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Six new species and 1 new species record of *Orthotrichia* (Trichoptera: Hydroptilidae) from China

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Abstract

Six new species of the caddisfly genus *Orthotrichia* are described and illustrated from China, namely *Or. apophysis* Zhou & Yang, **sp. nov.**; *Or. latiramifera* Zhou & Yang, **sp. nov.**; *Or. cornuta* Zhou & Yang, **sp. nov.**; *Or. discedata* Zhou & Morse, **sp. nov.**; *Or. cuspidigera* Zhou & Yang, **sp. nov.**; and *Or. subrhomba* Zhou & Morse, **sp. nov.**. One species, *Or. terpsichore* Malicky & Chantaramongkol, 2007, is recorded for the first time from China, bringing the number of species of the genus known from China to 14. Of these, 10 species are distributed among 3 species groups of Marshall (1979), with 4 species unassigned. The known distributions for all the Chinese *Orthotrichia* species are provided.

Key words: Trichoptera, Hydroptilidae, *Orthotrichia*, China

Introduction

Orthotrichia is one of the most successful genera in Hydroptilidae, with an almost continuous world-wide distribution. There are 203 species of *Orthotrichia* species currently known globally, with species from all biogeographic regions except the Antarctic (Morse 2009). However, this genus is predominantly distributed in the Oriental (76 species) and Australasian Biogeographic Regions (71 species) (Morse 2009). Wells (1986) estimated that the genus *Orthotrichia* is more diverse in Australia than elsewhere in the world. Only 7 species of *Orthotrichia* have been documented from China since Wang Shi-Da first reported *Or. costalis* (Curtis), 1834, and *Or. tragetti* Mosely, 1930, from Hubei, China, in 1963 (Oláh 1989, Wang 1963, Xue 1989, Xue & Yang 1990, 1991, Yang & Xue 1992, Wells & Dudgeon 1990). From 1990 to 2005, the junior authors have organized 5 expeditions in the southeastern, southwestern, northwestern, and central parts of China. As a result, 6 new species and 1 new species record for China have been discovered, doubling the number of Chinese *Orthotrichia* species to 14.

Larvae of *Orthotrichia* are associated with aquatic vegetation in standing waters (Marshall 1979) and also are found on or under rocks in streams (Wells *et al.* 1990). Our adult specimens were collected in similar habitats in Jiangxi, Sichuan, Guangxi, and Fujian Provinces, southeastern China, during May to July, in the years 1990, 2004 and 2005.

Wells (1979, 1983) and Marshall (1979) discussed the species groups for genus *Orthotrichia*. Wells recognized 4 species groups and provided some characters for each group; Marshall recognized 5 species groups and provided a few characters for 4 of them. This paper follows Marshall's (1979) species group system, except the *Or. litoralis* Group is not separated from the *Or. angustella* Group as Marshall suggested.

The morphological terms follow those of Marshall (1979) and Wells (1979). All the specimens are stored in 80% ethyl alcohol and deposited in Insect Collection of Nanjing Agricultural University.

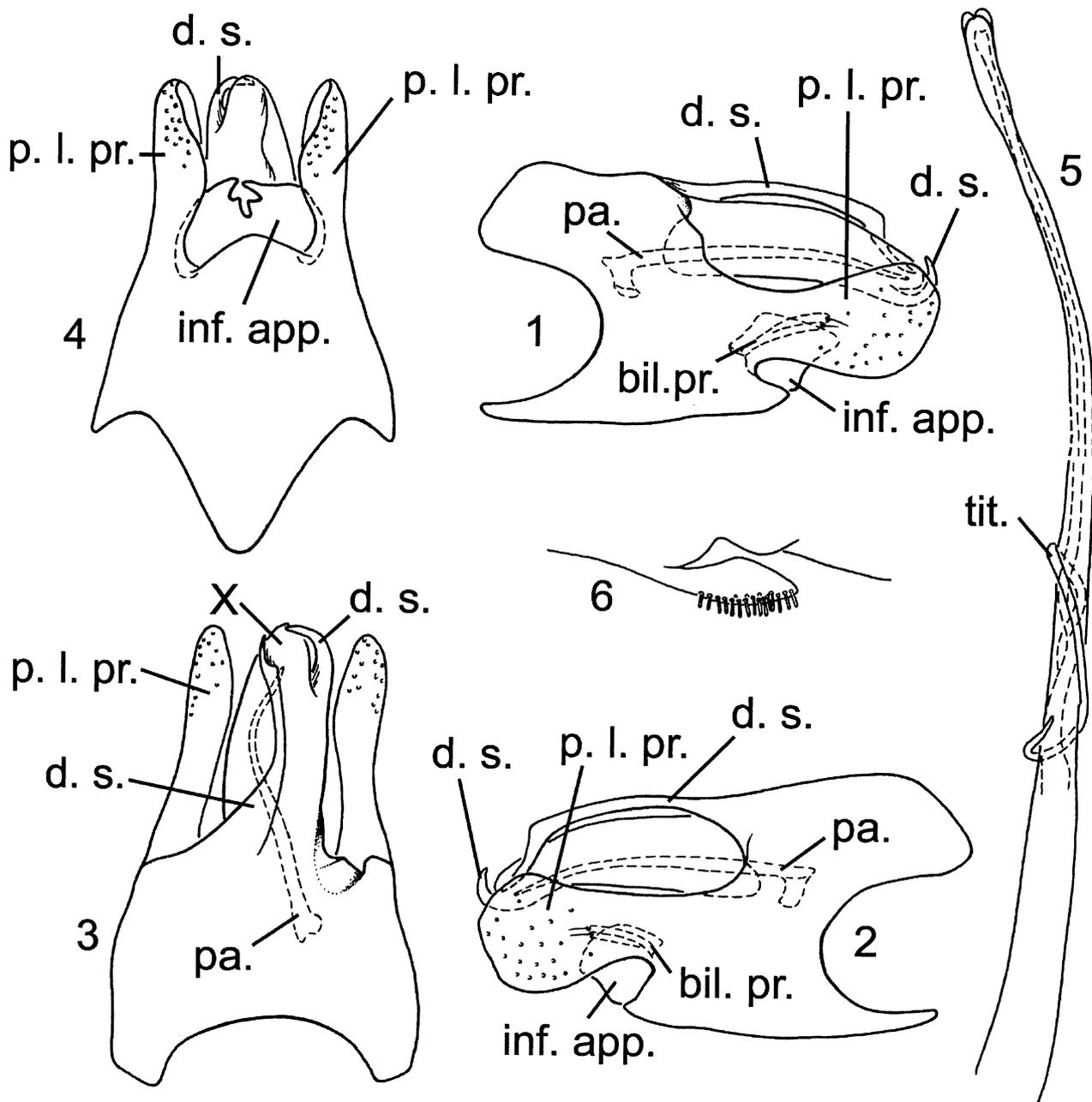
Orthotrichia apophysis Zhou & Yang, sp. nov.

Figs 1–6

Material. Holotype ♂, Jiangxi Province, Jiu Lian Shan National Nature Reserve, Da-Qiu-Tian, 8.2 km northwest of Da-Qiu-Tian (114°25'50"E, 24°34'15"N), elev. 425 m, 2005-vi-10, Coll. Zhou Xin. Paratypes: 7m♂, Guangxi Zhuang Autonomous Region, Yang-shuo County, Jin-bao He, 1.6 km upstream of Jin-bao town (110°18'39"E, 24°47'44"N), elev. 192 m, 2004-vi-18, Coll. Sun Chang-Hai, Zhou Xin.

Etymology. The Greek "*apophysis*" means "offshoot, process", in reference to the prominent dorsal spines of tergum X of this new species.

Description. Male. Antennae about 40-segmented. Forewing length 2.5 mm. Ventral process of abdominal segment VI absent. Ventral process of segment VII short, capitate, with ventral surface of "head" densely covered with clublike setae (Fig. 6).



FIGURES 1–6. *Orthotrichia apophysis*, sp. nov., male genitalia. 1, left lateral view; 2, right lateral view; 3, dorsal view; 4, ventral view; 5, phallus; 6, left lateral view of ventral process of segment VII. Abbreviations explained in text.

Male genitalia (Figs 1–6). Anterior margin of segment IX excised in shallow arc in dorsal view (Fig. 3), deeply excised in U shape laterally (Fig. 1), leaving venter of IX as triangular plate (Fig. 4); posterolateral processes of segment IX (p.l. pr.) each symmetrical, broad, leaflike (Figs 1, 2), almost as long as tergum X in dorsal view (Fig. 3). Tergite X fused with segment IX, about 1/3rd as broad as tergum IX (Fig. 3); dorsal spine (d. s.) of X apparently arising from tergum IX, left one stout and hooked, produced subapically from left margin with its apex directed dorsomesad; right one long and slender, slightly curved mesad, with apex abruptly narrowed to acuminate tip (Fig. 2). Inferior appendages (inf. app.) symmetrical, short and stout in ventral view (Fig. 4), bulbous, as long as wide, with basal halves fused with each other, each with acute apex directed mesad. Bilobed process (bil. pr.) composed of pair of short cylindrical rods at base of inferior appendages, only visible in lateral view (Figs 1, 2). Paramere spine (pa.) long, about 2/3rds as long as genitalia. Phallus (Fig. 5) slender, with basal portion about 2 times as long as distal portion, its apex slightly enlarged, titillator (tit.) circling segment 1 time.

Diagnosis. This species belongs to the *Or. angustella* Group. It is similar to *Or. bencana* in the general shapes of the posterolateral processes of segment IX and the inferior appendages, but differs in that 1) tergum X has dorsal spine (without dorsal spine in *Or. bencana*) and 2) a titillator encircles the phallus 1 time. (without titillator in *Or. bencana*).

Distribution. Type locality only.

Orthotrichia cornuta Zhou & Yang, sp. nov.

Figs 7–11

Material. Holotype ♂, Sichuan Province, Shi-mian County, Li-zi-ping Nature Preserve, Ca-luo-xiang Town, unnamed trib. of Hai-zi-gou stream, 200 m W of 3rd-level Hydropower Station, 4.3 km S of G108 from 2600.8 km stone marker (102°22'08"E, 29°08'27"N), elev. 1384 m, 2005-vi-30, Coll. Sun Chang-Hai, Zhou Chang-Fa, C. J. Geraci.

Etymology. The Latin word "*cornuta*" means "horned", in reference to the mesal processes of the inferior appendages being horn-like in ventral view.

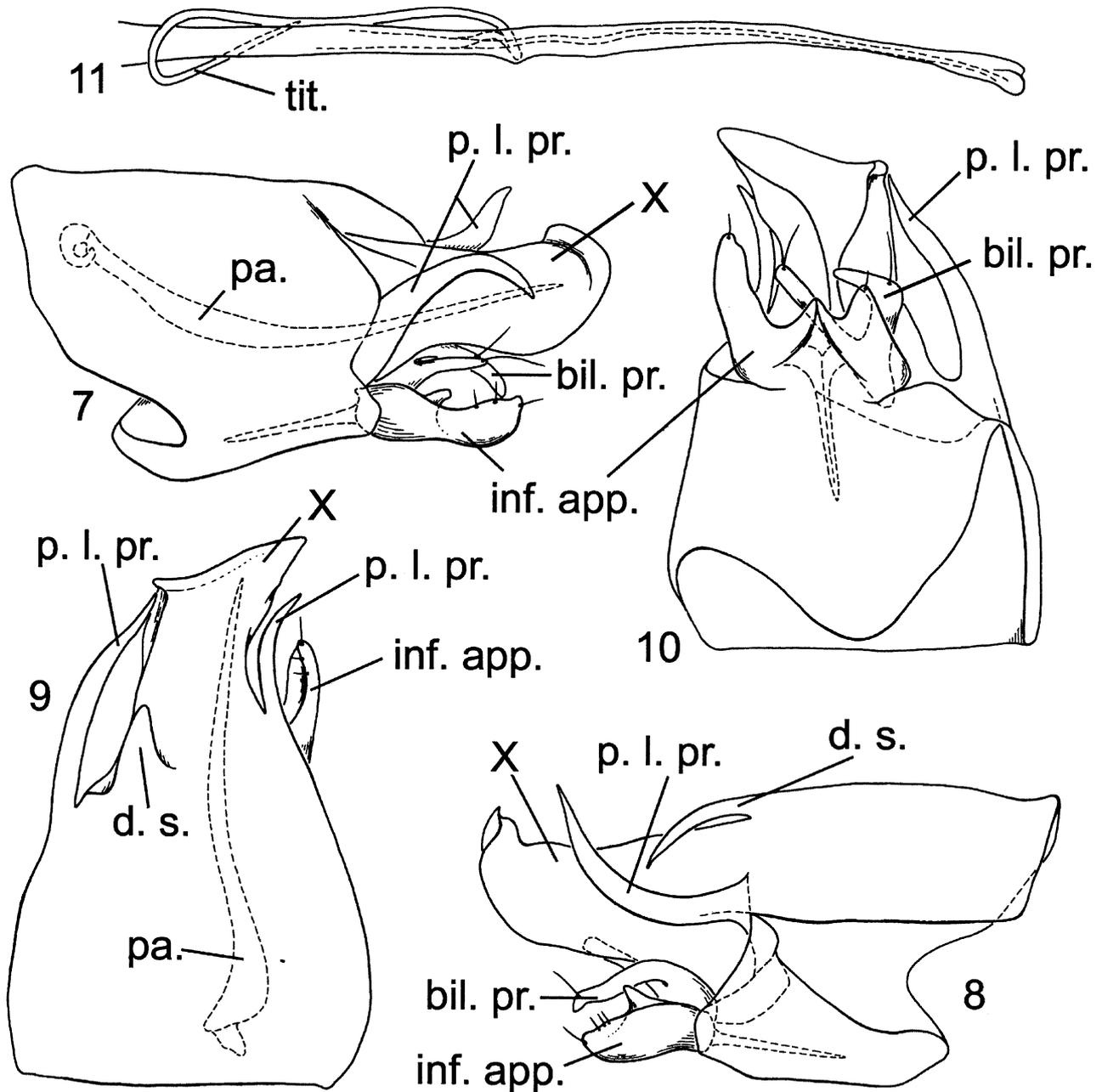
Description. Male. Distal ends of antennae lost, only 21 segments remaining. Anterior wing length 4.0 mm. Ventral process of segment VI short spine in lateral view (as in Fig. 22). Ventral process of segment VII absent.

Male genitalia (Figs 7–11). Anterior margin of segment IX entire, straight in dorsal view (Fig. 9), but deeply excised in "V" shape in right pleural region (Fig. 8) and shallowly excised lateroventrally in left pleural region (Fig. 7), such that venter of IX forming asymmetrically triangular plate (Fig. 10); posterolateral processes of IX (p.l. pr.) slender, each apically acute, left process curved caudoventrad and right process curved caudodorsad. Tergite X fused with segment IX in dorsal view (Fig. 9), with its right margin longer than left one, narrowed near middle then slightly twisted to left, with its apical margin obliquely truncate; in right lateral view (Fig. 8), tergum X tilted dorsad apically and obviously swollen subapically, with its apical margin raised, resembling sunshade; dorsal spine (d. s.) flat, triangular, positioned at the basal right corner of X (Fig. 9). Inferior appendages (inf. app.) stout, asymmetrical, mitten-like in ventral view, each with broader lateral apex protruded and bearing 1 setae distally, left inferior appendage more or less parallel-sided and angled laterad and much longer than right one, right inferior appendage triangular, and each inferior appendage with horn-like mesal "thumb," their acute apices meeting each other in ventral view (Fig. 10); bilobed process asymmetrically V-shaped, with short stem in ventral view (Fig. 10), its left lobe straight, directed caudolaterad, bearing long apical setae, and its right lobe curved mesad 90° and with long erect seta arising on caudolateral angle dorsally. Paramere spine (pa.) long, slightly shorter than genitalia. Phallus (Fig. 11) slender, basal portion is about 2 times as long as distal portion, its apex slightly enlarged and bilobed, with titillator circling phallus 1 time.

Diagnosis. This species is clearly a member of the *Or. costalis* Group and is somewhat similar to *Or. terpsichore* Malicky & Chantaramongkol, 2007, from Thailand, in the general shapes of segment IX and the inferior appendages. It differs in that 1) tergum X has a flat, triangular, dorsal spine (without dorsal spine in

Or. terpsichore); 2) inferior appendages are asymmetrical, mitten-like, with the left appendage longer than the right one, and the apices of the thumb processes acute, meeting each other in ventral view (almost symmetrical, the apices of the thumb processes curved mesad and not meeting each other in ventral view in *Or. terpsichore*); and 3) the right lobe of the bilobed process is curved mesad in 90° (straight in *Or. terpsichore*).

Distribution. Type locality only.



FIGURES 7–11. *Orthotrichia cornuta*, **sp. nov.**, male genitalia. 7, left lateral view; 8, right lateral view; 9, dorsal view; 10, ventral view; 11, phallus. Abbreviations explained in text.

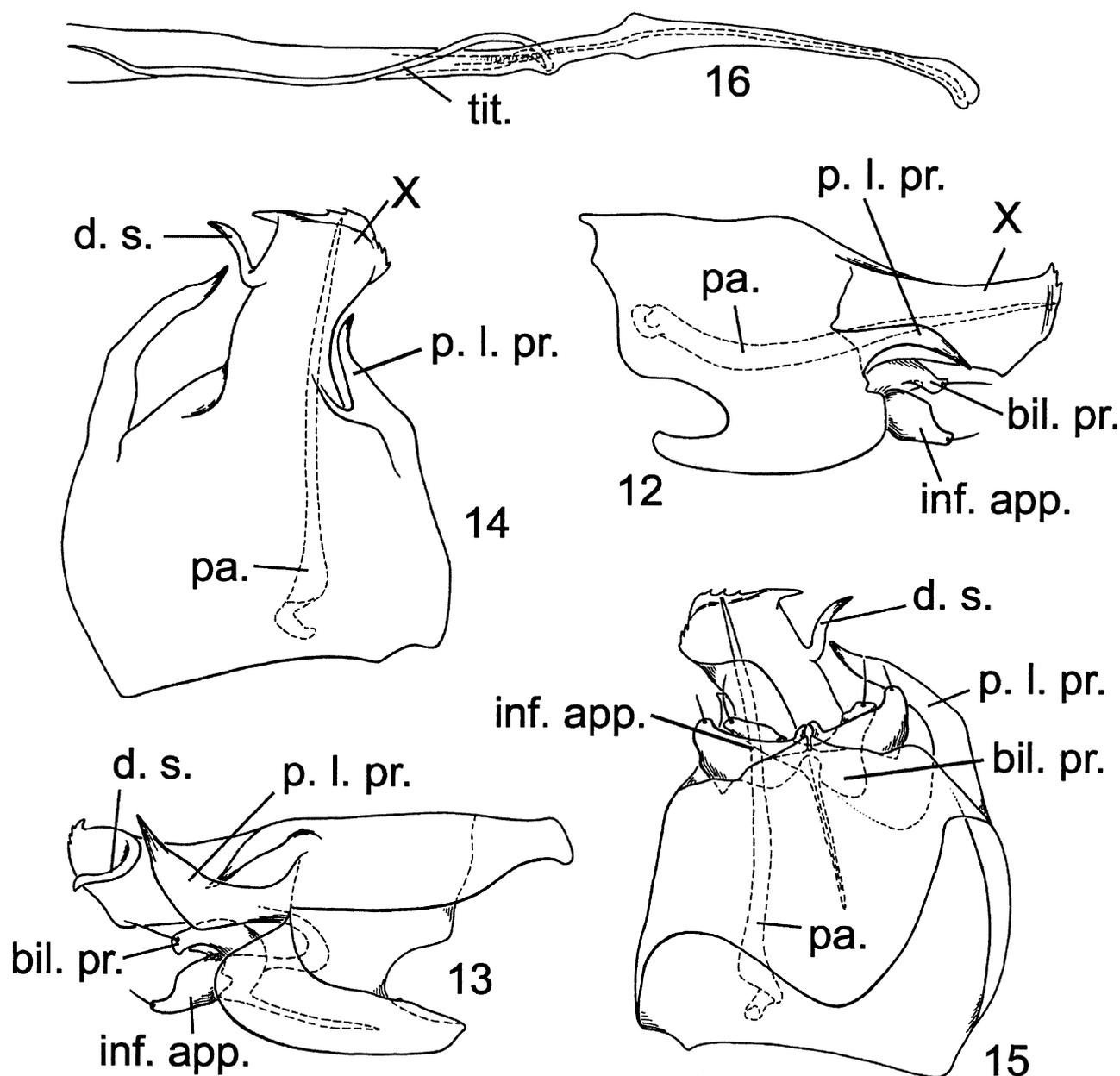
***Orthotrichia latiramifera* Zhou et Yang, sp. nov.**

Figs 12–16

Material. Holotype ♂, Jiangxi Province, Jiu Lian Shan National Nature Reserve, Unnamed trib. of Xia-Gong-Tang Stream (114°28'08"E, 24°32'05"N), elev. 630 m, 2005-vi-07, Coll. Zhou Xin, Sun Chang-Hai.

Etymology. The compounded Latin words “*latus-*” (side), “*ramus*” (branch), and feminine suffix “*-fera*” (bearing) mean “side-branch-bearing”, in reference to the spine arising subapically from the right lateral margin of segment X.

Description. Male. Distal ends of antennae lost, only 29 segments remaining. Anterior wing length 3.5 mm. Ventral process of segment VI short spine in lateral view (as in Fig. 22). Ventral process of segment VII absent.



FIGURES 12–16. *Orthotrichia latiramifera*, **sp. nov.**, male genitalia. 12, left lateral view; 13, right lateral view; 14, dorsal view; 15, ventral view; 16, phallus. Abbreviations explained in text.

Male genitalia (Figs 12–16). Anterior margin of segment IX entire, straight in dorsal view (Fig. 14), but deeply excised in “U” shape in right pleural region (Fig. 13) and shallowly excised lateroventrally in left pleural region (Fig. 12), such that venter of IX forming asymmetrical triangular plate (Fig. 15); right posterolateral process of IX (p.l. sp.) forming huge spine (Fig. 13), longer and stouter than left process with distal half gradually narrowed to acute apex and turned caudodorsad, left process turned caudoventrad (Fig. 12). Tergite X fused with segment IX, about 1/3rd as broad as IX in dorsal view (Fig. 14), distal margin of X

serrated and with its right apical end produced in lateral spine; dorsal spine (d. s.) long, slender, protruded laterally from right margin, about 1/3rd distance from apex in dorsal view (Fig. 14). Inferior appendages (inf. app.) short and stout, symmetrical; in ventral view (Fig. 15), triangular, broad basally, each with blunt apex bearing 1 seta, its anterolateral margin much longer than its inner margin and about 2/3rds as long as its basal width, at basomesal corners each with small, vertical, beak-like projection, with its apex curved mesad. Bilobed process (bil. pr.) stout, finger-like, shorter than inferior appendages, curved downward in lateral view (Figs 17, 18), in ventral view (Fig. 15) broadly V-shaped, with left lobe longer than right one, each lobe with 1 seta apically. Paramere spine (pa.) long, almost as long as genitalia. Phallus (Fig. 16) slender, basal portion about 3 times as long as distal portion, distal portion slightly protruded in small triangular “wings” at 1/4rth distance from its base, its apex enlarged and slightly bilobed, titillator encircling phallus 1 time.

Diagnosis. This species belongs to the *Or. costalis* Group. It is somewhat similar to *Or. tombak* Wells & Malicky, 1997, from Indonesia, and *Or. sibuyan* Malicky & Chantaramongkol, 2007, from the Philippines, in the general shapes of segment IX, tergum X, and the inferior appendages, but differs in that 1) tergum X has a long, slender branch protruding laterally from its right margin, (without such a branch in *Or. tombak* and *Or. sibuyan*); 2) the right posterolateral process of segment IX is longer and stouter than the left one (with the left posterolateral process absent in *Or. sibuyan*); and 3) the inferior appendages each have a small, vertical, beak-like projection at its basomesal corner (without such projections in *Or. tombak*).

Distribution. Type locality only.

***Orthotrichia terpsichore* Malicky & Chantaramongkol, 2007 New record for China**

Figs 17–22

Material. 1 ♂, Jiangxi Province, Jiu Lian Shan National Nature Reserve, Xia-Gong-Tang Str. 1.3 km W of reserve station (114°27'33"E, 24°32'53"N), elev. 507 m, 2005-vi-08, Coll. Sun Chang-Hai, Zhou Chang-Fa. 1 ♂, Jiangxi Province, Jiu Lian Shan National Nature Reserve, Da-Qiu-Tian, 8.2 km northwest of Da-Qiu-Tian (114°25'50"E, 24°34'15"N), elev. 425 m, 2005-vi-10, Coll. Zhou Xin.

Distribution. Jiangxi (Mt. Jiu-lian-shan); Thailand.

***Orthotrichia discedata* Zhou & Morse, sp. nov.**

Figs 23–27

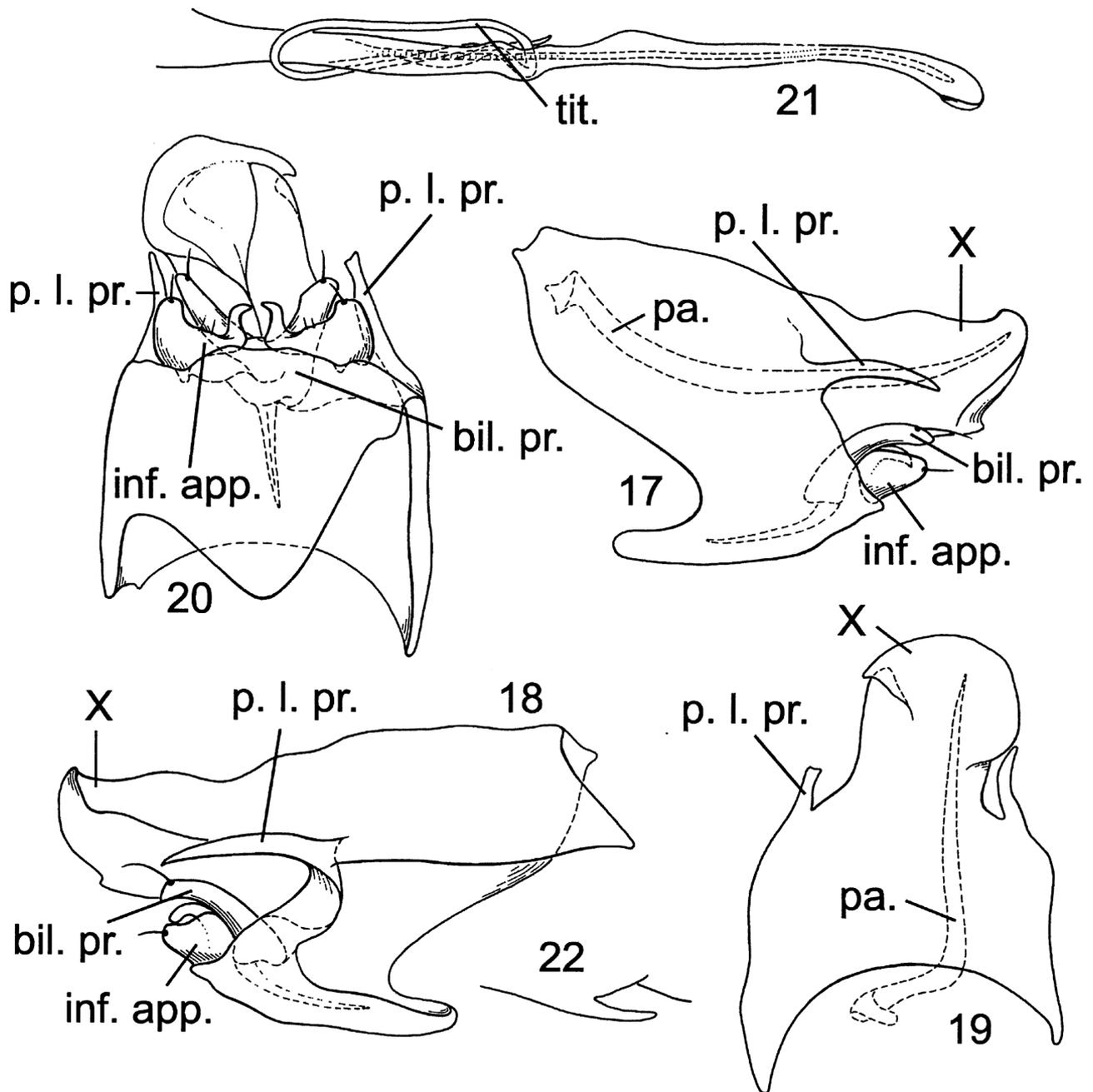
Material. Holotype ♂, Fujian Province, Jiu-qu-xi (118°01'12"E, 27°27'00"N), elev. 220 m, 1990-v-30, Coll. J. C. Morse, Liu Chang-Ming, Huang Jian. Paratype: 21 ♂♂, same data as holotype.

Etymology. The Latin word “*discedata*” means “separated” or “divergent”, in reference to the right posterolateral process of tergum IX having 2 strongly divergent spines.

Description. Male. Antennae 23–24-segmented. Anterior wing length 1.6–1.7 mm. Ventral process of segment VI short spine in lateral view (as in Fig. 22). Ventral process of segment VII absent.

Male genitalia (Figs 23–27). Anterior margin of segment IX irregularly curved, slightly narrowed anteriorly, anterior margin with shallow excision in dorsal view (Fig. 25), bluntly convex in ventral view (Fig. 26), widely excised in left lateral view (Fig. 23), and with trapezoid excision in right lateral view (Fig. 24); right posterolateral process of tergum IX having 2 strongly divergent spines, 1 branch directed upward and 1 turned to right; posterolateral margins of segment IX nearly straight, with postero-lateral processes absent (Figs 23, 24). Tergite X (X) broad at base, with narrowed apex almost truncate (Fig. 25), left pleural region of X strongly produced into a vertical ridge in left lateral view (Fig. 23), forming ear-like process in dorsal view (Fig. 25); right pleural region of X simple, its posterior margin slightly excised at center (Fig. 24). Inferior appendages (inf. app.) asymmetrical, right inferior appendage deeply and broadly incised to short base in ventral view (Fig. 26), its inner branch as long as tergum X, thick, tapered to acute upturned apex and bare, its outer branch 3/4ths as long as inner branch and with apical seta, left inferior appendage not incised, with a

rounded basomesal shoulder, 2/3rds as long as inner branch of right inferior appendage, and bearing long, apical seta. Bilobed process (bil. pr.) forming 4 slender, widely curved, tube-like branches positioned above bases of inferior appendages, 2 branches on each side, each branch with apical seta. Paramere (pa., Fig. 25) single, stout, with apex hooked left, about as long as segment IX. Phallus (Fig. 27) slender, basal portion about 2.5 times as long as distal portion, with its titillator encircling segment 1.5 times.

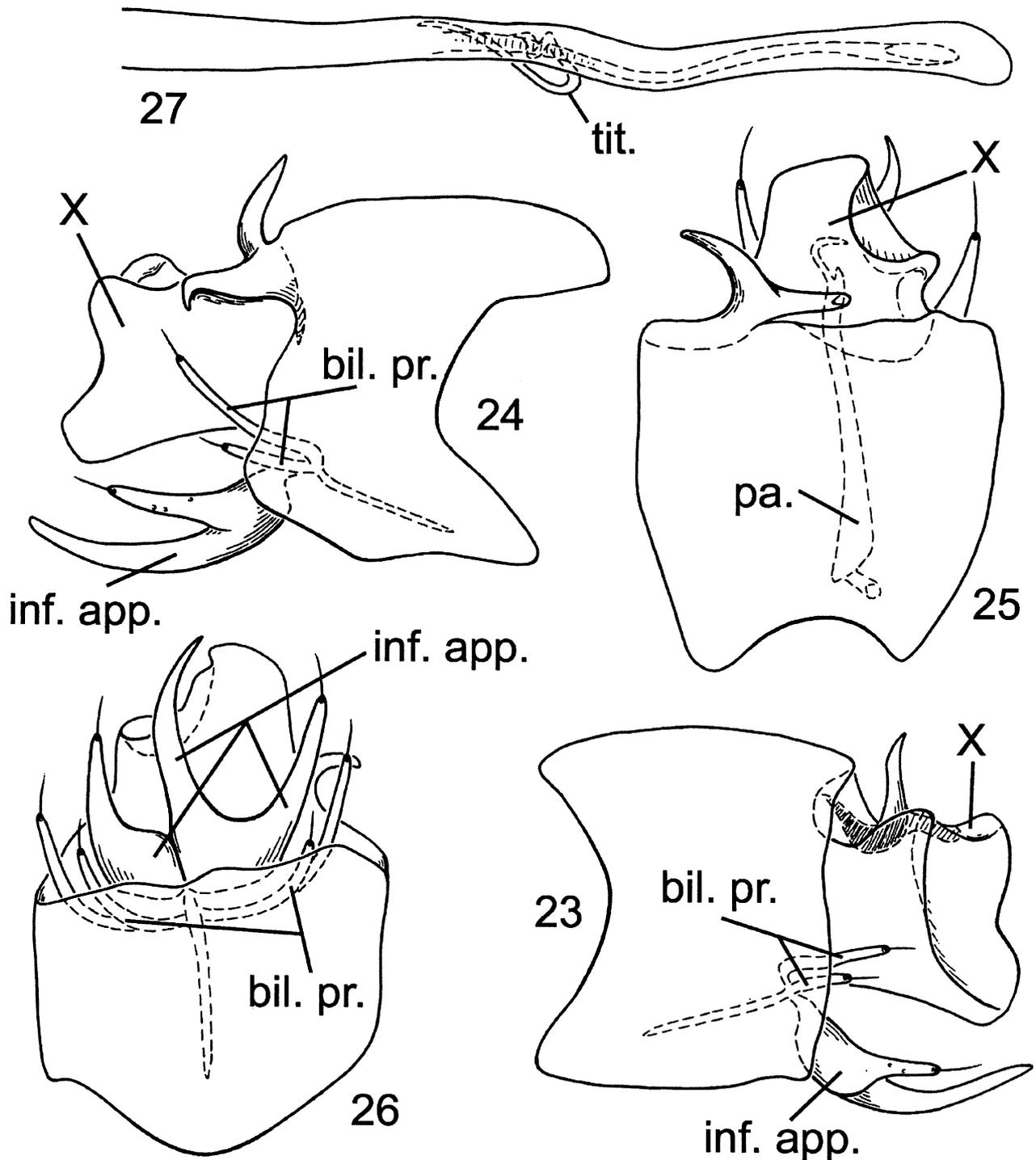


FIGURES 17–22. *Orthotrichia terpsichore* Malicky & Chantaramongkol, 1997, male genitalia. 17, left lateral view; 18, right lateral view; 19, dorsal view; 20, ventral view; 21, phallus; 22, left lateral view of ventral process of segment VI. Abbreviations explained in text.

Diagnosis. This species is not assignable to any group. It is somewhat similar to *Or. triacantha* Mey, 2003, from the Philippines, in the general shapes of the inferior appendages and segment IX, but differs in that 1) the right posterolateral process of tergum IX has 2 strongly divergent spines (without such a process in *Or. triacantha*); 2) the left margin of tergum X is strongly produced into an ear-like process in dorsal view (with

the left side straight in *Or. triacantha*); and 3) the inner branch of the right inferior appendage is slightly longer than tergum X and much longer than either the outer branch of the appendage or the left inferior appendage (the inner branch of the right inferior appendage is much shorter than tergum X and subequal in length with the outer branch of the appendage in *Or. triacantha*).

Distribution. Type locality only.



FIGURES 23–27. *Orthotrichia descendata*, **sp. nov.**, male genitalia. 23, left lateral view; 24, right lateral view; 25, dorsal view; 26, ventral view; 27, phallus. Abbreviations explained in text.

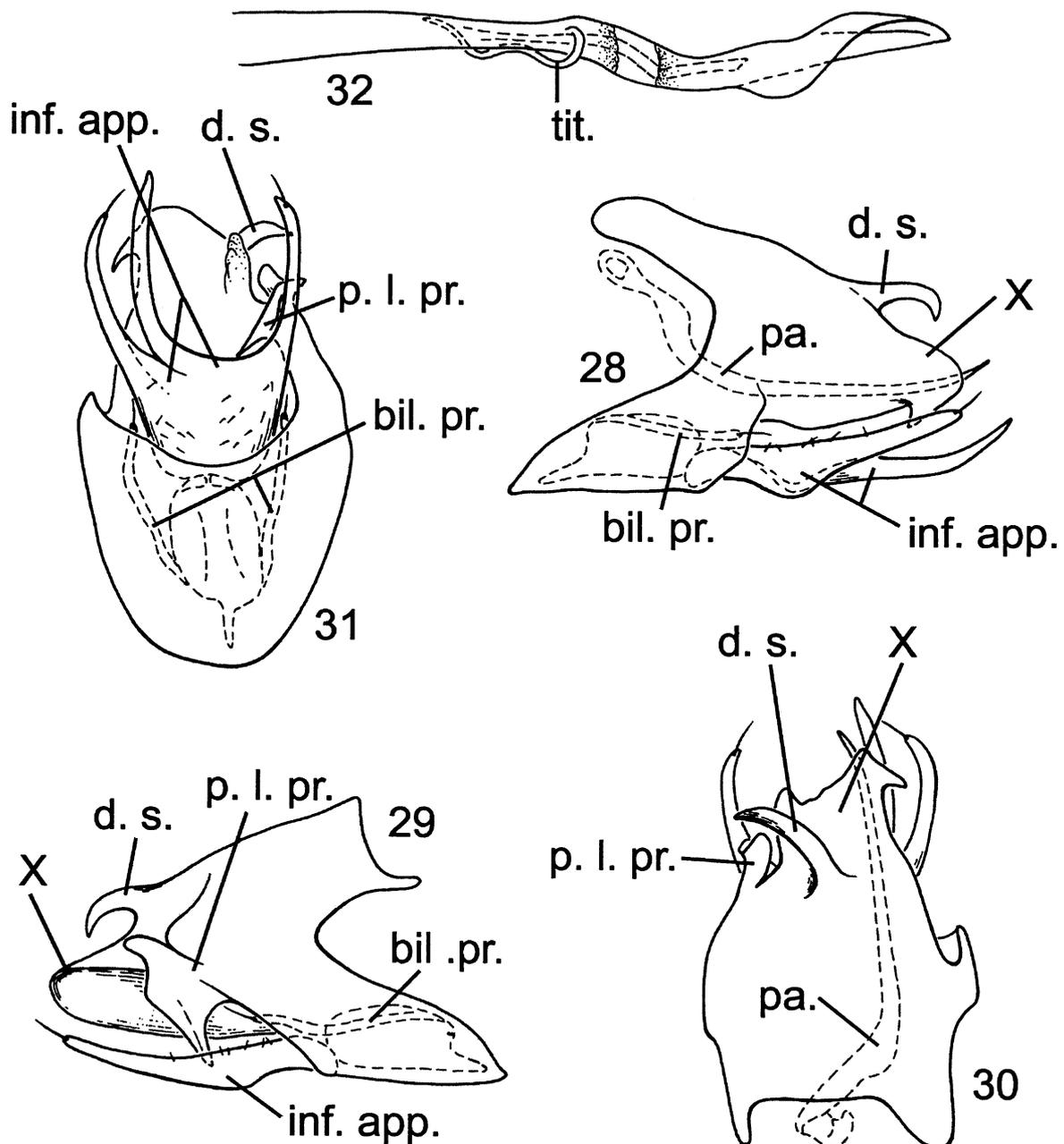
Orthotrichia subrhomba Zhou & Morse, sp. nov.

Figs 28–32

Material. Holotype ♂, Fujian Province, Jiu-qu-xi (118°01'12"E, 27°27'00"N), elev. 220 m, 1990-v-30, Coll. J. C. Morse, Liu Chang-Ming, Huang Jian. Paratype: 1 ♂, same data as holotype.

Etymology. The Latin prefix "sub-" means "almost" and the word "rhomba" means "diamond", referring to the nearly diamond shape of the right posterolateral process of segment IX.

Description. Male. Antennae 23–24-segmented. Anterior wing length 1.7 mm. Ventral process of segment VI short spine in lateral view (as in Fig. 22). Ventral process of segment VII absent.



FIGURES 28–32. *Orthotrichia subrhomba*, sp. nov., male genitalia. 28, left lateral view; 29, right lateral view; 30, dorsal view; 31, ventral view; 32, phallus. Abbreviations explained in text.

Male genitalia (Figs 28–32). Anterior margin of segment IX irregularly curved, with shallow rectangular excision in dorsal view (Fig. 30), bluntly convex in ventral view (Fig. 31), broadly excised in trapezoid in left lateral view (Fig. 28) and with triangular excision in right lateral view (Fig. 29); left posterolateral process absent (Fig. 28), right posterolateral process nearly diamond-shaped with its vertical axis about 2 times as long as that of its longitudinal axis its ventral projection long, beak-like in right lateral view (Fig. 29). Tergum X (X) fused with segment IX in dorsal view (Fig. 30), its left margin longer than right margin, its apex obliquely excised, its left distal end produced in strong ventral hook; dorsal spine of X arising near center of its base, hook-like, directed downward and to right. Inferior appendages (inf. app.) asymmetrical (Fig. 31), each appendage broad at base and fused in subquadrate plate, right appendage deeply and broadly excised, divided into 2 slender branches, its inner one long, curved slightly upward, with apex bare and extending beyond tergum X, its outer branch 5/6ths as long as its inner branch and bearing apical seta; left inferior appendage 3/4ths as long as inner branch of right inferior appendage and bearing apical seta. Bilobed process (bil. pr.) forming widely separated pair of slender, tube-like branches positioned above bases of inferior appendages, each branch with apical seta. Paramere spine (pa.) long, slightly longer than dorsum of IX+X. Phallus (Fig. 32) slender, with basal portion about 2.5 times as long as distal portion, distal portion enlarged, twisted, foliaceous, titillator encircling phallus 1 time.

Diagnosis. This species is not assignable to any group. It is somewhat similar to *Or. vertumnus* Malicky & Chantaramongkol, 2007, from Thailand, in the general shapes of segment IX and the phallus, and in the presence of a tube-like bilobed process, but differs in that 1) tergum X has a well developed, hook-like dorsal spine (without a dorsal spine in *Or. vertumnus*) and 2) tergum X has its left distal end produced in a strong hook (both distal ends straight in *Or. vertumnus*).

Distribution. Type locality only.

Orthotrichia cuspidigera Zhou & Yang, sp. nov.

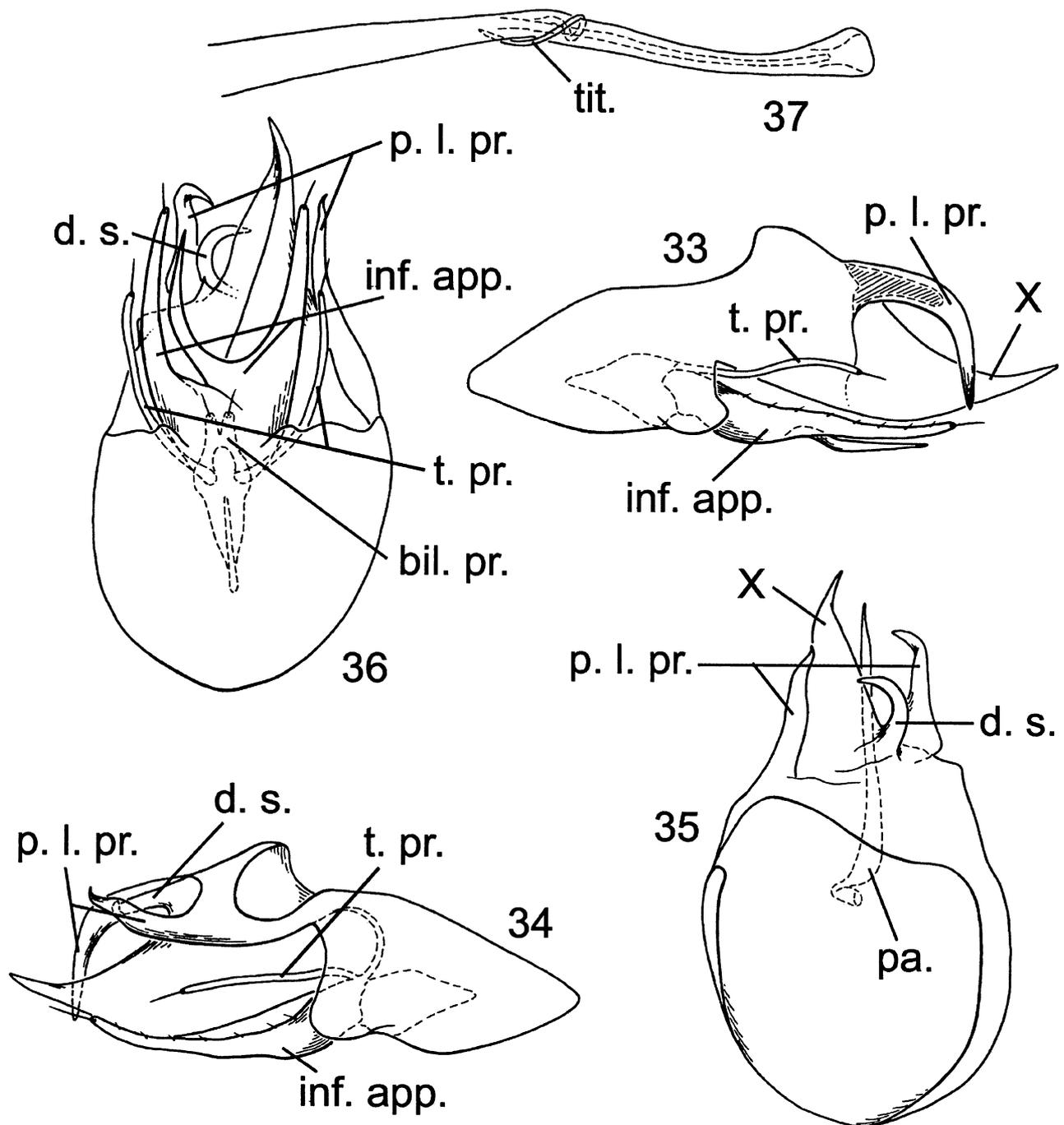
Figs 33–37

Material. Holotype ♂, Jiangxi Province, Jiu Lian Shan National Nature Reserve, Da-Qiu-Tian, 8.2 KM northwest of Da-Qiu-Tian (114°25'50"E, 24°34'15"N), elev. 425 m, 2005-vi-10, Coll. Zhou Xin.

Etymology. The Latin word "*cuspidigera*" means "with acute apex", in reference to the acute apex of tergum X.

Description. Male. Distal ends of antennae broken, only 20 segments remaining. Anterior wing length 2.0 mm. Ventral process of segment VI short spine in lateral view (as in Fig. 22). Ventral process of segment VII absent.

Male genitalia (Figs 33–37). Tergum IX very short, with its anterior margin sinuous, asymmetrically incised (Fig. 35), pleural regions nearly triangular with anterior margins inclined 30°–40° (Figs 33, 34), venter IX broadly oval (Fig. 36); posterolateral processes (p.l. pr.) of segment IX located dorsally, asymmetrical, left process stout, gradually narrowed to downcurved apex (Fig. 33), right one directed backward with apex slightly twist and tilted upward (Fig. 34). Tergum X (X) fused with tergum IX, in dorsal view (Fig. 35) positioned in right half of tergum IX, narrow triangular, with acute apex turned caudodorsad and toward left; dorsal spine of X arising on left basal corner, hook-like with apex directed caudoventrad and toward right. Inferior appendages (inf. app.) long and slender, asymmetrical, with fine, sparse setae on dorsal margins (Figs 33, 34), in ventral view (Fig. 36) each appendage broad at base and fused in semicircular plate, right appendage deeply divided into 2 branches, inner branch slender and shorter than outer one and with distal half narrowed to acute apex and curved mesad, length and shape of outer branch identical with left appendage apically, long cylindrical, each bearing apical seta; left appendage with rounded basomesal shoulder. Bilobed process (bil. pr.) short, digitate, hidden above bases of inferior appendages, each branch bearing distal seta. Pair of long, tube-like processes (t. pr.) further above bases of inferior appendages, arranged in U shape in ventral view. Paramere spine long, slightly shorter than genitalia. Phallus (Fig. 37) slender, basal portion about 1.6 times as long as distal portion, with its apex slightly enlarged, titillator circling segment once.



FIGURES 33–37. *Orthotrichia cuspidigera*, sp. nov., male genitalia. 33, left lateral view; 34, right lateral view; 35, dorsal view; 36, ventral view; 37, phallus. Abbreviations explained in text.

Diagnosis. This species is not assignable to any group. It is somewhat similar to *Or. tyro* Malicky & Chantaramongkol, 2007, from Thailand, in the general shape of segment IX and the inferior appendages composed of three branches, but it differs in that 1) the dorsal spine of tergum X is a strong hook with an acute apex (it is a short, stout process with a blunt, notched apex in *Or. tyro*) and 2) the inner branch of the right inferior appendage is slender, about 3/4ths as long as the outer branch (it is only a short spine in *Or. tyro*).

Distribution. Type locality only.

TABLE 1. List of Chinese Species of *Orthotrichia* Eaton, with known distributions.

Species	Distributions
<i>Or. aegerfasciella</i> Group	
1. <i>Orthotrichia tragetti</i> Mosely, 1930	China (Henan, Hubei, Jiangsu); Palearctic
2. <i>Orthotrichia wellsae</i> Xue & Yang, 1990	China (Guangxi)
<i>Or. angustella</i> Group	
3. <i>Orthotrichia bencana</i> Oláh 1989	China (Guangxi, Guizhou, Jiangxi); Vietnam
4. <i>Orthotrichia bucera</i> Yang & Xue, 1992	China (Guangxi, Guizhou, Jiangxi, Yunnan)
5. <i>Orthotrichia apophysis</i> Zhou & Yang, sp. nov.	China (Guangxi, Jiangxi)
6. <i>Orthotrichia udawarama</i> (Schmid, 1958)	China (Hainan, Yunnan); Sri Lanka
<i>Or. costalis</i> Group	
7. <i>Orthotrichia cornuta</i> Zhou & Yang, sp. nov.	China (Sichuan)
8. <i>Orthotrichia costalis</i> (Curtis, 1834)	China (Guangxi, Hainan, Henan, Hubei, Jiangsu, Jiangxi, Shandong); Palearctic
9. <i>Orthotrichia latiramifera</i> Zhou & Yang, sp. nov.	China (Jiangxi)
10. <i>Orthotrichia terpsichore</i> Malicky & Chantaramongkol, 2007, n. rec.	China (Jiangxi); Thailand
Incertae sedis	
11. <i>Orthotrichia discedata</i> Zhou & Morse, sp. nov.	China (Fujian)
12. <i>Orthotrichia cuspidigera</i> Zhou & Yang, sp. nov.	China (Jiangxi)
13. <i>Orthotrichia obtecta</i> Wells & Dudgeon, 1990	China (Hong Kong)
14. <i>Orthotrichia subrhomba</i> Zhou & Morse, sp. nov.	China (Fujian)

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References

- Malicky, H. & Chantaramongkol, P. (2007) Beiträge zur Kenntnis asiatischer Hydroptilidae (Trichoptera). *Linzer Biologische Beiträge*, 39, 1021–1022.
- Marshall, J.E. (1979) A review of the genera of the Hydroptilidae (Trichoptera). *Bulletin of the British Museum (Natural History), Entomology series*, 39, 135–226.
- Mey, W. (2003) Caddisfly fauna of the Philippines, V. *Insecta Koreana*, 20, 428–436.
- Morse, J.C. (2009) Trichoptera World Checklist, <http://entweb.clemson.edu/database/trichopt/index.htm>. (accessed 25 June 2009).
- Mosely, M.E. (1930) New European Trichoptera and Plecoptera. *Transactions of the Entomological Society of London*, 78, 237–253, pl XIV.
- Oláh, J. (1989) Thirty-five new Hydroptilid species from Vietnam (Trichoptera, Hydroptilidae). *Acta Zoologica Hungarica*, 35, 255–293.

- Schmid, F. (1958) Trichoptères de Ceylon. *Archiv für Hydrobiologie*, 54, 1–173.
- Wang S-D. (1963) Caddisflies (Trichoptera) from East Lake of Wu-Chang, Central China. *Acta Hydrobiologica Sinica*, 3, 55–68.
- Wells, A. (1979) The Australian species of *Orthotrichia* Eaton (Trichoptera: Hydroptilidae), with descriptions of new species. *Australian Journal of Zoology*, 27, 585–622.
- Wells, A. (1983) New species in the Australian Hydroptilidae (Trichoptera), with observations on relationships and distributions. *Australian Journal of Zoology*, 31, 629–649.
- Wells, A. (1986) *The systematics and biogeography of Australian Hydroptilidae (Trichoptera)*. Ph.D. dissertation, University of Adelaide. Pp. i–iii (abstract)
- Wells, A. & Dudgeon, D. (1990) Hydroptilidae (Insecta: Trichoptera) from Hong Kong. *Aquatic Insects*, 12, 161–175.
- Wells, A. & Malicky, H. (1997) The micro-caddisflies of Sumatra and Java (Insecta: Trichoptera: Hydroptilidae). *Linzer Biologische Beiträge*, 29, 173–202.
- Xue, Y-G. (1989) *A study of the Chinese Hydroptilidae (Insecta: Trichoptera)*. M.S. thesis, Nanjing Agriculture University. -61 pp.
- Xue, Y-G. & Yang, L-F. (1990) Six new species of Hydroptilidae from China (Insecta: Trichoptera). *Acta Agriculturae Universitatis Henansis*, 24, 124–131.
- Xue, Y-G. & Yang, L-F. (1991) Six new records of Hydroptilidae from China (Insecta: Trichoptera). *Acta Agriculturae Universitatis Henansis*, 25, 19–23.
- Yang, L-F. & Xue, Y-G. (1992) Six new species of Hydroptilidae (Insecta: Trichoptera) from China. *Entomotaxonomia*, 14, 26–32.
- Zhang, R-Z. (1999) *Zoogeography of China*. Science Press. Beijing. 299–392.