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25 new species of Rhyacophilidae (Trichoptera) from China

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Abstract: The following new species collected in China are described and figured: *Himalopsyche sichuanensis*, *Rhyacophila auricula*, *R. boleta*, *R. brachyblasta*, *R. bucina*, *R. complanatula*, *R. euphorbos*, *R. eurystheus*, *R. euterpe*, *R. fanjingshanensis*, *R. fides*, *R. flora*, *R. forcipata*, *R. furva*, *R. hadestril*, *R. ligulula*, *R. morsei*, *R. pentagona*, *R. pusilla*, *R. ramulina*, *R. shaanxiensis*, *R. sichuanensis*, *R. tianmushanensis*, *R. unisegmentalis*, *R. vascula*.

Key words: *Himalopsyche*, *Rhyacophila*, Rhyacophilidae, new species, China.

Introduction

This is a contribution to the knowledge of the rhyacophilid caddisflies of China. Although SCHMID (1970) in his important revision of the genus *Rhyacophila* has described and recorded many species for the country, we think that many more species remain to be described, and a final summary of the fauna is not expected in the near future. The species are arranged in species groups according to SCHMID (1970).

Abbreviations of the collections where the material is housed:

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

CM..... Collection of Hans Malicky

Description of the species

Himalopsyche sichuanensis n.sp.

Length of forewing: 22 mm. Body brown. Head brown; antennae brown; palpi yellow. Thorax brown; legs yellow; wings brown. Abdomen yellow. Male genitalia (Pl. 1): in lateral view the upper portion of segment IX broader than its lower part; dorsal lobe in dorsal view with a small excision at each side of sub-apex, and also an excision at the posterior margin. Segment X membranous. The base of preanal appendage narrower, and its distal portion broader, posterior margin rounded; its inner side with a process, which is somewhat triangular in lateral view and in dorsal view is club-like, with a semicircular process at its base. The second segment of inferior appendage long, in lateral view its upper margin bears a blunt tooth. The second segment triangular in lateral view.

Aedeagus long and broad, and distal half curved upwards in lateral view. The ventral lobe of aedeagus slender.

The species is near to several species such as *H. biansata* KIMMINS 1952, *H. alticola* BANKS 1940 and *H. martynovi* BANKS 1940, but differs in the proportions and shapes of the structures in comparison of the figures.

E t y m o l o g y : The species is named after the collection site in Sichuan province.

H o l o t y p e : 1♂, Sichuan province, 10 km south of Litang city (30.0 N, 100.2 E), Wulianghe river, 3830m elev., 13-VI-1996, light trap, collected by Yang Lianfang and Wang Xinhua, NAU.

***Rhyacophila anatina* group**

***Rhyacophila pusilla* n. sp.**

Length of forewing: 7 mm. Body dark brown. Head dark brown; antennae and palpi brown. Dorsum of thorax dark brown and other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 1): The upper portion of segment IX is broader than its lower one in lateral view; the base of dorsal lobe broader than its distal end. Preanal appendage slightly longer than dorsal lobe, rectangular in lateral view, and elliptical when viewed dorsally. Anal sclerite reniform in lateral view and triangular in caudal view. The first segment of inferior appendage very long, and its upper and lower margins parallel to each other. The second segment short, trapezoid in lateral view. Dorsal process of phallus broad at the base and distal margin slightly concave. Aedeagus slender, tube-like. Distal end of paramere pointed.

The species belongs to the *R. anatina* group, and among the many similar species, *R. pusilla* is characterized by the dorsal extension of segment 9 which is not bifurcated.

E t y m o l o g y : Latin word "pusillus" means "small", in reference to the small dorsal lobe of segment IX.

H o l o t y p e : 1♂, Guizhou province, Mt. Fanjingshan (27.9 N, 108.6 E), Yu-ao, 900 m elev., 4-VI-1995, light trap, collected by SUN Changhai and WANG Beixin, NAU.

***Rhyacophila castanea* group**

***Rhyacophila complanatula* n.sp.**

Length of forewing: 12.5 mm. Body brown. Head brown; antennae yellow, each segment with a dark brown ring; palpi brown. Dorsum of thorax brown and other parts yellow; legs yellow and wings brown. Abdomen brown. Male genitalia (Pl. 1): the anterior margin of segment IX in lateral view straight, the posterior margin with a deep excision at the place where the inferior appendage articulates. The upper half of segment X narrow and the lower half broadened in lateral view. Anal sclerite in lateral view rounded, its root long. The first segment of inferior appendage is near twice as long as its height. The second segment slightly oblique, its base broader than the rounded apex. The base of phallobase broad. Aedeagus in lateral view with a ventral process pointed to anterior in the middle, sub-apex with a trifurcate process; in dorsal view its basal half slender and the distal half bulgy, with a excision at the posterior margin. paramere long, tube-like.

This species of the *R. castanea* group is very closely similar to *R. complanata* TIAN & LI 1986 from Yunnan province, but differs in: (1) The upper half of segment X narrow and the lower half broadened, other than its posterodorsal angle produced into a tooth as in the latter. (2) The second segment of inferior appendage oblique, its base slightly broader and apex rounded; but in the latter the basal 1/3 broad and the distal 2/3 only half as wide as the base.

E t y m o l o g y : Latin suffix "-ula" means "like", and therefore "complanatula" means the species is very similar to *R. complanata*.

H o l o t y p e : 1♂, Sichuan province, 15 km north of Xiangcheng City (28.9N, 99.8E), Shuoqu river, 2750m, 12-VI-1996, light trap, collected by YANG Lianfang and WANG Xinhua, NAU.
P a r a t y p e s : 6♂♂, same collection data as Holotype.

Rhyacophila scissa group

Rhyacophila morsei n.sp.

Length of forewing: 7.0 mm. Body brown. Head brown; antennae, palpi yellow. Thorax yellow, legs yellow; wings brown. Abdomen brown. Male genitalia (Pl. 2): the upper portion of segment IX broader than its lower part in lateral view. In dorsal view segment X somewhat trapezoid and its posterior margin slightly concave; in lateral view its upper portion large and rounded, with a small tooth at posteroventral margin, and the lower portion slender. Anal sclerite small, button-like. Apical band elliptical in lateral view. In lateral view the distal end of tergal strap bulgy. The first segment of inferior joint short, and somewhat trapezoid in lateral view. The second segment separated into two lobes in lateral view; both are broad, the dorsal one almost pointed, the ventral one rounded. Phallus complicated: the dorsal process of phallus in lateral view tube-like, the base of aedeagus broader and narrowed to the distal end; in dorsal view the ventral lobe of aedeagus separated into three lobes: the middle one broad and its posterior margin somewhat truncate, the two lateral lobes pointed and shorter than the middle one. Paramere large, its base membranous, and the distal half bulgy.

The species belongs to the *R. scissa* group and differs from the other members of the group by combination of the following characters: (1) The posteroventral margin of the upper portion of segment X in lateral view produced into a small tooth. (2) The lower portion of segment X in lateral view with also a small tooth at posterior margin of the sub-apex. (3) The upper lobe of the second segment of inferior appendage almost equals to the lower lobe in width.

E t y m o l o g y : We name this species after Dr. John C. Morse, we thank him for his support of research on the Chinese Trichoptera.

H o l o t y p e : 1♂, Gansu province, Wen county (33.0 N, 104.6 E), Dianba, Donggou brook, 950m elev., 15-VI-1998, light trap, collected by YANG Lianfang, NAU. **P a r a t y p e :** 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), 4 km southwest of Huoditang forest farm, Dashuigou brook, 1400m, 4-VI-1998, light trap, collected by SUN Changhai, NAU.

Rhyacophila flora n.sp.

Brown, with a white spot in the centre of the forewing. Forewing length in the ♂ 5,5-10 mm, in the ♀ 7 mm. Male genitalia (Pl. 2): A species of *R. scissa* group, and

particularly close to *R. schismatica* SUN & YANG 1995 which is figured here (Pl. 2) for comparison. The caudal lobe of segment 10 is larger in *R. flora* in lateral view, and the ledge which is situated between these two in *R. schismatica* is lacking. The dorsal part of the fork of the second segment of the inferior appendages is digitiform in *R. schismatica*, with a tiny ventral tooth, but in *R. flora* the dorsal part of the fork is broad, with a large triangular ledge. **E t y m o l o g y** : Like several of the following species it bears a name from classical antiquity.

H o l o t y p e ♂: Taiwan, Hualien county, Anonymous point, 1450m, 23°32'N, 121°17'E, 5-IV-1996, leg. Horvat & Sivec, CM. - **P a r a t y p e s** : About 25♂♂ from various sites in the counties Taoyuan, Hualien, Taipei, Taichung, Hsin Chu, Chiayi, Ilan and Nantou, leg. Sivec, Horvat and Wang; in CM and NAU.

***Rhyacophila eurystheus* n.sp.**

Brown, forewings with light speckles along the edges. Forewing length 7-7,5 mm. Male genitalia (Pl. 2): a species in the *R. scissa* group which is striking for its segment 9 which is, in lateral view, shortest ventrally and broadest dorsally, and the ventral edge has no caudad projection. Segment 10 is short, in lateral view triangular projecting, and with a pair of minute triangular teeth ventrally. The two fingers of the forked second segment of the inferior appendages are simple and slender, without teeth inside; the ventral one is slightly rounded, the dorsal one pointed.

H o l o t y p e ♂: 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** 2♂♂: same site, but 27-V-1989, CM.

***Rhyacophila fides* n.sp.**

Brown, forewing with slightly lighter speckles. Forewing length ♂ 8 mm. Male genitalia (Pl. 2): another species of the *R. scissa* group with a triangular segment 10, seen dorsally, with a distal incision. Segment 1 of the inferior appendages is strikingly short and rounded triangular; the dorsal finger of segment 2 is thin and almost straight, the ventral one is broad, oval with a straight ventral edge in lateral view.

H o l o t y p e ♂: Zhejiang province, Mt. Gutianshan, 450m, 26°21'N, 119°26'E, 9-VI-1989, leg. Kyselak, CM.

***Rhyacophila euterpe* n.sp.**

Smoky brown with with a small, half-moon like patch in the middle of the forewing, and with a slightly lighter costal area. Forewing length 9 mm. Male genitalia (Pl. 2): a species of the *R. scissa* group with the following characters: segment 10 very large, flag-like in lateral view, and mushroom-shaped in dorsal view. Inferior appendages bifid which is typical of the group, but it appears that the dorsal finger does not belong to segment 2 as in the other species but is an extension of segment 1, because a segmentation line is not visible. Parameres as usual in the group, but more slender than in the relatives.

H o l o t y p e ♂: Henan province, Luoshan county, Lingshan Mt. 300-500m, 31°54'N, 114°13'E, 25-V-1989, leg. Kyselak, CM.

Rhyacophila obscura* group**Rhyacophila euphorbos* n.sp.**

Yellowish brown, wings without pattern. Forewing length 7-8 mm. Male genitalia (Pl. 3): segment 9 in lateral view in the middle shorter than dorsally and ventrally. The dorsal complex consists of a sclerite which is half-moon shaped in dorsal view and broadly rounded, with two bulbous structures beneath. Second segment of inferior appendage larger than the first, bilobed, with a shorter, broad, rounded dorsal lobe and a narrower and longer ventral lobe. On the outer surface of the first segment is a large area which is densely covered by fine hairs which are directed caudad. The phallic apparatus includes a ventral spoon-like structure which is distally deeply incised, and a dorsal part which is bifid in lateral view. Parameres are lacking. This is a species of the *R. obscura* group, but different from the other species of the group by the lack of parameres; the other species have each a pair of large parameres, densely covered by hairs. Also, the proportions of the dorsal complex and the inferior appendages are different.

H o l o t y p e ♂: Sichuan province, Valley of the Heroes (= Yingxionggu), Wolong, 15 km W Sauwan, 2000-2500m, 5-VI-1981, leg. Kyselak, CM. **P a r a t y p e s** 1♂, 4♀♀: Sichuan, silver mine valley, Wolong, 12 km W Sauwan, 2000-2200m, 2-VI-1981, leg. Kyselak, CM.

Rhyacophila annulicornis* group**Rhyacophila shaanxiensis* n.sp.**

Length of forewing: 11 mm. Body blackish brown. Head blackish brown, antennae and maxillary palpi dark brown, labial palpi brown. Dorsum of thorax blackish brown, other parts brown; legs and wings brown. Abdomen brown. Male genitalia (Pl. 3): the upper two thirds of segment IX narrower than the lower third in lateral view. The horizontal part of segment X with a deep excision at the posterior margin when viewed dorsally; its vertical portion simple. The base of the first segment of inferior appendage broad and narrowed to apex. The second segment rectangular, and as long as the first one. Phallus complicated: aedeagus long, tapering from the base to apex, in lateral view its middle part slightly curved. The ventral lobe of aedeagus consists of a membranous lamella and a pair of long processes. The lamella in dorsal view with its distal half broadened and an excision at the posterior margin. Parameres long, tapering to apex; in dorsal view their distal ends curved and pointing towards each other.

This species belongs to the *R. annulicornis* group, although it is not very similar to any other species. It differs from the other members of the group in: (1) Segment 10 with a deep excision at the distal margin in dorsal view. (2) The ventral lobe of aedeagus consisted of a membranous lamella and a pair of longer processes.

E t y m o l o g y: This new species is named after the collection site in Shaanxi province.

H o l o t y p e: 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Banqiao Brook, 1600 m elev., 5-VI-1998, sweeping, collected by John C. MORSE, YANG Lianfang and SUN Changhai, NAU. **P a r a t y p e s**: 1♂, same place and collection date, sweeping, collected by DU Yuzhou; 1♂, Shaanxi province, Qinling (34.2N, 106.8E), National Forest Park of Tiantaishan, Jialingjiang river, 1700 m elev., 9-VI-1998, light trap, collected by SUN Changhai, NAU.

***Rhyacophila auricula* n.sp.**

Length of forewing: 11 mm. Body brown. Head brown; antennae yellow and each segment with a brown ring; palpi yellow. Thorax brown; wings brown; coxae and femora yellow, other parts dark brown. Abdomen yellow. Male genitalia (Pl. 3): The anterior margin of segment IX straight, and the upper half of posterior margin oblique and the lower half excised anteriorly deeply in lateral view. The horizontal part of segment X in dorsal view with its lateral margins parallel to each other and with an excision at the posterior margin; the vertical part in lateral view somewhat auricle-shaped, in ventral view the upper part bell-like, its middle part slender and its lower part bulgy. The first segment of inferior appendage with its upper and lower margins parallel to each other. The second segment slightly shorter than the first one, and its posteroventral angle prolonged posteriorly. Aedeagus slender and tube-like, ventral lobe of aedeagus very long, in dorsal view its distal half parted into a pair of lobes. Paramere club-like.

The species belongs to the *R. annulicornis* group and is near to *R. truncata* KIMMINS 1953, *R. chandzo* SCHMID 1970 and *R. kunma* SCHMID 1970, but differs in the posteroventral edge of the second segment of inferior appendage which is prolonged posteriorly, other than its distal margin truncate as in the others. *R. naga* SCHMID 1970 is very similar, with similar inferior appendages, but the ventral part of segment 10 is shorter, and its phallus is slightly bulbous in the middle.

E t y m o l o g y : Latin word "auricula" means "external ear", in reference to the vertical part of segment X, which is auricle-shaped in lateral view.

H o l o t y p e : 1♂, Yunnan province, Dali county (25.9N, 99.8E), Mt. Diancangshan, Qingbi brook, 2520 m elev., 23-V-1998, light trap, collected by WANG Beixin, NAU. **P a r a t y p e s :** 10♂♂, same collection data as Holotype; 9♂♂, same place, 2350 m elev., 23-V-1996, light trap, collected by GUI Furong and DU Yuzhou; 1♂, Yunnan province, Lijiang county (27.0N, 100.1E), Mt. Yulongxueshan, Baishui bridge, 2880m, 29-V-1996, light trap, collected by YANG Lianfang, John C. MORSE and WANG Beixin, NAU.

***Rhyacophila brachyblasta* n.sp.**

Length of forewing: 11 mm. Body black. Head black; antennae and palpi dark brown. Dorsum of thorax black, other parts dark brown; legs and wings dark brown. Abdomen yellow. Male genitalia (Pl. 3): in lateral view the anterior margin of segment IX straight, the posterior margin concave anteriorly at the place where inferior appendage is articulated. The horizontal part of segment X in dorsal view deeply concave at the distal margin; vertical part in lateral view slender, at the base with a short tooth pointed posteriorly. Anal sclerite long, triangular in lateral view. The first segment of inferior appendage short, half as wide as the height of segment IX. The second segment slightly narrower than the first one. Its distal half parted into two lobes: the upper one small and short, the lower one large, and its apex rounded. Aedeagus in lateral view short. The ventral lobe of aedeagus large, its basal half slender and distal half bulgy. Paramere tapering from base to apex, and slightly curved.

The species belongs to the *R. annulicornis* group and differs from the other members of the group in: (1) The horizontal part of segment X in dorsal view short and concave at the posterior margin. (2) The second segment of inferior appendage parted into two lobes: the upper one small and the lower one large. (3) Aedeagus short, its ventral lobe bulgy at the distal half.

E t y m o l o g y : Greek word "brachyblastus" means "of short branch", in reference to the short aedeagus.

H o l o t y p e : 1♂, Yunnan province, Lijiang county (27.0N, 100.1E), Mt. Yulongxueshan, Baishui bridge, 2880m, 29-V-1996, light trap, collected by YANG Lianfang, John C. MORSE and WANG Beixin, NAU.

***Rhyacophila sibirica* group**

***Rhyacophila furva* n. sp.**

Length of forewing: 7 mm. Body blackish brown. Head black, the basal segments of antennae blackish brown, others brown; palpi yellow. Dorsum of thorax dark brown and other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 4): the upper half of segment IX broader than the lower portion in lateral view. Segment X long, as long as the whole inferior appendage; in dorsal view its base narrow and broadened gradually to apex, the posterior margin with an excision. Apical band in lateral view reniform. The first segment of inferior appendage rectangular, the second segment trapezoid. The base of dorsal process of phallus broad and the distal end narrow and rounded, with a small wart. Aedeagus tube-like, in lateral view slightly curved upwards. The basal half of ventral lobe of aedeagus membranous, distal half spoon-like in lateral view.

The species belongs to the *R. sibirica* group, similar to *R. tonneri* MEY 1989 from Korea, *R. arefini* LUKYANCHENKO 1993 and *R. narvae* NAVÁS 1926 from Russia, but differs in: (1) Segment X in lateral view broader, with a deeper excision at the posterior margin. (2) The phallobase without a finger-like process, but in the latter three species the phallobase with a finger-like process in lateral view.

E t y m o l o g y : Latin word "furvus" means "of a dark or dusky color", in reference to the body colour of the species.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Huodi brook, 1650m elev., 5-VI-1998, sweeping, collected by DU Yuzhou, NAU.

***Rhyacophila nigrocephala* group**

***Rhacophila vascula* n.sp.**

Length of forewing: 6.5 mm. Body blackish brown. Head dark brown; antennae and palpi brown. Dorsum of thorax black and other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 4): the anterior margin of segment IX produced into an arc anteriorly, and the posterior margin straight. Dorsal plate in lateral view broad, vase-like in dorsal view, and its posterior margin excised. Anal sclerite slender, in dorsal view its base broader, and the apex truncate. The first segment of inferior appendage short, its base narrower; in ventral view each inner side produced into a hook-like process. The base of second segment broad and gradually narrowed to distal end. The two lateral margins of aedeagus parallel to each other and its distal portion narrowed suddenly.

This new species belongs to the *R. nigrocephala* group and is similar to *R. putata* KIMMINS 1953 from India, *R. amblyodonta* SUN & YANG 1999 and *R. anakungai*

MALICKY 1995 from China but differs in: (1) The distal portion of dorsal plate broad in lateral view, other than obviously narrow as in these. (2) Anal sclerite extends over the distal end of dorsal plate, but in the others it is relatively shorter. (3) The second segment of inferior appendage longer than its height, but in the others it is shorter than its height.

E t y m o l o g y : Latin word "vasculum" means "vase", in reference to the dorsal plate, which is vase-like in dorsal view.

H o l o t y p e : 1♂, Shaanxi province, Liuba county (33.4N, 106.8E), Miaotaizi, 1400 m elev., 8-VI-1998, sweeping, collected by DU Yuzhou and SUN Changhai, NAU. **P a r a t y p e :** 1♂, same place, Baohe river, 1400 m elev., 7-VI-1998, light trap, collected by YANG Lianfang and John C. Morse, NAU.

***Rhyacophila unisegmentalis* n.sp.**

Length of forewing: 8.5 mm. Body blackish brown. Head blackish brown; antennae brown; palpi yellow. Dorsum of thorax blackish brown, and other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 4): in lateral view the upper portion of segment IX narrower than its lower part, and the posterior margin sinuate. In lateral view the upper margin of dorsal plate straight and the lower margin also sinuate, its distal end truncate and slightly oblique; in dorsal view its base broad and tapering from base to apex. Anal sclerite curved slightly in lateral view, in dorsal view its base narrow and each side near apex extended laterally into a tooth. Inferior appendage with only one segment, very long, its base broad and narrowed gradually to apex. The basal 2/3 of aedeagus broader than its distal 1/3. The species belongs to the *R. nigrocephala* group and differs from other members of the group by the one-segmented inferior appendage.

E t y m o l o g y : Latin word "unisegmentalis" means "having one segment", in reference to the inferior appendage.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3 N, 108.3 E), Huoditang forest farm, Banqiao brook, 1600 m elev., 5-VI-1998, sweeping, collected by John C. MORSE, YANG Lianfang and SUN Changhai.

***Rhyacophila forcipata* n.sp.**

Length of forewing: 8.0 mm. Body blackish brown. Head black, antennae and palpi dark brown. Dorsum of thorax black and other parts dark brown; all coxae dark brown, and other parts yellow; wings brown. Abdomen brown. Male genitalia (Pl. 4): the upper 1/3 of segment IX in lateral view slightly narrower than the lower 2/3. The basal half of dorsal plate broad, and distal half slender in lateral view; in dorsal view its two lateral margins parallel to each other with a deep excision at the posterior margin, the depth of the excision half as long as the dorsal plate. Anal sclerite slender in lateral view and also with a deeper excision at apex when viewed dorsally. The two margins of tergal band parallel to each other in dorsal view and its apex rounded. The base of the first segment of inferior appendage narrow in lateral view, but in ventral view its inner side produced into a hook-like process. The second segment short, distal margin concave in lateral view, and triangular in ventral view. The basal half of aedeagus broader than its distal half.

This species belongs to the *R. nigrocephala* group and differs from the other members of the group in: (1) In lateral view anal sclerite slender and extended over the distal end of

dorsal plate. (2) Dorsal plate with a deep excision at the distal margin, its depth is 2/3 times as deep as the whole plate. (3) Anal sclerite also with a excision at the distal margin. (4) The basal half of aedeagus broad and the distal half narrow.

E t y m o l o g y : Latin word "forcipatus" means "shaped like or resembling forceps", in reference to the dorsal plate and anal sclerite, which look like forceps in lateral view.

H o l o t y p e : 1♂, Shaanxi province, Liuba county (33.4 N, 106.8 E), Miaotaizi, 1400 m elev., 8-VI-1998, sweeping, collected by DU Yuzhou and SUN Changhai, NAU. **P a r a t y p e s :** 7♂♂, same collection data as Holotype; 7♂♂, Shaanxi province, Zhouzhi county (34.1N, 108.2E), Houzhenzi, 1250 m elev., 2-VI-1998, sweeping, collected by SUN Changhai and DU Yuzhou; 2♂♂, Shaanxi province, Qinling (34.2N, 106.8E), National forest park of Tiantaishan, Jialingjiang river, 1700 m elev., 9-VI-1998, light trap, collected by SUN Changhai; 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Banqiao brook, 1600 m elev., 5-VI-1998, sweep, collected by John C. MORSE, YANG Lianfang and SUN Changhai; all NAU.

Rhyacophila pentagona n.sp.

Length of forewing: 7.5 mm. Body blackish brown; antennae dark brown; palpi brown. Dorsum of thorax blackish brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 5): the upper portion of segment IX is slightly narrower than its lower portion in lateral view. The base of dorsal plate broad, and narrowed to distal end when viewed laterally; in dorsal view its two lateral margins parallel to each other, and its distal end rounded. Anal sclerite club-like in lateral view, and rectangular in dorsal view. The first segment of inferior appendage pentagonal in lateral view; in ventral view its inner side produced into a hook-like process. The second segment short, somewhat trapezoid in lateral view, and triangular in ventral view. Aedeagus long, its lateral margins parallel to each other, and the distal portion suddenly narrowed.

The species belongs to the *R. nigrocephala* group and is similar to *R. celata* SUN & YANG 1999 from Guizhou, but differs in: (1) Anal sclerite larger and longer relatively than that of the latter. (2) The first segment of inferior appendage short and pentagonal, other than trapezoid as in *R. celata*. (3) Aedeagus straight, other than its the distal portion curved downwards as in the latter.

E t y m o l o g y : Greek word "pentagonum" means "a polygon having five sides and five interior angles", in reference to the pentagonal first segment of inferior appendage.

H o l o t y p e : 1♂, Yunnan province, Dali county (25.9N, 99.8E), Mt. Diancangshan, Qingbi brook, 2200-2500 m elev., 23-V-1998, sweeping, collected by WANG Beixin and DU Yuzhou, NAU.

Rhyacophila hadestril n.sp.

Dark brown, veins of the wings contrasting and darker than the membrane, with a light spot in the middle of the forewing. Forewing length ♂ 5,5-6 mm. Male genitalia (Pl. 5): segment 9 with parallel anterior and posterior edges. Segment 10 forms a long saddle with paired black distal cross ledges. The anal sclerite forms the bottom of a pocket at the ventral side of the segment. Inferior appendages short, with the second segment distally enlarged and truncate. The phallic apparatus consist of a single large, cross-like sclerite; parameres are lacking. – *R. hadestril* n.sp. is a member of the *R. nigrocephala* group and is similar to and close to *R. mayestril* MALICKY 1991 from Thailand and *R. vernestril* MEY 1996 from Vietnam, but in both these segment 10 is much longer and more slender.

H o l o t y p e ♂: Zhejiang, Mt. Longwangshan, 700-1000m, 30°28'N, 119°22'E, 4-VI-1989, leg. Kyselak, CM. – **P a r a t y p e s**: 5♂♂, 1♀: Zhejiang, Tienmu Mt., 460m, 30°18'N, 119°26'E, 30-V-1989, leg. Kyselak, CM.

***Rhyacophila gyamo* group**

***Rhyacophila ligulula* n.sp.**

Length of forewing: 8 mm. Body brown. Head dark brown; antennae and palpi brown. Dorsum of thorax dark brown and other parts brown; wings and legs brown. Abdomen brown. Male genitalia (Pl. 5): the anterior and posterior margins of segment IX straight in lateral view; the dorsal lobe uncinately when viewed laterally; but in dorsal view its base broader, and the distal margin excised. Anal sclerite rectangular in lateral view, and produced into two curved lobes when viewed caudally. The base of the first segment of inferior appendage broader, and narrowed to the distal end. The second segment small, only 1/4 times as long as the first segment, and somewhat linguiform in lateral view. The dorsal process of phallus large, in dorsal view its two lateral margins parallel to each other and the distal margin deeply concave. The distal portion of aedeagus in lateral view divided into two lobes. The distal end of paramere bulgy. The ventral lobe of aedeagus curved slightly upwards and its distal end pointed.

This species belongs to the *R. gyamo* group, and is near to *R. manicata* KIMMINS 1953 from Burma, but differs in: (1) Anal sclerite rectangular in lateral view, and with a shallow excision at the distal margin. (2) The second segment of inferior appendage small and simple, and not divided into two lobes.

E t y m o l o g y: Latin word root "ligul-" means "small tongue", and the suffix "-ula" means small, in reference to the small second segment of inferior appendage.

H o l o t y p e: 1♂, Sichuan province, 5 km south of Luding city (29.9 N, 102.2 E), Mozi brook, 1350 m elev., 7-VI-1996, light trap, collected by YANG Lianfang and WANG Xinhua, NAU.

***Rhyacophila divaricata* group**

***Rhyacophila tianmushanensis* n.sp.**

Length of forewing: 7.5 mm. Body blackish brown. Head blackish brown; antennae and palpi brown. Dorsum of thorax black, other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 6): The upper portion of segment IX narrower, dorsal lobe with an excision at the distal margin in dorsal view. Segment X small, elliptical in lateral view. Anal sclerite and preanal appendage fused together. The first segment of inferior appendage in lateral view rectangular, but its posterodorsal angle produced into a process pointed caudally. The second segment divided into two lobes: the upper one slender and curved downwards, and the lower one broader. The dorsal process of phallus pointed in lateral view, ventral lobe short. Aedeagus tube-like. The base of paramere slightly broader and narrowed to the distal end.

This species of the *R. divaricata* group is strikingly similar to *R. longicuspis* SUN 1995 from Zhejiang, but differs in: (1) parameres broader, with a cluster of hairs, but in *R. longicuspis* they are slender, and their distal ends pointed. (2) The first joint of inferior

appendage broader and shorter. (3) Distal margin of dorsal lobe of segment IX with an excision, other than without such an excision as in the latter.

E t y m o l o g y : This species is named after its collection site, Mt. Tianmushan.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan (30.4 N, 119.5 E), Sanli pavilion, 640 m elev., 17-XI-1998, Malaise trap, collected by CHENG Xiaoyuan, NAU.

***Rhyacophila khimbarpa* group**

***Rhyacophila bucina* n.sp.**

Length of forewing: 6.5 mm. Body brown. Head dark brown, antennae and maxillary palpi brown; labial palpi yellow. Dorsum of thorax dark brown, other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 6): the lower portion of segment IX slightly narrower in lateral view. In dorsal view the base of dorsal lobe broad and the distal 1/3 narrower, its apex rounded. Preanal appendage in lateral view somewhat long elliptical. The base of anal sclerite narrower, broadened gradually to distal end, its apex truncate; in dorsal view the two sclerites fused each other into a big plate. The first segment of inferior appendage rectangular in lateral view. The second segment small, its upper margin oblique. The base of phallobase narrower. Aedeagus slender and tube-like. Paramere long and curved slightly upwards.

This species belongs to the *R. khimbarpa* group and is closely related to *R. anaktionkok* MALICKY 1995 from Sichuan province, China, but differs in: (1) In lateral view anal sclerite does not reach to the distal end of the first segment of inferior appendage and its posterior margin somewhat truncate. (2) In dorsal view the two anal sclerites integrated into a whole plate.

E t y m o l o g y : Latin word "bucina" means "having the shape of trumpet", in reference to the anal sclerite, which is trumpet-shaped in lateral view.

H o l o t y p e : 1♂, Shaanxi province, Ningshan county (33.3N, 108.3E), Huoditang forest farm, Huodi brook, 1650 m elev., 5-VI-1998, sweeping, collected by DU Yuzhou, NAU.
P a r a t y p e s : 3♂♂, same collection data as Holotype; 7♂♂, same place, Banqiao brook, 1600 m elev., 5-VI-1998, sweeping, collected by John C. MORSE, SUN Changhai and YANG Lianfang; 1♂, Shaanxi province, Zhouzhi county (34.1N, 108.2E), Houzhenzi, 1250 m elev., 2-VI-1998, sweeping, collected by SUN Changhai and DU Yuzhou, all NAU.

***Rhyacophila sichuanensis* n.sp.**

Length of forewing: 7.5 mm. Body brown. Head dark brown, antennae and palpi brown. Dorsum of thorax dark brown, other parts brown; legs and wings brown. Abdomen yellow. Male genitalia (Pl. 5): the lower portion of segment IX in lateral view narrowed; in dorsal view dorsal lobe triangular. Preanal appendage in lateral view with the shape of a parallelogram. In lateral view the base of anal sclerite very narrow, and its apex broadened, posteroventral angle prolonged posteriorly; in dorsal view the two sclerites fused into a big plate. The first segment of inferior appendage very long. The second segment short, somewhat trapezoid. Phallobase somewhat bell-like. Aedeagus tube-like. Paramere longer than aedeagus, tapering from base to apex.

This species of the *R. khimbarpa* group is similar to *R. rhombica* MARTYNOV 1935 and

R. paurava SCHMID 1959, but differs in: (1) The anal sclerite is basally narrow and its apex broad, posteroventral angle projecting posteriorly; in *R. rhombica* and *R. paurava* it is narrower and parallel-edged. (2) The first segment of inferior appendage very long. In *R. rhombicus*, the second segment of the inferior appendages is narrower in lateral view and has a straight dorsal edge.

E t y m o l o g y : The species is named after its collection site in Sichuan province.

H o l o t y p e : 1♂, Sichuan province, Yingjing county (29.8N, 102.8E), Mt. Nibashan, 2250 m elev., 17-VI-1996, sweeping, collected by YANG Lianfang and WANG Beixin, NAU.

P a r a t y p e s : 2♂♂, same collection data as Holotype.

***Rhyacophila lieftincki* group**

***Rhyacophila fanjingshanensis* n.sp.**

Length of forewing: 12 mm. Body blackish brown. Head blackish brown; antennae yellow; palpi brown. Dorsum of thorax blackish brown and other parts brown; legs yellow and wings dark brown. Abdomen yellow. Male genitalia (Pl. 7): the lower half of segment IX narrowed; the base of dorsal lobe in dorsal view broad, and narrowed to apex. Segment X in lateral view long, apex slightly bulgy. Anal sclerite small and apical band long in lateral view. The first segment of inferior appendage broad, and the two margins of its distal half parallel to each other. The base of second segment broad, its upper margin curved inwards, and its posteroventral angle prolong posteriorly. Aedeagus long, in dorsal view its basal 3/4 broad, distal 1/4 suddenly narrowed. Paramere long, with short hairs at the distal end.

The species is a member of the *R. lieftincki* group and closely similar to *R. crispa* SUN & YANG 1998 from Yunnan province and *R. claviforma* SUN & YANG 1998 but differs in: (1) The apex of dorsal lobe of segment IX pointed, other than truncate as in *R. crispa*. (2) The dorsal edge of the second segment of inferior appendage oblique, other than with an obvious excision as in *R. crispa*. In the similar *R. claviforma*, segment 9 is continuously tapered to its ventral edge.

E t y m o l o g y : The species is named after its collection site, Mt. Fanjingshan, Guizhou province.

H o l o t y p e : 1♂, Guizhou province, Mt. Fanjingshan (27.9N, 108.6E), Yu-ao, 900 m elev., 4-VI-1995, collected by SUN Changhai and WANG Beixin, NAU. **P a r a t y p e s :** 4♂♂, same collection data as Holotype.

***Rhyacophila naviculata* group**

***Rhyacophila boleta* n.sp.**

Length of forewing: 7-8 mm. Body yellow, but tibiae and tarsi brown; wings yellow with dark brown spots. Male genitalia (Pl. 7): the upper portion of segment IX broader than its lower portion; in dorsal view dorsal lobe consisted of 3 processes: the middle one shorter than the two lateral processes, its basal half slender and the distal half extended laterally; the two lateral processes slender, their distal ends curved and pointed to each other. Segment X vertical, short, and in caudal view "Λ"-shaped. The first segment of inferior

appendage very long, somewhat trapezoid in lateral view, the posteroventral angle of the second segment produced posteriorly into a long process. Aedeagus tube-like, paramere tapering from base to apex.

The species belongs to the *R. naviculata* group and differs from the other members by the unique dorsal lobe of segment IX.

E t y m o l o g y : Latin word "boletus" means "mushroom", in reference to the middle part of dorsal lobe of segment IX.

H o l o t y p e : 1♂, Zhejiang province, Anjie, Mt. Longwangshan (30.3N, 119.4E), south of the aqueduct, near wood bridge, 600 m elev., 18-X-1995, collected by WANG Beixin, NAU.
P a r a t y p e s : 2♂♂, same collection data as Holotype.

R h y a c o p h i l a incertae sedis

Rhyacophila ramulina n.sp.

Length of forewing: 7 mm. Body dark brown. Head dark brown; antennae yellow, palpi brown. Dorsum of thorax dark brown, other parts brown; legs and wings yellow. Abdomen yellow. Male genitalia (Pl. 6): segment IX narrowed in the middle in lateral view. Segment X oblique in lateral view and in dorsal view its base broad and divided into two lobes at the apex. Anal sclerite in lateral view triangular, in caudal view its lower margin concave. The first segment of inferior appendage pentagonal in lateral view; the second segment longer than the first one and the distal half only half as wide as its base. Dorsal process of phallus large, in lateral view its upper margin with a tooth in the middle; in dorsal view its two lateral margins sinuate, concave at the posterior margin. Aedeagus in lateral view parted into two lobes. Paramere slender.

The species is unique in the genus. There is no obvious relationship to any group of the genus.

E t y m o l o g y : Latin word "ramulinus" means "of small branch", in reference to the small paramere.

H o l o t y p e : 1♂, Zhejiang province, Mt. Tianmushan (30.4N, 106.8E), Chanyuan temple, 380m elev., 9-V-1998, sweeping, collected by YU Zhiyong, NAU.

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Zusammenfassung

Folgende neue Arten aus China werden beschrieben und abgebildet: *Himalopsyche sichuanensis*, *Rhyacophila auricula*, *R. boleta*, *R. brachyblasta*, *R. bucina*, *R. complanatula*, *R. euphorbos*, *R. eurystheus*, *R. euterpe*, *R. fanjingshanensis*, *R. fides*, *R. flora*, *R. forcipata*, *R. furva*, *R. hadestril*, *R. ligulula*, *R. morsei*, *R. pentagona*, *R. pusilla*, *R. ramulina*, *R. shaanxiensis*, *R. sichuanensis*, *R. tianmushanensis*, *R. unisegmentalis*, *R. vascula*

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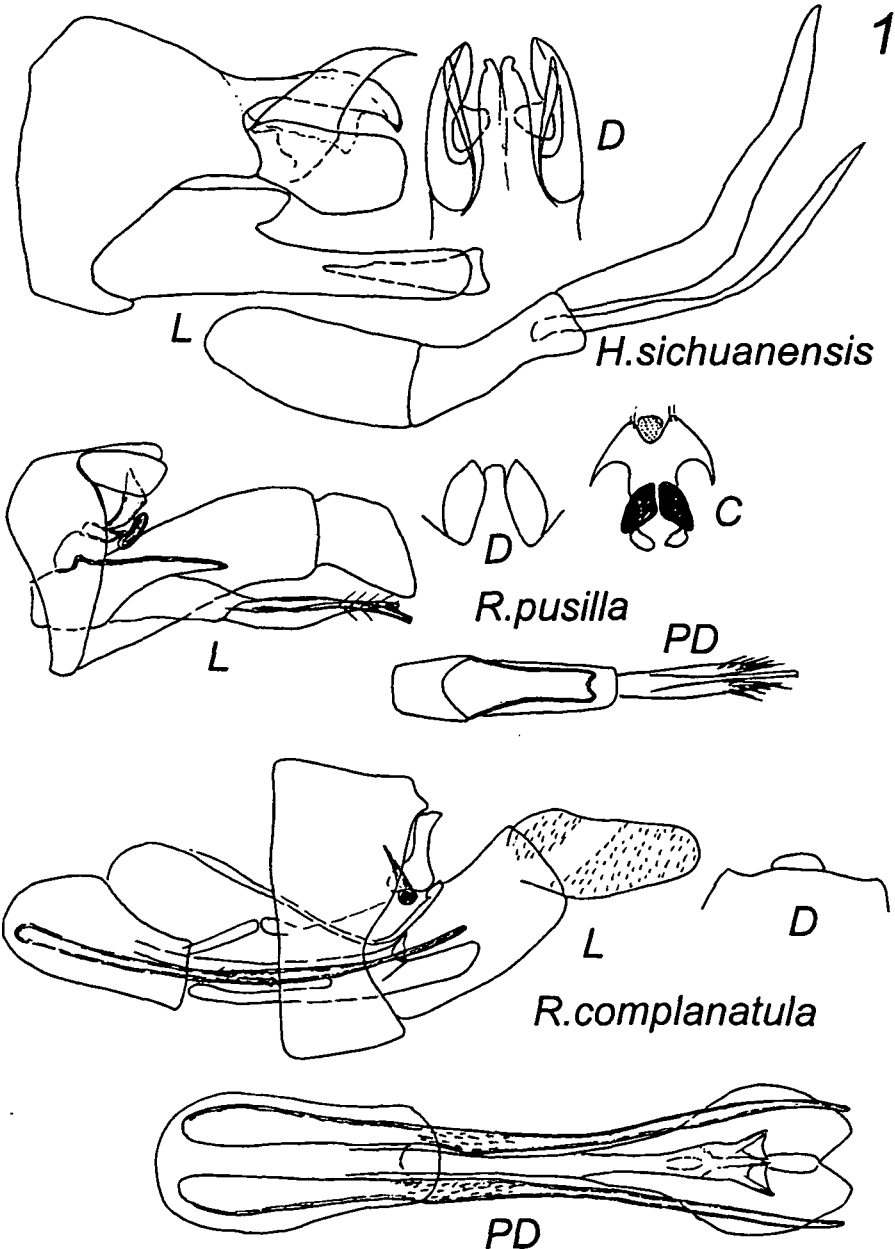


Plate 1: Male genitalia of *Himalopsyche* and *Rhyacophila* species. L .. lateral, D .. dorsal, C .. segment 10 caudal, PD .. phallus dorsal.

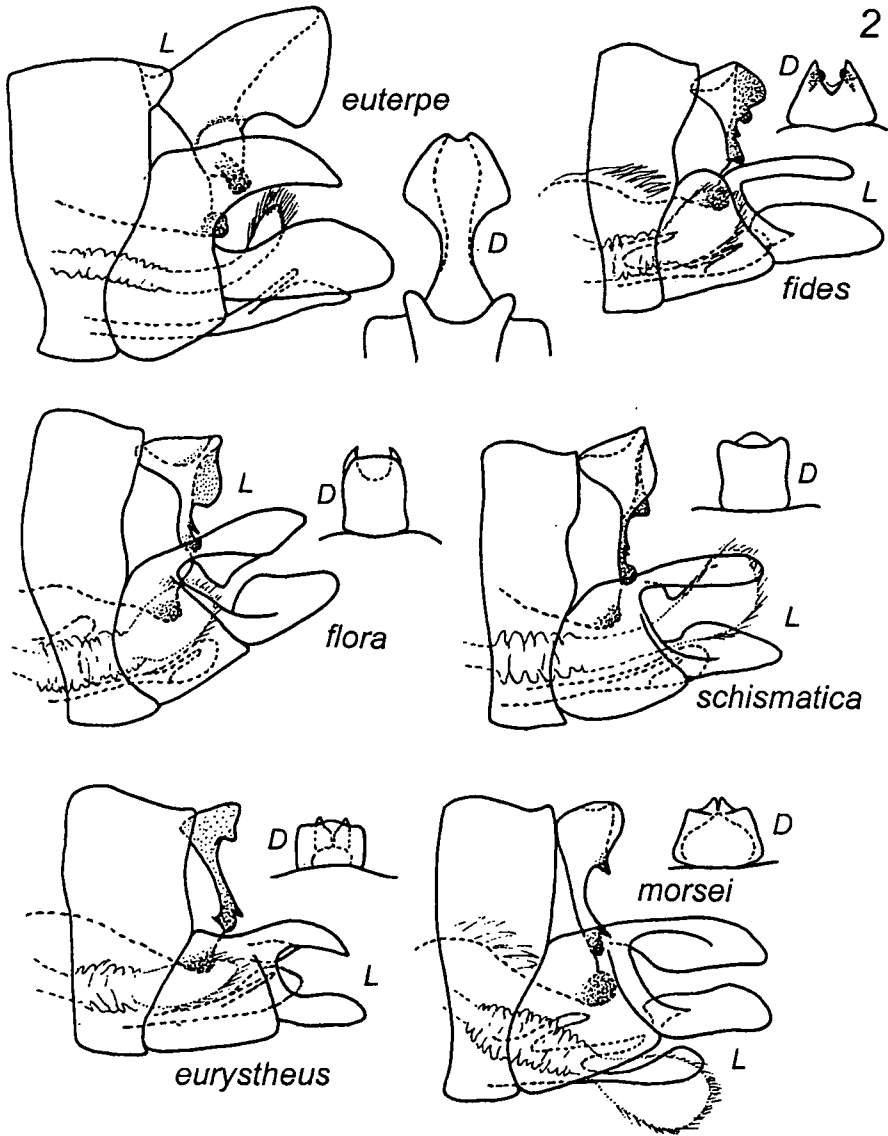


Plate 2: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal.

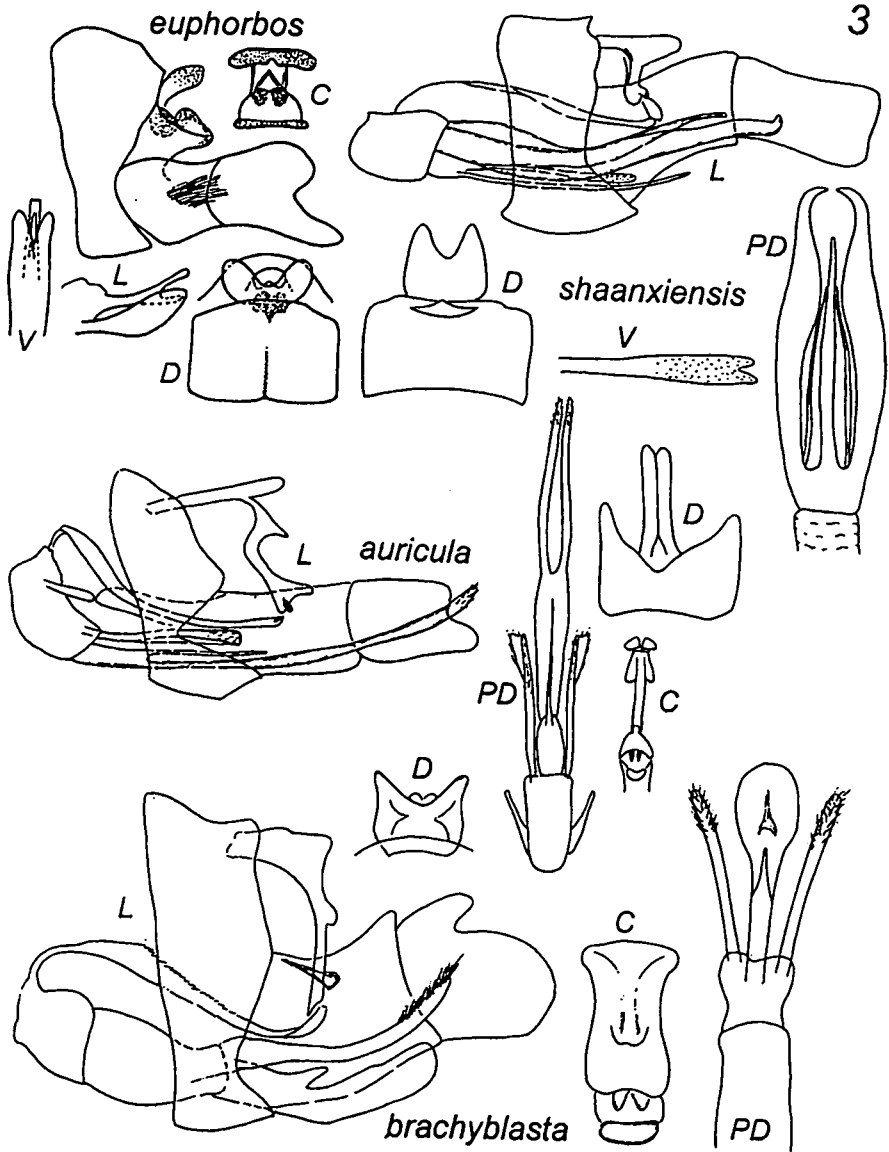


Plate 3: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal, C .. segment 10 caudal, PD .. phallus dorsal.

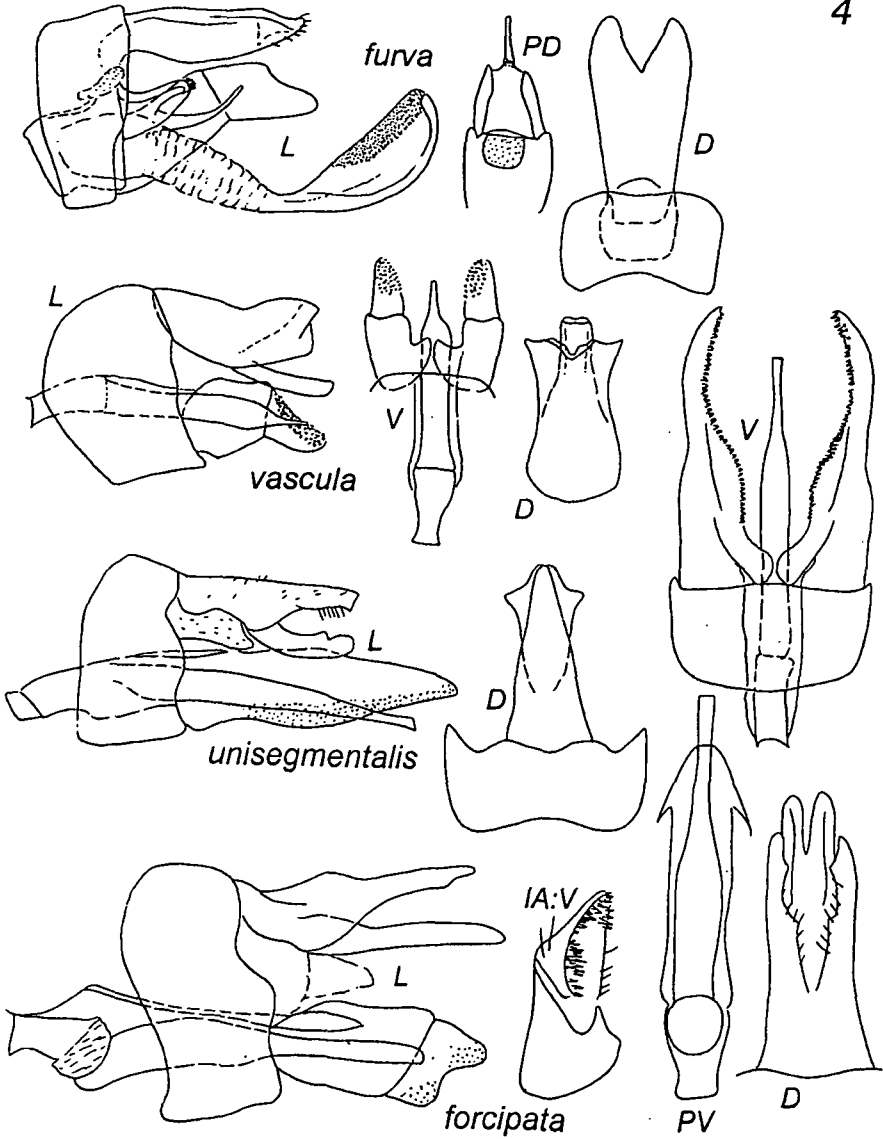


Plate 4: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal, PD .. phallus dorsal, PV .. phallus ventral, V .. ventral, IA:V .. inferior appendage ventral.

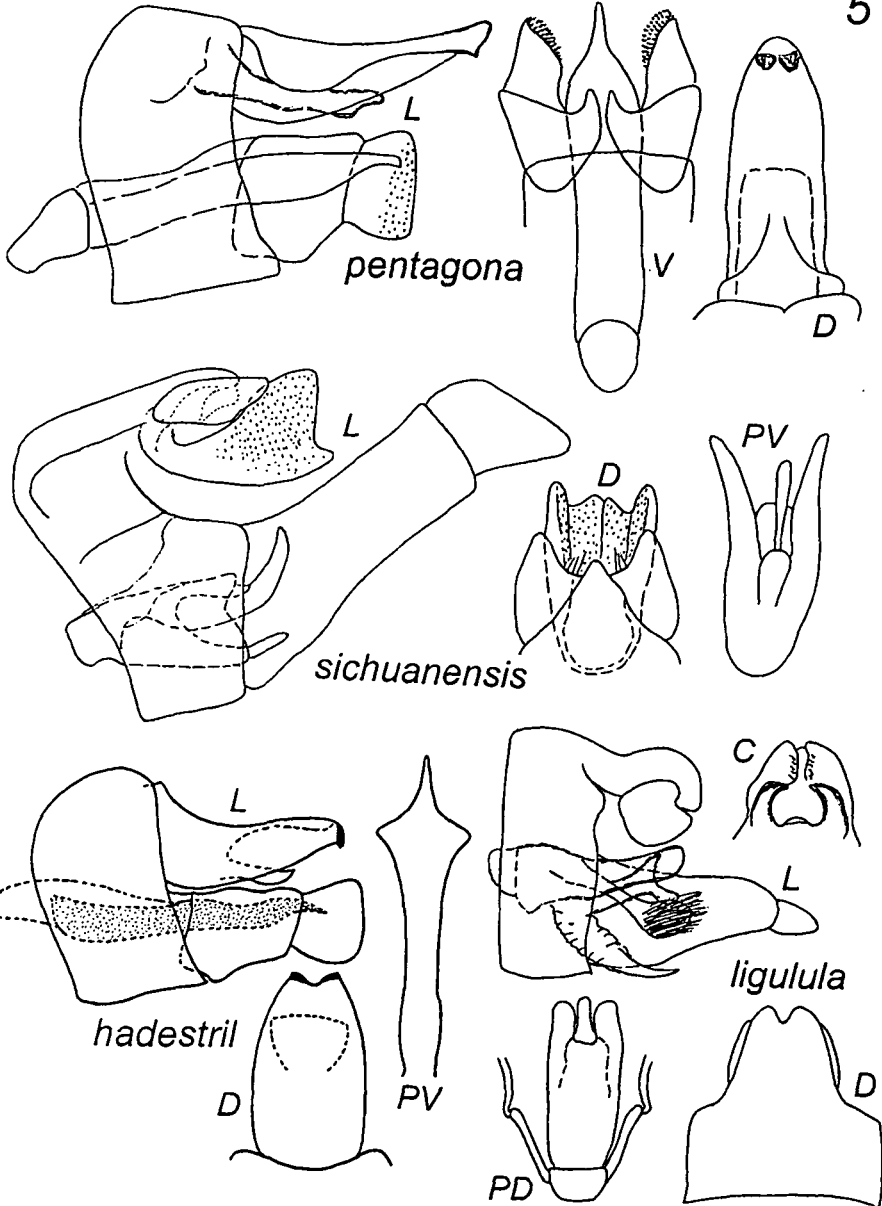


Plate 5: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal, C .. segment 10 caudal, PD .. phallus dorsal, PV .. phallus ventral, V .. ventral.

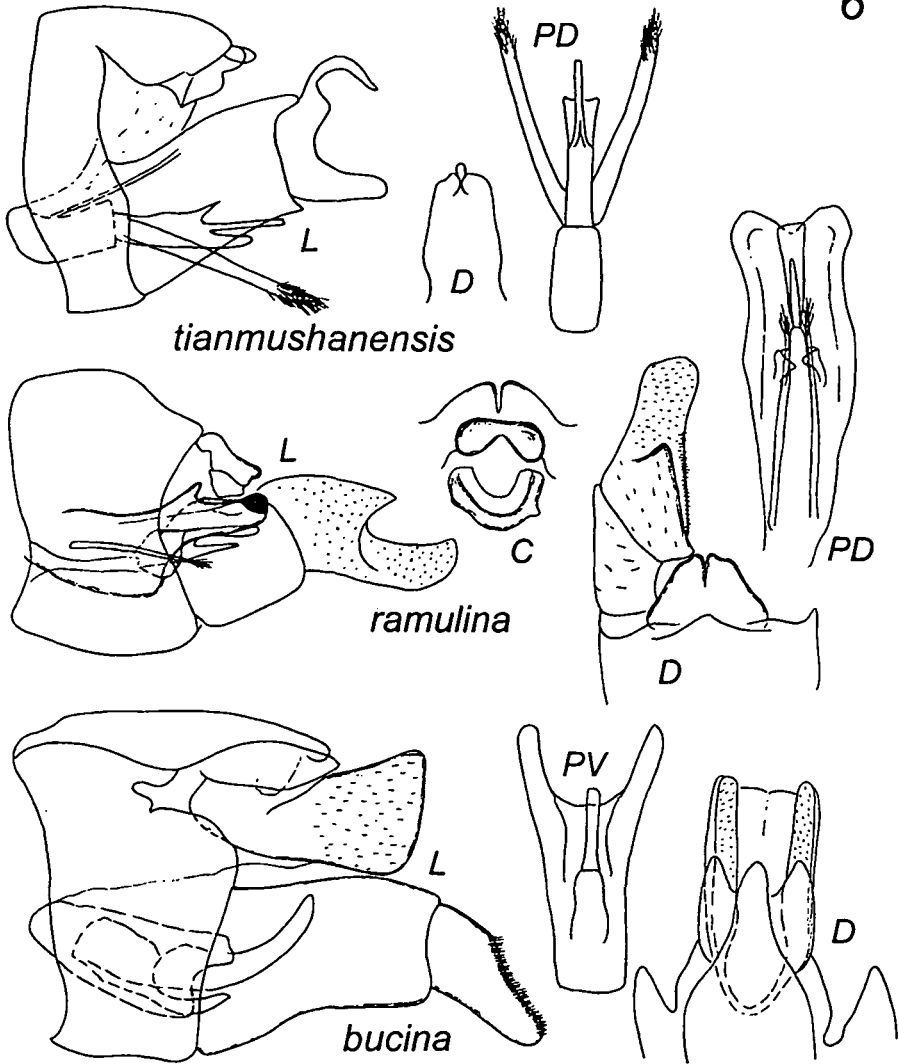


Plate 6: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal, C .. segment 10 caudal, PD .. phallus dorsal, PV .. phallus ventral.

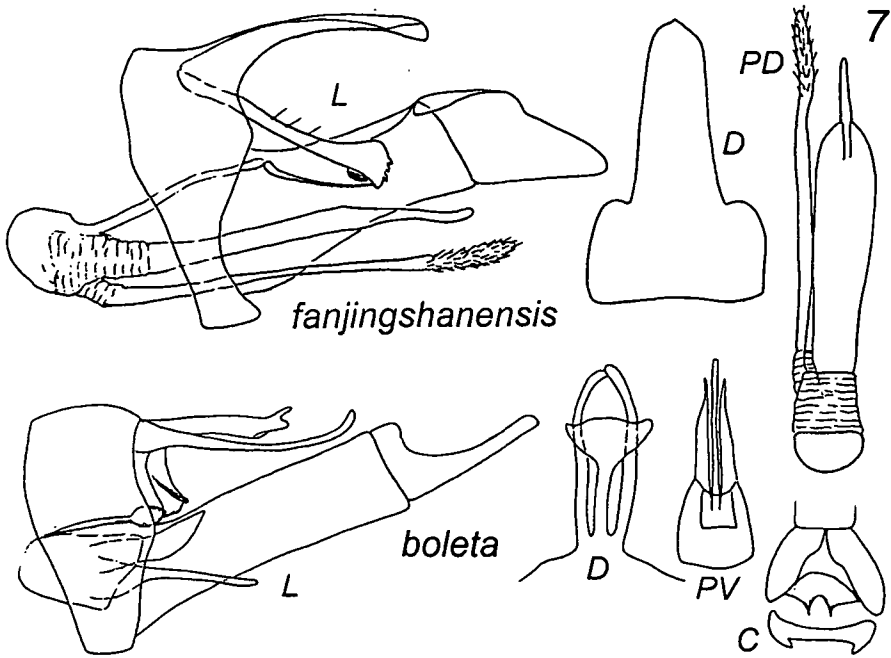


Plate 7: Male genitalia of *Rhyacophila* species. L .. lateral, D .. dorsal, C .. segment 10 caudal, PD .. phallus dorsal, PV .. phallus ventral.

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