



***Istiochrysis* gen. nov., a new chrysidid genus from Oriental China (Hymenoptera, Chrysididae)**

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Abstract

Istiochrysis Rosa & Xu, **gen. nov.** (type species *Istiochrysis ziliolii* Rosa, Feng & Xu, **sp. nov.**) in the tribe Chrysidini is described from Oriental part of China (Yunnan). The new genus is related to the genera *Caenochrysis* Kimsey & Bohart, 1981, *Chrysidea* Bischoff, 1913, and *Trichrysis* Lichtenstein, 1876, but can be separated from them by the unique crestate structure of male genitalia, shape of black spots on sternum 2, and facial depressions on scapal basin.

Key words: Chrysidini, *Istiochrysis*, *Caenochrysis*, *Chrysidea*, *Trichrysis*, new genus, new species, Oriental Region

Introduction

The cosmopolitan family Chrysididae includes 2,509 described species (Aguiar *et al.* 2013) in 93 genera. The Chinese fauna is still poorly known and a preliminary checklist of the Chinese species was recently published (Rosa *et al.* 2014). Some generic revisions (Rosa & Xu, 2015; Rosa *et al.* 2015a, b, c, d, 2016a, b) increased the number of known Chinese genera to 24 and the number of known species to 201.

One of the most controversial systematic debates is about genera or subgenera closely related to *Trichrysis* Lichtenstein, 1876. Linsenmaier (1959) considered *Trichrysis* and *Chrysidea* Bischoff, 1913 as two subgenera in the genus *Chrysis* Linnaeus, 1761. Later Linsenmaier (1968) considered *Chrysidea* merely as a species-group in the subgenus *Trichrysis*. The same systematic approach was used in the revision of the American *Chrysis* (*Trichrysis*) (Linsenmaier 1984), in which species were included into five species-groups: *C. pumila* species-group, *C. silvetrii* species-group, *C. cyanea* species-group, *C. armata* species-group, and *C. tridens* species-group. Kimsey and Bohart (1981), in their revision of the Neotropical genera, considered two valid subgenera of the Old World, nominotypical and *Chrysidea*, and established two new subgenera of the New World: *Caenochrysis* Kimsey & Bohart, 1981 and *Lorochrysis* Kimsey & Bohart, 1981. Bohart and Kimsey (1982) keyed the North American species of the subgenera *Caenochrysis* and *Lorochrysis*. The main differences between the Old World and New World subgenera are based on fore wing discoidal cell, complete in *Trichrysis* and *Caenochrysis*, whereas incomplete to faint in *Chrysidea* and *Lorochrysis*. However, the American species were considered different from those of the Old World for the different genital capsula with articulate gonostyle (telomere sensu Kimsey & Bohart 1981) (Fig. 1F), not yet observed in the Old World *Trichrysis* (Figs 1D, 1E). Later Kimsey and Bohart (1991) considered *Caenochrysis*, *Chrysidea* and *Trichrysis* as valid genera, whereas *Lorochrysis* was synonymised with *Caenochrysis*. The two main diagnostic characteristics to separate *Caenochrysis* from other genera are pair of facial foveae between clypeus and compound eye, and articulate gonostyle of male genitalia (Kimsey & Bohart 1991). We here follow the generic classification proposed by Kimsey and Bohart (1991). The new specimens from China bear a unique subsidiary structure on aedeagus not yet observed among Chrysididae (Kimsey & Bohart 1991: 37). In fact, shapes of chrysidid genital capsules were well documented with line drawings (Radoszkowski 1889; Edney 1940, 1953; Linsenmaier 1959, 1999; Kimsey & Bohart 1981, 1991; Bohart & Kimsey 1982) and SEM pictures (Rosa 2006), but no specimen shows such subsidiary structures (Figs 1A–1C). For this reason we consider these Oriental specimens as a new genus and describe it herein.

Materials and methods

All specimens were examined and described under stereomicroscope (Leica MZ125). Photographs were taken with a digital camera (CoolSNAP) attached to a Zeiss Stemi 2000-CS stereomicroscope. Images were processed using Image-Pro Plus software. Photographs of genitalia were taken with a scanning electron microscope (SEM) Jeol 5610 LV.

Morphological terminology follows Kimsey & Bohart (1991). Abbreviations used in the descriptions as follows: **BOL**=brow-ocellar line, the shortest distance between the median ocellus and the brow (**TFC**); **F1**, **F2**, **F3**=flagellomeres 1, 2, 3; **MOD**=median ocellus diameter; **MS**=malar space, the shortest distance between base of mandible and lower margin of compound eye; **OOL**=the shortest distance between posterior ocellus and compound eye; **P**=pedicel; **POL**=the shortest distance between posterior ocelli; **S2**=metasomal sternum 2; **T1**, **T2**, **T3**=metasomal terga 1, 2, 3; **TFC**=transversal frontal carina.

Istiochrysis Rosa & Xu, gen. nov.

(Figs 1A–1F, 2A–2D, 3A–3D, 4A–4F)

Type species: *Istiochrysis ziliolii* Rosa, Feng & Xu, sp. nov.

Diagnosis. *Istiochrysis* Rosa & Xu, gen. nov. is similar to the Nearctic and Neotropical genus *Caenochrysis* Kimsey & Bohart, 1981, and the Palaearctic and Oriental genera *Chrysidea* Bischoff, 1913 and *Trichrysis* Lichtenstein, 1876. However, this new genus can be separated from *Caenochrysis*, *Chrysidea* and *Trichrysis* by male genitalia with extended longitudinal crest on aedeagus (Figs 1A–1C); apex of aedeagus enlarged and folded laterally (Figs 1A, 1B) (not enlarged in the other genera and tapering in *Caenochrysis*); facial fovea between antennal socket and lower margin of eye hardly visible and shallowly depressed and finely punctate (Figs 2A, 2B) (usually deeply depressed in *Caenochrysis*); pronotum without sublateral carina (Fig. 3A) (usually with sublateral carina in *Trichrysis*); fore wing discoidal cell with thin and completely sclerotised outer vein (faint in *Chrysidea*); apex of T3 without teeth (laterally dentate and medially undulate in *Chrysidea*, tridentate in *Trichrysis*); S2 with large, subrectangular, black spots extending to lateral margins (Fig. 3B), somehow similar to those in the genus *Praestochrysis* Linsenmaier, 1968 (small, suboval, not extending to lateral margins in *Caenochrysis*; suboval and separated in *Chrysidea* (Fig. 3D), subtriangular and medially fused or nearly so in *Trichrysis* (Fig. 3C)) (Bohart & Kimsey 1982; Linsenmaier 1984; Rosa & Xu 2015; Rosa *et al.* 2016a) (Fig. 2D).

Description. *Male.* Head broader than high. Scapal basin with shallow depression on each side between antennal socket and lower margin of eye; depression visible only under certain angle (Figs 2A, 2B); bottom of depression filled with micro-punctures and densely setose. Scapal basin topped by TFC (Figs 2A, 4B); scapal basin with white setae, especially along lateral sides (Fig. 2A). F1 l/w>3; MS=1 MOD. Genal carina developed from gena to mandible. Subgenal area well defined. Median ocellus not lidded. Vertex without posterior depression beneath posterior ocellus. Mandible unidentate. Pronotum nearly as long as mesoscutellum with deep lateral depression, without sublateral carina. Mesopleuron with large episternal sulcus and scrobal sulcus (Fig. 4D); area between episternal sulcus and scrobal sulcus large and subtriangular. Metanotum with raised median area. Fore wing with thin but completely sclerotized outer veins of discoidal cell (Fig. 3A). T2 and T3 with shallow median longitudinal carinae (Fig. 4E). Apex of T3 without teeth, but with shallow concavity, thus appearing bilobate (Fig. 4F); pit row well developed with enlarged and partly fused pits (Fig. 4F). Black spots on S2 elongate, fused along lateral margins (Fig. 3B) and distinctly separated mesally. Male genitalia with gonostyle of gonocoxa elongate and slender, aedeagus with enlarge longitudinal crest, well visible in lateral view (Fig. 1C).

Female. Unknown.

Biology. Unknown.

Distribution. China (Yunnan).

Etymology. From Greek noun *istion* (= sail), referring to the unique subsidiary structure longitudinally placed on aedeagus, looking like a sail in lateral view. The gender is feminine.

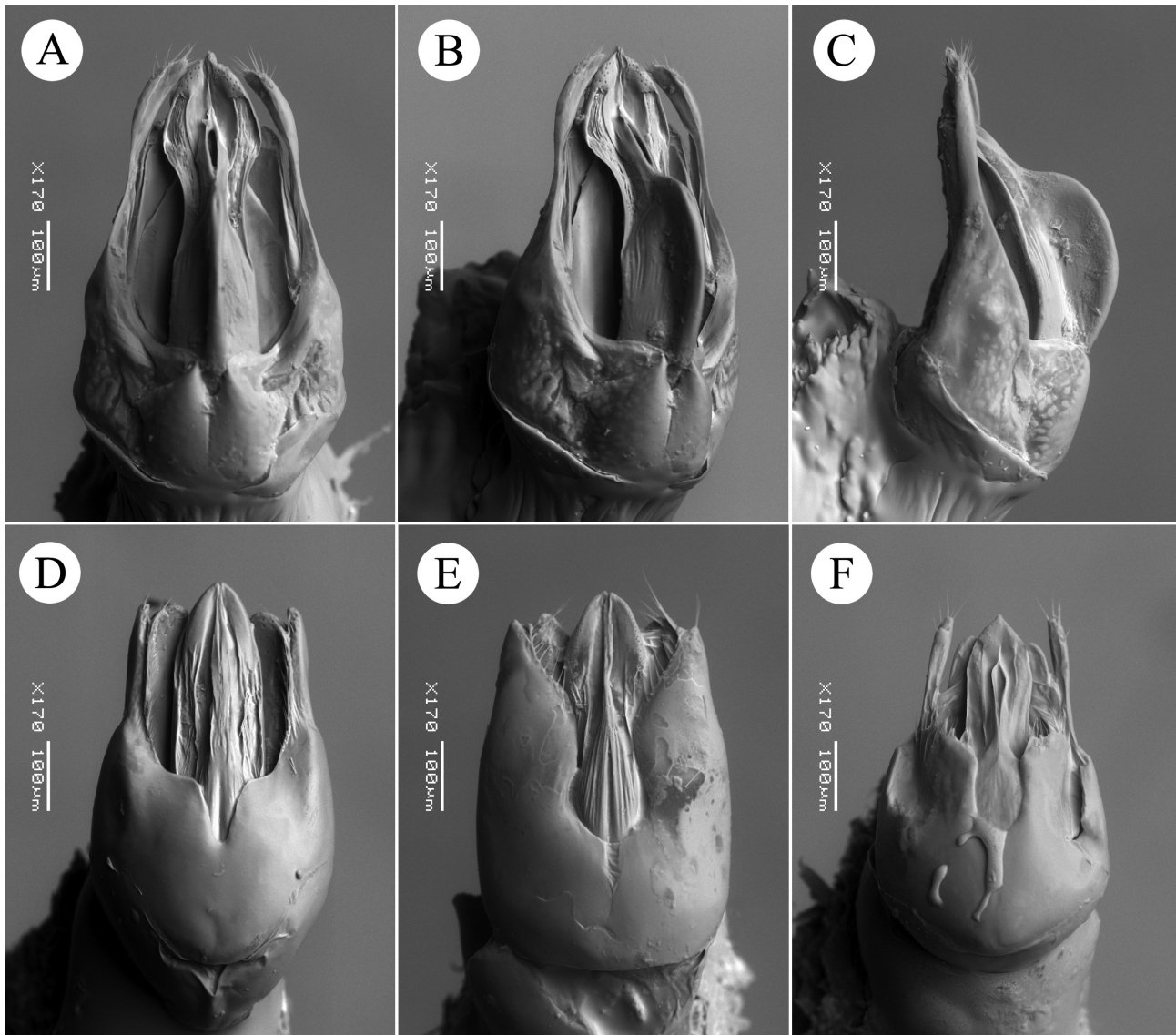


FIGURE 1A–1F. Genitalia. **A–C.** *Istiochrysis ziliolii* sp. nov., **A**, dorsal view; **B**, dorso-lateral view; **C**, lateral view; **D.** *Trichrysis cyanea* (Linnaeus), dorsal view; **E.** *Chrysidea pumila* (Klug), dorsal view; **F.** *Caenochrysis doriae* (Gribodo), dorsal view.

Key to the genera related to *Trichrysis* Lichtenstein

1. Genital capsule with aedeagus bearing longitudinal crest (Figs 1A–1C); S2 with large black spots connected to lateral margins of sternum (Fig. 3B). Oriental species *Istiochrysis* **gen. nov.**
- Genital capsule without subsidiary structure (Figs 1D–1F); S2 with small black spots distinctly separated from lateral margins of sternum (Figs 3C, 3D). 2
2. Genital capsule with articulate gonostyle (Fig. 1F); female scapal basin laterally with fovea or depression.—Nearctic and Neotropical species *Caenochrysis* Bohart & Kimsey
- Genital capsule with gonocoxa not subdivided and without articulate gonostyle (Figs 1D, 1E); female scapal basin without depression or fovea 3
3. Fore wing discoidal cell complete; apex of T3 with three teeth, sometimes lateral tooth like simple angle; black spots on S2 usually medially fused, or nearly so, only separated by thin metallic line; gonocoxa of genital capsule with unmodified apex (Fig. 1D).—Palearctic and Oriental species)..... *Trichrysis* Lichtenstein
- Fore wing discoidal cell usually incomplete with outer veins faint; apex of T3 usually medially rounded or sinuous between two lateral teeth or angles, rarely with median tooth; black spots on S2 usually separated by 1–2 MOD; gonocoxa of genital capsule with bilobed apex (Fig. 1E).—Palearctic, Oriental and Afrotropical species *Chrysidea* Bischoff

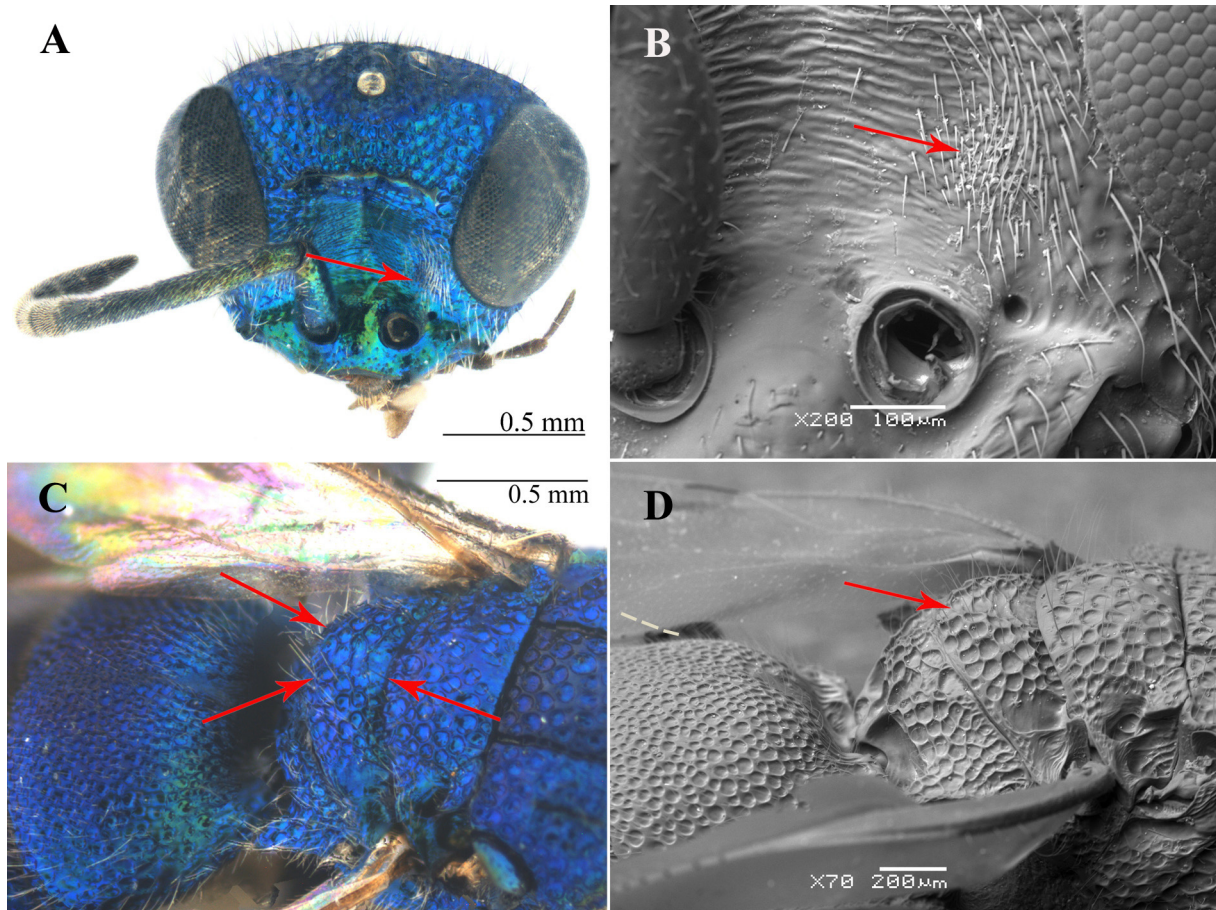


FIGURE 2A–2D. Head of *Istiochrysis* gen. nov. **A.** Head, frontal view, arrow pointing to the shallow micropunctate and densely setose depression; **B.** Detail of the depression between clypeus and lower margin of eye by SEM; **C.** Metanotum with raised triangular median area, which is shallowly concave medially; **D.** Detail of the raised median area on metanotum by SEM.

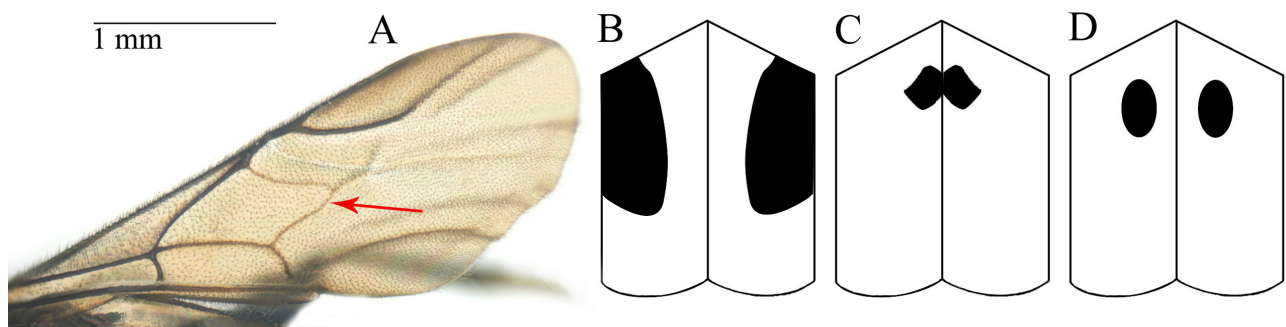


FIGURE 3A–3D. **A.** Fore wing of *Istiochrysis* gen. nov.; **B.** S2 black spots of *Istiochrysis* gen. nov.; **C.** S2 black spots of *Trichrysis* Lichtenstein; **D.** S2 black spots of *Caenochrysis* Bohart & Kimsey or *Chrysidea* Bischoff.

Key to Oriental genera of the tribe Chrysidini

1. Apex of *Rs* not distinctly sclerotized, ending at least 3 MOD from anterior wing margin; metanotum with a large cup-like posterior projection; apex of T3 with four teeth; head narrow and elongated. *Stilbum* Spinola
- Apex of *Rs* fully sclerotized and jointed to anterior wing margin, or separated at most 2 MOD; metanotum without or rarely with stout projection; if with metanotal projection, then apex of T3 with five teeth; head transverse, broader than its length. 2
2. Mesopleuron without scrobal sulcus; apex of T3 various, anyway without four or five teeth *Primeuchroeus* Linsenmaier
- Mesopleuron with distinct horizontal scrobal sulcus 3
3. Discoidal cell incomplete, its outer veins not or not entirely sclerotized *Chrysidea* Bischoff

- Discoidal cell complete 4
- 4. Apex of T3 with three or five teeth, sometimes only as angle, and median tooth sometimes almost vanishing in male 5
- Apex of T3 with different number of teeth 6
- 5. Apex of T3 with three or five teeth; pronotal carina partially or fully developed; metanotum simple, without projection; flagellum subcylindrical, not broadened.–Parasitoid of sphecid or crabronid wasps (Hymenoptera) *Trichrysis* Lichtenstein
- Apex of T3 with five teeth; pronotal carina absent; metanotum with projection, or as small spine; flagellum usually broadened.–Parasitoid of limacodid moths (Lepidoptera) *Praestochrysis* Linsenmaier
- 6. Apex of T3 without teeth; male genitalia modified, with longitudinal crest on aedeagus *Istiochrysis* **gen. nov.**
- Apex of T3 various; male genitalia unmodified, aedeagus without subsidiary structure *Chrysis* Linnaeus

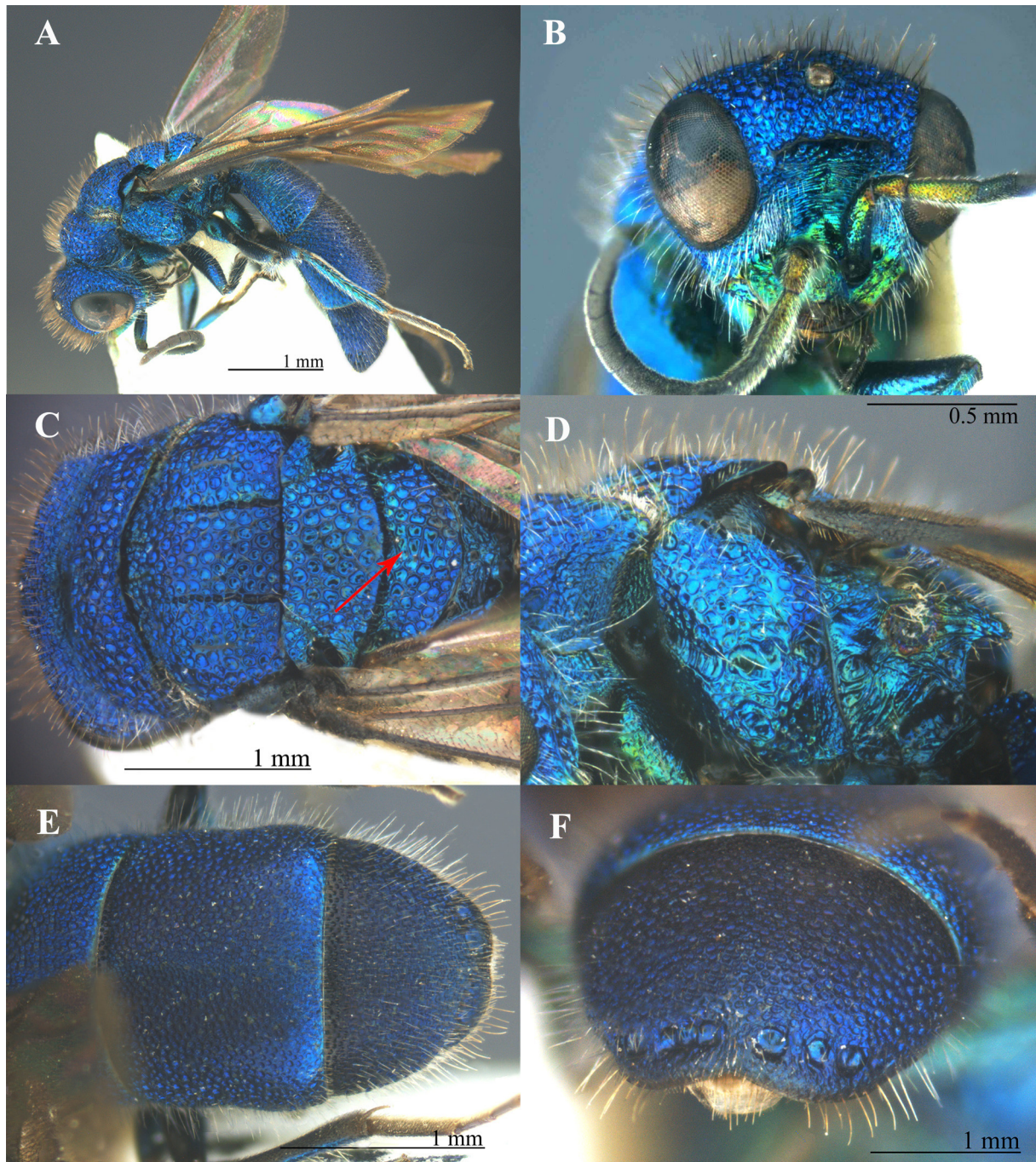


FIGURE 4A–4F. *Istiochrysis ziliolii* sp. nov., holotype, ♂. **A.** Habitus, lateral view; **B.** Head, frontal view; **C.** Mesosoma, dorsal view, arrow pointing to the metanotal concave medial area; **D.** Mesopleuron, lateral view; **E.** Metasoma, dorsal view; **F.** T3, posterior view.

***Istiochrysis ziliolii* Rosa, Feng & Xu, sp. nov.**

(Figs 1A–1C, 2A–2D, 3A–3B, 4A–4F)

Material examined. Holotype, ♂, China: Yunnan, Tengchong, Qushi (25°13'51"N 98°36'36"E), 1–9.VIII.2011, J-j Chen [SCAU]. Paratype: 1♂, China: Yunnan, Gaoligongshan National Nature Reserve (25°50'23"N 98°51'23"E), 1–18.VIII.2005, J-j Ma & Y-l Cai [SCAU].

Diagnosis. *Istiochrysis ziliolii* sp. nov. is the only known species within this genus. It can be recognised by apex of T3 simple, without teeth and somehow bilobate; metanotum with raised subtriangular median area, shallowly concave medially; black spots on S2 large and connected to lateral margins; genital capsula with crestate aedeagus.

Description. *Male.* Holotype. Body length 5.0 mm (Fig. 4A).

Head. Scapal basin transversally microridged (Fig. 4B); scapal basin with white setae, especially along lateral sides. TFC convex, topping scapal basin ending about 1 MOD from ocular margin (about to eye margin in paratype); TFC without posterior branches. Relative length of P:F1:F2:F3=1.0:1.3:0.8:0.7; F1 l/w> 3; OOL=2 MOD; POL=2.5 MOD; BOL=2.0 MOD; MS=1.0 MOD; subantennal space 0.5 MOD. Clypeus not incised medially.

Mesosoma. Pronotal groove deep, almost reaching posterior margin. Pronotum, mesoscutum and mesoscutellum with large foveate punctures. Postero-lateral corners of mesoscutum, distinctly depressed over tegulae. Parapsidal furrows distinct. Antero-lateral margins of mesoscutellum elongate and upwardly directed. Mesopleuron somewhat bulging over the large and scrobiculate episternal and scrobal sulci. Metanotum with raised subtriangular median area, shallowly concave medially (Figs 2C, 2D) and elevated along its margins.

Metasoma. T1, T2 and T3 with geminate, small and dense punctures, almost without interspaces between punctures; punctures with smaller diameter along posterior margin and median longitudinal carina (Fig. 4E). T3 with row of large pits. Apex of T3 simple, somewhat bilobate apically. Black spots on S2 large, subrectangular and connected to lateral margins (Fig. 3B).

Colouration. Body blue, with dark blue areas dorsally on metasoma. Clypeus and lower part of face metallic green with golden reflections. Scape, pedicel and F1 metallic green with golden reflections; rest of flagellum black. Tegula metallic blue. Legs with coxae, trochanters, femora and tibiae metallic blue, and tarsi black. Sterna metallic green to blue. Head and mesosoma with grey to blackish long (up to 2 MOD) setae. Metasoma with grey to whitish long (up to 2 MOD) setae.

Female. Unknown.

Distribution. China (Yunnan).

Etymology. The specific name *ziliolii* is named after Michele Zilioli, well known entomologist, who provided the SEM pictures for this study, as well as other pictures for our research on Chinese Chrysididae.

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