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The Subgenus *Apocrabro* Pate from China with Descriptions of Two New Species (Hymenoptera: Crabronidae)*

QIANG LI¹ AND YAN-RU WU²

ABSTRACT: The subgenus *Apocrabro* Pate (Crabronidae: Crabroninae: *Crossocerus*) from China is reviewed. A taxonomic key to the species from China is provided. Two new species, *Crossocerus (Apocrabro) medidentatus* n. sp. from Sichuan and Guizhou, China, and *Crossocerus (Apocrabro) binicarinalis* n. sp. from Sichuan, China, are described and illustrated.

KEY WORDS: Crabronidae, *Crossocerus*, Hymenoptera, new species, China

Apocrabro Pate is a subgenus of *Crossocerus* Lepeletier and Brullé in the crabronid subfamily Crabroninae. It includes five species and one subspecies of small, predatory solitary wasps. *Crossocerus (A.) pyrrius* Leclercq known from India (Punjab) (Leclercq, 1956); *C. (A.) ursidus* Leclercq from India (Assam), Nepal (Bakhri Kharka), and China (Tibet, Sichuan) (Leclercq, 1956, 1989); *C. (A.) aeta* Pate from India (Nilgiri Hills), Malaysia (Malay), Indonesia (Java, Borneo), Philippines (Negros) and China (Taiwan) (Bohart and Menke, 1976; Leclercq, 1963; Tsuneki, 1966, 1984a, b); *C. (A.) aeta loa* Pate from Indonesia (Sumatra), and China (Taiwan) (Tsuneki, 1968, 1971, 1982); *C. (A.) alticola* Tsuneki from China (Taiwan) (Tsuneki, 1968); and *C. (A.) microcollaris* Li and He from China (Zhejiang) (Li and He, 2001). In the course of a study of the fauna of Crabroninae from China, two undescribed species of *Apocrabro* were discovered. A taxonomic key to the species of *Apocrabro* from China is provided and the new species are described and illustrated below.

Material and Methods

The specimens examined during this study were deposited in the following institutions: Institute of Zoology, Academia Sinica, Beijing, China; Yunnan Agricultural University, Kunming, Yunnan; China Agricultural University, Beijing; Zhejiang University, Hangzhou, Zhejiang; Zhejiang Forestry College, Linan, Zhejiang; Nanjing Agricultural University, Nanjing, Jiangsu; Shandong Agricultural University, Taian, Shandong; Northwest Sci-Tech. University of Agriculture and Forestry, Yangling, Shanxi; and South China Agricultural University, Guangzhou, Guangdong.

The specimens were observed and figured with the aid of an Olympus stereomicroscope (SZ Series, Japan) with an ocular micrometer. The abbreviations in the text are as follows: HW, head width; HL, head length; POD, postocellar distance (the minimum distance between the two posterior ocelli); OOD, ocellular distance (the minimum distance between the compound eye and posterior ocellus); LTI, maximum length of metasomal tergum I; and WTI, maximum width of metasomal tergum I. Morphological terminology generally follows Bohart and Menke (1976).

Key to the species of *Crossocerus (Apocrabro)* from China

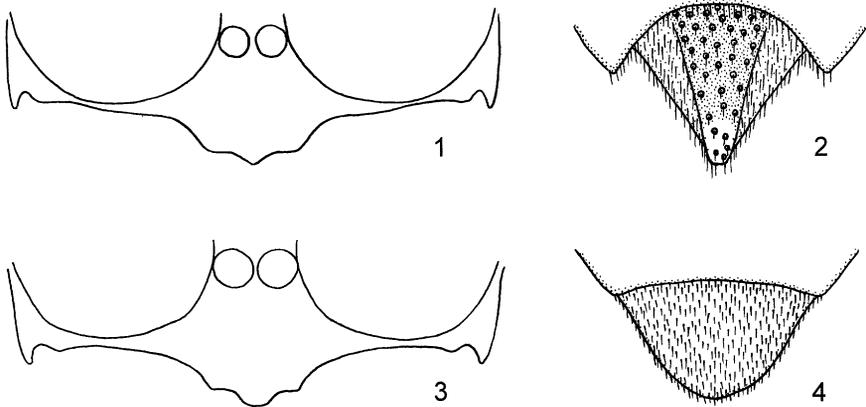
Females

(Diagnosis characters for female: with 12 antennal segments; with six exposed metasomal terga; with pygidial plate. Female unknown for *C. (A.) ursidus* Leclercq.)

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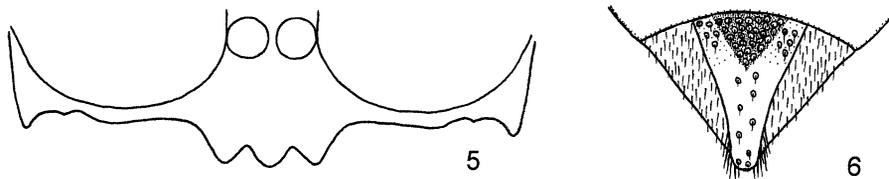
Figs. 1-4. *Crossocerus (Apocrabro) medidentatus*, sp. nov. 1-2. Female. 3-4. Male. 1, 3. Frontal view of clypeus. 2. Dorsal view of pygidial area. 4. Dorsal view of tergum VII.

- 1. Mandible with 2 teeth at apex 2
- 1'. Mandible with 3 teeth at apex 3
- 2. Propodeal enclosure with delimiting furrow; pygidial plate with longitudinal median carina at base; gastral petiole relatively short *C. (A.) aeta loa* Pate
- 2'. Propodeal enclosure without delimiting furrow (Fig. 10); pygidial plate with a large, low, triangular elevation at base (Fig. 6); gastral petiole relatively long and slender *C. (A.) binicarinalis* sp. nov.
- 3. Pronotal collar with anterior lateral carina *C. (A.) alticola* Tsuneki
- 3'. Pronotal collar without anterior lateral carina 4
- 4. Pronotal collar small and low; propodeal enclosure with complete delimiting furrow; thorax and legs with white or yellow spots *C. (A.) microcollaris* Li and He
- 4'. Pronotal collar large and high (Fig. 7); propodeal enclosure without or with incomplete delimiting furrow (Fig. 8); thorax and legs without white or yellow spots *C. (A.) medidentatus* sp. nov.

Males

(Diagnosis characters for male: with 13 antennal segments; with seven exposed metasomal terga; usually without pygidial plate. Male unknown for *C. (A.) alticola* Tsuneki and *C. (A.) binicarinalis* sp. nov.)

- 1. Pronotal collar with anterior lateral carina *C. (A.) aeta loa* Pate
- 1'. Pronotal collar without anterior lateral carina 2
- 2. Surface of frons, vertex, scutum, and mesopleuron rough, punctures obscure *C. (A.) ursidus* Leclercq
- 2'. Surface of frons, vertex, scutum, and mesopleuron smooth, punctures clear 3
- 3. Pronotal collar small and low; propodeal enclosure with complete delimiting furrow; apical flagellomere normal; legs with white or yellow spots *C. (A.) microcollaris* Li and He.
- 3'. Pronotal collar large and high; propodeal enclosure without or with incomplete delimiting furrow; apical flagellomere flattened; legs without white or yellow spots *C. (A.) medidentatus* sp. nov.



Figs. 5–6. *Crossocerus (Apocrabro) binicarinalis*, sp. nov. 5. Frontal view of clypeus. 6. Dorsal view of pygidial area.

Crossocerus (Apocrabro) medidentatus, new species
(Figs. 1–4, 7–8)

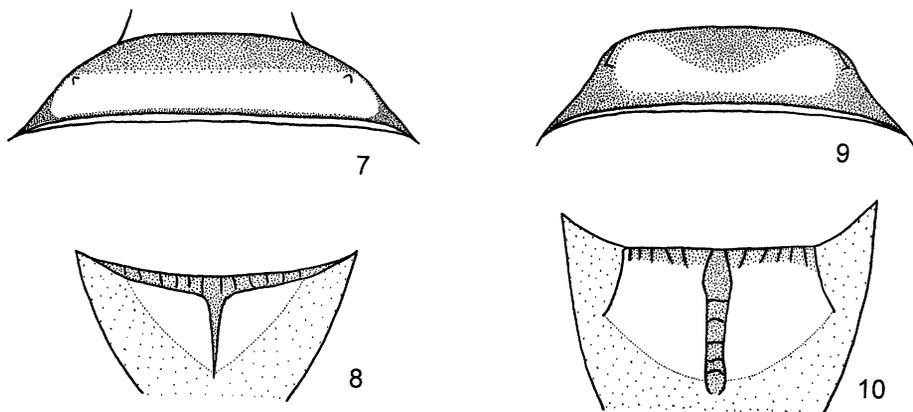
DIAGNOSIS: The placement in the subgenus *Apocrabro* Pate is based on the following characters: head subequal in width to thorax, subquadrate; without large, median, posteroventral projection; occipital carina not a complete circle; mandible with 2 or 3 teeth at apex, without tooth on inner margin; antennal scape slender, flagellomere III not swollen beneath; propleuron and forecoxa without large projections; mesothorax with mesopleural tubercle, without acetabular carina; hind wing with jugal lobe shorter than submedian cell; with gastral petiole gradually widened apically and broadly joined to gaster; metasomal tergum II without large, rounded, deep depression; tergum VII usually large in male; female with pygidial plate usually narrowed and excavated apically; males with last tergum more finely punctate than penultimate tergum; body longer than 5 mm.

The new species can be distinguished from the related *C. (A.) microcollaris* Li et He and all other *Apocrabro* species by the following combination of characters: anterior margin of clypeus with a broad, median tooth; upper frons with broad, blunt, low, and transverse elevation; pronotal collar large and high, without anterior lateral carina, lateral corner with a small, low, blunt lateral tooth; propodeal enclosure without delimiting furrow or with very shallow, inconspicuous delimiting furrow only at its posterior portion; upper frons with very fine punctures, vertex with very dense punctures medially; mesopleuron with mesopleural tubercle; flagellum ventrally fringed with white hair; the shape of apical flagellomere in male; and body coloration.

DESCRIPTION: Female. Body length 7.4–8.6 mm. Black, or head beneath, thorax and gaster partly or largely reddish brown or dark brown; mandible largely, antennal scape in front, tibiae at apex, tarsi beneath partly or largely, and gaster at apex yellowish brown; body without white or yellow spots. Head and thorax with steel blue luster.

Head shiny. Anterior margin of clypeus with a broad, median tooth (Fig. 1). Mandible with 3 teeth at apex, without tooth at midlength of inner margin. Frons without supra-antennal projection; with median furrow; with broad, blunt, low, and transverse upper frontal elevation. Upper frons very sparsely, finely punctate; vertex densely, coarsely punctate medially, sparsely, coarsely punctate laterally; with shallow median furrow between posterior ocelli; orbital foveae small. HW:HL:POD:OOD = 167:114:11:23; relative lengths of antennal scape : pedicel : flagellomere I:II:III:IV:V = 63:15:21:14:12:11:10.

Pronotal collar without anterior lateral carina; lateral corner rounded, with small, low, blunt lateral tooth (Fig. 7). Scutum densely, coarsely punctate, without longitudinal ruga adjacent to its posterior margin; scutellum densely, coarsely or finely punctate; metanotum densely, finely punctate; mesopleuron densely, coarsely punctate on anterior, lower portion; very sparsely, coarsely punctate on posterior, upper portion, with low mesopleural tu-



Figs. 7–10. 7–8. *Crossocerus (Apocrabro) medidentatus*, sp. nov. female. 9–10. *Crossocerus (Apocrabro) bincarinialis*, sp. nov. female. 7, 9. Dorsal view of pronotal collar. 8, 10. Dorsal view of propodeal enclosure.

bercle; metapleuron impunctate or very sparsely punctate. Propodeal enclosure without delimiting furrow or with very shallow, inconspicuous delimiting furrow posteriorly; with short, longitudinal rugae anteriorly; with or without very fine, dense, oblique rugae laterally; and with narrow, deep, median furrow (Fig. 8). Posterior surface of propodeum with broad, deep, median furrow on upper portion, with dense and coarse punctures laterally, with short median carina and long lateral longitudinal carina on lower portion. Propodeal side of propodeum with dense, coarse punctures on upper portion, without or with a few punctures on lower portion. Apical half of hind tibia very swollen, with spines on outer surface.

Gastral petiole long. Metasomal tergum I very sparsely punctate. LTI:WTL = 129:55. Pygidial plate narrow, excavate apically (Fig. 2).

Male. Body length 7.5–8.6 mm. Anterior margin of clypeus prominent medially (Fig. 3). Mandible with 2 teeth at apex. HW:HL:POD:OOD = 145:102:10:22. Flagellum ventrally fringed with white hair; apical flagellomere flattened, apical margin straight, apical inner corner with angular projection. Relative lengths of antennal scape : pedicel : flagellomere I:II:III:IV:V = 57:12:18:14:12:12:11. Apical half of hind tibia swollen, with spines on outer surface. LTI:WTI = 120:56.

Gaster without pygidial plate; tergum VII nearly semicircular (Fig. 4).

TYPE MATERIAL: Holotype, ♀, China, Sichuan, Emeishan, Xixiangchi, 1800–2000 m, 27.VIII.1957, leg. Keren Huang. Paratypes: 2♀♀, 4♂♂, same locality as holotype, 14.VIII.1957 (1♂), 17.VIII.1957 (1♂), 19.VIII.1958 (1♂), 27.VIII.1957 (1♀), leg. Keren Huang, 18.VIII.1957 (1♂), 27.VIII.1957 (1♀), leg. Fuxing Zhu; 2♀♀, 2♂♂, China, Sichuan, Emeishan, Jiulaodong, 10.VIII.1957 (1♀), 23.VIII.1957 (1♂), leg. Zhongyuan Wang, 3.VIII.1957 (1♀), 25.IX.1957 (1♀), leg. Zuocai Yu; 2♀♀, China, Sichuan, Emeishan, 24.VI.1958 (1♀), leg. Zhonglin Ge, 11.VIII.1980 (1♀), leg. Junhua He.

Holotype, and 11 paratypes (5♀♀, 6♂♂) were deposited in the Insect Collections of Institute of Zoology, Academia Sinica, Beijing, China; 1♀ paratype in the Insect Collections of Zhejiang University, Hangzhou, Zhejiang, China.

ETYMOLOGY: The name, *medidentatus*, derived from Latin *med-* (=median) and Latin *dentatus* (=with tooth), refers to the anterior margin of the clypeus, which has a broad median tooth, one of the main characters for recognition of the species.

Crossocerus (Apocrabro) binicarinalis, new species
(Figs. 5–6, 9–10)

DIAGNOSIS: The placement in the subgenus *Apocrabro* Pate is based on the same characters described in the diagnosis section for *medidentatus*.

The new species can be distinguished from related *C. (A.) aeta loa* Pate and all other species of *Apocrabro* by the following combination of characters: the propodeal enclosure without delimiting furrow; pygidial plate with a large, low, triangular median elevation at base; gastral petiole long and slender; posterior surface of propodeum with two long lateral longitudinal carinae on each lateral lower portion; anterior outer side of antennal scape with longitudinal carina; and mandible with two teeth at apex.

DESCRIPTION: **Female.** Body length 9.8–10.0 mm. Black, or head, thorax, legs, and gaster partly or largely reddish brown or dark brown; outer side of antennal scape with or without yellowish brown spot; tegula at apex, tarsi partly, and gastral petiole apicoventrally with yellowish brown spots; mandible at apex yellowish brown or reddish brown; body without white or yellow spots. Head and thorax with very weak steel blue luster.

Anterior margin of clypeus with 3 broad teeth medially (Fig. 5). Mandible with 2 teeth at apex, without tooth at midlength of inner margin. Frons without supra-antennal projection; with median furrow; with low, broad, blunt, transverse upper frontal elevation; with low, blunt, short, oblique carinae at sides of upper frontal elevation. Frons and vertex densely, coarsely punctate; orbital foveae not concave, flat or slightly elevated, flush with surface. HW:HL:POD:OOD = 174:110:15:25; anterior outer side of antennal scape with longitudinal carina; relative lengths of antennal scape : pedicel : flagellomere I:II:III:IV:V = 66:15:26:18:16:15:13.

Pronotal collar with short, longitudinal, incomplete anterior lateral carina terminating in small spine at its upper end; lateral corner round (Fig. 9). Scutum densely, coarsely punctate, without longitudinal ruga adjacent to its posterior margin; scutellum densely, coarsely punctate anteriorly, densely, coarsely or finely punctate posteriorly. Metanotum densely, finely punctate; mesopleuron sparsely, coarsely punctate, coarsely, transversely rugose on anterior median; posterior median and posterior ventral portion, with large mesopleural tubercle. Metapleuron impunctate or sparsely, finely punctate. Propodeal enclosure without delimiting furrow; with short, longitudinal anterior rugae, with fine, dense, inconspicuous, oblique rugae laterally; with broad, deep median furrow bordered by carina on its upper margin and transversely rugose within (Fig. 10). Posterior surface of propodeum with broad, deep median furrow on upper portion; with dense, fine punctures laterally; with short median carina; transverse rugae and 2 long lateral, longitudinal carinae on lower portion. Propodeal side with dense, coarse punctures on upper portion, slightly alutaceous on lower portion. Apical half of hind tibia swollen, with spines on outer surface.

Gastral petiole long and slender. Metasomal tergum I finely, sparsely punctate. LTI : WTL = 163 : 58. Pygidial plate narrow, excavate apically, with a large, low, triangular median elevation at base (Fig. 6).

Male. Unknown.

TYPE MATERIAL: Holotype ♀, China, Sichuan, Emeishan, Xixiangchi, 1800–2000 m, 20.VIII.1957, leg. Keren Huang. Paratype: 1♀, China, Guizhou, Dongchuan, Fazedachang, 2900 m, 15.VI.1980, leg. Zhen Cai.

Holotype is deposited in the Insect Collections of Institute of Zoology, Academia Sinica, Beijing, China; paratype in the Insect Collections of Yunnan Agricultural University, Kunming, Yunnan, China.

ETYMOLOGY: The name, *binicarinalis*, derived from Latin *bin-* (=two, twain) and Latin *carinalis* (=carinal), refers to the posterior surface of the propodeum with two long lateral longitudinal carinae on each lateral lower portion, which is one of the main characters for recognition of the species.

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