

A new species of *Oncopsis* from the *O. flavicollis* (Linnaeus, 1761)
species group (Homoptera: Cicadellidae: Macropsinae)
from Eastern Siberia

Новый вид *Oncopsis* группы *O. flavicollis* (Linnaeus, 1761)
(Homoptera: Cicadellidae: Macropsinae) из Восточной Сибири

D.Yu. Tishechkin
Д.Ю. Тишечкин

Department of Entomology, Faculty of Biology, M.V. Lomonosov Moscow State University, Vorobyevy Gory, Moscow 119991, Russia.
E-mail: macropsis@yandex.ru

Кафедра энтомологии Биологического факультета Московского государственного университета имени М.В. Ломоносова, Воробьевы Горы, Москва 119991, Россия.

KEY WORDS: *Oncopsis*, Cicadellidae, Macropsinae, taxonomy, new species, vibratory signals.

КЛЮЧЕВЫЕ СЛОВА: *Oncopsis*, Cicadellidae, Macropsinae, систематика, новый вид, вибрационные сигналы.

ABSTRACT. *Oncopsis burjatika* Tishechkin **sp.n.** from Eastern Siberia is described and illustrated. Oscillograms of calling signals of the new species and of closely related *O. flavicollis* and *O. subangulata* are provided.

РЕЗЮМЕ. Приведено иллюстрированное описание *Oncopsis burjatika* Tishechkin **sp.n.** из Восточной Сибири. Представлены осциллограммы призывных сигналов нового вида и близкородственных *O. flavicollis* и *O. subangulata*.

Palaeartic species of the genus *Oncopsis* Burmeister, 1838 (Homoptera: Cicadellidae: Macropsinae) can be classified into two groups. *O. flavicollis* (Linnaeus, 1761) species group is characterized by penis with concave ventral edge in lateral view. Five species of this group were recorded from Palaeartic. The range of *O. carpini* (J. Sahlberg, 1871) feeding on *Carpinus* includes Western Europe, Crimea and Caucasus. *O. subangulata* (J. Sahlberg, 1871) dwelling on birches occurs in Europe, Northern Kazakhstan and Western Siberia. *O. avellanae* (Edwards, 1920) from *Corylus avellana* L., treated as a separate species by Claridge and Howse [1968], and Claridge and Reynolds [1973] basing on analysis of male courtship signals was found only in Britain and Netherlands. Distribution of *O. tsejensis* Tishechkin, 1992 is restricted to North Caucasus, the host plant of the species is *Alnus incana* (L.) Moench. *O. flavicollis* was believed to be widespread throughout all Palaeartic from Western Europe to the Russian Far East and Japan.

Variability of male genitalia and colour polymorphism in females led the authors to suggest that *O. flavicollis* is a complex of closely related biological species. Claridge and co-authors performed extensive

study of the problem in Britain, still they failed to obtain an unambiguous results. The study of a chromosome polymorphism revealed two male forms with respect to sex chromosome system, dwelling on *Betula pendula* (Roth) and *B. alba* L. (= *B. pubescens* Ehrh.) respectively [John & Claridge, 1974]. Investigation of distribution of female colour morphs on two abovementioned birch species in several localities in Britain demonstrated that proportions of morphs on *B. pendula* and *B. alba* is different, moreover, certain morphs demonstrate strong preference to one of two hosts [Claridge & Nixon, 1981] Oviposition experiments do not show complete discrimination between the two hosts by population from *B. pendula* and *B. alba*, however [Claridge et al., 1977].

Further researches have not clarified the situation. Comparative analysis of apodeme morphology in males of *O. subangulata* and *O. flavicollis* revealed three distinct forms in the latter species. Also, they differed partially in distribution (form 3 was not found in South Wales) and host preference (form 1 was found dominantly on *B. alba* and form 3 on *B. pendula*) [Claridge & Nixon, 1986]. Analysis of calling and courtship signals led the authors to conclude that all three forms are biological species. Still, they have not associated these species with existing available names, designating them as *O. flavicollis* 1, 2 and 3.

Oscillograms of calling signals of *O. flavicollis*, *O. tsejensis* and *O. subangulata* from the territory of Russia and of *O. carpini* from Crimea were presented in our papers [Tishechkin, 1992, 2003]. Signals in these species as well as in other Cicadellidae are rather variable in temporal pattern. However, only two oscillograms at different speeds are given for each *O. flavicollis* form in Claridge and Nixon [1986]. For this reason comparison

of our recordings with these from Britain presents many difficulties.

We have studied signals of *O. subangulata* from Moscow Area and of *O. flavicollis* from Moscow Area and Altai Mts. [Tishechkin, 2003]. All the material was collected from *B. pendula*. *O. subangulata* from Russia and Britain are similar both in morphological and acoustic characters. Our specimens of *O. flavicollis* from Moscow Area and Altai Mts. are identical in the shape of second dorsal abdominal apodemes of males and fall into *O. flavicollis* 3 sensu Claridge and Nixon [1986] in this character. In the structure of calling signals they are most similar with *O. flavicollis* 2, however. On the other hand, differences in signal temporal pattern (but not in the shape of apodemes) between *O. flavicollis* 2 and 3 is not great. Since the status of British forms is still unclear and their valid names are unknown, in our papers we use the name *O. flavicollis* for the form with apodemes as in *O. flavicollis* 3 sensu Claridge and Nixon [1986] feeding on *B. pendula* and producing signals as described in Tishechkin [1992, 2003] and in the present article. Such treatment of this species is in good agreement with present day taxonomic works [e.g. Ossiannilsson, 1981]

In populations of *O. flavicollis* from European Russia, Northern Kazakhstan and adjacent territories of Western Siberia (West-Siberian plane, Altai Mts.) bright-yellow females — *O. flavicollis* forma *dubia* (Fieber, 1868) — necessarily present, but they were never found in Eastern Siberia. So it was reasonable to assume that in this region *O. flavicollis* is replaced with another species. Investigation of calling signals in population of *O. gr. flavicollis* from *B. pendula* in southwestern Buryatia supported this suggestion and allowed to reveal a new species described below.

Oncopsis burjatika Tishechkin sp.n.

Figs 1–14, 21–25, 29–39

MATERIAL. Holotype, ♂ — Eastern Siberia, Buryatia, the valley of Irkut Riv. 3–4 km west of Mondy Village (80 km west of Kyren), 3.VII.2007, from *Betula pendula* Roth. Paratypes, same locality and host plant: 28–29.VI.2007 — 7 ♂♂, 2 ♀♀; 2.VII.2007 — 4 ♂♂, 1 ♀; 3.VII.2007 — 22 ♂♂, 19 ♀♀, 8 nymphs; Transbaikalia, Chita, beyond Ingoda River, 11.VI.1912, Gel'tman — 1 ♂; Transbaikalia, Chita, 10.VI.1912, Gel'tman — 1 ♂. Type series is deposited in the Zoological Museum of M.V. Lomonosov Moscow State University, several paratypes are also in Zoological Institute of the Russian Academy of Sciences (St.-Petersburg). Vibratory calling signals of 8 ♂♂ including holotype from the valley of Irkut Riv. were recorded at the temperature 18 and 21–24 °C.

DESCRIPTION. Nymph is similar with this of *O. flavicollis* [see Vilbaste, 1982], brown, dark pattern on face is almost indistinguishable.

Male in coloration is similar with *O. flavicollis* (Figs 1–2). Vertex with dark transverse stripe and two black spots at

its margins. Sometimes the spots are merged with the stripe and are almost indistinguishable against it. Face pale-yellow with dark pattern consisting of small ocellar spots and a large horseshoe-shaped central spot connected by short longitudinal band with the stripe on vertex (Figs 6–8). The ends of the spot usually are weakly pigmented and sometimes are almost indistinguishable (Figs 6–7). Pronotum with two black spots on the fore margin next to eyes and with more or less darkened central part. Scutellum with black triangular spots in side angles, widely darkened median line and two round spots on both sides of it (Figs 1–2). The end of scutellum is also darkened. In strongly pigmented specimens scutellum is almost entirely black, only two spots in the middle of side margins remain pale-yellowish (Fig. 1). Fore wings are transparent with black veins. Hind margin of clavus is whitish proximally and distally of the ends of claval veins. Membrane is more or less darkened around the ends of claval veins, at the end of clavus, around transverse veins and in the apical part of the wing.

Second dorsal abdominal apodemes of males are of about equal length and width, with widely rounded lobes in frontal view (Figs 9–14). As it is visible distinctly in ventral view, the lobes are strongly bent caudally (Figs 21–25). In the shape of anal collar appendages (Figs 29–32), second ventral apodemes, penis (Figs 33–34) and styli (Figs 35–36) the new species is indistinguishable from *O. flavicollis*.

In females two different colour variations occurring at equal proportions (represented in our material by 11 specimens of 22 each) exists (Figs 3 and 4–5). The first form is similar with male, but usually have less developed dark pigmentation (Fig. 3). For this reason dark pattern on the dorsal side of a body as a rule is not black, but brown or greyish. The second form is reddish brown with whitish inner angles of clavus and transparent areas in the costal half of wings between transverse veins (Figs 4–5). In specimens with most contrasting coloration pronotum and scutellum are pale with yellowish tinge; dark pattern on scutellum and fore wings is more distinct (Fig. 4).

The end of ovipositor in lateral view is the same as in *O. flavicollis* (Figs 37–39).

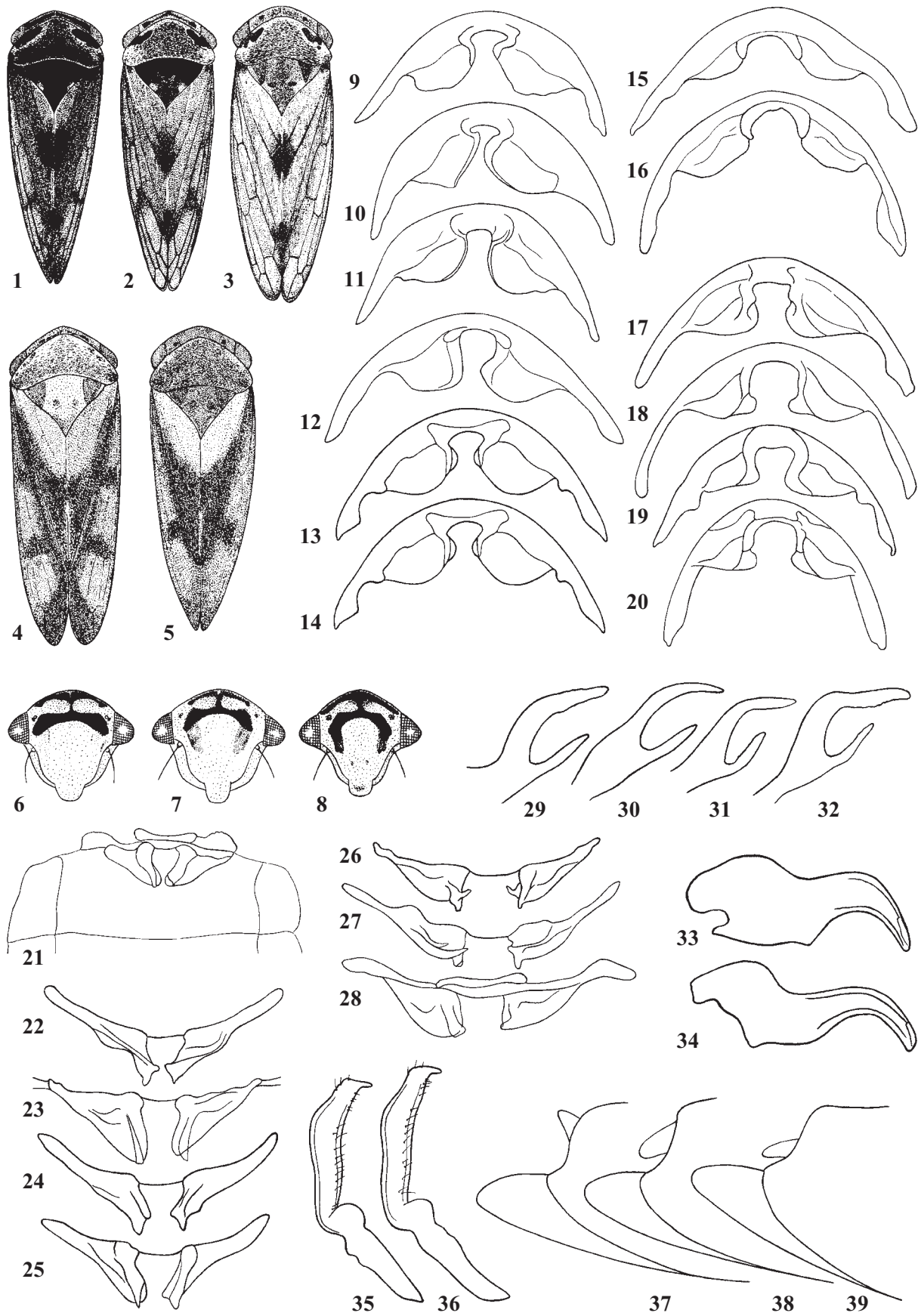
Body length 4.2–4.7 mm in males, 4.5–5.1 mm in females.

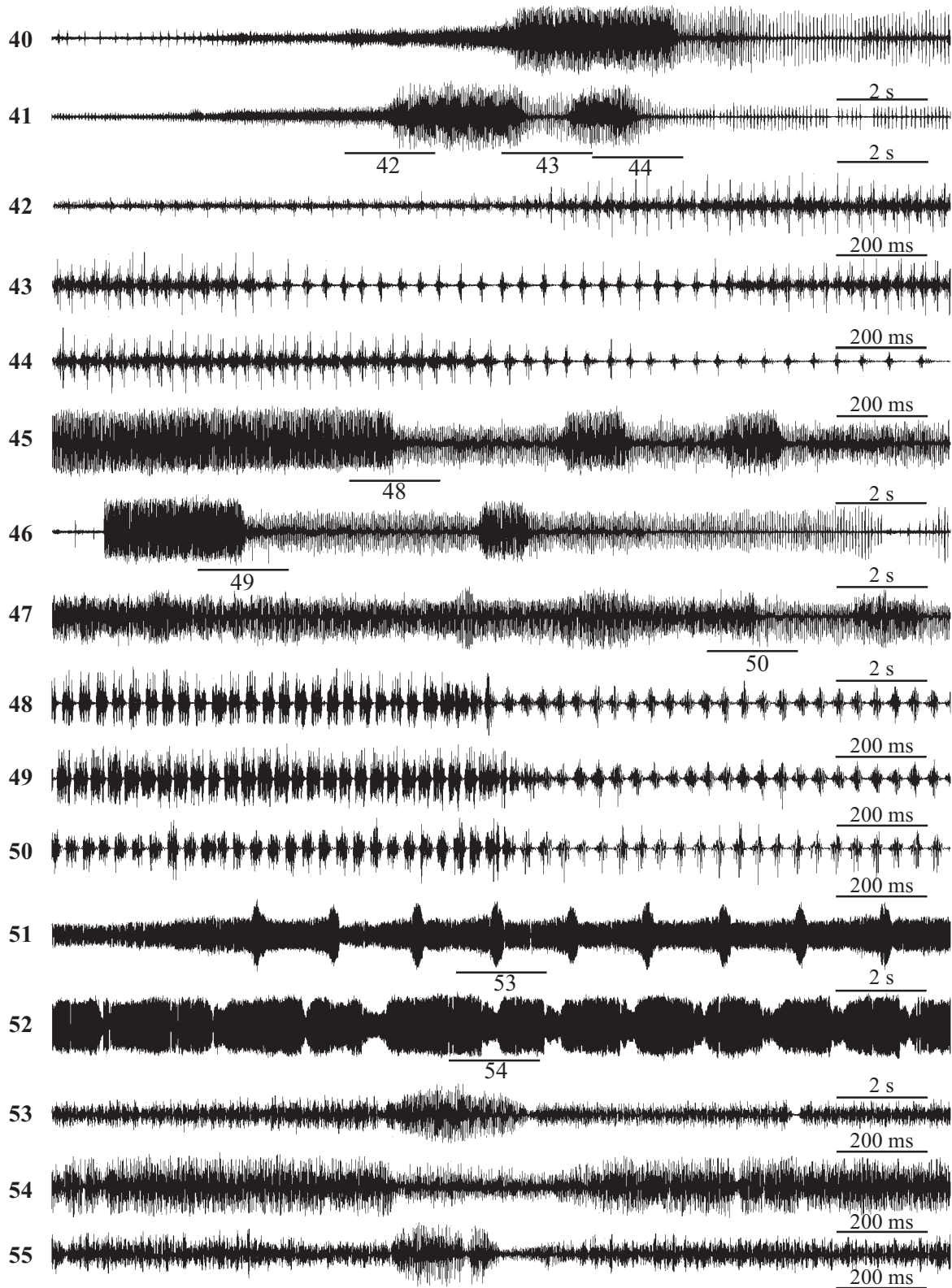
DIAGNOSIS. Differs from closely related *O. flavicollis* in the shape of second dorsal abdominal apodemes of male; for certain identification of species investigation both in frontal (Figs 9–14 and 17–20) and ventral view (Figs 22–25 and 26–28) is advisable. In addition, only two colour forms were found in a new species. Bright-yellow colour form characteristic for *O. flavicollis* is absent in *O. burjatika*. In the pattern of calling signals is somewhat similar with *O. flavicollis* 1 sensu Claridge and Nixon [1986], but differs from it in the shape of dorsal abdominal apodemes. Moreover, *O. flavicollis* 1 dwells only on *B. alba*, but the new species was found on *B. pendula*.

O. subangulata has shorter second dorsal abdominal apodemes (Figs 15–16), anal collar appendages with longer base and shorter branches and longer ovipositor [see Ossiannilsson, 1981].

Figs 1–39. *Oncopsis* spp.: 1–14, 21–25, 29–39 — *Oncopsis burjatika* sp.n.; 15–16 — *O. subangulata*; 17–20, 26–28 — *O. flavicollis*; 1–5 — body; 6–8 — face; 9–20, 22–28 — second dorsal abdominal apodemes; 21 — basal part of abdomen and second dorsal abdominal apodemes; 29–32 — anal collar appendage; 33–34 — penis; 35–36 — stylus; 37–39 — posterior segments of abdomen; 1–2, 6–8, 9–36 — males; 3–5, 37–39 — females; 1–5 — dorsal view; 6–20 — frontal view; 21–28 — ventral view; 29–39 — lateral view.

Рис. 1–39. *Oncopsis* spp.: 1–14, 21–25, 29–39 — *Oncopsis burjatika* sp.n.; 15–16 — *O. subangulata*; 17–20, 26–28 — *O. flavicollis*; 1–5 — тело; 6–8 — лицо; 9–20, 22–28 — дорзальные аподемы второго сегмента брюшка; 21 — основание брюшка и дорзальные аподемы второго сегмента; 29–32 — придаток анальной трубки; 33–34 — пенис; 35–36 — стилус; 37–39 — верхинная часть брюшка; 1–2, 6–8, 9–36 — самцы; 3–5, 37–39 — самки; 1–5 — сверху; 6–20 — спереди; 21–28 — снизу; 29–39 — сбоку.





Figs 40–55. Oscillograms of calling signals of species of *Oncopsis flavicollis* group: 40–44 — *O. burjatika* sp.n., 45–50 — *O. subangulata*, 51–55 — *O. flavicollis*. Faster oscillograms of the parts of signals indicated as 42–44, 48–50 and 53–54 are given under the same numbers.

Рис. 40–55. Осциллограммы призывных сигналов видов группы *Oncopsis flavicollis*: 40–44 — *O. burjatika* sp.n., 45–50 — *O. subangulata*, 51–55 — *O. flavicollis*. Фрагменты сигналов, помеченные цифрами 42–44, 48–50 и 53–54, представлены при большей скорости развёртки на осциллограммах под соответствующими номерами.

In the shape of male genitalia is very similar with *O. tsejensis*, but differs from it in shorter ovipositor, another coloration in females, calling signal pattern, host plant and distribution [Tishechkin, 1992].

From other species of *O. flavicollis* species group differs in the shape of anal colar appendages. Apparently, is allopatric with other representatives of the group.

RANGE. Southern part of Eastern Siberia (Buryatia, Chita Area). Possibly, records of *O. flavicollis* from the Russian Far East also should be referred to this species.

BIOLOGY. Both nymphs and imago were collected from young thickets of *B. pendula* in the flood-lands of Irkut River.

Calling signal is a single phrase lasting for about 15–30 s (Figs 40–41). Its initial part begins quietly increasing in amplitude towards the end (Fig 42). After it high-amplitude trills of two types with different shape of pulses follow (Figs 43–44). Sometimes, the phrase includes one trill of each type (Fig 40), in other cases trills of different types alternate several times (Fig 41).

O. burjatica sp.n., *O. subangulata* and *O. flavicollis* are three closely related species dwelling on the same host plant. For this reason it seems useful to provide oscillograms of calling signals of two latter ones for comparison. Presented signals of individuals of *O. subangulata* from the environs of Mytishchi (north-east boundary of Moscow) were recorded at the temperature 25 °C, signals of *O. flavicollis* from Serpukhov Region (southern part of Moscow Area) — at 21 °C.

In general scheme of temporal pattern calling signal of a new species is most similar with this of *O. subangulata*, which is prolonged phrase lasting from 15–20 up to 40–60 s and consisting of alternating trills of two types (Figs 45–47). Still, the shape of pulses in signals of two species is different (Figs 48–50).

O. flavicollis is very similar with the new species in morphological characters, but has quite different temporal pattern of calling signal. It begins with monotonous buzzing trill as a rule averaging several seconds (Figs 51–52). In the main part of signal trill is regularly (every 1–2 s) interrupted with short fragments with distinctly higher carrier frequency. The relation of amplitudes of fragments of different kinds

varies greatly, depending on physical characteristics of substrate (twig or stem on which the insect sings) (Figs 53–55).

The study was supported by Russian Foundation for Basic Research (No. 07–04–00349–a).

References

- Claridge M.F. & Howse P.E. 1968. Songs of some British *Oncopsis* species (Hemiptera: Cicadellidae) // Proc. Royal Entomol. Soc. London. Ser.A. Vol.43. No.4–6. P.57–61, 2 plates.
- Claridge M.F. & Nixon G.A. 1981. *Oncopsis* leafhoppers on British trees: polymorphism in adult *O. flavicollis* (L.) // Acta Entomol. Fenn. Vol.38. P.15–19.
- Claridge M.F. & Nixon G.A. 1986. *Oncopsis flavicollis* (L.) associated with tree birches (*Betula*): a complex of biological species or a host plant utilisation polymorphism // Biol. J. Linn. Soc. Vol.27. P.381–397.
- Claridge M.F. & Reynolds W.J. 1973. Male courtship songs and sibling species in the *Oncopsis flavicollis* species group (Hemiptera: Cicadellidae) // J. Entomol. Ser.B. Vol.42. No.1. P.29–39.
- Claridge M.F., Reynolds W.J. & Wilson M.R. 1977. Oviposition behaviour and food plant discrimination in leafhoppers of the genus *Oncopsis* // Ecol. Entomol. Vol.2. P.19–25.
- John B. & Claridge M.F. 1974. Chromosome variation in British populations of *Oncopsis* (Hemiptera: Cicadellidae) // Chromosoma. Vol.46. P.77–89.
- Ossiannilsson F. 1981. The Auchenorrhyncha (Homoptera) of Fennoscandia and Denmark. Part 2: Families Cicadidae, Cercopidae, Membracidae and Cicadellidae (exc. Deltocephalinae) // Fauna Entomologica Scandinavica. Vol.7. P.223–593.
- Tishechkin D.Yu. 1992. [A new species of *Oncopsis* from North Caucasus] // Zoologicheskij Zhurnal. Vol.71. No.4. P.141–144 [in Russian, with English summary].
- Tishechkin D.Yu. 2003. Vibrational communication in leafhoppers from Ulopides subfamilies group (Homoptera: Cicadellidae) and Membracidae with notes on classification of higher taxa // Russian Entomol. J. Vol.12. No.1. P.11–58.
- Vilbaste J. 1982. Preliminary key for the identification of nymphs of North European Homoptera, Cicadinea. II. Cicadelloidea // Ann. Zool. Fenn. Vol.19. P.1–20.