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Lepidostomatid Caddisflies (Trichoptera) of the Russian Far East, with Descriptions of Female and Larva of *Goerodes sinuatus* (MARTYNOV)

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Abstract Ten species of the Lepidostomatidae, Trichoptera, *Lepidostoma hirtum* (FABRICIUS), *Goerodes elongatus* (MARTYNOV), *G. kurentzovi* (MARTYNOV), *G. sinuatus* (MARTYNOV), *G. complicatus* (KOBAYASHI), *G. satoi* (KOBAYASHI), *G. hiurai* (TANI), *G. naraensis* (TANI), *Neoseverinia crassicornis* (ULMER) and *Dinarthrum stellatum* ITO, are recorded from the Russian Far East. Geographical distribution of the ten species is reviewed and discussed. Female and larva of *G. sinuatus* are firstly described, and case and habitat of the species are also reported.

Key words: Trichoptera; Lepidostomatidae; fauna; Russian Far East; female and larva.

Introduction

In the first third of the 20th Century, A. V. MARTYNOV, one of the most prominent researchers and trichopterologists, described a number of new taxa including the Lepidostomatidae from Japan and the Pacific regions of Russia (for example, MARTYNOV, 1935).

In the fourties to sixties, within the limits of the Far East, the freshwater fauna of the basin of the Amur and Ussuri Rivers as well as the Kamchatka Peninsula was intensively examined. From the early seventies to the present time, the faunas of the Extreme Northeast (Chukotsk Peninsula, Vrangel Island, Basin of the Kolyma River) and the Extreme South of the Far East (Primorye, Sakhalin, South Kuril Islands) were mainly studied. Studies of these river ecosystems were carried out in the Laboratory of Freshwater Biology, Institute of Biology and Pedology, Far East Branch of the Russian Academy of Sciences (FEB Russian AS). LEVANIDOVA (1982) reported one of the principal parts of these studies.

This paper deals with the family Lepidostomatidae, Trichoptera, of the Russian Far East. Large quantities of materials were collected by the Laboratory of

Freshwater Biology for the studies mentioned above, arranged by the Russian authors, identified for the most part by the second author and ascertained and analysed by the first author.

Female and larva of *Goerodes sinuatus* were firstly described here, and case and habitat of larvae were also reported. Male, female, larva, case and habitat of other species were already known as shown in the synonymic list.

Materials and Methods

Male, female, pupa (P), prepupa (PP) and fifth instar larva (*5th*) were identified, but fourth and third instar larvae (*4th*, *3rd*) were not identified except for *G. sinuatus*, *Neoseverinia crassicornis* and *Dinarthrum stellatum*, which were easily identified even at the fourth and third instars. Larvae of *Lepidostoma hirtum*, *Goerodes hiurai* and *Goerodes elongatus* were not identifiable because they were very similar to one another (LEPNEVA, 1966; ITO, 1985 a, 1989). Larvae of *Goerodes kurentzovi* were not identified, either, due to their close similarity to those of the Japanese species, *Goerodes japonicus* (ITO, 1985 b, 1989). Figures in parentheses of the specimen list show the original collection numbers. Specimens are deposited in the collection of the first author (without indication) and in the collection of the Laboratory of Freshwater Biology of FEB Russian AS (FB).

In the following list, we include collection records from Russia, but do not include records from other countries, since complete listing, particulary the records of *L. hirtum*, is too voluminous to be included here.

Association between adult and larva of *G. sinuatus* was established by dissecting mature pupae for examining their genitalic segments and by examining larval exuvae in pupal cases.

Lepidostoma hirtum (FABRICIUS)

Phrygania hirta FABRICIUS, 1775, 308[1].

Lepidostoma hirtum: MACLACHLAN, 1880, 274–276, pl. 30, ♂, wings and head of ♀; LEPNEVA, 1966, 350–356, figs. 604–606, larva, case, habitat; FISCHER, 1970, 43–57; LEVANIDOVA, 1982, 93; MALICKY, 1983, 145, 150, ♂ ♀.

South Primorye. 6 ♀, Komissarovka River (R.), 7. VIII. 1989, LUKYANCHENKO (4670).

North Primorye. Bolshaya Ussurka (=Iman) R. Basin: 1 ♂, Tudo-Vaku R., near Rakitnoye Village, 4. VIII. 1958, LEVANIDOVA; 1 ♂, Zimovejnii Stream, light trap, 26. VII. 1968, SINTSHILINA; 22 ♀, near Rozchino Village, 17–21. VII. 1976, ZHERICHIN (5351, 5352, 5348, 5354, 5356), FB; 1 ♂, Zimovejnii Stream, 26. VII. 1968, light trap, unknown collector.

Ussuri River Basin, Lower Part. Khor R.: 1 ♂, 9. VII. 1950, LEVANIDOVA;

1) Since this report was not available to us, we referred to it from FISCHER (1970).

26 ♂ 14 ♀, 19. VII. 1950, LEVANIDOVA; 2 ♂ 2 ♀, 22. VII. 1950, LEVANIDOVA, FB; 12 ♂ 5 ♀, 22. VII. 1950, LEVANIDOVA.

Amur River Basin. 2P (1 ♂ 1 ♀), Malakhtan R., 19. VII. 1956, LEVANIDOVA. 1 ♀, Bira R., 3. VIII. 1954, LEVANIDOVA.

Altai Region. 1 ♂ 3 ♀, Mana R., 25. VIII. 1959, ZAPEKINA-DULKEJT.

Baikal Lake. 1 ♀, vicinity, 22. VI. 1945, LEVANIDOVA. 1 ♀, Polovinka R., 2. IX. 1940, LEVANIDOVA.

Distribution. Europe, European parts of Russia, Altai, Siberia, Baikal, Amur-Ussuri River Basin, North and South Primorye.

Goerodes elongatus (MARTYNOV)

Dinarthrodes elongatus MARTYNOV, 1935, 392–395, fig. 198, ♂; FISCHER, 1970, 13; TANI, 1977, pl. 43, ♂; LEVANIDOVA, LEVANIDOV & MAKARCHENKO, 1977, 22; LEVANIDOVA, 1982, 93; LEVANIDOVA, TESLENKO & LUKYANCHENKO, 1988, 48; ITO, 1989, 46–50, figs. 1–2, ♂, ♀, larva, case, habitat.
Goerodes elongatus: ITO, in press.

South Primorye. 1 ♂ 1 ♀, Okeanskaya Station, a forest brook, 17. VIII. 1955, LEVANIDOVA (273). Kangaus Village: 2 ♂ 3 ♀, Smolny spring, 18. VI. 1975, ZHILTZOVA (1492); 3 ♂, Beryozovy Spring, 17–19. VI. 1975, ZHILTZOVA (1481, 1488); 1 ♂ 2 ♀, Sukhodol Spring, 21. VI. 1975, ZHILTZOVA (1490). Partizanskaya R. Basin, Frolovka R.: 1 ♂ 1 ♀, 31. VII. 1986, MASLOV (4409); 1 ♂ 1 ♀ 1P(♀), 31. VII. 1990, LUKYANCHENKO (5125, 5126). 1 ♂ 1 ♀, Pasechnaya R., 8. VII. 1981, TESLENKO (4166). 2 ♂, Amba R., 28. VI. 1990, LUKYANCHENKO (4959). 2 ♂ 1 ♀, a spring on the way from Spassk Town to Yakolevka R. (41th km), 28. VI. 1990, LUKYANCHENKO (4662). 1 ♀, Barabashevka R., 17. VII. 1975, ZHILTZOVA (1261). 5 ♂, Lephu R. Basin, Tshernigovka R., 27. VIII. 1989, LUKYANCHENKO (4766). 1 ♂, a spring near Vladivostok, 17. VIII. 1973, LEVANIDOVA (207).

"Kedrovaya Pad" Reserve. Biostation: 1 ♀, 9. VII. 1973, VSHIVKOVA (231); 1 ♂ 1 ♀, 11. VII. 1973, LEVANIDOVA; 3 ♂ 14 ♀, 4. VIII. 1973, VSHIVKOVA; 2 ♂ 11 ♀, 5–12. VIII. 1973, KONONENKO & NADEZHDINA (299); 6 ♀, 3–6. VII. 1975, MAKARCHENKO (1275, 1276, 1283); 1 ♂ 5 ♀, 12–25. VII. 1975, VSHIVKOVA (1270, 1273); 2 ♀, 30. VIII. 1975, NIKOLAEVA (1232); 1 ♂ 3 ♀, 14. VIII. 1988, KOCHARINA (5327), FB; 1 ♂ 7 ♀, 11–16. VII. 1991, ITO. Kedrovaya R.; 1 ♀, 30. VI. 1973, LEVANIDOVA (1047); 11 ♂ 5 ♀, 6–22. VII. 1973, VSHIVKOVA (225, 245, 268); 4 ♂ 1 ♀, 14–21. VII. 1973, NADEZHDINA (239, 261); 13 ♂ 11 ♀, 5–22. VIII. 1973, VSHIVKOVA (308, 368); 7 ♂ 5 ♀, 10–31. VIII. 1973, NADEZHDINA (391); 2 ♀, 11. VII. 1975, VSHIVKOVA (1281); 1 ♂, 2. VIII. 1984, TIUNOVA; 1 ♂, 24. VI. 1990, LUKYANCHENKO (4955); 8 ♂ 1 ♀, 1. VII. 1990, LUKYANCHENKO (4963); 2 ♂ 2 ♀, 11. VII. 1991, ITO. Goraisky Stream: 2 ♂, 8–25. VII. 1973, NADEZHDINA (274); 3 ♂, 10. VIII. 1972, VSHIVKOVA (311). Kascadny Spring: 7 ♂, 31. VII. 1973, VSHIVKOVA (287); 1 ♂, 18. VIII. 1973, NADEZHDINA (324); 2 ♂, 25. VII. 1975, ZHILTZOVA & VSHIVKOVA (1249, 1250); 14 ♂ 1 ♀, 28. VI–2. VII. 1990, LUKYANCHENKO (4957).

1 ♂ 1 ♀, Pervy Zolotoy Spring, 16–18. VII. 1975, Zhiltzova (1254). 1 ♂, Podkrestovy Spring, 26. VII. 1975, Zhiltzova (1256).

Ussurisky Reserve. Biostation: 1 ♀, 29. VII. 1954, Levanidova (5174); 6 ♂ 3 ♀, 12. X. 1966, Konovalova (1263); 1 ♂ 22 ♀, 17–22. VII. 1991, Ito. Upper parts (upper than Biostation) of Komarovka R.: 4 ♂ 1 ♀, 24. VII. 1983, Vshivkova (3438); 2 ♂ 3 ♀, 19. VII. 1991, Ito. 1 ♀, lower border of the reserve, 20. VII. 1991, Ito. 2 ♂ 1 ♀, Mironov Stream, 18. VII. 1991, Ito.

Lazovsky Reserve. A spring: 1 ♂, 8. VII. 1978, Vshivkova (2441); 3 ♂, 10. VII. 1981, Teslenko. 4 ♂ 1 ♀, a spring of Koreyskaya R., 13. VII. 1963, Krivolutskaya. 5 ♂ 2 ♀, Kievka R., 13. VII. 1978, Vshivkova (2435). 2 ♂, Sukhoy Spring, 19. VI. 1979, Vshivkova (219). Postovoy Spring: 3 ♂ 2 ♀, 7. VII. 1981, Zhiltzova & Teslenko (4474), FB; 1 ♂ 2 ♀, 11. VII. 1989, Teslenko (4933). 1 ♂ 1 ♀, Benevka R., 4–5. VII. 1981, Teslenko.

Ussuri River Basin, Upper Part. Biostation: 2 ♂ 7 ♀, 9–23. VII. 1975, Zhiltzova (1229); 1 ♂, 14–16. IX. 1975, Komarova (1243); 9 ♂ 12 ♀, 13. VII–19. VIII. 1976, Vshivkova (1668, 1735). 23 ♂ 34 ♀, upper part of Ussuri R., summer, 1976, Levanidova & Levanidov. Sokolovka R.: 5 ♂, 31. VII. 1975, Zhiltzova (1227); 2 ♂, 11. VII. 1976, Vshivkova (1650); 1 ♂ 2 ♀, 18–25. VII. 1976, Vshivkova (1709). Sokolovka R. Basin, Beryozovy Spring: 1 ♂ 1 ♀, 30. VII. 1975, Zhiltzova (1225); 1 ♂, 16. VII. 1976, Vshivkova (1666); 7 ♂ 2 ♀, 21. VII. 1976, Vshivkova (1695); 3 ♂ 8 ♀, 17. VIII. 1976, Vshivkova (1748). 1 ♂, Bezymyany Spring, 21. VII. 1976, Vshivkova (1693). 1P(♂), Yelovy Spring, 29. VII. 1976, Vshivkova (1715).

North Primorye. 4 ♂ 7 ♀, Yedinka R., 19. VIII. 1986, Korionov (4578). 8 ♀, Samarga R., 19. VIII. 1976, Semenchenko. 2 ♀, Bolshaya Ussurka R., near Rozchino Village, 14–16. VII. 1976, Zherichin (5065), FB.

Shihote Alinsky Reserve. 1 ♂, Serebrjanka R., 5. IX. 1987, Potikha.

Ussuri River Basin, Lower Part. 1 ♀, a spring, 11. VIII. 1962, Levanidova (1028).

Amur Region. 3P(3 ♀), summer, 1958, Levanidova.

South Sakhalin. 1 ♂, a brook of Bryuanka R. Basin, 25. VI. 1985, Makarchenko (4656). 1 ♂, Belaya R., 8. VIII. 1986, Makarchenko (4384). 4 ♂ 2 ♀, a stream at Novoalexandrovsk Town, 12. VIII. 1973, Zhiltzova (853). 1 ♂, "Vodopad" Spring of Belaya R. Basin, 25. VII. 1986, Makarchenko (4488). Anivskii Region: 1 ♂ 1 ♀, 25. VI. 1985, Vshivkova (4085), FB; 1 ♂ 2 ♀, 9. VII. 1989, Bosarukin (5306), FB.

Distribution. Amur-Ussuri River Basin, North and South Primorye, South Sakhalin and Tsushima.

Goerodes kurentzovi (Martynov)

Dinarthrodes kurentzovi Martynov, 1935, 392–395, fig. 195, ♂; Fischer, 1970, 14; Tani 1977, 200, ♂; Levanidova, 1982, 93; Ito, 1989, 46–50, figs. 1–2, ♂, ♀, larva, case.

Goerodes kurentzovi: ITO, in press.

South Primorye. 2 ♂ 1 ♀, Lyanchikhe R., 18. VIII. 1955, LEVANIDOVA (1473). 1 ♂, near Vladivostok, 17. VIII. 1955, LEVANIDOV (1474). 1P(♂), Komissarovka R., 8. VIII. 1989, LUKYANCHENKO (4940).

"Kedrovaya Pad" Reserve. Biostation: 1 ♀, 4. VIII. 1973, VSHIVKOVA (298); 2 ♂ 2 ♀, 5. VIII. 1983, KONONENKO & NADEZHDINA (307). Kedrovaya R.: 1 ♀, 21. VII. 1973, NADEZHDINA (261); 1 ♂, 10–31. VIII. 1973, NADEZHDINA (391).

Ussurisky Reserve. 1 ♂ 1 ♀, Biostation, 17–22. VII. 1991, ITO.

Lazovsky Reserve. 1 ♂, 5. VIII. 1985, GOSTYUKHINA.

Ussuri River Basin, Upper Part. 1 ♂. 16. VI. 1976, light trap, VSHIVKOVA (1688). 1 ♀, 7. VIII. 1976, VSHIVKOVA (1624).

North Primorye. Yedinka R.: 2 ♂ 4 ♀, 12. VIII. 1985, KOSOLAPOV (4035); 1P(♂), 14. VII. 1986, KORIONOV (3310); 8 ♀, 12. VIII. 1985, KOSOLAPOV. 1 ♂ 1 ♀, Samarga R., 19. VIII. 1976, SEMENCHENKO.

Shikhote Alinsky Reserve. 7 ♂ 7 ♀, Serebryanka R., 10. IX. 1980, POTIKHA (127). Dzhigitovka R.: 6 ♂, 17. VIII. 1987, POTIKHA (560); 1 ♂ 1 ♀. 9. IX. 1987, POTIKHA (601).

Ussuri River Basin, Lower Part. Khor R.: 1 ♀, 28. VIII. 1949, LEVANIDOVA; 1 ♂, 3–6. VII. 1950, LEVANIDOVA; 2 ♂ 2 ♀, 22. VII. 1950, LEVANIDOVA, FB; 1 ♂, 19. VII. 1950, LEVANIDOVA; 1 ♂, 12–13. VI. 1951, LEVANIDOVA; 1P(♀), 7–8. VII. 1990, MEDVEDEVA (4680).

South Sakhalin. 1 ♂, Pravda Village, 26. VII. 1971, NARCHUK.

Kunashir. 10 ♂ 2 ♀, an area of Peschanoye, along the stream and on the lake bank, 10. VII. 1962, KRIVOLUTSKAYA & AZAROVA, FB. 1 ♂ 2 ♀, Lake Goryachee, in tall herbaceous vegetation, 19. VII. 1962, AZAROVA, FB. 1 ♂, a spring near Kipjashee Lake (Bubbling Lake), 24. VII. 1973, ZHILTZOVA (1000).

Distribution. Ussuri River Basin, North and South Primorye, South Sakhalin, Kunashir and Tsushima.

Goerodes sinuatus (MARTYNOV)

(Figs. 1–2)

Crunobiodes sinuata MARTYNOV, 1935, 208, 376–379, figs. 182–185, ♂.

Goerodes sinuatus: FISCHER, 1970, 24; LEVANIDOVA, LEVANIDOV & MAKARCHENKO, 1977, 22; LEVANIDOVA, 1982, 93; LEVANIDOVA, TESLENKO & LUKYANCHENKO, 1988, 22.

South Primorye. Partizanskaya R. Basin, Frolovka R.: 2 *5th*, 25. VIII. 1984, KORIONOV (3067); 1 *5th*, 11. X. 1984, LUKYANCHENKO (3766); 1 *5th*, 9. VII. 1986, MASLOV (4460). 4 *5th*, Gulf of Peter Great, Pelis Island, a spring, 3. X. 1983, LEVANIDOVA (3206). Russky Island, a spring: 9 *5th*, 17. VIII. 1977, VSHIVKOVA (1850); 3 *5th*, 29. III. 1978, VSHIVKOVA (1843), FB; 2 *5th*, 30. III. 1978, VSHIVKOVA (1842). 2 ♂, Gamov Cape, Telikovsky Bay, Vtoroy Spring, 30. VI. 1988, VSHIVKOVA (3818). 7 *5th*, Phurugelma Island, a spring, 29. IX. 1983, LEVANIDOVA (3210). 2

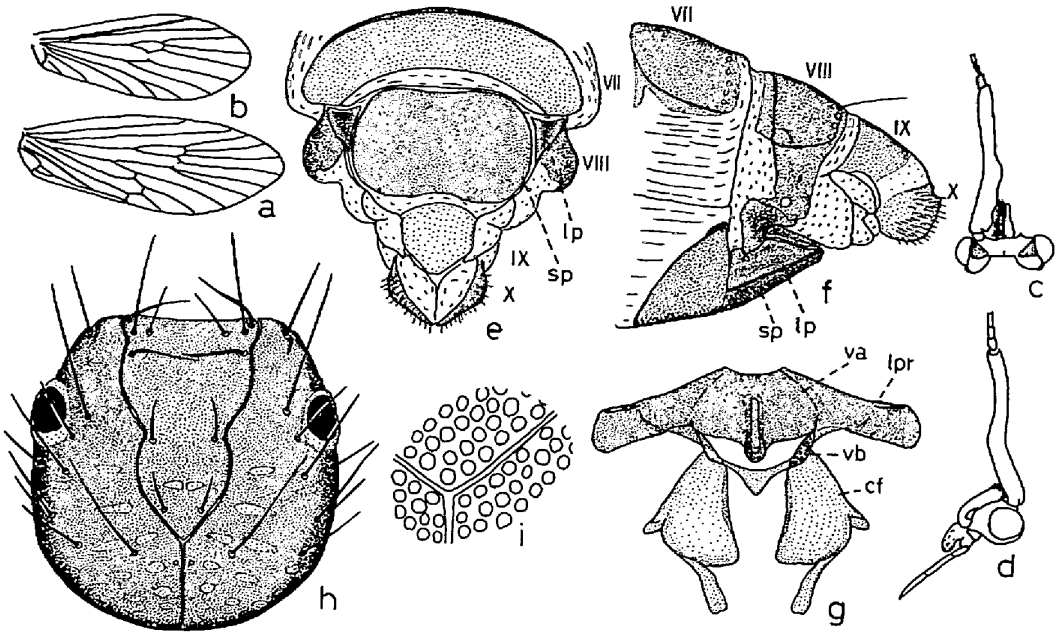

Fig. 1. Female (a–g) and head of 5th instar larva (h–i) of *Goerodes sinuatus*. —— a, Fore wing; b, hind wing; c, head, mouth parts and 1st to 4th segments of antenna, dorsal view; d, same, lateral view; e, posterior part of abdomen, ventral view; f, same, lateral view; g, inner organ, ventral view; h, head; i, granules on dorsum of head. Abbreviations: VII-X, 7th to 10th segments; lp, lateral plate; sp, subgenital plate; va, vaginal apparatus; lpr, lateral projections; vb, ventral bridge; cf, connecting folds.

5th, spring near Vladivostok, 14. X. 1974, Levanidova (117). Dmitrievka Village, a spring: 14P(6 ♂ 8 ♀) 3PP 32 *5th*, 10. VII. 1989, Lukyanchenko (4925); 5 *5th*, 10. VII. 1989, Lukyanchenko (4925), FB; 2P (1 ♂ 1 ♀), 2. VIII. 1989 Lukyanchenko (4926); 4 ♂ 3 ♀, 10. VII. 1989, Arephin (4932), FB.

"*Kedrovaya Pad*" *Reserve*. Unknown locality: 1 ♂, 30. VII. 1973, Nadezhdina (203); 1 ♂, 18. VII. 1975, Zhiltzova (1251). Goraisky Stream: 1 ♂, 10. VIII. 1973, Vshivkova (311); 1 ♂ 1PP 7 *5th*, a small spring, 11. VII. 1991, Ito. Kascadny Stream: 12 ♂ 32 *5th*, 2–9. VII. 1973, Levanidova & Vshivkova (220, 223, 224, 230, 989); 3 ♂, 13–22. VIII. 1973, Nadezhdina (324, 368); 2 *5th*, 12. IX. 1973, Vshivkova (412-A); 2 ♂ 1 ♀, 25. VII. 1975, Zhitzova (1249); 9 *5th*. 10. XI. 1975, Nikolaeva (1616); 2 ♀, 28. VI. 1990, Lukyanchenko (4957); 4P(2 ♂ 2 ♀) 5PP, 2. VII. 1990, Lukyanchenko (4968). 2 ♀ 7 *5th*, small springs of Kedrovaya R., 11. VII. 1991, Ito.

Ussurisky Reserve. Near source of Komarovka R.: 1PP 1 *5th*, 18. VII. 1983, Vshivkova (3233); 2 ♂ 1 ♀, 25. VIII. 1983, Vshivkova (3428); 5 *5th*, 27. X. 1983, Vshivkova (3230); 1 *5th*, 22. VII. 1984, Vshivkova (3580); 7 *5th*, 23. XI. 1984, Vshivkova (3955); 3 *5th*, 17. VII. 1991, Ito. A small spring near source of Komarovka R.: 3 *5th*, 18. VII. 1983, Vshivkova (3233); 6 *5th*, 25. VIII. 1983, Vshivkova

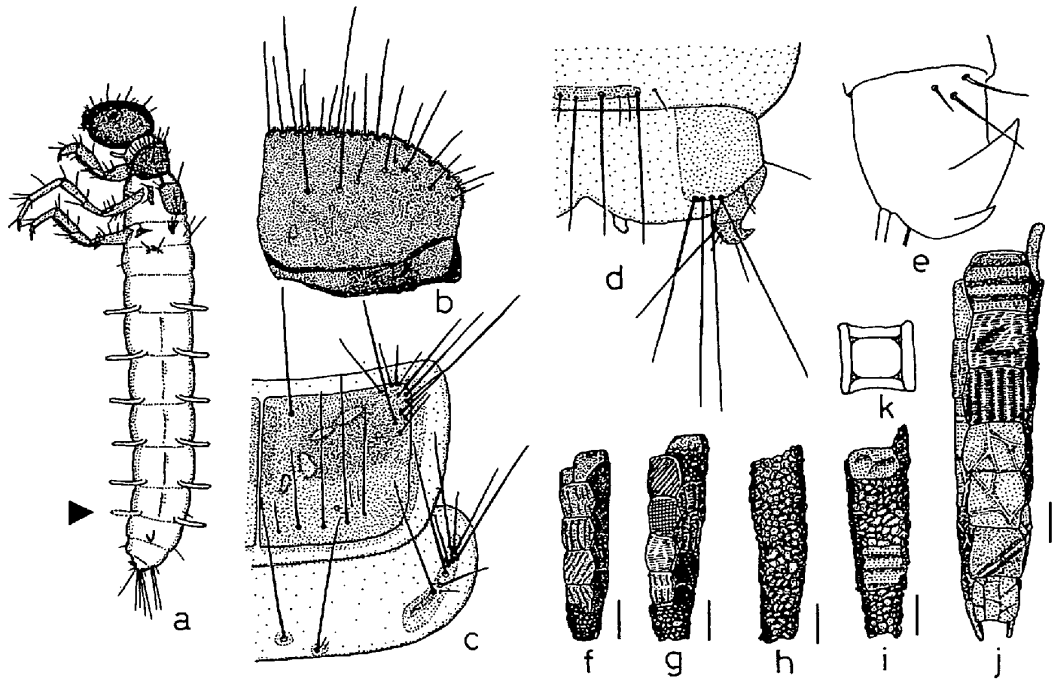

Fig. 2. Fifth instar larva (a–e) and case of larva (f–k) of *Goerodes sinuatus*. —— a, Body, arrow, see text; b, pronotum; c, meso- and metanota; d, posterior parts of abdomen; e, anal claw, inner-ventral view; f–i, cases of early period of fifth instar larva; j, case of full grown larva (scales for f–j: 1 mm); k, posterior end of case of fifth instar larva.

(3425).

Ussuri River Basin, Upper Part. Sokolovka Pravaya R.: 1 ♂ 3 ♀, 31. VII. 1975, ZHILTZOVA (1224); 1 *5th*, 28. VIII. 1976, VSHIVKOVA (1962).

Distribution. South Primorye and Jilin (=Kirin).

Female (Fig. 1). Fore wing (Fig. 1 a), ca. 7 mm long and ca. 2.5 mm wide; discoidal and thyridial cells ca. 2 mm long; apical forks I, II, III and V present. Hind wing (Fig. 1 b) ca. 6 mm long and ca. 2.3 mm wide; discoidal cell 1 mm long and thyridial cell open; apical forks I, II and V present, but fork V absent in some specimens.

Body brown and ca. 5.5 mm long. Antenna ca. 6.5 mm long; the first segment (Fig. 1 c–d) long, ca. 4 times as long as head. Eighth tergite (Fig. 1 f) with an irregular concavity at antero-lateral margin; a light colour dot present near lateral margin. Ninth and 10th tergites (Fig. 1 f) separated and 10th tergite lighter than the 9th. Lateral plate (Fig. 1 e–f) triangular and sclerotized. Subgenital plate (Fig. 1 e) large and subsquare with round corners; lateral margin convex, anterior and posterior margins gently concave. Internal apparatus (Fig. 1 g):— Vaginal apparatus heavily sclerotized and rhomboidal with large lateral projections; lateral projections long, about 2/3 as wide as vaginal apparatus, and its lateral margin broad; ventral bridge thin with a convexity at middle; connecting folds rhomboidal

with a small convexity at middle of each lateral margin.

Larva (Figs. 1–2). Head width and body length: 0.8–0.9 mm and 3.5–5.5 mm in 5th instar larvae; 0.5–0.6 mm and 2.5–4.0 mm in the 4th. Abdominal gills present near posterior margin of subdorsal and subventral rows of 2nd to 7th segments (Fig. 2 a); a gill of subventral row of 7th segment absent in about a half of the specimens examined (Fig. 2 a, arrow). Numerous short spines present on whole surface of dorsum of head of 4th instar larvae, and numerous small granules present on those of 5th instar larva (Fig. 1 i). Other features of larvae of this species are similar to those of *G. kurentzovi* (Ito, 1989) and principal parts of this species are figured in Figs. 1 h–2 e.

Case (Fig. 2). Length: 4.0–10.5 mm in 5th instar larvae; 2.5–6.5 mm in the 4th. Larvae change their case materials and shape from sand cylinder to leaf foursided at the latter half of the 4th instar or early half of the 5th instar (Fig. 2 f–k); at a site, almost all larvae change the materials at the 4th instar, but at another site, about two-thirds of larvae change the materials at the 5th instar. About a tenth of larvae change the materials three times (Fig. 2 i), *i.e.*, sand particles to leaf pieces at first, next leaf to sand and finally sand to leaf again.

Habitat. Larvae of this species live in small (under 100 cm in width) and shallow (under 3 cm in deep) water flow of spring and near source of streams.

Goerodes complicatus (Kobayashi)

Dinarthrodes complicata Kobayashi, 1968, 8, pl. 4, ♂; Tani, 1971, 67–69, fig. 13, ♂, wings of ♀; Ito, 1978, 575–581, figs. 1–3, larva, case; Ito, 1980, 313–316, life cycle; Kobayashi, 1984, 18, figs. 25–31, ♂, ♀.

Goerodes complicatus: Ito, 1984 b, 507–514; Ito, 1985 b, 263–264, figs. 1, 3, ♀, pupa, larva.

North Primorye. 1 ♂, Yedinka R., 11. VIII. 1986, Korionov (4573).

Kunashir. Unknown locality: 2 ♂, 26. VII. 1974, Bodrova (1052); 3 ♂, 2. VIII. 1974, Bodrova (1091), FB; 2 ♂, 28. VIII. 1974, Bodrova (1095); 4 ♂ 4 ♀, 20. VIII. 1988, Bosarukin, FB. Alyochino Village, a cold spring: 1 ♂, 30. VII. 1973, Zhiltzova (757); 1 ♂, 27. VII. 1973, Zhiltzova (1001); 1 *5th*, 4. VI. 1976, Levanidova (1383). 3 *5th*, Lebediny Stream, 21. V. 1976, Makarchenko. Filatovka R.: 1 ♂ 1 ♀, 6. VIII. 1986, Tiunova, FB; 2 *5th*, 15. VI. 1989, Tiunova (4681). 6 *5th*, Shtolny Spring, Zolotaya R. Basin, 24. VI. 1989, Tiunova (4677, 4678). 2 ♂ 1 ♀, near Golovnina Volcano, a brook near Hot Lake, 24. VII. 1973, Levanidova (712); 4 ♂ 4 ♀, 20. VIII. 1988, Bosarukin, FB. Medeleevo Village, Tyurino R.: 2 *5th*, 22. IV. 1978, Chereshnev (1815); 13 *5th*, 26. IV. 1978, Vshivkova (244). 4 *5th*, Alyekhin's Cascade, 1. VI. 1976, Levanidova (1138). Tretyakovo Village, Valentin's R.: 2 ♀, 3. VII. 1973, Zhiltzova (987); 1 ♂, 27. VI. 1976, Ermolenko, FB. 1 *5th*, Vinay R. Basin, 24. VII. 1974, Bodrova (1527). 4 ♂ 1 ♀, near Peschanoe Lake, 10. VIII. 1962, Azarova & Krivolutskaya (5505), FB. 3 ♂, Nazarovo Village, 2. VIII. 1974, Bodrova (1091).

Distribution. North Primorye, Kunashir, Hokkaido, Honshu, Shikoku and Kyushu.

Goerodes satoi (KOBAYASHI)

Dinarthrodes satoi KOBAYASHI, 1968, 9–10, pl. 5, ♂; ITO, 1978, 581–582, fig. 4, ♂, larva, case; ITO, 1980, 313–316, life cycle.
Gen. *satoi*: TANI, 1978, 10–11, fig. 4, ♂.
Goerodes satoi: ITO, 1984 b, 507–514; ITO, 1985 b, 266–268, figs. 2–3, ♀, pupa, larva.

Kunashir. 1 ♂ 1 ♀, Balychev Stream, 100 m above the confluence into Filatovka R., 16. VI. 1989, TIUNOVA (4894). 1 ♂ 3 ♀, Alyochino Village, a waterfall, 9. VI. 1976, VSHIVKOVA (1340). 2 ♂ 1 ♀, Alyochino Village, a spring, 1. VI. 1976, VSHIVKOVA (1137), FB. 1 *5th*, Mendeleyevo Village, Tyurino R., 22. IV. 1978, CHERESHNEV (1815). 1 ♀, Golovnin's Volcano, a spring, 6. VI. 1976, VSHIVKOVA (1363). 1 ♀, near source of Chaika R., 23. VI. 1989, TIUNOVA, FB.

Shikotan. 1 ♀, Zerkovnaya Bay, 23. VII. 1976, unknown collector.

Distribution. Kunashir, Shikotan, Hokkaido and Honshu.

Goerodes hiurai (TANI)

Crunoeciella hiurai TANI, 1971, 53–54, fig. 5, ♂, wings of ♀; TANI, 1977, 200, ♂.
Goerodes hiurai: ITO, 1984 b, 507–514; ITO, 1985 a, 12–16, figs. 1–2, ♀, pupa, larva, case, habitat, life cycle.

Amur River Basin. 1P(♂), U1 R., 25. VII. 1956, LEVANIDOV (158).

South Sakhalin. Okhinsky Region: 1 ♂, 3–7. IX. 1990, BOSARUKIN (5297); 1 ♀, 8–17 IX. 1990, BOSARUKIN (5294), FB. 1 ♀, Anira Village, Lutoga R., 4. VII. 1973, VSHIVKOVA, FB. Belaja R. Basin: 1 ♀, 30. VI. 1985, VSHIVKOVA (4065), FB; 1 ♂, 27. VI. 1986, VSHIVKOVA (4382); 1 ♂, 6. VII. 1986, VSHIVKOVA (4478), FB. 1 ♂, Novoaleksandrovsk Town, 11. IX. 1976, ERMOLENKO, FB.

Kunashir. Unknown locality: 2 ♂ 2 ♀, 9. VII. 1973, ZHILTZOVA (862), FB; 2 ♂, 24. VII. 1974, BODROVA (1096). 3 ♂ 2 ♀, South Kurilsk, a stream, 11. VII & 11. VIII. 1973, ZHILTZOVA (852). 1 ♀, a spring, 19. VII. 1974, ZHILTZOVA (1005). 1 ♂, Lesnaya R., 12. VI. 1976, VSHIVKOVA (1328).

Iturup. 1 ♀, near vicinity, 22–23. VI. 1989, BOSARUKIN (5310), FB.

Distribution. Amur River Basin, South Sakhalin, Iturup, Kunashir and Hokkaido.

Goerodes naraensis (TANI)

Crunobiodes naraensis TANI 1971, 58–60, fig. 8, ♂, wings of ♀; TANI, 1977, 200, ♂.
Goerodes naraensis: ITO, 1984 b, 507–514; ITO, 1985 c, 199–211, geographical variation of ♂, ♀, larva, case, habitat, life cycle.

Kunashir. Alyochino Village, "Bay of sulfate sources": 1 ♂, 2. VI. 1976,

Vshivkova (1125); 1 ♂, 5. VI. 1976, Makarchenko (1366). 1 ♀, Alyochino Village, a spring, 2. VI. 1976, Vshivkova (1127).

Distribution. Kunashir, Hokkaido, Honshu and Kyushu.

Neoseverinia crassicornis (Ulmer)

Severinia crassicornis Ulmer, 1907 a, 35–37, figs. 54–59, ♂, wings and scape of antenna of ♀; Ulmer, 1907 b, 105, figs. 119–120, wings of both sexes.

Neoseverinia crassicornis: Ulmer, 1908, 343; Tsuda, 1936, 403–405, figs. 18–26, larva, case; Fischer, 1970, 26–27; Tani, 1971, 54–55, fig. 6, ♂, wings of ♀; Tani, 1977, 200, ♂; Ito, 1983 a, 207–213, figs. 1–3, geographical variation of ♂, ♀, pupa; Ito, 1983 b, 322–326, figs. 1–3, larva, case, habitat, life cycle.

South Sakhalin. 2 *4th*, Peschanaya R., Belaya R. Basin, 6. VII. 1989, Vshivkova (4788). 3 *4th*, Otoveshii Tributary of Pechanya R., 6. VII. 1989, Vshivkova (4788). 1 ♀, South Sakhalinsk, 9. VIII. 1985, Bosarukin (5364), FB.

Kunashir. 1 ♀, unknown locality, 2. VII. 1973, Zhiltzova. 1 ♀, Golovnin's Volcano, a spring, 7. VI. 1976, Makarchenko (1354). 1 ♂, near Mendeleebo, 9. VI. 1968, Savchenko (5517), FB. 1 ♂, South Kurilsk, 10. VII. 1973, Zhiltzova (1002), FB. Mendeleevo Village, a cold spring: 1 *4th*, 22. IV. 1978, Levanidova & Chereshnev (2416); 1 *4th* 2 *3rd*, 22. IV. 1978, 5.6°C WT, Levanidova & Chereshnev (2339). 1 *4th*, Sernovodsk, coming from underground waters, 27. IV. 1978, Levanidova (2350).

Distribution. South Sakhalin, Kunashir, Hokkaido, Honshu, Kyushu and Sado.

Dinarthrum stellatum Ito

Dinarthrum stellatum Ito, 1984 a, 12–15, figs. 6–7, ♂♀, larva, case, habitat, life cycle; Mey, 1991, 197, record from South Sakhalin.

Kunashir. Sernovodsk Village: 4 *5th* 4 *4th*, 24. IV. 1978, Levanidova (1826); 5 *5th*, 24. IV. 1978, Makarchenko (2412), FB. 2 *5th*, Tyurino R. Basin, 24. IV 1978, Levanidova (2400).

Distribution. South Sakhalin, Kunashir and Hokkaido.

Geographical Distribution and Discussion

Ten species of the Lepidostomatidae have been collected from the Russian Far East (Table 1); only one of them, *Lepidostoma hirtum*, is common with the European and central parts of Russia (Lepneva, 1966), and 8 species excluding *L. hirtum* and *Goerodes sinuatus* are common to Japan (Ito, 1987, 1989). Since our field trips to Iturup and Shikotan Islands were very brief, we discuss about lepidostomatid species in other districts.

Lepidostoma hirtum is widely distributed from England to Amur (Fischer,

Table 1. Distribution of the Lepidostomatidae in the Russian Far East.
(+, present; R, only one record for over ten collecting trips)

Locality	South Primorye					North Primorye		Amur-Ussuri River Basin		Peripheral Islands			
Species	"Kedrovaya Pad" Reserve	Ussurisky Reserve	Lazovsky Reserve	Ussuri R. Basin, upper part	Other watercourses	Shihote Alinsky Reserve	Other watercourses	Ussuri R. Basin, lower part	Amur R. Basin	South Sakhalin	Iturup	Kunashir	Shikotan
*L. hirtum**					R		+	+	+				
G. elongatus	+	+	+	+	+	+	+	+	+	+			
G. kurentzovi	+	+	+	+	+	+	+	+		+		+	
G. sinuatus	+	+		+	+								
G. complicatus							R					+	
G. satoi												+	+
G. hiurai									R	+	+	+	
G. naraensis												+	
N. crassicornis										+		+	
D. stellatum										+		+	
Number of Species	3	3	2	3	4	2	4	3	3	5	1	7	1

* We also presented the records of this species from the surroundings of Lake Baikal and Altai Region (see text).

1970), and rather common in the Amur River Basin and North Primorye, but is very scarce in South Primorye and has not been collected in the peripheral islands. Of the 10 lepidostomatids, this is the species most advanced towards the North (Lena River Basin, Okhotsk Shore) (LEVANIDOVA, 1982). *G. elongatus* is the commonest in the southern part of the Far East, including South Sakhalin, but not collected from Kunashir. *G. kurentzovi* is also common in South Primorye, North Primorye and the Ussuri River Basin and also occurs in South Sakhalin. *G. kurentzovi* was also collected from Kunashir, and this is the only species which is not common between Kunashir and Hokkaido, northern Japan. *G. sinuatus* is very common in small mountain streams and springs of South Primorye but absent in other districts of the Far East. It is also known in Jilin Province, northeastern China (ITO, in press).

Goerodes complicatus, one of the commonest trichopterans of northern Japan, is also popular in Kunashir, and a male was collected from North Primorye (Yedinka River). *G. satoi*, one of the most popular late-spring or early-summer species of

Japan, was collected from Kunashir only. *G. hiurai*, an inhabitant of wetland and lowland rivers of Hokkaido, is common in South Sakhalin and Kunashir, and a male pupa was collected from the Amur River Basin (Ul River). *G. naraensis*, an inhabitant of small brooklets in a wide area from southern Hokkaido to Kyushu of Japan, was recorded only in Kunashir. *Neoseverinia crassicornis*, the commonest species in small springs of Japan, is present in cold springs of South Sakhalin and Kunashir, generally together with *Allomyia* (=*Imania*). And *Dinarthrum stellatum*, an inhabitant of small brooklets of northeastern Hokkaido, was collected from Kunashir and recently recorded from South Sakhalin (MEY, 1991).

The number of the Lepidostomatidae recorded until now is 4 in South Primorye, 4 in North Primorye, 4 in the Amur-Ussuri River Basin, 5 in South Sakhalin and 7 in Kunashir, respectively. In comparison with 5 species in the European and central parts of Russia (LEPNEVA, 1966), the Lepidostomatidae are more diverse in the Far East. LEVANIDOVA *et al.* (1988) already pointed out that the aquatic insect fauna of the Far East greatly differs from that of the European parts and is extremely diverse.

Since we have intensively studied in "Kedrovaya Pad" Reserve, Ussurisky Reserve, South Primorye and Kunashir Island, we will discuss about the faunas of the four districts in comparison with those of some regions of Hokkaido.

Three species, *G. elongatus*, *G. kurentzovi* and *G. sinuatus*, have been recorded from each of "Kedrovaya Pad" Reserve (Kedrovaya River Basin) and Ussurisky Reserve (Komarovka River Basin). On the other hand, 5 to 8 species of the Lepidostomatidae usually live in rivers of Hokkaido. For example, 6 species, *G. complicatus*, *G. satoi*, *G. nukabiraensis*, *G. naraensis*, *N. crassicornis* and *D. robustum*, have been collected from the Atsuta River, Atsuta-mura, Hokkaido, and 8 species, *G. complicatus*, *G. satoi*, *G. nukabiraensis*, *G. bipertitus*, *G. japonicus*, *G. hiurai*, *N. crassicornis* and *D. stellatum*, have been recorded in Nobusha River, Mashike-cho, Hokkaido (ITO, 1983 c and unpubl.). Latitude, altitude of river sources and drainage areas of the four rivers are rather similar, with the exception of the large drainage area of the Komarovka River, *i.e.*, 43°28′N, ca. 420 m and ca. 150 km² for the Atsuta River, 44°47′N, ca. 800 m and ca. 140 km² for the Nobusha River, 43°11′N, ca. 600 m and ca. 200 km² for the Kedrovaya River (LEVANIDOVA *et al.*, 1977; VSHIVKOVA, unpubl.), and 43°40′N, ca. 360 m and ca. 1,500 km² for the Komarovka River (VSHIVKOVA, unpubl.).

Lepidostomatid species of South Primorye are also distinctly fewer than those of central and eastern parts of Hokkaido; *i.e.*, 4 speices in South Primorye and 8 species in central and eastern Hokkaido (ITO, 1987). And latitude, altitute of the highest mountain, and area are approximately similar between the two regions; 42.5–45.5°N, 1885 m and 75,000 km² in South Primorye, and 42–44.5°N, 2290 m and 65,000 km² in central and eastern Hokkaido.

Consequently, we can say that the Lepidostomatidae of "Kedrovaya Pad" and Ussurisky Reserves and South Primorye are less diverse than those of geogra-

phically similar regions of Hokkaido, *i.e.*, Atsuta and Nobusha Rivers and central and eastern Hokkaido, respectively.

Seven species have been recorded from Kunashir Island, in spite of the small area of the island (ca. 1,500 km^2 and 1/50 of South Primorye), and 6 of the 7 are common to Hokkaido. The Nemuro Straits between Kunashir and Hokkaido are relatively shallow (10–20 m deep). According to the sea-level curve (SHAKLETON, 1987), the two islands were a continuous land during over a hundred thousand years and separated by the sea about nine thousand years ago. Since the two islands are very close to each other (ca. 30 km) even after the separation, some lepidostomatid adults could migrate from Hokkaido to Kunashir or vice versa within several thousand years.

This supposition about the migration is based on the fact observed in Yakushima Island, southern Japan. About six thousand years ago, tephras of volcanic eruption wholly covered the island and destroyed aquatic insects except those under snow of extremely high mountains (KUROSAWA, 1987). At the present time, *Goerodes japonicus* and *G. toyotamaensis* live in middle and lower parts of rivers of the island (ITO, 1990); they may have migrated from Kyushu across the Ohsumi Straits (ca. 65 km) within about six thousand years.

It is therefore probable that relatively large diversity of the lepidostomatid fauna of Kunashir may be due to the topographical history of the island and/or to its short distance from Hokkaido. TATEWAKI (1933) and KUWAYAMA (1967) surveyed the flora and the insect fauna of Kunashir, respectively, and pointed out that the flora and the insect fauna of Kunashir were very similar to those of Hokkaido. KUWAYAMA (1967) also stated that the rich insect fauna of Kunashir may depend on dense and complex growth of plants.

Since our study has not been completed yet, some lepidostomatid species will be newly recorded from the Russian Far East. We will discuss about the fauna again in the future.

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