

Indocypha catopta sp. nov. from Guizhou, China (Odonata: Chlorocyphidae)

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ABSTRACT

Indocypha catopta sp. nov. (holotype ♂: China, Guizhou, Maolan National Nature Reserve 28 vii 2008, to be deposited in the Collection of Aquatic Insects and Soil Animals, Department of Entomology, South China Agricultural University, Guangzhou) is described, illustrated and compared with all known *Indocypha* species. The uncertain taxonomic status of some Chinese *Indocypha* species is briefly discussed. The correct spelling of the species-group name of *I. silbergliedi* is established.

INTRODUCTION

Indocypha Fraser, 1949 is a small genus of medium sized to moderately large chlorocyphids with half a dozen known species in the Oriental region. The known species are distributed from Northeast India through Burma, Thailand and Laos to Vietnam and southern and south-western parts of China. All *Indocypha* species are apparently rare and elusive insects, inhabiting broad and fast flowing streams. They have seldom been collected and therefore are poorly represented in the collections. A new species discovered and collected by HZ in Maolan National Nature Reserve in Libo county in the southern part of Guizhou province, is described here as a new species *I. catopta* sp. nov.

Indocypha species are characterized by hyaline wings and a tapering dorsoventrally flattened abdomen. In *Indocypha*, the anal vein (1A) meets the hind margin of the wing well proximal to the level of the first antenodal, which is a reliable character to separate this genus from *Aristocypha* Laidlaw, 1950, *Heliocypha* Fraser, 1949 and *Rhinocypha* Rambur, 1842. In species of the former genera 1A meets the wing margin distal to the level of the first or second antenodal.



***Indocypha catopta* sp. nov.**
(Fig. 1, Plate III)

Etymology

Catopta, the feminine form of the latinised Greek adjective *katoptos* (κατοπτος), meaning visible or conspicuous.

Specimens examined

Holotype ♂: Maolan National Nature Reserve, Guizhou Province, 28 vii 2008, HZ leg. Deposited in the Collection of Aquatic Insects and Soil Animals, Department of Entomology, South China Agricultural University, Guangzhou, China. — Paratypes: 3 ♂, same locality, date and collector as for holotype; 1 ♀, same locality and collector, but date 25 vii 2008.

Diagnosis

A large chlorocyphid with a rather slim thorax; abdomen dorsoventrally flattened and in dorsal view tapered strongly from S3 to S9, largely orange in colour; wings hyaline and proportionally long (Plate III).

Holotype male

Head: Labium largely black, with a yellow stripe on margin of the lateral lobes; hind margin of labium narrowly yellow. Base of mandibles with a large pale blue spot. Labrum pale blue with lower margin black. Anterior surface of rhinarium largely black. Posterior surface of rhinarium with a large, oval-shaped, blue spot on the top and paired lateral blue spots at each lower angle. Frons, vertex and occiput black, with a pair of large crescent-shaped blue spots below the level of the anterior ocellus extending downwards to the edge of rhinarium; a pair of bluish yellow spots beside the lateral ocelli and a pair of triangular bluish yellow spots on the side of the occiput. Antennae black, with the anterior surface of pedicel largely pale. Genae bluish yellow up to a point midway between level of anterior and lateral ocelli (Figs 1a,b, Plate IIIa).

Thorax: Prothorax (Fig. 1a) largely black; anterior lobe with a transverse yellow stripe; median lobe with a pair of large yellow spots on either side, and with a pair of very small yellow spots lower down; posterior lobe with a pair of triangular yellow spots at side, and a very small yellow spot in the centre. Synthorax largely black with greenish yellow stripes or spots as follows (Fig. 1a, Plate IIIa). Collar with two separate triangular spots at each side. Mesepisternum with a long hu-



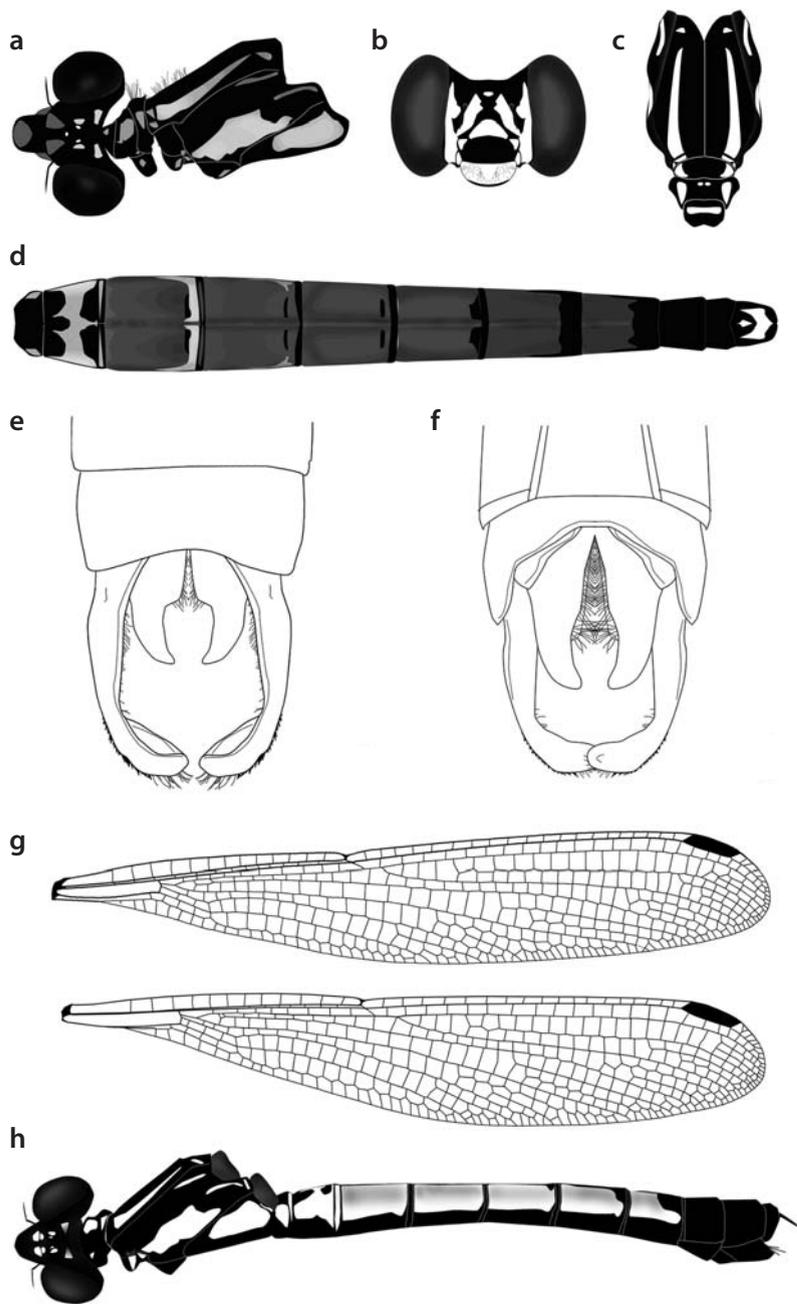


Figure 1: *Indocypha catopta* sp. nov., holotype male (a-g) and paratype female (h) — (a) head in dorsal view and thorax in lateral view; (b) head, anterior view; (c) thorax, dorsal view; (d) abdomen, dorsal view; (e) anal appendages, dorsal view; (f) same, ventral view; (g) wings; (h) female body in lateral view and head in dorsal view.

meral stripe narrowing posteriorly; a separate small oblique spot near the antalar ridge. Narrow stripe present at the posterior half of mesepimeron below the humeral suture. Metepisternum with a broad stripe covering the stigma, disconnected with a posterior narrow stripe below the first lateral suture. A broad stripe covering the posterior 2/3rd of metepimeron. Ventral side of thorax largely black with a pair of large yellow spots in the anterior part of the poststernum. — Legs black, except for a yellow posterior stripe on coxae. — Wings (Fig. 1g) entirely hyaline. Fw with 13 Ax and 19-20 Px; Hw correspondingly with 11-12 and 18. Arculus slightly distal to Ax 3. Quadrangle with two crossveins in Fw and three in Hw. 1A arises distinctly proximal to Ax1 in Fw and less markedly proximal to Ax1 in Hw. 1A meets wing margin at the level of Px 4 or 5. CuP meets wing margin at level of Px 5. MA meets wing margin at Px 8 or 9. Intercalated vein present between CuP and MA, starting well beyond nodus. R₃ arising between Px 1 and 2. Pterostigma black, covering 3-4 underlying cells.

Abdomen: Dorsoventrally flattened; reverse truncheon-shaped seen from anterior to posterior, S3 being the broadest, thereafter gradually narrowing towards S9 (Fig. 1d, Plate IIIa). S9-10 slightly wider apically. Predominantly orange, with yellow and black markings. S1 black with lateral yellow spots; S2 black with sides broadly yellow, the yellow colour extending across the dorsum forming a distinctive batwing pattern; S3-8 largely orange with the dorsal carina on S3-5 narrowly and obscurely yellow; the lateral ridge on S3-7 is similarly narrowly coloured with yellow. Intersegmental rings bordered black, narrowly and faintly in the basal segments, more broadly between S6-7 and S7-8. The apical 1/3rd of S8 and the whole S9-10 entirely black. S3-6 with a pair of black dorsal spots close to the posterior margin, those on S6 being the largest. Anal appendages black; the superiors bending inwards in dorsal view and slightly bent downwards in lateral view. The inferior appendages bent inwards in dorsal view; nearly 1/2 of the length of the superiors (Figs 1e-f).

Measurements [mm]: Total body length 37, Hw 28, abdomen (excl. appendages) 24.

Variation in paratype males

In one male the broad yellow stripe on the metepisternum is connected with the posterior narrow stripe. In one male the arculus is in line with Ax3 in all wings. In the three paratypes the antenodals number 13-15 in Fw and 11-14 in Hw, postnodals correspondingly 19-20 and 18.

Measurements [mm]: Total body length 37, Hw 29, abdomen (excl. appendages) 23.5-24.5.

Paratype female

Head: Marking generally similar to male, but the blue markings of head replaced by greenish yellow (Fig. 1h, Plate IIIb). Markings on posterior face of rhinarium greatly reduced. Frons, vertex and occiput black, with two crescent-shaped yellow spots below the anterior ocellus, a pair of pale yellow spots beside the lateral ocelli and a pair of triangular yellow spots on the side of the occiput.

Thorax: Colour pattern similar to that of male (Fig. 1h, Plate IIIb). — Wings hyaline with a faint yellow tinge in the basal part before the nodus. Fw with 13 Ax and 18-20 Px; Hw with 11-12 Ax and 18-20 Px. Arculus in line with Ax 3. Quad-rangle with 1-2 crossveins in Fw and 2 in Hw. 1A arises distinctly proximal to Ax1 in both wings. 1A meets wing margin at the level of Px 3 in Fw and Px 4 in Hw. CuP meets wing margin at the level of Px 4 in Fw and Px 5 in Hw. MA meets wing margin at Px 7 in Fw and Px 8 in Hw. Intercalated vein present between CuP and MA, starting well beyond nodus. R_3 arising between Px 2 and Px 3, slightly distal to Px 2 in both wings. Pterostigma black, covering 3-4 underlying cells.

Abdomen: Resembles that of male in most respects. Reverse truncheon-shape from anterior to posterior less pronounced than in male; S3 broadest, thereafter gradually narrowing towards S9. Predominantly orange and yellow with black markings (Fig. 1h, Plate IIIb). S1 black with lateral yellow spots; S2 black with yellow, x-shaped mark dorsally. S3-7 orange on dorsum, yellow on sides with broad black ventral margin, intersegmental rings black. S3-7 with a pair of dorsal black spots close to the posterior margin, those on S6-7 being the largest. S3-7 with a yellow line along the dorsal carina. S9-10 and anal appendages entirely black.

Measurements [mm]: Total body length 35, abdomen (excl. appendages) 22, Hw 31.5.

Notes on biology

The known habitat was a fast flowing rocky stream (10-30 m wide) with some slow moving or almost stagnant sections. The altitude of the site was ca 840 m. *I. catopta* individuals occupied both the riffles and quieter waters, mostly in the narrower sections where the banks were densely vegetated. They were active on sunny days and perched on shady trees by the side of the stream, usually at a height of 2-3 m. When disturbed they flew higher out of reach. The males seldom approached the water's edge or patrolled along the stream. Individuals appeared after 10:00 h, and reached their peak numbers around noon. Many immatures were observed during the survey in late July, indicating that their flight period may last into late autumn. Other chlorocyphid species co-occurring on the same stream were *Aristocypha chaoi* (Wilson, 2004) and *Rhinocypha drusilla* Needham, 1930.

DISCUSSION

Five of the six presently recognized *Indocypha* species are known from China, i.e. *I. catopta* sp. nov., *I. chishuiensis* Zhou & Zhou, 2006, *I. katharina* (Needham, 1930), *I. svenhedini* (Sjöstedt, 1932) and *I. vittata* (Selys, 1891) (= *I. leucoura* Asahina, 1985). *I. vittata*, a species known from northeastern India (Mizoram), Burma, Thailand and Laos, was recorded for the first time in China in 2009 (Zhang 2010). HZ collected a male specimen in Menglun botanic garden, Xishuangbanna, in the southernmost part of Yunnan on 25 June 2009. Only *I. silbergliedi* Asahina, 1988 (for the correct spelling, see the note below), originally described from northwestern Laos, has not yet been found in China, although it could be expected to occur in the nearby areas of the southernmost corner of Yunnan, where *I. vittata* was also found.

Differential diagnosis

Both sexes of *I. catopta* sp. nov. differ from their congeners in many respects. The colour pattern is different. In both male and female the abdomen is predominantly orange and the yellow lateral bands on the lower half of synthorax are very broad. According to the description and illustrations of *I. chishuiensis* by Zhou & Zhou (2006) the abdomen in that species is largely reddish orange, but the colour pattern of S2-3 is markedly different from *catopta*. Also the colour pattern of head and thorax is different. Moreover, unlike *I. catopta*, in *I. chishuiensis* the wings (Hw 25 mm) are only a little longer than the abdomen (24 mm, including appendages, presumably ca 23 mm without appendages).

I. svenhedini, described by Sjöstedt (1932) on the basis of a male and female specimen from northeastern Sichuan, is the largest known species in the family Chlorocyphidae. In the male the total body length is ca 42 mm, abdomen (incl. appendages) ca 28 mm and hind wing ca 34 mm (see Fig. 2). The abdomen of *I. svenhedini* male is predominantly yellow with broad reddish brown stripes on dorsum and with black markings on S1-2 (Fig. 2); the apical segments are broadly black laterally. The inferior appendages (Fig. 3b) and the colour pattern of head, prothorax and synthorax (Figs 2, 3a) differ markedly from those found in *I. catopta*. Unlike *I. catopta* male, in *I. svenhedini* the wing bases are diffusely yellow and pterostigma is largely pale (Fig. 2). The abdomen of *I. svenhedini* female (Fig. 3c) is black with broad yellow stripes on the sides and middorsum. This colour pattern of abdomen resembles that found in females of *I. vittata* and *I. katharina*, but differs strikingly from that of *I. catopta* female (Fig. 1h, Plate Xb).

Males of *I. vittata*, *I. silbergliedi* and the male described as the first male of *I. katharina* by Wilson and Reels (2003) differ from *I. catopta* in structural characters and in the colour pattern. The body length of *I. catopta* male is a little shorter than in the largest specimens of *I. vittata*, but *I. catopta* has, proportionally, dis-

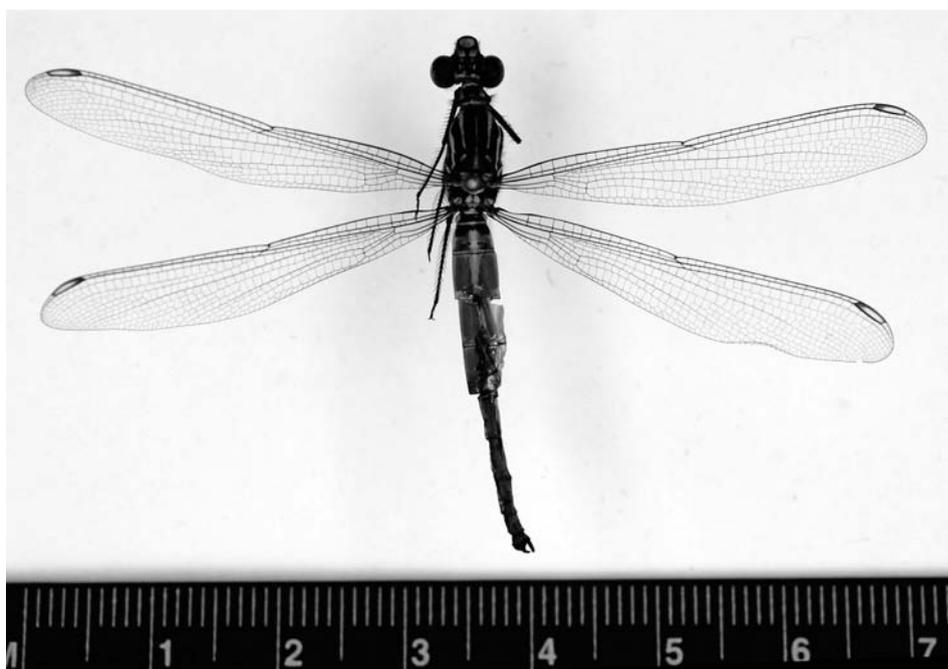


Figure 2: Syntype male of *Indocypha svenhedini*, dorsal view. The abdomen of the specimen was damaged after the description by Sjöstedt.

tinctly longer wings and a slenderer thorax. In mature *I. vittata* males the synthorax is almost wholly black, and S3-5 and the anterior half of S6) are whitish blue, the remaining segments being black. *I. silbergliedi* male is a much smaller insect (abdomen including appendages 22 mm; without appendages probably ca 21 mm, Hw 21 mm). S2-6 of the abdomen are black on the dorsum, with S7-10 reddish brown. According to an illustration in Wilson & Reels (2003: fig. 6) the male linked to *I. katharina* has a remarkably developed reverse club-shaped abdomen, S3 being ca 4-5 times broader than S9-10. S4-8 are brick red with broadly black distal borders.

Notes on *Indocypha katharina*

I. katharina was described by Needham (1930) as *Rhinocypha katharina* on the basis of two teneral female specimens from "Suifu (1000 ft. alt)", the present Yibin, in southern Sichuan. Wilson & Reels (2003) described the supposed first male of *I. katharina* from specimens originating in Guangxi. However, since the discovery of a male *Indocypha*, named as *I. chishuiensis* by Zhou & Zhou (2006), from "Jinshagou, Chishui City, Guizhou Province", further studies are needed to investigate

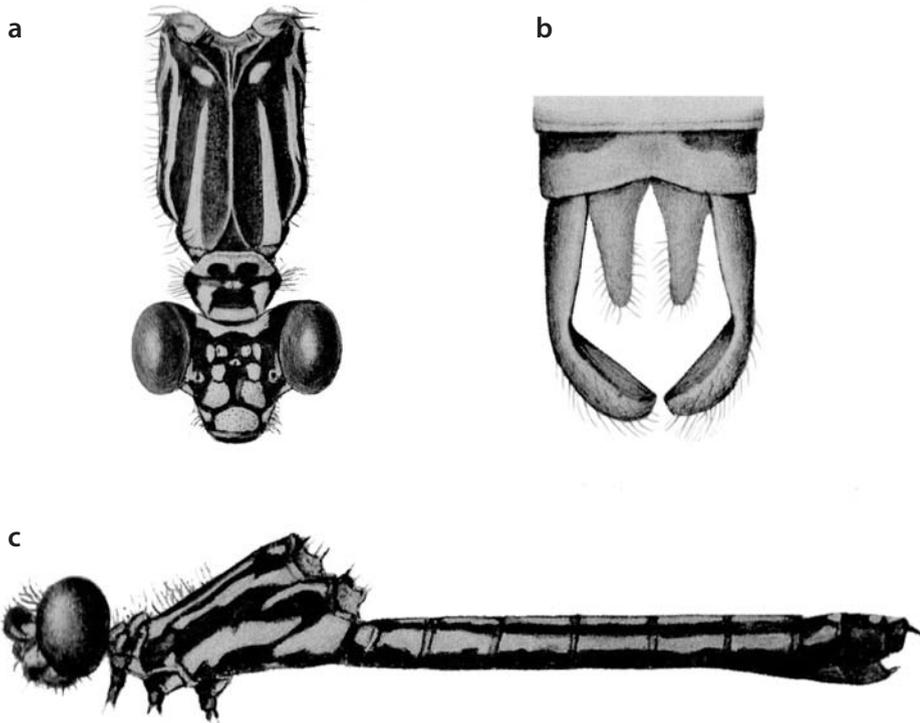


Figure 3: Illustrations of syntype male and female of *Indocypha svenhedini* (Sjöstedt, 1932), copied from Sjöstedt (1932) — (a) head and thorax of male, dorsal view; (b) anal appendages of male, dorsal view; (c) body of female, lateral view.

the possibility that *I. chishuiensis* is conspecific with *I. katharina*. This locality is less than 150 km from the type locality of *I. katharina* and from the same upland plateau region, at the same altitudinal range of 300-600 m, without any large intermediate mountain barriers.

It should be noted here that there is another chlorocyphid species, originally described from specimens collected in the Maolan Reserve. Zhou & Bao (2002) provided a brief illustrated description of new species named *Indocypha maolanensis*, based on two specimens reported as having been collected on 10 May 1998. Later Zhou & Zhou (2006) transferred *maolanensis* to the genus *Heliocypha* and stated that it was quite similar to their new species *H. huai* Zhou & Zhou, 2006 from Hainan. However, both *huai* and *maolanensis* belong to *Rhinocypha* s.str. and not to the genus (or subgenus of some authors) *Heliocypha*. We agree with Wilson et al. (2008) and Reels (2011) that *R. huai* (Zhou & Zhou, 2006) is a well supported species, clearly distinct from *R. drusilla*. On the other hand, the taxonomic status of '*I. maolanensis*' remains uncertain.

Note on the spelling of the species name of *Indocypha silbergliedi*

In the original description of *I. silbergliedi* by Asahina (1988), the species name was written in two ways. In the title of the species account the spelling is *silvergliedi*, but in the figure caption the spelling is *silbergliedi*. In his remarks, the author states: "The specific name of this remarkable species is dedicated to the late Dr. R.E. Silberglied..." Later Asahina (1991) corrected his error and wrote that "*silvergliedi*" is a misspelling and that the correct spelling is "*silbergliedi*". According to Article 32.2.1. of the Code (International Commission on Zoological Nomenclature 1999), if a name is spelled in more than one way in the work where it was established, then the correct original spelling is that chosen by the First Reviser. In this case Asahina (1991) is the First Reviser. Therefore the correct spelling of this species-group name is *silbergliedi*. So far, the incorrect spelling has been used in nearly all subsequent publications, except Tsuda (2000).

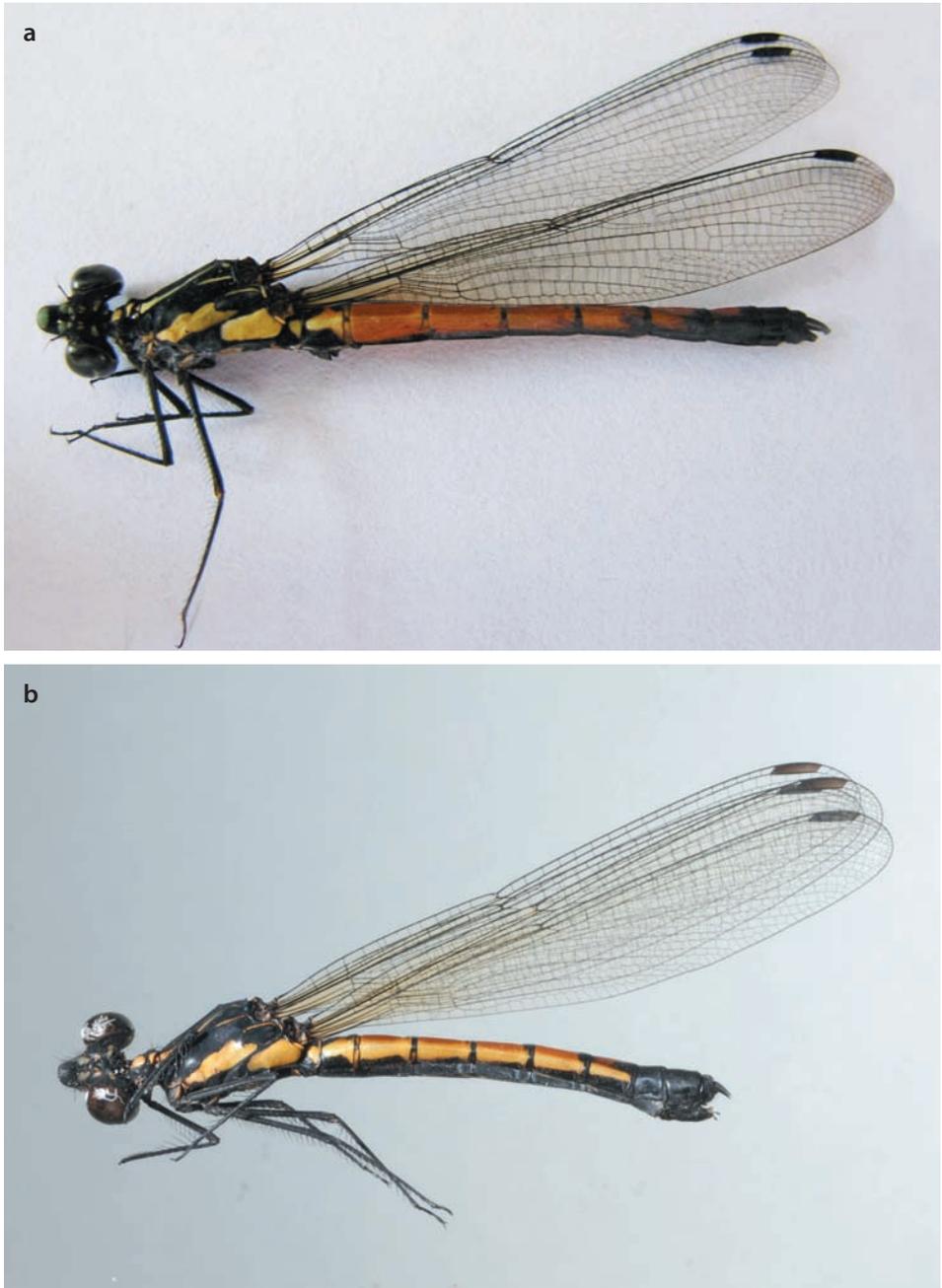
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REFERENCES

- Asahina, S., 1988. Notes on some Asiatic dragonflies in the collection of MCZ, Harvard University. Tombo 31: 2-8.
- Asahina, [S.], 1991. Corrigendum. Tombo 34: 54.
- International Commission on Zoological Nomenclature, 1999. International code of zoological nomenclature. Fourth edition. The International Trust for Zoological Nomenclature, London.
- Needham, J.G., 1930. A manual of the dragonflies of China. A monographic study of the Chinese Odonata. Zoologia Sinica (A) 11 (1): i-xi, 1-344, 20 pls excl.
- Reels, G.T., 2011. A field guide to the dragonflies of Hainan. Kadoorie Farm & Botanic Garden and China Forestry Publishing House, Beijing, in press.

- Sjöstedt, Y., 1932. Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas unter Leitung von Dr. Sven Hedin und Prof. Sü Ping-Chang. Insekten gesammelt vom schwedischen Arzt der Expedition Dr. David Hummel 1927-1930. 3. Odonata. Arkiv för Zoologi 25A (5): 1-22, 3 pls excl.
- Tsuda, S., 2000. A distributional list of world Odonata 2000. Privately published, Osaka.
- Wilson, K.P.D. & G.T. Reels, 2003. Odonata of Guangxi Zhuang Autonomous Region, China, part I: Zygoptera. Odonatologica 32: 237-279.
- Wilson, K.D.P., G.T. Reels & Zf. Xu, 2008. Revised checklist of Hainan Odonata, China. Echo 5: 6-14. [Included in Agrion 12 (1)].
- Zhang, Hm., 2010. The superfamily Calopterygoidea in South China: taxonomy and distribution - Progress Report for 2009 surveys. IDF-Report 26: 1-36.
- Zhou, Wb. & K. Bao, 2002. Odonata. In: Li, Zz. & Dc. Jin (eds) "Insects from Maolan". Guizhou Science and Technology Publishing House, Guiyang, pp. 95-101. [In Chinese; English summary].
- Zhou, X. & Wb. Zhou, 2006. Two new species of the family Chlorocyphidae (Odonata) from China. Entomotaxonomia 28: 13-16. [In Chinese; English summary].



Colour plate III: *Indocypha catopta* sp. nov. — (a) holotype male; (b) paratype female. Both were collected on a fast flowing rocky stream in the Maolan National Nature Reserve, Guizhou Province, China, in July 2008.