).
Haba subtilis: Kimsey & Bohart 1991: 177 (cat.)

Taxonomic placement of *Chamaeholopyga* Linsenmaier

Linsenmaier (1987) described the subgenus *Holopyga* (*Chamaeholopyga*) based on a Spanish species named *H.* (*C.*) *parvicornis* Linsenmaier, 1987. Later, Linsenmaier (1999) described a second species from North Africa, *Holopyga* (*C.*) *rubrinigra*, while a third undescribed species from Israel was found during the reordering of the Linsenmaier collection (Rosa *et al.* 2015b, 2022a). Finally, Rosa *et al*. (2022a) noticed that a fourth species was previously described as *Hedychridium atratum* Linsenmaier, 1968.

The original description of *Chamaeholopyga* was considered too short and unclear, which is why Kimsey & Bohart (1991: 228), who did not examine any specimens, did not assess it in their revision of the world species: "Linsenmaier (1987) described the genus *Chamaeholopyga* based on the new species *C. parvicornis* Linsenmaier (1987). We have been unable to see this species and therefore cannot render judgment on the placement of this group". Mingo (1994) was the first author to provide a short diagnosis of this subgenus explaining that the main diagnostic character is the distinct hind wing venation, with submarginal and basal nervures differing in length and bend, as shown in the drawings (Mingo 1994: fig. 19b). Linsenmaier (1997) provided some additional information after finding more specimens of *Chamaeholopyga parvicornis* in the provinces of Madrid, Soria and Segovia. He provided drawings of the habitus (Linsenmaier 1997: fig. 20), head in frontal view (fig. 21), propodeal posterior angles (fig. 22), and tarsal claws (figs 23–25), and suggested a strict relation of *Chamaeholopyga* with *Pseudolopyga* Krombein, 1969. Finally, Strumia *et al*. (2010) considered *Chamaeholopyga* a valid genus in the checklist of the Chrysididae collected at the Natural Park of Las Batuecas—Sierra de Francia (Spain), without any taxonomic comment.

The morphological analysis of the Palaearctic specimens confirms Linsenmaier's (1997) intuition that *Chamaeholopyga* could be synonymous with the New World genus *Pseudolopyga* Krombein, 1969. Members of this genus share the combination of the following characters: face flat to slightly concave, medially polished to slightly wrinkled; temples (or postocular region, the continuation of the gena to the posterior limit of the head) narrow and rounded; malar space as long as or less than 1 MOD; pronotum gently curved without anterior declivity or carinae; notauli deep, sulciform; mesopleuron rounded; posterior propodeal projection (= propodeal angles) small and spiniform, directed laterad; protibia unmodified, ecarinate; pro and mesotarsal claws with two subapical teeth; metatarsal claws dimorphic, with the female claw having one subapical tooth and the male two; forewing medial vein almost straight in *P. parvicornis* or strongly bent close to the subcostal vein in *P. rubrinigra*; Rs stub shorter than or as long as the R1 stub; genitalia similar in shape to *Hedychridium* species. Finally, the Palaearctic species are small and darkly coloured like members of *Pseudolopyga* such as the male of *P. rubrinigra* and the undescribed Isreaeli species, or red-purple to blackish as in *P. parvicornis* and the female of *P. rubrinigra*, with some specimens exhibiting a non-metallic brownish metasoma. Overall, their general habitus is more similar to *Hedychridium* rather than *Holopyga*; in fact, *atrata* was described as *Hedychridium* by Linsenmaier (1968), nearly 20 years before *Chamaeholopyga* was established. Indeed, *Hedychridium* is characterised by species with relatively flat face; head, in dorsal view, without deep scapal basin; narrow, round temples; mesopleuron rounded and a medial vein that is either almost straight or angled differently. Some major differences, such as the shape of the genitalia closer to *Hedychridium* in Palaearctic species, the medial vein, which is distinctly bent in *H. rubinigra*, but not in *H. parvicornis* and the distance between the posterior ocelli are diagnostic at the species level rather than the genus level.

Based on the features mentioned above, we propose that *Chamaeholopyga* Linsenmaier, 1987 should be considered a synonym (**syn. nov.**) of *Pseudolopyga* Krombein, 1969. However, confirmation of this synonymy through molecular analysis is desirable.

Conclusions

Linsenmaier's revisions (1959a, b, 1968, 1969, 1987, 1994, 1997, 1999) are the only available tool for the identification of *Holopyga* species in the West Palaearctic realm. In fact, he was the only author who provided keys to species level at a supranational scale: Europe and part of western Asia (1959a, 1997), Arabian Peninsula (1994) and northern Africa (1999) (Rosa *et al.* 2022a). Other keys proposed to national scale by Móczár (1967b), Nikol'skaya (1978), Mingo (1994), Rosa (2006) and others are based on Linsenmaier's keys. However, more than in other genera, his descriptions of *Holopyga* are sometimes inadequate for clearly identifying the different taxa, particularly the various subspecies. The diagnoses are often too short, morphological characters are sometimes obscure in line drawings (Kimsey & Bohart 1991), and the species concept is frequently unclear due to the high varibility of *Holopyga* species.

As Arens (2004) previously noted in the case of Greek populations, the regional variability of some diagnostic characters such as body sculpture has proved to be relatively small. Conversely, across the distribution area, considerable modification of important diagnostic features seems common in this genus, making it difficult to fully understand and identify some *Holopyga* species. In Linsenmaier's collection many specimens including paratypes are misidentified and are still awaiting full revision (Arens 2004).

Holopyga Dahlbom, 1854 has undergone a long series of taxonomic and nomenclatural changes in recent years. One of the main reasons of these changes is Linsenmaier's impossibility to study most of old type specimens. When he first approached this genus (1959a), he found many available names in European literature and tentatively associated them with numerous species accumulated in his collection. When the first author began revising the Palaearctic types (e.g. Rosa *et al.* 2020b), he discovered that this task was highly prone to misinterpretation if done without type examination. In this regard, also the checklist proposed by Kimsey & Bohart (1991) is largely unusable as many Palaearcitc taxa had, even before its publication, and continue to have a distinctly different taxonomic status and species concept. Further changes are expected in the near future due to ongoing molecular analyses.

Acknowledgements

We are in debt with the subject Editor Celso O. Azevedo (Vitória, Brazil), Neveen Gadallah (Cairo, Egypt) and an anonymous reviewer, whose comments contributed to improve the quality of the manuscript. We also thank the following colleagues for providing specimens of *Holopyga dichroica* **sp. nov.** for a better understanding of its distribution: Gianpaolo Abbo (Milan, Italy), Manuel Amorelli (Marsala, Italy), Daniele Baiocchi (Rome, Italy), Luca Fancello (Cagliari, Italy), Marek Halada (České Budějovice, Czech Republic), Maurizio Pavesi (Milano, Italy), Andrea Petrioli (Asciano, Italy), Daniele Sechi (Cagliari, Italy), Marco Selis (Viterbo, Italy), Villu Soon (Tartu, Estonia) and Michele Zilioli (Varese, Italy).

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