

# New species and designation of primary types in Neotropical carpenter bees of the genus *Xylocopa* Latreille (Hymenoptera, Apidae)

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## Abstract

We describe and figure two distinctive new species of Neotropical carpenter bees of the genus *Xylocopa*, *X. (Schonnherria) barbarae* sp. n. from Bolivia, and *X. (Schonnherria) bigibbosa* sp. n. from Peru. To stabilize the names, we designate a neotype for *X. (Schonnherria) dimidiata* Latreille and lectotypes for the following species: *X. (Neoxylocopa) andica* Enderlein, *X. (Neoxylocopa) columbiensis* Pérez, *X. (Neoxylocopa) mendozana* Enderlein, and *X. (Neoxylocopa) rufidorsum* Enderlein. For each species, we provide comparative diagnosis, taxonomic comments, and summarize its distribution.

## Keywords

Anthophila, Bolivia, Peru, taxonomy

## Introduction

Carpenter bees of the genus *Xylocopa* Latreille (Apidae: Xylocopini) are a cosmopolitan, commonly collected group of promising pollinators. The group contains more than 470 species in 31 subgenera worldwide (Michener 2007), with some species effectively used

as pollinators of diverse crops, including passion fruit, squash, tomato, Brazilian nut tree, and eggplant (e.g., Keasar 2010, Giannini et al. 2015). As for many other bees, the species-level systematics of *Xylocopa* remains troubling, with many species known either only from the type specimen, from small number of specimens, or from a single sex. Identification keys to species are also lacking for many subgenera or regions, and basic biological aspects, such as nesting behavior, are known from common species only (Gonzalez et al. 2013, Lucia et al. 2014, 2015). Such obstacles not only hinders the true diversity of these bees, but also interferes with current conservation and sustainable use efforts on these pollinators.

The purpose of this paper is to address the nomenclature of some species of the subgenera *Xylocopa* (*Neoxylocopa*) Michener and *X.* (*Schonnherria*) Lepeletier de Saint Fargeau, the two most species-rich groups in the Western Hemisphere. We describe two new species of *X.* (*Schonnherria*) and designate primary types for five species in both subgenera to stabilize their names. We also provide comments on the taxonomy and distribution of each species.

## Material and methods

Morphological terminology generally follows that of Hurd and Moure (1963) and Michener (2007). Species descriptions emphasize shapes and dimensions of structural features that appeared to be reliable in species recognition. Measurements were taken with an ocular micrometer attached to an Olympus SZ-60 stereomicroscope. We measured total body length from the head to the apex of metasoma in lateral view; forewing length from the apex of the costal sclerite to the wing apex; mesosoma width as the maximum distance between the outer borders of tegulae; and metasoma width as the maximum width of the second tergum. We used the following abbreviations: T, S, and OD for metasomal tergum and sternum, and maximum diameter of the median ocellus, respectively. Supraorbital line refers to the upper ocular tangent and we used it to indicate the position of the lateral ocelli in frontal view. We prepared photomicrographs using a Canon 7D digital camera attached to Infinity K-2 long-distance microscope lens, and assembled them with the Combine ZM software package. We reproduced information on label and locality data as they appear on each label, with a slash (/) separating portions appearing on different labels attached to the same specimen. Annotations to clarify information as it appears on labels are indicated in square brackets.

We used the following institutional acronyms for repositories holding material: **NHML**, Natural History Museum, London, England (David Notton); **MNHN**, Museo National D'Histoire Naturelle, Paris, France (Agnière Touret-Alby); **MIZ**, Museum i Instytut Zoologii Polskiej Akademii Nauk, Warsaw, Poland (Tomasz Hufleit); **MLP**, Museo de La Plata, La Plata, Argentina (Analia Lanteri, Alberto Abrahamovich); **SEMC**, Snow Entomological Collection, Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA (Michael S. Engel, Zach Falin, Jennifer Thomas); and **USNM**, National Museum of Natural History, Washington, DC, USA (Sean Brady, Brian Harris).

## Systematics

Genus *Xylocopa* Latreille, 1802

Subgenus *Neoxylocopa* Michener, 1954

*Xylocopa* (*Neoxylocopa*) *andica* Enderlein, 1913

Fig. 1

*Xylocopa* (*Neoxylocopa*) *andica* Enderlein, 1913: 160 (Lectotype: USNM; ♀, Peru, Chanchamayo) (new lectotype designation).

**Diagnosis.** This species can be distinguished by the combination of the following features: large body size (body length ~23 mm); pubescence black; integument dark brown to black throughout, basal three terga with weak, dark brown bands; wings dark brown with green highlights apically, violet basally; labrum basally with three longitudinally elongated tubercles; gena and supraocular areas sparsely punctate; mesoscutellum with subhorizontal dorsal surface smooth and shiny, declivitous posterior surface weakly imbricate, dull, not separated by a border or carina; T2 and T3 sparsely punctate on discs, punctures separated by at least 2–3 times a puncture width; apical terga with denser punctures laterally; discs of T2 and T3 medially with very short, black, simple setae, each seta barely exiting puncture, increasing in length laterally and on apical terga.

**Comments.** The female lectotype of *Xylocopa andica* is morphologically similar to the female of *X. nigrocincta* Smith, a species that occurs in Brazil, Argentina, and Paraguay. It differs from *X. nigrocincta* in the coloration of the terga and wings. In *X. nigrocincta*, all terga are basally reddish brown, except T6, and the wings are dark brown with strong violet highlights. In *X. andica*, the basal three terga have weak, dark brown bands, and the wings are dark brown with green highlights apically, violet basally. Because integumental coloration of the metasomal terga and wings are variable in other species of *Xylocopa*, it is possible that both species are conspecifics. For example, specimens of *X. frontalis* (Olivier) from Central America and northern South America have terga uniformly black and wings with strong green highlights. In contrast, specimens from southern South America (Brazil, Argentina, and Paraguay) have light reddish brown bands on the basal terga and wings with strong violet highlights (Hurd 1978: 80–81). Furthermore, we examined two female specimens from the same locality and collector in Argentina (Virginia, nr. La Ramada, Dpto. Burruyacu, III-27-1967 / Cucurbita maxima / USNM) in which the coloration of the wings is similar to that of *X. andica* in one of them, and to *X. nigrocincta* in the other.

Another species that might be conspecific with *X. nigrocincta* is *X. suspecta* Moure and Camargo, a species recorded from Argentina, Bolivia, Brazil, and Paraguay (Moure 2007). Male and female specimens from Bolivia (El Beni) standing in SEMC under *X. suspecta* are undistinguishable from *X. nigrocincta*, including in the male genitalia. Doubtless, future studies are necessary to assess the species limits of these species.



**Figure 1.** Dorsal habitus of the female lectotype of *Xylocopa* (*Neoxylocopa*) *andica* Enderlein.

*Xylocopa andica* was described from five specimens (two females and three males) and no holotype was designated. According to T. Huffleit (MIZ), these syntypes were borrowed by the late J.S. Moure in 1959 and were never returned. These specimens could not be located at the Universidade Federal do Paraná, Curitiba, Brazil (G. Melo, pers. comm.). However, we found a female specimen of this type series in the general bee collection of the USNM, which we here designate as the lectotype to stabilize the name. The label data for this specimen are as follows: Peru Chanchamayo [Wilhelm] Hoffmanns [green label] / Co = Typus [yellow label] / *Xylocopa andica* Enderl. ♀ Type Dr. Enderlein det. 1913 [handwritten] / Lectotype, *Xylocopa andica* Enderlein des. M. Lucia & V.H. Gonzalez. This specimen is currently in USNM.

**Distribution.** Peru (Chanchamayo).

### *Xylocopa* (*Neoxylocopa*) *columbiensis* Pérez, 1901

Figs 2–5

*Xylocopa* (*Neoxylocopa*) *columbiensis* Pérez, 1901: 94 (Lectotype: MNHN; ♀, Panama, Chiriquí) (new lectotype designation).

**Diagnosis.** This species can be recognized by the combination of the following features: large body size (body length ~25 mm); pubescence black; integument dark brown to black throughout, with coxae and femora, apical margins of sterna, and T2–T4 brown; regula black; wings dark brown with coppery highlights (Fig. 4); labrum basally with three longitudinally elongated tubercles; gena and supraocular areas sparsely punctate, punctures separated by ~2–3 times a puncture width; mesoscutellum (Fig. 3) weakly angled in profile; T1 and T2 densely punctate on discs, punctures small, separated by





**Figures 2–5.** Female lectotype of *Xylocopa* (*Neoxylocopa*) *columbiensis* Pérez. **2** Facial view **3** detail of mesoscutellum **4** Right fore and hind wings **5** detail of T1–T3.

~1–2 times a puncture width, punctures denser laterally; T3 sparsely punctate on disc, punctures small, separated by 2–3 times a puncture width (Fig. 5); T4–T6 with large punctures on discs, punctures separated by a puncture width; T1 with short, plumose and simple setae intermixed; discs of T2 and T3 with long ( $0.15\text{--}0.50 \times \text{OD}$ ), simple setae; T4–T6 with long ( $0.8\text{--}4.0 \times \text{OD}$ ), simple setae.

**Comments.** *Xylocopa columbiensis* superficially resembles *X. andica*, *X. nigrocincta*, and *X. suspecta*. It can be separated from those species by the coloration and punctuation of terga, as well as the coloration of terga and wings, as indicated in the diagnosis.

*Xylocopa columbiensis* was described from six specimens (three females and three males) and no holotype was designated. We examined these specimens, which are in the MNHN, and chose one of the females as the lectotype to stabilize the name. The label data for this specimen are as follows: Chiriqui [white label, handwritten] / Museum Paris, Coll. J. Pérez / Lectotype [red label] / Lectotype *Xylocopa columbiensis* Pérez des. M. Lucia & V.H. Gonzalez.

**Distribution.** Panama (Chiriquí), Peru (Moure 2007).

***Xylocopa (Neoxylocopa) mendozana* Enderlein, 1913**

Fig. 6

*Xylocopa (Neoxylocopa) mendozana* Enderlein, 1913: 160 (Lectotype: USNM; ♀, Argentina, Mendoza) (new lectotype designation).

**Diagnosis.** This species can be recognized by the combination of the following features: large body size (body length ~27 mm); pubescence black; integument dark brown to black throughout, with legs and apical margins of terga light brown; tegula black; wings dark brown with green highlights; labrum basally with three longitudinally elongated tubercles; gena and supraocular areas densely punctate, punctures separated by ~1–1.5 times a puncture width; mesoscutellum with basal, smooth and shiny surface gently continuing onto distal, punctate surface; T2 densely punctate on disc, punctures small, separated by a puncture width, punctures denser laterally; T3 with sparse punctures on disc, punctures small, separated by 1–2 times a puncture width; T4–T6 with large punctures on discs, punctures separated by a puncture width; T1 with very short, plumose and simple setae intermixed; discs of T2 and basally on T3 with very short ( $0.2\text{--}0.4 \times \text{OD}$ ) simple setae, increasing in length laterally and on apical terga; T3 apically and T4–T6 with long ( $1\text{--}4 \times \text{OD}$ ), simple setae. The male can be easily recognized by the distinctive punctuation and pubescence of T2 and T3, which are finely and densely punctate, with very short setae, each seta barely exiting the puncture. Thus, these terga appear largely bare at low magnifications when compared with remaining terga, which are densely covered by very long setae.

**Comments.** Specimens of *X. mendozana* were erroneously identified as *X. ordinaria* Smith by Hurd (1978: 67), a species that does not occur in Argentina (Lucia et al. 2014). *Xylocopa mendozana* is most similar to *X. atamisquensis* Lucia & Abrahamovich from Argentina but it can be easily separated by the large body size (25–29 mm), wings with strong green highlights, and T2 and T3 with short, simple setae contrasting with the long setae on the remaining terga. *Xylocopa atamisquensis* is smaller (21–23 mm), have wings with strong violet-green highlights, and T2–T6 with setae uniformly long. The male of *X. mendozana* can be distinguished from the male of other species occurring in Argentina by the features listed in the diagnosis.

*Xylocopa mendozana* was described from eight specimens (four females, three males and one gynandromorph) and no holotype was designated. In 1959, these syntypes were loaned to the late J.S. Moure and have never returned to the MIZ (T. Hufleit, pers. comm.). We were able to locate two females, two males, and the gynandromorph specimen in the general bee collection of the USNM. The remaining two females and one male could not be located at the Universidade Federal do Paraná, Curitiba, Brazil (G. Melo, pers. comm.). To stabilize the name, we chose one of the females as the lectotype. The label data for this specimen are as follows: Argentinien, Mendoza, Jensen-Haarup S. 1.1.07 [green label] / Type [red label] / *Xylocopa mendozana* Enderl. ♀ Type Dr. Enderlein det. 1913 [handwritten] / Mus. Zool. Polonicum. Warszawa. 12/45/ Lectotype *Xylocopa mendozana* Enderlein P. D. Hurd '60 / Lectotype *Xylocopa*



**Figure 6.** Dorsal habitus of the female lectotype of *Xylocopa* (*Neoxylocopa*) *mendozana* Enderlein.

*mendozana* Enderlein des. M. Lucia & V.H. Gonzalez. This specimen as well as the others are currently in USNM.

**Distribution.** Argentina: Catamarca, Córdoba, La Pampa, La Rioja, Mendoza, Rio Negro, Salta, San Juan, San Luis, Santiago del Estero, and Santa Fe (Lucia et al. 2014).

### *Xylocopa* (*Neoxylocopa*) *rufidorsum* Enderlein, 1913

Fig. 7

*Xylocopa* (*Neoxylocopa*) *rufidorsum* Enderlein, 1913: 160 (Lectotype: USNM; ♀, Peru, Chanchamayo) (new lectotype designation).

**Diagnosis.** This species can be recognized by the combination of the following features: medium body size (body length, ~21 mm); pubescence black, except dorsum of mesosoma densely covered with ferruginous setae; integument dark brown to black throughout, except tegula reddish brown; wings dark brown with strong violet highlights; labrum basally with three longitudinally elongated tubercles; gena and supraocular areas sparsely punctate; mesoscutellum with subhorizontal dorsal surface smooth and shiny, declivitous posterior surface weakly imbricate, dull, not separated by a border or carina; T2 densely punctate on disc, punctures separated by 1–1.5 times a puncture width, punctures denser laterally; T3 sparsely punctate on disc, punctures separated by 2–3 times or more a puncture width; T1 with plumose and very short, simple setae intermixed; discs of T2 and T3 with very short ( $0.2\text{--}0.7 \times \text{OD}$ ), simple setae, increasing in length laterally and on apical terga; T4 and T5 with long ( $1.0\text{--}1.5 \times \text{OD}$ ), simple setae.

**Comments.** As indicated by Moure (1949), *X. rufidorsum* belongs to the group of species that includes *X. similis* Smith, *X. tacanensis* Moure, *X. eximia* Perez, and *X. aurulenta*





**Figure 7.** Dorsal habitus of the female lectotype of *Xylocopa* (*Neoxylocopa*) *rufidorsum* Enderlein.

(Fabricius), which share the ferruginous pubescence on the dorsum of mesosoma. *Xylocopa similis* can be easily recognized by the presence of ferruginous setae on T1 (T1 with black setae in *X. rufidorsum*); *X. aurulenta* by the wings light brown with coppery highlights (dark brown with strong violet highlights in *X. rufidorsum*); *X. eximia* by the presence of long ( $\geq 1.5 \times OD$ ), simple setae on discs of T2 and T3 (discs of T2 and T3 with short [ $0.2-0.7 \times OD$ ], simple setae in *X. rufidorsum*); and *X. tacanensis* by the gena and T3 more densely punctate, punctures separated by 1–1.5 a puncture width (at least 2 or 3 times a puncture width in *X. rufidorsum*).

*Xylocopa rufidorsum* was described from three females and no holotype was designated. As in the case of *X. andica* and *X. mendozana*, these syntypes were also loaned to the late J.S. Moure and have never returned to the MIZ (T. Hufleit, pers. comm.). We only found one of these females in the general bee collection of the USNM; the remaining two females could not be located at the Universidade Federal do Paraná, Curitiba, Brazil (G. Melo, pers. comm.). To stabilize the name, we chose the female we found as the lectotype. The label data for this specimen are as follows: Peru, Chanchamayo [Wilhelm] Hoffmanns [green label] / Co=Typus [yellow label] / *Xylocopa rufidorsum* Enderl. ♀ Type Dr. Enderlein det. 1913 [handwritten] / Mus. Zool. Polonicum. Warszawa. 12/45 / Lectotype, *Xylocopa rufidorsum* Enderlein des. M. Lucia & V.H. Gonzalez. This specimen is currently deposited in USNM.

**Distribution.** Bolivia (Cochabamba) and Peru (Chanchamayo) (Moure 2007).

### Subgenus *Schonnherria* Lepeletier de Saint Fargeau, 1841

#### *Xylocopa* (*Schonnherria*) *barbarae* sp. n.

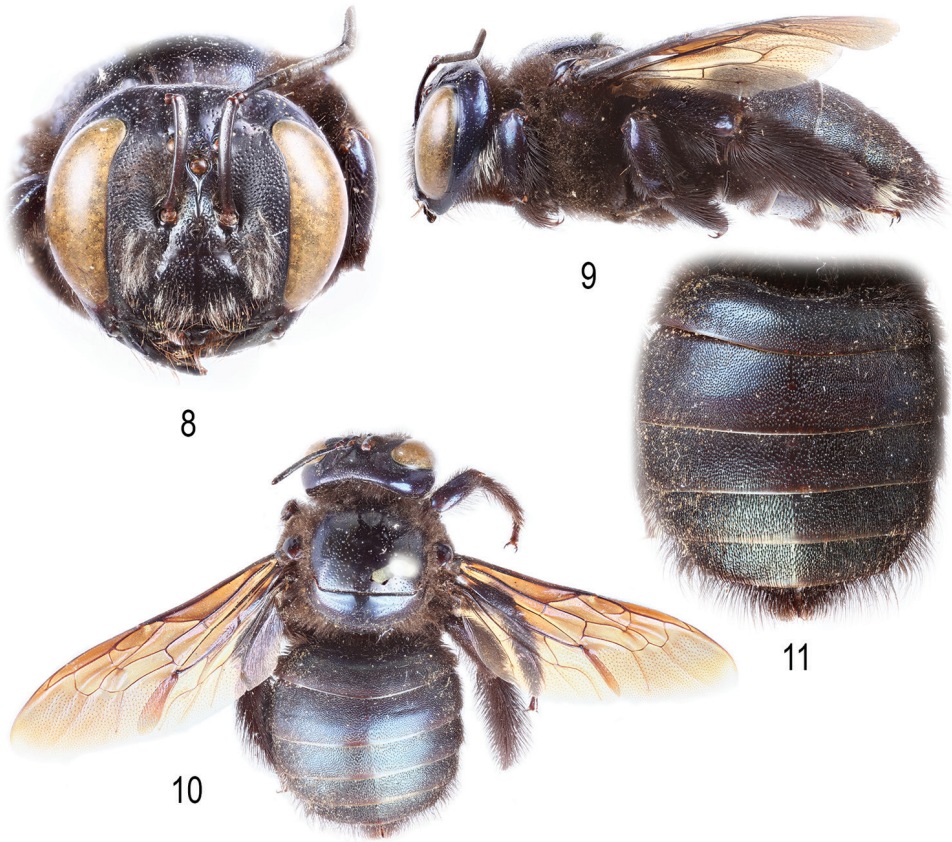
<http://zoobank.org/2B534E11-D150-48DE-A7FE-82A4961710C4>

Figs 8–11

**Diagnosis.** This species, known only from the female sex, can be easily distinguished from other species of *Schonnherria* by the combination of the following features: medium body size (body length, 19–22 mm); integument dark brown to black with blue highlights throughout and green metallic highlights on discs of terga; wings dark brown with strong violet highlights throughout; labrum basally with a distinct, large, single capitate tubercle; sides of T2–T4 and sides of S2–S4 with white setae; and discs of T2–T4 with dark brown to black setae,  $0.5\text{--}1.0 \times \text{OD}$ .

*Xylocopa barbarae* is most similar to *X. dimidiata* Latreille (see below), sharing a similar body size, metallic highlights on all tagmata, wings dark brown with violet highlights, and a labrum basally with a distinct, large, single capitate tubercle. However, *X. barbarae* can be easily distinguished by the longer and denser pubescence of terga (T2–T4 with setae  $0.5\text{--}1.0 \times \text{OD}$  in *X. barbarae* vs. setae very short, barely exiting puncture in *X. dimidiata*), presence of white setae on sides of T2–T4 (absent in *X. dimidiata*), and wings with violet highlight throughout (with green highlights apically in *X. dimidiata*).

**Description.** ♀, Body length 22.0 mm; head width 6.9 mm; mesosoma width 8.3 mm; metasoma width 9.9 mm; forewing length 17.0 mm. *Coloration.* Integument dark brown to black throughout, with weak blue metallic highlights on gena, vertex, mesoscutum except on disc, mesoscutellum, tegula, outer surfaces of tibiae, and T1 and T2; sterna with strong blue metallic highlights; T2 preapically and discs of remaining terga with weak green metallic highlights. Wings dark brown with strong violet highlights, pterostigma and veins dark brown to black. *Pubescence.* Dark brown to black, except face, gena, sides of T2–T4, and sides of S2–S4 with white setae. Discs of



**Figures 8–11.** Female holotype of *Xylocopa* (*Schonnherria*) *barbarae* sp. n. **8** Facial view **9** Lateral habitus **10** Dorsal habitus **11** Detail of metasomal terga.

terga with decumbent to semierect simple setae, shortest on T1 ( $0.2\text{--}0.5 \times \text{OD}$ ), progressively increasing in density and length towards apical terga, longest on T6 ( $5.0\text{--}6.0 \times \text{OD}$ ), sides of terga with semierect, mostly branched setae, denser and longer than discs. *Sculpturing.* Weakly imbricate to smooth and shiny. Vertex and upper gena with scattered punctures, largely impunctate. Mesoscutum with scattered, coarse punctures on anterior margin and lateral sides, impunctate otherwise; mesoscutellum largely impunctate, with large, scattered punctures on posterior half. Terga with circular to ovoid setiferous punctures, about as large and coarse as those on mesoscutellum, submedially with punctures separated at most by 1–2 times a puncture width, punctures denser and coarser laterally and on apical terga; S1 with small, ovoid, dense punctures, remaining sterna with elongate punctures on discs, denser and coarser preapically. *Structure.* Head 1.3 times broader than long; compound eyes with inner margins parallel or nearly so; inferior interocular distance 1.2 times superior interocular distance; lateral ocelli just below supraorbital line; ocellocular distance 2.5 times OD; ocellocipital distance 4.8



times OD; clypeotorular distance 1.3 times longitudinal diameter of antennal torulus; clypeus 2.3 times longer than broad; labrum basally with a distinct, large, single capitate tubercle, about as large as OD. Mesoscutum gently convex in profile; mesoscutellum convex, without carina or border between dorsal and posterior surfaces; metanotum and propodeum vertical.

**Holotype.** Bolivia: ♀, Chapare [Department of Cochabamba], 14.xi.1945 [14 November 1945], R. Zischka (MLP).

**Paratypes.** ( $n = 5$ ) Three paratypes with same data as the holotype but collected on 11 and 12 November, 1945 (MLP); 1♀, Chapare (Yungas), I-49 [January 1949] (MLP); 1♀, Dpto. La Paz, Alto Marani, N. of Rurrenbaque, 10 Nov. 1956 (L. Peña) / SEMC1232254 (SEMC).

**Etymology.** The specific epithet is a matronym honoring Mrs. Bárbara Defea, loving and supporting wife of the senior author.

**Distribution.** *Xylocopa barbarae* is known from the departments of Cochabamba and La Paz in Bolivia.

***Xylocopa (Schonnherria) bigibbosa* sp. n.**

<http://zoobank.org/F6275DE2-C404-4FB2-9C94-22FAFADD21B6>

Figs 12–16

**Diagnosis.** The female of this species superficially resembles that of *X. splendidula* Lepelletier de Saint Fargeau and other small species of *Schonnherria*, such as *X. lucida* Smith and *X. muscaria* (Fabricius). However, *X. bigibbosa* can be easily separated from those species and from any other species of the subgenus by the mesoscutum anteriorly with two distinct round tubercles (Fig. 15).

**Description.** ♀, Body length 16.7 mm; head width 5.6 mm; mesosoma width 6.8 mm; metasoma width 7.5 mm; forewing length 14.3 mm. **Coloration.** Integument dark brown to black throughout, with strong blue metallic highlights on gena, vertex, mesoscutum lateral and anterior to tubercles, and sterna; outer surfaces of tibiae with weak blue metallic highlights; terga with weak greenish metallic highlights. Wing membranes dark brown with strong violet highlights, pterostigma and veins dark brown to black. **Pubescence.** Dark brown to black, except face, gena, and sides of T2–T5 with white setae. Discs of terga with decumbent to semierect simple setae, shortest on T1 ( $< 0.5 \times OD$ ), progressively increasing in density and length towards apical terga, longest on T6 ( $\sim 5.0 \times OD$ ), sides of terga with semierect, mostly branched setae, denser and longer than discs. **Sculpturing.** Weakly imbricate to smooth and shiny. Vertex and upper gena with scattered punctures, largely impunctate. Mesoscutum with scattered, coarse punctures on anterior margin and lateral to tubercles, impunctate otherwise; mesoscutellum largely impunctate, with large, scattered punctures on posterior half. Terga with circular to ovoid setiferous punctures, as large and coarse as those on mesoscutellum, mostly separated by 1–2 times a puncture width, denser laterally and on apical terga; sterna with elongate punctures on discs, denser and coarser preapically.



**Figures 12–16.** Female holotype of *Xylocopa (Schonnherria) bigibbosa* sp. n. **12** Facial view **13** Lateral habitus **14** Dorsal habitus **15** Detail of mesoscutum in profile with arrow pointing to tubercles **16** Detail of T1–T3.

*Structure.* Head 1.2 times broader than long; compound eyes with inner margins parallel or nearly so; inferior interocular distance 1.1 times superior interocular distance; lateral ocelli just below supraorbital line; interocellar distance 1.5 times OD, 0.8 times ocellocular distance; ocellocipital distance 3.7 times OD; clypeotorular distance about as long as longitudinal diameter of antennal torulus; clypeus about twice longer than broad; labrum basally with a distinct, large, single capitate tubercle, about as large as OD. Mesoscutum anteriorly with two round tubercles; mesoscutellum gently convex; metanotum and propodeum vertical or nearly so.

**Holotype.** Peru: ♀, Yurac, 67 mi. E. of Tingo Maria., 350 m, XII-11-54 [November 11, 1954] / E.I. Schlinger & E.S. Ross collectors / SEMC1232253 (SEMC).

**Etymology.** The specific epithet refers to the two distinctive humps on the mesoscutum of this species. The novelty of this species was recognized by P.D. Hurd and J.S. Moure who intended to use this name. We retained this designation.

**Distribution.** This species is known only from the type locality in eastern Peru.

### *Xylocopa dimidiata* Latreille, 1809

Figs 17–21

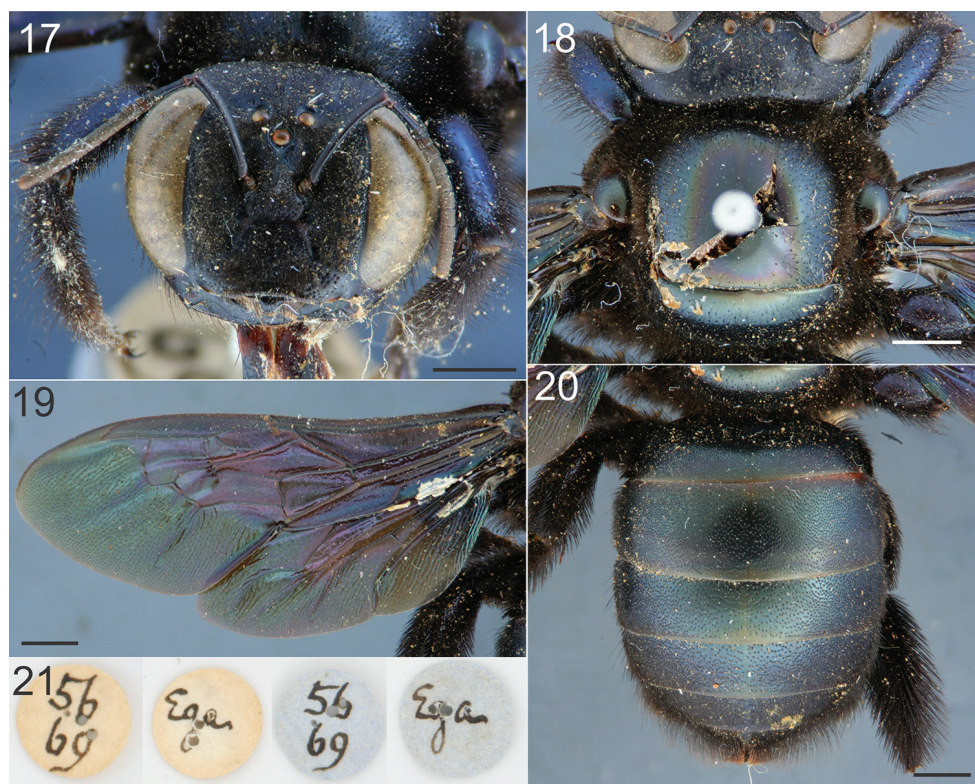
*Xylocopa dimidiata* Latreille, 1809: 95, pl. 38. (Neotype: BMNH; ♀, Brazil, Ega [Tefé]) (new neotype designation).

*Xylocopa batesi* Cockerell, 1907: 228, new name for “*Xylocopa dimidiata* Smith”, *nomen invalidum* (not *X. dimidiata* Latreille, 1809 and *X. dimidiata* Lepeletier de Saint-Fargeau, 1841 [= *X. ocularis* Pérez, 1901]).

**Diagnosis.** This species can be recognized by the combination of the following features: medium body size (body length 23 mm); integument black, with distinct metallic green highlights on metasoma and mesosoma, particularly on mesoscutellum, and head with blue metallic highlights (Figs. 17, 18, 20); wings dark brown with violet highlights except apex green (Fig. 19); pubescence black; labrum basally with a distinct, large, single capitate tubercle, about as large as OD; T1 with plumose and simple setae; discs of T2 and T3 with very short, simple setae, each seta barely exiting puncture (Fig. 20); and T4–T6 with long setae, 1–2 times longer than those on T2 and T3.


**Comments.** The identity of *Xylocopa dimidiata* proposed by Latreille (1809) has been a mystery and its current concept encompasses more than one species (Fig. 22). Latreille proposed *Xylocopa dimidiata* from a single female collected somewhere along Alexander von Humboldt and Aimé Bonpland’s voyage and whose whereabouts are unknown (Hurd 1978, Moure 2007). More than 60 years after Latreille’s description, Smith (1874) identified and briefly described a female specimen from Ega [Tefé], Brazil, as what he interpreted to represent *X. dimidiata* Latreille. Subsequent authors followed Smith’s concept of *X. dimidiata* and even incorrectly attributed the name to him, despite Smith making a clear reference to Latreille when using the name (e.g., Schrottky 1902). In fact, because Cockerell (1907) thought that Smith had proposed *X. dimidiata* in 1874, which then would result in homonym with Latreille’s *X. dimidiata* as well as with one established by Lepeletier (1841), he proposed to replace Smith’s name with *X. batesi* Cockerell (Hurd 1959). However, because Smith (1874) did not establish a name, Cockerell’s replacement name for an unavailable name is therefore invalid under the ICZN (*nomen invalidum*). For the same reasons, the synonym of *X. batesi* under *X. dimidiata* Latreille listed by Hurd and Moure (1963), Hurd (1978), and Moure (2007) are unavailable.





**Figures 17–21.** Neotype of *X. dimidiata* Latreille. **17** Facial view **18** Dorsal view of head and mesosoma **19** Left fore and hind wings **20** Detail of metasomal terga **21** Associated labels (NHML).

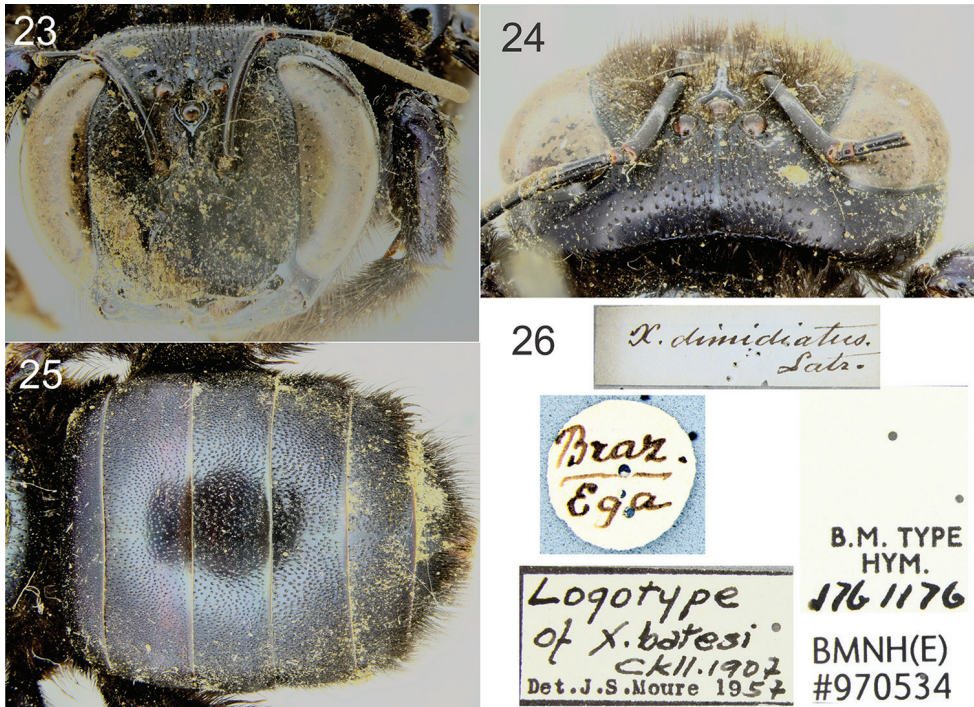
The specimen identified as *X. dimidiata* by Smith is in the NHML (Figs 23–26), along with the specimen from the same locality herein designated as the neotype of that species. The second specimen is in better condition than that identified by Smith and, judging by the handwriting of the labels, it appears to be from the same collection event. Given the confusing identity of *X. dimidiata*, the designation of a neotype is necessary to stabilize the name. For practical reasons, we chose as the neotype a specimen that matches Smith's concept of *X. dimidiata* Latreille. Although this proposed taxonomic action resolves the identity issue of *X. dimidiata*, there is no reason to assume that Smith's interpretation of Latreille's *X. dimidiata* is correct. First, Smith's specimen is from the Amazon Basin, in a locality well outside of the route taken by Humboldt and Bonpland. These explorers traveled through large areas of Venezuela and the Magdalena River Valley in Colombia and through the Andes southward to Lima, Peru, and Guayaquil, Ecuador, before traveling to Mexico (e.g., Sandwith 1925, 1926, Papavero 1971). Thus, Latreille's specimen could have been collected from any of these areas bordering the Amazon Basin, unless it came from San Carlos de Río Negro in Venezuela's Amazonas state. Second, specimens standing in collections under *X. dimidiata* actually belong to multiple species, distinct from Smith's material. This is the case for the Bolivian specimens described

Present		* <i>X. batesi</i> Cockerell: <b>nomen invalidum</b> * Current application of the name <i>X. dimidiata</i> includes several species
1978		P.D. Hurd and others followed Smith's concept of <i>X. dimidiata</i>
1907	?	T.D. Cockerell believed Smith proposed <i>X. dimidiata</i> and replaced name with <i>X. batesi</i>
1902		C. Schrottky followed Smith's concept of <i>X. dimidiata</i>
1874		F. Smith identified as <i>X. dimidiata</i> a specimen from Ega, Brazil
1809	P.A. Latreille described <i>X. dimidiata</i> from a specimen collected somewhere along Humboldt and Bonpland's voyage	

**Figure 22.** Schematic representation of the historical changes in the species concept and nomenclature surrounding *X. dimidiata* Latreille (see text for details). The yellow and blue columns each represent a species concept.

herein as new (*X. barbarae*), which superficially fall within the historical concept of Smith's *X. dimidiata*, but differing in the longer and denser pubescence of terga, presence of white setae on sides of T2–T4, and wings with violet highlights throughout. Thus, Smith's concept of Latreille's *X. dimidiata* is questionable, and the current application of this name includes several species.

Given the problems outlined above, we initially thought that it would be best to regard *X. dimidiata* Latreille as a *nomen dubium*, meaning that future workers would have the task to fix this name to one of those biological species overlapping Humboldt and Bonpland's route. *Xylocopa* (*Schonnherria*) is the second most species-rich group of *Xylocopa* in the Western Hemisphere, containing about 30 species ranging from southern United States to southern Argentina (Michener 2007). Because taxonomic issues like these are best resolved in a context of a revision, a study of such a magnitude might take several years to complete, if done at all. Thus, despite all problems surrounding the identity of *X. dimidiata*, we chose to designate a neotype for this species following Smith's interpretation. This might not be Latreille's concept of *X. dimidiata* but we believe this taxonomic action now would be beneficial to the advancement of the taxonomy of the group. The label data for the specimen here designated as the neotype are as follows: 5669 / Ega / 5669 / Ega / Neotype, *Xylocopa dimidiata* Latreille des. M. Lucia V.H. Gonzalez ♀.



**Figures 23–26.** Specimen of the NHML identified as *X. dimidiata* Latreille by F. Smith. **23** Facial view **24** Dorsal view of head **25** Detail of terga **26** Associated locality and determination labels (Photographs by David Notton, NHML).

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