Studies on the genus Rhyacophila (Trichoptera) in China (I)

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A review of the genus Rhyacophila in China was carried out in the last three years. The known Chinese Rhyacophila comprise 95 species; 63 have been recorded previously, and 6 are new to science. Some typ specimen studies of new species are in a separate paper. The new species are all new to China.

Rhyacophila wuyiensis sp. n. (fig. 1)

Male body length 7.5 mm, forewing length 8.5 mm. Body brown; basal segments of the antennae pale, others brown; thorax brown above and yellowish laterally; legs yellowish. Male genitalia: Segment 9 rectangular in lateral view, without apicolateral lobe. Vertical part of segment 9 with a long acute process on each lateral margin and with a small distal lobe bilobed. Apical sclerites paired, rounded and separated from each other. Apical band with two short arms. Phallic dorsal process blunt; vertical lobe of aedeagus broad, divided into a pair of acute lateral processes and a global median apex. Parameres clavate in lateral view, about 2.5 times as long as wide in dorsal view. First segment of inferior appendages rectangular and second segment composed of two identical lobes.

Holotype: 1♂, loc. 5. Paratypes: 56♂, same data as holotype.

trapezoid, second composed of two lobes, the upper lobe with a triangular process on the base of the lower margin. - Holotype: 1♀, loc.19. Paratype: 1♂, loc.18. Types all found in SE China. - Diagnosis: This species is similar to *R*. *scissoides*, from which it is distinguished by (1) anal sclerites close to each other and (2) upper lobe of the second segment of inferior appendage with a basoventral triangular process.

Rhyacophila quadrifida sp.n. (fig.3)

Male body length 8 mm, forewing length 10 mm. Body brown; head and thorax blackish brown; antennae with basal 2/3 blackish brown and distal 1/3 pale, palpi yellowish; legs yellowish; abdomen black above and yellowish beneath. Male genitalia: Posterior margins of segment 9 excised in ventral two-third portion. Horizontal part of segment 10 tridentate posteriorly with middle process much shorter than two lateral ones. Phallobase semi-spherical, aedeagus curved down in distal half, with a membranous dorsal lobe at the base. Apical half of ventral lobe deeply excised, distal part of parameres triangular in lateral view, with long bristles. Second segment of inferior appendages a broad lobe, slightly excised at dorso-distal end. - Holotype: 1♂, loc.20. Paratypes: 1♂, same data as holotype; 1♀, loc.29. Types located in NW and SE China. - Diagnosis: This species obviously belongs to the *obscura* group (Schmid 1970), and is somewhat similar to *R*. *bidens* Kimmins but is distinguished from the latter by: (1) segment 10 tridentate when viewed dorsally, (2) distal half of aedeagus curved downward other than straight as in the latter.

Rhyacophila dactyloidis sp.n. (fig.4)

Male body length 8,5 mm, forewing length 10 mm. Body brown; antennae yellowish bifid at tips, forewing brown. Male genitalia: Posterior margins of segment 9 excised in ventral half, its sternum twice as long as dorsum. Vertical part of segment 10 excised distally in dorsal view and concave on the outer margins when viewed laterally. Anal sclerites in reverse "U" shape in ventral view. Apical band similar to *R*. *naga*. Tergal strap strongly sclerotized, abruptly curved downward at base. Phallobase short, sub-cylindrical; aedeagus very thin; ventral lobe about 3 times as long as aedeagus with each apex enlarged, slightly dentate along its inner margins; paramere club-like, one-half as long as ventral lobe of aedeagus, its distal half densely covered with fine short hairs. Second segment of inferior appendages twice as long as the first one, with finger-like processes at the upper margin of distal end. - Holotype: 1♂, loc.22. Type found in SW China. - Diagnosis: This species belongs to the *annulicornis* group (*philopotamoides* branch), but it is distinguished from the other members of this group by (1) second segment of inferior appendages twice as long as first than equal to or shorter than the first, and (2) anal sclerites in reverse "U" shape.

Rhyacophila hippocrepica sp.n. (fig.5)

Male body length 6,5 mm, forewing length 7,0 mm. Body brown; antennae yellowish at the base then gradually darkened toward the end to blackish brown; first three segments of maxillary palpi yellowish, rest part blackish brown; thorax and legs brown; forewing scattered with darkened spots; abdomen black above and yellowish beneath. Male genitalia: Segment 9 rectangular with anterior
margins excised in lower one-third portion in lateral view. Pre-anal appendages compressed. Tergal strap membranous. Phallobase cylindrical; aedeagus bilobed distally in lateral view with lower lobe extending beyond dorsal one and compressed in lateral view; paramere with a tooth at 1/3 distance to the end. Second segment of inferior appendage with distal half portion gradually tapering to a narrow apex. - Holotype: 1♂, loc.30. Paratypes: 2♂, same data as holotype. Types located in SW China. - Diagnosis: This species is similar to R. curvata Morton and R. malayana Banks (curvata group: Schmid 1970), from which it is distinguished by a paramere with a ventral tooth near apex.

Rhyacophila contorta sp.n. (fig.6)
Male body length 8 mm, forewing length 9.5 mm. Body brown, palpi yellowish, thorax and legs yellowish, spurs black, forewing brown, scattered with many pale spots. Male genitalia: Posterior margins of segment 9 excised in ventral two-third portions in lateral view. Complex of pre-anal appendages and apicodorsal lobe large, excised at the distal end in dorsal view. Tergal strap membranous. Phallobase sub-cylindrical. Dorsal process of phallic apparatus narrower at base, distal half broad lobe-like, with a triangular

Rhyacophila rima sp.n. (fig.7)
Male body length 8 mm, forewing length 9 mm. Body black; antennae and palpi brown; legs yellowish, spurs black; wings brown; abdomen yellowish, genital segment black. Male genitalia: Distal margin of the segment 9 projected backward at the middle in lateral view. Preanal appendages - apicodorsal lobe complex large, horizontal. Anal sclerites broad lobe-like extending far beyond the end of the complex in lateral view, with a deep mesal cleft in ventral view. Apical band arched backward, with a tooth near the end. Distal end of tergal strap expanded at apex with a shallow excision. Aedeagus abruptly narrowed in distal half, paramere spine-like. First segment of the inferior appendages large, almost as long as the complex; second one-half as long as the first one, with distal end deeply excised. - Holotype: 1♂, loc.16. Paratype: 1♂, same data as holotype. Types located in SE China. - Diagnosis: This species is similar to R. kawamurae Tsuda (nigrocephala group), from which it is distinguished by (1) apical band with a tooth at the base; (2) anal sclerites excised deeply at its distal end; and (3) first segment of inferior appendages twice as long as the second.

Rhyacophila longistyla sp.n. (fig.8)
Male body length 6 mm, forewing length 6.5 mm. Body yellowish; forewing pale to yellowish, with irregular spots; legs yellowish, spurs black; abdomen brown above and yellowish beneath. Male genitalia: Sternum of segment 9 only one-fourth as long as its dorsum, apicodorsal lobe excised deeply at the apex. Segment 10 small rounded lobe with a short apico-mesal excision. Anal sclerites elliptic in lateral view. Phallic dorsal process membranous, aedeagus curved slightly upward, parameres twice as long as aedeagus and crossing
each other under it, each with distal dilated portion bearing many short hairs on the upper margins and strong spines along the lower margins. First segment of inferior appendages rectangular, second very narrow at base, bifid apically, one-half as long as first one. - Holotype: 1♂, loc.1. Paratypes: 1♂, same data as holotype; 3♂, loc.18. Types found in E China. - Diagnosis: This species is similar to R. sherchokpa Schmid (angulata group), from which it is distinguished by: (1) distal half of paramere with a cluster of short hairs on the upper margin and with spines on the lower margin; (2) second segment of inferior appendages half as long as the first rather than very small as in the latter.
slender, aedeagus slightly longer than paramere. First segment of inferior appendages very large, rectangular, about 3 times as long as and at least 2 times as wide as the second. - Holotype: 1♂, loc.27. Paratypes: 3♂, same data as holotype. Types located in SW China. - Diagnosis: This species is similar to *R. cruciata* Forsslund (naviculata group), from which it is distinguished by: (1) apicodorsal lobe of segment 9 4-branched distally other than cruciate as in *R. cruciata*; (2) phallic dorsal process straight, not sinuate as in the latter when viewed laterally; (3) segment 10 with a ventral process near apex when viewed laterally.

Rhyacophila tetraphylla sp.n. (fig.12)
Male body length 5,5 mm, forewing length 6 mm. Body brown; antennae pale, palpi black; legs and wings brown; abdomen brown above and pale beneath. Male genitalia: Segment 9 rectangular in lateral view. Horizontal part of segment 10 rounded, excised distally in dorsal view. Anal sclerites paired, with a long root. Apical band tridentate distally in caudal view. Tergal strap long, recurved at the base. Phallobase cylindrical, phallic dorsal process composed of 2 long processes, the ventral lobe broad and bilobed at apex, aedeagus fused with ventral lobe in the basal two-third portion, paramere dilated, with acute apex curved inward. First segment of inferior appendage with a transverse ridge at the middle of the inner face, the second about half as long as the first, slightly excised apically. - Holotype: 1♂, loc.27. Paratypes: 1♂, loc.28; 4♂, loc.22. Types located in SW China. - Diagnosis: This species is similar to *R. wangpo* Schmid, but differs from it by (1) dorsal process of phallus divided into 2 slender branches; (2) the ventral lobe of aedeagus simple without lateral arm.

Rhyacophila ternifolia sp.n. (fig.13)
Male body length 6 mm, forewing length 9 mm. Body black; antennae pale, palpi black; legs and wings brown; abdomen brown above and pale beneath. Male genitalia: Dorsal half of segment 9 strongly projecting backward in two long processes, each with a subapical tooth dorsally and a triangular lobe ventrally; apicodorsal lobe curved downward with apex deeply excised. Segment 10 large, vertical, also excised distally. Anal sclerites elongate elliptical in lateral view, without root. Aedeagus evenly tapering to the end, parameres slender, crossing each other under the base of the aedeagus and with spines at the dilated end. First segment of inferior appendages rectangular, at least 2,5 times as long as the second; the second excised apicodorsally. - Holotype: 1♂, loc.5. Paratypes: 4♂, same data as holotype; 2♂, loc.3; 2♂, loc.2; 3♂, loc.4; 3♂, loc.17; 2♂, loc.1. Types located in E and SW China. - Diagnosis: This species belongs to the naviculata branch, but differs from other species in dorsum 9 with 2 long lateral projections on either side of the apicodorsal lobe.

Rhyacophila lata Martynov (new record): Loc.6, 4♂; loc.7, 5♂; loc.12, 1♂; loc.11, 3♂; loc.10, 2♂; loc.9, 5♂; loc.8, 2♂. All found in NW China.

Rhyacophila mjohjangsanica Botosaneanu (new record): Loc.7, 2♂; loc.9, 1♂; loc.14, 4♂. All found in NW China.

Rhyacophila retracta Martynov (new record): Loc.10, 13♂; loc.14, 23♂; loc.13, 6♂; loc.15, 1♂; loc.9, 31♂; loc.8, 7♂; loc.7, 143♂. All found in NW China.
Rhyacophila proeliva Kimmins (new record): Loc.34, 50; Loc.32, 10. All found in SW China.

Rhyacophila coreana Tsuda (new record): Loc.7, 220; Loc.12, 70; Loc.11, 50. All found in NW China.

Rhyacophila scissolides Kimmins. (new record): Loc.32, 65. All found in SW China.

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Prof.Paul BAGGE; Institute of Bio- and Environmental Sciences Jyväskylä University, P.O.Box 35, SF - 40351 JYVÄSKYLÄ, Finland. - Research subject: Feeding types, dispersal, emergence. Area: Finland. Other interests: Macrinvertebrate communities, pollution problems.


Lujza UJVAROSI, Department of Zoology, Babes - Bolyai University, Str.Clinicilor 5-7, RO - 3400 CLUJ - NAPOCA, Romania. - Present interest: Evolution, Systematics and Biogeography of the Carpathian Trichoptera, Identification of Romanian Trichoptera. Trichoptera as water quality indicators. - Information wanted: Papers on evolution, systematics and biogeography of European Trichoptera.

Neal VOELZ, Ph.D., Assistant Professor; Dept.of Biological Sciences, St.Cloud State University, ST.CLOUD, MN 56301, USA. - Research subject: Microredistributions and feeding habits of filter-feeding caddisflies.


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