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A Revision of *Mesopodagrion* McLachlan, 1896 (Odonata: Zygoptera: Megapodagrionidae)

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Abstract

A synopsis of *Mesopodagrion* including diagnostic illustrations, distribution maps, and keys to all taxa incorporates the following taxonomic changes: *Mesopodagrion yachowensis* Chao, 1953 is resurrected from synonymy, *Mesopodagrion tibetanum* McLachlan, 1896 comprises two subspecies, one new *M. tibetanum australe* and a unique character for the genus, the bifurcate process on distal dorsum of S10 of the male.

Key words: Odonata, Megapodagrionidae, *Mesopodagrion*, revision

Introduction

Mesopodagrion was established by McLachlan (1896) to accommodate his unique species *Mesopodagrion tibetanum* from Moupin (now, Baoxing, Sichuan province), China. He diagnosed his new species from *Argiolestes* Selys and all Old-World forms of the légion [Podagrion] by "…wings ceasing to be petiolated before the basal postcostal nervule" and "postcostal area with one row of cellules." In his key to genera, Needham (1930) separated *Mesopodagrion* (one row of cells behind CuA), based on the original description, from a series of *Philosina buchi* Ris, 1917 (2–3 rows of cells behind CuA). Fraser (1933) redescribed *M. tibetanum* from a series collected at the type locality, and provided figures of caudal appendages and genital ligula. Fraser (1933) thought the male in life to be blue rather than apple-green in preserved specimens. Lieftinck (1948) observed specimens from Shaanxi, China, to be larger than those from northeast of Burma, believed *M. tibetanum* to be more widely distributed than previously known and suggested division into subspecies. Chao (1953) described *M. yachowensis* from Beh-Luh-Din and Chin Chi Shien, both near Yachow (now, Ya'an, Sichuan, China) based on comparison with descriptions and figures from Fraser (1933). Asahina (1955) compared specimens from Southern Shaanxi and Zhejiang provinces, China, with the syntypes of *M. tibetanum* in the British Museum and noted that 'the pale pattern of the types are more extended than those from Shaanxi and Zhejiang' and noted the bifurcate process on the distal dorsum of S10 for the male. He believed Fraser's (1933) illustrations failed to include the bifurcate process and further disagreed with Fraser's suggestion of blue coloration for the species in life. Asahina (1955) quoting Lieftinck (1948) who stated that specimens from South Shaanxi did not differ structurally or in size from more westerly specimens, noted size discrepancies of his specimens from type material in the BMNH. Chao (1987) treated *M. yachowensis* as a junior synonym of *M. tibetanum* ascribing his error to "…lack of experience and the misleading by Fraser's inaccurate drawing to the apex of abdomen and penile organ." He provided a complete bibliography and distribution for *M. tibetanum*, and noted that the type locality, 'eastern Tibet', is actually located in Sichuan province, China. He suggested excluding Xizang (Tibet) from the distributional list of *M. tibetanum*. Based on examination of published literature and a number of specimens, species limits within this poorly-known genus

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seem unclear. Accordingly, we provide a revision for the genus based on new material. Field observations are few; its members are poor flyers preferring to spend most of their time sitting on leaves.

Materials and methods

Specimens. We examined 22 specimens all from China comprising 16 ♂ and 6 ♀. All are deposited in Nankai University, Hebei University, and the Institute of Zoology, Chinese Academy of Sciences, China. We also examined photos of 15 specimens (provided by Dr. Vincent J. Kalkman, including the syntype specimens of *Mesopodagrion tibetanum*) from Yunnan and Sichuan provinces, China and Northwestern Burma, preserved in BMNH, CUMZ, and RMNH. A FEI Quanta 200 environmental scanning electron microscope was used to photograph male caudal appendages and female pronota in a low vacuum mode. Because specimens were few none was cleaned and dried or coated with gold-palladium. All the figures were drawn with aid of a digital camera, light microscope, and computer. Digital photos from specimens were used as models and rendered using Adobe Photoshop. All measurments are in mm, abdominal length for both sexes includes caudal appendages; S= abdominal segment(s).

Abbreviations For Collections

CHU	Hebei University, Life Sciences College, Baoding, Hebei, China,
IZAS	Institute of Zoology, Academia Sinica, Beijing, China,
NKUM	Nankai University, College of Life Sciences, Tianjin, China,
BMNH	The Natural History Museum, London, UK
CUMZ	Cambridge University, Museum of Zoology, Cambridge, UK
RMNH	Nationaal Natuurhistorisch Museum Naturalis, Leiden, The Netherlands

Results

Taxonomy

The diagnostic characters of *Mesopodagrion* as listed by McLachlan (1896) are equivocal. A posteriorly directed bifurcate process on S10 (Figs. 5a, c, e, g) in males appears to be an autapomorphy. Although McLachlan (1896), Chao (1953), and Asahina (1955) mentioned the bifurcate process as an important feature, none treated it as diagnostic or unique. According to characters we examined coupled with the creditable original figures in Chao (1953), we agree with Kalkman (2008) and elevate *M. yachowensis* from synonymy as proposed by Chao (1987). We also consider *M. tibetanum* to comprise two subspecies, *M. t. tibetanum* and *M. t. australe* **ssp. nov.**

According to McLachlan (1896)'s original description and photos of the syntype specimens from BMNH taken by Vincent J. Kalkman, we believe the male syntype represents *M. t. tibetanum*, and the female syntype represents *M. yachowensis* as reported by Kalkman (2008). First, McLachlan (1896) noted that the rear of head of the female was entirely black, which condition should be the same in both sexes according to our study. Second, photos of the type female showed a definitely broken antehumeral stripe characteristic of *M. yachowensis*. Finally, according to McLachlan, abdominal length of the type female (35) was longer than for the type male (33). Abdominal length for all females were shorter than their conspecific males, and abdominal length in male *M. yachowensis* was significantly longer than in *M. tibetanum* (Table 2). Asahina (1955) had also noted some differences between the holotype and his specimens from Shaanxi and Zhejiang, China, but, unfortunately, he failed to mention the important characters of cerci and genital ligula, which can be used to readily distinguish the two species.

Key to species and subspecies for *Mesopodagrion*

1 Rear of head black (Fig. 3a); antehumeral stripe broken at the upper end (Fig. 4a); basal half of cerci in dorsal view dilated, twice as wide as distal half (Figs. 8–10); Bifurcate process shorter than 1/2 length of S10, outer margin concave, smooth (Figs. 5a, 8–10); apical lobes of genital ligula bifurcate at base (Fig. 1, d & e). ..... *M. yachowensis*

- Rear of head pale or at least pale at upper border (Fig. 3b, c); antehumeral stripe complete or interrupted at upper end (Fig. 4b–d); basal half of cerci in dorsal view as wide as, or slightly wider than distal half ; bifurcate process not shorter than 1/2 length of S10, outer margin inflectional or arched and smooth (Figs. 5b–d, 11–15) ; apical lobes of genital ligula bifurcate distal to base (Fig. 2, d & e) (*M. tibetanum*)..... 2

2 Pale occipital bar present (Fig. 4b); only upper border of rear of head pale (Fig. 3b); bifurcate process foot-like in latero-ventral view (Fig. 18), outer margin inflectional, not smooth (Figs. 5b; 11). .....*M. t. tibetanum*

- Pale occipital bar absent (Fig. 4c, d); rear of head entirely pale (Fig. 3c); bifurcate process not foot-like in latero-ventral view (Fig. 19), outer margin arched and smooth (Figs. 5c–d, 12–15)..... *M. t. australe* **ssp. nov**

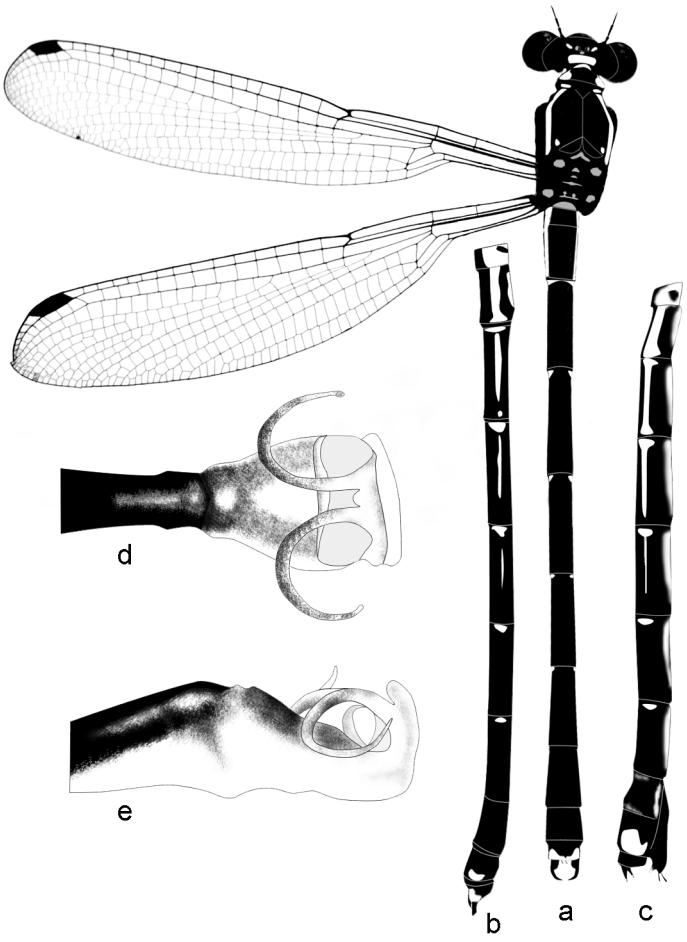


FIGURE 1. *Mesopodagrion yachowensis* (China, Henan, Songxian, Mt. Baiyun): (a) body and wings, dorsal view, ♂; (b) abdomen, lateral view, ♂; (c) abdomen, lateral view, ♀; (d) genital ligula, ventral view, ♂; (e) genital ligula, lateral view, ♂.

***Mesopodagrion tibetanum* McLachlan, 1896**

Remarks. As discussed in the introduction, the male and female syntypes of *Mesopodagrion tibetanum* in BMNH represent two different species. In order to preserve current usage of the name we here designate the syntype male as lectotype. We have informed the curator of the Odonata collection, David Goodger, of this and have asked him to apply the following lectotype label to the male: "*Mesopodagrion tibetanum* McLachlan, 1896/LECTOTYPE des. Xin Yu & Wenjun Bu, 2009." The lectotype male is the type species for

Mesopodagrion and its type locality is Moupin, now in Sichuan province, China. Curiously, Kimmins (1970) did not list this species in his type catalog. Fraser's (1933) account should apply to *Mesopodagrion tibetanum* but Fraser neglected to illustrate or discuss the unique bifurcate process although cerci and genital ligula were correctly figured . None of our specimens was consistent with the wing vein pattern illustrated by Fraser (1933), i.e. 'two rows of cells between Cuii and IA near their terminations'. His supposition that pale color on living male was blue was correct based on our field work. This species usually has pruinosity onS9–10. Based on distinct differences between populations from Sichuan and Yunnan we have divided them into two subspecies as follows.

TABLE 1. T-Test of A+A length, HW length for ♂ *Mesopodagrion.*

	Species	N	Mean	Range	F	df	t
Abdomen plus appendage length	*yachowensis*	6	36.6	33.0–36.0	$F_{0.155} = 0.701$	12	$t_{3.41} = 0.005$
	tibetanum	8	34.1	35.0–38.0			
HW length	*yachowensis*	7	30.9	29.5–32.5	$F_{0.177} = 0.680$	14	$t_{1.919} = 0.076$
	tibetanum	9	29.6	27.0–30.5			

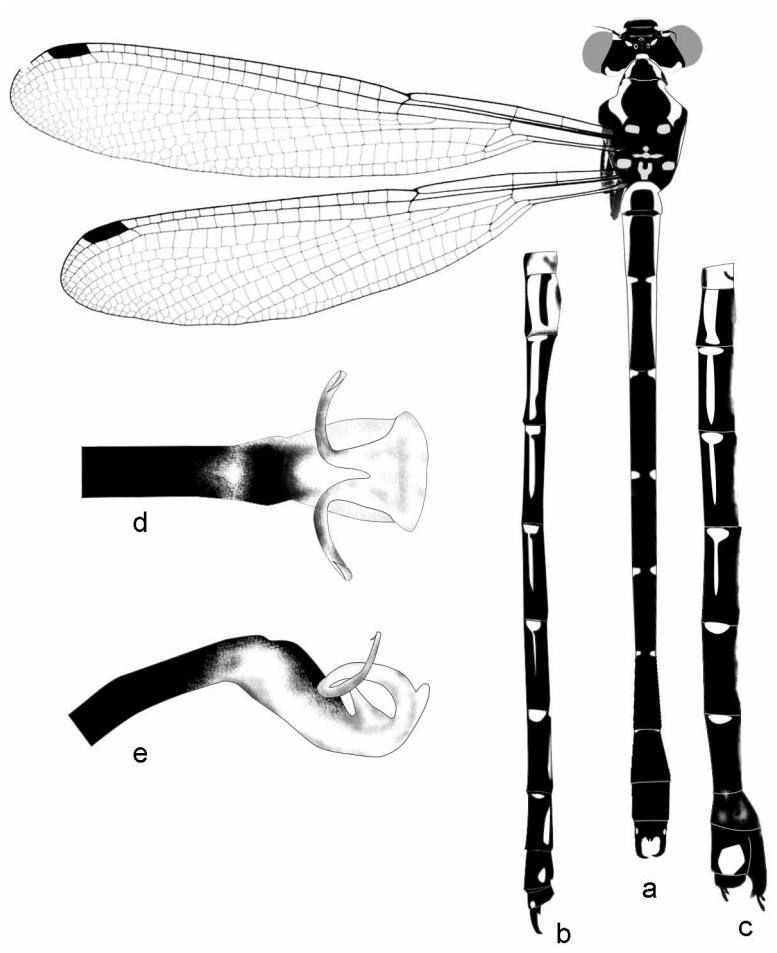


FIGURE 2. *Mesopodagrion tibetanum* (China, Sichuan, Wolong Nature Reserve): (a) body and wings, dorsal view, ♂; (b) abdomen, lateral view, ♂; (c) abdomen, lateral view, ♀; (d) genital ligula, ventral view, ♂; (e) genital ligula, lateral view, ♂.

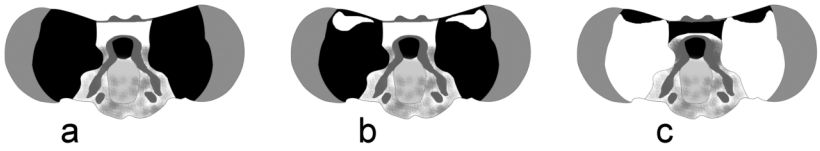


FIGURE 3. Color pattern of rear of head. a, *Mesopodagrion yachowensis* (China, Shaanxi, Ningshan, Huoditang); b, *Mesopodagrion tibetanum tibetanum* (China, Sichuan, Wolong Nature Reserve); c, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Lijiang, Mt. Yulong).

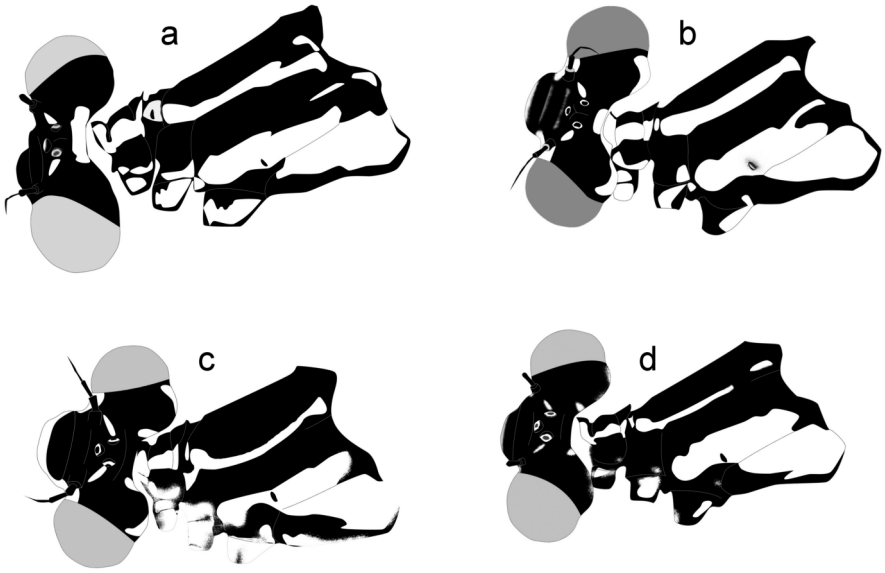


FIGURE 4. Pale occipital bar and antehumeral stripe. a, *Mesopodagrion yachowensis* (China, Henan, Songxian, Mt. Baiyun); b, *Mesopodagrion tibetanum tibetanum* (China, Sichuan, Wolong Nature Reserve); c, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Lijiang, Mt. Yulong); d, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Yuanjiang, Nanxi).

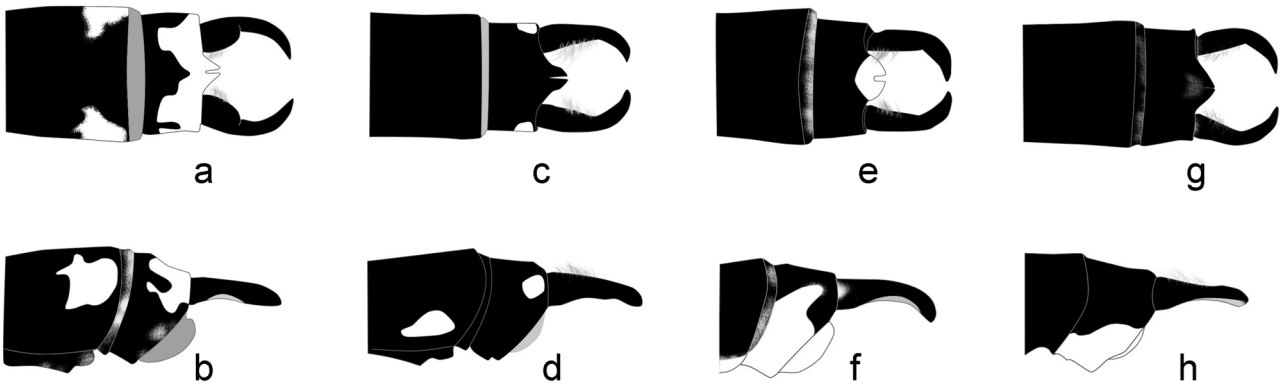


FIGURE 5. Color pattern of ♂ S10 and appendages, dorsal and lateral. a, *Mesopodagrion yachowensis* (China, Henan, Songxian, Mt. Baiyun); b, *Mesopodagrion tibetanum tibetanum* (China, Sichuan, Wolong Nature Reserve); c, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Lijiang, Mt. Yulong); d, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Yuanjiang, Nanxi).

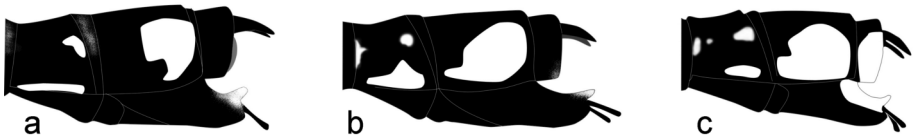


FIGURE 6. FAE. a, (China, Henan, Huixian, Baligou); b, *Mesopodagrion tibetanum tibetanum* (China, Sichuan, Wolong Nature Reserve); c, *Mesopodagrion tibetanum australe* **ssp. Nov.** (China, Yunnan, Dali).

Mesopodagrion tibetanum tibetanum McLachlan, 1896

Mesopodagrion tibetanum: McLachlan, 1896: 372–273, "Moupin (now Baoxing, Sichuan, China)"; Needham, 1930: 239–240, "Tibet"; Fraser, 1933: 96–98, figs. 44, 45, 46 (c, d), "Tibet, Sichuan"; Lieftinck, 1948: 7, "Burma, China (Shaanxi)" (in part); Asahina, 1955: 130–133, figs. 1–6, "Burma, China (Shaanxi, Sichuan, Zhejiang, Yunnan)" (in part); SUI & SUN, 1986: 294–295, Fig. 201, "Burma, China (Xizang, Yunnan, Zhejiang)" (in part); Chao, 1987: 112, 120; "Burma, China (Shaanxi, Sichuan, Yunnan, Zhejiang)" (in part); Kalkman, 2008: 187, habits, key to species.

Material. 1 ♂, China, Moupin (now Baoxing, Sichuan), 189?,. (BMNH) [Holotype]; 2 ♂, 1 ♀, China, Sichuan, Wolong nature reserve, 2040m, 24-VII-2005, Xin Yu leg. (NKUM).

Description. Male. Labium black; labrum, bases of mandibles, genae, anteclypeus and sides of frons pale; postclypeus, middle of frons, and top of head, including antennae, black, except for a pair of short pale stripes between lateral ocelli and bases of antennae; postocular spots absent, pale occipital bar present (Fig. 4b); upper border of Rear of head pale, remainder black (Fig. 3b). Prothorax black except for a pair of pale stripes on propleura and lower-most margin; synthorax black dorsally with wide pale antehumeral stripe about 1/2 width of mespisternum, sides of synthorax pale except for ventral border (Fig. 4b); legs black, pale at base; wings hyaline; pterostigmata brown, braced, covering three cells. S1-2 black dorsally, pale laterally; S2 with black stripe laterally; S3-6 black with pale basal spot and lateral stripe gradually narrowing distally; S7-8 black except for pale basal spot and a pair of ventral narrow stripes (figs. 2a, 2b); S9 black except for a pale latero-ventral spot; S10 black except for pale postero-lateral spot (Fig. 5d); bifurcate process longer than 1/2 of S10, apex acute, outer margin inflectional, not smooth, hemline of bifurcate process about 1/2 width of S10 (Figs. 5c, 11), foot-like from latero-ventral view (Fig. 18); caudal appendages black, cerci almost twice as long as S10, paraprocts vestigial (Figs. 5d, 11); genital ligula simple, apical lobs bifurcated beyond the base (Fig. 2, d & e).

Female. Similar as male by color pattern but slightly shorter in body length and more robust (Fig. 2c). S10 wholly black; ending before level of cerci, black except for pale tip (Fig. 6a). Pale body color pattern on living female apple-green.

Distribution. Known from northwestern Burma and central Sichuan, China. The nominotypic subspecies occurs principally north of *M. t. australe* but south of *M. yachowensis* (Fig. 7). This subspecies is believed by Kalkman (2008) to occur in Kambaiti, NW Burma.

Mesopodagrion tibetanum australe ssp. nov.

Mesopodagrion tibetanum: Lieftinck, 1948: 7, "Burma, China (Shaanxi)" (in part); Asahina, 1955: 130–133, figs. 1–6, "Burma, China (Shaanxi, Sichuan, Zhejiang, Yunnan)" (in part); SUI & SUN, 1986: 294–295, Fig. 201, "Burma, China (Xizang, Yunnan, Zhejiang)" (in part); Chao, 1987: 112, 120; "Burma, China (Shaanxi, Sichuan, Yunnan, Zhejiang)" (in part).

Materials. Holotype: ♂, China, Yunnan, Yuanjiang, Nanxi, 2100m, 20-VII-2006, Xin Yu leg. (NKUM);

Paratypes: 1 ♂, China, Yunnan, Mt. Ailao, Xujiaba, 8-V-1984, Leyi Zheng leg. (NKUM); 1 ♂, 2 ♀, China, Yunnan, Dali, 20-VI-2005, Benyong Mao leg. (NKUM); 3 ♂, China, Yunnan, Lijiang, Mt. Yulong, 15-VI-1998, Wenjun Bu leg. (NKUM); 1 ♂, China, Yunnan, Lijiang, Mt. Yulong, 2700m, 14-VIII-1979, Zuopei Ling leg. (NKUM); 2 ♂, 1 ♀, China, Sichuan, Luding, Mt. Gongga, 16-VI-1993, Yang Bing leg. (CUMZ); 3 ♂, 1 ♀, China, Yunnan, 1918, G. Forrest leg. (BMNH); 2 ♀s, Upper Burma, Seinghku Valley, 5000', 17-V-1926, Ward leg. (BMNH); 1 ♂, China, Yunnan, 1918, G. Forrest leg. (CUMZ).

Etymology. The subspecific name refers to the more southerly distribution for this subspecies compared to that of the nominotypical subspecies.

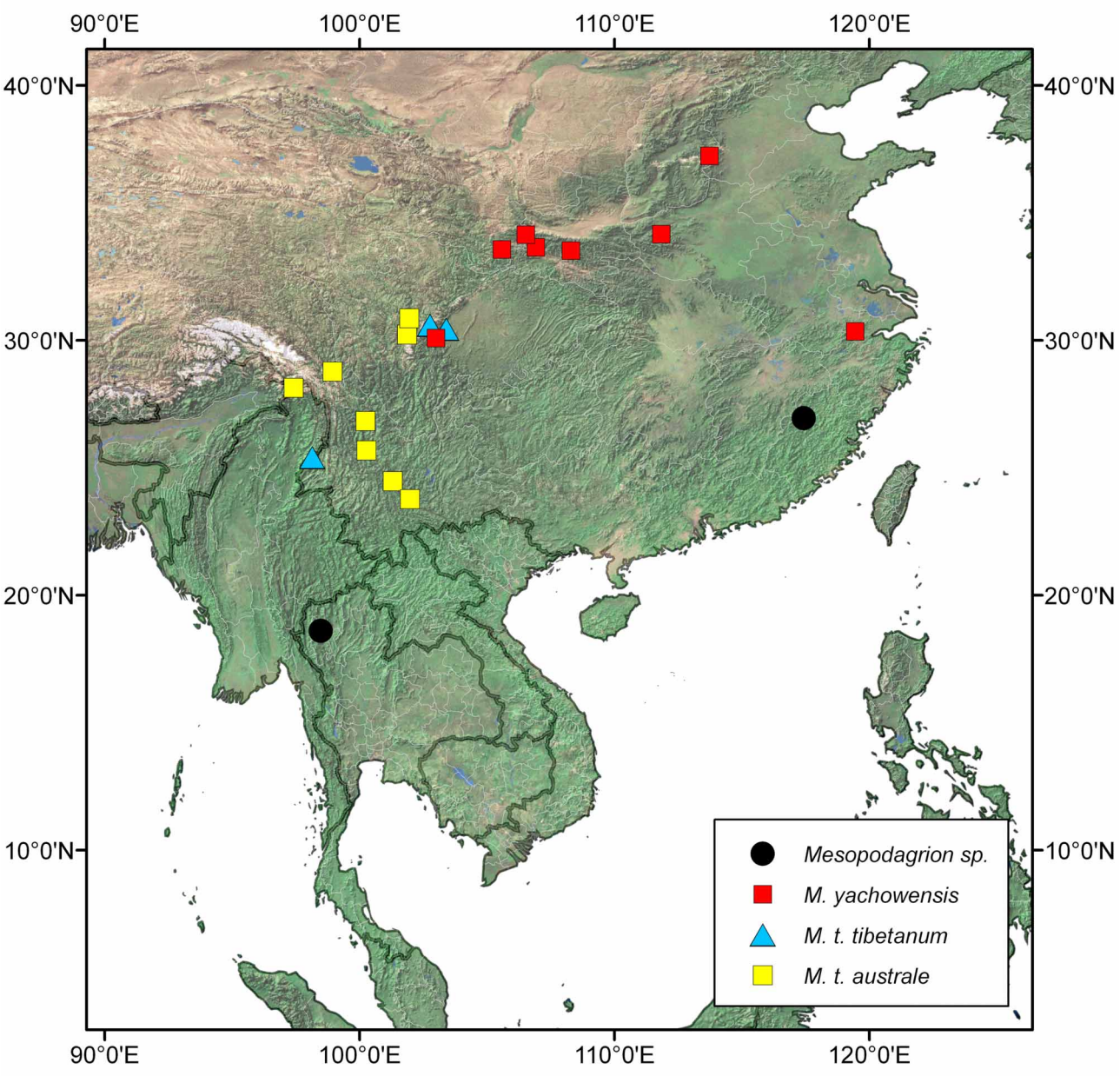
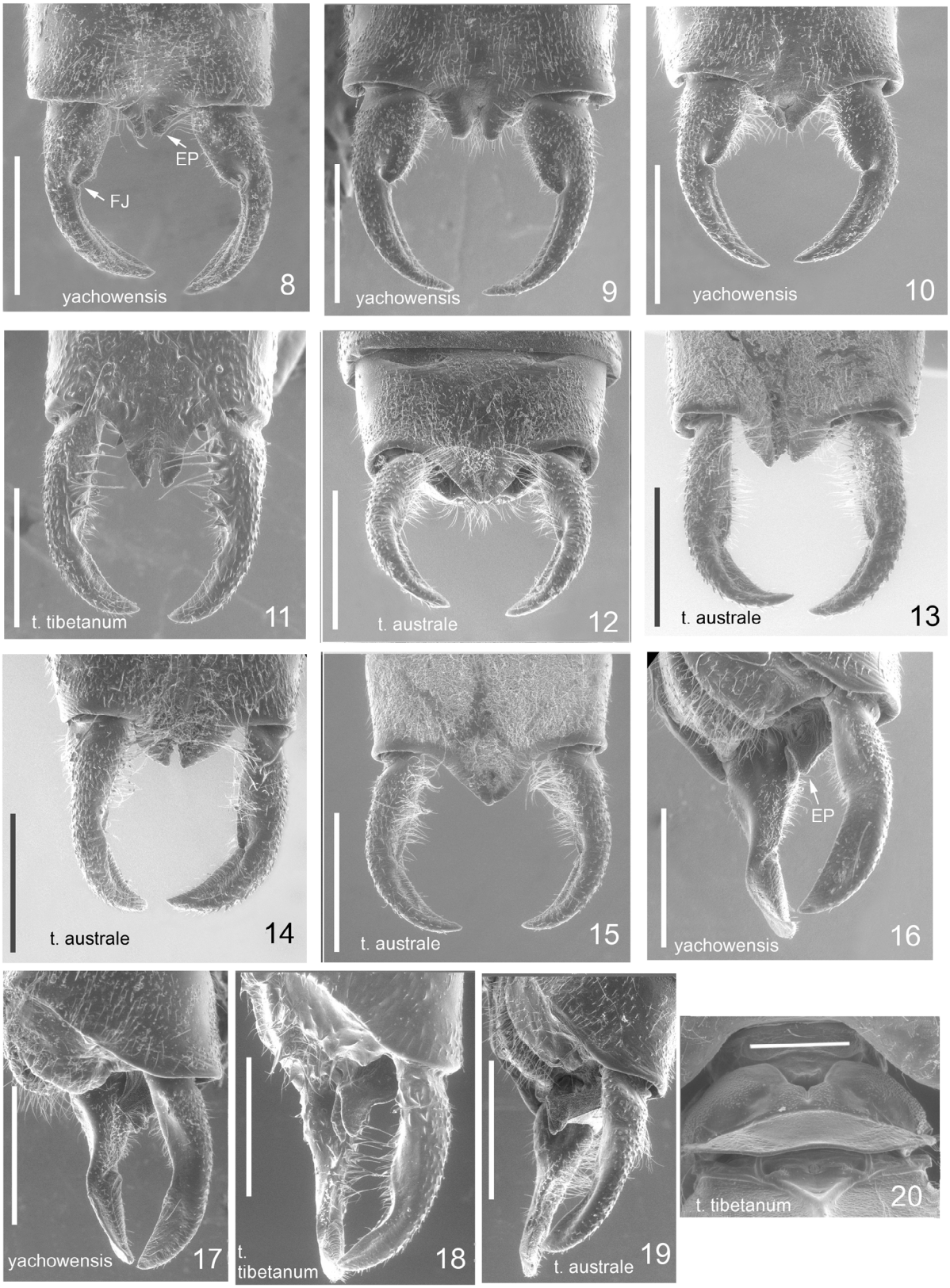


FIGURE 7. Distribution of *Mesopodagrion*.

Description. Male. Similar to *M. t.tibetanum*, but differs as follows: pale occipital bar absent (Fig. 4c, d), Rear of head entirely pale (Fig. 3c); antehumeral stripe narrow (about 1/3 width of mesepimeron), complete, sometimes interrupted near upper end (Fig. 4c, d); S10 and appendages black, latero-ventrally pale (Fig. 5f, h); bifurcate process almost as long as 1/2 width of S10, outer margin arched, smooth, black or sometimes pale, hemline of bifurcate process more than 1/3 width of S10, but not to 1/2 (Figs. 5c, d, 12–14).



FIGURES 8–20. SEM photos for cerci and bifurcate process of ♂ *Mesopodagrion*, all specimens from China (8–15 dorsal, 16–19 ventro-lateral, and 20 ♀ pronotum, dorsal): 8) Gansu, Kangxian; 9) Henan, Songxian; 10) Shaanxi, Ningshan; 11) Sichuan, Wolong nature reserve; 12) Yunnan, Mt. Ailao; 13) Yunnan, Dali; 14) Yunnan, Lijiang; 15) Yunnan, Yuanjiang; 16) Henan, Songxian; 17) Shaanxi, Ningshan; 18) Sichuan, Wolong; 19) Yunnan, Yuanjiang; 20) Sichuan, Wolong. FJ = false joint, EP = epiproct. (Scale bar = 1mm).

Female. Similar to male by color pattern but slightly shorter in body length and more robust. Antehumeral stripes broader than in male; S10 pale laterally; ovipositor pale dorsally beyond level of S10 (Fig. 6c).

Distribution. A more southerly species than *M. yachowensis* occurring in mountainous areas southern China from central Sichuan (apparently sympatric with *M. yachowensis* there), south through Yunan province and into northern Burma. This subspecies is believed by V. Kalkman (pers. com.) to occur in Kangding, Sichuan and Deqen, Yunnan, China. This species occurs at higher elevations (> 3000m) compared to *M. yachowensis* (Fig. 7).

Mesopodagrion yachowensis Chao, 1953, new status

Mesopodagrion tibetanum: McLachlan, 1896: 372–273, "♀ from Siao-Lon (now in Sichuan, China)"; Lieftinck, 1948: 7, "Burma, China (Shaanxi)" (in part); Asahina, 1955: 130–133, figs. 1–6, "Burma, China (Shaanxi, Sichuan, Zhejiang, Yunnan)" (in part); Asahina,1956: 207, "Zhejiang"; SUI & SUN, 1986: 294–295, Fig. 201, "Burma, China (Xizang, Yunnan, Zhejiang)" (in part); Chao, 1987: 112, 120; "Burma, China (Shaanxi, Sichuan, Yunnan, Zhejiang)" (in part).

Mesopodagrion yachowensis Chao, 1953: 330–334, figs. 5–8, type locality: "Beh Luk Din, Sichuan, China"; Kalkman, 2008: 187, key to species.

Material. 1 ♂, China, Gansu, Kangxian, Qinghe forestry centre, 1400m, 14-VII-1998, Shuyong Wang leg., IOZ(E)830140 (IZAS); 1 ♂, China, Henan, Songxian, Mt. Baiyun, 18-VII-2002, Xiujuan Yang leg. (CHU); 1 ♀, China, Henan, Huixian, Baligou, 13-VII-2002, Xiujuan Yang leg. (CHU); 2 ♂, 19-VII-2002, ditto.; 1 ♂, China, Shaanxi, Liuba, Miaotaizi, 1400m, 22-VII-1998, Guangzhi Yu leg., IOZ(E)830116 (IZAS); 1 ♀, same data., 1600m, 21-VII-1998, Jian Yao leg., IOZ(E)830139 (IZAS); 1 ♂, China, Shaanxi, Ningshan, Huoditang, 1820m, 28-VII-1998, Jun Chen leg., IOZ(E)830120 (IZAS); 1 ♂, China, Shaanxi, Fengxian, Qinling railway station, 1500m, 27-VII-1994, Jianzhen Dong leg. (NKUM); 1 ♂, China, South Shensi, 16-VI-1936, E. Sueson leg. (BMNH); 1 ♀, China, Sichuan, Siao-Lou, 189? (BMNH) [paratype of *M. tibetanum*]; 1 ♂, 1 ♀, China, South Shensi, 16-VI-1936, E. Sueson leg. (CUMZ).

Description. Male. As in *M. tibetanum* by color pattern though larger. Differs from *M. t. tibetanum* as follows: Rear of head entirely black (Fig. 3a). Antehumeral stripe excavated at upper fourth and with small anteriorly directed offshoot (Fig. 4a). S10 pale dorsally (Fig. 5a); basal half of cerci distinctly dilated, almost twice as wide as abruptly narrowed distal half (Figs. 5a, 8–10); bifurcate process short, not longer than 1/2 width of S10, outer margin concave, hemline of bifurcate process less than 1/3 width of S10 (Figs. 8–10). Apical lobs of genital ligula bifurcate at base (Fig. 1, d & e).

Female. Similar to male in color pattern but slightly shorter in body length and more robust (Fig. 1c). Antehumeral stripes broader than in male. Terminus of abdomen similar to female of *M. t. tibetanum* except ovipositor shorter, ending at about level of end of S10 (Fig. 6a).

Remarks. Acknowledging the inaccuracy of illustrations of *M. tibetanum* by Fraser (1933), Chao (1987) later synonymized his own species with *M. tibetanum*. We doubt that Chao had seen the syntype male of *M. tibetanum* or had a specimen of true *M. tibetanum*, otherwise he would seen the distinct differences between these two species. We concur with Kalkman (2008) in treating M. yachowensis as a separate species.

Distribution. A more northerly species than *M. tibetanum* species occurring in mountainous areas along a largely east-west arc from central Sichuan (apparently sympatric with *M. tibetanum* there), Gansu north to Henan and east to Zhejiang provinces. This species occurs at lower elevations from about 1400m (Tianmu), to about 3000m (Qinling, Fig. 7). We have been unable, despite intensive search, to locate Siao-lou [Xiaolou] for McLachlan's female in Sichuan Province.

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References

Asahina, S. (1955) Odonata from South Shensi (North China) in the collection of the Zoological Museum, Copenhagen. *Entomologiske Meddelielser*, 27, 130–133.
Asahina, S. (1956) Dragonflies of West Tien-Mu-Shan,central China. *Entomologiske Meddelelser*, 27, 207.
Asahina, S. (1977) Notes on Chinese Odonata. VI. *Kontyû*, Tokyo, 45, 479–494.
Asahina, S. (1990) A list of the Odonata recorded from Thailand. Part XXI. Supplement. *Tombo*, 33, 2–20.
Bridges, C. A. (1994) *Catalogue of the family-group, genus-group and species-group names of the Odonata of the world (Third Edition)*. Urbana, 951 pp., 824 figs.
Chao, H. f. (1953) A new species of *Mesopodagrion* from southwestern China. *Entomotaxonomia*, 5(5), 330–334.
Chao, H. f. (1987) On the synonymy of a species of *Mesopodagrion* (Odonata: Megapodagrionidae). *Entomotaxonomia*, 9(2), 112, 120.
Davies, D.A.L. & Tobin, P., (1984) The Dragonflies of the World. Vol.1. Utrecht: *Societas Internationalis Odonatologica Rapid Communications (Supplements)* No.3. [ix]+127pp.
Fraser, F. C. (1933) *The Fauna of British India-Odonata*. VI. London: Taylor and Francis, 96–98.
Hua, L., (2000) *List of Chinese insects*. Vol. 1. Zhongshan University Press, Guangzhou.
Kalkman, V.J., (2008) Taxonomy, behaviour, and habitat of *Mesopodagrion* and *Sinocnemis* . Notes on old world Megapodagrionidae 3 (Odonata). International Journal of Odonatology 11(2): 185–193.
Kimmins, D.E., (1970) A list of the type-specimens of Odonata in the British Museum (Natural History) Part III. Bulletin of the British Museum (Natural History) 24(6): 171–205.
Lieftinck, M. A. (1948) Entomological results from the Swedish Expedition 1934 to Burma and British India. Odonata. *Arkiv For Zoologi*, 41(A), 7.
McLachlan, R. (1896) On Odonata from the Province of Szechuen in Western China, and from Moupin in eastern Thibet. *The Annals and magazine of natural history: zoology, botany, and geology*, (6)17, 372–373.
Needham, J. G. (1930) *A manual of the dragonflies of China*. Peiping: The Fan Memorial Institute of Biology, 239–240.
Rehn, A. C. (2003) Phylogenetic analysis of higher-level relationships of Odonata, *Systematic Entomology*, 28, 181–239.
SUI, J-Z. & SUN, H-G.. (1986) *Common species of dragonflies from China*. Agriculture Publishing House, Beijing, 294–295.
Wilson, K.D.P. & Reel, G.T. (2001) Odonata of Hainan, China. *Odonatologica*, 30(2), 145–208.
Wilson, K.D.P. (2003) *Field guide to the dragonflies of Hong Kong*. Agriculture, Fisheries and Conservation Department, Hong Kong.
Wilson, K.D.P. & Reels, G. T. (2003) Odonata of Guangxi Zhuang Autonomous Region, China, part I: Zygoptera. *Odonatologica*, 32(3), 237–279.
Wilson, K.D.P. (2004) New odonata from south China. *Odonatologica*, 33(4), 423–432.
Wilson, K.D.P. & Xu, Z.F., (2007) Odonata of Guangdong, Hong Kong and Macau, South China, part 1: Zygoptera. *International Journal of Odonatology*, 10(1), 87–128.
Wu, C.F. (1935) Catalogus Insectorum Sinensium I. Peiping: *The Memorial Institute of Biology*. 277–291.
Zhang, J. (1999) Odonata. In: Huang, B. (ed.). *Fauna of insects in Fujian Province of China*, vol. 3. Fujian Agricultural University, Fuzhou, pp. 187–300.