A journal of world insect systematics

INSECTA MUNDI

0799

Notes on the taxonomy and distribution of *Xylocopa coronata* Smith, 1860, a large carpenter bee from Maluku, Indonesia (Insecta: Hymenoptera: Apidae)

Jonathan R. Mawdsley

Department of Entomology, MRC 187
National Museum of Natural History
Smithsonian Institution
10th Street and Constitution Avenue NW
Washington, DC, 20560 USA

Date of issue: September 25, 2020

Center for Systematic Entomology, Inc., Gainesville, FL

Mawdsley JR. 2020. Notes on the taxonomy and distribution of *Xylocopa coronata* Smith, 1860, a large carpenter bee from Maluku, Indonesia (Insecta: Hymenoptera: Apidae). Insecta Mundi 0799: 1–5.

Published on September 25, 2020 by
Center for Systematic Entomology, Inc.
P.O. Box 141874
Gainesville, FL 32614-1874 USA
http://centerforsystematicentomology.org/

Insecta Mundi is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod. Topics considered for publication include systematics, taxonomy, nomenclature, checklists, faunal works, and natural history. Insecta Mundi will not consider works in the applied sciences (i.e. medical entomology, pest control research, etc.), and no longer publishes book reviews or editorials. Insecta Mundi publishes original research or discoveries in an inexpensive and timely manner, distributing them free via open access on the internet on the date of publication.

Insecta Mundi is referenced or abstracted by several sources, including the Zoological Record and CAB Abstracts. Insecta Mundi is published irregularly throughout the year, with completed manuscripts assigned an individual number. Manuscripts must be peer reviewed prior to submission, after which they are reviewed by the editorial board to ensure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

Guidelines and requirements for the preparation of manuscripts are available on the Insecta Mundi website at http://centerforsystematicentomology.org/insectamundi/

Printed copies (ISSN 0749-6737) annually deposited in libraries:

CSIRO, Canberra, ACT, Australia
Museu de Zoologia, São Paulo, Brazil
Agriculture and Agrifood Canada, Ottawa, ON, Canada
The Natural History Museum, London, UK
Muzeum i Instytut Zoologii PAN, Warsaw, Poland
National Taiwan University, Taipei, Taiwan
California Academy of Sciences, San Francisco, CA, USA
Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA
Field Museum of Natural History, Chicago, IL, USA
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
Zoological Institute of Russian Academy of Sciences, Saint-Petersburg, Russia

Electronic copies (online ISSN 1942-1354, CDROM ISSN 1942-1362) in PDF format.

Printed CD or DVD mailed to all members at end of year. Archived digitally by Portico.
Florida Virtual Campus: http://purl.fcla.edu/fcla/insectamundi
University of Nebraska-Lincoln, Digital Commons: http://digitalcommons.unl.edu/insectamundi/
Goethe-Universität, Frankfurt am Main: http://nbn-resolving.de/urn/resolver.pl?urn:nbn:de:hebis:30:3-135240

0799: 1–5 **INSECTA MUNDI** 2020

Notes on the taxonomy and distribution of *Xylocopa coronata* Smith, 1860, a large carpenter bee from Maluku, Indonesia (Insecta: Hymenoptera: Apidae)

Jonathan R. Mawdsley

Department of Entomology, MRC 187
National Museum of Natural History
Smithsonian Institution
10th Street and Constitution Avenue NW
Washington, DC, 20560 USA
mawdsleyj@si.edu

Abstract. The recently rediscovered female holotype of *Xylocopa coronata* Smith, 1860, (Hymenoptera: Apidae) collected by Alfred Russel Wallace at the type locality of "Kaisaa" (= modern-day Kaioa, Maluku, Indonesia) is illustrated for the first time. Dorsal and lateral images of males and females of *X. coronata* and a map showing the known distribution of the species are provided. Females of this species exhibit geographic color variation in dorsal pubescence patterns and wing iridescence. At the present time, two subspecies are recognized: *X. coronata combinata* Ritsema from the island of Obi, Maluku, Indonesia, and *X. coronata coronata* Smith from additional islands (Bacan, Halmahera, Kaioa, Obi, Ternate, and Tidore) in the Maluku archipelago, Indonesia.

Key words. Geographic color variation, subspecies.

ZooBank registration. urn:lsid:zoobank.org:pub:0F05A789-DBAC-4944-A152-3C7FF2545606

Introduction

Xylocopa coronata Smith, 1860, is a brightly colored species of large carpenter bee (Hymenoptera: Apidae; Fig. 1–12) which is generally distributed throughout the northern islands of the Maluku Archipelago of Indonesia (Fig. 13). The taxonomy of *X. coronata* was reviewed most recently by Lieftinck (1956), who provided keys to separate males and females of this species from those of sympatric species of *Xylocopa* but neither mapped the distribution of the species nor illustrated adult specimens. This paper provides new distribution records, maps, and color illustrations of males and females of this species, including the known geographic color forms of the females. I also report the rediscovery of the holotype specimen of *X. coronata*, which was missing from the Frederick Smith collection at the time Lieftinck (1956) studied the species, because it was sent to Paul D. Hurd, Jr. of the Smithsonian Institution for his studies of *Xylocopa* (Hurd and Moure 1963).

Materials and Methods

The following notes are based on specimens of *X. coronata* contained in the entomological collections of the National Museum of Natural History, Smithsonian Institution (USNM). The late Smithsonian entomologist Paul D. Hurd, Jr. assembled a very large collection of pinned large carpenter bees from all areas of the world in order to support the preparation of his own monographic revisionary studies of *Xylocopa* (e.g., Hurd and Moure 1963; Hurd 1978). Specimens of *X. coronata* contained in this collection were authoritatively identified by previous workers, including Frederick Smith, Theodore D. A. Cockerell, Paul D. Hurd, Jr., and Maurits A. Lieftinck.

Results

Xylocopa coronata Smith 1860: 135

Fig. 1–13.

Xylocopa coronata Smith 1860: 135; type locality "Kaisaa" (= Kaioa, also spelled Kayoa, Maluku, Indonesia).

Holotype. Female, labeled "Kaisaa" and "*X. coronata* Sm., 'Malay Arch', F. Sm. coll." found by the author in collection of the National Museum of Natural History, Smithsonian Institution, to be returned to the Frederick Smith Collection, Oxford University Museum, Fig. 1–4.

Synonyms. *Xylocopa combinata* Ritsema (1876: 181), type locality "Obi-eilanden" (= Obi, Maluku, Indonesia); synonymy by Lieftinck (1956: 63). *Xylocopa coronata combinata* Ritsema, combination proposed by Lieftinck (1956: 63).

Known distribution. *Xylocopa coronata coronata* Smith: Indonesia: Bacan: Wajaua, Labuha, and unspecified localities; Halmahera: Akilamo, Atjengo, Dodinga, Galelo, Goa, Kau, Tolewang, and unspecified localities in North, South, and Southeast Halmahera; Kai; Kaioa; Obi: Kasowari and unspecified localities; Ternate: Bukunora and unspecified localities; Tidore (Lieftinck 1956: 62). The Kai locality given by Lieftinck (1956: 62) based on old specimens in the F. Smith collection requires confirmation, given the significant geographic distance between Kai or Kei and the other localities reported here for this species. *Xylocopa coronata combinata* Ritsema: Indonesia: Obi: Laiwui and unspecified localities (Lieftinck 1956: 63).

Additional material examined. *X. coronata coronata*: Indonesia: Bacan Island, Kampung Wayamiga, 27–31 July 1981, A. C. Messer (1 female); "S. Batjan" with no further locality information, VI–VII.1953, A. M. R. Wegner (1 female, 1 male). Halmahera Island, Jailolo District, Isthmus of Dodinga, 29 January 1981, A. C. Messer and P. M. Taylor (1 female); Jailolo District, Kampung Pasir Putih, 0° 53′ N, 127° 41′ E, 1–14 January 1981, A. C. Messer

Figures 1–4. Holotype female of *Xylocopa coronata* and accompanying labels. **1)** Dorsal view. **2)** Labels. **3)** Lateral view. **4)** Oblique view.

Figures 5–12. Female and male specimens of *Xylocopa coronata*; all are *X. coronata coronata* except for the female of *X. coronata combinata* in Figures 8 and 12. **5)** Dorsal habitus, female, Halmahera. **6)** Dorsal habitus, female, Bacan. **7)** Dorsal habitus, female, Tidore. **8)** Dorsal habitus, female, Obi. **9)** Dorsal habitus, male, Bacan. **10)** Lateral view, male, Bacan. **11)** Lateral view, female, Tidore. **12)** Lateral view, female, Obi.

and P. M. Taylor (11 females); same data except 15–31 January 1981 (2 females); same data except 1–14 February 1981 (3 females and 1 male); same data except December 1980 (1 female), same data except 1–14 May 1981 (2 females); same data except 15–31 July 1981, P. M. Taylor (1 female); same data except no date of collection (1 female); Kao District, Kao River Basin, Air Kanan, Kampung Tuguls, 1–14 March 1981, A. C. Messer and P. M. Taylor (1 female); Kao District, Kampung Kao, 19 March 1981, A. C. Messer and P. M. Taylor (1 female); Tobelo District, Kampung Rupo, 11 April 1981, A. C. Messer and P. M. Taylor (1 female). Ternate Island, T. Barbour (1 female). Tidore Island, Kampung Guaepaji, 5–10 July 1981, A. C. Messer (3 females); same data except 6–7 July 1981 (8 females). *X. coronata combinata*: Indonesia: Obi, NW Obi, Laiwui, 0–200 m, IX–X.1953, A. M. R. Wegner (2 females); same data except IX.1953 (1 female). All specimens in USNM collection.

Notes on type material of *X. coronata*. This species was originally described by Frederick Smith from a single female specimen collected at "Kaisaa" by Alfred Russel Wallace during his travels in the Malay Archipelago (Smith 1860, 1874; see also Lieftinck 1956: 62, who notes that the original description was based on a single specimen). According to the detailed chronicle of Wallace's travels published by Baker (2001), the locality "Kaisaa" corresponds to modern-day Kaioa or Kayoa, an island in the Maluku Archipelago of Indonesia. In preparation for his revision of the species of *Xylocopa* from the Maluku Archipelago, Lieftinck (1956: 62) was unable to locate any specimens in the Smith collection or other institutional collections which were specifically labeled "Kaisaa," and material from "Kaisaa" is not listed among the numerous specimens of *X. coronata* that were examined by Lieftinck (1956: 62). Instead, Lieftinck (1956: 62) designated a female specimen collected at "Kai" as a lectotype for *X. coronata*. Kai or Kei is an altogether different island group within the Maluku Archipelago which is located approximately 872 km from Kaioa (shortest distance according to Google Maps 2020). While examining the collection of specimens of *X. coronata* in the National Museum of Natural History, Smithsonian Institution, I discovered a female with a smaller handwritten label stating it was collected at "Kaisaa" and a larger handwritten

label indicating that it was from the F. Smith collection (Fig. 1–4). The specimen corresponds closely with the description of the unique holotype provided by Smith (1860: 135) as well as the redescription of the holotype given by Smith (1874: 279–280) in his monographic revision of the genus *Xylocopa*. The accompanying larger handwritten label is similar in style and content to labels reported from the F. Smith collection by Lieftinck (1956: 62), while the handwriting on the smaller label is similar to that of Alfred Russel Wallace in the examples published by Baker (2001) and in additional examples of original Wallace labels studied by Mawdsley (2006). This specimen had been sent by staff of the Oxford University Museum of Natural History to the late Paul D. Hurd, Jr. of the Smithsonian Institution in preparation for his comprehensive monograph reclassification of the genus *Xylocopa* (Hurd and Moure 1963). Based on the evidence available, this specimen appears to be the original holotype specimen on which Smith's description of the species was based.

Notes on geographic variation and subspecies. Lieftinck (1956) placed *X. combinata* Ritsema 1876 as a subspecies of *X. coronata* based on examination of pinned specimens, which included large series of specimens of both taxa, the original syntypic series of *X. combinata*, and multiple specimens of *X. coronata* which had been authoritatively identified by F. Smith. The principal difference between the two forms is in the coloration of the pubescence on the dorsal mesosoma in females. In certain populations on the island of Obi, particularly in the northwestern portion of the island, females have a broad band of yellow pubescence across the posterior portion of the mesosoma (Fig. 8, 12) which is otherwise black in females from elsewhere in the Maluku Archipelago (Fig. 1, 5–7, 11, 13). This color difference is very consistent in the limited material that I have examined, which suggests a possibility that two separate species may be involved. However, Lieftinck (1956: 64) notes that specimens with small amounts of yellow pubescence or individual yellow hairs on the base of the mesosoma occur at sites elsewhere in the species range, including the island of Bacan and West Obi. Further studies of morphology, species biology, and molecular systematics will be needed to determine the status of the populations on the island of Obi. For the time being, I prefer to follow Lieftinck (1956) in recognizing two separate subspecies, which can be separated readily by the differences in dorsal coloration of females.

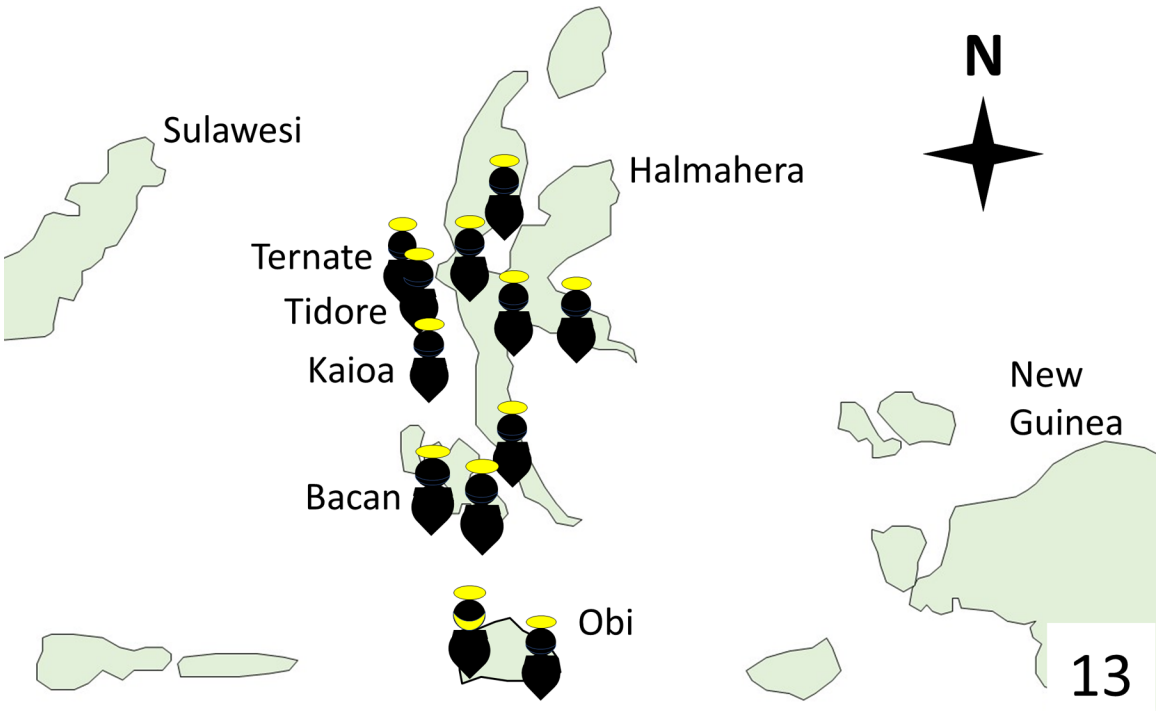

Figure 13. Map showing known distribution of *Xylocopa coronata*, with schematic illustrations of the dorsal coloration patterns in females from each locality.

In my own examination of specimens of *X. coronata* from the USNM collection, I noticed that the wing iridescence in female specimens of this species also exhibits geographic variation. In female specimens identified as *X. coronata combinata* from northwest Obi, the wings are iridescent blue-violet or blue-green, with strong blue iridescence predominating (Fig. 8). Female specimens identified as *X. coronata coronata* from Tidore, Ternate, and Kaioa have wing iridescence that is coppery or coppery-violet in color (Fig. 1, 7), while females identified as *X. coronata coronata* from Halmahera and Bacan have wing iridescence that is purplish-blue with strong purple iridescence predominating (Fig. 5, 6). Further study of additional specimens is needed to determine the exact geographic distribution of these various color variants. The color of wing iridescence is frequently used as a diagnostic character to separate taxa at the species level in other lineages of *Xylocopa* (see, for example, illustrations and discussion in Mawdsley 2017a, 2017b), and thus these different forms clearly merit further investigation in order to determine whether multiple valid species-level taxa are present. However, it should also be noted that at least one other widespread species of *Xylocopa* exhibits infraspecific geographic variation in wing iridescence coloration: the Central and South American *X.* (*Neoxylocopa*) *frontalis* (Olivier), in which different populations have violet, blue, blue-violet, greenish-blue, golden-green, or dark green wing iridescence, as discussed by Hurd (1978).

Acknowledgments

For permission to examine specimens for this study, I thank Seán Brady and Brian Harris of the National Museum of Natural History, Smithsonian Institution (USNM). For critical review and comments on the manuscript prior to publication, I thank Sam Droege of the United States Geological Survey's Bee Inventory and Monitoring Laboratory and Eugene Scarpulla of the Maryland Entomological Society.

Literature Cited

Baker DB. 2001. Alfred Russel Wallace's record of his consignments to Samuel Stevens, 1854–1861. Zoologische Mededelingen Leiden 75: 251–341.

Google Maps. 2020. Google Maps Website. Available at https://www.google.com/maps. (Last accessed April 2020.)

Hurd PD Jr. 1978. An annotated catalog of the carpenter bees (Genus *Xylocopa* Latreille) of the Western Hemisphere (Hymenoptera: Anthophoridae). Smithsonian Institution Press; Washington, DC. 106 p.

Hurd PD Jr., Moure JS. 1963. A classification of the large carpenter bees (Xylocopini) (Hymenoptera: Apoidea). University of California Publications in Entomology 29: i–vi + 1–365.

Lieftinck MA. 1956. Revision of the carpenter-bees (*Xylocopa* Latreille) of the Moluccan Islands, with notes on other Indo-Australian species. Tijdschrift voor Entomologie 99: 55–73.

Mawdsley JR. 2006. Taxonomy, phylogeny, and cladistic biogeography of the genus *Omadius* (Insecta: Coleoptera: Cleridae). Contributions of the American Entomological Institute 34(4): 1–98.

Mawdsley JR. 2017a. Large carpenter bees: A guide to the species of *Xylocopa* (*Neoxylocopa*) from North and Central America. Pineway Press; University Park, Maryland. 64 p.

Mawdsley JR. 2017b. Giant carpenter bees: Taxonomy and identification of the species of the *Xylocopa* (*Mesotrichia*) group. Pineway Press; University Park, Maryland. 68 p.

Ritsema C. 1876. Acht nieuwe Oost-Indische *Xylocopa*-soorten. Tijdschrift voor Entomologie 19: 177–185.

Smith F. 1860. Catalogue of hymenopterous insects collected by Mr. A. R. Wallace in the islands of Bachian, Kaisaa, Amboyna, Gilolo, and at Dory in New Guinea. Journal of the Proceedings of the Linnaean Society of London 5: 93–143.

Smith F. 1874. Monograph of the genus *Xylocopa* Latr. Transactions of the Entomological Society of London 1874: 247–302.

Received June 12, 2020; accepted July 24, 2020.
Review editor Elijah Talamas.