



Establishment of two species groups of *Ichthyurus* Westwood (Coleoptera: Cantharidae), with description of two new species from China and Vietnam

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Abstract

Two species groups of the genus *Ichthyurus* Westwood, 1848 in the Oriental Region are proposed based on the anatomical comparison. One is the *I. vandepolli* species group, which is composed of two species, namely *I. vandepolli* Gestro, 1892 and *I. opacus* Gestro, 1906 (newly recorded to China). The other is the *I. bourgeoisi* species group, consisting of four species, including *I. bourgeoisi* Gestro, 1892, *I. savioi* Pic, 1928, *I. niger* **sp. nov.** (Vietnam, Vinh Phue) and *I. bilineatimimus* **sp. nov.** (China, Yunnan). The above species are illustrated with habitus and genital segments of both sexes, prothoracic leg and aedeagus of the male and internal genitalia of the female. A key for identification and distribution maps of these species are provided.

Key words: soldier beetles, Ichthyurini, classification, Oriental Region

Introduction

Ichthyurus Westwood, 1848 is the largest genus of Ichthyurini, with about 200 species worldwide (Delkeskamp 1977; Brancucci 1983, 2009; Li *et al.* 2014, Li & Gao 2015). The adults can be easily recognized by its slender body, strongly abbreviated elytra with well-developed hindwings, and fishtail-like terminal abdominal tergite, as well as aposematic coloration pattern of mixed black and yellow. It can be differentiated from other ichthyurine genera by the relatively large body, elytra with sutures moderately or strongly dehiscent, mesotrochanters usually present with one to three denticles, which sometimes reduced, aedeagus composed of a right paramere, a left paramere, a setifore extension and a median lobe (Brancucci 1983).

The majority of the *Ichthyurus* species (over 75% of the total number) are distributed in the Oriental Region (Delkeskamp 1977; Brancucci 1983, 2009; Li *et al.* 2014, Li & Gao 2015). Several specialists have made significant contributions to the taxonomy of these species throughout history. Notable individuals include Westwood (1848), Ritsema (1879), Gestro (1888, 1892, 1902, 1906, 1911), Fairmaire (1867), Pic (1913, 1915a, 1915b, 1916, 1919a, 1919b, 1921, 1922, 1923, 1926a, 1926b, 1927, 1938, 1939, 1943, 1954, 1955), Champion (1920, 1924, 1925, 1927) and Wittmer (1966). Within this biogeographical region, most species are found in the Malaysian subregion, while only a small portion occurring in the Indochina subregion. In the Chinese fauna, there are currently known to be eleven species (Delkeskamp 1977; Brancucci 1983), five of which are endemic to Taiwan Island.

During our study of the *Ichthyurus* species from China and adjacent areas, we encountered difficulties in identifying the species within this diverse genus without any subdivisions. In order to facilitate the taxonomy of this genus, we are going to propose some species groups based on the morphological characters, including appearance and male genitalia. The present study will focus on the *Ichthyurus* species from the southern China, and we will define two species groups in this region. Meanwhile, we have discovered some new species, which we are going to

describe them herein. In addition, we will redescribe those previously known species, which remain quite poorly known in their morphology, to make comparison with the new species.

Material and methods

The studied material is deposited in the following collections:

CAU Entomological Museum, China Agriculture University, Beijing, China;

CWNU China West Normal University, Nanchong, China;

IZAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China;

MGI Museo Civico di Storia Naturale “Giacomo Doria”, Genova, Italy;

MHBU Museum of Hebei University, Baoding, China;

MYNU Mianyang Normal University, Mianyang, China;

NWAFU Northwest A& F University, Yangling, China;

SHNU Shanghai Normal University, Shanghai, China.

The specimens were first softened in the water, and then the genitalia and genital segments of both sexes were dissected. After dissection, the male genitalia were immersed in a 10% NaOH solution and then placed in a metal bath warmed to 90 °C for one minute, and finally glued on a paper card for permanent preservation. The female genitalia were dyed with hematoxylin, examined in 75% alcohol and preserved in glycerol. At least one specimen was dissected for each species, and some more would be treated if any damage occurred during dissection. If a morphospecies has multiple distributions, at least one pair of specimens were compared from each locality. Images of the adults were taken with a Canon EOS 80D digital camera and those of the genitalia by a Leica M205A stereomicroscope, which were stacked in Helicon Focus 7. The final plates were edited in Adobe Photoshop 2020.

The distribution information was collected from the publications (Delkeskamp 1977; Gestro 1892, 1906) and the label data of the present study. The distribution map was prepared by ArcMap 10.8 and edited in Adobe Photoshop 2020.

Complete label data are listed for type specimens of the previously known species, using square brackets “[]” for our remarks and comments, [p] indicating that the following data are printed and [h] that they are handwritten. Quotation marks are used to separate data from different labels and a backslash “/” to separate data from different lines of the same label. For the additional specimens, quotation marks are used if their original labels are written in English. All the labels written in Chinese are transliterated into English.

Morphological terminology used in this study mainly follows that of Brancucci (1980). Body length is measured from the front of head to apices of the terminal abdominal tergite and width at humeri of conjoint elytra. Interocular distance is measured at the minimal part between eyes, and diameter of an eye at its maximal part.

Taxonomy

Class Insecta Linnaeus, 1758

Order Coleoptera Linnaeus, 1758

Family Cantharidae Imhoff, 1856 (1815)

Subfamily Chauliognathinae LeConte, 1861

Tribe Ichthyurini Champion, 1915

Genus *Ichthyurus* Westwood, 1848

Ichthyurus vandepolli species group

Definition. Body middle-sized (8.0–12.0 mm). Antennomeres III feebly thickened in male (e.g., Fig. 2A, C), while simple in female (e.g., Fig. 2B). Pronotum feebly longer than wide or subequal. Profemora moderately swollen ventrally, protibiae dilated dorso-distally and each present with a well-developed spine at apex, and protarsomeres I projecting distally to the ventral part of II in male (e.g., Fig. 3A–B), while prothoracic legs usually slender, without such apical spines in female. Proctiger small and triangular, completely surrounded by paraproct, which is simple

at lateral margins (e.g., Fig. 4A, E). Terminal abdominal tergite (or tergite VIII) of male with lateral projections oblique at inner margins and directing postero-laterally (e.g., Fig. 4A, E). Terminal abdominal ventrite (or sternite VIII) of male bilobed, with outer apical angles directing inwards (e.g., Fig. 4B, F). Aedeagus (e.g., Fig. 6A–F): right paramere short and acute at apex; left paramere distinctly longer than right paramere, almost vertically stepped near middle of left side, rounded at apex; setifore extension moderately developed and weakly or moderately sclerotized; median lobe feebly longer than parameres, widely rounded at apex.

Included species. *I. vandepolli* Gestro, 1892 and *I. opacus* Gestro, 1906.

Distribution (Fig. 1). China (Jiangsu, Anhui, Zhejiang, Jiangxi, Hunan, Fujian, Guangdong, Guangxi, Yunnan), Vietnam.

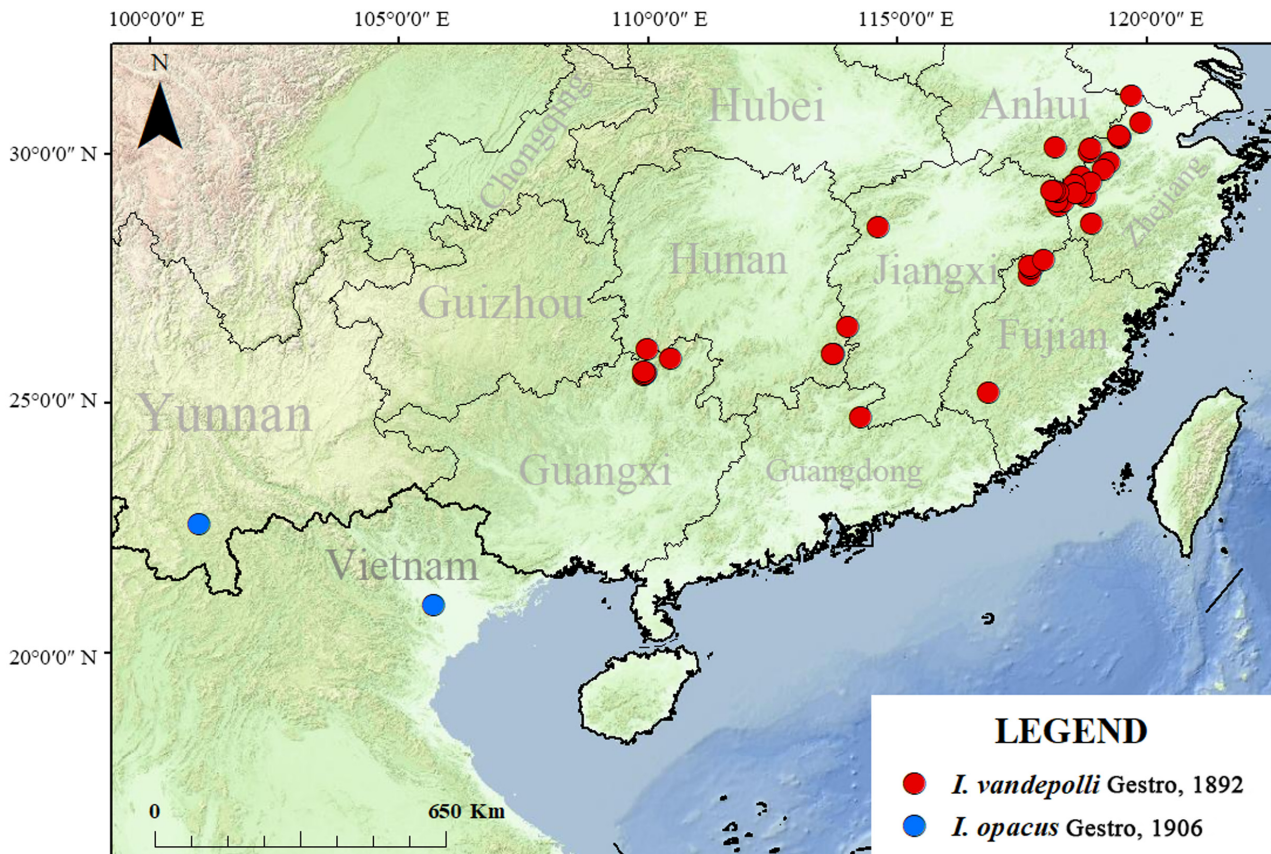


FIGURE 1. Distribution map of the *Ichthyurus vandepolli* species group.

Ichthyurus vandepolli Gestro, 1892

Chinese common name: 宛氏短翅花萤
(Figs 2A, B, 3A, 4A–D, 5A, 6A–D, 7A)

Ichthyurus vandepolli Gestro, 1892: 1029, 1030; 1906: 283.

Type material examined. HOLOTYPE: ♂ (MGI), [h] “Cina bor. / Fostune / D.vod. Coll”, [h] “Vandepollii / Gestro”, [p] “Typus”.

Additional material examined. CHINA • **Jiangsu:** 2♀♀ (MHB), Wuxi, Yixing, Bamboo Forest, 2015–2017, Z. W. Liang leg. **Anhui:** 9♂♂9♀♀ (MHB), Yixian, Qingliangfeng, 5.–9.VI.2013, J. S. Xu and C. X. Yuan leg. 2♂♂2♀♀ (MHB), Xiji, Qingliangfeng, 2.–5.VI.2013, J. S. Xu and C. X. Yuan leg.; 2♂♂ (MHB), Huangshan, Tanjiaqiao, 20.V.2020, L. Yu leg. **Zhejiang:** 1♂♂3♀♀ (IZAS), Tianmushan, 300–900 m, 24.VI.1957, collector unknown; 1♂ (IZAS), Jiangpu, 5.VII.2017, Y. D. Chen and Y. X. Zhang leg.; 2♀♀ (IZAS), Tianmingshan, 2.VII.2017, Y. D. Chen and Y. X. Zhang leg.; 1♂1♀ (MHB), Moganshan, 16.VII.1991, Z. J. Tong leg.; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, L. J. Yang leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, Q. Cao leg.”; 2♂♂

(SHNU), “Linan, Tianmushan, 9.–14.VI.2000, N. He leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, L. Sun leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, X. Y. Jin leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, Q. Cao leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, C. X. Xu leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, Z. P. Qian leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, X. B. Wang leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, D. H. Pu leg.”; 1♂ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, J. Fan leg.”; 1♀ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, W. Zhang leg.”; 1♀ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, L. Xu leg.”; 1♀ (SHNU), “Linan, Tianmushan, 9.–14.VI.2000, Y. H. Yu leg.”; 1♂ (SHNU), “Zhejiang, Tianmushan, 300–400 m, 11.–15.VI.2006, leg. HU & WANG”; 1♀ (SHNU), “Anji, Qianmutian, 700–1325 m, 29.VII.2011”; 1♂ (SHNU), “Linan, West Tianmushan, 6.–7.VI.1999”; 1♂ (SHNU), “Linan, West Tianmushan, 7.–10.VI.1999, C. Jin leg.”; 2♂♂3♀♀ (MHB), Linan, Tianmushan, 25.VII–2.VIII.2011, Y. Y. Lu leg.; 1♀ (MHB), Linan, Tianmushan, 2.VIII.2011, L. Y. Guo leg.; 1♂ (IZAS), West Tianmushan, Xianrending, 1500 m, 30.V.1998, H. Wu leg.; 1♂ (MHB), Tianmushan, 22.VII.2019, collector unknown; 1♂ (MHB), Linan, Qingliangfeng, 16.–22.V.2012, G. L. Xie leg.; 4♀♀ (MHB), Tianmushan, Qianmutian, 1.–2.VII. 2011, J. B. Zhang and Z. X. Zhang leg.; 1♂1♀ (MHB), Tianmushan, Chanyuan Temple, 19.VII.2014, S. H. Dong and S. S. Liu leg.; 3♂♂3♀♀ (MHB), Quzhou, Qili, 27.V.2017, Y. B. Ba and H. H. Guan leg.; 1♀ (MHB), Hangzhou, Chunan, 25.V.2023, L. Yu leg.; 2♂♂9♀♀ (MHB), Hangzhou, Chunan, 26.–27.V.2023, L. Yu leg.; 4♂♂3♀♀ (MHB), Quzhou, Kaihua, 26.–27.V.2021, L. Yu leg.; 1♂ (MHB), Gutianshan, Gutian, 303 m, 3.V.2021, Y. Kang and X. X. Wang leg. **Jiangxi:** 2♂♂ (IZAS), Guanshan Nation. Natur. Res., Xihe Station, 8.VI.2004, X. Yu leg. **Hunan:** 2♂♂1♀ (MHB), Yanling, Shidu, Taoyuandong, 870 m, 6.VII.2008, R. R. Wang leg.; 1♀ (IZAS), Yanling, Taoyuandong Nation. Natur. Res., Niujiaolong, 1265 m, 5.VII.2008, G. Y. Yang leg.; 1♀ (MHB), Zhuzhou, Yanling, Xiexiang, Niujiaolong, Huangmaolong, 1400 m, 3.VI.2023, Y. Z. Huang leg.; 2♂♂3♀♀ (SHNU), “Guidong Co., Bamian Shan, 25°58′53″N, 113°42′43″E, mixed forest, shrub flower sifted & beating, 1100 m, 4.VI.2014, Peng, Shen, Yu & Yan leg.”; 1♀ (SHNU), “Guidong Co., Bamian Shan, 25°59′33″N, 113°42′25″E, mixed forest, shrub flower sifted & beating, 1510 m, 1.VI.2014, Peng, Shen, Yu & Yan leg.”. **Fujian:** 1♂ (IZAS), Chongan, Xingcun, Longdu, 580 m, 5.VI.1960, S. Q. Jiang leg.; 1♂ (IZAS), Chongan, Xingcun, Guadun, 900 m, 30.VI.1960, G. Zuo leg.; 1♂ (IZAS), Chongan, Xingcun, Guadun, 1140 m, 2.VII.1960, F. J. Pu leg.; 1♂ (IZAS), Jianyang, Huangkeng, Dazhulan, 900–1170 m, 5.VII.1960, F. J. Pu leg.; 1♀ (IZAS), Wuyishan, Xianfengling, 27.707217° N, 117.39482° E, 835–1143 m, 10.VII.2015, H. D. Yang leg.; 3♂♂1♀ (MHB), Wuyishan, 5–20.VII.2003, M. Bai leg.; 2♀♀ (MHB), Wuyishan, Guadun, 18.VII.2003, M. Bai leg.; 1♀ (MHB), Wuyishan, Nankeng, 7.VII.2003, M. Bai leg.; 1♂1♀ (MHB), Shanghang, Gutian, 2.–3.VI.2004, C. X. Yuan and J. Li leg.; 1♀ (MHB), Wuyishan, 13.VII.2017, Y. D. Chen and Y. X. Zhang leg.; 1♂ (NWFU), Wuyigang, 15.VII.1984, S. Z. Wang leg. **Guangdong:** 2♀♀ (MHB), Chebaling, 30.V.2019, X. M. Wang leg.; 3♀♀ (MHB), Nanling, Chebaling, 31.V.2021, Y. N. Wang leg. **Guangxi:** 1♀ (IZAS), Longsheng, Hongtan, 900 m, 14.VI.1963, Y. S. Shi leg.; 1♂1♀ (IZAS), Longsheng, Hongmaochong, 900 m, 10.VI.1963, S. Y. Wang leg.; 1♂ (IZAS), Longsheng, Baiyan, 1150 m, 18.VI.1963, S. Y. Wang leg.; 1♂ (MHB), Longsheng, Huaping, 400–500 m, 27.V.2011, H. Y. Liu leg.; 1♂2♀♀ (MHB), Maoershan, 4.VI.2014, H. Y. Liu leg.; 1♀ (MHB), Longsheng, Huaping, 25.62873° N, 109.918586° E, 26.V.2023, H. Q. Lin and S. L. Yuan leg.

Redescription. Body length (both sexes): 10.0–12.2 mm; body width (both sexes): 2.0 mm.

Male (Fig. 2A). Coloration. Body black, clypeus and mouthparts yellow, lingula, galea, lacinia, terminal labial and maxillary palpomeres black, antennomeres I–III yellow ventrally; pronotum narrowly yellow at posterior margin, metaventricle each side with a large transverse yellow or pale marking; scutellum yellow; elytra yellow at humeri; legs yellow at coxae and trochanters, profemora yellow at basal half parts ventrally and laterally, and tibiae ventrally; abdominal segments narrowly yellow or pale at both sides and posterior margins.

Eyes moderately large, interocular distance about 0.6 times of diameter of an eye. Antennae extending to posterior margin of abdominal tergite II, antennomeres II about 1/4 length of I, III feebly cylindrically thickened, III–XI subequal in length and about 3.0 times longer than II.

Pronotum 1.1 times longer than wide, anterior margin rounded, lateral margins arcuate, posterior margin feebly bisinuate, anterior angles confluent with anterior margin and posterior angles nearly rectangular.

Elytra about 1.4 times longer than humeral width of conjoint elytra, twice longer than pronotum, with lateral margins subparallel, sutures moderately dehiscent at posterior 2/3, distance between sutures about as wide as width of an elytron, apices rounded.

Legs slender, protibiae (Fig. 3A) dilated dorso-distally along whole length, with outer apical angles acute at apices, each present with a short and thin spine at apex.

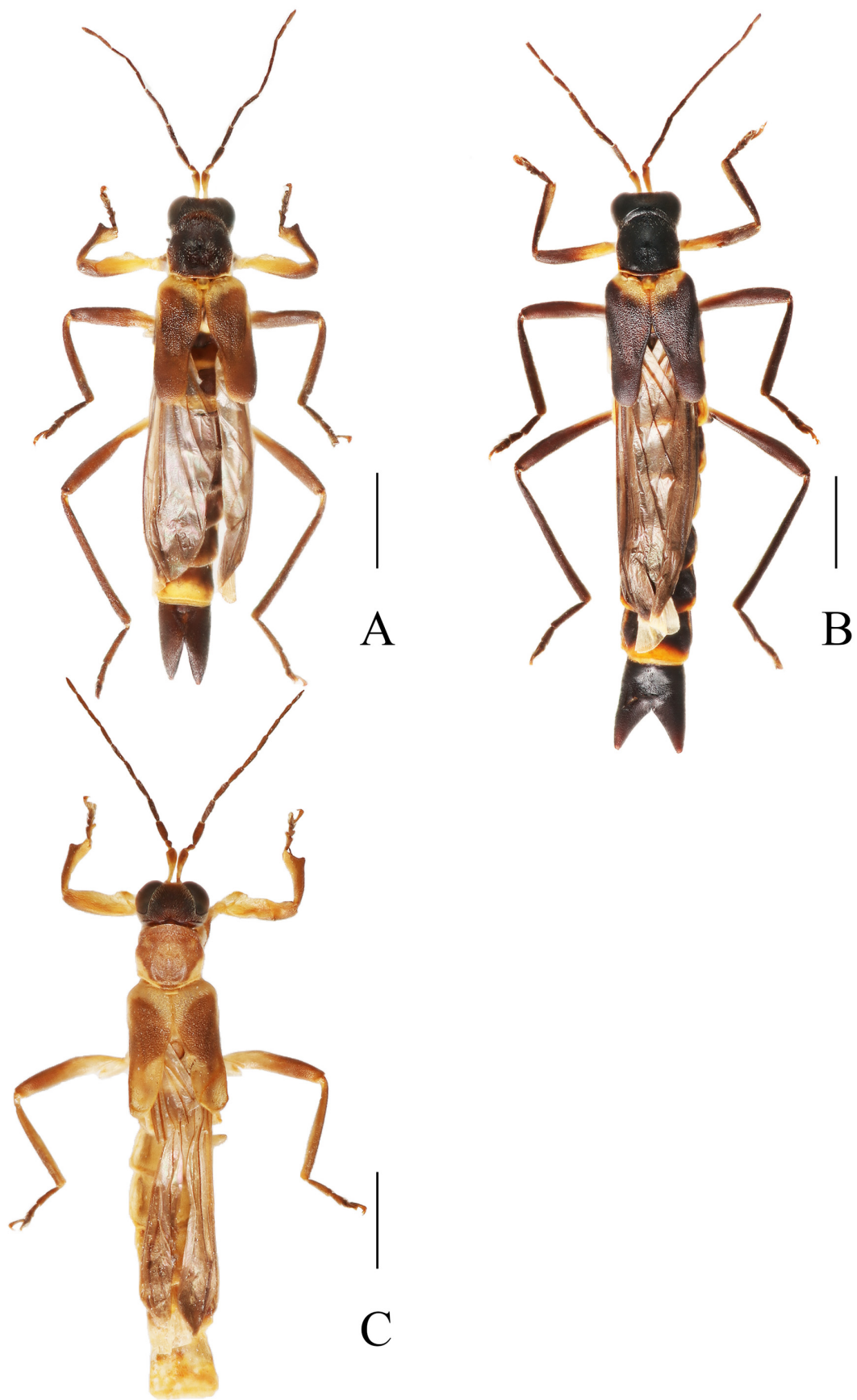


FIGURE 2. Habitus of *Ichthyurus* species, dorsal views. **A, B.** *I. vandepolli* Gestro, 1892; **C.** *I. opacus* Gestro, 1906. **A, C.** males; **B.** female. Scale bars: 2.0 mm.

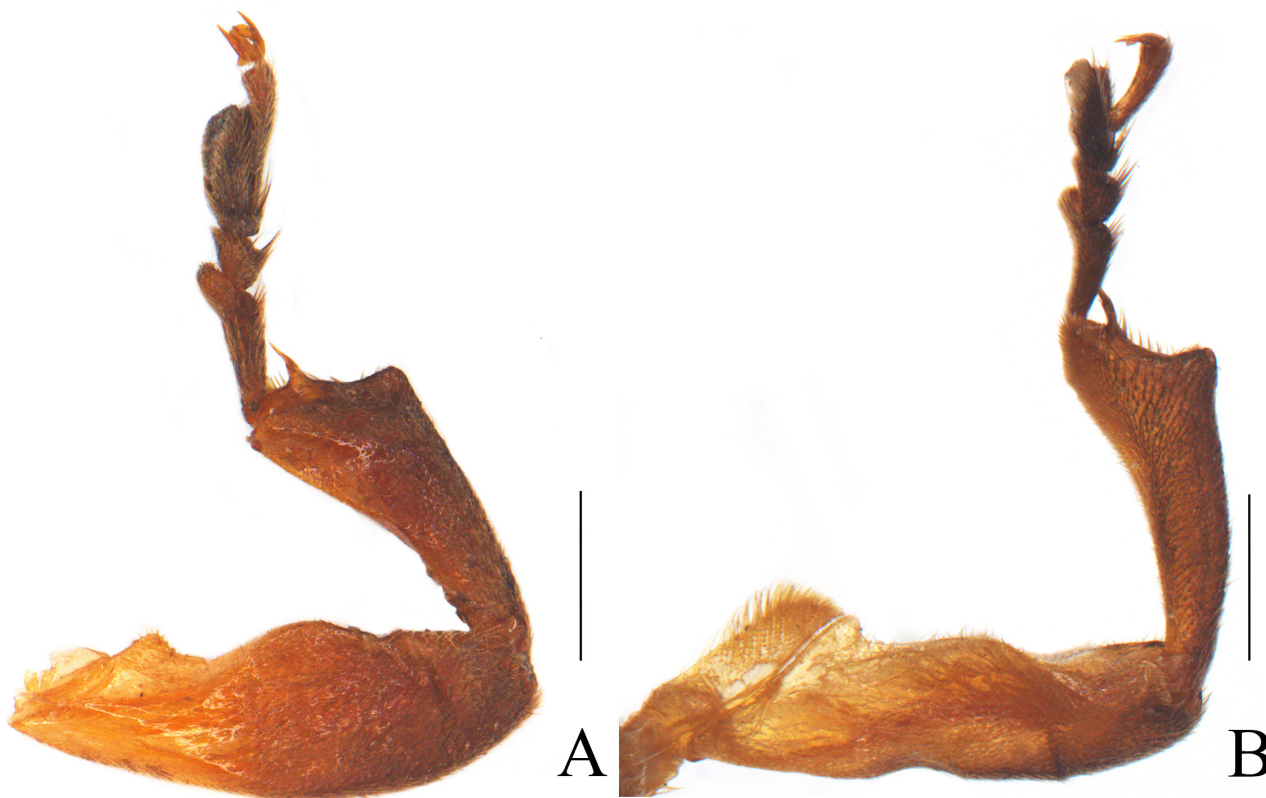


FIGURE 3. Male prothoracic legs of the *Ichthyurus vandepolli* species group, lateral views. **A.** *I. vandepolli* Gestro, 1892. **B.** *I. opacus* Gestro, 1906. Scale bars: 0.5 mm.

Terminal abdominal ventrite (Fig. 4B) with lateral lobes slicky at inner margins and narrowly rounded at apices. Abdominal sternite IX (concealed underneath sternite VIII) axe-like, wider than long, with posterior right angle rounded and left angle protuberant and obtusely right-angled, anterior right angle strongly and narrowly protruding anteriorly and feebly expanded and rounded at apex (Fig. 5A).

Aedeagus (Fig. 6A–D): right paramere about twice as long as wide, tapered distally and rounded apex (Fig. 6B–C); left paramere about 1/3 longer than right paramere; setifore extension weakly sclerotized, short and distinctly shorter than right paramere (Fig. 6B–C).

Female (Fig. 2B). Similar to males, but profemora yellow at basal 1/3; terminal abdominal tergite with lateral projections wider (Fig. 4C), terminal abdominal ventrite nearly as long as wide, with lateral margins arcuate and posterior margin widely and shallowly emarginate in middle, lateroapical angles rounded (Fig. 4D).

Internal organ of reproductive system (Fig. 7A): vagina global, with median oviduct situated at ventro-apical part; bursa copulatrix arising from apex of vagina, expanded and horn-shaped, progressively thinned apically and feebly expanded at apex; accessory gland opening at dorsal base of bursa copulatrix, moderately long and feebly expanded apically; a spermatheca in the form of two short and spiral tubes and arising from ventro-basal part of bursa copulatrix.

Distribution. China (Jiangsu, Anhui, Zhejiang, Jiangxi, Hunan, Fujian, Guangdong, Guangxi).

Remarks. The type locality of this species remains unclear within South China (Delkeskamp 1977; Kazantsev & Brancucci 2007), and here it is shown to occur in the southeastern part (Fig. 1). Gestro (1892, 1906) described the external characters of female and male for this species respectively. In this study, we redescribe it and provide the macrophotographs of habitus and genital segments of both sexes, aedeagus and internal genitalia of females for the first time.

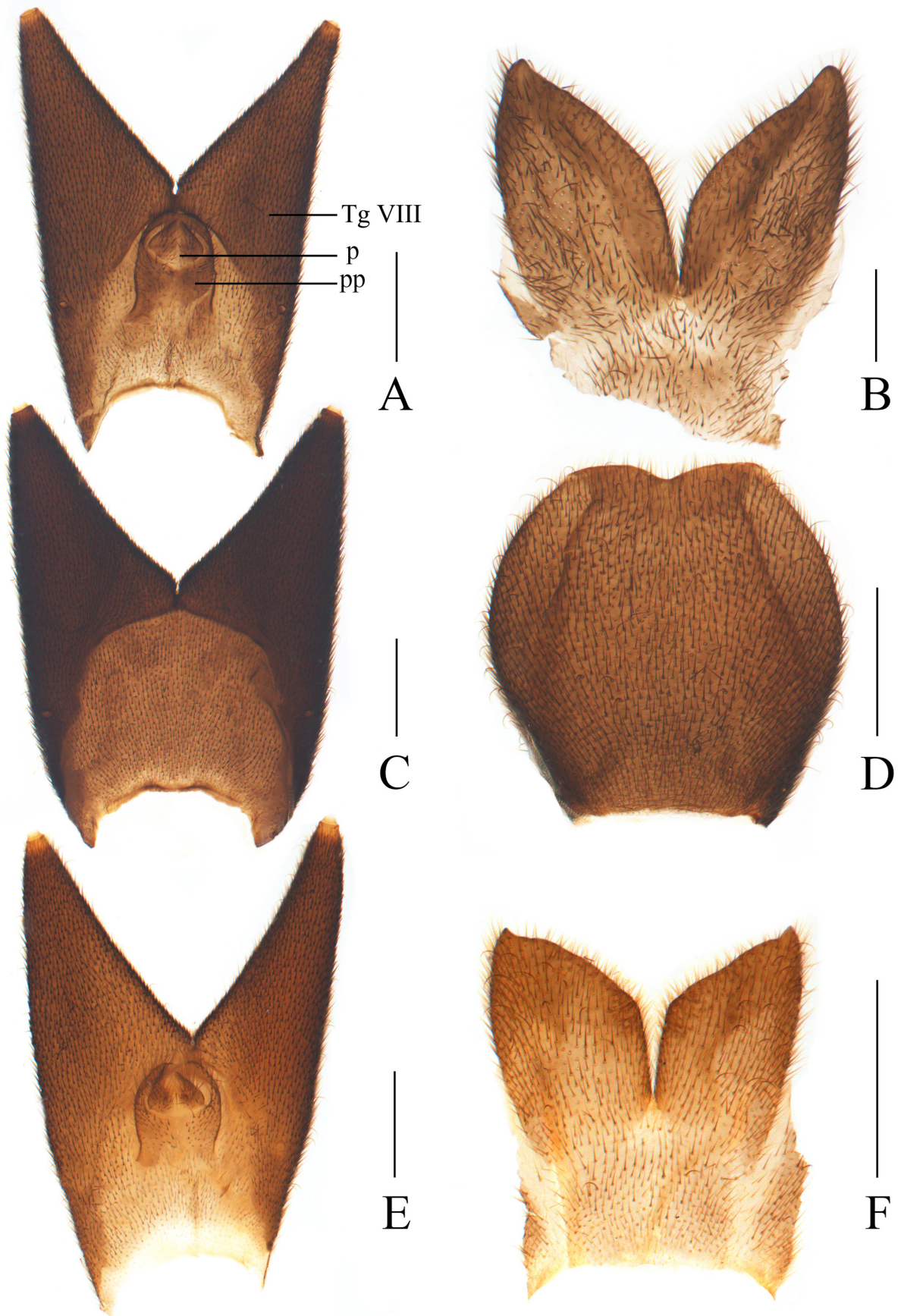


FIGURE 4. Genital segments of the *Ichthyurus vandepolli* species group (A, C, E: terminal abdominal tergite, ventral views; B, D, F: terminal abdominal ventrite, ventral views). **A–D.** *I. vandepolli* Gestro, 1892. **E, F.** *I. opacus* Gestro, 1906. **A, B, E, F.** males; **C, D.** female. Abbreviations: Tg VIII: abdominal tergite VIII; p: proctiger; pp: paraproct. Scale bars: 0.5 mm.

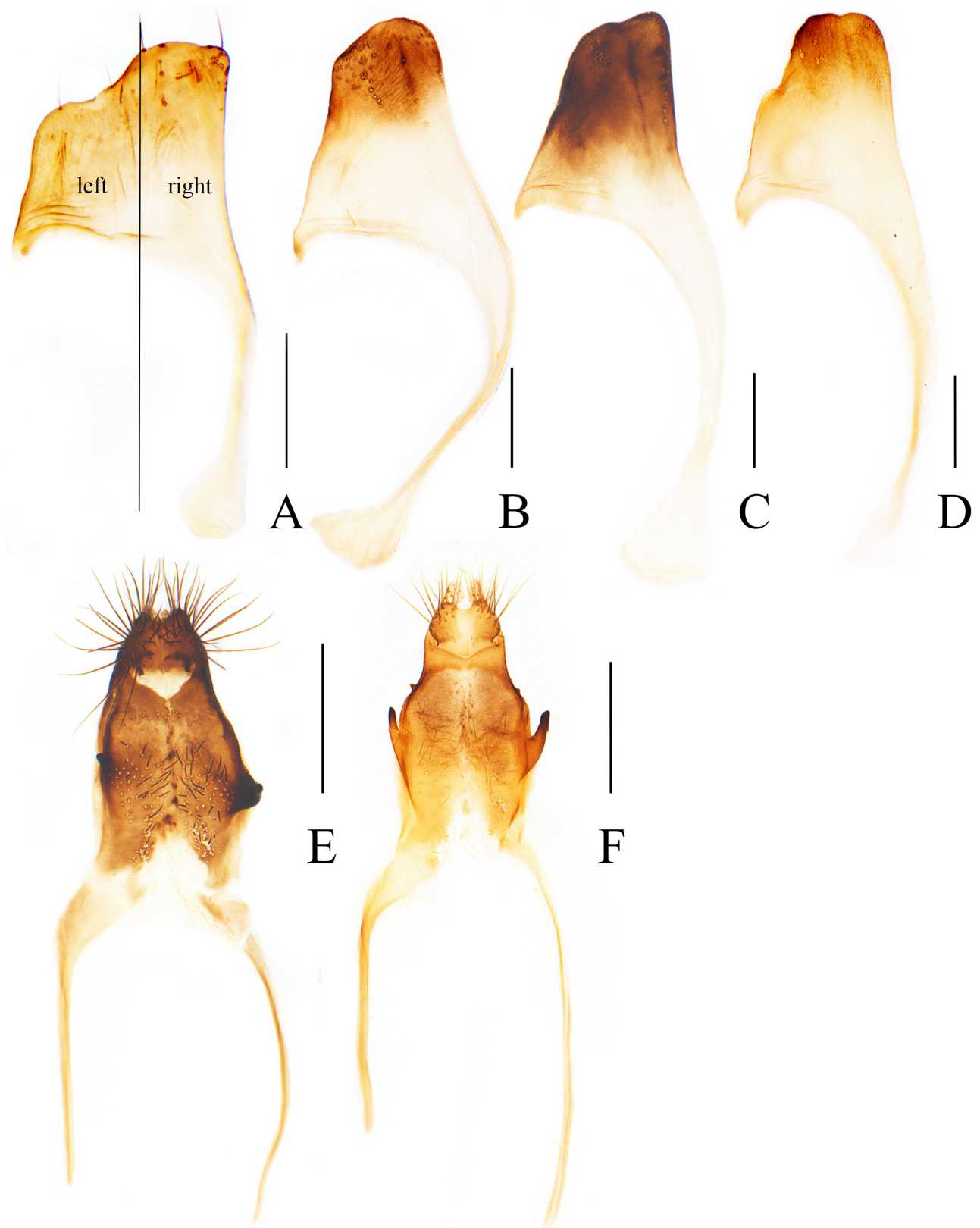


FIGURE 5. A–D: Male abdominal sternites IX of *Ichthyurus* species, ventral views; E, F: proctiger and paraproct of *Ichthyurus* species, ventral views. **A.** *I. vandepolli* Gestro, 1892. **B.** *I. bourgeoisi* Gestro, 1892. **C, E.** *I. savioi* Pic, 1928. **D, F.** *I. bilineatimimus* sp. nov. Abbreviations: p: proctiger; pp: paraproct; tf: tergal flange. Scale bars: 0.2 mm.

Ichthyurus opacus Gestro, 1906

Chinese common name: 暗色短翅花萤
(Figs 2C, 3B, 4E, F, 6E–H)

Ichthyurus opacus Gestro, 1906: 290; Pic, 1923: 45.

Examined material. 1♂ (IZAS), CHINA • Yunnan: Puer, Simao, Dakaihe, 23.V.1957, Z. H. Zhu leg.

Redescription. Body length: 11.9 mm; body width: 2.0 mm.

Male (Fig. 2C). Coloration. Body black, clypeus and mouthparts yellow, lingula, galea, lacinia, terminal labial and maxillary palpomeres black, antennomeres I–II yellow ventrally; proventrite yellow, pronotum yellow at posterior angles; scutellum yellow; elytra yellow at humeri and sutures, forming a traverse triangular yellow area, as well as apices; legs yellow at coxae and trochanters, profemora ventrally and basal half part laterally, and protibiae ventrally, middle legs missing; abdominal segments yellow at posterior and lateral margins.

Eyes moderately large, interocular distance about half of diameter of an eye. Antennae extending to elytral apices, antennomeres II about 1/5 length of I, III–XI subequal in length and about 3.0 times longer than II.

Pronotum nearly as long as wide, anterior margin rounded, lateral and posterior margins moderately arcuate, anterior angles confluent with anterior margin, posterior angles nearly rectangular.

Elytra about 1.5 times longer than humeri width of conjoint elytra, twice longer than pronotum, with lateral margins sinuate, sutures moderately dehiscent at posterior 2/3, distance between sutures about as wide as width of an elytron, apices rounded.

Legs slender, protibiae (Fig. 3B) dilated dorso-distally along basal 3/4 and abruptly constricted at apical 1/4, forming a triangular angle at subapical part, each present with a feebly longer and stouter spine at apex.

Terminal abdominal ventrite (Fig. 4F) with lateral lobes widely triangular near middle of inner margins, acute at apices.

Aedeagus (Figs 6E–H): right paramere nearly as long as wide, abruptly narrowed distally at apical half part and very acute at apex (Fig. 6F, G); left paramere about twice as long as right paramere; setifore extension moderately sclerotized, relatively long and feebly shorter than right paramere (Fig. 6F, G).

Female. Unknown.

Distribution. China (new record: Yunnan), Vietnam.

Remarks. Although the type of this species was not located in GMI, it could be easily recognized by its characteristic male prothoracic leg and its body coloration, which was described in detail in the original manuscript by Gestro (1906). The abdominal sternite IX of the male was inadvertently overlooked during dissection, and this character will be noted when additional material is available in the future.

Ichthyurus bourgeoisi species group

Definition. Body middle to large-sized (8.0–16.0 mm). All antennomeres simple in both sexes (e.g., Figs 9, 13). Pronotum transverse, wider than long. Pro- and meso-femora weakly swollen in male (e.g., Figs 9A, C, 13), while simple in female (e.g., Fig. 9B, D). Proctiger small and transverse, paraproct with at least a pair of projections at lateral margins (e.g. Figs 5 E, F, 10C, 14C). Terminal abdominal tergite (or tergite VIII) of male with lateral projections arcuate at inner margins and directing posteriorly, excavated ventrally and arcuately, often delimited with the edges, which are keeled and hooked terminally (e.g., Figs 10A–D, 14A–C), while usually simple in female (e.g., Fig. 12A, C). Terminal abdominal ventrite (or sternite VIII) of male widely and triangularly emarginate in middle of posterior margin, longitudinally and arcuately ridged in middle and on both sides, transversely and arcuately ridged near outer apical angles (e.g., Figs 10E, F, 14D, E). Aedeagus (e.g., Figs 11, 15): right paramere dorso-ventrally compressed, narrowed apically and strongly bent dorsally, with a small, sclerotized conical projection at inner apical part; left paramere longer than right paramere, dorso-ventrally compressed and bifurcate at apex, with outer branch shorter than inner branch; setifore extension moderately developed and weakly to strongly sclerotized; tegmen shorter than right paramere and widely rounded at apical margin; median lobe about 3.0 times longer than parameres, distinctly narrowed apically.

Included species. *I. bourgeoisi* Gestro, 1892, *I. savioi* Pic, 1928, *I. niger* sp. nov. and *I. bilineatimimus* sp. nov.

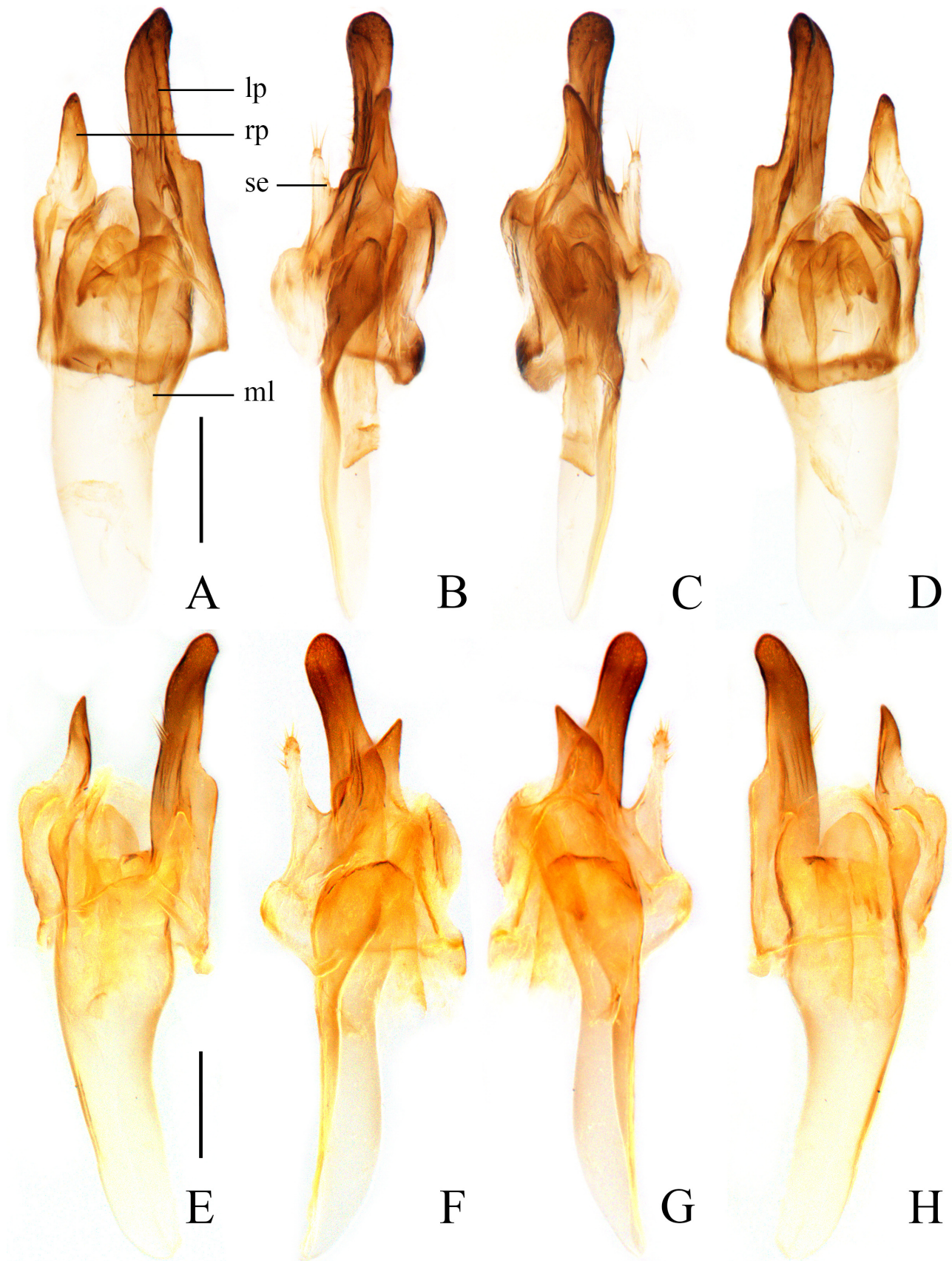


FIGURE 6. Aedeagi of the *Ichthyurus vandepolli* species group. **A–D.** *I. vandepolli* Gestro, 1892. **E–H.** *I. opacus* Gestro, 1906. A, E. dorsal views; B, F. left-lateral views; C, G. right-lateral views; D, H. ventral views. Abbreviations: lp: left paramere; ml: median lobe; rp: right paramere; se: setifore extension. Scale bars: 0.2 mm.

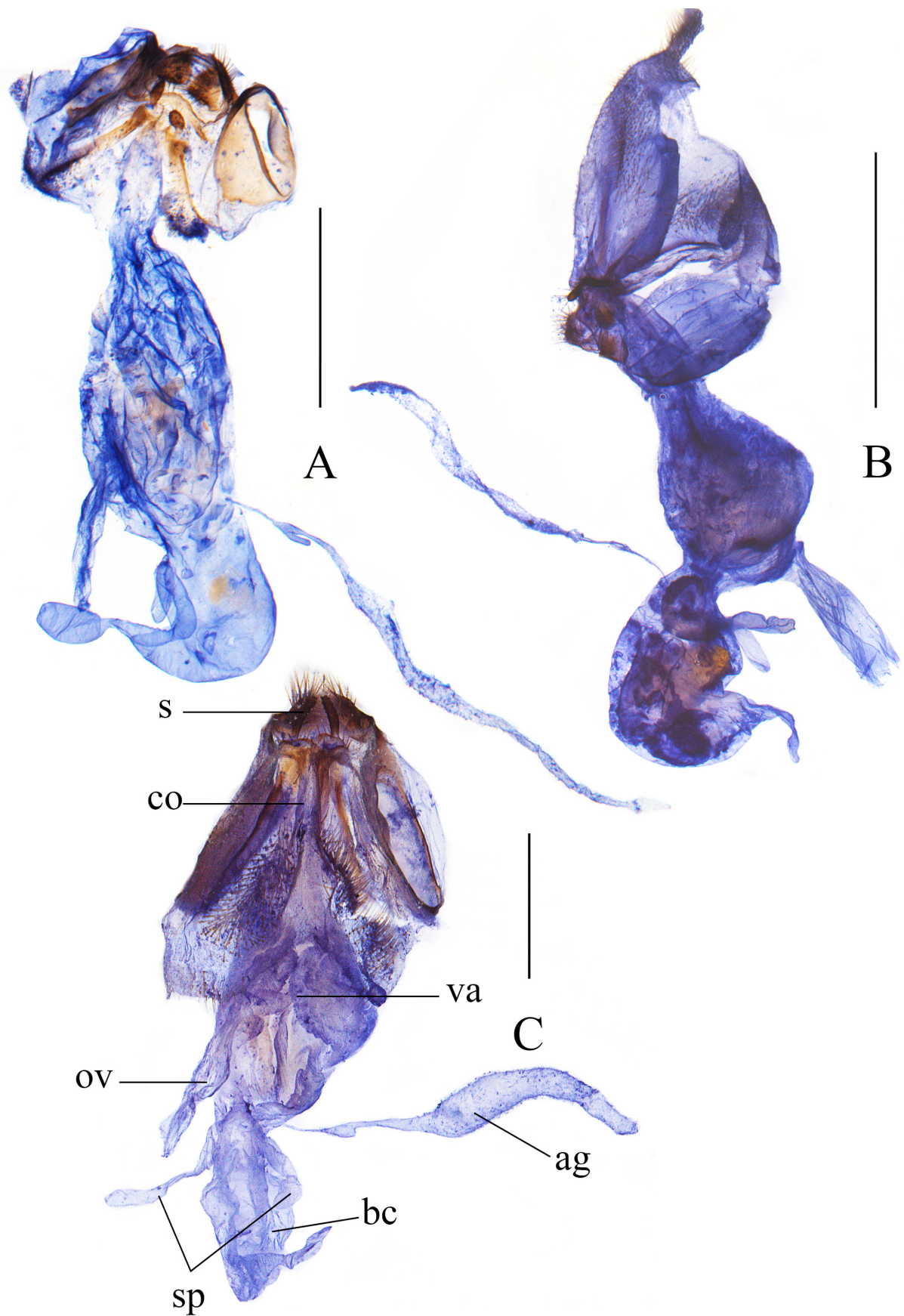


FIGURE 7. Internal organs of female reproductive systems of *Ichthyurus* species, ventro-lateral views. **A.** *I. vandepolli* Gestro, 1892. **B.** *I. bourgeoisi* Gestro, 1892. **C.** *I. savioi* Pic, 1928. Abbreviations: ag: accessory gland; bc: bursa copulatrix; co: coxites; ov: median oviduct; s: style; sp: spermatheca; va: vagina. Scale bars: 1.0 mm.

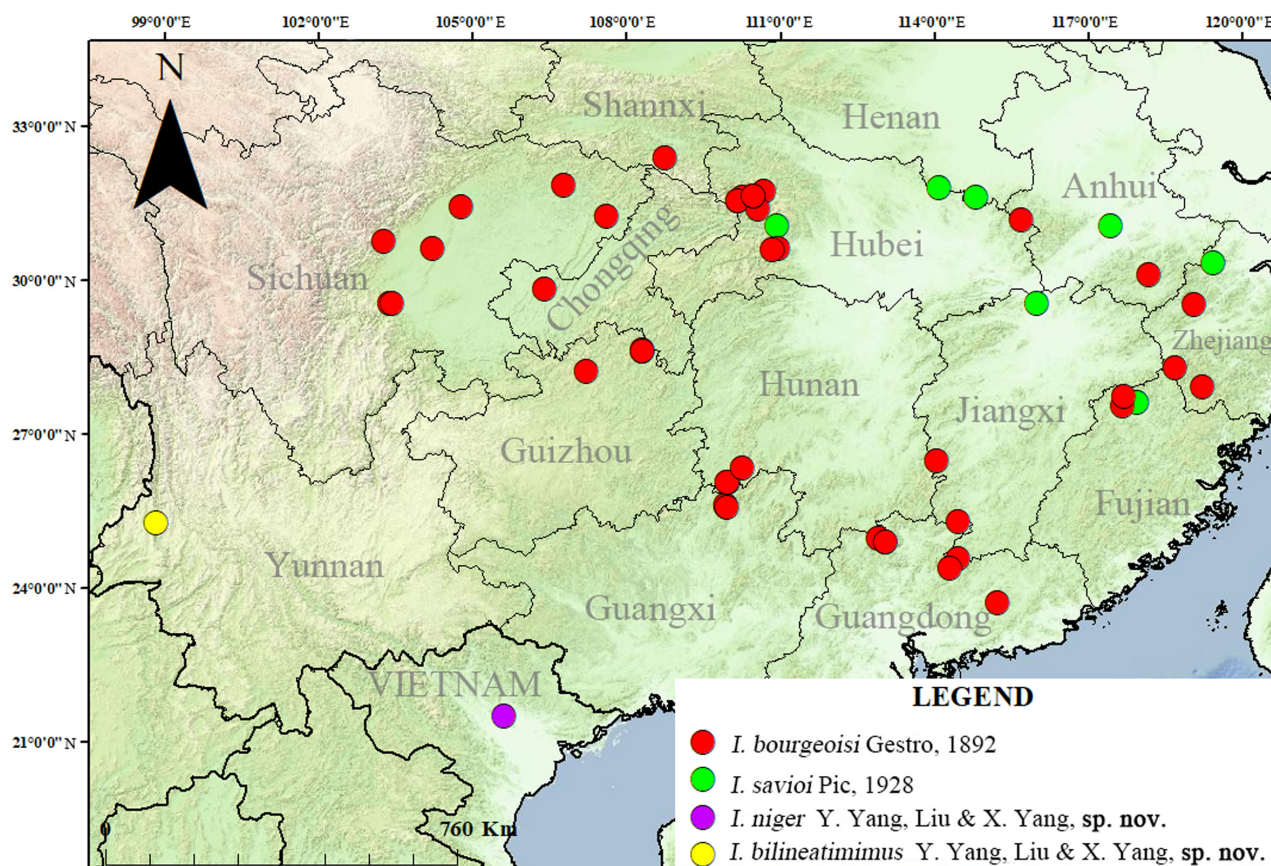


FIGURE 8. Distribution map of the *Ichthyurus bourgeoisi* species group.

Distribution (Fig. 8). China (Henan, Shaanxi, Jiangsu, Anhui, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Guangdong, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan), Vietnam.

Ichthyurus bourgeoisi Gestro, 1892

Chinese common name: 保氏短翅花萤

(Figs 5B, 7B, 9A, B, 10A, 10C, 10E, 11A–D, 12A, B)

Ichthyurus bourgeoisi Gestro, 1892: 1023.

Type material examined. HOLOTYPE: ♂ (MGI), [h] “Cina / W. Szunden / D. Bourg. 92”, [h] “Bourgeoisii / Gestro”, [p] “Typus”.

Additional material examined. CHINA• **Shaanxi:** 3♀♀ (MHB), Lanao, Minzhu, 4.VII.2003. C. X. Yuan and Y. S. Liu leg. **Anhui:** 1♀ (IZAS), Huangshan, 16.VI.1981, collector unknown. **Zhejiang:** 1♂1♀ (IZAS), Jiangshan, Huangtiantou, 4.V.2017, Y. D. Chen and Y. X. Zhang leg.; 1♂ (MHB), Hangzhou, Chunan, 29.67668594° N, 119.12492135° E, 26.V.2021, L. Yu leg.; 1♂ (MHB), Hangzhou, Chunan, 29.35316153° N, 118.85532255° E, 26.V.2021, L. Yu leg.; 1♀ (MHB), Hangzhou, Chunan, 29.66549036° N, 119.22666667° E, 26.V.2021, L. Yu leg.; 1♀ (MHB), Hangzhou, Chunan, 29.57456702° N, 119.20596085° E, 26.V.2021, L. Yu leg.; 1♂ (MHB), Longquan, Fengyangshan, 30.VII.2007, H. Y. Liu leg.; 2♂♂1♀ (MHB), Longquan, Douxiang, Luao, 20.VII.2012, G. L. Xie leg. **Hubei:** 10♂♂6♀♀ (MHB), Shennongjia, Xiaguping, 20.VI.2018, P. Wang leg.; 1♂ (MHB), Shennongjia, Songbai, 27.V.2018, P. Wang and L. Li leg.; 1♂1♀ (MHB), Luoyanghe, 31.V.2019, P. Wang leg.; 2♀♀ (MHB), Shennongjia, Dongxi, 31.904167° N, 110.146389° E; 819 m, 7.–10.VII.2014, Y. B. Ba and S. Y. Tang leg.; 1♀ (MHB), Shennongjia, Jiuchong, 31.410278° N, 110.554167° E, 711.9 m, 11.–15.VII.2014, Y. B. Ba and S. Y. Tang leg.; 1♂1♀ (MHB), Qingtaiguan Forestry, 31.904167° N, 115.694194° E, 600 m, 25.–

29.VI.2014, Y. B. Ba and S. T. Tang leg.; 1♀ (MHB), Shennongjia, Honghuaping, 2019, collector unknown; 1♂ (MHB), Luoyanghe, 30.V.2019, collector unknown; 2♀♀ (MHB), Luoyanghe, 31.V.2019, collector unknown; 1♀ (MHB), Yichang, Hejiaping, Longwangchong, 2.VII.2015, F. Han leg.; 1♂1♀ (MHB), same locality as the preceding, 5.VII.2015, leg. Z. B. Huang; 1♂ (MHB), same locality as the preceding, 2.VII.2015, X. L. Li leg.; 1♂ (MHB), same locality as the preceding, 4.VII.2015, X. L. Li leg.; 1♂ (MHB), same locality as the preceding, 5.VII.2015, J. B. Lu leg.; 1♀ (MHB), same locality as the preceding, 3.VII.2015, P. Z. Dai leg.; 2♀♀ (MHB), same locality as the preceding, 3.VII.2015, S. Ye leg.; 2♂♂, same locality as the preceding, 4.VII.2015, S. Ye leg.; 1♀ (MHB), same locality as the preceding, 6.VII.2015, S. Ye leg.; 1♀ (MHB), same locality as the preceding, 6.VII.2015, J. W. Jiang leg.; 1♂ (MHB), same locality as the preceding, 4.VII.2015, J. W. Jiang leg.; 1♂ (MHB), same locality as the preceding, 4.VII.2015, S. N. Chen leg.; 1♂ (MHB), same locality as the preceding, 5.VII.2015, S. N. Chen leg.; 1♂ (MHB), same locality as the preceding, 6.VII.2015, Y. X. Deng leg.; 1♀ (MHB), Yichang, Dalaoling Forestry, 5.VII.2015, H. H. Xu leg.; 1♀ (MHB), Yichang, Changyang, Hejiaping, Qinggang, 8.VII.2016, Y. L. Lu leg.; 1♀ (MHB), same locality as the preceding, 11.VII.2016, M. Y. Wu leg.; 1♀ (MHB), same locality as the preceding, 1000 m, 4.VII.2012, C. Q. Mo leg.; 1♂ (MHB), same locality as the preceding, 1000 m, 5.VII.2012, Z. X. Liu leg. **Jiangxi:** 1♂ (MHB), Longnan, Jiulianshan, 24.587017° N, 114.452717° E, 5.–21.V.2021, collector unknown; 1♀ (NWFU), specific location unknown, 19.–23.VII.2019, W. L. Yang leg. **Hunan:** 1♂ (IZAS), Chengbu, Dankou, 7.V.2018, Y. D. Chen leg.; 1♂ (MHB), Yanling, 956 m, 26.46485889° N, 114.04359329° E, 23.VI.2023, Y. Z. Huang leg.; 1♀ (MHB), Mangshan, Jiangjunzhai, 23.V.2021, Y. N. Wang leg. **Fujian:** 1♀ (IZAS), Jianyang, Huangkeng, 5.VII.1979, collector unknown; 1♂ (IZAS), Wuyishan, Tongmu, Sangang, 27.752500° N, 117.674722° E, 773 m, 28.V.2018, Y. Y. Lu and Y. D. Chen leg. **Guangdong:** 1♂1♀ (IZAS), Nanling National Natural Reserve, Shaoguan, 24.914000° N, 113.040283° E, 17.–19.VI.2021, collector unknown; 1♂ (MHB), Nanling Nation. Natur. Res., 24.910075° N, 113.025572° E, 1023 m, 26.–28.V.2021, J. B. Tong leg.; 3♀♀ (MHB), Chebaling, 30.V.2019, X. M. Wang leg.; 1♂1♀ (MHB), Heyuan, Beitou, 25.VI.2021, Y. N. Wang leg.; 1♀ (MHB), Nanling, 17.–20.V.2021, Y. N. Wang leg.; 1♀ (MHB), Nanling, 24.91400° N, 113.04028° E, 1.–4.VI.2020, J. B. Tong leg.; 1♂ (MHB), Nanling, 846 m, 24.914000° N, 113.040283° E, 9.IV–28.V.2021, J. B. Tong leg.; 1♂ (MHB), Nanling, Shaoguan, 18.V.2021, Y. N. Wang leg.; 1♂ (MYNU), Heyuan, Zijin, Baixi Natural Reserve, Meiziao, 450 m, 22.–26.IV.2023, L. Qiu leg. **Guangxi:** 1♂ (IZAS), Longsheng, Neicuijiang, 840 m, 6.VI.1963, S. Y. Wang leg.; 1♀ (IZAS), Longsheng, Tianpingshan, 740 m, 4.VI.1963, S. Y. Wang leg.; 1♀ (IZAS), same locality as the preceding, 5.VI.1963, C. G. Wang leg.; 1♂ (IZAS), Longsheng, Baiyan, 1150 m, 18.VI.1963, S. Y. Wang leg.; 2♂♂1♀ (MHB), Longsheng, Huaping, 400–500 m, 27.V.2011, H. Y. Liu leg.; 1♀ (MHB), same locality as the preceding, 11.VII.2013, Y. Q. Qi leg.; 1♂2♀♀ (MHB), Longsheng, Huaping, Tianpingshan, 29.V.2023, H. Q. Lin and S. L. Yuan leg.; 1♀ (MHB), Guilin, Maershan, 1235 m, 2.VI.2011, H. Y. Liu leg.; 1♀ (MHB), Taizishan, Yezhudian, 2021.5.5, J. B. Tong leg. **Chongqing:** 1♀ (IZAS), Beibei, 4.VI.2000, D. L. Luo leg.; 1♂ (CWNU), Jinyunshan, 6.VII.2017, Q. Tian leg.; 2♀♀ (CWNU), Jinyunshan, 6.VII.2017, R. Gan leg.; 1♂3♀♀ (CWNU), Jinyunshan, 6.VII.2017, Y. Chen leg.; 1♂1♀ (CWNU), Jinyunshan, 6.VII.2017, L. Li leg.; 1♂ (CWNU), Jinyunshan, 6.VII.2017, collector unknown; 1♂2♀♀ (CWNU), Jinyunshan, 6.VII.2017, G. Q. Feng leg.; 1♂1♀ (CWNU), Jinyunshan, 6.VII.2017, J. L. He leg.; 2♂♂ (CWNU), Jinyunshan, 6.VII. 2017, S. J. Qian leg.; 1♂ (CWNU), Jinyunshan, 6.VII.2017, W. B. Dong leg.; 1♀ (CWNU), Jinyunshan, 6.VII.2017, L. H. Wen leg.; 1♂2♀♀ (CWNU), Jinyunshan, 6.VII.2017, S. L. Qiu leg.; 1♀ (CWNU), Jinyunshan, 6.VII.2017, H. L. Yang leg.; 1♀ (CWNU), Jinyunshan, 6.VII.2017, G. Q. Feng leg.; 2♀♀ (CWNU), Jinyunshan, 6.VII.2017, Y. Deng leg.; 1♀ (CWNU), Jinyunshan, 6.VII.2017, S. J. Qian leg.; 2♀♀ (CWNU), Jinyunshan, 6.VII.2017, Z. Y. Hao leg.; 1♂1♀ (CWNU), Jinyunshan, 6.VII.2017, Y. He leg.; 1♀ (CWNU), Jinyunshan, 6.VII.2017, D. X. Zhou leg.; 1♂3♀♀ (CWNU), Jinyunshan, 6.VII.2017, H. L. Wang leg.; 2♀♀ (CWNU), Jinyunshan, 6.VII.2017, M. Xu leg.; 3♂♂1♀ (CWNU), Jinyunshan, 7.VII.2017, Q. J. Yang leg.; 1♂ (CWNU), Jinyunshan, 7.VII.2017, leg. L. L. Yan; 1♂1♀ (CWNU), Jinyunshan, 7.VII.2017, Z. J. Liu leg.; 2♀♀ (CWNU), Jinyunshan, 7.VII.2017, J. H. Yang leg.; 1♀ (CWNU), Jinyunshan, 7.VII.2017, H. J. Deng leg.; 1♀ (CWNU), Jinyunshan, 7.VII.2017, X. L. Feng leg.; 1♀ (CWNU), Jinyunshan, 8.VII.2017, Y. Zhu leg.; 1♀ (CWNU), Jinyunshan, 9.VII.2017, R. Gan leg.; 1♀ (CWNU), Jinyunshan, 9.VII.2017, P. F. Chen leg.; 1♀ (CWNU), Jinyunshan, 10.VII.2017, P. F. Chen leg.; 1♀ (CWNU), Jinyunshan, 9.VII.2017, X. L. Feng leg.; 1♀ (CWNU), Jinyunshan, 9.VII.2017, X. L. Zhang leg.; 1♀ (CWNU), Jinyunshan, 10.VII.2017, X. L. Zhang leg.; 1♀ (CWNU), Jinyunshan, 10.VII.2017, H. Jiang leg.; 1♂ (CWNU), Jinyunshan, 11.VII.2017, P. F. Chen leg.; 1♀ (CWNU), Jinyunshan, 11.VII.2017, Q. L. leg. **Sichuan:** 1♂1♀ (IZAS), Emeishan, 14.VI.1955, Y. T. Jin and K. R. Huang leg. 1♂ (IZAS), Emeishan, Qingyinge, 800–100 m, 30.V.1958, Y.

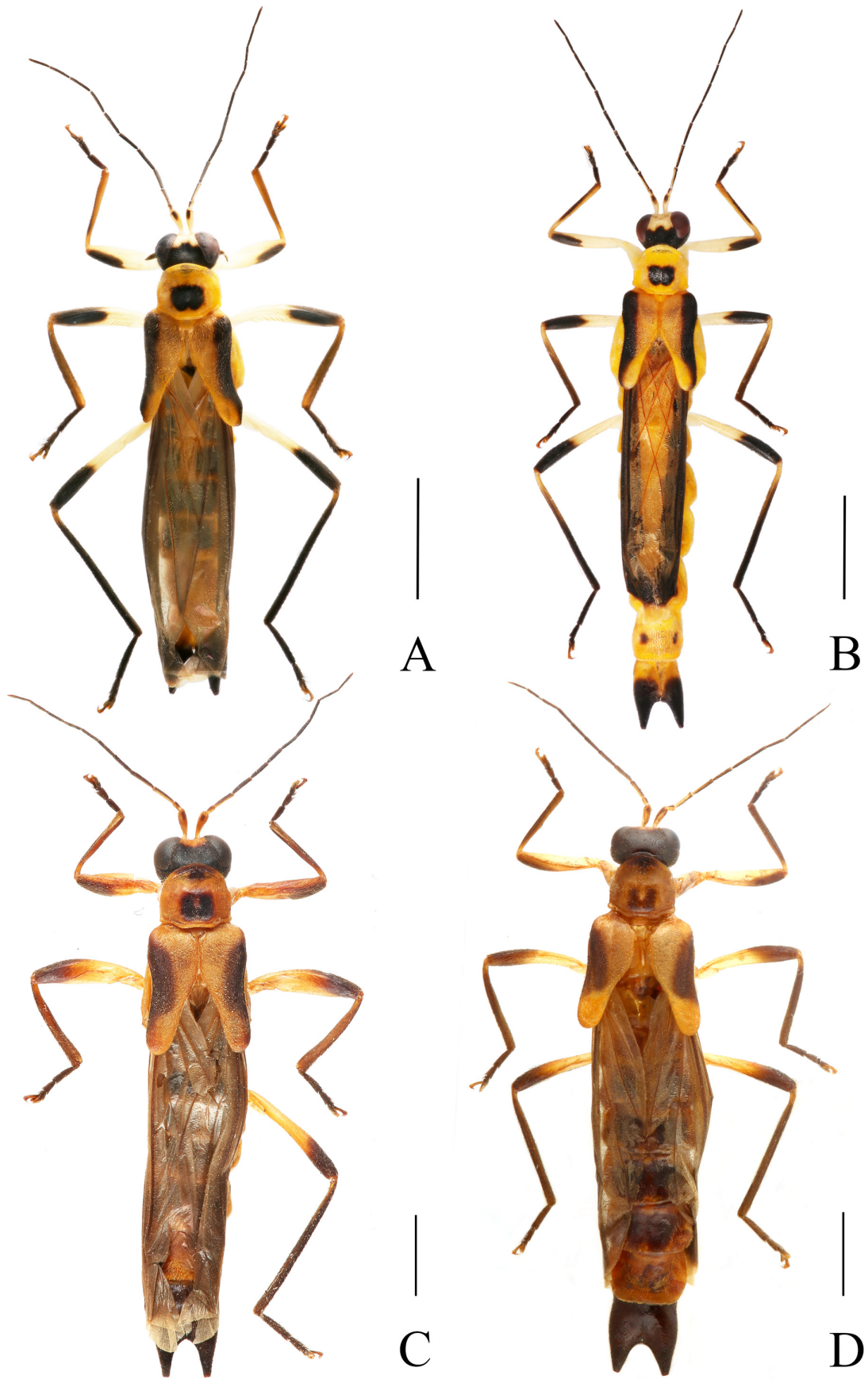


FIGURE 9. Habitus of the *Ichthyurus bourgeoisi* species group, dorsal views. **A, B.** *I. bourgeoisi* Gestro, 1892. **C, D.** *I. savioi* Pic, 1928. A, C. males; B, D. females. Scale bars: 2.0 mm.

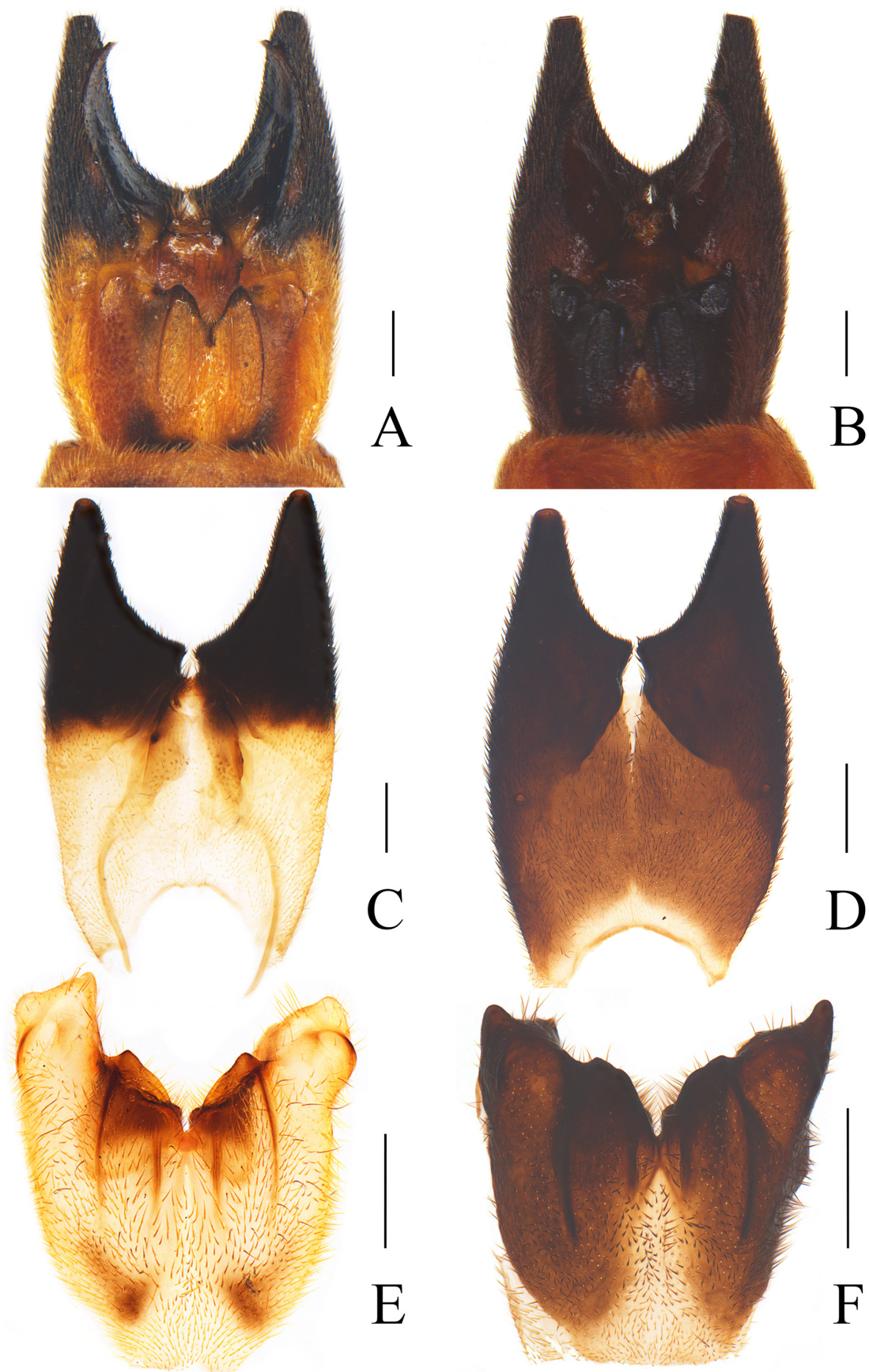


FIGURE 10. Male genital segments of *Ichthyurus bourgeoi* species group (A, B. genital segments in natural state, ventral views; C, D. terminal abdominal tergite, ventral views; E, F. terminal abdominal ventrite, ventral views). A, C, E. *I. bourgeoi* Gestro, 1892. B, D, F. *I. savioi* Pic, 1928. Scale bars: 0.5 mm.

C. Lu leg.; 1♀ (IZAS), Emeishan, Qingyinge, 800–100 m, 23.VI.1959, K. R. Huang leg.; 1♀ (MHBU), Jiguanshan, 17.VI.2016, F. M. Shi leg.; 3♂♂4♀♀ (CWNU), Chengdu, 7.VII.2017, X. Wu leg.; 1♂ (CWNU), Dazhou, 7.VII.2017, L. L. Zhang leg.; 1♀ (CWNU), Fucheng, 7.VII.2017, Y. Li leg.; 1♀ (CWNU), Bazhong, 7.VII.2017, J. Xiang leg.; 1♀ (CWNU), Shangmen, 18.VII.2017, H. Jiang leg.; 2♂♂1♀ (MHBU), Shuanghe, 21.VI.2022, J. B. Tong leg. **Guizhou:** 1♂ (MHBU), Mayanghe, Maojia, 8.–12.VII.2007, G. L. Xie leg.; 1♂ (IZAS), Yanhequ, Mayanghe Nation. Natur. Res., 1761 m, 29.V.2018, Y. D. Chen leg.; 1♀ (IZAS), Yanhe, Daheba, 450–750 m, 5.–12.VI.2007, Y. J. Li leg.; 1♂2♀♀ (IZAS), Zunyi, Kuankuoshui, 848 m, 8.VI.2010, W. G. Liu leg.

Redescription. Body length (both sexes): 9.0–10.0 mm; body width (both sexes): 1.7–1.9 mm.

Male (Fig. 9A). Coloration. Body black, clypeus and mouthparts yellow, lingula, galea, lacinia, terminal labial and maxillary palpomeres black, antennomeres I yellow and darkened dorso-apically, II–III yellow ventrally; prothorax yellow, pronotum with a black marking in center of disc; scutellum yellow; elytra widely yellow at whole length of inner half part; legs yellow at coxae, trochanters and basal half parts of femora, as well as pro- and mesotibiae ventrally; abdominal segments II–VI narrowly yellow at lateral and posterior margins, VII uniformly yellow and VIII yellow at anterior half part.

Eyes large, interocular distance about 0.4 times of diameter of an eye. Antennae reaching posterior margin of abdominal tergite IV, antennomeres II about 1/3 length of I, III–XI subequal in length and about 4.0 times longer than II.

Pronotum 1.2 times wider than long, anterior and lateral margins arcuate, posterior margin feebly bisinuate, anterior angles rounded and posterior angles nearly rectangular.

Elytra about 1.4 times longer than humeri width of conjoint elytra, 2.1 times longer than pronotum, with lateral margins sinuate, sutures moderately dehiscent at posterior 2/3, distance between sutures slightly wider than width of an elytron, apices rounded.

Proctiger (Fig. 10C) slightly extending over paraproct, semicircular and roundly emarginate in middle of posterior margin. Paraproct (Fig. 10C) with a pair of indistinct projections at lateral margins. Terminal abdominal tergite (Fig. 10A, C) with lateral projections about 1/3 length of tergite, ventro-lateral excavations well delimited and keeled along edges. Terminal abdominal ventrite (Fig. 10E) moderately ridged on surface, with middle emargination about 2/5 length of the ventrite, outer apical angles rounded at apices. Abdominal sternite IX (Fig. 5B) axe-like, longer than wide, widened anteriorly, with posterior right and left angles arcuate, anterior right angle strongly and narrowly protruding anteriorly and feebly expanded and rounded at apex.

Aedeagus: right paramere slightly narrowed at apex in dorsal and ventral views (Fig. 11A, D), fluent at ventro-apical part (Fig. 11B, C); left paramere parallel-sided, about twice as long as wide, with inner branch progressively thinned apically and twice as long as outer branch (Fig. 11A, D); setifore extension moderately sclerotized and 1/3 shorter than right paramere (Fig. 11A, D); tegmen short and about half length of right paramere (Fig. 11D); median lobe sharp at apex (Fig. 11A, D).

Female (Fig. 9B). Similar to males, but body larger, abdomen yellow, each tergite with a pair of small black markings on both sides, and terminal abdominal tergite black at posterior half part; terminal abdominal tergite (Fig. 12A) with lateral projections slightly wider; terminal abdominal ventrite (Fig. 12B) longitudinal, with lateral margins arcuate, posterior margin widely and roundly emarginate and latero-apical angles rounded.

Internal organ of reproductive system (Fig. 7B): vagina global apically, with median oviduct situated at ventro-apical part; bursa copulatrix arising from apex of vagina, expanded and broad bean-shaped, abruptly thinned into a slightly short and thin tube at ventro-apical part; accessory gland opening at dorsal base of bursa copulatrix, moderately long and feebly expanded apically; a spermatheca in the form of two short spiral tubes arising from ventro-basal part of bursa copulatrix.

Distribution. China (Shaanxi, Anhui, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Guangdong, Guangxi, Chongqing, Sichuan, Guizhou).

Remarks. Although the type of this species was located in MGI, its locality remains unclear within China (Delkeskamp 1977; Kazantsev & Brancucci 2007). In the present study, a large series of material shows that it is widely distributed in southern China (Fig. 7). Herein we redescribe and illustrate it to make it better known.

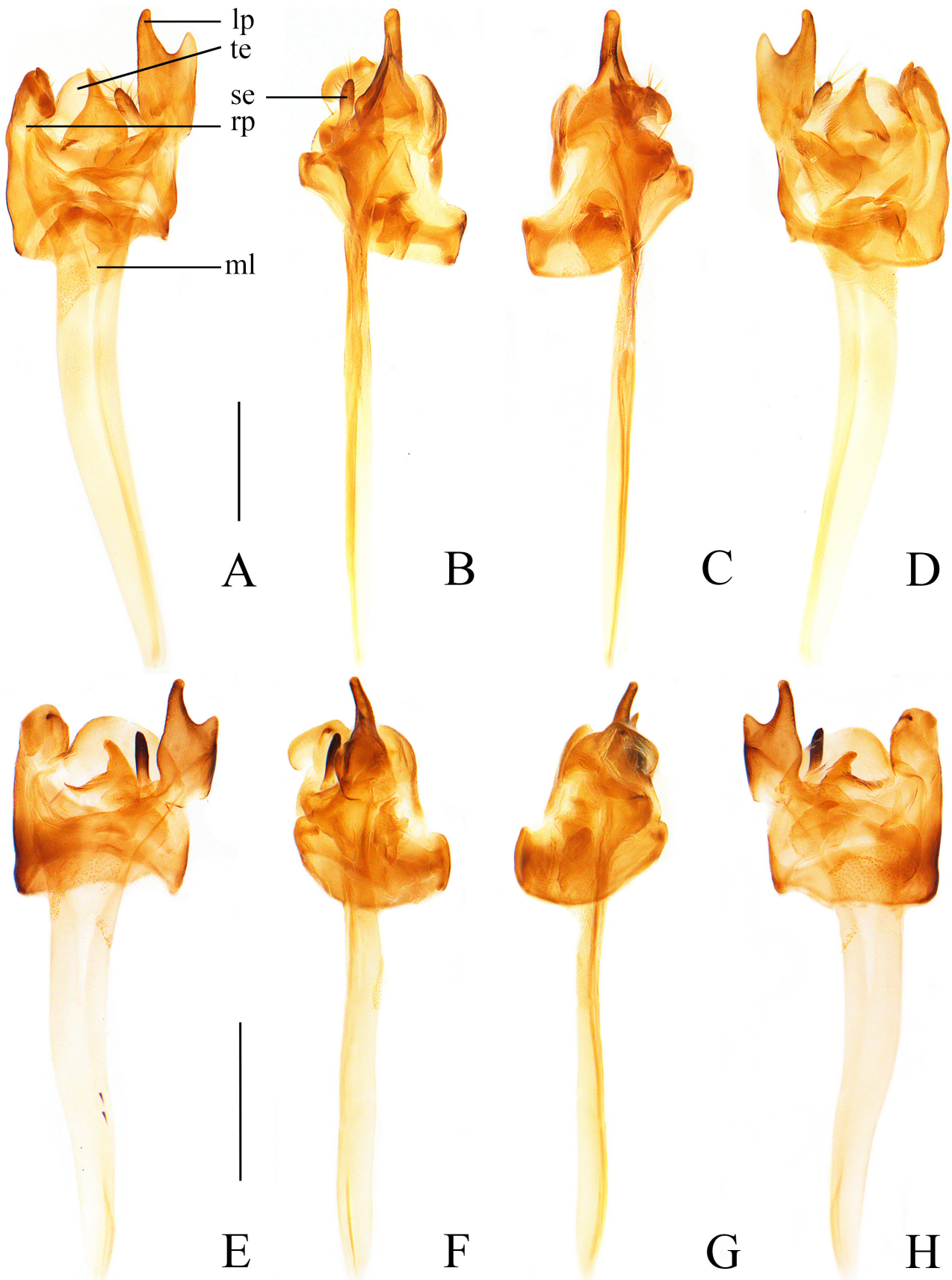


FIGURE 11. Aedeagi of the *Ichthyurus bourgeoisi* species group. **A–D.** *I. bourgeoisi* Gestro, 1892. **E–H.** *I. savioi* Pic, 1928. A, E. dorsal views; B, F. left-lateral views; C, G. right-lateral views; D, H. ventral views. Abbreviations: lp: left paramere; ml: median lobe; rp: right paramere; se: setifore extension; te: tegmen. Scale bars: 0.5 mm.

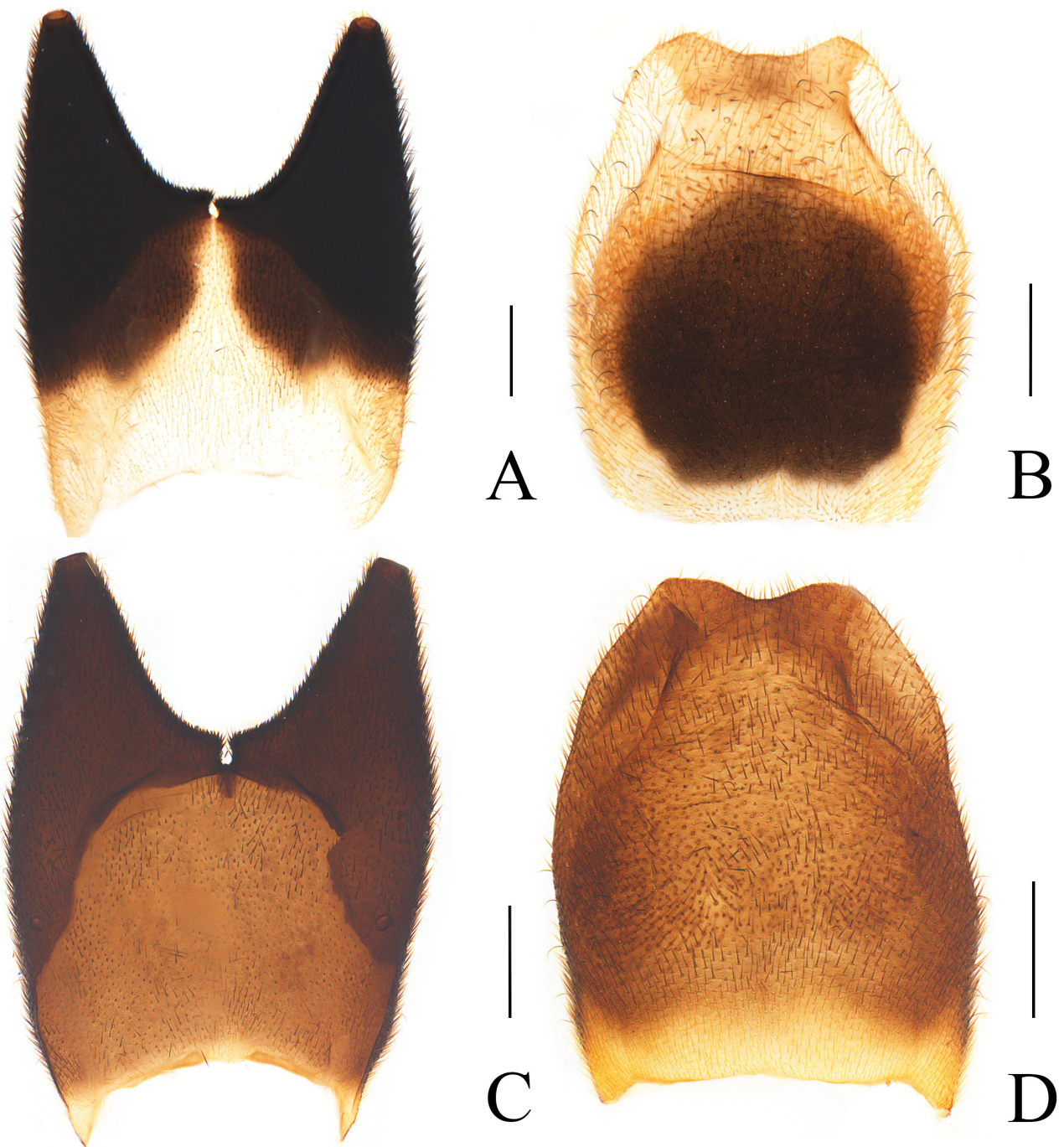


FIGURE 12. Female genital segments of *Ichthyurus bourgeoisi* species group (A, C. terminal abdominal tergite, ventral views; B, D. terminal abdominal ventrite, ventral views). A, B. *I. bourgeoisi* Gestro, 1892. C, D. *I. savioi* Pic, 1928. Scale bars: 0.5 mm.

***Ichthyurus savioi* Pic, 1928**

Chinese common name: 萨维短翅花萤

(Figs 5C, 5E, 7C, 9C, D, 10B, 10D, 10F, 11E–H, 12C, D)

Ichthyurus savioi Pic, 1928: 14.

Type material examined. HOLOTYPE: 1♂ (MNHN), [h] “yue-wan-K. / 10. 7. 20”, [h] “309”, [h] “savioi / n. sp.” (Pic’s handwritten label), [p] “HOLOTYPE”, [h] “*Ichthyurus / savioi* Pic / det. Y.X. Yang”.

Additional material examined. **Anhui:** 1♀ (IZAS), “CHINE, Prov ANHWEI, Ningkwo”, “yue-wan-K, 10.7.20”, “309”; 3♂♂ (MHB), Chizhou, Shitai, Qifeng, 31.08775° N, 117.43942° E, 586 m, 17.VI.2024, Z.H. Ma leg. **Jiangsu:** 1♂ (IZAS), “CHINE, Prov KIANGSU, Lac Ta hou, 21.7.23”; **Jiangxi:** 2♂♂2♀♀ (IZAS), “Kuling, 1935.VII.13, O. PIEL coll.” **Zhejiang:** 1♂ (IZAS), “Tianmushan, 14.VII.1935”; 1♂1♀ (IZAS), “Tianmushan, 18.VII.1935”; 1♀ (IZAS), “Tianmushan, 10.VII.1936”. **Henan:** 1♂ (CAU), “Xinxian, Liankangshan Nat. Res., Daling, 700 m, 17.VI.2014, Xingyue Liu leg.”; 1♀ (MHB), Xinyang, Jigongshan, 11.–13.VII.2015, C. Gao and J. L. Wang leg.; 1♀ (IZAS), Jigongshan, 540 m, 15.VII.2001, J. Z. Cui leg. **Fujian:** 1♀ (IZAS), Chongan, Xingcun, Sangang, 740 m, 28.VI.1960, Y. R. Zhang leg. **Hubei:** 2♂♂1♀ (MHB), Shennongjia, Dongxi, 31.567634° N, 110.161186° E, 819 m, 7.–10.VII.2014, Y. B. Ba and S. Y. Tang leg.; 2♀♀ (MHB), Yichang, Dalaoling Forestry, 10.VII.2014, Y. P. Lin leg.; 1♂ (MHB), same locality as the preceding, 22.VII.2010, Y. X. Wang leg.; 1♂ (MHB), same locality as the preceding, 25.VII.2010, K. Fang leg.; 1♀ (MHB), same locality as the preceding, 24.VII.2010, B. X. Wang leg.; 1♀ (MHB), same locality as the preceding, 25.VII.2010, J. W. Wang leg.; 1♀ (MHB), same locality as the preceding, 23.VII.2010, Y. P. Zhang leg.; 1♀ (MHB), same locality as the preceding, 13.VII.2014, L. B. Xiang leg.; 1♀ (MHB), Yichang, Dalaoling Forestry, Yaowuxi, 3.VII.2014, L. B. Xiang leg.

Redescription. Body length (both sexes): 11.4–15.2 mm; body width (both sexes): 2.3–2.7 mm.

Male (Fig. 9C). Coloration. Body black, clypeus and mouthparts yellow, lingula, galea, lacinia, terminal labial and maxillary palpomeres black, antennomeres I yellow and darkened dorsoapically, II–III yellow ventrally; prothorax yellow, pronotum with a triangular black marking at anterior margin and a black marking in center of disc, pro- and mesoventrite yellow, metaventrite narrowly yellow at lateral margins; scutellum yellow; elytra widely yellow at whole length of inner half part, humeri and apices; legs yellow at coxae, trochanters and basal half parts of femora, as well as pro- and meso-tibiae ventrally; abdominal segments II–VI narrowly yellow at lateral and posterior margins, VII uniformly yellow.

Eyes large, interocular distance about half of diameter of an eye. Antennae reaching posterior margin of abdominal tergite III, antennomeres II about 1/3 length of I, III–XI subequal in length and about 4.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin strongly arcuate and lateral margins slightly arcuate, posterior margin feebly bisinuate, anterior angles rounded and posterior angles nearly rectangular.

Elytra about 1.3 times longer than humeral width of conjoint elytra, twice longer than pronotum, with lateral margins sinuate, sutures moderately dehiscent at posterior 2/3, distance between sutures slightly wider than width of an elytron, apices rounded.

Proctiger (Fig. 5E) slightly extending over paraproct, semicircular and roundly emarginate in middle of posterior margin. Paraproct (Fig. 5E) with a pair of triangular projections at lateral margins and covered with some long and stout setae around posterior margin. Terminal abdominal tergite (Fig. 10B, D) with lateral projections about 1/3 length of the tergite, ventro-lateral excavations well delimited and keeled along edges. Terminal abdominal ventrite (Fig. 10F) strongly ridged on surface, with middle emargination about half length of the ventrite, feebly bisinuate at inner margins, outer apical angles distinctly projecting laterally. Abdominal sternite IX (Fig. 5C) axelike, slightly longer than wide, widened anteriorly, with posterior right angles rectangular and left angles rounded, anterior right angle strongly and narrowly protruding anteriorly and moderately expanded and rounded at apex.

Aedeagus: right paramere widely rounded at apex in dorsal and ventral views (Fig. 11E, H), fluent at ventro-apical part (Fig. 11F, G); left paramere nearly parallel-sided, about 1.5 times as long as wide, with inner branch progressively thinned apically and 3.0 times as long as outer branch (Fig. 11E, H); setifore extension strongly sclerotized and 1/3 shorter than right paramere; tegmen about 2/3 length of right paramere (Fig. 11H); median lobe horn-shaped at apex (Fig. 11E, H).

Female (Fig. 9D). Similar to males, but body larger, abdominal segments narrowly yellow at lateral margins, penultimate abdominal segments yellow, terminal abdominal tergite (Fig. 12C) with lateral projections slightly wider, terminal abdominal ventrite (Fig. 12D) longitudinal, with lateral margins arcuate, posterior margin widely and roundly emarginate and latero-apical angles rounded.

Internal organ of reproductive system (Fig. 7C): vagina bucket-shaped, with median oviduct situated at ventro-apical part; bursa copulatrix arising from apex of vagina, globally expanded and abruptly thinned into a thick and slightly long tube at ventro-apical part; accessory gland opening at dorsal base of bursa copulatrix, long and strongly expanded apically; a spermatheca in the form of two short spiral tubes arising from ventro-basal part of bursa copulatrix.

Distribution. China (Anhui, Henan, Hubei, Zhejiang, Jiangsu, Jiangxi, Fujian).

Remarks. The type of this species was located in MNHN, and an additional specimen attached with same locality information was fortunately found in IZAS. Upon examination of these specimens, we have identified a large series of additional material belonging to this species. This makes a possibility for us to well recognize and redescribe it in detail.

***Ichthyurus niger* Y. Yang, Liu & X. Yang, sp. nov.**

Chinese common name: 黑体短翅花萤
(Figs 13A, 14A, 14C, 14E, 15A–D)

Type material. HOLOTYPE: CHINA: ♂ (CAU), “Vietnam, Vinh Phue Prov., Tam Dao National Park, 1010 m, 18.V.2012, Xingyue Liu leg.”.

Differential diagnosis. It is most similar to *I. bourgeoisi* in the aedeagus, but can be easily distinguished from the latter by the following characters: pronotum and elytra (Fig. 13A) almost black (in *I. bourgeoisi* (Fig. 9A, B), pronotum and elytra mostly yellow, with black markings or longitudinal stripes); terminal abdominal ventrite of male (Fig. 14E) with middle emargination strongly ridged at basal 2/3 of inner margins and right-angled terminally (in *I. bourgeoisi* (Fig. 10E), terminal abdominal ventrite of male with middle emargination not ridged at inner margins); aedeagus: left paramere (Fig. 15A, D) with inner branch evenly thin (in *I. bourgeoisi* (Fig. 11A, D), left paramere with inner branch progressively thinned apically).

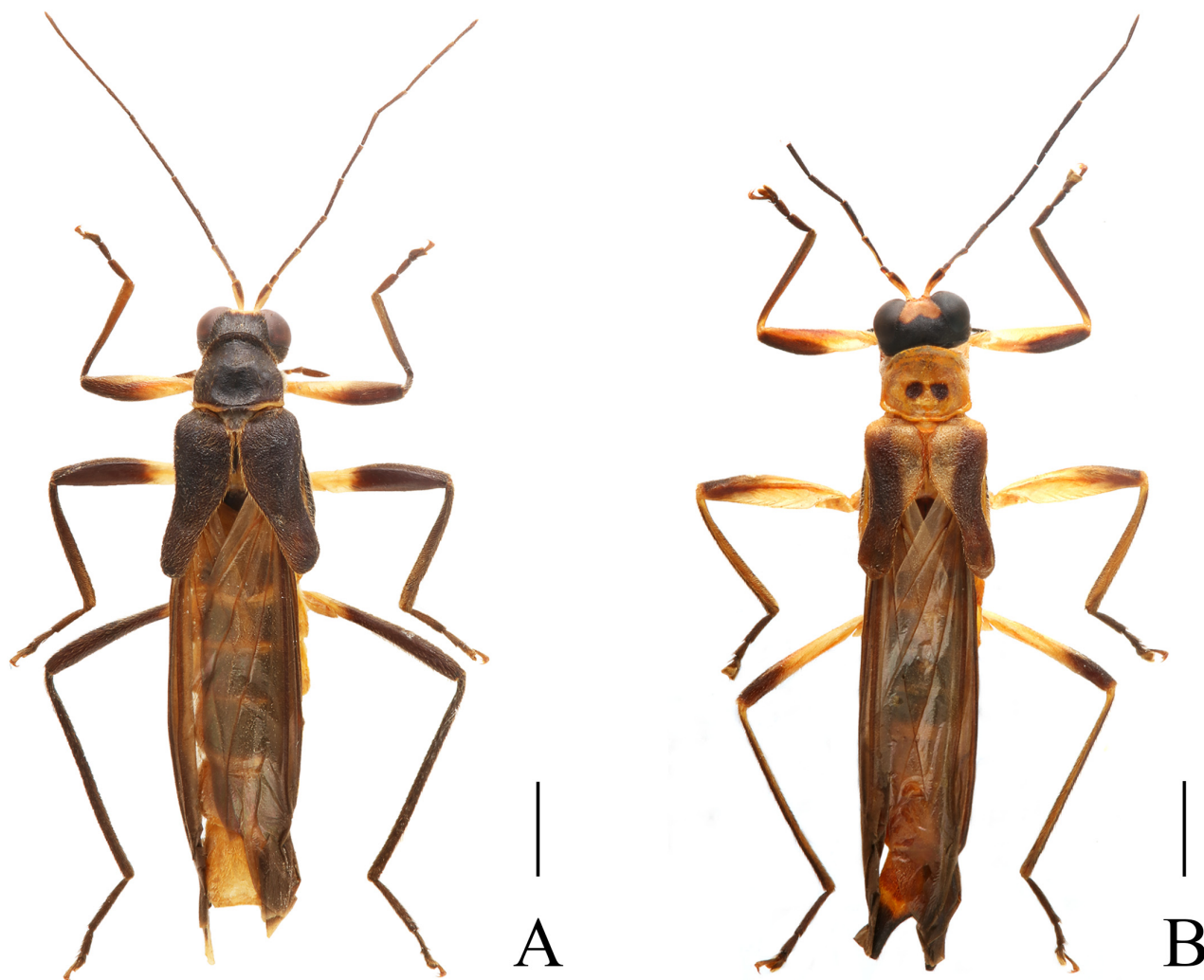


FIGURE 13. Habitus of the *Ichthyurus bourgeoisi* species group, dorsal views. **A.** *I. niger* sp. nov. **B.** *I. bilineatimimus* sp. nov. A, B, males. Scale bars: 2.0 mm.

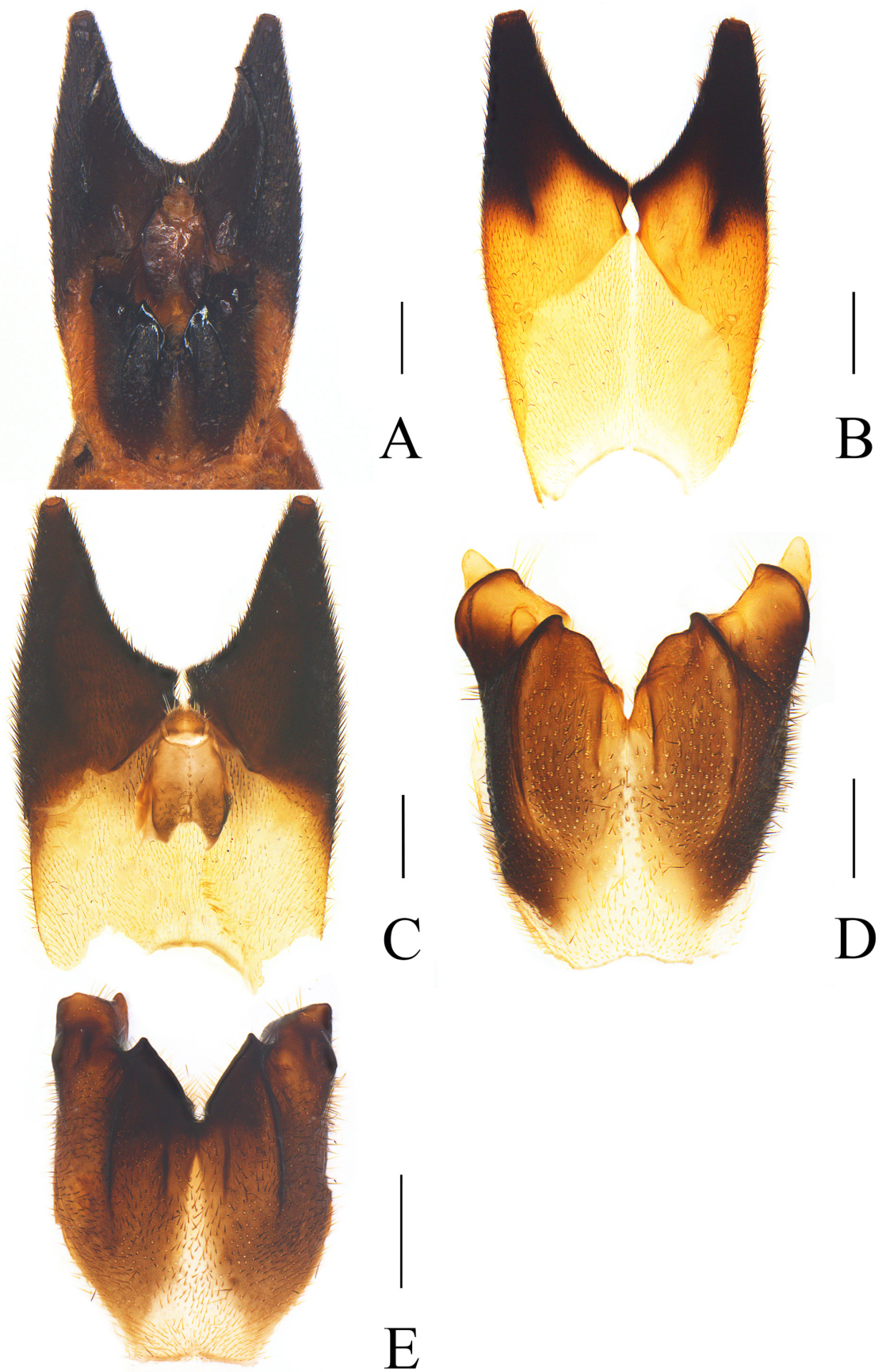


FIGURE 14. Male genital segments of *Ichthyurus bourgeoisi* species group (A. genital segments in natural state, ventral views; B, C. terminal abdominal tergite, ventral views; D, E. terminal abdominal ventrite, ventral views). **A, C, E.** *I. niger* **sp. nov.** **B, D.** *I. bilineatimimus* **sp. nov.** Scale bars: 0.5 mm.

Description. Body length: 13.8 mm; body width: 2.8 mm.

Male (Fig. 13D). Coloration. Body black, antennomeres I–III yellow ventrally; pronotum almost black, marginate by extremely narrow yellow band only at posterior margin, elytra almost black, extremely narrow yellow at sutures; metaventricle each side with a small rounded yellow marking; legs yellow at coxae, trochanters and the basal half parts of pre- and mesofemora; abdominal segments II–VI narrowly yellow at posterior and lateral margins, VII uniformly yellow.

Eyes large, interocular distance about 0.6 times of diameter of an eye. Antennae reaching posterior margin of abdominal tergite V, antennomeres II about 1/3 length of I, III–XI subequal in length and about 3.0 times longer than II.

Pronotum 1.2 times wider than long, anterior margin strongly arcuate and lateral margins slightly arcuate, posterior margin feebly bisinuate, anterior angles rounded and posterior angles nearly rectangular.

Elytra about 1.4 times longer than humeri width of conjoint elytra, twice longer than pronotum, with lateral margins slightly sinuate, sutures strongly dehiscent at posterior 2/3, distance between sutures slightly wider than width of an elytron, apices rounded.

Proctiger (Fig. 14C) slightly extending over paraproct, semicircular and roundly emarginate in middle of posterior margin, covered with some long and stout setae. Paraproct (Fig. 14C) with a pair of indistinct projections at lateral margins. Terminal abdominal tergite (Fig. 14A, C) with lateral projections about 2/5 length of tergite, ventro-lateral excavations well delimited and keeled along edges. Terminal abdominal ventrite (Fig. 14E) strongly ridged on surface, with middle emargination about 2/5 length of the ventrite, strongly ridged at basal 2/3 portion of inner margins and right-angled terminally, outer apical angles moderately projecting laterally.

Aedeagus: right paramere slightly narrowed at apex in dorsal and ventral views (Fig. 15A, D), fluent at ventro-apical part (Fig. 15B, C); left paramere feebly arcuate at lateral margins, about twice as long as wide, with inner branch evenly thin and as twice long as outer branch (Fig. 15A, D); setifore extension strongly sclerotized and 1/3 shorter than right paramere (Fig. 15A); tegmen about 2/3 length of right paramere (Fig. 15A); median lobe sharp at apex (Fig. 15A, D).

Female. Unknown.

Etymology. The specific name is derived from the Latin word “*niger*” (black), referring to its almost black body.

Distribution. N. Vietnam.

Remarks. The abdominal sternite IX of the holotype was inadvertently overlooked during dissection, and this character will be noted when additional material is available in the future.

***Ichthyurus bilineatimimus* Y. Yang, Liu & X. Yang, sp. nov.**

Chinese common name: 拟双带短翅花萤

(Figs 5D, 5F, 13B, 14B, 14D, 15E–H)

Type material. HOLOTYPE: CHINA: ♂ (CAU), CHINA• **Yunnan**, Baoshan, Baihualing, 1500 m, 29.V.2007, X. Y. Liu leg.

Differential diagnosis. It is most similar to *I. bourgeoisi* in the general appearance, but can be easily distinguished from the latter by the following characters: elytra (Fig. 13B) with apical half part completely black (in *I. bourgeoisi* (Fig. 9A, B), elytra with apical half part bicolored, mixed with yellow and black); terminal abdominal ventrite (Fig. 14D) strongly ridged on surface, with middle emargination bidentate at inner margins, outer apical angles slightly projecting laterally (in *I. bourgeoisi*, terminal abdominal ventrite (Fig. 10E) moderately ridged on surface, with middle emargination unidentate at inner margins, outer apical angles rounded); paraproct (Fig. 5F) with a pair of large and horn-shaped projections and another pair of small triangular projections at lateral margins (in *I. bourgeoisi* (Fig. 10C), paraproct only with a pair of inconspicuous projections at lateral margins); aedeagus: left paramere with inner branch (Fig. 15E, H) abruptly thinned apically, right paramere with a large conical projection at ventro-apical part (in *I. bourgeoisi* (Fig. 11A, D), left paramere with inner branch progressively thinned apically, right paramere fluent at ventro-apical part).

Description. Body length: 14.2 mm; body width: 2.7 mm.

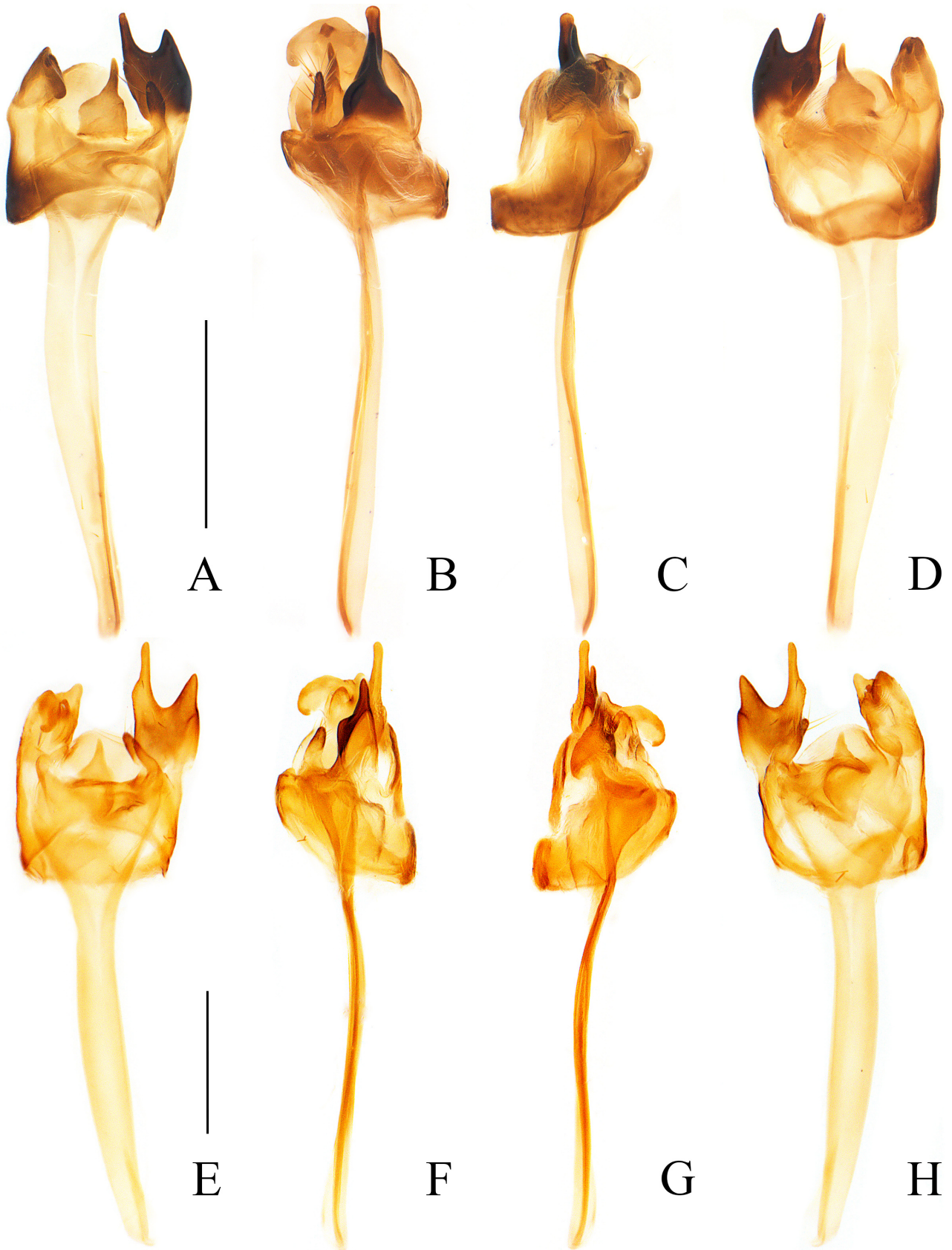


FIGURE 15. Aedeagi of the *Ichthyurus bourgeoisi* species group. A–D. *I. niger* sp. nov. E–H. *I. bilineatimimus* sp. nov. A, E. dorsal views; B, F. left-lateral views; C, G. right-lateral views; D, H. ventral views. Scale bars: 0.5 mm.

Male (Fig. 13B). Coloration. Body black, clypeus and mouthparts yellow, lingula, galea, lacinia, terminal labial and maxillary palpomeres black, antennomeres I–III yellow ventrally; prothorax yellow, pronotum with two small black marking in center of disc; metaventrite each side with a large transverse yellow marking; scutellum yellow; elytra yellow at the inner basal half part; legs yellow at coxae, trochanters and the basal half parts of femora, the apical half parts ventrally of pro- and meso-femora, the whole length ventrally of pro- and mesotibiae; abdominal segments II–V narrowly yellow at posterior and lateral margins, VI and VII yellow, VIII yellow at basal half part.

Eyes large, interocular distance about half of diameter of an eye. Antennae reaching posterior margin of abdominal tergite IV, antennomeres II about 1/3 length of I, III–IV subequal in length and about 3.0 times longer than II, V–XI subequal in length and about 1.2 times longer than II.

Pronotum 1.1 times wider than long, anterior margin moderately arcuate and lateral margins subparallel, posterior margin feebly bisinuate, anterior angles rounded and posterior angles nearly rectangular.

Elytra about 1.3 times longer than humeri width of conjoint elytra, 2.1 times longer than pronotum, with lateral margins strongly sinuate, sutures strongly dehiscent at posterior 2/3, distance between sutures slightly wider than width of an elytron, apices rounded.

Proctiger (Fig. 5F) extending over paraproct, semicircular and roundly emarginate in middle of posterior margin, covered with a few long and stout setae along lateral margins. Paraproct (Fig. 5F) with a pair of large horn-shaped projections and a pair of small triangular projections at lateral margins. Terminal abdominal tergite (Fig. 14B) with lateral projections about 2/5 length of the tergite, ventro-lateral excavations well delimited and keeled along edges. Terminal abdominal ventrite (Fig. 14D) strongly ridged on surface, with middle emargination about half length of the ventrite, largely bidentate at inner margins, outer apical angles distinctly projecting laterally. Abdominal sternite IX (Fig. 5D) axe-like, longer than wide, slightly widened anteriorly, with posterior right and left angles both rectangular, anterior left angle strongly and narrowly and longways protruding anteriorly.

Aedeagus: right paramere with a large conical projection at ventro-apical part (Fig. 15E–H); left paramere nearly parallel-sided, about 1.5 times as long as wide, with inner branch abruptly thinned apically and twice as long as outer branch (Fig. 15E, H); setifore extension weakly sclerotized and half shorter than right paramere (Fig. 15E); tegmen short and about half length of right paramere (Fig. 15E); median lobe sharp at apex (Fig. 15E, H).

Female. Unknown.

Etymology. The specific name is derived from the Latin *mimus* (imitator), referring to its body coloration similar to *I. bilineatus* Pic, 1915.

Distribution. China (Yunnan).

Discussion

The taxonomy of the specious *Ichthyurus* has been poorly studied over the past century. The majority of previously known species were described at the end of the 19th and early 20th centuries by Italian R. Gestro and French M. Pic. In recent years, Swiss specialist M. Brancucci (1983, 2009) reviewed the species from Taiwan Island and Himalayan area respectively. More recently, Chinese J.-K. Li and his coauthors (Li et al. 2014; Li & Gao 2015) added several species from northern Laos. However, there has been no comprehensive and systematic review of this genus until now. Upon commencing the taxonomic works of *Ichthyurus* species, we encountered difficulties in identification due to a lack of subdivisions within this large group. Fortunately, one of our coauthors, Yu-Xia Yang has examined the types of *Ichthyurus* deposited in MGI, Naturhistorisches Museum Basel, Switzerland (NHMB) and Muséum national d'Histoire naturelle, Paris, France (MNHN). Also, a large series of material from mainland China is available in our study, which allows us to study this genus more deeply. Now we have a better understanding of the species and morphological diversity of this genus. To facilitate the morphology-based taxonomy of *Ichthyurus*, we would like to propose the species groups as an informal taxon to allocate the species at the moment. The species groups could be recognized by both male genitalia and external characters, including shapes of antennae, pronotum, legs and genital segments. In the present study, we define two species groups for those species from the southeastern China and adjacent areas, which can be differentiated by the following key.

Key to the species of the two defined species groups of *Ichthyurus*

- 1 Antennomere III feebly thickened in male (Fig. 2A, C), while simple in female (Fig. 2B); pronotum longer than wide or subequal; profemora moderately swollen ventrally, protibiae dilated dorso-distally and each present with an obviously spine at apex, and protarsomeres I projecting distally to the ventral part of II in male (Fig. 3A, B), while prothoracic legs normally slender and absent with spines in female (Fig. 2B); terminal abdominal ventrite of male bilobed (Fig. 4B, F) 2
- Antennomere III and prothoracic legs simple in both sexes (Figs 9, 13); pronotum wider than long; terminal abdominal ventrite of male saddle-shaped (Figs 10E, F, 14D, E) 3
- 2 Protibiae (Fig. 3A) dilated dorso-distally along whole length, with outer apical angles acute at apices, apical spines short and thin in male; aedeagus: right paramere rounded at apex (Fig. 6A, D) *I. vandepolli* Gestro, 1892
- Protibiae (Fig. 3B) dilated dorso-distally along basal 3/4 and abruptly constricted at apical 1/4, forming a triangular angle at subapical part, apical spines feebly longer and stouter in male; aedeagus: right paramere acute at apex (Fig. 6E, H) *I. opacus* Gestro, 1906
- 3 Paraproct with a pair of large and horn-shaped projections and another pair of small triangular projections at lateral margins (Fig. 5F); aedeagus: left paramere with inner branch abruptly thinned apically, right paramere with a large conical projection at ventro-apical part (Fig. 15E, H) *I. bilineatimimus* sp. nov.
- Paraproct only with a pair of inconspicuous projections at lateral margins (Figs 5E, 10C, 14C); aedeagus: left paramere with inner branch (Figs 11A, D, E, H, 15A, D) progressively thinned apically or evenly thin along whole length, right paramere fluent at ventro-apical part 4
- 4 Pronotum and elytra almost black (Fig. 13A); terminal abdominal ventrite of male (Fig. 14E) with middle emargination strongly ridged at basal 2/3 of inner margins and right-angled terminally; aedeagus: left paramere nonparallel-sided, with inner branch evenly thin along whole length (Fig. 15A, D) *I. niger* sp. nov.
- Pronotum and elytra mostly yellow (Fig. 9), with black markings or longitudinal stripes; terminal abdominal ventrite of male with middle emargination not ridged at inner margins (Fig. 10E–F); aedeagus: left paramere parallel-sided, with inner branch progressively thinned apically (Fig. 11A, D, E, H) 5
- 5 Elytra black at humeri and apices (Fig. 9A, B); terminal abdominal segment bicolored, mixed with yellow and black (Figs 10A, 12A); terminal abdominal ventrite of male with outer apical angles rounded at apices (Fig. 10E); aedeagus: right paramere narrowly at apex in dorsal or ventral view (Fig. 11A, D) *I. bourgeoisi* Gestro, 1906
- Elytra yellow at humeri and apices (Fig. 9C, D); terminal abdominal segment uniformly black (Figs 10B, 12C); terminal abdominal ventrite of male with outer apical angles projecting laterally (Fig. 10F); aedeagus: right paramere widely rounded at apex in dorsal or ventral view (Fig. 11E, H) *I. savioi* Pic, 1928

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短翅花萤属 *Ichthyurus* 两种团定义并记越南和中国二新种（鞘翅目：花萤科）

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摘要: 定义了鞘翅目花萤科短翅花萤属 *Ichthyurus* 的2个种团, 分别为宛氏短翅花萤种团 *I. vandepolli* species group 和保氏短翅花萤种团 *I. bourgeoisi* species group。前者包括2种, 即宛氏短翅花萤 *I. vandepolli* 和暗色短翅花萤 *I. opacus* (中国新纪录种); 后者包括4种, 即保氏短翅花萤 *I. bourgeoisi*、萨维短翅花萤 *I. savioi*、黑体短翅花萤 *I. niger* **sp. nov.** (越南永富) 和拟双带短翅花萤 *I. bilineatimimus* **sp. nov.** (中国云南)。对以上物种进行了详细描记, 提供了两性整体和生殖节、雄性前足和阴茎、及雌性内生殖系统的特征图; 编制了检索表, 并绘制了分布图。

关键词: 花萤科; 短翅花萤族; 系统分类; 东洋区