A new Vietnamese species and a key to the Oriental species of Pareumenes (Nortonia) de Saussure, 1855 (Hymenoptera: Vespidae: Eumeninae)

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Abstract. The potter wasp genus Pareumenes de Saussure, 1855, is represented in Vietnam by two species, Pareumenes quadrispinosus acutus Liu, 1941 of the subgenus Pareumenes, and a new species, Pareumenes caoduong, belonging to the subgenus Nortonia. The new species is described and figured. A key to all known taxa of this genus from the Oriental region is also provided.

Key words. key, new species, Nortonia, Pareumenes, potter wasp, Vietnam

INTRODUCTION

De Saussure (1855) created the genus Pareumenes as a division of the genus Eumenes Latreille, 1802, based on Eumenes quadrispinosus de Saussure, 1855, by subsequent designation of Bequaert, 1918. The genus contains 18 species and 12 subspecies worldwide in two subgenera, Nortonia de Saussure, 1869, and Pareumenes de Saussure, 1855 (Carpenter, pers. comm.), with one and seven species presently recorded in the Oriental region, respectively (Liu, 1941; van der Vecht, 1963; Selis, 2016). This genus of solitary wasps has traditionally received little study on its bionomics. It is known that females construct nests consisting of a single brood cell and lay a solitary egg prior to mass-provisioning (Barthélémy, 2012). Jayakar and Spurway (1971) also studied the nesting behaviour of Pareumenes brevirostratus (de Saussure, 1855) and noted that “It is a squatter species practicing mass provision. The only individual watched provisioned with pyralid [Lepidoptera] prey, and all her offspring entered diapause, one for two seasons. While working she was disturbed by individuals of Rhynchium brunneum and R. carnaticum. Some of the mutual reactions of these wasps may simulate the early stages of social behavior in some hymenopteran”.

In Vietnam, only one taxon, Pareumenes quadrispinosus acutus Liu, 1941 in the subgenus Pareumenes has been recorded up to now (Nguyen et al., 2014, 2015, 2018).

In this paper, based on specimens deposited in the Institute of Ecology and Biological Resources (IEBR), Hanoi, Vietnam, the subgenus Nortonia is recorded in Vietnam for the first time, represented by one new species, and is described and figured. In addition, a key to all known species and subspecies from the Oriental region is provided.

MATERIAL AND METHODS

The material examined in the present study is deposited in the collections of the Institute of Ecology and Biological Resources (IEBR), Hanoi, Vietnam.

The adult morphological and colour characters were observed on pinned and dried specimens under a stereoscopic microscope. Measurements of body parts were made with the ocular micrometer attached to a stereoscopic microscope. “Body length” indicates the lengths of head, mesosoma, and the first two metasomal segments combined. Terminology follows Carpenter and Cuming (1985) and Yamane (1990) for all characters such as the wings, head, mesosoma, and the first two metasomal segments combined. Terminology follows Carpenter and Cuming (1985) and Yamane (1990) for all characters such as the wings, head, mesosoma, and metasoma. Photographic images were obtained using a Nikon SMZ 800N Digital Stereo Microscope with ILCE-5000L/WAP2 digital camera attached, using Helicon Focus 7 software; plates were edited using Photoshop CS6.

TAXONOMIC ACCOUNTS

Genus Pareumenes de Saussure, 1855

Pareumenes de Saussure, 1855, Ét. Fam. Vesp. 3: 133, division of genus Eumenes Latreille.

Figs. 1–6. *Pareumenes caoduong*, new species, holotype, female. 1, Head in frontal view; 2, Vertex in dorsal view; 3, Mesosoma in dorsal view; 4, Mesosoma in lateral view; 5, Propodeum in posterior view; 6, Tergum I in dorsal view. Scale = 1 mm.
**Diagnosis.** According to van der Vecht (1963) and Tan et al. (2018), the diagnosis of the genus Pareumenes is as follows: Mesoscutum with prescutal furrows. Propodeum with epicnemial carina absent, the transition from dorsal to lateral areas sharply marked, produced into a more or less distinct spine or tooth near apex; dorsal area at base with fovea or longitudinal slit, from which runs a median carina to the apex; first gastral sternite more or less gradually widening from base to apex, rather regularly transversely striate. Metasomal segments more or less distinctly petiolate, the first segment always longer than its width at the apex. Mid tibiae with one apical spur. Outer side of hind tibiae with a variable number of short spines. Female head with cephalic fovea. Forewing with parastigma longer than the stigma.

**Subgenus Nortonia de Saussure, 1869**

As noted in Giordani Soika (1938: 111) and van der Vecht (1963: 17), the subgenus Nortonia differs from the subgenus Pareumenes in the parastigma being shorter than the stigma, and the gastral petiolate being shorter and wider. However, in Pareumenes caoduong, new species, described below, and Pareumenes taiwanus (Sonan, 1937), the only one species in the subgenus Nortonia has been recorded from the Oriental region, the parastigma is slightly longer than the stigma (Fig. 8), and the parastigma is much longer than stigma in the subgenus Pareumenes (Fig. 11).

**Pareumenes (Nortonia) caoduong, new species**  
(Figs. 1–9)

**Material examined.** Holotype, female, pinned (deposited in IEBR), labelled “VIETNAM: Cao Duong, Yen Thuan, Ham Yen, Tuyen Quang, Cham Chu NP, way to waterfall, 22°17′32.5″N 104°59′28″E, 15.v.2019, 643 m, Nguyen T.P. Lien, Truong X. Lam, Nguyen Q. Cuong & Mai V. Thai”. Paratype (deposited in IEBR): 1 female, same data as holotype.

**Diagnosis.** This species can be distinguished from other species of subgenus Nortonia of the genus Pareumenes by the following combination of characters: Head in frontal view slightly wider than high. Body with coarse punctures; clypeus flat in the middle part, in lateral view convex from basal half; then straight to apical margin, apical emargination not so deep; vertex with depression behind posterior ocelli, with two foveae placed inside V-shaped carina; distance from posterior ocelli to apical margin of vertex 2.4 times distance from posterior ocelli to inner eye margin; lateral sides of propodeum shallowly emarginate at apex; metasoma petiolate in dorsal view with strongly projecting spiracles at about one-third of the length of the petiole basally, in lateral view abruptly produced near base, then depressed and gradually convex to near apical margin; apical margins of all terga not raised; forewing with parastigma slightly longer than stigma measured along ventral part. Clypeus with irregular yellow mark in the middle; tegum I with two large yellow spots at lateral side near apex, terga II–VI black except a short narrow yellow band at apical margin of tegum III medially.

**Description.** Female (Fig. 9). Body length 19.8–20 mm (holotype 19.8 mm); forewing length 18.5–18.7 mm (holotype 18.5 mm). Head in frontal view subcircular, slightly wider than high, about 1.1 times as wide as high (Fig. 1). Vertex with slightly swollen area around ocellus, with depression behind posterior ocellus (Fig. 2), with two cephalic foveae placed inside a V-shaped carina, close to each other. Distance from posterior ocelli to apical margin of vertex about 2.4 times distance from posterior ocelli to inner eye margin (Fig. 2). Gena thick, wider than eye, in lateral view 1.2 times as wide as eye at ocular sinus. Occipital carina complete, present along entire length of gena. Inner eye margins slightly convergent ventrally, in frontal view nearly equal from each other at vertex as at clypeus. Clypeus flat in the middle part, disc of clypeus in lateral view weakly convex at basal half, then almost straight to apical margin, in frontal view nearly 1.2 times as high as wide (Fig. 1), with basal margin strongly convex medially and almost touching antennal sockets; apical margin emarginate medially, forming sharp tooth on each lateral side (Fig. 1); width of emargination much less than ½ width of clypeus between inner eye margins. Mandible with prominent five teeth, the first and second teeth from base denticle at inner margin. Antennal scape long, about 4.5 times as long as its maximum width; flagellomere I 2.0 times as long as wide, flagellomeres II–IV slightly longer than wide, flagellomeres V–VIII as long as wide, flagellomere IX wider than long, terminal flagellomere bullet-shaped, longer than wide.

Mesosoma longer than wide in dorsal view (Fig. 3). Pronotal carina strongly raised throughout, reaching ventral corner of pronotum. Mesoscutum in lateral view weakly convex (Fig. 4), in dorsal view almost as long as wide between tegulae, with prescutal furrows near apical margin (Fig. 3). Disc of scutellum slightly convex, with a short medial longitudinal depression at base, in lateral view at the same level of apical margin of mesoscutum. Metanotum convex, sloping down to apical margin. Propodeum deeply excavated medially at apex, with the excavation wide, about one-third the width of propodeum, basal triangular area with longitudinal basal fovea, with median carina runs from half of the length of propodeum to apical margin (Fig. 5), lateral side shallowly emarginate at apex; border between dorsal and lateral faces sharply angled. Forewing with parastigma slightly longer than stigma measured along ventral part (Fig. 8).

Metasomal tergum I in dorsal view 1.6 times as long as wide, with the strongly projecting spiracles at about one-third of the length of the petiole basally (Fig. 6), in lateral view abruptly produced near base, then depressed and gradually convex to near apical margin (Fig. 7), much narrower than tergum II, with a fovea near apical margin; tergum II in dorsal view nearly as long as wide; sternum II in lateral view gradually and slightly convex at basal two-third, then straight to apical margin (Fig. 7).

Body covered with golden setae. Clypeus covered with sparse and strong punctures, each bearing a short seta, punctures at centre larger than at sides, space between punctures
larger than puncture diameter except some punctures at middle with space between punctures smaller than puncture diameter, punctures near apical margin smaller but denser. Mandible with several shallow small punctures. Frons densely covered with coarse punctures. Vertex and gena with strong punctures, space between punctures not raised, anterior face smooth. Mesoscutum densely covered with strong and flat-bottomed punctures except area between furrow with sparse punctures (Fig. 3), punctures at margins sparser. Punctures on scutellum similar to those on mesoscutum. Punctures on metanotum larger than those on scutellum. Mesepisternum with punctures on upper dorsal part very coarse, space between punctures strongly raised to form reticulation, with strong and large punctures posterdorsally, several shallow and small punctures anteroventrally; border between posterdorsal and anteroventral parts indistinct. Metapleuron almost smooth. Propodeum with strong punctures and some large smooth area on dorsal surface, posterior surface with coarse punctures in between strong punctures, some transverse striations in the middle half at apex; lateral surface with striations and sparse punctures. Metasomal tergum I densely covered with dense and coarse punctures but punctures smaller than those on pronotum, punctures on tergum II much sparser and weaker than those on tergum I, punctures on terga III–V much smaller and weaker than those on tergum II; tergum VI with minute punctures; punctures on sternum II stronger and larger than those on sterna III–V, sternum VI with minute punctures.

Colour. Black; following parts yellow: an irregular mark at the middle of clypeus, large spot between antennal sockets, antennal scape beneath, two thin short bands at dorsal part of pronotum near pronotal carina (almost touching each other), apical margin of valvulae, two large spots at lateral sides near apex of tergum I, a short apical band on tergum III medially. Legs almost black except some brown parts at apical half of middle and hind tibiae. Wings infuscate, veins dark brown.

Male. Unknown.

Distribution. Vietnam (Northern part).

Etymology. The specific name refers to the type locality, Cao Duong, Tuyen Quang province of Vietnam; it is to be treated as a noun in apposition.

Remarks. This species comes close to Pareumenes taiwanus (Sonan, 1937) in having coarse punctures on mesosoma and vertex, tergum I coarsely punctate, petiolate, gradually widening to apex, but can be distinguished from the latter by having clypeus with sparse and strong punctures, border between punctures smooth (vs. clypeus with coarse and dense punctures, border between punctures raised to form longitudinal reticulation in P. taiwanus), frontal view slightly wider than high (vs. as wide as high in P. taiwanus); vertex with two foveae close to each other (vs. vertex with a median fovea in P. taiwanus); lateral side of propodeum shallowly emarginate at apex (vs. lateral side of propodeum deeply emarginate at apex in P. taiwanus); and colouration: clypeus black with irregular yellow mark in the middle (vs. clypeus entirely yellow in P. taiwanus); two short and thin yellow bands on pronotum (vs. two large spots on pronotum in P. taiwanus); tergum II entirely black (vs. tergum II with a broad apical yellow band in P. taiwanus).

Subgenus Pareumenes de Saussure, 1855

Pareumenes quadrispinosus acutus Liu, 1941

(Figs. 10–12)

Pareumenes acutus Liu, 1941, Notes Entomol. Chin. 8: 255 (key), 262, female, pl. 1 fig. 5, pl. 2 fig. 3, 13 (in subgenus Pareumenes) - “South China” (coll. Liu).

This species has been recorded in several provinces (Ha Giang, Lao Cai, Tuyen Quang, Lang Son, Bac Giang, Hoa Binh, Thanh Hoa, Nghe An) in the northern part of Vietnam in previous studies (Nguyen et al., 2014, 2015, 2018), and is newly recorded from Thai Nguyen, Yen Bai, Hanoi, also in the northern part of Vietnam, as well as the middle (Ha Tinh), and southern part (Gia Lai, Da Lak, Lam Dong in Tay Nguyen highland) of Vietnam in this study.

Material examined. Ha Giang: 1 female, Lac Nong, Bac Me, ca. 418 m, 22°46’24.8″N 105°10’22.9″E, 22 July 2019; Nguyen QC, Dang TH, Mai VT, Vu TTT; 1 male, Tung Ba, Vi Xuyen, 3 July 2013, Nguyen VT; Lao Cai: 6 males, Ban Xeo, Bat Xat, 23 June 2008, Nguyen TPL & Pham HP; 1 female, Hoang Lien NP, Ban Ho, Sa Pa, 27–29 July 2008, Nguyen TPL; Yen Bai: Khau Man, Mu Cang Chai (2 males, 21°51’40″N 104°2’42″E, 12 September 2017, Nguyen TPL; 1 male, road to Che Tao, ca. 1,400 m, Nguyen TPL & Nguyen QC), Thai Nguyen: 1 female, Phuc Xuyen, Dai Tu, 23 April 2012, Khuat DL; Hanoi: 2 males, Ba Vi NP, 10 July 2016, Pham HP; Hoa Binh: 1 female, Da Bac, 26 April 2012, Nguyen TPL; Thanh Hoa: 1 female, Xuan Lien NP, Hoan Can, Van Xuan, Thuong Xuan, 23–24 August 2012, Nguyen TPL & Hoang VT; 1 female, Xuan Lien NP, Hon Can, Van Xuan, Thuong Xuan, 23 August 2012, Nguyen TPL; Nghe An: 1 female, Thanh My, Thanh Chuong, 28 May 2008, Nguyen TPL; Ha Tinh: 2 females, Vu Quang NP, 09 September 2019, Nguyen TPL & Nguyen QC; Gia Lai: 1 female, Kon Chu Rang natural reserve, KBang, Son Lang, 14°31’08″N 108°28’24″E, ca. 840 m, 2 May 2016, Nguyen TPL; Dak Lak: 1 female, York Don NP, main station, Buon Don, 191 m, 12°52’19″N 107°48’23″E, 9 June 2013, Nguyen TPL; Lam Dong: 1 female, Bao Loc, 11°31’53″N 107°48’27″E, 11 November 2019, Nguyen TPL.

Distribution. China; India; Vietnam.

Key to species of the genus Pareumenes occurring in Oriental region

The characters are applicable to both sexes unless the sex is specified. The characters are taken from the description of the species following Liu (1941), van der Vecht (1963), Kim (2014), and Selis (2016).
1. Parastigma of forewing shorter or slightly longer than stigma, metasomal petiole shorter and wider...........................................2 (subgenus Nortonia de Saussure)
   – Parastigma of forewing much longer than stigma (slightly greater than 1.5 times as long as stigma), metasomal petiole longer and narrower...3 (subgenus Pareumenes de Saussure)
2. Clypeus with coarse punctures, border between punctures raised to form longitudinal reticulation, in frontal view as wide as high; lateral side of propodeum deeply emarginate at apex. Clypeus entirely yellow; tergum II with a broad apical yellow band ..................................P. taiwanus (Sonan, 1937)
   – Clypeus with sparse and strong punctures, border between punctures smooth, in frontal view 1.1 times as wide as high; lateral side of propodeum shallowly emarginate at apex. Clypeus black with irregular yellow mark in the middle; tergum II entirely black,.......................P. cao doung, new species
3. Dorsal face of propodeum with coarse punctures (except in P. obesus with sparser and shallower punctures); tergum III with raised apical lamella, the lamella narrowed laterally; apical teeth of propodeum short, approximately rectangular or round, separated from the valvulae by a semi-circular emargination. ..............................................................4
   – Dorsal face of propodeum with sparse and strong punctures; tergum III with slightly raised apical lamella, evanescent at lateral sides, or without raised apical lamella; apical teeth of propodeum very sharp and long, separated from the valvulae by a very deep emargination, much greater than a semi-circular. ........................................................................................................................................6
4. Vertex with a few distinct punctures near the top of the eyes; prescutal furrow extending about one-fourth the length of the mesoscutum; lateral face of propodeum largely smooth, with very few coarse punctures............................P. obesus Liu, 1941
   – Vertex with coarse and dense punctures near the top of the eyes; prescutal furrow extending about one-fifth the length of the mesoscutum; lateral face of propodeum with coarse striae.................................................................5
5. Male with last antennal segment in recurved position reaching the apex of the tenth segment; clypeus with apical margin wide (slightly greater than one-third of the maximum width of clypeus); propodeum with apical teeth short, approximately rectangular ..................P. bengalensis (Fabricius, 1804)
   – Male with last antennal segment in recurved position not quite reaching the apex of the tenth segment; clypeus with apical margin narrower (one-fourth of the maximum width of clypeus); propodeum with apical teeth sharper, forming an angle of about 60°.........................P. brevirostratus (de Saussure, 1855)
6. Sternum II strongly swollen at about one-third of the sternum from base........................................................................7
   – Sternum II gradually convex from base to apical margin....8
7. Vertex and gena strongly developed; postocular area raised; semicircular impression on vertex present; mesosoma smooth and shiny, without punctures; tergum I with proportion between long and maximum width shorter and less curved laterally; sternum I with strong transverse striations; tergum II weakly reflexed apically; basal convexity of sternum II bearing a central hump................................................P. impunctatus Selis, 2016
   – Vertex and gena normally developed; postocular area flattened; vertex without semicircular impression; mesosoma with deep well impressed punctures; tergum I longer and strongly curved in lateral view; sternum I with fine and weak striations; tergum II strongly reflexed apically; basal convexity of sternum II normally rounded .............P. nigerrimus van der Vecht, 1963
8. Punctures on head, mesoscutum, and mesepisternum very coarse; metanotum with distinct punctures; mesosoma covered with dense black pubescence. Body entirely black, with small yellow spots between antennae and antennal scape; wings yellowish.................................P. pullatus (Smith, 1864)
   – Punctures on head, mesoscutum, and mesepisternum not coarse; metanotum without distinct punctures; mesosoma without black pubescence. Body more extensively marked with yellow; wings hyaline-brownish .................................................................9
9. Yellow marking on mesosoma and tergum I much reduced: scutellum entirely black or with a pair of small yellow spots, metanotum entirely black or with a pair of very small yellow spots; propodeum entirely black or with much reduced yellow spots at basal and apical margins laterally; tergum I with a pair of small yellow spots subapically.................................9a
   – Yellow marking on mesosoma and tergum I very extensive.................................9b
   9b. Head and mesosoma almost entirely black, very small yellow spots on clypeus, scape, and metanotum; legs entirely black..............quadrispinosus javanus van der Vecht, 1963
   – Head with a lower frontal marking reaching clypeus, ocular sinus, antennal scape below, entire clypeus, upper genal bands, scutellum with a pair of small spots, spots on propodeum at basal and apical margins laterally yellow; legs black with apical part of fore femur, outer face of fore tibia, and apical parts of mid femur and tibia yellow.............................................. quadrispinosus quadrispinosus (de Saussure, 1855)
9c. Metanotum entirely black; sternum II with two large basal subquadrate yellow spots ..................................................................quadrispinosus interruptus Liu, 1941
   – Metanotum with a yellow band apically; sternum II with a large basal yellow spot......quadrispinosus acutus Liu, 1941

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LITERATURE CITED

Nguyen: Genus *Pareumenes* from Vietnam


