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22 new species of Philopotamidae (Trichoptera) from China

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Abstract: The following new species of Philopotamidae (Trichoptera) which were collected in China are described and figured: *Dolophilodes bellatulus*, *D. caligula*, *D. erysichthon*, *D. eryx*, *D. ovalis*, *D. retrocurvatus*, *D. semicircularis*, *D. setosus*, *Wormaldia bicornis*, *W. dissecta*, *W. quadrata*, *W. scalaris*, *W. tricuspis*, *W. zhejiangensis*, *Kisaura adamickai*, *K. eteokles*, *K. euandros*, *K. eumaios*, *K. euphemos*, *K. shaanxiensis*, *Chimarra maoi*, *C. senticosa*. Notes on the variation of *Wormaldia triacanthophora* SUN 1998 are given. *Doloclanes* is considered a synonym of *Wormaldia*.

Key words: Philopotamidae, *Dolophilodes*, *Wormaldia*, *Doloclanes*, *Kisaura*, *Chimarra*, new species, China.

Introduction

This is a contribution to the knowledge of philopotamid caddisflies of China. Many species from Asia have been described, in particular in the last decades, but there is no modern revision. Some of the species described from adjacent countries may also be expected in China. A partial summary was given by ROSS (1956), but many new species are expected in China. An impression of the diversity of the fauna may be given by the fact that in one small mountain region in Zhejiang province, Tianmushan Mts., only about 10 to 15 km in size, we have found 15 species of Philopotamidae, 13 of which were new and are described here.

Only males are described here. In several genera (*Dolophilodes*, *Kisaura*, *Wormaldia*) the females cannot be identified to species because of their weak distinguishing characters. Females of *Chimarra* have often good characters, but in a mixture of many species from the same sites it is difficult to say which female belongs to which male; the situation will improve with increasing knowledge.

Abbreviations of the collections where the material is housed:

NAU.....Entomological collections of Nanjing Agricultural University

CM.....Collection of Hans Malicky

Remarks on the taxonomic position of some genera

Kisaura was described by ROSS (1956) as a subgenus of *Sortosa*, and considered by KUHARA (1999) a subgenus of *Dolophilodes*. The male genital structures are so typical and homogenous within the group that we consider *Kisaura* a separate genus.

Dolophilodes was described by ULMER (1909) as a separate genus, but considered by ROSS (1956) a subgenus of *Sortosa*. As in *Kisaura*, the male genitalia are so distinctive that we prefer to consider it a separate genus. The identification of *Dolophilodes* species is difficult because they are similar in shape, and their differences are weak. For a safe identification, the preparation of the genital structures in KOH is mandatory.

Doloclones was described by BANKS (1937) as a separate genus and considered as such by various authors, but by ROSS (1956) as a subgenus of *Wormaldia*. We are aware of the diversity of many recently described species in Asia. ROSS (l.c.) gives as a separating character that the veins R1 and R2 in the hindwing are fused in *Doloclones*, but separated in *Wormaldia*. In one of six of our specimens of *W. quadriphylla* SUN 1997, R1 and R2 are distally separate; in another specimen they meet each other at one point on the wing edge, and in two specimens they unite some distance before the edge. In another specimen, they meet each other at one point on the edge of left hindwing, and are separate in the right one, and in the last specimen they unite in some distance from the edge of the left wing, but are separated in the right wing. We have observed similar conditions in various other species, so we think that this character is not useful for separating the genera, and as we do not know any other character which clearly separates *Doloclones* and *Wormaldia*, even a subgeneric status is doubtful, and we consider *Doloclones* a synonym of *Wormaldia* (new synonym).

Description

Dolophilodes semicircularis n.sp.

Length of forewing: 7.0 mm. Body black brown. Head brown; antennae and palpi yellow. Dorsum of thorax blackish brown; wings and legs brown. Abdomen brown. Male genitalia (Pl. 1): dorsum of segment IX narrow; in lateral view its anterior margin straight, upper apex rotundate and the posterior margin slightly concave where the inferior appendages articulate. The basal 2/3 of segment 10 is broad, and the other part is narrower and slightly curved upwards in lateral view; in dorsal view it is triangular, and the distal half is divided into two lobes which touch each other. Preanal appendage blunt in lateral view and semicircular in dorsal view. The basal segment of inferior appendage somewhat rectangular and slightly narrower at the base. The distal segment is slightly shorter than the basal one, and its distal portion is slightly narrower. Phallus membranous, with the following spines: in addition to a long spine with a basal plate at about half of its length, there are two pairs of bunches of fine, straight spines (of which the second may be united in one), and one distal bunch of spines which are distinctly curved and larger than the others. The number of spines is variable. The outer edge of the preanal appendages is concave in dorsal view, and the second segment of the inferior appendage has a sloping distal edge, with the outer edge longer, in a vertical view of its surface. This species is very similar to *D. ovalis* n.sp., but differs in the shape of the sclerites in the phallus, and the shape of the preanal and inferior appendages (see there).

Etymology: Latin word "semicircularis" means "having the form of half of a circle", in reference to the semicircular preanal appendage when viewed dorsally.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan (with the latitude ranging 30°18'30" - 30°24'55" N and the longitude 119°23'47" - 119°28'27" E.), Sanmuping, 780 m, 26-V-1999, light trap, collected by ZHAO Mingshui, NAU. **P a r a t y p e s :** 1♂, same collection data as Holotype; 17♂♂, same place, Sanmuping, 780 m, 30-VII-1998, light trap, collected by WU Hong; 4♂♂, same place, Qili pavilion, 800m, 23-VIII-1998, Malaise trap, collected by ZHAO Mingshui. All in NAU. – **P a r a t y p e ♂:** Zhejiang, Tienmu Mt., 500m, 30°18'N, 119°26'E, 31-V-1989, leg. Kyselak, CM.

***Dolophilodes ovalis* n.sp.**

Length of forewing: 6 mm. Body dark brown. Head dark brown, antennae brown, palpi yellow. Dorsum of thorax dark brown and the other parts yellow; wings yellow; legs brown. Abdomen yellow. Male genitalia (Pl. 1): Dorsum of segment 9 short; in lateral view its upper portion is oblique posteriorly, lower portion narrow. The basal part of segment 10 is broad and the distal third finger-like and curved upwards when viewed laterally; in dorsal view it is somewhat triangular, and the distal third divided into two lobes, which touch each other. Preanal appendage elliptical in lateral view, and ovate in dorsal view. The first segment of inferior appendage rectangular, its length is twice as long as wide in lateral view; the second segment is as long as the first one, apex round, and slightly curved downwards. Phallus large, membranous, with spines as described below. This species is very near to *D. semicircularis* n. sp., but differs in the sclerites in the phallus which include, in addition to the long spine with its basal plate, two pairs of bunches of straight spines, of which one pair may be united, and a distally situated bunch of straight spines, shaped like a pin cushion (not curved as in *D. semicircularis*); the outer edge of the preanal appendages is straight or convex in dorsal view, and the second segment of the inferior appendages, seen of its surface, is truncate, i.e. the distal edge is straight.

E t y m o l o g y : Latin word "ovalis" means ovate, with reference to the preanal appendage which is ovate in dorsal view.

H o l o t y p e : 1♂ Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m, 8-IX-1998, light trap, collected by ZHAO Mingshui, NAU. **P a r a t y p e s :** 1♂, same collection data as Holotype; 1♂, same place, Sanmuping, 780m, 26-VII-1999, sweep, collected by WU Hong; 4♂♂, same place, Sanmuping, 780 m, 23-VI-1998, light trap, collected by ZHAO Mingshui; 1♂, same place, Sanmuping, 780 m, 14-15-VII-1998, light trap, collected by WU Hong; 1♂, same place, Sanmuping, 780 m, 15-IX-1998, light trap, collected by ZHAO Mingshui; 1♂, same place, Sanmuping, 780 m, 25-VIII-1998, light trap, ZHAO Mingshui; 6♂♂, same place, Kaishanlaodian, 1090m, 23-VI-1998, light trap, collected by ZHAO Mingshui; 1♂, same place, Kaishanlaodian, 1090 m, 3-VIII-1998, light trap, collected by ZHAO Mingshui; 2♂♂, same place, Kaishanlaodian, 1090 m, 14-VII-1999, light trap, collected by ZHAO Mingshui; 1♂, same place, Qili pavilion, 800 m, 21-VII-1999, Malaise trap, collected by ZHAO Mingshui; 1♂, same place, Qili pavilion, 800 m, 28-VII-1999, Malaise trap, collected by ZHAO Mingshui; 1♂, same place, Xianren peak, 400 m, 17-VIII-1998, Malaise trap, collected by WU Hong; all in NAU.

***Dolophilodes setosus* n.sp.**

Length of forewing: 6 mm. Head blackish brown, antennae and palpi brown. Dorsum of thorax dark brown, other parts brown; wings and legs yellow. Abdomen yellow. Male genitalia (Pl. 2): dorsum of segment 9 short; in lateral view its anterior margin straight and the upper portion apparently projects posteriorly. Segment 10 slightly sinuate when viewed laterally, but in dorsal view the base is triangular, and the distal third immedi-

ately narrower. Preanal appendages slender in lateral view and clavate in dorsal view. In lateral view, they are hidden behind the dorsal lobes of segment 9 for most of their length. The first segment of inferior appendage rectangular, and the second segment has a blunt apex and slightly shorter than the first one. Phallus membranous, with the following spines: one large straight spine with a basal plate of its own length; and about 7-9 shorter but strong spines which are longer distally, the final one is curved but the others are straight. This species is similar to *D. cheni* HSU & CHIN 1996 from Taiwan, China, and *D. burmana* KIMMINS 1955 from Burma, but is distinguished from the latter in: (1) segment 10 in lateral view slightly sinuate, other than somewhat curved upwards as in the others; (2) phallus with more than 6 big spines, but in the latter only about longer 4 spines in *D. cheni*, and *D. burmana* has a triangular segment 10 in dorsal view.

E t y m o l o g y : Latin word "setosus" means "having many spines", in reference to the phallus with many spines.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Kaishanlaodian, 1090 m, 5-VI-1998, light trap, collected by ZHAO Mingshui, NAU. **P a r a t y p e s :** 2♂♂, same collection data as Holotype; 1♂, same place, science and technique hall, 380m, 5-X-1998, sweeping, collected by ZHAO Mingshui; 1♂, same place, science and technique hall, 380 m, 13-XI-1998, sweeping, collected by WU Hong; 2♂♂, same place, science and technique hall, 380 m, 20-X-1998, sweep, collected by WU Hong; 1♂, same place, Xianren peak, 1500 m, 21-VII-1999, light trap, collected by ZHAO Mingshui; 1♂, same place, Sanmuping, 780 m, 17-XI-1998, light trap, collected by ZHAO Mingshui; 4♂♂, same place, Sanmuping, 780m, 26-V-1999, light trap, collected by ZHAO Mingshui; 1♂, same place, Sanmuping, 780 m, 15-IX-1998, light trap, collected by ZHAO Mingshui; 9♂♂, same place, Kaishanlaodian, 1090 m, 20-VII-1998, light trap, collected by ZHAO Mingshui; 2♂♂ same place, over Kaishanlaodian, 1100-1200 m, 30-V-1998, light trap, collected by WU Hong; 16♂♂, same place, Kaishanlaodian, 1090 m, 31-VIII-1998, Malaise trap, collected by ZHAO Mingshui; 11♂♂, same place, Kaishanlaodian, 1090 m, 27-VII-1998, light trap, collected by ZHAO Mingshui. All in NAU. – **P a r a t y p e s :** 6♂♂ Zhejiang, Tienmu Mt., 500m, 30°18'N, 119°26'E, 31-V-1989, leg. Kyselak; 2♂♂ Zhejiang, Long Wang Shan, 560-600m, 30°28'N, 119°22'E, 3.-4.-VI-1989, leg. Kyselak; CM.

Dolophilodes caligula n.sp.

Length of forewing: 7.5mm. Body dark brown. Head blackish brown, antennae dark brown, palpi brown. Dorsum of thorax dark brown and the other parts brown; wings and legs brown. Abdomen brown. Male genitalia (Pl. 1): dorsum of segment 9 short; in lateral view its upper 2/3 broad and oblique posteriorly. The base of segment 10 broad, and the distal end sharp in lateral view; but in dorsal view the distal 2/3 divided into two sharp points. Preanal appendage narrow in lateral view, but in dorsal view somewhat boot-like. This first segment of inferior appendage rectangular, its length is 2 times as long as its width; the second one short, its apex truncate, and about ¾ times as long as the first one. Phallus large, membranous, with the following spines: a long and thin one with a basal plate which is about half its length; a large almost circular one, and two smaller straight ones. The species is somewhat similar to *D. lagarha* MALICKY from Vietnam, but is different from it in: (1) The preanal appendage narrower in lateral view, but in the latter it is very broad. (2) Segment 10 in lateral view very sharp at its apex, but in *D. lagarha* the apex fingerlike and curved upwards in lateral view. (3) The second segment of inferior appendage is shorter than the first one, with an almost straight ventral edge, other than equal to the first one in *D. lagarha*, with a deep ventral incision. *D. caligula* n.sp. is also similar to *D. bicolor* KIMMINS 1955 from Burma, with similar sclerites, but

the preanal appendages are broad and the inferior appendages narrower in lateral view in *D. bicolor*.

E t y m o l o g y : Latin noun "caligula" means "boot", in reference to preanal appendage, which is boot-like in dorsal view.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Xianren peak, 800 m, 15-IX-1998, Malaise trap, collected by ZHAO Mingshui, NAU. **P a r a t y p e :** 1♂, same place, Daheng road, 1200 m, 14-VII-1999, Malaise trap, collected by ZHAO Mingshui, NAU.

***Dolophilodes retrocurvatus* n.sp.**

Length of forewing 7.5mm. Body brown. Head dark brown, antennae and maxillary palpi brown, labial palpi yellow. Dorsum of thorax dark brown, and the other parts brown; wings and legs brown. Abdomen yellow. Male genitalia (Pl. 3): dorsum of segment 9 short; in lateral view the upper 2/3 is broader than the lower third. Segment 10 triangular in lateral view, distal end bears two short points which are directed outwards and upwards; in dorsal view its base broad and gradually narrowed to the end, and the distal margin somewhat truncate. Preanal appendage broad in lateral view, the edges parallel to each other, distal end rounded; in dorsal view clavate. The first segment of inferior appendage rectangular in lateral view, it is twice as long as wide; the second one is as long as the first one, its distal end rounded and slightly bent downward. Phallus large, membranous, with the following spines: a longer one with a basal plate of its own length, and 4 shorter, slightly curved ones. This species is similar to *D. truncatus* KIMMINS from Burma, but is distinguished from it in: (1) In lateral view preanal appendage broader than that of the latter. (2) The second segment of inferior appendage is as long as the first one, other than obviously shorter than the first one in the latter. The sclerites are similar. *D. adnamat* MAL. & CHANT. 1993 and *D. bullu* MAL. & CHANT. 1993 have similar inferior appendages in lateral view, but their segment 10 is broadly rounded in dorsal view, and their dorsal lobes of segment 9 are longer.

E t y m o l o g y : Latin word "retrocurvatus" means curved posteriorly, in reference to the shape of the segment 9 in lateral view.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Banqiao brook, 1600 m, 5-VI-1998, sweeping, collected by John C. MORSE, YANG Lianfang & SUN Changhai, NAU. **P a r a t y p e s :** 2♂♂, same collection data as holotype; 1♂, same place, Huodi brook, 1650m, 5-VI-1998, sweeping, collected by DU Yuzhou. All in NAU. – **P a r a t y p e s :** 2♂♂ Henan province, Balyun Mts., 1470m, 33°40'N, 111°51'E, 20-V-1989, leg. Kyselak, CM.

***Dolophilodes bellatulus* n.sp.**

Length of forewing: 5.5mm. Body blackish brown. Head black, antennae brown, palpi yellow. Dorsum of thorax dark brown, and the other parts yellow; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 3): dorsum of segment 9 short, in lateral view its anterior margin curved into an arc, and the posterior margin concave where the inferior appendage articulates. Segment 10 in lateral view narrower at the middle; in dorsal view linguiform. Preanal appendage elliptical in lateral view and reniform in dorsal view. The first segment of inferior appendage rectangular in lateral view, its length is about twice as its width; the second segment slightly shorter than the first one, and the distal portion rounded and narrower than its base. Phallus large, membranous, with the following

spines: a longer one with a basal plate of its own length, both are however smaller than in many other species; and three pairs of each two shorter, straight spines. The species is similar to *D. bullu* MAL. & CHANT. 1993 and *D. adnamat* MAL. & CHANT. 1993 from Thailand, but is distinguished in: (1) segment 10 in lateral view narrower at the middle, other than equal to the distal portion in width as in the latter, (2) preanal appendage elliptical in lateral view, other than with the two margins parallel to each other and with a rounded apex as in the latter, (3) the distal portion of second segment of inferior appendage rounded and narrower than its base, other than trapezoid as in *D. bullu* and *D. adnamat*.

E t y m o l o g y : Latin word "bellatulus" means "elegant", in reference to the well-designed male genitalia.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m, 26-VII-1998, light trap, collected by WU Hong, NAU.

***Dolophilodes erysichthon* n.sp.**

Light brown, length of forewing 5 mm. Male genitalia (Pl. 2): segment 9 in lateral view with a large plate which covers laterally almost the full length of the long and slender preanal appendages. Segment 10 in lateral view bent upward, distal part oval; in dorsal view triangular, but retracted subdistally. Both segments of the inferior appendages equally large, second segment rounded and broad, with fine spines on the inner side of its distal half. Sclerites in the phallus: the long sclerite with the basal plate is relatively short, i.e. it has about the same length as the plate, and there are about 7 short, straight spines, some of which may be in bunches of 2-3 each. – This species is very similar to *D. eryx* n.sp., but has a narrower dorsal plate of segment 9, and other sclerites (see there).

H o l o t y p e : ♂: Zhejiang province, Mt. Gutianshan, 450m, 26°21'N, 119°26'E, 9-VI-1989, leg. Kyselak, in CM. **P a r a t y p e s :** 2♂♂ with the same data and 1♂ 7-VI-1989, one of them in NAU, the others in CM.

***Dolophilodes eryx* n.sp.**

Light brown, length of forewing 5-6 mm. Male genitalia (Pl. 2): Very similar to *D. erysichthon* (see above), but the dorsal lobe of segment 9 is broader, and the sclerites in the phallus are different: The long spine is as long as its basal plate, and there are 2-4 smaller, straight sclerites, and one large sclerite which is strongly curved. In addition, and immediately visible, is the hook at the inner surface of the first segment of the inferior appendage, which is lacking in similar species. – In the similar species *D. burmana* KIMMINS 1955 from Burma and *D. henanensis* SUN 1997, the retraction of segment 10 in dorsal view is lacking. *D. truncata* KIMMINS 1955 from Burma has several long, strongly bent sclerites in the phallus.

H o l o t y p e : 1♂: Zhejiang province, Long Wang Shan, 560m, 30°28'N, 119°22'E, 3-VI-1989, leg. Kyselak, CM. **P a r a t y p e s :** Same data, 2♂♂ (CM), and same data, but 600m: 2♂♂ (NAU). – Zhejiang province, Tienmu Mt, 460-500m, 30°18'N, 119°26'E, 30.-31.-V-1989, leg. Kyselak: 9♂♂ (CM).

***Wormaldia dissecta* n.sp.**

Length of forewing 6 mm. Body dark brown. Head blackish brown; antennae and

maxillary palpi brown; labial palpi yellow. Thorax brown; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 4): tergum of segment 8 pentagonal in lateral view; in dorsal view its posterior margin deeply concave. Segment 9 pentagonal when viewed laterally, its dorsum membranous. Segment 10 very long, with its distal end slightly curved upwards in lateral view; in dorsal view it is triangular. The basal half of preanal appendages narrow and the distal half broad. The base of the first segment of inferior appendages broader than its distal portion. The second one in lateral view slender, its length is about 2.5 times as long as its width, its apex rounded; in ventral view each inner side forms a large tooth at the basal third. Phallus membranous, with 2 small spines, a long curved spine and a field of extremely fine spines. The species is closely related to *W. quadrata* n.sp., but it has a deep dorsal incision of segment 8, and only the distal third of the inner surface of the inferior appendages is densely covered by fine spines.

E t y m o l o g y : Latin word "dissectus" means "having deep excision", in reference to the tergum of segment 8, with a deep excision at the middle of posterior margin in dorsal view.

H o l o t y p e : 1♂, Shaanxi province, Liuba county (33.4N, 106.8E), Miaotaizi, 1400 m, 8-VI-1998, sweep, collected by DU Yuzhou & SUN Changhai, NAU.

***Wormaldia quadrata* n.sp.**

Length of forewing: 5 mm. Body brown. Head dark brown; antennae and maxillary palpi brown; labial palpi yellow. Dorsum of thorax dark brown, the other parts brown; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 4): caudal edge of segment 8 rounded in dorsal view, with a shallow incision. Dorsum of segment 9 membranous; in lateral view its upper part expands anteriorly. Segment 10 elongate, with a small process at the apex pointing upwards when viewed laterally; in dorsal view it is triangular. Preanal appendage club-like. The first segment of inferior appendage is quadrate in lateral view. The second segment is narrower but slightly longer than the first one, its apex rounded, and has a strong tooth on the inner surface in about the first third of its length. Phallus membranous, with a larger and a small curved spine. This new species is closed related to *W. dissecta* n. sp., but is distinguished from it in: (1) Tergum of segment 8 with a slight incision only. (2) The inner surface of the second segment of inferior appendages is densely covered by fine spines over the full length from the tooth to the end.

E t y m o l o g y : Latin word "quadratus" means quadrate, in reference to the first segment of inferior appendage, which is quadrate in lateral view.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Banqiao brook, 1600 m, 5-VI-1998, sweep, collected by John C. MORSE, YANG Lianfang & SUN Changhai, NAU. – **P a r a t y p e s** 2♂♂ Henan province, 3 km N Long Yu Wan, 1150m, 33°38'N, 111°46'E, 22-V-1989, leg. Kyselyak, CM.

***Wormaldia tricuspis* n.sp.**

Length of forewing: 4.5mm. Body brown. Head dark brown; antennae and maxillary palpi brown; labial palpi yellow. Thorax brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 5): segment 8 rectangular in lateral view. Dorsum of segment 9 membranous, in lateral view it is irregular in shape. Its ventrocaudal edge is prolonged in caudal direction, and in lateral view pointed, so that the caudal edge appears concave. Segment 10 in lateral view broad at the base, and narrowed to the distal end, in dorsal

view triangular. Preanal appendage broad, the two edges parallel to each other in lateral view, with a rounded apex; in dorsal view half as long as the segment 10. The first segment of inferior appendage is somewhat trapezoid in lateral view, its base is obviously broader than its distal end. The second segment slender, its length is about 3 times as long as its width. Phallus membranous, with 2 slender spines. This species is unique with its preanal appendages, somewhat similar in this respect to *W. kambaitiensis* MALICKY 1993 from Burma in which however the second segment of inferior appendages is much shorter and more rounded.

E t y m o l o g y : Latin word "tricuspis" means "having three teeth", in reference to the segment X and preanal appendages which are trilobate in dorsal view.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m, 30-VI-1998, Malaise trap, collected by ZHAO Mingshui, NAU.

***Wormaldia bicornis* n.sp.**

Length of forewing: 4.5 mm. Body yellow. Head brown; antennae and palpi yellow. Dorsum of thorax brown and other parts yellow; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 3): the posterodorsal angle of segment 8 slightly prolonged in lateral view; in dorsal view its distal margin with a pair of processes. Anterior margin of segment 9 expands strongly forwards into a triangular process in lateral view. Segment 10 in dorsal view linguiform. Preanal appendage club-like. The first segment of inferior appendage pentagonal in lateral view. The second segment slender, with a rounded apex. Phallus membranous, with two spines. This species is unique in the genus in having a pair of horns of the described shape at the caudal edge of tergite 8, and segment 9 expands strongly forward into a long spine in the middle of the anterior edge.

E t y m o l o g y : Latin word "bicornis" means "having two horns", in reference to the distal margin of segment VIII, with a pair of processes in dorsal view.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m, 30-VII-1998, sweeping, collected by WU Hong, NAU.

***Wormaldia scalaris* n.sp.**

Length of forewing: 3 mm. Body brown. Head brown; antennae brown, palpi yellow. Dorsum of thorax brown and the other parts yellow, legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 6): Segment 8 somewhat trapezoid in lateral view, but its posterodorsal upper angle expands posteriorly; in dorsal view is somewhat bell-like. Dorsum of segment 9 membranous, in lateral view anterior margin, expands strongly forward into a triangular process. Segment linguiform in dorsal view. Preanal appendage slender, slightly shorter than segment 10. The first segment of inferior appendage rectangular in lateral view, its length slightly longer than its width. The second segment slightly longer than the first one, with a rounded apex. Phallus membranous, with a longer and several smaller straight spines. The species is somewhat unique in the genus, having a 10th segment which is broad and triangular in dorsal view, and the inner surface of segment 2 of the inferior appendages is scarcely covered over its whole area with unusually long, light-colored spines.

E t y m o l o g y : Latin word "scalaris" means "trapezoid", in reference to the segment 8, which is trapezoid in lateral view.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m, 15-IX-1998, light trap, collected by ZHAO Mingshui, NAU. – **P a r a t y p e s :** 1♂ Zhejiang, Tienmu Mt., 460m, 30°18'N, 119°26'E, 30-V-1989, leg. Kyselak, CM; 4♂♂ Zhejiang, Long Wang Shan, 560-1000m, 30°28'N, 119°22'E, 3.-4.-VI-1989, leg. Kyselak, CM.

***Wormaldia zhejiangensis* n.sp.**

Length of forewing: 4 mm. Body brown. Head brown; antennae brown; palpi yellow. Thorax brown, legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 6): segment 8 trapezoid in lateral view and concave at the distal margin in dorsal view; with a pair of long processes. Dorsum of segment 10 membranous, in lateral view its anteroventral margin expands forwards. Segment X in lateral view broad at the base and slender at the distal half; in dorsal view linguiform. Preanal appendage slender, and slightly shorter than segment 10. The first segment of inferior appendage pentagonal in lateral view. The second segment elongate, with a rounded apex. Phallus membranous, with three spines. This species has similar long spines on tergite 8 like *W. spinosa* ROSS from Jiangxi province, China and *W. alticola* BANKS from the Philippines and *W. muoisian* MALICKY from Vietnam, but is distinguished from the latter three species by the following combination of characters: (1) Segment 8 short in dorsal view, concave at the distal margin. (2) The processes of segment 8 closed to each other at its base, the basal half much broader than distal half. (3) Segment 10 linguiform in dorsal view.

E t y m o l o g y : This species is named after Zhejiang province where it was collected.

H o l o t y p e : 1♂ Zhejiang province, Mt. Tianmushan, over Kaishanlaodian, 1100-1200 m, 30-V-1998, light trap, collected by WU Hong, NAU. – **P a r a t y p e s :** 2♂♂ Zhejiang, Gutien Shan, 450m, 26°21'N, 119°26'E, 9-VI-1989, leg. Kyselak, CM.

***Wormaldia triacanthophora* SUN 1998**

We have studied several more specimens since the first description (WANG & al. 1998) and have noted a slight variation (Pl. 6). Tergite 8 is bilobed in dorsal view, with a small cavity beneath. In this cavity is a pair of small triangular spines which however may be absent in other specimens. The form of segment 10 in dorsal view with the distinct shoulder and two spines on each side is a good separating character. In the phallus there are three straight spines of medium length.

***Kisaura shaanxiensis* n.sp.**

Length of forewing: 6 mm. Body dark brown. Head blackish brown; antennae and palpi yellow. Dorsum of thorax dark brown; scutellum of mesothorax and the other parts yellow; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 7): segment 8 with a deep excision at the distal margin in dorsal view, the depth of the excision is more than half of the length of segment 8. Dorsum of segment 9 membranous; in lateral view somewhat pentagonal. Segment 10 with a spine at its distal end when viewed laterally; in dorsal view its middle membranous, and the lateral parts sclerotized into a pair of sclerites, which are concave at the distal end. Preanal appendage large, distal half bulgy in lateral view and clavate in dorsal view. The first segment of inferior appendage in lateral view pentagonal, the second segment elongate. Phallus membranous. This species is unique among any Asiatic species in the genus as the long dorsal spine, which is

probably the inner part of the preanal appendage, is lacking, and is transformed into a complicated structure whose form is seen in the figure.

E t y m o l o g y : This species is named after Shaanxi province where it was collected.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Banqiao brook, 1600 m, 5-VI-1998, sweeping, collected by John C. MORSE, YANG Lianfang & SUN Changhai. **P a r a t y p e :** 1♂, same collection data as holotype, both NAU. – **P a r a t y p e** 1♂ Shaanxi, Qinling Shan 1000-1300m, 6 km E Xunyangba, 23-V-13-VI-1990, leg. Kyselak, CM.

***Kisaura adamickai* n.sp.**

Length of forewing: 7-9 mm. Body brown. Head brown; antennae dark brown and palpi yellow. Thorax brown; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 5): the dorsum of segment 9 membranous; in lateral view its anterior margin produced into an arc, and its posterior margin slightly concave at the place where the inferior appendage articulates. Segment 10 also membranous, its two lateral processes very long, and their apices sclerotized. Preanal appendage broad in lateral view, slightly curved and apex rounded; in dorsal view its base slightly broad, and narrowed to the distal end. The base of the first segment of inferior appendage narrow, and broadened to the distal end. The second segment slender, and 4 times as long as its height when viewed laterally, and the pecten band in the inner side of each segment reaches from its base to the distal end. Aedeagus membranous. This species is similar to *K. tsudai* BOTOSANEANU from Korea, but differs in: (1) in dorsal view segment 10 not divided into two lobes. (2) the shape of preanal appendage differs from that of the latter. (3) the pecten band in the inner side of the second segment of inferior appendage reaches from its base to the distal end.

E t y m o l o g y : This species is named after Dr. Peter Adamicka from Biological Station, Lunz am See, Austria, we thank him for his help.

H o l o t y p e : 1♂, Gansu province, Wen county (33.0N, 104.6E), Dianba, Donggou brook, 950m, 15-VI-1998, light trap, collected by YANG Lianfang, NAU. **P a r a t y p e s :** 3♂♂, same collection data as Holotype; 1♂, same place, Bikou town, Bifeng brook, 650m, 14-VI-1998, light trap, collected by SUN Changhai and DU Yuzhou; 1♂, Shaanxi province, Mei county (34.2N, 107.7E), Tangu town, black water river, 800m, 1-VI-1998, light trap, collected by YANG Lianfang; 1♂, Shaanxi province, Liuba county (33.4N, 106.8E), Miaotaizi, Baohe river, 1300m, 7-VI-1998, light trap, collected by SUN Changhai; 2♂♂, Shaanxi province, Foping county (33.5N, 107.9E), Longcaoping, 1100m, 3-VI-1998, light trap, collected by MA Yun; 2♂♂, Shaanxi province, Qingling (34.2N, 106.8E), Tiantaishan, National Forest Park, Jialingjiang river, 1700m, 9-VI-1998, light trap, collected by SUN Changhai; 1♂, Zhejiang province, Mt. Tianmushan, Science and technique hall, 380m, 22-IX-1998, light trap, collected by ZHAO Mingshui. All in NAU. – **P a r a t y p e s :** 38♂♂ Henan province, Long Yu Wan, 1000-1050m, 33°38'N, 111°46'E, 21-23-V-1989, leg. Kyselak, CM.

***Kisaura eumaios* n.sp.**

Light brown, length of forewing 7-7.5 mm. Male genitalia (Pl. 4): Segment 9 irregularly hexagonal. Basal segment of inferior appendages oval, second segment much longer and slender, with a straight, very narrow strip of black spinules over the whole length of its inner surface. Dorsal spine short, straight, pointed. Segment 10 is as long as the dorsal spine and has two protruding short median fingers in dorsal view. – *K. eumaios* n.sp. is similar to *K. nozakii* KUHARA 1999 and *K. borealis* KUHARA 1999, but in these both the spiny strip at the inner surface of segment 2 of the inferior appendages is distinctly shorter.

E t y m o l o g y : This species as well as several others in this paper is named after a person from classical antiquity.

H o l o t y p e : 1♂: Henan province, Luoshan county, Lingshan Mt., 300-500m, 31°54'N, 114°13'E, 25-V-1989, leg. Kyselak, CM. - **P a r a t y p e s :** same data, 4♂♂; one of them in NAU, the others in CM. - 4♂♂, Henan province, 1 km S Long Yu Wan, 1000m, 33°38'N, 111°46'E, 23-V-1989, leg. Kyselak, CM.

***Kisaura euphemos* n.sp.**

Light brown, forewing length 7 mm. Male genitalia (Pl. 4): segment 9 large, with sloping dorsal edge. First segment of inferior appendage large, oval, second segment smaller, with a ventro-basal corner in lateral view, from whose inner surface a very narrow strip of black spinules originates which runs to the distal end of the segment in a bow. The pointed dorsal spines originate dorso-basally on segment 9 in a slightly separated manner, and are slightly curved. - A similar species is *K. lanceolata* SUN 1997 in which the ventro-basal corner of segment 2 is rounded, and its dorsal spine attains the end of segment 1 of the inferior appendage (in *K. euphemos* only the half length of it), and segment 10 is as long as the spine (in *K. euphemos* less than half of its length).

H o l o t y p e 1♂: Sichuan province, Mt. Emeishan, Qingyin pavilion, Jingshui, 180 km SW Chengdu, 800-1200m, 26-V-1981, leg. Kyselak (CM).

***Kisaura eteokles* n.sp.**

Light brown, fore wing length 5-6,5 mm. Male genitalia (Pl. 5): *K. eteokles* n.sp., *K. adamickai* n.sp. and *K. euandros* n.sp. are very similar in having segment 9 rounded in lateral view, the inferior appendages with their long and slender second segment which has on its inner surface a very long, straight strip of black spinules, and having the same type of curved dorsal spines. However, this dorsal spine stands free in *K. eteokles* because its membranous segment 10 is much shorter than the spine.

H o l o t y p e 1♂: Zhejiang province, Mt. Tianmushan, 460m, 30°18'N, 119°26'E, 30-V-1989, leg. Kyselak (CM). **P a r a t y p e s :** 2♂♂, same data, but 500m and 31-V-1989 (NAU). - 13♂♂, Zhejiang province, Mt. Longwangshan, 560-600m, 30°28'N, 119°22'E, 3.-4.-VI-1989, leg. Kyselak (CM).

***Kisaura euandros* n.sp.**

Light brown, forewing length 7-8 mm. Male genitalia (Pl. 5): very similar to *K. eteokles* n.sp., but the dorsal spines have a short distal spine which is bent outwards in dorsal view, and segment 10 is longer than the spines and broadly rounded in lateral view. In *K. adamickai* n.sp. the membranous segment 10 is as long as the spines, and narrow. *K. hattorii* KUHARA 1999 is similar, but its dorsal spines are much finer. Segment 10 is as long as the spine in *K. tsudai* BOTOSANEANU 1970 and *K. pectinata* ROSS 1956 either, but they are finer in *K. tsudai* and slightly stronger bent sub-basally and sub-distally in *K. pectinata*.

H o l o t y p e 1♂: Henan province, 1 km S Long Yu Wan, 1000m, 33°38'N, 111°46'E, 23-V-1989, leg. Kyselak, CM. - **P a r a t y p e s :** same data, 1♂ in NAU, 7♂♂ in CM.

***Chimarra senticosa* n.sp.**

Length of forewing: 5.5 mm. Body blackish brown. Head blackish brown, antennae brown, palpi yellow. Dorsum of thorax dark brown, other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 7): in lateral view the dorsal part of segment 8 much broader than its ventral part, and its posterodorsal angle with a group of spines; in dorsal view its distal margin deeply concave, with long spines inside. In lateral view the upper third of segment 9 narrower than the lower 2/3, and its posterodorsal angle also with a group of spines. Lower edge of segment 10 horizontal and upper edge oblique in lateral view. Preanal appendage bifurcated in lateral view, and its upper lobe short and the lower lobe longer. Inferior appendage club-like in lateral view. Phallus slightly sclerotized, with a group of spines at the apex. Among many similar species (e.g. *C. aneca* MAL. & CHANT. 1993, *C. batukaua* MALICKY 1995, *C. excavata* KIMMINS 1957, *C. discolor* KIMMINS 1957, *C. triangulata* HSU & CHEN 1996) this one is well characterized by the form of the dorsal excavations and the situation of the spines of segment 8, and by the bifurcate preanal appendages.

E t y m o l o g y : Latin word "senticosus" means "having many spines", in reference to segment 8 and segment 9 and the distal end of phallus with many spines.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanmuping, 780 m elev., 30-VI-1998, Malaise trap, collected by ZHAO Mingshui, NAU.

***Chimarra maoi* n.sp.**

Length of forewing: 4.5 mm. Body blackish brown. Head blackish brown, antennae and palpi yellow. Dorsum of thorax dark brown, and the other parts brown; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 7): tergite 8 in dorsal view trapezoid; in lateral view its anterior margin curved into an arc. Dorsum of segment 9 membranous, in lateral view its upper half narrower than its lower half. Segment 10 somewhat rectangular when viewed laterally, with a big wart at the base. Preanal appendage clavate in lateral view. Inferior appendage elongate, triangular in lateral view; in ventral view its inner margin excised near the distal end. Phallus slightly sclerotized, with a pair of large spines in the middle and two pairs of bunches of coarse spines, in lateral view very broad at the base and sharp at the distal end. Among many roughly similar species, there is no very similar one. The pair of large sclerites in the phallus is striking which suggests the shape of parameres, but they are clearly situated inside the phallus.

E t y m o l o g y : We follow Dr. Peter Adamicka's suggestion and name this species *C. maoi*, in memory of Mao Zedong, one of the greatest persons in the world in the 20th century.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan, Sanli pavilion, 640 m, 1-IX-1998, Malaise trap, collected by ZHAO Mingshui, NAU.

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Zusammenfassung

Folgende neue Philopotamiden aus China werden beschrieben und abgebildet: *Dolophilodes bellatulus*, *D. caligula*, *D. erysichthon*, *D. eryx*, *D. ovalis*, *D. retrocurvatus*, *D. semicircularis*, *D. setosus*, *Wormaldia bicornis*, *W. dissecta*, *W. quadrata*, *W. scalaris*, *W. tricuspis*, *W. zhejiangensis*, *Kisaura adamickai*, *K. eteokles*, *K. euandros*, *K. eumaios*, *K. euphemos*, *K. shaanxiensis*, *Chimarra maoi*, *C. senticosa*. Die Variabilität von *Wormaldia triacanthophora* wird besprochen. *Doloclanes* wird als Synonym von *Wormaldia* betrachtet.

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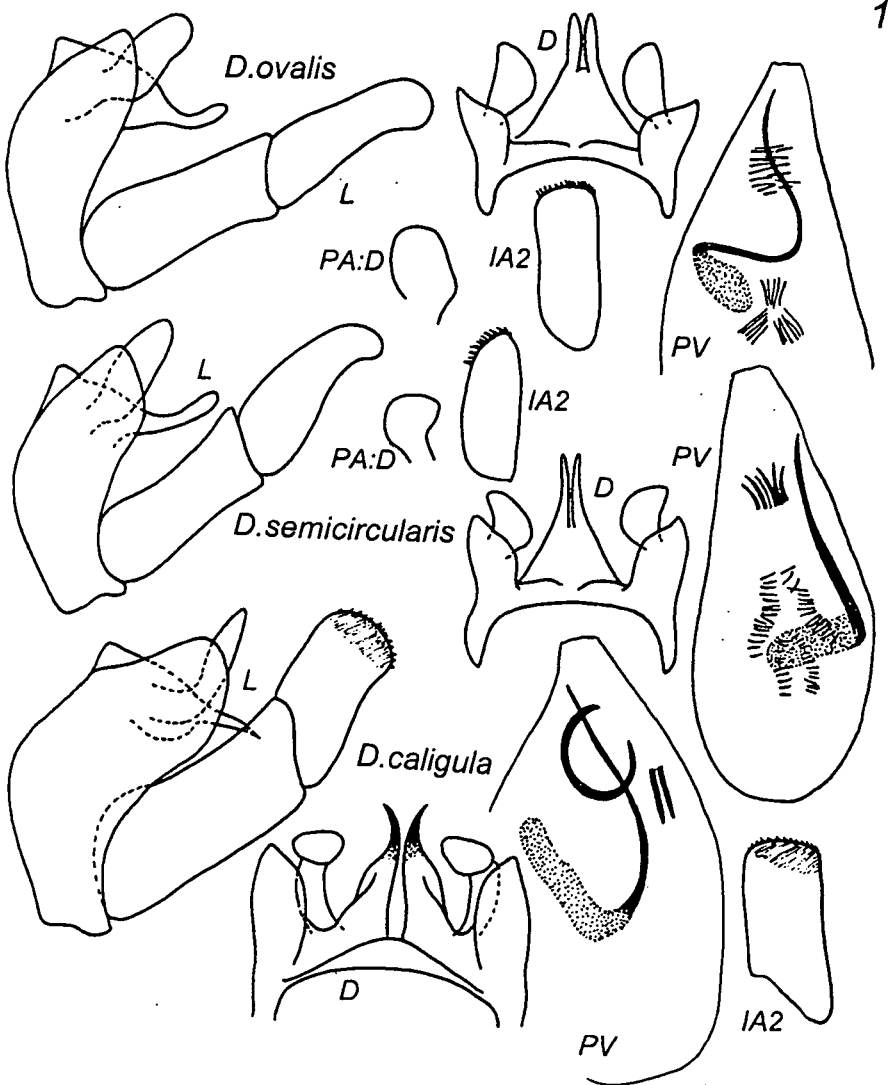


Plate 1: Male genitalia of *Dolophilodes* species. L .. lateral, D .. dorsal, PV .. phallus ventral, PA:D .. preanal appendages dorsal, IA2 .. second segment of inferior appendages, vertical view.

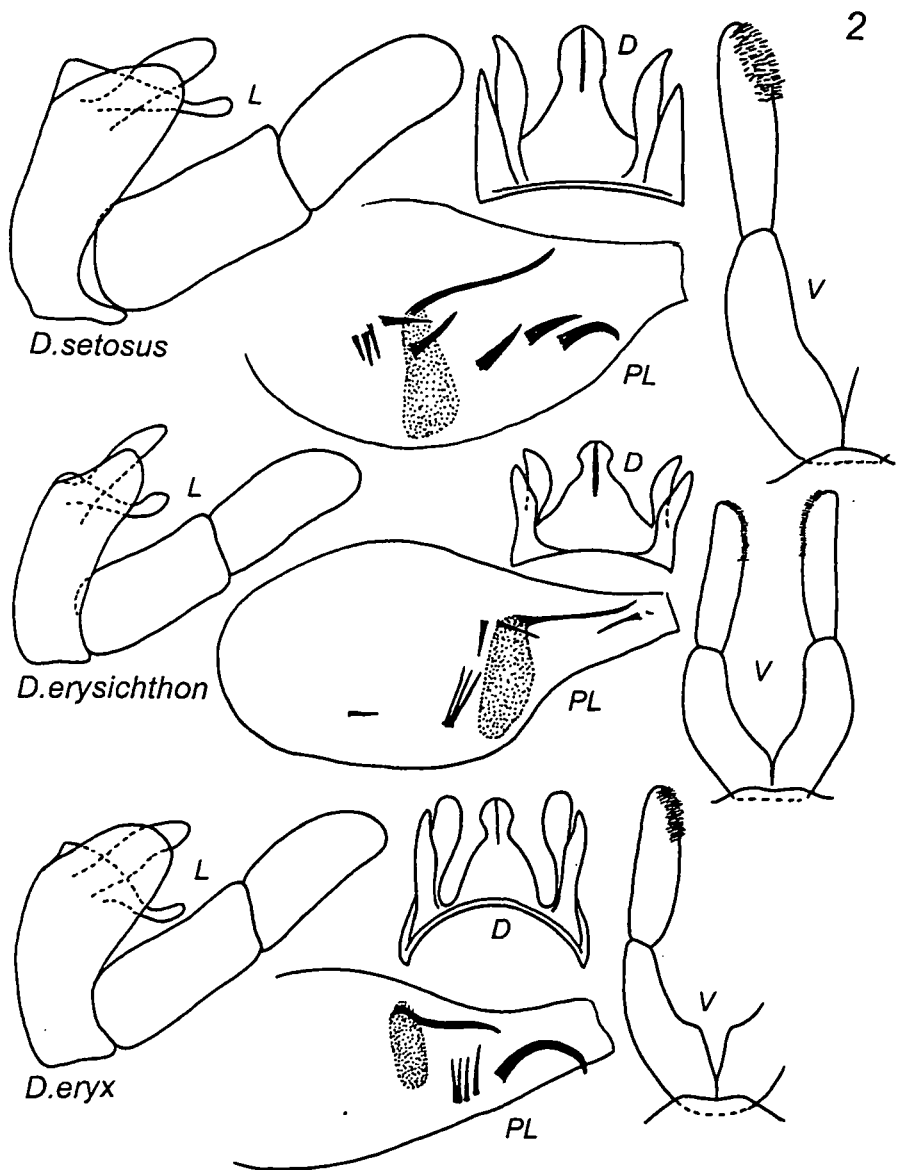


Plate 2: Male genitalia of *Dolophilodes* species. L .. lateral, D .. dorsal, PL .. phallus lateral, V .. ventral.

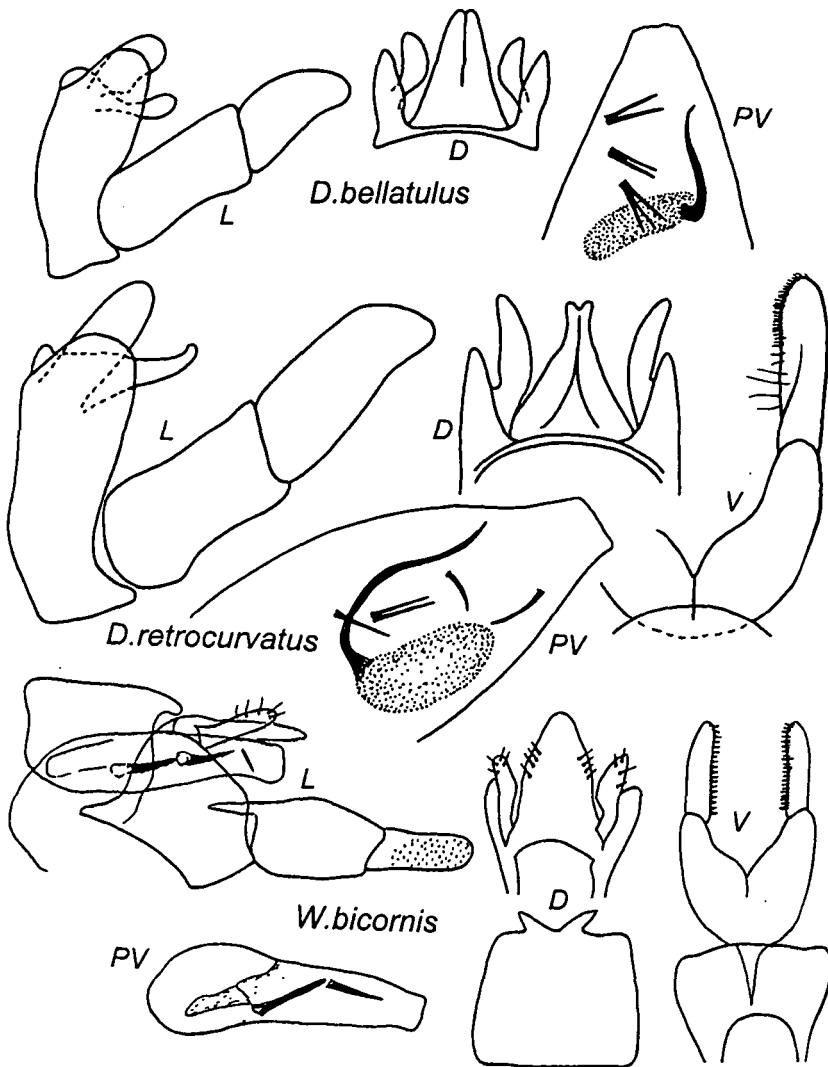


Plate 3: Male genitalia of *Dolophilodes* and *Wormaldia* species. L .. lateral, D .. dorsal, PV .. phallus ventral, V .. ventral.

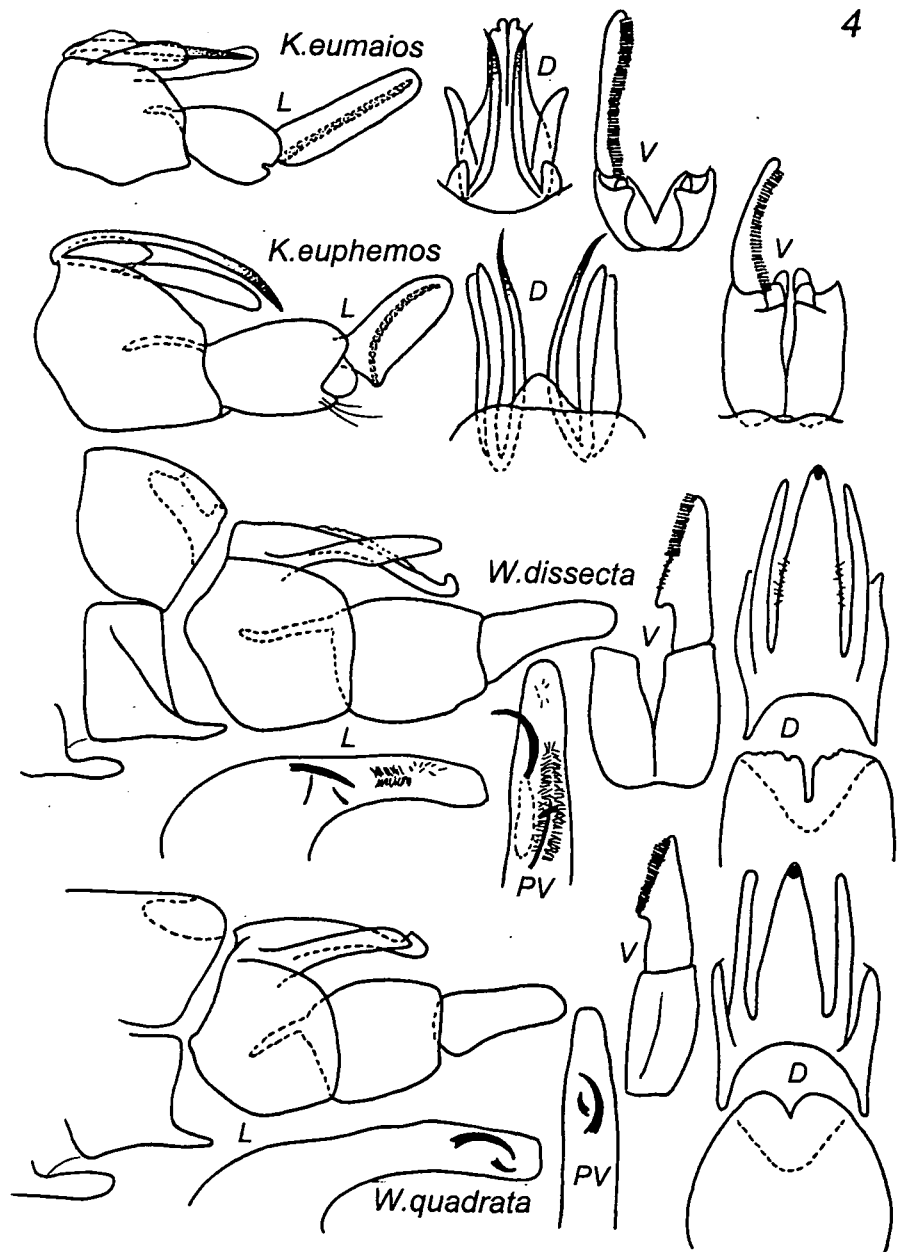


Plate 4: Male genitalia of *Kisaura* and *Wormaldia* species. L .. lateral, D .. dorsal, PV .. phallus ventral, V .. ventral.

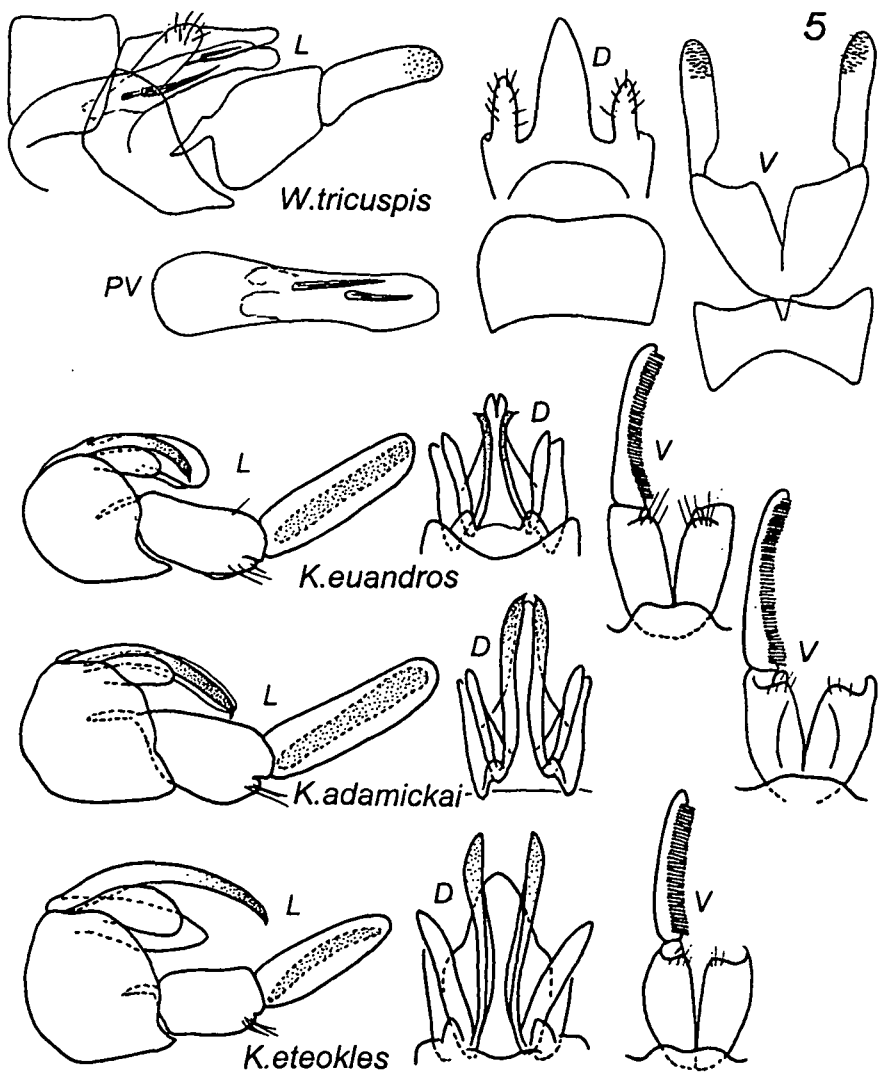


Plate 5: Male genitalia of *Kisaura* and *Wormaldia* species. L .. lateral, D .. dorsal, PV .. phallus ventral, V .. ventral.

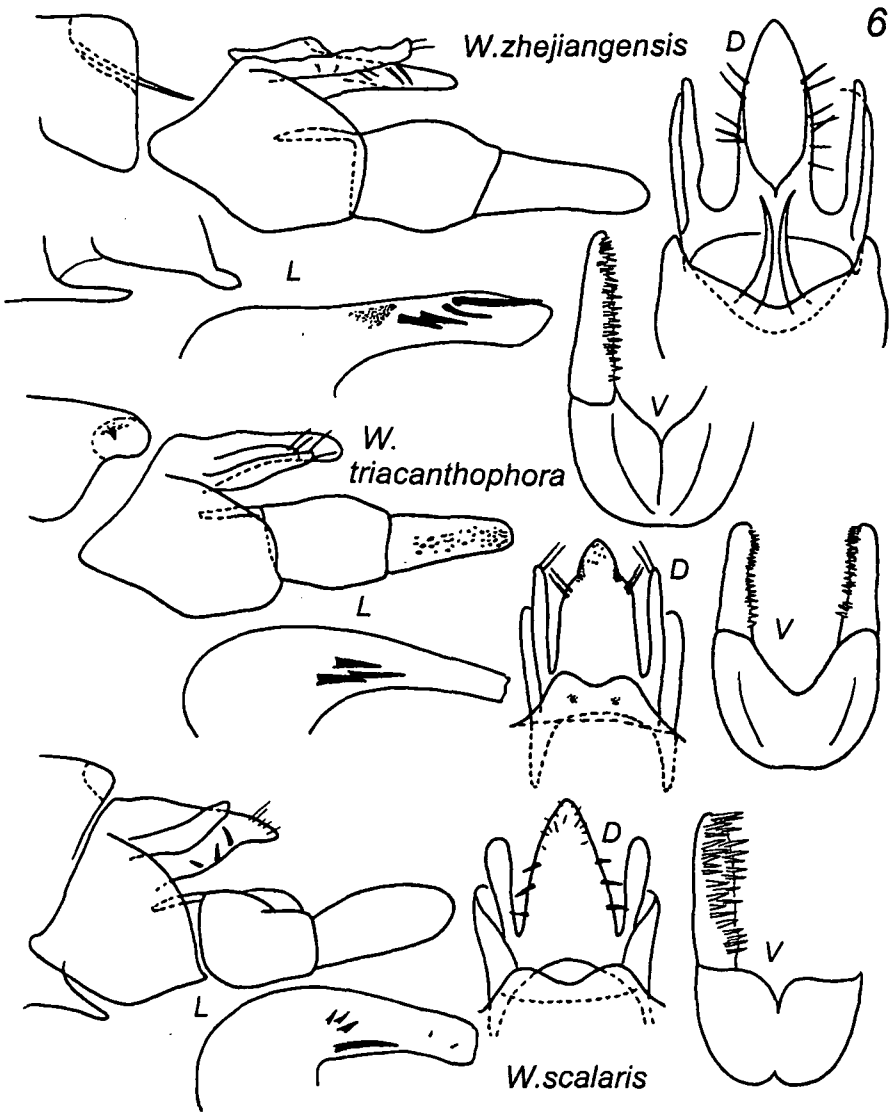


Plate 6: Male genitalia of *Wormaldia* species. L .. lateral, D .. dorsal, V .. ventral.

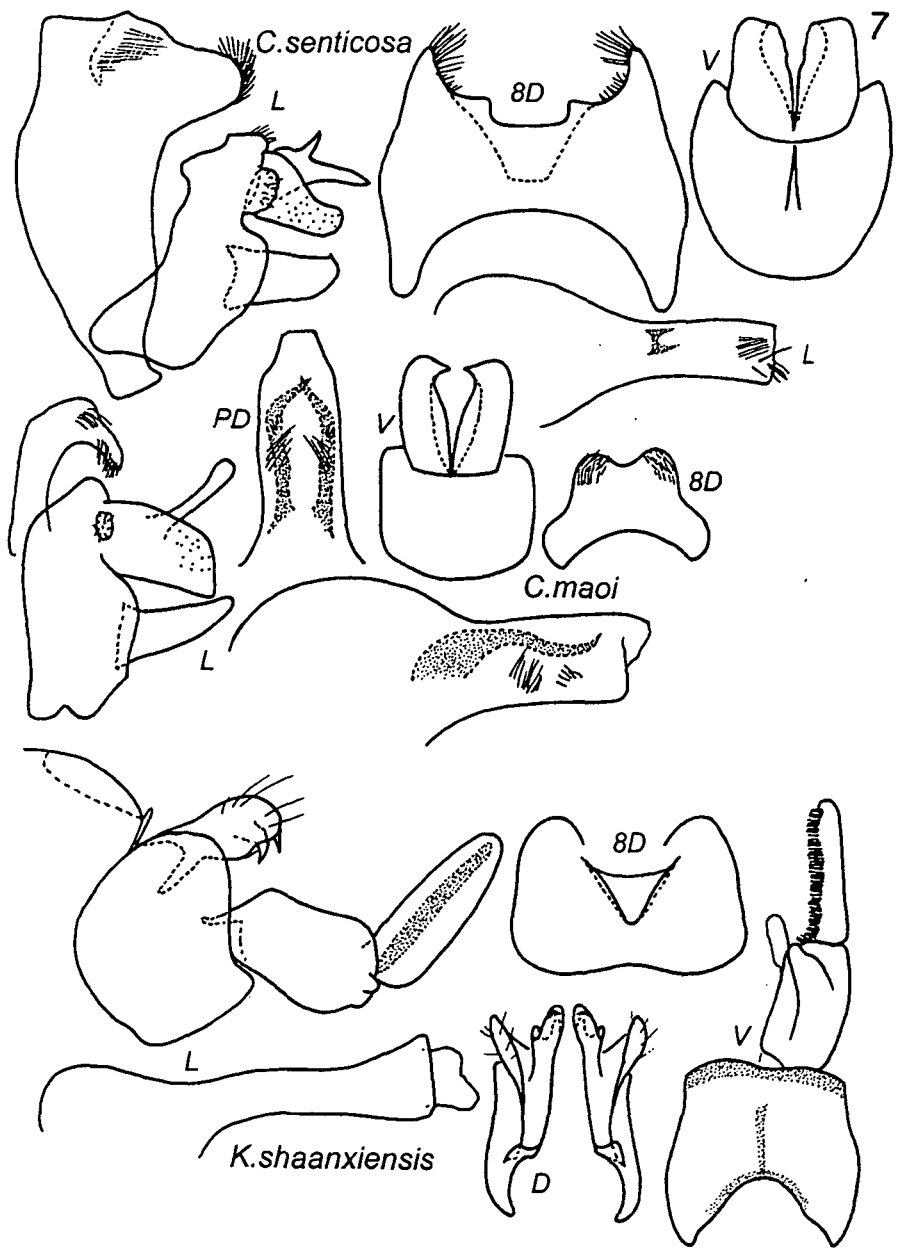


Plate 7: Male genitalia of *Chimarra* and *Kisauro* species. L .. lateral, D .. dorsal, V .. ventral, PD .. phallus dorsal, 8D .. tergite 8 dorsal.

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