

## NEW ODONATA FROM SOUTH CHINA

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*Rhinocypha chaoi* sp. n. (holotype ♂: Dadingshan, Guangdong), *Megalestes discus* sp. n. (holotype ♂: Mangshan, Hunan), *Rhipidolestes chaoi* sp. n. (holotype ♂: Mangshan, Hunan), *Calicnemia chaoi* sp. n. (holotype ♂: Pengshan, Guangdong) and *Macromia unca* sp. n. (holotype ♂: Maoping, Guangdong) are described from the Shikengkong area of northern Guangdong province and southern Hunan in southern China.

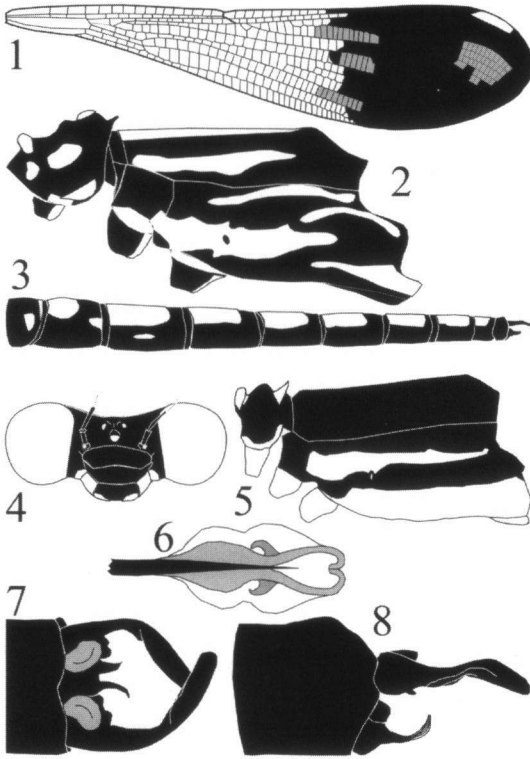
### INTRODUCTION

Odonata material from northern Guangdong and southern Hunan was collected during the period 25 June 2000 to 8 July 2000, by a rapid biodiversity survey team, organised by the Hong Kong based Kadoorie Farm and Botanic Garden, in collaboration with the Guangdong Forestry Department and the South China Institute of Botany. The survey area was mainly located within the Nanling National Nature Reserve, located some 60 kilometres north-northwest of Shaoguan city. Nanling National Nature Reserve is a large reserve covering some 531 km<sup>2</sup>, established in 1994. It was formed by linking up the smaller reserves of Babaoshan (established in 1984), Dadongshan, Cheng Jia and Xi Dong. The area surveyed includes Shikengkong peak of Mount Dadong, which at 1,902 m is the highest point in Guangdong province. To the north and immediately adjacent to the Nanling National Nature Reserve is the Mangshan Nature Reserve in Hunan Province, which covers a further 200 km<sup>2</sup>. A small part of the Mangshan Nature Reserve was surveyed close to the Babaoshan area.

### *RHINOCYPHA CHAOI* SP. NOV.

Figures 1-3

**Material.** – **Holotype** ♂: Dadingshan, Shikengkong, N Guangdong, China, 30-VI-2000, K.D.P. Wilson leg. – **Paratypes**: 3 ♂, 2 ♀, ditto, 30-VI-2000, coll. K.D.P. Wilson. – **Other material**: 4 ♂, Nankunshan, Guangdong, 23°35'N by 113°45'E, 26-V-2002, Tong, Xiaoli leg.; – 4 ♂, 1 ♀, Shimentai Provincial Na-



Figs 1-8. [1-3] *Rhinocypha chaoi* sp. n., ♂: (1) hindwing; (2) thorax, lateral; (3) abdomen, lateral; [4-8] *Megalestes discus* sp. n., ♂: (4) head, frontal; (5) thorax, lateral; (6) penile organ, ventral; (7) caudal appendages, dorsal; (8) caudal appendages, lateral.

its centre. Prothorax black with three areas of small pale bluish spots laterally, frontal lobe bordered pale bluish and oblong pale bluish spot at centre of the posterior lobe (Fig. 2). Synthorax black with prominent, pale blue, well developed mesothoracic triangle extending to antealar sinus, a pale blue antehumeral stripe above and below the humeral suture, a broad yellow stripe at base of metepisternum and a fine pale blue, curved stripe at posterior, upper corner, and a broad triangular stripe at corner of metepimeron (Fig. 2). Coxae black with posterior border finely pale. Legs black with white expanded inner tibia. Inner face of femora pale. Forewing hyaline. The maximum breadth of forewing is slightly larger than hindwing; typically 5.0 mm forewing and 6.0 mm hindwing; the ratio of hindwing to forewing is 1.2. The hindwing ratio of length to breadth is 4.1-4.3. Slightly more than one-third of the hindwing is coloured blackish inlaid with rectangular windows reflecting metallic violet (Fig. 1). R3 arising two cells distal to the subnodus. Pterostigma finely bordered black with pale bluish-white coloured centres. Abdomen

ture Reserve, 7-VIII-2003, coll. K.D.P. Wilson. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

**Etymology.** — Named in honour of the late Chao Hsiu-fu.

**Description.** — *Rhinocypha* with black synthorax, streaked above with large, elongate blue mesothoracic triangle, sides streaked predominately cyan blue above and bright yellow, below and abdomen almost entirely coloured a brilliant cyan blue.

**MALE.** — Labium pale cream with palpi tipped blackish-brown. Labrum, genae, clypeus, mandibles, antennae, shiny black. Frons above and top of head, matt black. Five minute pale spots on top of head; a pair of spots of similar size to the lateral ocelli, each lying just to their outer side, a pair of spots each lying at outer ends of the occiput and one lying at

black with small lateral cyan blue patch segment 1 and 2, large blue rectangular patches on dorsum of segments 2-9 as illustrated in Figure 3.

**FEMALE.** – Head black with paler yellow markings than male. Base of mandibles, genae, and base of antennae pale yellow. Face of frons with a pair of pale yellow triangular spots. Top of head with same minute pale yellow spots and an additional pair in front of the anterior ocellus. Thorax with similar pattern to male but extent of markings is much reduced and coloured pale yellow. Mesothoracic triangle narrow at base but long, extending to antealar sinus. Legs black without expanded tibia and inner face of femora pale. All wings entirely hyaline with white pterostigmas smoked with brown at proximal and distal areas, subtending 5-6 cells. Abdomen black with fine, interrupted pale yellow stripes at lateral margin and below from 1-7. Very fine interrupted dorsal stripe 2-7.

**Measurements (mm).** – ♂ abd. + app. 19.0-21.0, hw 23.0-24.5; ♀ abd. + app. 18.5-20.0; hw 26.0-26.5.

**DIFFERENTIAL DIAGNOSIS.** – Males of this species can be separated from all other *Rhinocypha* by its well developed mesothoracic triangle, distinctive thoracic and abdominal colouration, its hyaline forewing and broad hindwing with dark apex.

**REMARKS.** – There are seven species of *Rhinocypha* known from Chinese territory: (1) *R. fenestrella* Rambur known from Burma, China (Guangxi, Hainan and Tibet), Laos, Nepal, Peninsular Malaysia, Thailand and Vietnam, (2) *R. baibarana* Matsumura from Taiwan, (3) *R. biforata* Selys from Burma, China (Hainan), Indonesia, India, Laos, Nepal, Peninsular Malaysia, and Thailand, (4) *R. cuneata* Selys from Bangladesh, China, India and Nepal, (5) *R. drusilla* Needham, known only from Fujian, Guangxi, Hainan (unpub.) and Zhejiang, (6) *R. perforata* (Percheron), which is widespread throughout southern China, Indo-China, Thailand and Peninsular Malaysia (including ssp. *limbata*) and (7) *R. trimaculata* Selys from India and Tibet. *Indocypha katharina* (Needham), a large brick red species from broad rivers, described from southern China as a species of *Rhinocypha*, belongs to *Indocypha* (WILSON & REELS, 2003).

The subgenus *Aristocypha* Laidlaw includes *baibarana* with blue abdomens and others with more or less black abdomens such as *fenestrella* and *cuneata*. Both the fore and hindwings of this subgenus are highly coloured with vitreous spots and the hindwing is broader than forewing. R3 arises at the subnodus or occasionally at least 1 cell distal to subnodus. *Rhinocypha fulgipennis* (Guérin-Méneville, 1831) from neighbouring Vietnam is also a member of this subgenus. The hindwing ratio of breadth to length for *fenestrella* is 1:3.6 and its ratio of forewing breadth to hindwing breadth is 1:1.24. *R. biforata* and *R. perforata* have hindwing and forewing of similar petiolate shape and breadth. They also have short mesothoracic triangles. These two species belong to the subgenus *Heliocypha* Fraser. The hindwing ratio of breadth to length for *biforata* is typically 1:5.5. The classification of *chaoi* at subgeneric level is slightly problematical. It has a long prominent mesothoracic triangle typical of *Aristocypha* and hindwing slightly larger than forewing but a hyaline forewing. These characters are features of FRASER's (1934) *bifasciata* group.

*Rhinocypha trimaculata* has a black abdomen, lacks a coloured mesothoracic triangle

and has highly coloured fiery, coppery red wings. *R. drusilla* has similar wing shape and venation, but has a red coloured abdomen and short mesothoracic triangle. *R. watsoni* van Tol & Rozendaal, 1995, which was recently described from Vietnam, is considered closely related to *drusilla*. It is a black species with short uncoloured mesothoracic triangle and uncoloured forewing. Both *drusilla* and *watsoni* lack the metallic reflecting windows of *chaoi*. *R. seducta* HÄMÄLÄINEN & KARUBE (2001a), recently described from Vietnam, has similar venation, a hyaline forewing but somewhat proportionately narrower hindwing and the abdomen is almost entirely black. *R. orea* HÄMÄLÄINEN & KARUBE (2001b), also from Vietnam, is another black species with hyaline forewing and opaque, blackish hindwing with violet, green and coppery reflections.

### MEGALESTES DISCUS SP. NOV.

Figures 4-8

**Material.** — **Holotype** ♂: Mangshan (near Babaoshan), Shikengkong, S Hunan, China, 26-VI-2000, K.D.P. Wilson leg. — **Paratype**: 1 ♂, ditto, 26-VI-2000. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

**Etymology.** — Named after the disc-like structure at the base of the superior appendages.

**Description.** — Small-sized *Megalestes* with pale disc-like structures located at base of male superior appendages.

**MALE.** — Labium pale whitish yellow. Labrum shiny metallic green with lateral distal borders pale yellow. Base of mandibles pale yellow. Anteclypeus blackish spotted with pale yellow. Postclypeus, frons, top of head and rear of head shiny metallic green. Antennae black with small pale yellow spot at base. Ocelli pale yellow. The frontal head is illustrated in Figure 4. Prothorax blackish metallic green with pale yellow frontal lobe, rear lobes and lateral margin. Dorsum of synthorax and mesepimeron shiny, dark metallic green with black humeral suture (Fig. 5). Metepisternum shiny, dark metallic green with pale yellow stripe which is broad anteriorly and narrows towards posterior. The pale yellow stripe is finely bordered with black margin. Metepimeron and metaposternum pale yellow. Coxae pale yellow. Legs pale brown outer faces and dark brown inner, ventral faces. Wings hyaline with dark brown pterostigma, covering three cells, braced at anterior margin. First two segments blackish above with metallic green reflection and pale yellow below. Segments 3-5 bronzy brown with faint metallic green reflection. Segments 6-8 dark brown with metallic green reflection. Segments 9-10 blackish brown with faint metallic green reflection covered in whitish pruinescence prior to preservation. Superior appendages blackish with pale disk-like structure at dorsal base (Figs 7-8). Quadrate, peg-like projection, bifurcated at tip, downward and posterior pointing, originating from inside face of the superior appendage below disk-like structure. Inferior appendages with stout central posterior directed projection beset at tip with long upwardly curved orange brown hairs. Penile organ is illustrated in Figure 6.

**Measurements** (mm). — abd. + app. 49.0-50.0, hw 32.0-35.0.

DIFFERENTIAL DIAGNOSIS. — There are five *Megalestes* species known from China. These comprise *M. chengi* Chao, 1947 from Fujian, *M. distans* Needham, 1930 from Guangxi, Jiangxi and Sichuan, *M. heros* Needham, 1930 from Fujian, Zhejiang and possibly Sichuan, *M. maai* Chen, 1947 from Taiwan, *M. micans* Needham, 1930 from Sichuan, Yunnan and Assam, and *M. riccii* Navás, 1935 from Jiangxi. *M. discus* is the only Chinese member of the genus to possess superior appendages with basal disc-like structures. It is closely related to *M. lieftincki* LAHIRI (1979), which is the only other *Megalestes* known to possess superior appendages with distinctive basal expansions. The inferior appendages of *lieftincki* have an upward pointing spine (absent in *discus*) in addition to the curved tip.

### RHIPIDOLESTES CHAOI SP. NOV.

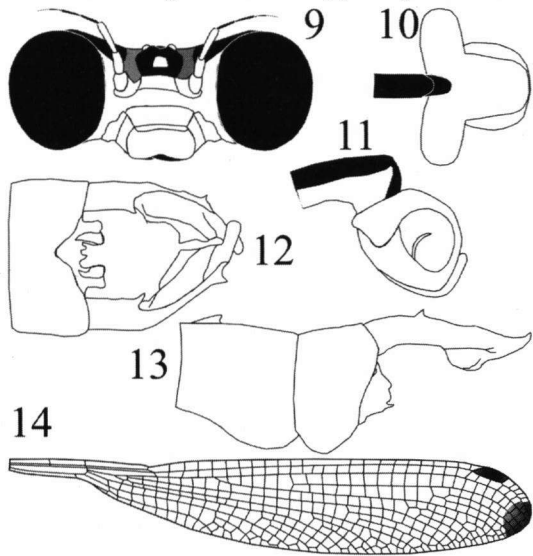
Figures 9-14

**Material.** — **Holotype** ♂: Mangshan (near Babaoshan), Shikengkong, S Hunan, China, 26-VI-2000, K.D.P. Wilson leg. — **Paratype**: 1 ♂, ditto, 26-V-2002, coll. K.D.P. Wilson. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

**Etymology.** — Named in honour of the late Chao Hsiu-fu.

**Description.** — Medium-sized *Rhipidolestes* with ochreous face. Males with tiny conical projection on dorsum of ninth abdominal segment, inferior appendage with small upward and minute outward, sharply pointed projections and penile organ with short, simply-shaped, broad lobes.

**MALE.** — Labium dark brown. Labrum, postclypeus, face and antennae chrome yellow. Anteclypeus reddish-yellow. Top of head above antennae matt blackish-brown with pale mid-brownish areas between antennae, surrounding the ocelli anteriorly and laterally and rear of head laterally (Fig. 9). The occiput is blackish-brown. Prothorax matt-black with a pair of broad pale yellow dorso-lateral stripes. Dorsum of synthorax black with broad, yellow antehumeral stripes, which fall short of the posterior margin



Figs 9-14. *Rhipidolestes chaoi* sp. n., ♂: (9) head, frontal; (10) penile organ, ventral; (11) penile organ, lateral; (12) caudal appendages, dorsal; (13) caudal appendages, lateral; (14) hindwing.

below the wings, typical of the genus. Small pale spot below wings. Sides of thorax black with broad ochreous yellow metepisternal stripe covering the spiracle. Metaposternum pale yellow. Metepimeron mainly black with small area adjacent to metaposternum and dorsal corner below hindwings pale yellow. Coxae mainly pale with smoky-black central areas. Legs pale ferruginous. Wings have medium venation density with mid-brown pterostigma subtending three segments (Fig. 14). Extreme tips beyond pterostigma smoky-brown. Abdomen dark brown. Base of ninth segment with tiny, vestigial projection with single, blunt point. Caudal appendages blackish brown. Superior appendages very stout distal half with prominent, inwardly pointing, basal projection, minute outward pointing projection towards tip and narrow finger-like projection at tip (Figs 12-13). Inferior appendages short, squarish, peg-like with dorsal, finely pointed projection and short, ventral projection. Penile organ with short, stout, squarish lobes (Figs 10-11).

Measurements (mm). — abd. + app. 45.0-48.5, hw 31.5-32.0.

DIFFERENTIAL DIAGNOSIS. — *R. chaoi* can be separated from all other congeners by the following characters; (1) vestigial or minute non-bifurcated dorsal projection at the dorsal base of the ninth abdominal segment, (2) ochreous face, (3) penile organ with pair of short, broad, squarish-shaped projections, and (4) squarish, peg-like inferior appendages with both upward and outward projections. The closest congeners are *R. malaisei* LIEFTINCK (1948) and *R. jucundus* LIEFTINCK (1948). *R. malaisei* lacks a prominent dorsal projection on the ninth abdominal segment, which is blunt in profile. The inferior appendages of *malaisei* lack a ventral projection. *R. jucundus* has a bifid vestigial abdominal projection and its inferior appendages are broad and flat and not peg-like.

REMARKS. — Three further species of *Rhipidolestes* species are known from neighbouring Guangdong and Hong Kong. These comprise *R. cyanoflavus* WILSON (2000) and *R. truncatidens* Schmidt and *janetae* WILSON (1997).

### CALICNEMIA CHAOI SP. NOV.

Figures 15-21

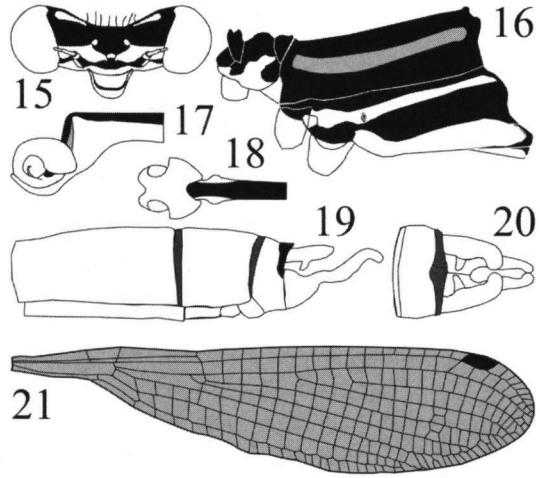
Material. — **Holotype** ♂: Pengshan (Dadingshan), Shikengkong, N Guangdong, China, 1-VII-2000, K.D.P. Wilson leg. — **Allotype**: ♀, ditto, 1-VII-2000. — **Paratypes**: 1 ♂, Henglongbei, Shikengkong, 28-VI-2002; 7 ♂, 1 ♀, Dadingshan, Shikengkong, N Guangdong, 30-V-2000; 1 ♂, Longtanjiao, N Guangdong, 2-VII-2000; 1 ♀, Cheng Jia, N Guangdong, 5-VII-2000. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

Etymology. — Named in honour of the late Chao Hsiu-fu.

Description. — A *Calicnemia* with bright red coloured abdomen and amber tinted wings.

MALE. — Pale labium. Labrum, base of mandibles, genae, shiny orange red. Frons and clypeus carmine red. Irregular transverse line across front of head covering base of frons and base of antennae (Fig. 15). A pair of quadrate, carmine red spots above anten-

nae almost linked below central ocellus. Top of head matt black with elongate, yellow, tear-shaped postocular spots. Prothorax matt black with pale yellow lateral spots (Fig. 16). Synthorax black with broad, bright orange red dorsal stripe. Sides of synthorax with a yellow stripe across metepisternum, covering the spiracle and lower metepimeron and metaposternum yellow (Fig. 16). Legs pale reddish brown. Wings uniformly tinted rich amber. Pterostigma greyish-brown, braced at proximal corner and subtending two to three cells (Fig. 21). Abdomen bright, blood red with segment 1 pale orange and segment



Figs 15-21. *Calicnemia chaoi* sp. n., ♂: (15) head, frontal; (16) thorax, lateral; (17) penile organ, lateral; (18) penile organ, ventral; (19) caudal appendages, lateral; (20) caudal appendages, dorsal; (21) hindwing.

10 blackish at distal border. Caudal appendages as figured in Figures 19-20 with long superior appendages twice length of 10<sup>th</sup> abdominal segment. Inferior appendages slightly longer than segment 10 with prominent downward and inward pointing basal pegs. Penile organ with simple, short, broad, quadrate lobes as illustrated in Figures 17-18.

**FEMALE.** — As male with red and orange red pattern of frontal head replace with pale orange. Dorsal thoracic stripe is fine yellow. Abdomen is uniformly dull orange red apart from segment 1 which is pale yellow and dorsum of abdominal segments 8-10 which are coloured dark brown. Wings, like the male, are strongly tinted uniformly amber.

**Measurements (mm):** ♂, abd. + app. 31.5-33.0; hw. 22.0-24.0; ♀ abd. + app. 27.5-29.0, hw 22.0-24.0.

**DIFFERENTIAL DIAGNOSIS.** — LIEFTINCK (1984) divided all the members of *Calicnemia* into two main species groups according to the structure of their penile organs. Group I species possess a pair of recurved penile lobes ending in narrow, ribbon-like filaments whereas Group II species have a recurved penis with broadly expanded lobes. *C. chaoi* belongs to the latter group. Of the six *Calicnemia* species known from China and adjacent Vietnam four, comprising *C. eximia* (Selys), *C. erythromelas* (Selys), *C. imitans* Lieftinck, and *C. sinensis* Lieftinck, have Group I penile organs. The remaining two species, *C. miles* (Laidlaw), and *C. uenoi* Asahina have Group II penile organs. *C. uenoi* has a fine ventral peg and only the anterior half of the abdomen is coloured red (ASAHINA, 1997). *C. miles* (Laidlaw) is undoubtedly the closest congener and apart from the unique amber wings of *chaoi* it is difficult to separate the two species. The apical tips of the penile lobes of *chaoi* are reflexed and subacute, almost squarish, whereas the apical lobes of *miles* are curved, but not reflexed, and sharply pointed (cf. ASAHINA, 1985: 4-5, figs 9-16).

*MACROMIA UNCA* SP. NOV.

Figures 22-30

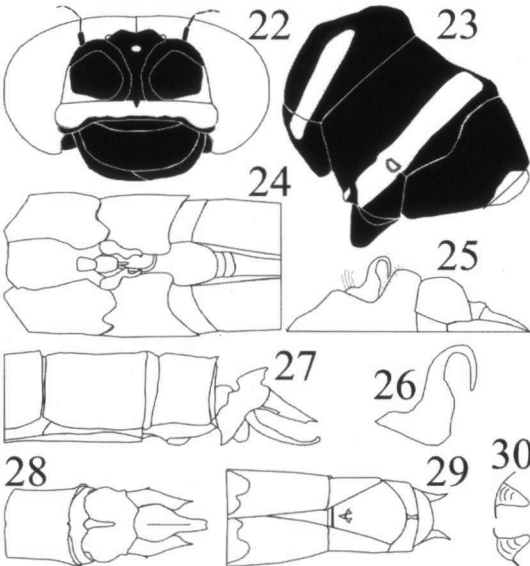
**Material.** — **Holotype** ♂: Maoping (Dadongshan), N Guangdong, China, 5-VII-2000, K.D.P. Wilson leg. — **Paratypes**: 3 ♀, Maoping (Dadongshan), 5-VII-2000, coll. K.D.P. Wilson; 1 ♂, 1 ♀, ditto, 6-VII-2000. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

**Etymology.** — The name *unca* is derived from the Latin word "uncus" meaning hooked, bent in or curved. The name reflects the markedly hooked posterior hamulus.

**Description.** — Short bodied *Macromia* with blackish face, yellow labium, broad yellow antehumeral stripe and males with stout pyramidal process on the male abdominal segment 10.

**MALE.** — Ochreous yellow labium with diffuse dark brown areas on central lobe and distal borders. Mandibles and labium black, anteclypeus dark brown, postclypeus bright yellow with distal margins dark brown, as illustrated in Figure 22. Frons dark blackish brown with metallic blue reflections and lower, lateral halves coloured yellow. Frons deeply grooved at centre to form pair of smoothly-rounded, pyramidal processes at apexes, which are slightly protruded frontally with flattish faces. Vertex raised to form a small pyramidal process. Occiput black, slightly raised. Prothorax matt dark brown.

Synthorax (Fig. 23) blackish with shiny metallic green reflections and covered in thick coat of fine yellow hairs. Dorsum with broad yellow stripe falling short of wing bases by about one quarter the length of the mesepisternum. Dorsal stripe continues onto the mesokatepisternum. Broad yellow stripe covering upper two-thirds of metepisternum, covering the spiracle and continuing across the metakatepisternum. Coxae dark brown. Legs black. Tibia of hind femora with white keel covering three quarters of length. Keels of front and middle legs slightly less than half the tibial lengths. Metaposternum, and minute area immediately adjacent on metepimeron, yellow. Antealar sinuses yellow.



Figs 22-30. [22-28] *Macromia unca* sp. n., ♂: (22) head, frontal; (23) thorax, lateral; (24) secondary appendages, ventral; (25) secondary appendages, lateral; (26) posterior hamulus; (27) caudal abdomen, lateral; (28) caudal abdomen, dorsal; [29-30] *M. unca* sp. n., ♀: (29) caudal abdomen, ventral; (30) valvula vulvae.



low. Wings hyaline with short blackish-brown pterostigmas subtending two to three cells. Anal field complete with 9-10. Anal corner of hindwing rounded i.e. not sharply pointed. First abdominal segment black. S2 black with basal half, including small oreilet, yellow. S3-5 black with pairs of yellow spots proximal to transverse carina. S6-10 black with basal quarter of S7 yellow and minute yellow spot at basal, ventro-lateral corner of S8. S10 very short less than half width of S9, which is itself half width of S8. S10 with stout, dorsal, pyramidal projection covering basal half as illustrated in Figures 27-28. Superior appendages black, about twice length of S10, stout and sharply pointed with minute lateral projections, basal to the mid-point. Inferior appendage dark brown, slightly longer than superior appendages. Posterior hamulus with remarkably hooked tip as shown in Figures 24-26.

FEMALE. — Stouter and slightly larger than male with smoky-brown wing tips. Head and thorax as male. Legs without keels. Abdomen as male with slightly larger yellow markings than male and S6 also with a pair of yellow spots, basal to transverse carina. Anal field 11-14 cells. Wings very pale amber throughout and enfumed with faint smoky-brown at wing tips. Valvular vulvae are minute rounded, peg-like protrusions as illustrated in Figures 29-30.

Measurements (mm): ♂, abd. + app. 45.0-45.5; hw. 41.5-42.0; ♀ abd. + app. 46.5-50.0, hw 47.0-50.0.

DIFFERENTIAL DIAGNOSIS. — The prominent yellow dorsal stripe, stout pyramidal process on the dorsum of the tenth abdominal segment and distinctly hooked-shaped posterior hamulus will serve to separate this *Macromia* from all other known species. There are no Chinese *Macromia* which are closely related to this new species. In neighbouring Vietnam, *M. cingulata* Rambur, also known from India and Nepal, although smaller, has similar body coloration, tenth abdominal process and hooked posterior hamulus. The posterior hamulus of *cingulata* is not so profoundly hooked as *unca* and the lateral teeth of the superior appendages are distal to the mid-point (cf. FRASER, 1936: 179-182, figs 57 & 60c).

REMARKS. — Following the publication of the Odonata of Hainan (WILSON & REELS, 2001) there were 16 species of *Macromia* known from Chinese territory. Including *unca* there are now 17 species known from China. The four females and two males were taken on two successive evenings, just before dusk, in a shaded lane adjacent to a Forestry Department field station. No observations of this species were made, during day light for the entire period of the two-week survey conducted in the Shikengkong area.

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