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The genus *Lyroda* Say, 1837 (Hymenoptera: Crabronidae) in Vietnam

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Abstract. *Lyroda* Say, 1837 (Hymenoptera: Crabronidae) is a small genus of solitary wasps distributed worldwide. The genus consists of 26 species, half of which are found in the Oriental region. The single species of *Lyroda* known from Vietnam was *L. formosa* (F. Smith, 1858). Here, we study the genus *Lyroda* in Vietnam resulting in four species, namely *L. formosa*, *L. binghami* Tsuneki, 1983, *L. tridentata* Li, Cai et Li, 2009 and *L. venusta* Bingham, 1897 being recorded from the country. Excepting the first species, the other three are recorded for Vietnam for the first time. Keys to both males and females of the *Lyroda* species of Vietnam, new distributional records and remarks of *L. formosa* are provided.

Key words: Crabronidae, *Lyroda*, distribution, key, first record, Vietnam.

Род *Lyroda* Say, 1837 (Hymenoptera: Crabronidae) во Вьетнаме

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Резюме. *Lyroda* Say, 1837 (Hymenoptera: Crabronidae) – небольшой род одиночных ос, распространенный по всему миру. Род насчитывает 26 видов, половина из которых встречается в Ориентальной области. Единственным известным из Вьетнама видом *Lyroda* был *L. formosa* (F. Smith, 1858). В настоящей работе изучен род *Lyroda* во Вьетнаме, в результате чего для страны зарегистрировано 4 вида: *L. formosa*, *L. binghami* Tsuneki, 1983, *L. tridentata* Li, Cai et Li, 2009 и *L. venusta* Bingham, 1897. За исключением первого вида, остальные три указываются для Вьетнама впервые. Приведены определительные таблицы для самцов и самок видов *Lyroda* Вьетнама, новые данные о распространении и замечания по *L. formosa*.

Ключевые слова: Crabronidae, *Lyroda*, распространение, определительная таблица, первое указание, Вьетнам.

Introduction

The genus *Lyroda* Say, 1837 belongs to the family Crabronidae, subfamily Crabroninae and tribe Miscophini, and comprises 26 species distributed worldwide. Half of the known species are found in the Oriental region (13 species), and the other half are known from other regions (five from the Afrotropic region, five from the Australian region, two from the Neotropical region, two from the Nearctic region, and three from the Palaearctic region) [Pulawski, 2026]. *Lyroda* is characterized by the pronotal collar with three tubercles dorsally and forewing with three submarginal cells (except two in some Australian species); second submarginal cell is not petiolate, four to six sided. Antennae are elongate, scape is usually short and stout, flagellomeres are longer than broad, those of male unmodified. In female, free clypeal margin is with several teeth, and in male, usually truncate or with inconspicuously toothed lobe [Tsuneki, 1967, 1983; Bohart, Menke, 1976].

The genus *Lyroda* has not yet been studied comprehensively in Vietnam. The single species known from the country is *L. formosa* (F. Smith, 1858) recorded by Schmid-Egger and Al-Jahdhami [2021] who studied five female specimens collected from Dak Lak Province. This species is well characterized and unique among Old World *Lyroda* species by a red gastral base, and widely spread in tropical and subtropical Asia, from Arabia to India and China, Indonesia, Philippines, Thailand and Solomon Islands [Li et al., 2009; Schmid-Egger, Al-Jahdhami, 2021; Phong Huy Pham, Antropov, 2021; Ayisha Mawadda et al., 2021].

In this paper, we study the genus *Lyroda* from Vietnam resulting in records of four species for the country, namely *L. binghami* Tsuneki, 1983, *L. formosa*, *L. tridentata* Li, Cai et Li, 2009 and *L. venusta* Bingham, 1897 and produce keys to both males and females of the *Lyroda* species.

Material and methods

Specimens were collected using insect nets and Malaise traps at localities in the following provinces of Vietnam: Bac Ninh, Cao Bang, Da Nang, Ha Noi, Hung Yen, Nghe An, Phu Tho, Quang Ninh, Son La, and Tay Ninh. Adult morphological characters were observed from pinned and dried specimens with the aid

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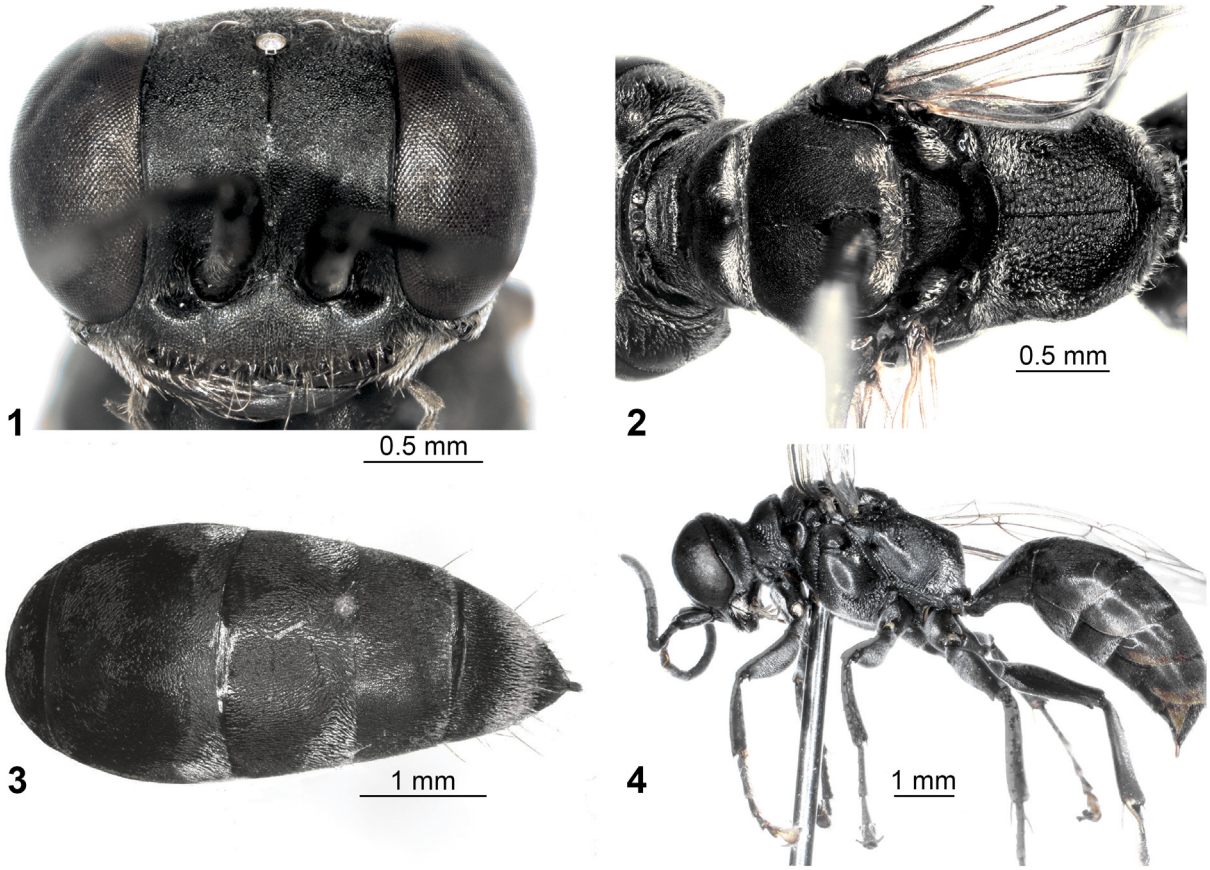


Figs 1–4. *Lyroda binghami*, female.
1 – head, frontal view; 2 – mesosoma, dorsal view; 3 – metasoma, dorsal view; 4 – habitus, lateral view.
Рис. 1–4. *Lyroda binghami*, самка.
1 – голова, вид спереди; 2 – мезосома, вид сверху; 3 – метасома, вид сверху; 4 – внешний вид, сбоку.

of a stereoscopic microscope SMZ 745 Nikon. Bohart and Menke [1976] was used to identify the genus *Lyroda*, and Tsuneki [1967, 1983], Li et al. [2009], and Ayisha Mawadda et al. [2021] were used to accomplish identifications to all taxon levels. Keys to the Vietnamese *Lyroda* were compiled based on the specimens examined and publications of Tsuneki [1967, 1983] and Li et al. [2009]. Morphological terms follow Bohart and Menke [1976]. Photographic images were taken using a Nikon SMZ800N microscope camera and a Canon SD3500 IS camera.

The specimens examined in the present study are deposited in the Institute of Biology, Vietnam Academy of Science and Technology (Ha Noi, Vietnam).

Genus *Lyroda* Say, 1837

Lyroda Say, 1837: 372 (type species *Lyroda subita* Say, 1837, by subsequent designation [Patton, 1880: 386]).

Morphota F. Smith, 1856: 293 (type species *Morphota fasciata* F. Smith, 1856, by subsequent designation [Pate, 1937: 41]).

Odontolarra Cameron, 1900: 35 (type species *Odontolarra rufiventris* Cameron, 1900 (= *Morphota formosa* F. Smith, 1858), by monotypy).

Lyrodon Howard, 1901: pl. 6, fig. 5. Lapsus for *Lyroda* Say, 1837. Junior homonym of *Lyrodon* Goldfuss, 1837.

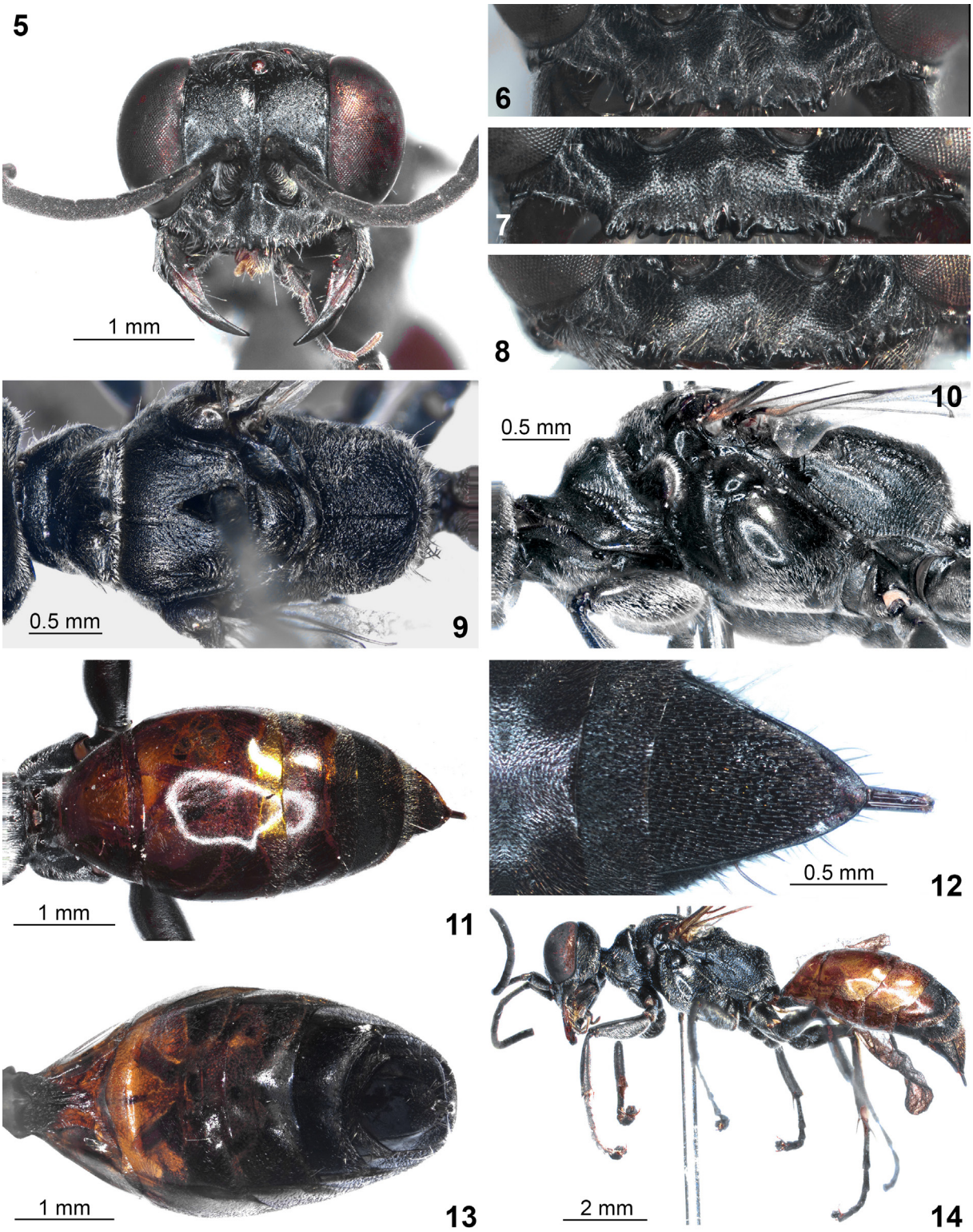
Key to the Vietnamese species of *Lyroda*

Females:

1. Two first gastral segments red ..... *L. formosa*
– Gaster wholly black 2
2. Free margin of clypeus with two sets of three teeth and a set of two teeth in middle ..... *L. venusta*
– Free margin of clypeus with three sets of three teeth 3
3. Pygidial plate ferruginous, triangular, its lateral carina straight ..... *L. tridentata*
– Pygidial plate black and not triangular, its lateral carina somewhat curved ..... *L. binghami*

Males:

1. Two first gastral segments red ..... *L. formosa*
– Gaster wholly black 2
2. Free margin of clypeus not excavated in middle ..... *L. binghami*
– Free margin of clypeus distinctly, arcuately or gently excavated in middle 3
3. Gastral sternum VIII without median tooth at apex; prominence of clypeus emarginate in middle; second gastral sternum with pair of round ferruginous spot ... *L. tridentata*
– Gastral sternum VIII with median tooth at apex; median prominence of clypeus not emarginate medially; second gastral sternum without ferruginous spots ..... *L. venusta*

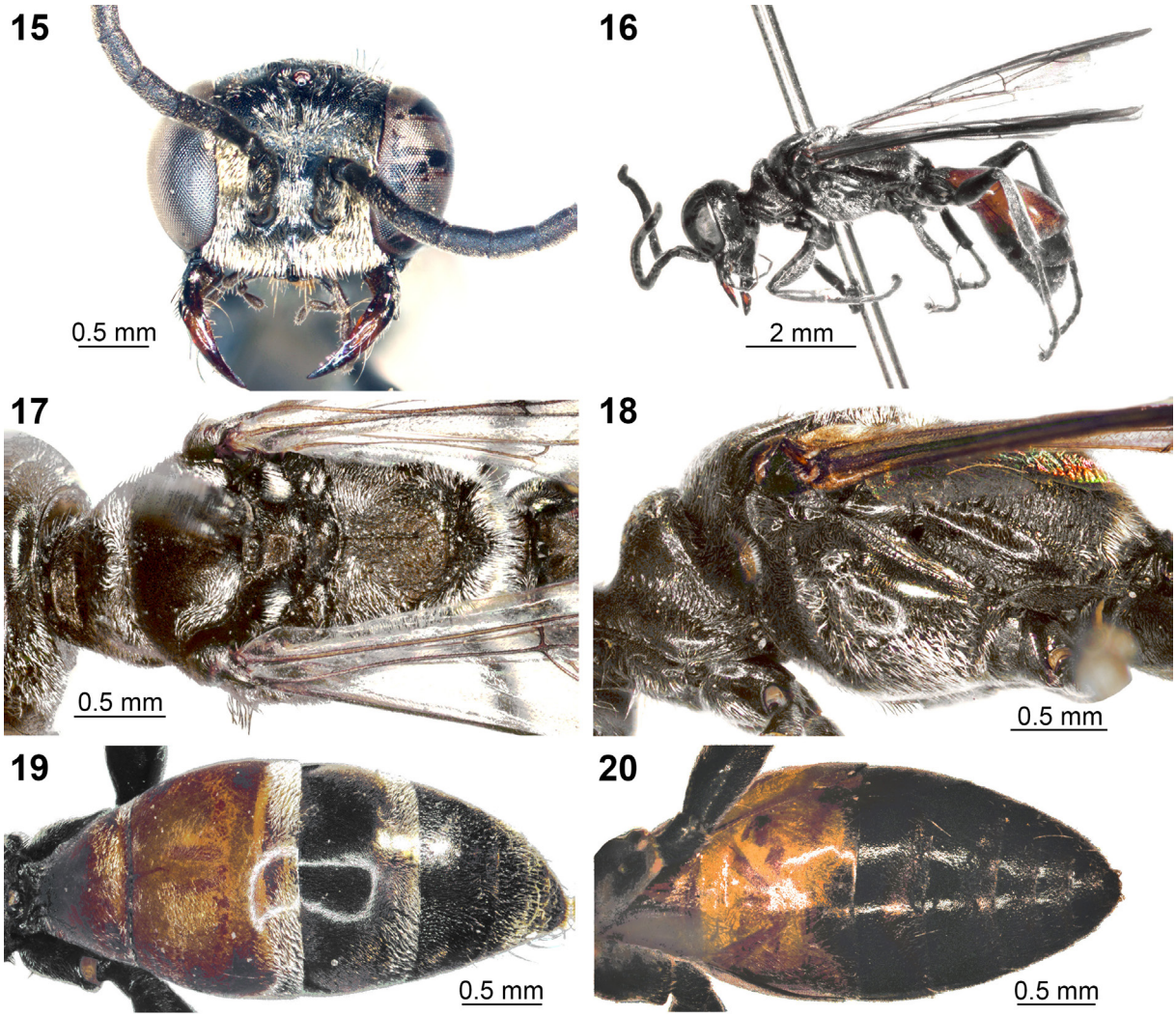


Figs 5–14. *Lyroda formosa*, female.

5 – head, frontal view; 6–8 – clypeus; 9–10 – mesosoma: 9 – dorsal view, 10 – lateral view; 11, 13 – metasoma: 11 – dorsal view, 13 – ventral view; 12 – sixth tergum; 14 – habitus, lateral view.

Рис. 5–14. *Lyroda formosa*, самка.

5 – голова, вид спереди; 6–8 – наличник; 9–10 – мезосома: 9 – вид сверху, 10 – вид сбоку; 11, 13 – метасома:, 11 – вид сверху, 13 – вид снизу; 12 – шестой тергит; 14 – внешний вид, сбоку.



Figs 15–20. *Lyroda formosa*, male.
15 – head, frontal view; 16 – habitus, lateral view; 17–18 – mesosoma: 17 – dorsal view, 18 – lateral view; 19–20 – metasoma: 19 – dorsal view, 20 – ventral view.
Рис. 15–20. *Lyroda formosa*, самец.
15 – голова, вид спереди; 16 – внешний вид, сбоку; 17–18 – мезосома: 17 – вид сверху, 18 – вид сбоку; 19–20 – метасома: 19 – вид сверху, 20 – вид снизу.

Lyroda binghami Tsuneki, 1983
(Figs 1–4)

Lyroda binghami Tsuneki, 1983: 73 (♀, ♂; holotype ♀, Myanmar: Tenasserim: Shwegyin (British Museum of Natural History, London, UK)).

Material. Vietnam. Phu Tho Province: 1♀, Kim Boi, forest, Malaise trap, 5–15.08.2012 (Long Dang Khuat). Son La Province: 1♀, Xuan Nha, forest, Malaise trap, 20.09–19.10.2023 (Phong Huy Pham).

Diagnosis. See the characters given in the key. Also see Ayisha Mawadda et al. [2021].

Distribution. Vietnam (first record): Phu Tho and Son La provinces (Fig. 38). Elsewhere: India, Myanmar [Tsuneki, 1983; Pulawski, 2026].

Lyroda formosa (F. Smith, 1858)
(Figs 5–20)

Morphota formosa F. Smith, 1858: 17 (♀; holotype or syntype ♀, Indonesia: Sulawesi: no specific locality (British Museum of Natural History).

Material. Vietnam. Ha Noi Province: 2♀, 1♂, Dong Ngac, sweep net, 13.07.2016, 16.06.2019, 1.11.2022 (Phong Huy Pham); 1♀, Bai Giua Song Hong, Hong Ha, sweep net, with one prey collected, 8.05.2018 (Phong Huy Pham). Hung Yen Province: 5♀, 2♂, Hong Minh, sweep net, nest, 16.07.2016, 22.06.2024, 11.01.2026 (Khuc Van Linh, Phong Huy Pham); 1♀, Quang Hung, sweep net, 22–24.03.2026 (Phong Huy Pham). Phu Tho Province: 2♀, Luong Son, sweep net, 27.07.2019 (Phong Huy Pham); 1♀, Kim Boi, sweep net, 26.06.2020 (Phong Huy Pham). Tay Ninh Province: 3♀, Duong Minh Chau, Malaise trap, 3.03–18.03.2023, 28.04–28.05.2023 (Van Tho Le); 2♀, Binh Minh, Malaise trap, 8–30.03.2023, 9–28.04.2023 (Van Tho Le). Da Nang Province: 4♀, Quang Phu, 15°37′22.4″N / 108°29′2″E, 7 m, Malaise trap, 21.03–4.04.2023 (Hoa Thi Dang, Hiep Duc Nguyen). Nghe An Province: 1♀, Con Son, sweep net, 21.05.2024 (Phong Huy Pham). Bac Ninh Province: 1♀, 1♂, Tu Son, collected into cocoons dug at a longan garden, 3.01.2026 (Phong Huy Pham).

Notes. *Lyroda formosa* is the easiest to recognize in the genus *Lyroda*. It is unique in having at least first two gastral segments completely ferruginous. The species varies conspicuously in morphological characters, for example the teeth of the free clypeal margin are either lengthened, shortened, emarginated

or appended to one other (Figs 5–8); third gastral segment or whole gaster may be red; mandible is black, black with a red marking in the middle, or red except black apex; silver setae on clypeus and frons are sparse or moderately dense; and pygidial plate is black or ferruginous.

Diagnosis. See the characters given in the key. Also see Schmid-Egger and Al-Jahdhami [2021] and Ayisha Mawadda et al. [2021].

Distribution. Vietnam: Dak Lak Province [Schmid-Egger, Al-Jahdhami, 2021; Phong Huy Pham, Antropov, 2021], Bac Ninh, Da Nang, Ha Noi, Hung Yen, Nghe An, Phu Tho, and Tay Ninh provinces (new records) (Fig. 39). Elsewhere: Bangladesh, Cambodia, China, India, Indonesia, Laos, Myanmar, Oman, Philippines, Solomon Islands, Thailand [Pulawski, 2026].

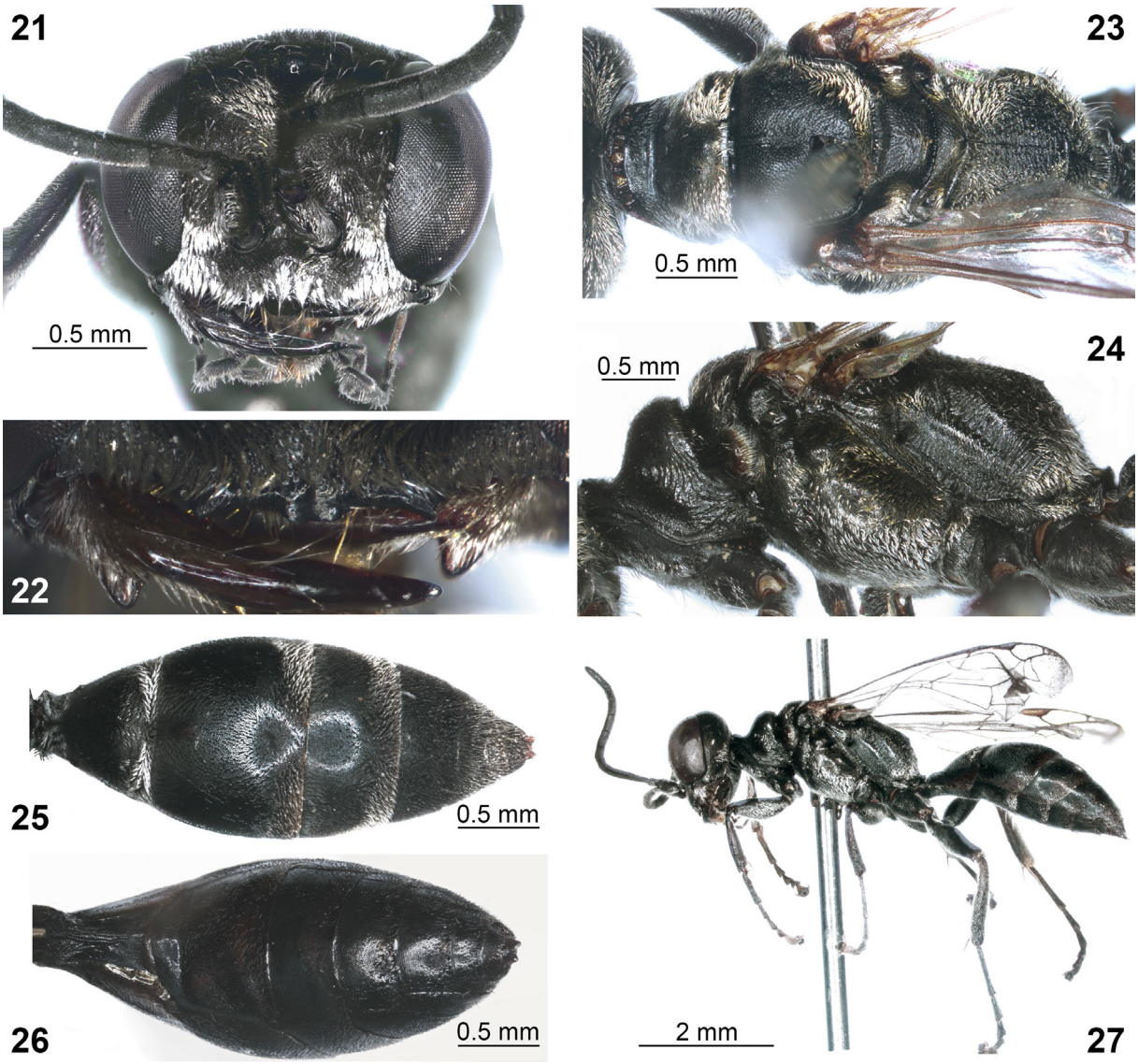
Lyroda tridentata Li, Cai and Li, 2009 (Figs 21–27)

Lyroda tridentata Li, Cai et Li, 2009: 145 (♀, ♂; holotype ♀, China: Yunnan: Yunnan Mountain in Dehong Prefecture (Yunnan Agricultural University (Kunming, China)).

Material. Vietnam. Nghe An Province: 1♂, Cua Lo town, coast shrubs, sweep net, 29.06.2017 (Phong Huy Pham).

Diagnosis. See the characters given in the key. Also see Li et al. [2009].

Distribution. Vietnam (first record): Nghe An Province (Fig. 40). Elsewhere: China [Li et al., 2009; Pulawski, 2026].

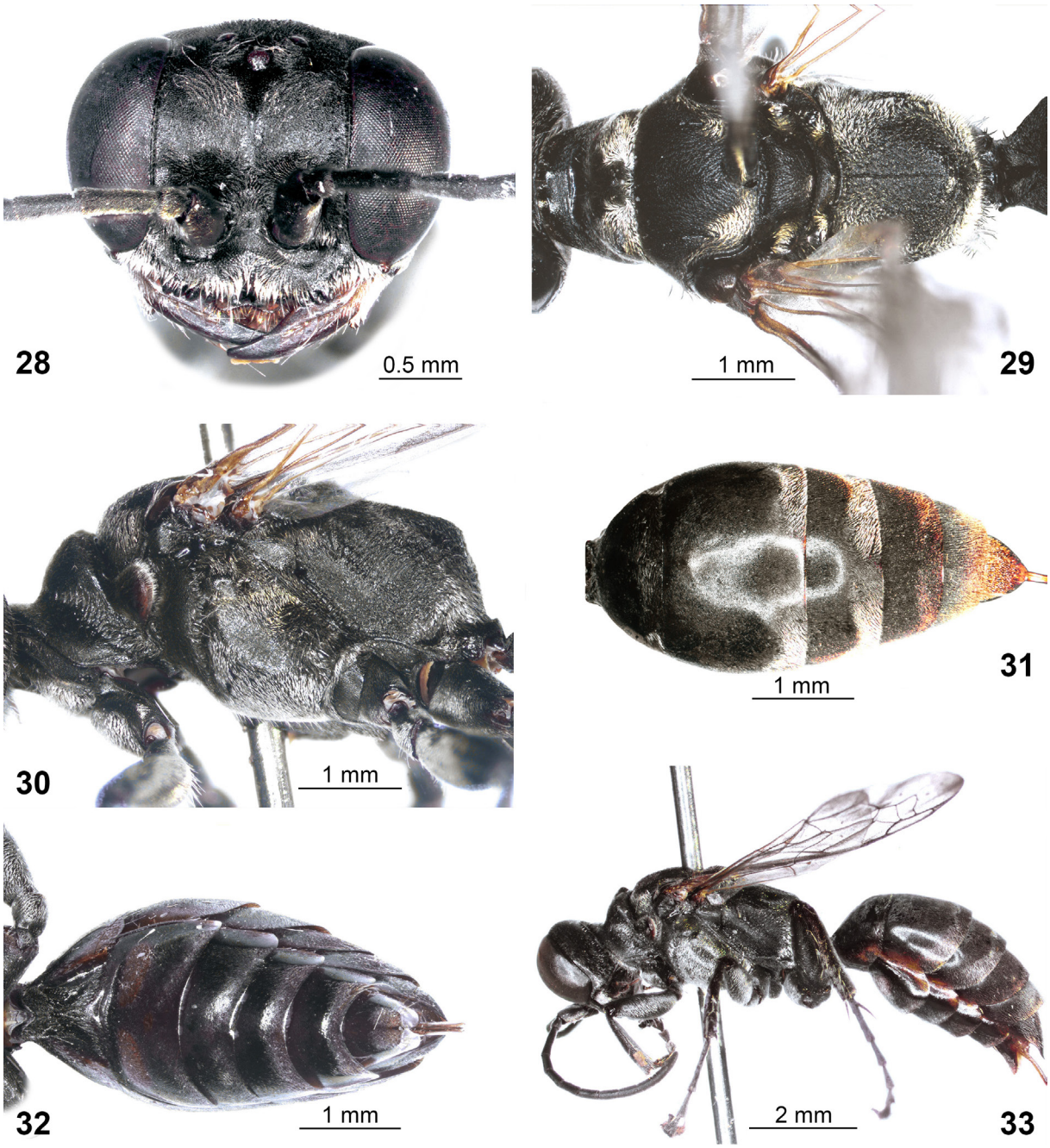


Figs 21–27. *Lyroda tridentata*, male.

21 – head, frontal view; 22 – clypeus; 23–24 – mesosoma: 23 – dorsal view, 24 – lateral view; 25–26 – metasoma: 25 – dorsal view, 26 – ventral view; 27 – habitus, lateral view.

Рис. 21–27. *Lyroda tridentata*, самец.

21 – голова, вид спереди; 22 – наличник; 23–24 – мезосома: 23 – вид сверху, 24 – вид сбоку; 25–26 – метасома: 25 – вид сверху, 26 – вид снизу; 27 – внешний вид, сбоку.



Figs 28–33. *Lyroda venusta*, female.

28 – head, frontal view; 29–30 – mesosoma: 29 – dorsal view, 30 – lateral view; 31–32 – metasoma: 31 – dorsal view, 32 – ventral view; 33 – habitus, lateral view.

Рис. 28–33. *Lyroda venusta*, самка.

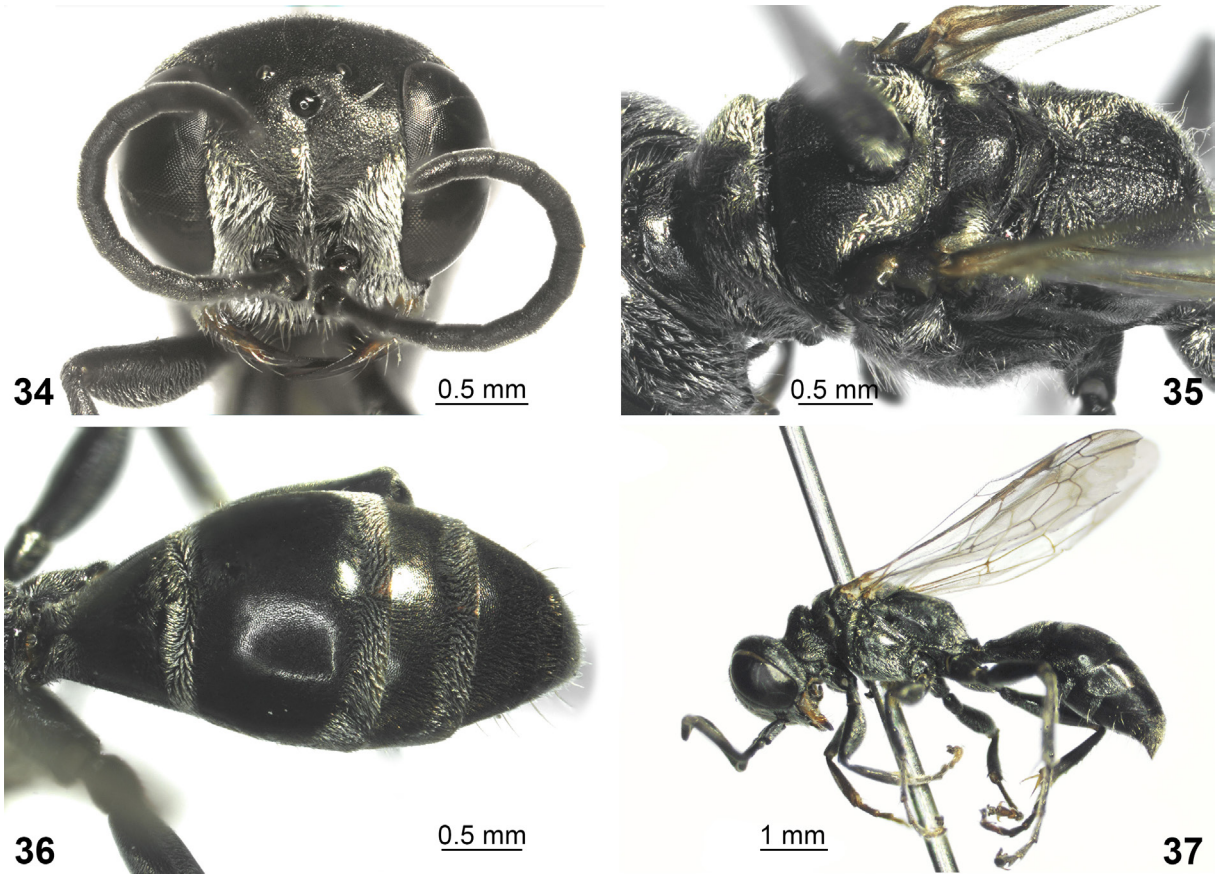
28 – голова, вид спереди; 29–30 – мезосома: вид сверху, 30 – вид сбоку; 31–32 – метасома: 31 – вид сверху, 32 – вид снизу; 33 – внешний вид, сбоку.

Lyroda venusta Bingham, 1897
(Figs 28–37)

Lyroda venusta Bingham, 1897: 210 (♀, ♂; lectotype ♂, Burma: Tenasserim: no specific locality (British Museum of Natural History), designated by Tsuneki [1983: 70].

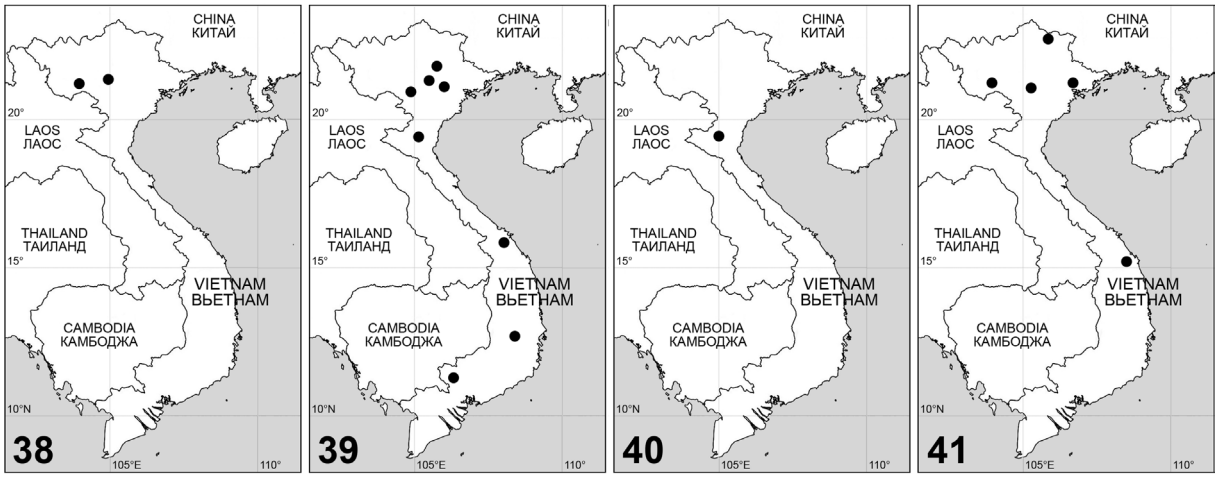
Material. Vietnam. Phu Tho Province: 3♀, Hoa Lac, Malaise trap, 5–15.06.2002, 15–25.08.2002 (Long Dang Khuat); 1♀, Yen Thuy, Malaise trap, 1–10.10.2002 (Quy Phu Mai). Son La Province: 1♀, Son La, Malaise trap, 16–25.05.2018 (Long Dang Khuat). Quang Ninh Province: 2♀, Tien Yen, sweep net, 12.07.2018 (Phong Huy Pham). Lang Son Province: 1♀, Huu Lien, sweep net, 12.06.2019 (Hoa Thi Dang). Da Nang Province: 4♂, Quang Phu, 15°37′22.4″N / 108°29′2″E, 7 m, Malaise trap, 21.03–4.04.2023 (Hoa Thi Dang, Hiep Duc Nguyen). Cao Bang Province: 1♀, Can Ty, sweep net, 18.06.2023 (Phong Huy Pham).

Diagnosis. Female: free margin of clypeus with two sets of three teeth and a set of two teeth in middle, one tooth between lateral and median sets; body



Figs 34–37. *Lyroda venusta*, male.
34 – head, frontal view; 35 – mesosoma, dorsal view; 36 – metasoma, dorsal view; 37 – habitus, lateral view.
Рис. 34–37. *Lyroda venusta*, самец.
34 – голова, вид спереди; 35 – мезосома, вид сверху; 36 – метасома, вид сверху; 37 – внешний вид, сбоку.

wholly black; setae on body silvery, apical margins of T1–T4 with silvery setal band; basal rounded platform of GT1 not distinctly concave. Male: free margin of clypeus distinctly, arcuately excavated in middle; median prominence of clypeus beveled directly from free margin; sternum VIII with median tooth at apex; median prominence of clypeus not emarginate medially; second sternum without round ferruginous macula pygidial plate not incised at apex, its lateral carina somewhat rounded.



Figs 38–41. Distributional maps of the Vietnamese *Lyroda*.
Рис. 38–41. Карты распространения вьетнамских видов *Lyroda*.
38 – *L. binghami*; 39 – *L. formosa*; 40 – *L. tridentata*; 41 – *L. venusta*.

Distribution. Vietnam (first record): Cao Bang, Da Nang, Quang Ninh, Phu Tho, Son La Provinces (Fig. 41). Elsewhere: China, Indonesia, Japan, Myanmar, Philippines, Taiwan, Thailand [Bingham, 1897; Ayisha Mawadda et al., 2021; Pulawski, 2026].

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