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Contribution to the knowledge of the *Rhyacophila (Trichoptera)* of the *sibirica* group

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Abstract

The phylogeny of the *Rhyacophila* of the *sibirica* group is completed by the addition of twelf species. Seven of these are here described as new. The seventeen East Asian species are described and figured.
Key-words: *Rhyacophila, sibirica,* taxonomy, phylogeny.

Résumé

La phylogénie des *Rhyacophila* du groupe de *sibirica* est complétée par l'addition de douze espèces nouvelles pour le groupe, dont sept sont nouvelles pour la Science. Les dix-sept espèces de l'Asie orientale sont décrites et figurées.
Mots-clés: *Rhyacophila, sibirica,* taxonomie, phylogénie.

Introduction

The *sibirica* group of the genus *Rhyacophila* belongs to the *invaria Twig* of the *philopotamoides* BRANCH. It is widely spread over the entire Holarctic Region, with the larger number of species localized in Eastern Asia and Western North America. Two of them only, *narvae* NAVAS and *mongolica* n. sp. are amphipacific. All these species are rheophilic, cold stenothermic and localized mostly in mountainous areas. In higher latitudes, some species also live in rivers of low altitudes.

ROSS (1956) first defined and studied the phylogeny of the *sibirica* group. Later, SCHMID (1970) improved the phyletic classification of the group and divided it in five subgroups. He recognized twenty-five species. Since then, several species have been added to the group: *riedeliana* BOTOSANEANU (1970), *lepnevae* LEVANIDOVA (1977), *tonneri* MEY (1989), *arefini* LUKYANCHENKO (1993) and species n° 1, 2 and 3 (respectively *nana* LEVANIDOVA, *chirka* SCHMID and *egijnica* SCHMID) LEVANIDOVA (1980). Today, seven new species are added to the group. Actually, seventeen species are recorded from Sibiria and the Russian Far East. All are mentionned and figured in the following pages. They form a beautiful series, remarquable by their diversity in homogeneity.

Holotypes ♂ of all species are preserved in alcohol and deposited in the Zoological Institute of the Russian Academy of Sciences (Saint-Petersburg) (ZIRAS). Paratypes in the Institute of Biology and Pedology, Far East Branch of the Russian Academy of Sciences (Vladivostok).

Description of the sibirica group

Segment IX with a short dorso-apical lobe (only in the nearctic *rickeri* ROSS). Segment X triangular, vertical or subvertical. Small anal sclerites usually present, with a short root. Apical band very short. Phallic apparatus short. Phallotheca reduced. Dorsal process of the aedeagus absent or present, then large, elongated and strong. Aedeagus not large, subelongated and composed of a short dorsal trilobed branch and a cylindrical and acute ventral upturned appendix. Parameres lost. There is a large, extensile ventral lobe ending in a sclerotized, concave and setiferous distal part.

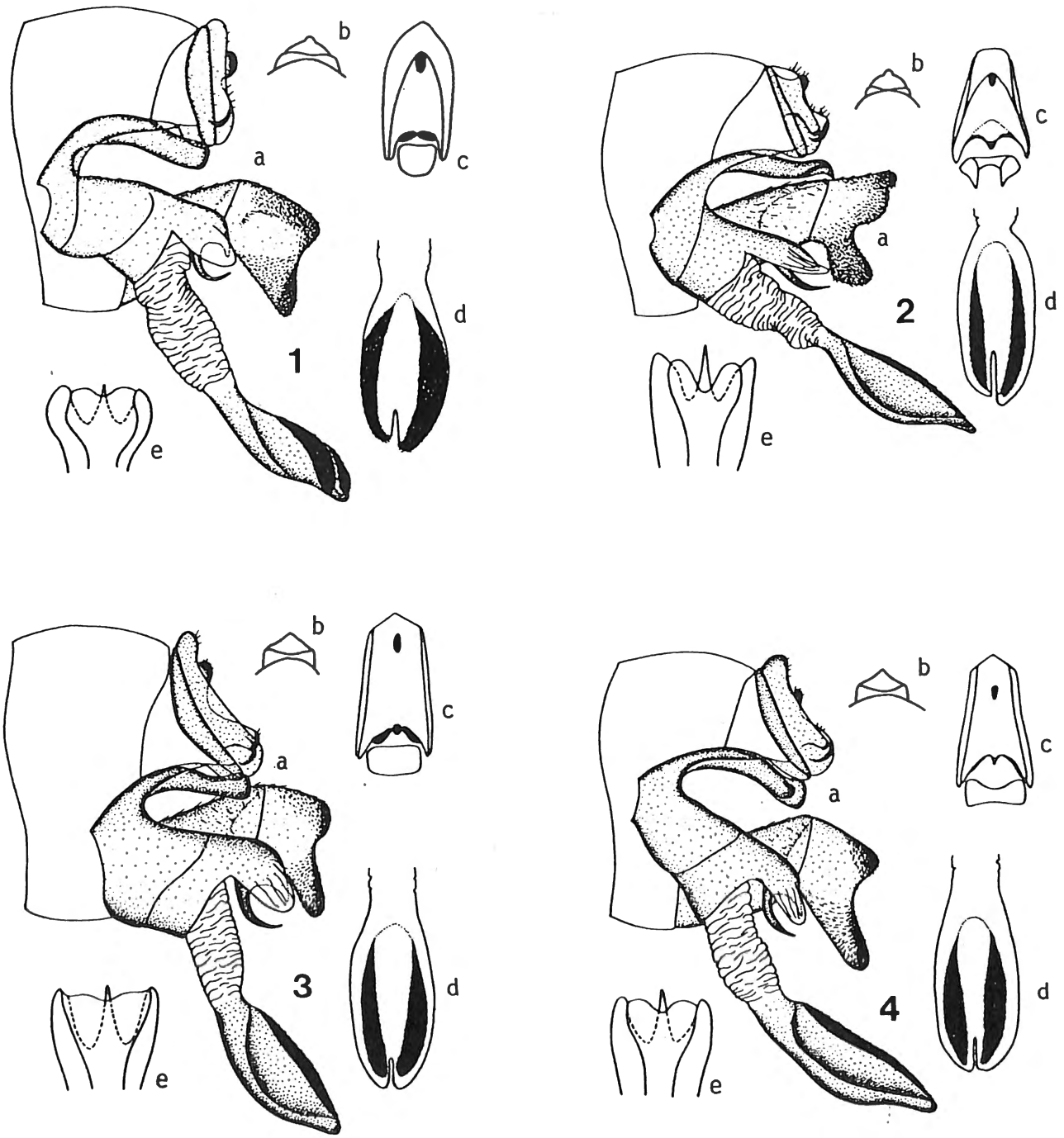
PHYLOGENY

The *amicis* subgroup

It contains six nearctic species, forming three pairs. *R. amicis* ROSS and *melita* ROSS are characterized by the absence of the anal sclerites, a large complex dorsal process, a simple aedeagus and with the ventral lobe not extensile. *R. pellisa* ROSS and *valuma* MILNE have a strongly convex U-shaped segment X, vestigial anal sclerites and with a large ventral lobe. *R. atrata* BANKS and *colonus* SCHMID show the triangular segment X as in *amicis* and *melita* and the phallic apparatus as in *pellisa* and *valuma*.

The *depressa* subgroup

Segment X vertical, with the upper part slightly extended backwards. Anal sclerites present. Apical band short.



Figs 1-4 – *Rhyacophila*, Male genitalia – 1, kardakoffi NAVAS; 2, depressa MARTYNOV: 3, lepnevae LEVANIDOVA: 4, imitabilis sp. n. a, lateral view: b, segment X, dorsal view; c, segment X, caudal view; d, distal part of ventral lobe, dorsal view; e, aedeagus dorsal view.

Tergal strap elongated. Dorsal process of the aedeagus well developped and adpressed to the tergal band. Upper branch of the aedeagus without median lobe, its ventral appendix slender, cylindrical and curved. Ventral lobe of the aedeagus erectile, with a spoon-like distal part, usually with an apical excision; two straps covered with dense and short setae are present. Second article of the inferior appendages with an apical excision making it somewhat bifid.

The *depressa* subgroup is divided into two complexes. The *depressa* complex is characterized by the upper part of segment X not prominent (*kardakoffi* NAVAS, *depressa* MARTYNOV, *lepnevae* LEVANIDOVA, *imitabilis* sp. n. and *implicata* sp. n.). In the *egijnica* complex, the upper part of segment X is somewhat extended backwards (*egijnica* SCHMID, *kolymensis* sp. n. and *lenae* MARYNOV).

R. nana sp. n. and *cedrensis* sp. n. are also members of this subgroup, but the shape of the segment X is unusual.

The *laevis* subgroup

R. abchasica MARTYNOV and *laevis* PICTET are placed between the *depressa* and the *sibirica* subgroups. They combine primitive and specialized features and are restricted to the European region.

The *sibirica* subgroup

This subgroup is closely related to the *depressa* subgroup, differing by the longer and wider segment X. Apical band U-shaped, tergal strap reduced, dorsal process fused with the aedeagus as a short dark bump. Second article of the inferior appendages entire and without apical excision. This subgroup contains three complexes.

The *sibirica* complex contains three species: *mongolica* sp. n. and *sibirica* MCLACHLAN are sister species: *chirka* sp. n. shows a more specialized segment X.

There are three closely related species in the *manistee* complex: *manistee* ROSS, *minora* BANKS and *blarina* ROSS demonstrate a variety of specializations of segment X. Second article of the inferior appendages with a slight apical excision.

The *riedeliana* complex has the same tendency in the modifications of segment X, as in the preceeding complex. The ventral lobe of the aedeagus is very asymmetrical in *riedeliana* BOTOSANEANU (Corea). The apical band of *yukii* joins the ventral branch of segment X; anal sclerites absent. *R. yukii* TSUDA and *kisoensis* TSUDA are known only from Japan.

The *narvae* subgroup

The species of this subgroup are strikingly more specialized than the others by the very large size of the dorsal branch of segment X. The upper branch of the aedeagus has a median lobe that is longer than the lateral ones. Dorsal process fused with the aedeagus as a short dark bump. Ventral lobe with asymmetrical spoon-like distal part. This subgroup contains four sister species: *narvae* NAVAS (amphipacific). *transquilla* TSUDA (Japan), *arefini* LUKYANCHENKO (Far East, Japan, Kurile Islands) and *tonneri* MEY (Corea).

The *unimaculata* subgroup

This subgroup contains four nearctic species. They differ strongly from the other species of the *sibirica* group by the ventral lobe of the aedeagus in form of a long membranous process, slender at the apex. *Rh. unimaculata* DENNING and *unipunctata* SCHMID are characterized by the specialization of the segment X with very long dorsal and ventral branches and a strong dorsal process. *R. vetina* MILNE and *belona* ROSS are characterized by the reduction of the ventral branch of segment X, the dorsal process and the ventral lobe of the aedeagus.

TAXONOMY

Rhyacophila kardakoffi NAVAS
(Fig. 1)

Rhyacophila kardakoffi NAVAS 1926: 57-58, Pl. I, fig. 8 ♂ ; MARTYNOV 1934: 39, 54-57, fig. 28a-c ♂ ; SCHMID 1970: 63-64, pl. XLVIII, fig. 4-6 ♂ ; LEVANIDOVA 1980: 60, 64-66, fig. 4b ♂.

R. kardakoffi is closely related to *depressa*, differing by the distal part of the dorsal aedeagal process and the dorsal part of segment X not prominent.

Specimens inhabit the upper part of mountain streams, with water temperature 7,5-13°C. Pupae collected in June-July, imagines in July-August.

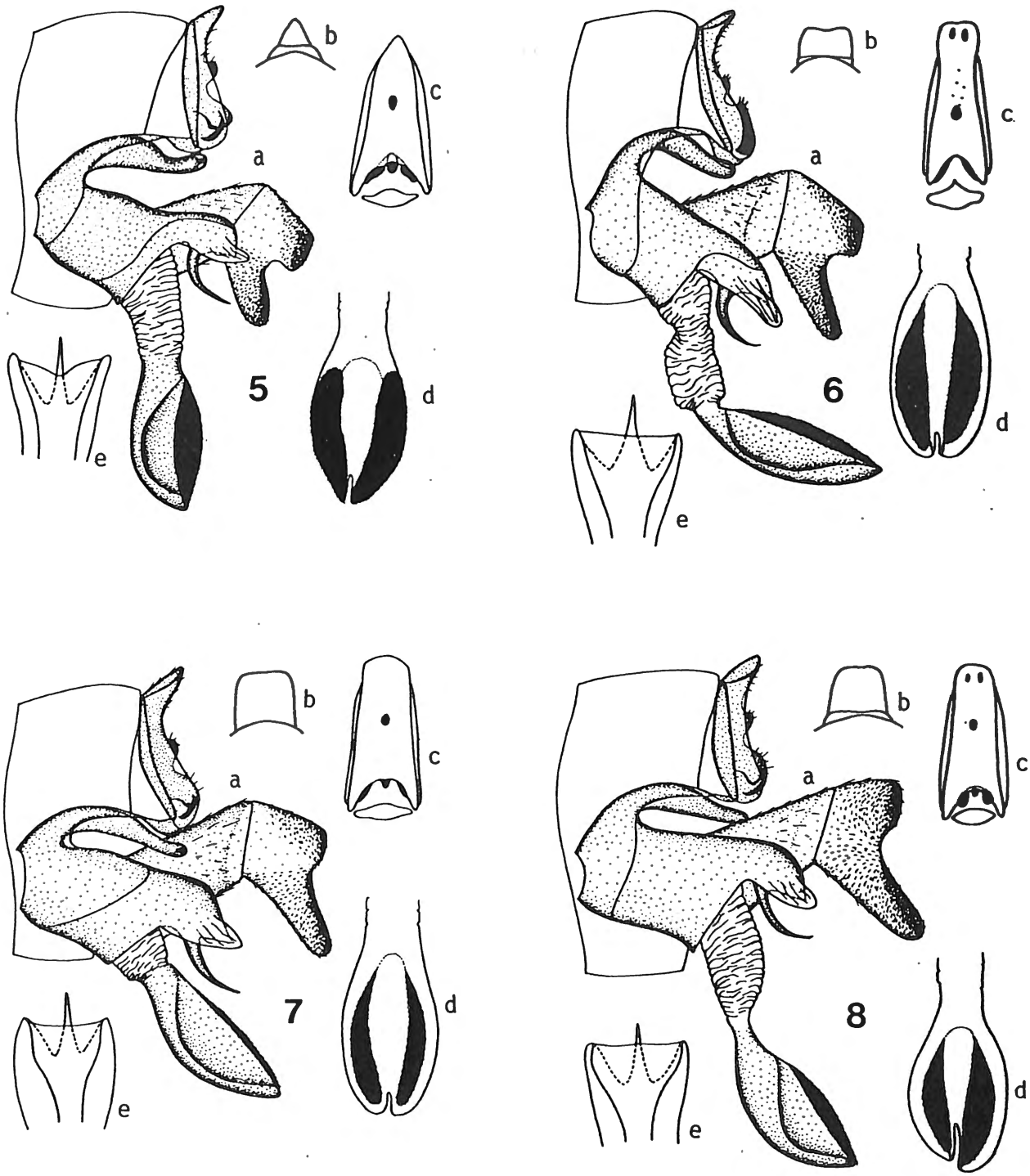
Distribution

Japan; Far East: Primorye, Khabarovsk vicinities (lower part of Ussuri river basin).

Rhyacophila depressa MARTYNOV
(Fig. 2)

Rhyacophila depressa MARTYNOV 1910: 420-423, fig. 60-64 ♂ ♀ ; MARTYNOV 1934: 38, 57-58, fig. 29a-d ♂ ; ROSS 1956: 120, fig. 218 A, E, G, ♂ ; SCHMID 1970: 63-64, pl. XV, fig. 16, pl. XLVIII, fig. 7-9 ♂ ; LEVANIDOVA 1980: 64-66, fig. 4 ♂.

Larvae are typical inhabitants of slimy pebbles in the lower part of mountain streams. Water temperature in emergence period 9-20°C. Pupae collected in April-May, imagines in June-July.



Figs 5-8 – *Rhyacophila*, Male genitalia – 5, implicata sp. n.; 6, egijnica SCHMID; 7, lenae MARTYNOV; 8, kolymensis sp. n. a, lateral view; b, segment X, dorsal view; c, segment X, caudal view; d, distal part of ventral lobe, dorsal view; e, aedeagus, dorsal view.

Distribution
Far East: middle part of Amur riv. basin, Khabarovsk vicinities (lower part of Ussuri riv. basin), Primorye; Sibiria: Chita region.

Rhyacophila lepnevae LEVANIDOVA (Fig. 3)

Rhyacophila lepnevae LEVANIDOVA 1977: 67-71, fig. 4b-g ♂; LEVANIDOVA 1980: 64-66, fig. 4g ♂.
Imagines collected in July near mountain streams.

Distribution
Far East: southernmost Primorye (Kedrovaya riv. basin, Mongurai riv. basin).

Rhyacophila imitabilis sp. n. AREFINA (Fig. 4)

Imago.
Body length 7,5-8 mm., dorsally brown, warts and palpi yellowish grey, setae yellow brown. Wings yellowish brown, veins and pterostigma brown; wingspan 18-21 mm.

Male genitalia.
Segment X narrow, acute apically. Anal sclerites smaller than in *lepnevae* (Fig. 4c). Typical U-shaped apical band short. Distal part of dorsal process saddle-like. Ventral appendix of aedeagus cylindrical, curved. Distal part of ventral lobe spoonshaped, symmetrical, with excision at the middle of the apex, with paired straps of yellowish brown dense setae. Second article of inferior appendages with a moderate excision; ventral portion longer and slender than dorsal one.
Very similar to *lepnevae* in many respects, but differing in subtle details of male genitalia. Anal sclerites smaller and distal part of dorsal process of a different form.
Larvae inhabit upper part of cold water mountain streams.

Distribution
Far East: Primorye, Khabarovsk vicinities.

Material
Holotype ♂, Primorye, streams near Vladivostok, 29 June 1975 (LEVANIDOVA).
Paratypes: ♂, data as the holotype; 2♂♂, Primorye, Ussuriyskiy Reserve, Komarovka riv. basin, Mironov spring, 19 July 1984 (VSHIVKOVA); pharate ♂, Komarovka riv., 7 July 1984 (BOGATOV); ♂, Primorye, Ussuri riv. basin, Bolshaya Ussurka riv. (former Iman riv.), near Dersu vil., 14-16 June 1990 (MAKARKIN); 7 pharate ♂♂, Khabarovsk vic., Bolshehehtsirskyi reserve, Ussuri riv. basin, 30 June 1958 (LEVANIDOVA); male genitalia labelled "mountain Pidan, 40 km. W. Sutshan city, 28 June 1928 (KURENTSOV)"

Remarks
Genitalia ♂ with the autographic label of A. V. MARTYNOV were found in the alcohol collection of the Zoological Institute of the Russian Academy of Sciences (Saint-Petersburg).

Rhyacophila implicata sp. n. AREFINA (Fig. 5)

Imago
Body length 7,5-8 mm., ventrally lighter, setae golden, palpi yellowish. Forewings yellowish brown, pterostigma slightly darker, wingspan 16-21 mm.

Genitalia male.
Segment X narrow, with small acuminated triangular apex. Anal sclerites quite large. Dorsal process distinct and free, sligthly curved and somewhat flat apically. Ventral appendix of aedeagus of moderate size. Somewhat asymmetrical distal part of ventral lobe with an excision at the middle of the apex; paired straps with yellow brown dense setae. Second article of inferior appendages with a deep excision, apex of dorsal portion truncated, ventral one with rounded apex.
R. implicata differs from other species by the acuminated apex of segment X.
Larvae found in the middle part of mountain streams with pebbly bottom. Water temperature in the emergence period 9-9,4 °C.

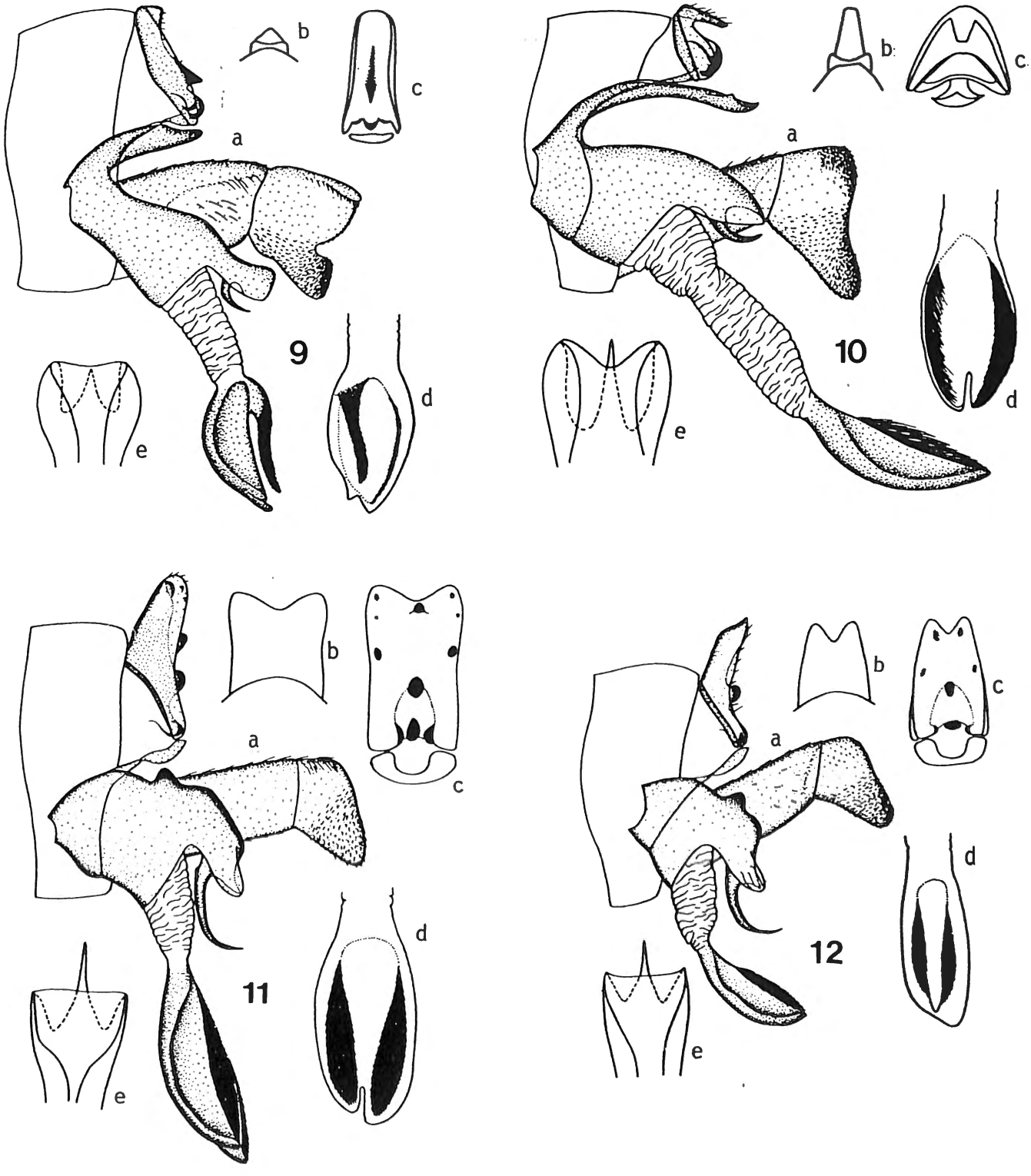
Distribution
Far East: southernmost Primorye.

Material
Holotype ♂, "Kedrovaya Pad'" reserve, Kedrovaya riv. basin, Kaskadny stream 27 June 1973 (LEVANIDOVA).
Paratypes: pharate ♂, same data as holotype; ♂, Ibid., 28 June 1990 (LUKYANCHENKO); 2 pharate ♂♂, Kedrovaya riv. basin, Goraiskiy stream, 19 June 1973 (LEVANIDOVA); 10 ♂♂, Ibid., 3 July 1990 (AREFIN); 2 ♂♂, Gamov cape stream, 30 June 1988 (VSHIVKOVA).

Rhyacophila egijnica SCHMID (Fig. 6)

Rhyacophila egijnica SCHMID 1968: 7-9, fig. 1-2 ♂♀; SCHMID 1970: 63-64, pl. XLVIII, fig. 1-3; LEVANIDOVA 1980: 64-66, fig. 4d ♂.
Larvae live in mountain streams on stony ground and with low temperature in summer. Pupae collected in June, imagines in July.

Distribution
Mongolia; Far East: Khabarovsk region. Ulya riv. basin, lower part of Amur riv. basin, Magadan region, Kolyma riv. basin; Sibiria: Baikal lake basin.



Figs 9-12 – *Rhyacophila*, Male genitalia – 9, nana sp. n.; 10, cedrensis sp. n.; 11, sibirica McLACHLAN; 12, mongolica sp. n. a, lateral view; b, segment X, dorsal view; c, segement X, caudal view; d, distal part of ventral lobe, dorsal view; aedeagus, dorsal view.

Rhyacophila lenae MARTYNOV
(Fig. 7)

Rhyacophila lenae MARTYNOV 1910: 417-419, 423, fig. 57-59 ♂(♀); MARTYNOV 1934: 39, 54, fig. 27a-c ♂; SCHMID1970: 63-64; LEVANIDOVA 1980: 64-66, fig. 4e ♂.

Imago
Body length 8,5-10,5 mm; wingspan 18-20,5 mm.

Male genitalia
Apex of segment X somewhat elongate and declined backwards. Anal sclerites, apical band and tergal strap typical for the subgroup. Dorsal process massive. Ventral appendix of aedeagus slightly curved. Symmetrical distal part of the ventral lobe with paired straps covered with short brown setae.
Larvae inhabit cold-water mountain streams with stony bottom. Pupae and imagines collected in July.

Distribution
Sibiria: Lena riv. basin, Baikal lake basin; Far East: Primorye, Bikin riv. basin, Khabarovsk region, Khetana riv., Okhotskoye sea coast; lower part of Amur riv. basin, Magadan region, Kolyma riv. basin; Chukotka, Chegitun' riv.

Rhyacophila kolymensis sp. n. AREFINA
(Fig. 8)

Imago
Body length 9,5-11 mm., dark brown, palpi brown. Wings with dark brown veins and light spots along them. Pterostigma with dark margins and light in the center; wingspan 28 mm.

Male genitalia
Apex of segment X slightly elongated and declinate backwards, distally narrowed; a pair of small tubercles on the apex in caudal view (as in *egijnica*, fig. 6). Anal sclerites well apparant. Apical band very small; long tergal strap adpressed to dorsal process. Asymmetrical distal part of the ventral lobe with excision at the middle of apex, paired straps with brown, short, dense setae. Second article of inferior appendages with an excision, the ventral lobe larger than the dorsal one.
R. kolymensis is a close relative of *lenae*, differing in the larger size and the dorsal part of the dorsal process.
Larvae live in mountain streams, on stony bottom and low summer temperature.

Distribution
Far East: Magadan region.

Material
Holotype ♂, Magadan region, Kolyma riv. basin, stream near Aborigen station, 5 July 1977 (KOCHARINA). Paratypes: ♂, Kolyma riv. basin, Olen' stream. 13 July 1977 (KOCHARINA); pharate ♂, Kolyma riv. basin, Anyurodat stream, 3 July 1977 (MAKARCHENKO); 2 ♂♂, Kolyma riv. basin, Ozyorny stream. 19 July 1977 (ZHILTZOVA); 4 ♂♂, Kolyma riv. basin, Aborigen station, 2 August 1981 (MARCHENKO).

Rhyacophila nana sp. n. LEVANIDOVA
(Fig. 9)

Pharate male genitalia. Segment X with a small apex. There is a sclerotized tubercle in the middle of the segment, appearing as a downwards directed acute appendix. Anal sclerites present. Apical band short, tergal strap long, situated closely over the well developed dorsal process. Ventral appendix of aedeagus shorter than in the other species; its tip unprominent under the upper appendix margin. Distal part of ventral lobe asymmetrical with an unusual structure: on the right side is a narrow strap of short setae; on the left side, a long slender appendix covered by short setae too. Second article of inferior appendages massive, with an excision dividing it into two portions; upper margin of dorsal portion curved inward, ventral portion smaller than the preceeding.
Larvae and pupae collected in the middle and lower parts of mountain streams with stony bottom, fast current and moderately cold water temperature in summer.

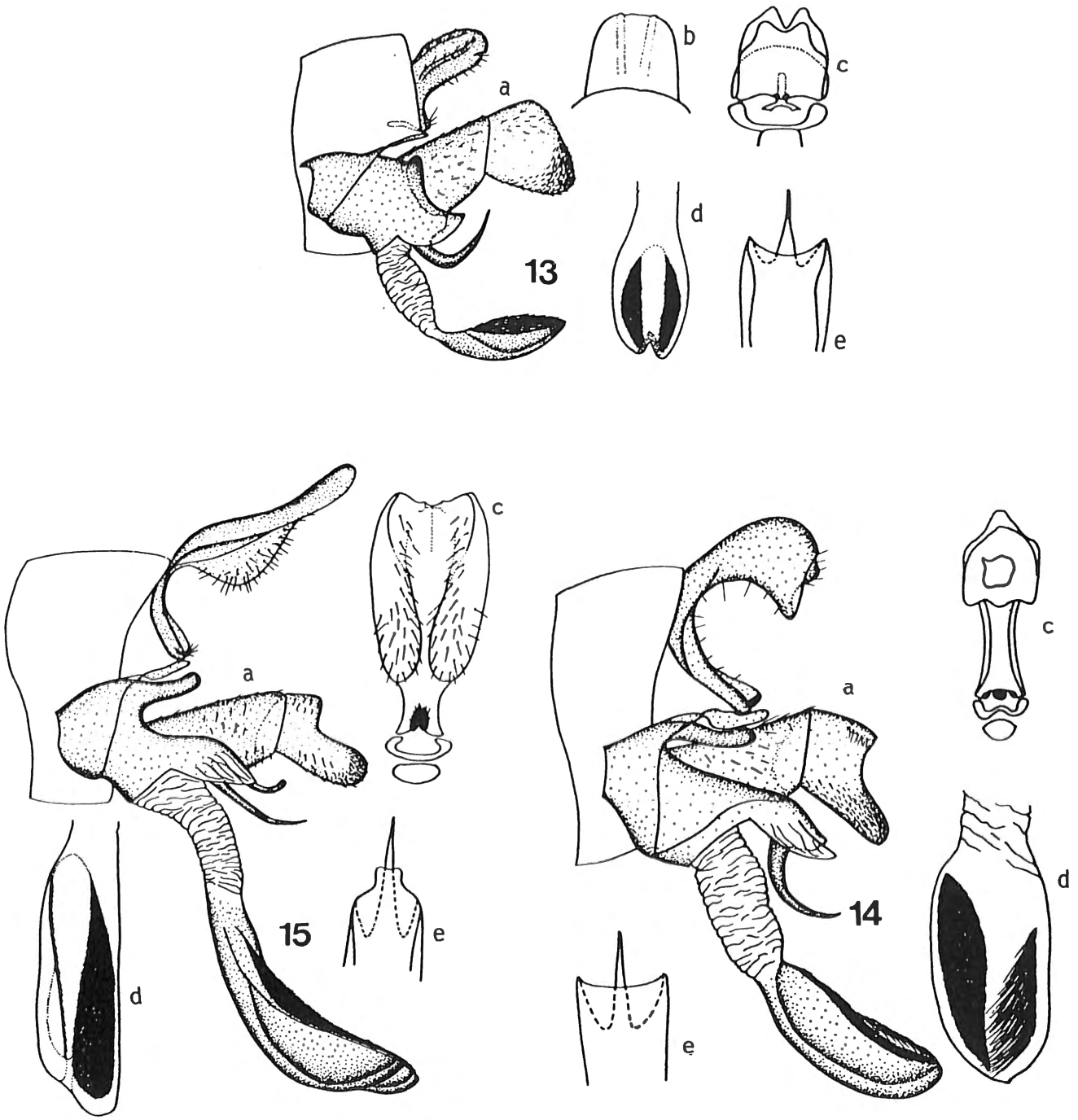
Distribution
Far East: Khabarovsk vicinities. Primorye.

Material
Holotype pharate ♂, with sclerites of corresponding larva, Khabarovsk vicinities, Bolshehehtsirskiy reserve, Ussuri riv. basin Bychikha riv., 30 June 1957 (LEVANIDOVA).
Paratypes: 8 pupae, 3 prepupae, 5 larvae, Ibid., 4 June 1989 (LEVANIDOVA); pupa, 12 prepupae, 2 larvae, Bolshehehtsirskiy reserve, Ussuri riv. basin, Pilka riv., 7 June 1989 (LUKYANCHENKO); 2 pupae, Pilka riv.,15 July 1989 (KHLEBAS); larva, Primorye, Khanka basin, Tolochkin riv., middle tributary of Komissarovka riv., 7 August 1989 (LUKYANCHENKO).

Rhyacophila cedrensis sp. n. SCHMID
(Fig. 10)

Imago
Body length 7-7,2 mm., yellow brown, warts somewhat lighter, palpi and setae yellowish grey. Wings light brown, pterostigma darker; wingspan 15-16,5 mm.

Male genitalia
Segment X with an unusal structure for the *depressa* subgroup: elongated apex declined backwards; in dorsal view in form of truncated cone. Anal sclerites present. Apical band short and tergal strap long. Dorsal



Figs 13-15 – *Rhyacophila*, Male genitalia – 13, chirka sp. n.; 14, riedeliana BOTOSANEANU; 15, transquilla TSUDA. a, lateral view; b, segment X, dorsal view; c, segment X, caudal view; d, distal part of ventral lobe, dorsal view; e, aedeagus, dorsal view.

process slender and longer than in the other species, flat, widened and convex apically and tonguelike shaped. Distal part of the ventral lobe asymmetrical, with an excision in the middle of apex; on one edge, a strap of short yellow brown setae; on the other edge, a row of sparse and long setae. Second article of inferior appendages with a moderate concavity.
Larvae live in moderate cold water mountain steams on stony ground.

Distribution
Far East: Southernmost Primorye.

Material
Holotype ♂, "Kedrovaya Pad" reserve, Kedrovaya riv. basin, 1st Zolotoy stream, 16 July 1975 (ZHILTZOVA). Paratypes: ♂, Kedrovaya riv. basin, 2 July 1973 (LEVANIDOVA); ♂, Ibid., 5 July 1975 (MAKARCHENKO); pharate ♂, Kedrovaya riv. basin, Gorayskiy stream, 30 June 1990 (LUKYANCHENKO).

Rhyacophila sibirica McLACHLAN
(Fig. 11)

Rhyacophila sibirica McLACHLAN 1879: 456-466, pl. 49, fig. 1-4 ♂ ♀ ; MARTYNOV 1934: 39, 53, fig. 25 a-c ♂; ROSS 1956: 120, fig.228A ♂; SCHMID 1970: 63-64; LEVANIDOVA 1980: 60, 64-65.

Imago
Body length 9-10,5 mm. Wingspan 20,5-23,5 mm.

Male genitalia
Segment X well developed, wide, declined backwards, with triangular apical excision and concave lateral margins; four sclerotized tubercles at the apex. Anal sclerites large. Dorsal process short, fused with the aedeagus as a dark bump. Asymmetrical distal part of the ventral lobe large, with a narrow apical excision. Second article of the inferior appendages without concavity.
Larvae live in cold water streams.

Distribution
Sibiria, Altai and Sayani.

Rhyacophila mongolica sp. n. LEVANIDOVA
(Fig. 12)

Imago
Body length 7,2 mm., dorsally dark brown, antennae and warts somewhat lighter, setae and palpi light brown. Wings light brown with darker veins, pterostigma brownish; wingspan 16 mm.

Male genitalia
Segment X narrowed distally, declined backwards with an excision at the middle of the distal margin. There is a well sclerotized tubercle in the center of the segment and two smaller ones apically and laterally (Fig. 12c). Anal sclerites of average size. Tergal strap reduced. Dorsal process of the aedeagus as that of *sibirica*. Ventral appendix of aedeagus long and curved. Distal part of ventral lobe without excision, the paired straps with yellow brown short setae. Second article of the inferior appendages with a straight margin.
R. mongolica is very similar to *sibirica*, but the segment X differ in form and position of the sclerotized tubercles. In the south of area (Mongolia), the species is known from the upper part of mountain streams. In the north of area, larvae inhabit also cold water streams (Kolyma riv. basin). Also large cold water tributaries of Amur riv. (Amgun' riv.), everywhere on pebbly ground.

Distribution
Mongolia; Far East: Magadan region, Amur riv. basin; North America: Yukon Territories.

Material
Holotype ♂, Magadan region, Kolyma riv. basin, Nevidimka stream, 6 August 1977 (MAKARCHENKO). Paratypes: ♂, Kolyma riv. basin, Sibit-Tyallakh riv., 25 July 1977 (KOCHARINA); Pharate male with sclerites of corresponding larva, Amur riv. basin, Amgun' riv., near Nizhniy Gorbylyak vil., 15 July 1958 (LEVANIDOVA); 2 larvae, Amgun' riv., near Dilikin vil., 13 July 1958 (LEVANIDOVA); 9 larvae, Magadan region, Kolyma riv. basin, Nevidimka stream, 31 May 1983 (SAMOKHVALOV); Male genitalia, North-West Mongolia, Sugu-nur, Khora riv. (upper part), 29 June 1924 (KOZLOV).

Remark
There is a male genitalia in the alcohol collections of ZIRAS labelled by MARTYNOV as *R. mongolica* n. sp. No species of such name has been described by MARTYNOV.

Rhyacophila chirka sp. n. SCHMID
(Fig. 13)

Imago
The smallest species of the group. Body length 4 mm., dark brown dorsally, head black. Wings light brown with darker veins pterostigma darker, wingspan 11 mm.

Male genitalia
Segment X with a well developed dorsal branch, wide and declined backwards; its lateral margins bent downwards, rounded from above. Anal sclerites small. Apical band U-shaped, tergal band reduced. Dorsal process fused with aedeagus as a small bump. Ventral appendix of aedeagus long and strongly curved. Distal part of ventral lobe slightly asymmetrical, with an apical excision; paired

straps covered with brown short dense setae. Second article of the inferior appendages without concavity.
R. chirka shows a more specialized segment X than the other species.

Distribution
Far East: Khabarovsk vicinities.

Material
Holotype ♂, Khabarovsk vicinities, Ussuri riv. basin, Chirka vil., 24 June 1957 (LEVANIDOVA). Paratypes: ♂, Khabarovsk vicinities, Ussuri riv. basin, Bychikha vil., 18 June 1958 LEVANIDOVA).

Rhyacophila riedeliana BOTOSANEANU
(Fig. 14)

Rhyacophila riedeliana BOTOSANEANU 1970: 277, 280-281, pl. III, fig. 1-5 ♂; LEVANIDOVA 1980: 64.
Larvae inhabit small mountain rivers with stony bottom and fast current. Imagines were collected in June.

Distribution
Corea; Far East: South Primorye, Kedrovaya riv. basin, Amba riv.

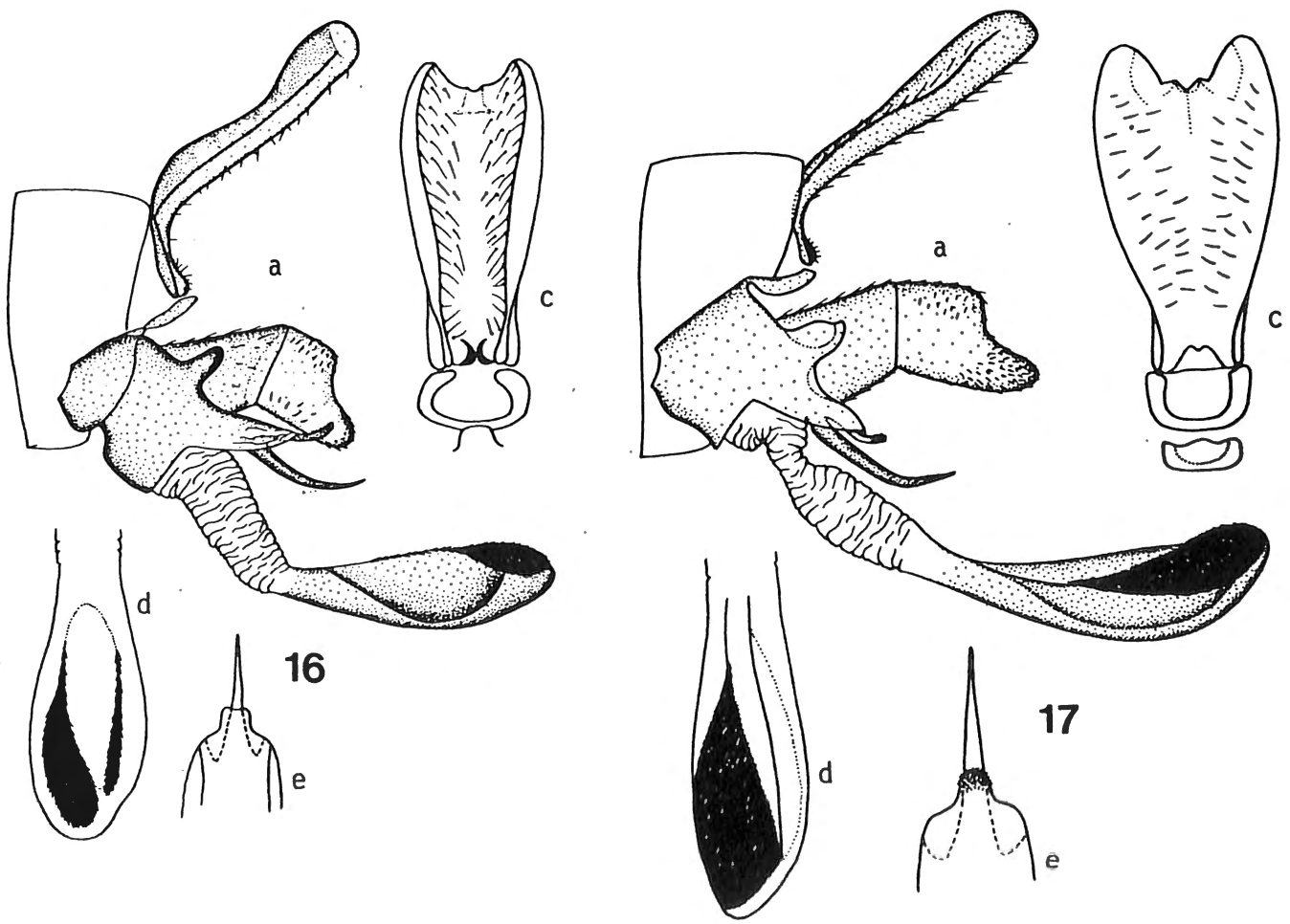
Rhyacophila transquilla TSUDA
(Fig. 15)

Rhyacophila transquilla TSUDA 1940: 19, 131, 135, fig. 18 ♂; TSUDA 1942: 17, 247, SCHMID 1970: 63-65; LEVANIDOVA 1980: 64-65; ROSS 1956: 120, fig. 231A ♂.
Distinct from *narvae* by the dorsal branch of segment X with a pair of large lumps on internal surface. Dorsal process of the aedeagus rather large. Distal part of ventral lobe long and asymmetrical.
Lives in mountain streams and rivers with stony bottom, fast current and low water temperature in summer. Pupae were collected in April-May, imagines in June and July.

Distribution
Japan; Far East: Kuriles Islands, Sakhalin.

Rhyacophila narvae NAVAS
(Fig. 16)

Rhyacophila narvae NAVAS 1926: 15, 57, pl. I, fig. 7 ♂♀; MARTYNOV 1934: 39, 53-54, 323-324, fig. 26a-b ♂♀; ROSS 1956: 121, fig. 263 ♂; BOTOSANEANU 1970: 276-277, 280, pl. VIII, fig. 1-2 ♀; SCHMID 1970: 63, 65,



Figs 16-17 – *Rhyacophila*, Male genitalia – 16, narvae NAVAS; 17, arefini LUKYANCHENKO. a, lateral view; b, segment X, dorsal view; c, segment X, caudal view; d, distal part of ventral lobe, dorsal view; e, aedeagus, dorsal view.

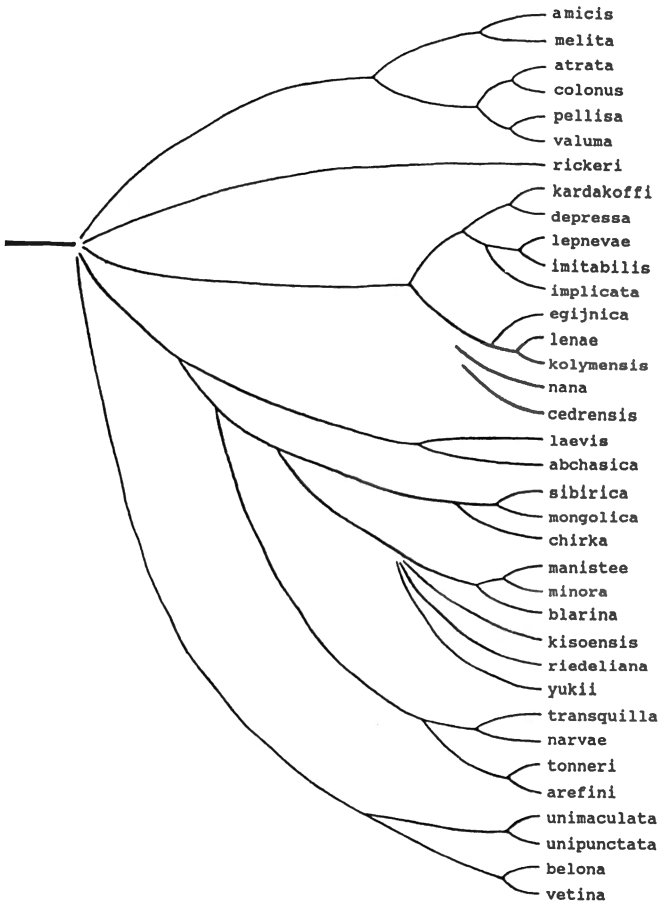


Fig. 18 – Phyletic tree of the *sibirica* group.

pl. XV, fig. 20 ♀; LEVANIDOVA 1980: 60, 63-65, 67; MEY 1989: 299-300.
Differs from *arefini* by the shape of segment X and the distal part of the ventral lobe of the aedeagus. Dorsal process as a dark bump.
Larvae inhabit mountain streams and rivers.

Distribution
This is the second species of *Rhyacophila* with an amphipacific distribution. Widely spread in the Russian Far East: Amur riv. basin, Primorye; also Sibiria and Corea. It is unknown northwards from the Amur riv. basin. In North America, it is widely distributed, north as far as the Yukon Territories.

Rhyacophila arefini LUKYANCHENKO (Fig. 17)

Rhyacophila arefini LUKYANCHENKO: 5-6, fig. 1-4 ♂ ♀.
This species is closely related to *tonneri* from Corea. Distinct by the form of the dorsal scoop-like process and of the dorsal branch of segment X.

Distribution
Japan: Hokkaido; Far East: Kurile Islands, Kunashir, Iturup and Shikotan.

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