

## Review of the species of the genus *Macropsis* Lewis, 1834 (Homoptera: Cicadellidae: Macropsinae) from European Russia and adjacent territories

### Обзор видов рода *Macropsis* Lewis, 1834 (Homoptera: Cicadellidae: Macropsinae) из европейской России и сопредельных территорий

D.Yu. Tishechkin  
Д. Ю. Тишечкин

Department of Entomology, Faculty of Biology, M.V. Lomonosov Moscow State University, Vorobyevy Gory, Moscow 119899 Russia.  
Кафедра энтомологии Биологического факультета Московского государственного университета имени М.В. Ломоносова, Воробьевы  
Горы, Москва 119899 Россия.  
E-mail: dt@3.entomol.bio.msu.ru.

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КЛЮЧЕВЫЕ СЛОВА. Cicadinea, Cicadellidae, *Macropsis*, систематика, вибрационные сигналы, кормовые  
растения, Россия.

ABSTRACT. Illustrated descriptions and data on host plants are given for 35 *Macropsis* Lewis, 1834 species from Western Europe, European Russia and Western Siberia. Three new synonyms are established. The key for identification of species is provided. Oscillograms of calling signals of 29 species are presented.

РЕЗЮМЕ. Приведены иллюстрированные описания и данные о кормовых растениях для 35 видов рода *Macropsis* Lewis, 1834 из Западной Европы, европейской России и Западной Сибири. Установлены три новых синонима. Составлен ключ для определения видов. Для 29 видов представлены осциллограммы призывных сигналов самцов.

The genus *Macropsis* Lewis, 1834 is one of the largest and most difficult for taxonomy ones among Palaearctic Cicadellidae. It includes about 90 species in this region, most of which are difficult to distinguish morphologically, because the shape of male genitalia in representatives of the genus is extremely uniform and provides few diagnostic characters. Wagner [1950, 1964] successfully used some additional characters such as number of additional teeth on 2nd valvulae of ovipositor, morphology of nymphs, data on colour polymorphism and host plants for distinguishing between North- and Central-European species of the genus. Later Hamilton [1983] in his review of New World Macropsinae demonstrated that the shape of abdominal apodems of the 2nd segment in males is the most useful and reliable diagnostic character in most part of closely related *Macropsis* species.

It is widely known now, that males of small Auchenorrhyncha (leafhoppers, planthoppers etc.) produce low-amplitude vibrational signals for attracting of conspecific

females. Difference in temporal pattern of signals provides the main precopulatory barrier of reproductive isolation. For this reason, acoustic analysis is used sometimes in difficult cases for discrimination between closely related species or for elucidation of the taxonomic status of dubious forms.

Recently I published review of the species of the genus *Macropsis* from the Russian Far East and Eastern Transbaikalia [Tishechkin, 2000a]. The paper contains illustrated descriptions of males, females and nymphs (if available) of 22 species, including all morphological characters, mentioned above, data on host plants, distribution and acoustic signals (the latter — for 16 species of 22) and also comparison of each species with similar sympatric ones. In the present article descriptions of 35 species arranged in the same manner are presented. 30 of them are recorded from European Russia, 3 until now are known only from Western Europe. Two species from Altai Mountains and Tuva (Western Siberia) are also included. These are the only two siberian species, which does not occur in the Eastern Siberia; for this reason they were not treated in my previous work [Tishechkin, 2000a]. Thus, the paper afocited together with the present one covers all species of *Macropsis* known from the territory of Russia.

Only calling signals, produced by single male ready to copulation were investigated during the course of this study. It must be noted, that in several species male can produce signals of another type when courting female. Such signals sometimes differ much from calling ones in temporal structure. Technique of registration and analysis of leafhoppers vibrational signals is described in Tishechkin [2000a]. For identification of species of willows on which the insects were collected I used the monograph "Willows of the USSR. A taxonomic and

geographic revision" by Skvortsov [1968]. Nomenclature of black spots on face and crown of imago is accepted after Wagner [1950]. As in the previous paper, after the name of the species recent synonyms lacking in Nast [1972] and references to main works, where the species was mentioned are given. In the item "Similar sympatric species" only ones from European Russia are included.

Interpretation of species treated in the papers by Wagner [1941, 1950, 1953, 1964] is accepted after this author; in the most part of other species type specimens were investigated.

Almost all the material studied, including the specimens, which signals were recorded, is deposited in the collection of the Zoological Museum of M.V. Lomonosov Moscow State University, Moscow (ZMUM).

### Genus *Macropsis* Lewis, 1834

#### 1. *Macropsis fuscinervis* (Boheman, 1845)

Figs. 1–17, 29–41.

= *M. nigriscutum* Mitjaev, 1971 [Anufriev, 1981]; Wagner, 1941: 103, 105, 119, fig. 15 (description, colour variability, host plant, key);

Ribaut, 1952: 419, 429–430, figs. 1127, 1140–1141 (key, description, distribution, host plants);

Anufriev, 1981: 171 (distribution, synonymy);

Ossiannilsson, 1981: 282, 288–290, plate-fig. 51, text-figs. 922–927 (description, key, host plant for European populations, distribution);

Zhantiev, Tishechkin, 1989: 471, figs. 1–3 (acoustic signals of specimens from population near Moscow);

Tishechkin, 1994c: 8, fig. 1 (acoustic signals of specimens from population near Moscow);

Tishechkin, 2000a: 77–79, figs. 31–62 (description of nymph and imago, based on material from Transbaikalia and the Russian Far East, host plants, signals of specimens from different populations).

**NYMPH.** (Fig. 1). Brown. Mesonotum is strongly convex, upper profile of abdomen is more or less even, not jagged. Setose covering is weakly developed.

**MALE.** Face yellow with darkened upper part (Fig. 7). Frontal, thyridial, ocellar and discoidal spots usually are well developed. Pronotum dark-grey with black spots on the fore margin next to eyes (Figs. 2–3). Scutellum is dark with the exception of apical part. As a rule, fore wings are pale with veins broadly darkened; inner part of clavus, costal margin and area, surrounding transverse veins at the proximal ends of antepical cells are also dark (Fig. 3). In less pigmented specimens dark pattern on membrane is almost invisible and veins in apical part of wings are pale (Fig. 2).

Tergal apodems of 2nd abdominal segment are rather narrow, with inner margin strongly concave, sternal apodems are of more or less triangular shape (Figs. 10–13). Structure of male genitalia is similar with this in poplar- and willow-feeding species of the genus and provides no diagnostic characters (Figs. 14–16).

Body length 4.3–4.7 mm.

**FEMALE.** Same as male, but less pigmented (Figs. 4–6, 8–9). On face sometimes only frontal spot presents (Fig. 8). Ground coloration of pronotum is grey or brownish, in the least pigmented light-brown specimens dark spots on the fore margin behind eyes are absent (Fig. 4). Scutellum for the most part is yellowish with dark triangular spots in side angles and dark-brown longitudinal middle line (Fig. 5); rarely it is almost entirely darkened, as in males (Fig. 6), or, on the contrary, pale brownish, almost without dark pattern (Fig. 4).

2nd valvulae of ovipositor are with one rather large additional tooth each, occasionally, two teeth presents on one of valvulae (Fig. 17).

Body length 5.0–5.3 mm.

**HOSTS.** Aspen (*Populus tremula* L.). For the most part on young growth on glades, edges of a forest and other open places, very rare on adult trees.

**ACOUSTIC SIGNALS.** (Figs. 29–41). Signals of specimens from the following localities were studied:

1. Moscow Area, environs of Pushkino (about 15 km from the north-eastern boundary of Moscow), from *P. tremula* on the bank of Ucha River. 12–13.VI.1984. Signals of several males were recorded at the temperature 19–21°C under laboratory conditions.

2. Chita Area, Ingoda River 15 km E of Urul'ga (Karymskiy District), from *P. tremula*. 30.VI.1995. Signals of 1 ♂ were recorded at the temperature 25–28°C.

3. Amur Area, 30 km W of Svobodny, from *P. tremula*; 2 ♂♂. 9.VII.1995. Shade air temperature — 20°C.

4. The Southern Maritime Province, Pogranichny District, environs of Barabash-Levada, from *P. tremula*; 2 ♂♂. 21.VII.1995. Shade air temperature — 23–24°C.

Single male can spontaneously produce signals of two types (Figs. 29–34 and 35–41). Signal of the first type consists of two different fragments (Figs. 29–34), the second type one includes three parts (Figs. 35–41). Relative amplitude of the parts may vary greatly from signal to signal depending on the physical characteristics of substrate (stem or twig) on which an insect sings (Fig. 35–37). Signals of the first type for the most part were registered from single male or from several males sitting together in one cage. When close to female, male usually produces signals of the second (more complex) type. Nevertheless, there is no strict functional subdivision of these two types of signals into calling and courtship ones.

**RANGE.** From Western Europe to the Russian Far East.

Material was studied from several localities in Northern half of European Russia, from Altai Mountains, Transbaikalia and the Russian Far East.

**SIMILAR SYMPATRIC SPECIES.** Differs from all willow-dwelling species by small number of additional teeth on 2nd valvulae in females. May be easily distinguished from *M. sibirica* Kusn. and *M. illota* Horv., which have similar shape of 2nd valvulae, due to more large size, different coloration and wide aedeagus. Differs from closely-related poplar-feeding species (*M. graminea* F. and *M. vicina* Horv.) by more dark coloration, especially in males, and by narrow 2nd tergal apodems.

**NOTES.** Interpretation of species is accepted after Wagner [1941] and Ossiannilsson [1981]. Wagner [1941] notifies, that he has never found specimens with green coloration in Germany; also they are absent in my material from European Russia. However, in the Siberian and the Far-Eastern populations specimen with more pale coloration prevails and females with olive-green ground coloration are rather abundant [Tishechkin, 2000a].

Holotype of *M. nigriscutum* was re-investigated by Anufriev [1981].

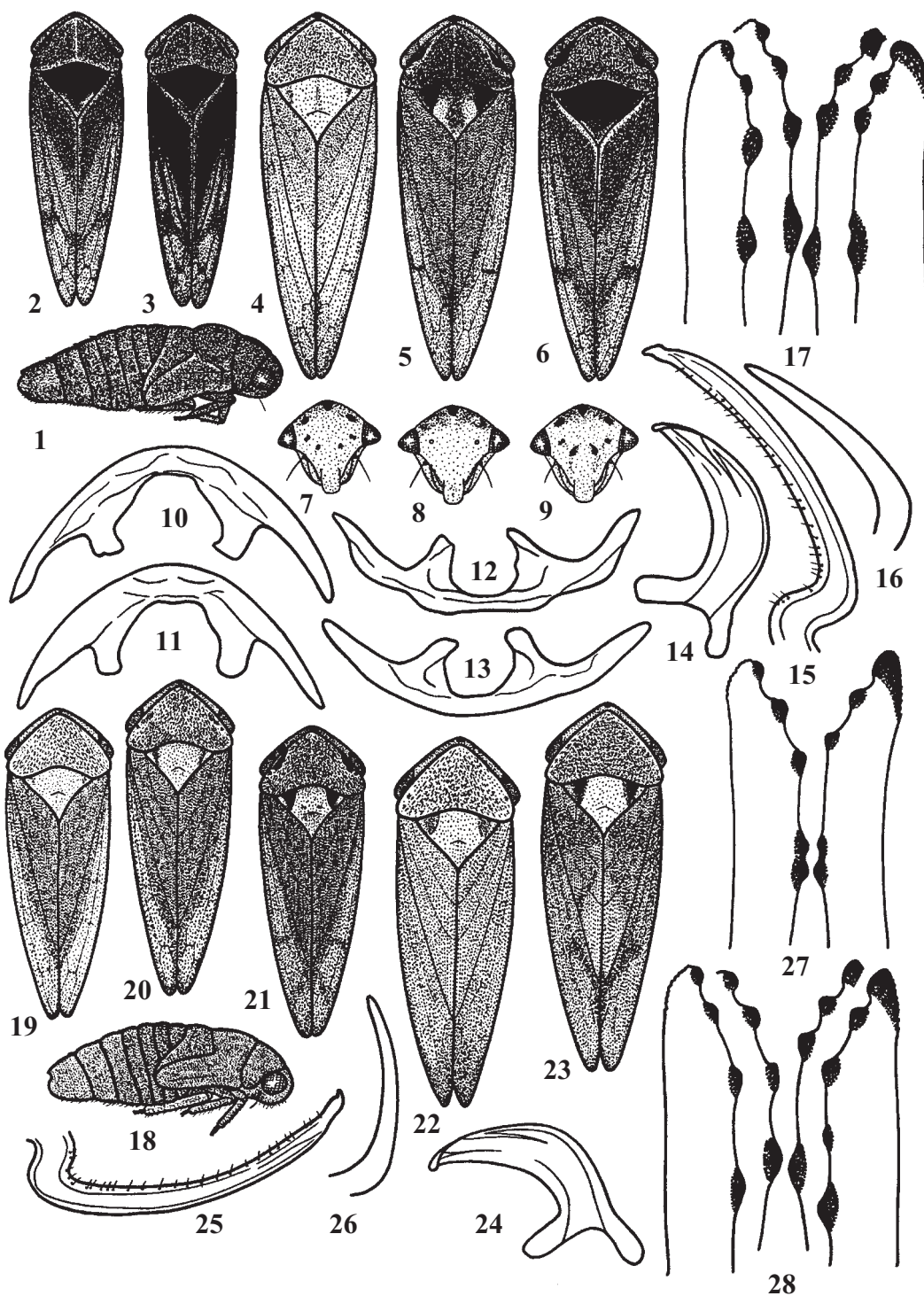
#### 2. *Macropsis graminea* (Fabricius, 1798)

Figs. 18–28, 42–60.

Wagner, 1941 (as *M. populi* Edwards, 1919): 103, 106–107, 119, 121–122, fig. 16 (description, host plants, key);

Wagner, 1950: 86, fig. 1 (description of type specimen, synonymy);

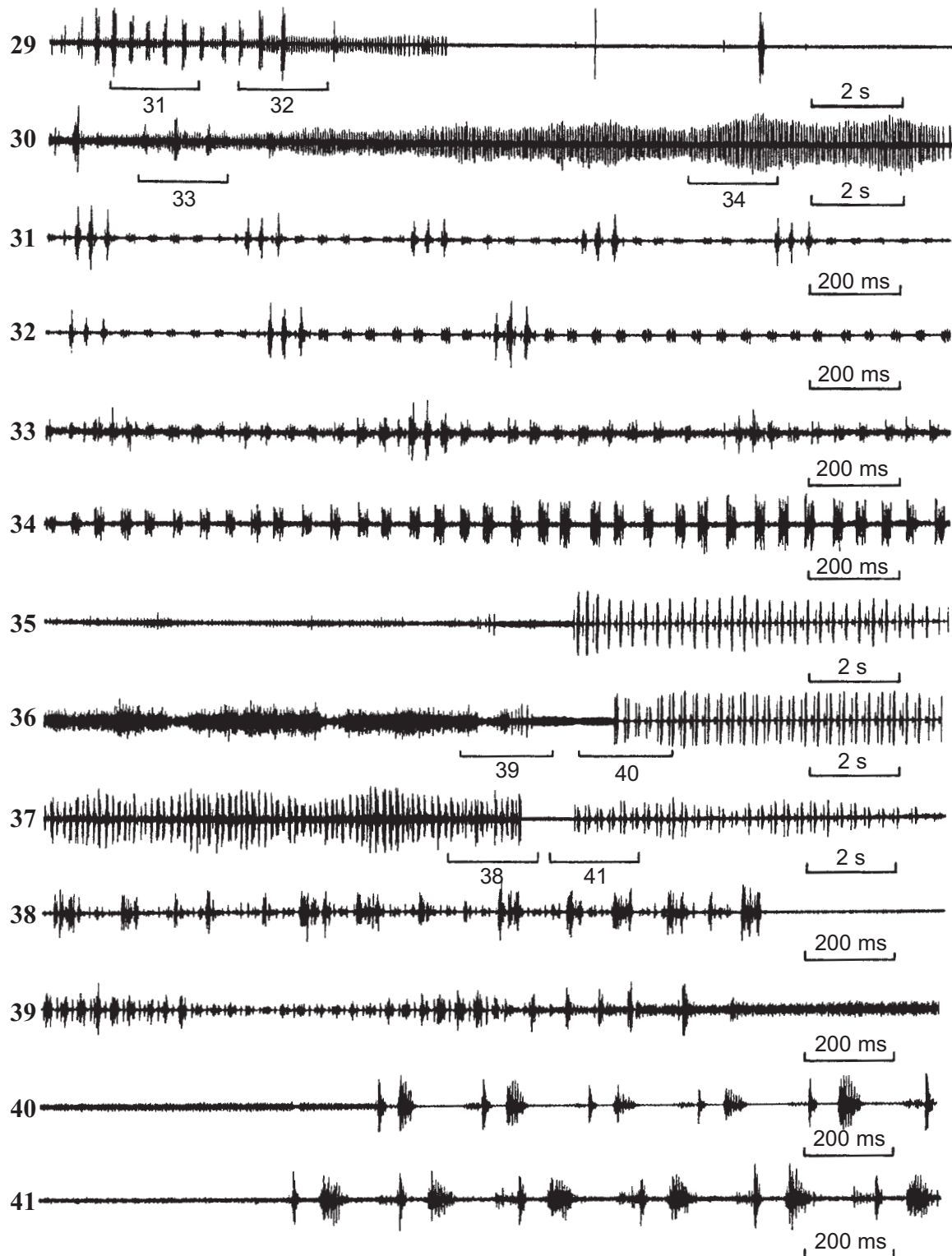
Ribaut, 1952: 419, 421, 429 (key, description, distribution, host plants);



Figs. 1-28. *Macropsis fuscinervis* (Boh.) (1-17): 1 — nymph, 2-3 — ♂, dorsal view of a body, 4-6 — same, ♀, 7-9 — face, 10-11 — apodems of 2nd ♂ abdominal tergite, 12-13 — same, apodems of 2nd abdominal sternite, 14 — aedeagus, side view, 15 — stylus, 16 — pygofer appendage, 17 — 2nd valvulae of ovipositor; *M. graminea* (F.) (18-28): 18 — nymph, 19-21 — ♂, dorsal view of a body, 22-23 — same, ♀, 24 — aedeagus, side view, 25 — stylus, 26 — pygofer appendage, 27-28 — 2nd valvulae of ovipositor.

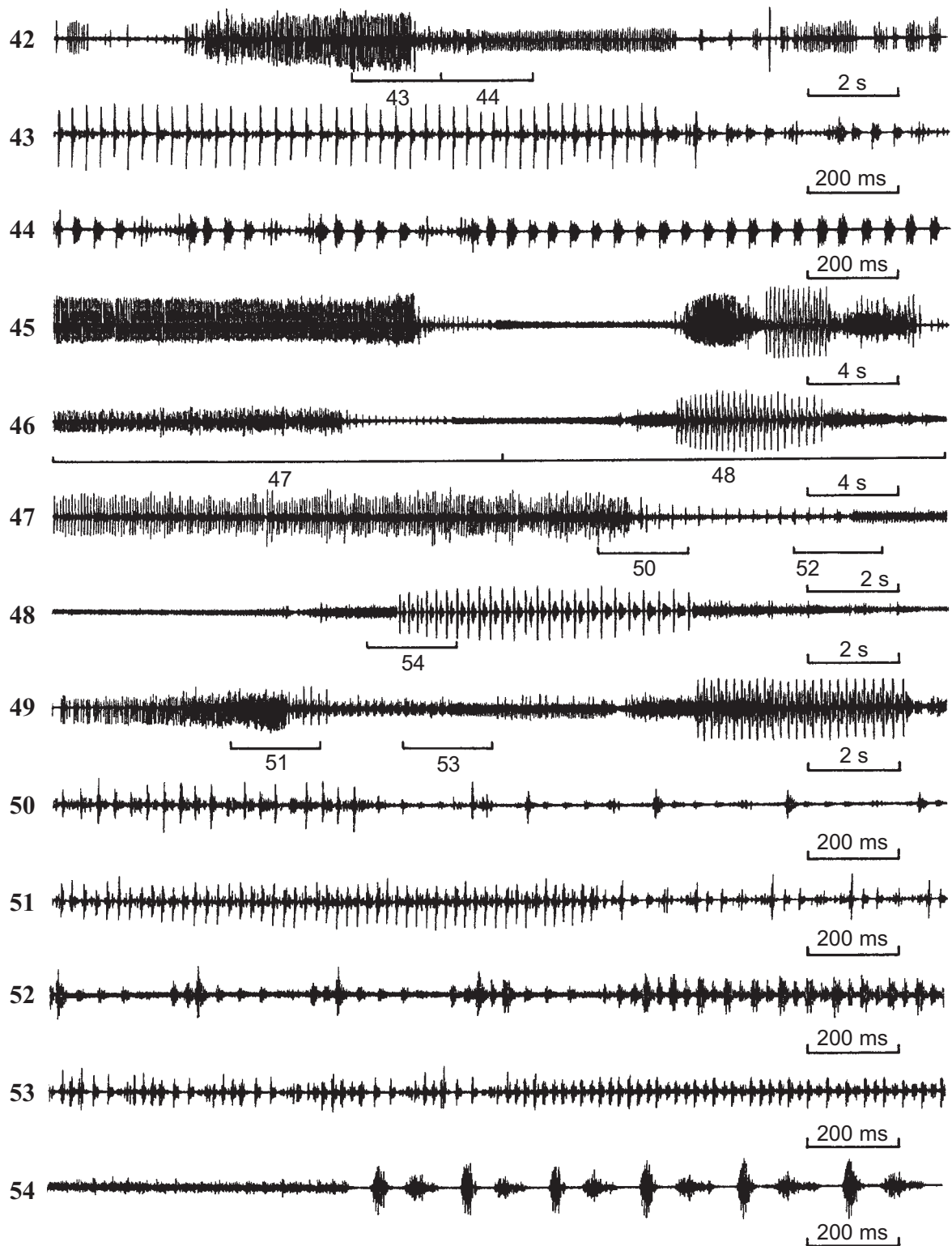
Рис. 1-28. *Macropsis fuscinervis* (Boh.) (1-17): 1 — личинка, вид сбоку, 2-3 — ♂, вид сверху, 4-6 — то же, ♀, 7-9 — лицо, 10-11 — аподемы 2-го брюшного тергита ♂, 12-13 — то же, аподемы 2-го брюшного стернита, 14 — эдеагус, вид сбоку, 15 — стилус, 16 — отросток доли пигафора, 17 — внутренние гонапофизы яйцеклада; *M. graminea* (F.) (18-28): 18 — личинка, вид сбоку, 19-21 — ♂, вид сверху, 22-23 — то же, ♀, 24 — эдеагус, вид сбоку, 25 — стилус, 26 — отросток доли пигафора, 27-28 — внутренние гонапофизы яйцеклада.





Figs. 29–41. Oscillograms of male calling signals of *Macropsis fuscinervis* (Boh.). 29–34 and 35–41 — two different forms of signal. Faster oscillograms of the parts of signals indicated as “31–34” and “38–41” are given under the same numbers.

Рис. 29–41. Осциллограммы призывных сигналов самцов *Macropsis fuscinervis* (Boh.). 29–34 и 35–41 — две разные формы сигнала. Фрагменты сигналов, помеченные цифрами “31–34” и “38–41”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



Figs. 42–54. Oscillograms of male calling signals of *Macropsis graminea* (F.). 42–44 — reduced, 45–54 — full form of signal. Faster oscillograms of the parts of signals indicated as “43–44”, “47–48” and “50–54” are given under the same numbers.

Рис. 42–54. Осциллограммы призывных сигналов самцов *Macropsis graminea* (F.). 42–44 — редуцированная, 45–54 — полная форма сигнала. Фрагменты сигналов, помеченные цифрами “43–44”, “47–48” и “50–54”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Ossiannilsson, 1981: 282, 291, text-figs. 928–932 (description, key, host plant for European populations, distribution);

Hamilton, 1983: 51–54, figs. 69, 174 (description, hosts, range, key);

Zhantiev, Tishechkin, 1989: 471, fig. 1 (acoustic signals of specimens from population near Moscow).

**NYMPH.** (Fig. 18). Uniformly bright-green or somewhat yellowish. Mesonotum distinctly convex, as in the previous species. Setose covering on the dorsal side of body is almost entirely absent, upper profile of abdomen is even, not jagged.

**MALE.** (Figs. 19–21). In most dark males dorsal side of body for the most part is brown (Fig. 21). Face pale, yellowish, somewhat darkened in the upper part. Frontal, thyridial and discoidal spots are well-developed, ocellar ones are absent. Pronotum with black spots on the fore margin behind eyes. Scutellum is more light, than pronotum, with dark triangular spots in side angles and occasionally with median line somewhat darkened. Wings are brownish, veins are of more or less the same colour, as membrane; the latter sometimes is somewhat darkened around transverse veins. In less pigmented specimens fore part of body is brownish-green or green, black spots are partly reduced (Fig. 20). Usually, only frontal spot presents on head, occasionally it is also absent. Dark spots on pronotum and scutellum are pale, sometimes hardly visible. Most light males are green with yellowish or brownish tinge and only with traces of dark pattern (Fig. 19).

2nd tergal apodems with wide lobes, their tips are widely rounded (Figs. 55–57). Sternal apodems are similar with these of *M. fuscinervis*, but their ends sometimes are strongly expanded (Figs. 58–60). Structure of male genitalia is typical for poplar- and willow-dwelling species of the genus (Figs. 24–26).

Body length 4.2–4.7 mm.

**FEMALE** (Figs. 22–23). The most abundant colour form is uniformly green, sometimes with slight brownish tinge (Fig. 22). Only frontal spot on head usually presents, all other dark pattern is almost entirely absent. Occasionally, frontal spot is also reduced. More rare colour form, occurring in European Russia, is yellowish-brown or brown, with dark pattern on pronotum and scutellum, as in male (Fig. 23). Fore wings in such specimens are darkened near the base and around transverse veins. Even in the most dark-coloured females only frontal spot presents on head. Colour form with well-developed dark pattern on fore wings (for instance, as in *M. vicina*, see Figs. 66–67) was not found in European Russia.

2nd valvulae of ovipositor are with 1–2 additional teeth each (Figs. 27–28).

Body length 4.5–5.2 mm.

**HOSTS.** Black poplar — *Populus nigra* L. including *P. nigra* var. *pyramidalis* Spach. Was never found on *P. balsamifera* L. and other introduced poplar species cultivated in parks and gardens. According to Hamilton [1983], in North America mainly on *P. nigra*, but occasionally also on *P. balsamifera*, *P. canadensis* Moench. and other american species.

**ACOUSTIC SIGNALS** (Figs. 42–54). Signals recordings were made in the following localities:

1. Moscow Area, Serpukhov District, Pushchino-na-Oke Town, from *P. nigra* var. *pyramidalis*. 27–28.VI.1985. Signals of 3 ♂♂ are recorded at 21–22°C under laboratory conditions.

2. Crimea, environs of Pereval'noe Village (halfway from Simferopol to Alushta), from *P. nigra*. 16.VI.1997. Signals of 2 ♂♂ are recorded at 21–22°C.

3. Volgograd Area, Ilovlya River about 5 km from the mouth, from *P. nigra*. 6–7.VI.1996. Signals of 5 ♂♂ are recorded at 18 and 21–22°C.

4. Orenburg Area, Sakmara River 20–25 km NNE of Kuvandyk Town, environs of Churaevo Village from *P. nigra*. 29.VI.1996. Signals of 2 ♂♂ are recorded at 27°C.

As in *M. fuscinervis*, two forms of calling signals present in this species (Figs. 42–44 and 45–54). More short form consists of three different fragments (Figs. 42–44), full form includes three additional parts (Figs. 45–54). Signals of both types were registered from single male. In the presence of conspecific female male usually produce only full signals.

**RANGE.** Western Europe, Ukraine, European Russia, Western, Northern and Eastern Kazakhstan, apparently also southern part of Western Siberia within the range of host plant; North America (introduced).

Material was studied from several localities in European Russia (including North Caucasus) and Ukraine and also from Western and Eastern Kazakhstan.

**SIMILAR SYMPATRIC SPECIES.** From closely related *M. fuscinervis* and *M. vicina* differs in the shape of tergal apodems (Figs. 10–11, 55–57 and 69–71) and for the most part also in coloration. From all other *Macropsis* species differs in the same characters, as the previous species.

**NOTES.** Interpretation of species is accepted after Wagner [1941, 1950], who reinvestigated type specimen.

### 3. *Macropsis vicina* (Horvath, 1897)

Figs. 61–85.

Ribaut, 1952: 421, 430 (key, description, distribution, host plants);

Hamilton, 1983: 57–61, figs. 71, 154 (description, hosts, range, key);

Zhantiev, Tishechkin, 1989: 470–471, figs. 1–2 (acoustic signals of specimens from population near Moscow).

**NYMPH** (Fig. 68). Greyish or brownish, with diffused dark pattern. All the body with dense setose covering. Upper profile of abdomen is somewhat serrated, especially in back half.

**MALE** (Figs. 61–62). For the most part pale greyish-green. Face with frontal, thyridial and discoidal spots; sometimes traces of ocellar spots also present. Pronotum with dark markings on the fore margin next to eyes, scutellum with triangular spots in side angles, occasionally, with middle line more or less darkened, and with a pair of small round spots on each side of it. In poorly pigmented specimens veins are of the same colour as a membrane (Fig. 61). In strongly coloured ones veins are darkened, as well as membrane around transverse veins (Fig. 62).

2nd tergal apodems are rather long, wide at the base, but usually narrowed towards the tips (Figs. 69–71). Sternal apodems are similar with these of two previous species, but somewhat wider (Fig. 72–74). Genitalia are of typical shape (Figs. 75–77).

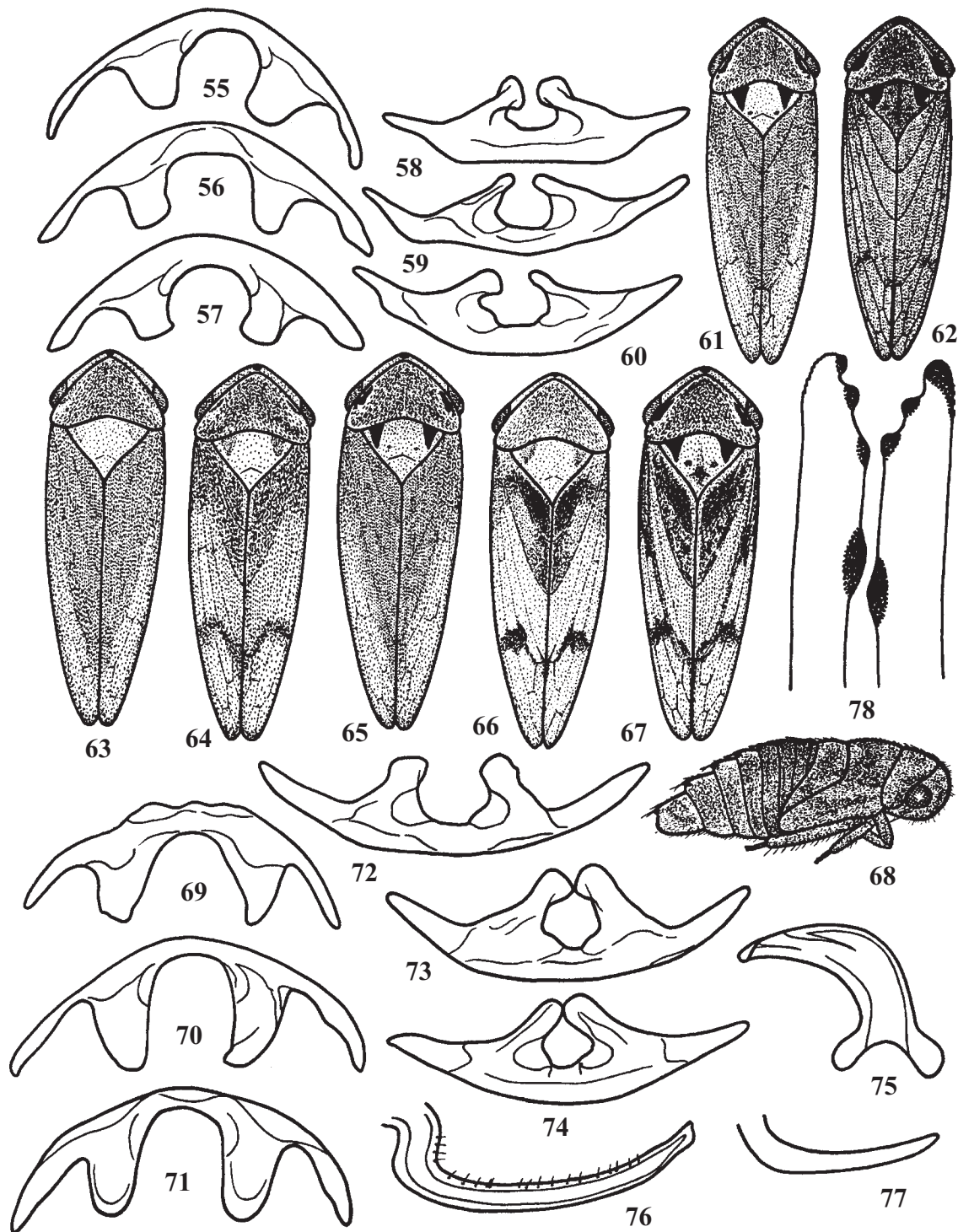
Body length 4.1–4.5 mm.

**FEMALE** (Figs. 63–67). Ground coloration is pale greyish-green, the shape of black pattern varies greatly depending on intensity of pigmentation. In most pale-coloured specimens spots on face are very small and dorsal side of body lacks any dark pattern (Fig. 63). If pigmentation is more developed, than black spots on pronotum and scutellum present (Figs. 64–67). Fore wings are usually pale (Figs. 63–65), occasionally, with more or less developed black pattern and with veins partially darkened (Figs. 66–67).

2nd valvulae as a rule are with one additional tooth each (Fig. 78).

Body length 4.5–5.0 mm.

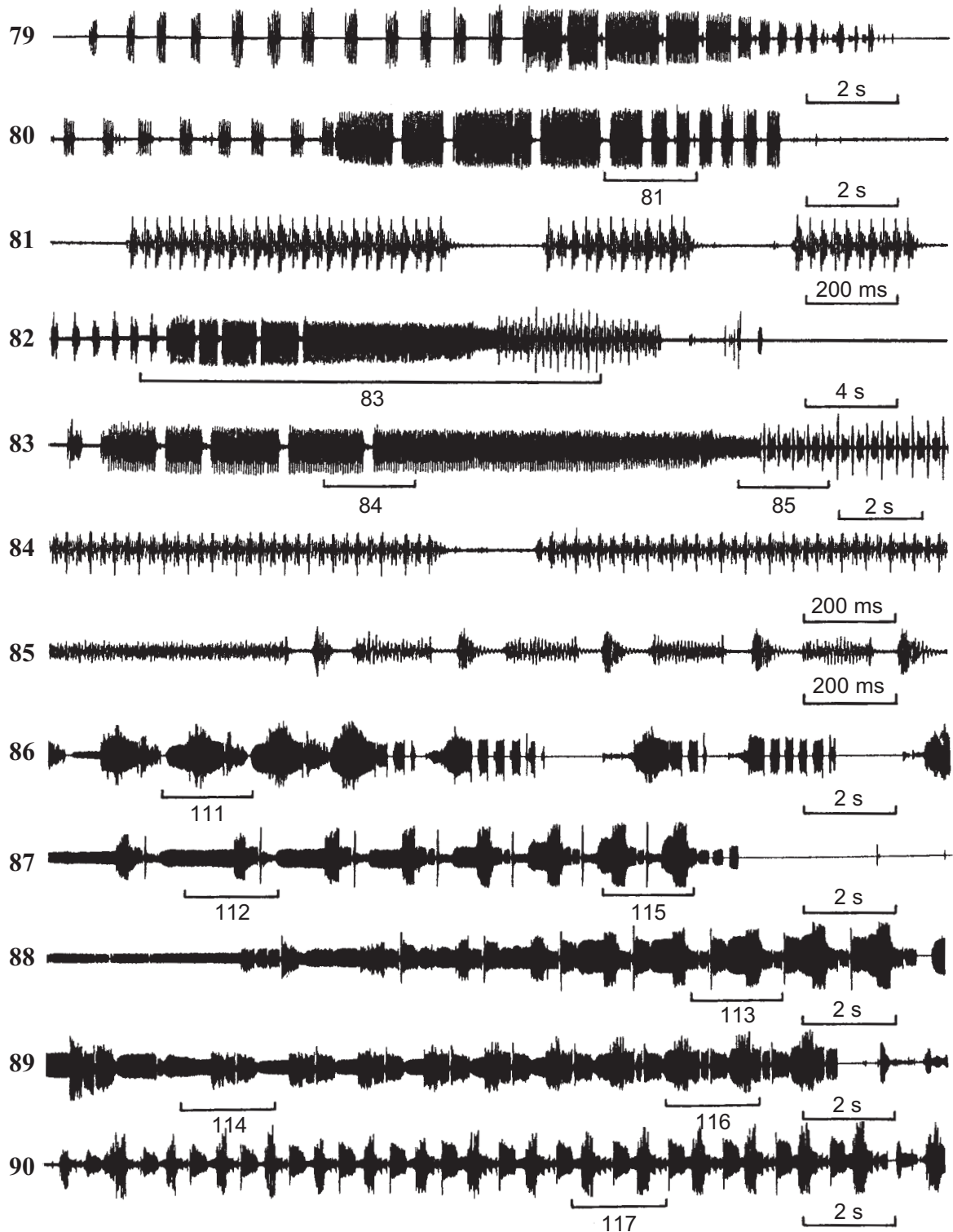
**HOSTS.** White poplar (*Populus alba* L.) both in Europe and North America.



Figs. 55–78. *Macropsis graminea* (F.) (55–60): 55–57 — apodemes of 2nd ♂ abdominal tergite, 58–60 — same, apodemes of 2nd abdominal sternite; *M. vicina* (Horv.) (61–78): 61–62 — ♂, dorsal view of a body, 63–67 — same, ♀, 68 — nymph, 69–71 — apodemes of 2nd ♂ tergite, 72–74 — same, apodemes of 2nd abdominal sternite, 75 — aedeagus, side view, 76 — stylus, 77 — pygofer appendage, 78 — 2nd valvulae of ovipositor.

Рис. 55–78. *Macropsis graminea* (F.) (55–60): 55–57 — аподемы 2-го брюшного тергита ♂, 58–60 — аподемы 2-го брюшного стернита; *M. vicina* (Horv.) (61–78): 61–62 — ♂, вид сверху, 63–67 — то же, ♀, 68 — личинка, вид сбоку, 69–71 — аподемы 2-го брюшного тергита ♂, 72–74 — то же, аподемы 2-го брюшного стернита, 75 — эдеагус, вид сбоку, 76 — стилус, 77 — отросток доли пифофора, 78 — внутренние гонапофизы яйцеклада.





Figs. 79–90. Oscillograms of male calling signals of *Macropsis vicina* (Horv.) (79–85) and *M. marginata* (H.-S.) (86–90). 79–81 — reduced, 82–85 — full form of signal of *M. vicina*. Faster oscillograms of the parts of signals indicated as “81”, “83–85” and “111–117” are given under the same numbers.

Рис. 79–90. Осциллограммы призывных сигналов самцов *Macropsis vicina* (Horv.) (79–85) и *M. marginata* (H.-S.) (86–90). 79–81 — редуцированная, 82–85 — полная форма сигнала *M. vicina*. Фрагменты сигналов, помеченные цифрами “81”, “83–85” и “111–117”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



ACOUSTIC SIGNALS (Figs. 79–85). Signals recordings were made in the following localities:

1. Moscow Area, Serpukhov District, Pushchino-na-Oke Town, from *P. alba*. 3.VII.1985. Signals of 5 ♂♂ are recorded at 21°C under laboratory conditions.

2. Volgograd Area, Ilovlya River about 5 km from the mouth, from *P. alba*. 10.VI.1996. Signals of 2 ♂♂ are recorded at 26–29°C.

3. North-west Caucasus, Krasnodar Province, valley of Sukko River 12 km S of Anapa. 30.VI–1.VII.1997. Calling signals of 2 ♂♂ collected from *P. alba* are recorded at 27–28°C.

As in *M. fuscineris* and *M. graminea*, there are two different types of signals in this species (Figs. 79–81 and 82–85). General scheme of their temporal structure is similar with this of the previous species.

RANGE. Central and southern parts of Western Europe, Ukraine, southern half of European Russia (northwards at least as far as Moscow Area), Western Siberia; North America (introduced).

Material was studied from Moscow and Kursk areas, several localities in Lower Volga Region (Rostov and Volgograd Areas), from North-Western Caucasus, South Urals and Western Siberia (Tomsk Area).

SIMILAR SYMPATRIC SPECIES. Differs from *M. fuscineris* and *M. graminea* by pale greyish-green ground coloration and shape of 2nd tergal apodems. From all other species may be distinguished due to small number of additional teeth on 2nd valvulae of ovipositor or by size and coloration.

#### 4. *Macropsis marginata* (Herrich-Schäffer, 1836) Figs. 86–117.

=*M. vestita* Ribaut, 1952 (part);

Wagner, 1950: 87, 89–98, figs. 2–8, 10–11 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plant, synonymy, phenology);

Ribaut, 1952: 420–421, 423–424, figs. 1114–1119, 1126 (key, description, distribution, host plants).

NYMPH (Fig. 99). Green, olive-green or brown. Upper profile of abdomen smooth, not jagged, setose covering is almost entirely absent, only on the lower margins of abdomen rows of setae presents.

MALE (Figs. 91–94). The species with extremely variable coloration. Uniformly green specimens may lack any dark pattern at all (Fig. 91), or have well-developed black spots on face, pronotum and scutellum (Fig. 92). In strongly pigmented individuals background coloration is olive-green or even greyish-brown (Fig. 93). More rare colour form usually has black dorsal side with light-yellow middle part of pronotum and scutellum and black wings with yellow costal margin (Fig. 94). It must be noted, that all the range of colour variations was found only in populations from Crimea and North-western Caucasus. In populations from Lower Volga (several localities in Volgograd and Saratov areas) only green colour variation without black spots presents.

Apodems of 2nd abdominal tergite are well-developed, with lobes bent inwards, sometimes with distinct projection in the middle of the inner margin (Figs. 100–103). Sternal apodems are wide, variable in shape, with lobes strongly converging, sometimes even touching each other or slightly overlapping. Aedeagus is rather narrow, widest in the point of bending (Figs. 104–106), pygofer appendages and styles are of usual shape (Figs. 107–108).

Body length 4.0–4.5 mm.

FEMALE (Figs. 95–98). In coloration is similar with male but as a rule is less pigmented. For this reason uniformly-

green form without black spots is most abundant (Fig. 95). Specimens with dark dorsal side and yellow costal margins of fore wings are usually not black, but dark-brown (Fig. 97–98). Light yellow colour variation with dark longitudinal stripes on pronotum and in claval part of wings, which presents in some European populations, was found only once in Krasnodar Area (NW Caucasus) (Fig. 96).

2nd valvulae are with 10–14 small additional teeth (Figs. 109–110).

Body length 4.7–5.2 mm.

HOSTS. *Salix* spp. from the section *Helix*. I have collected this species from *S. purpurea* L. in two localities in Crimea, on *S. elbursensis* Boiss. in Krasnodar Area (North-western Caucasus) and on *S. vinogradovii* Skvortsov in Saratov and Volgograd Areas.

ACOUSTIC SIGNALS (Figs. 86–90, 111–117). Signals recordings were made in the following localities:

1. Crimea, environs of Glubokiy Yar Village North of Bakhchisaray, from *S. purpurea*. 8.VI.1997. Calling signals of 5 ♂♂ were recorded at 22°C.

2. NW Caucasus, Krasnodar Area, Sukko River in the environs of Sukko Village 12 km South of Anapa, from *S. elbursensis*. 3.VII.1997. Calling signals of 2 ♂♂ were recorded at 29°C.

3. Volgograd Area, Ilovlya River 5–7 km from the mouth, from *S. vinogradovii*. 7–8.VI.1996. Calling signals of 5 ♂♂ were recorded at 18–22°C.

Signal consists of repeated phrases with complex temporal pattern. The structure of phrases is rather variable and somewhat changes towards the end of signal. Signals of males from different populations are quite similar.

RANGE. Central and southern parts of Western Europe, Ukraine, the southern half of European Russia within the range of *S. vinogradovii*, eastwards for the most part as far as Volga; was found also in extreme east of Saratov Area on the boundary with Kazakhstan.

Material was studied from France (H. Ribaut collection, Paris), Yugoslavia, Western Germany (Bavaria), Ukraine (Crimea), Nizhniy Novgorod Area, NW Caucasus, several localities in Volgograd and Saratov Areas.

SIMILAR SYMPATRIC SPECIES. From most part of green *Macropsis* species dwelling on Salicaceae differs by high number of additional teeth on 2nd valvulae of ovipositor. From *M. viridinervis* Wagn., *M. verbae* Anufr., Zhilts., *M. microcera* Vilb. and green form of *M. impura* Boh. having similar shape of 2nd valvulae may be distinguished due to different shape of apodems. Besides, differs from *M. viridinervis* by aedeagus widest in the point of bending (in the latter species it is widest at the base). *M. microcera* also has more pale coloration, than *M. marginata*.

NOTES. Interpretation of species is accepted after Wagner [1950].

Several female paratypes of *M. vestita* from the collection of H. Ribaut (Muséum National d'Histoire Naturelle, Paris) are investigated. These appeared to be the mixture of black-yellow colour forms of *M. marginata* and *M. notata* Prohaska, 1923 (also, see the description of the latter species).

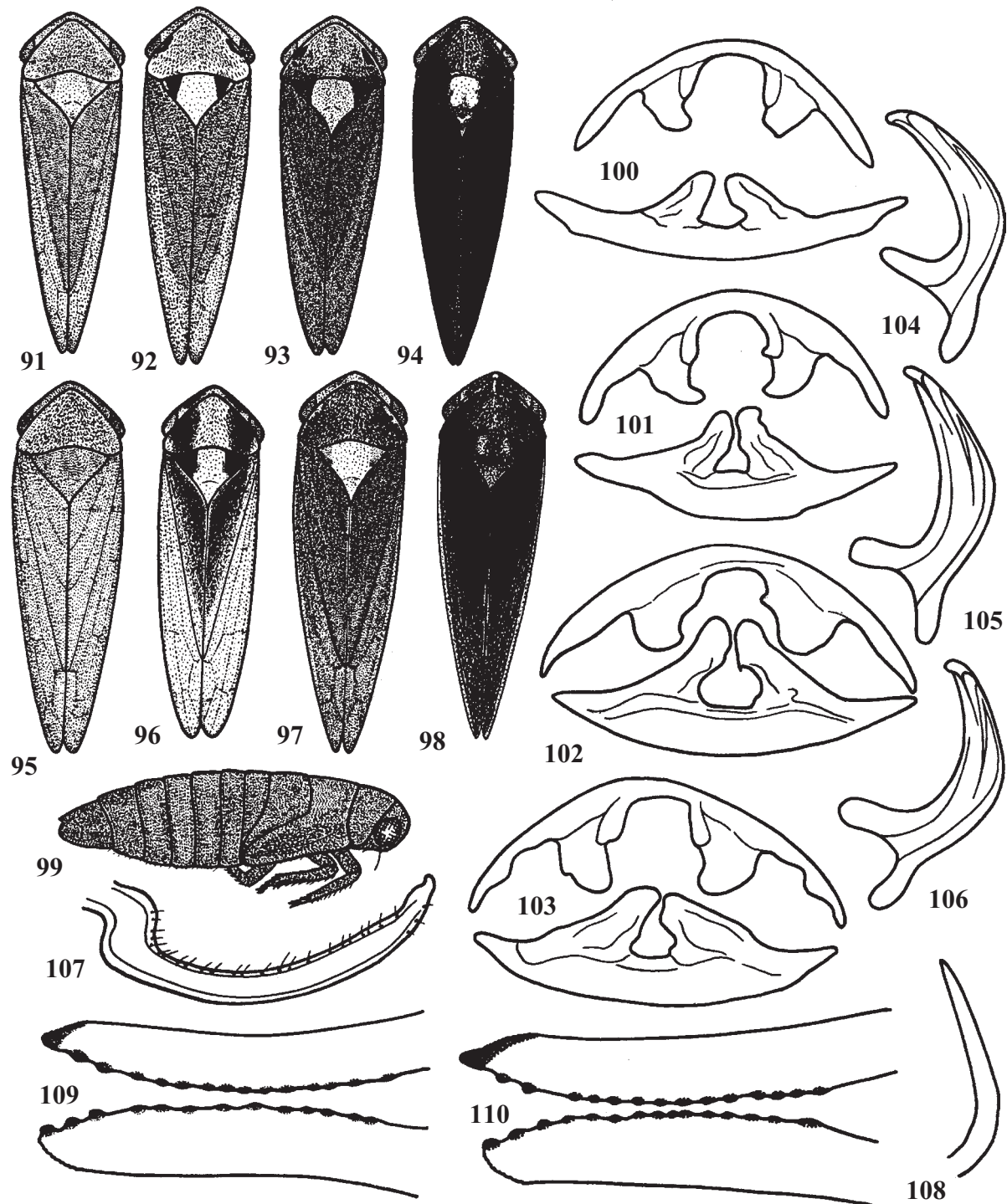
#### 5. *Macropsis notata* (Prohaska, 1923) Figs. 118–148.

= *M. vestita* Ribaut, 1952, **syn.n.**;

= *M. punctata* Mitjaev, 1971 [Anufriev, 1981];

= *M. salicicola* Vilbaste, 1968 [Tishechkin, 1998];

= *M. xena* Hamilton, 1983 [Tishechkin, 1998];

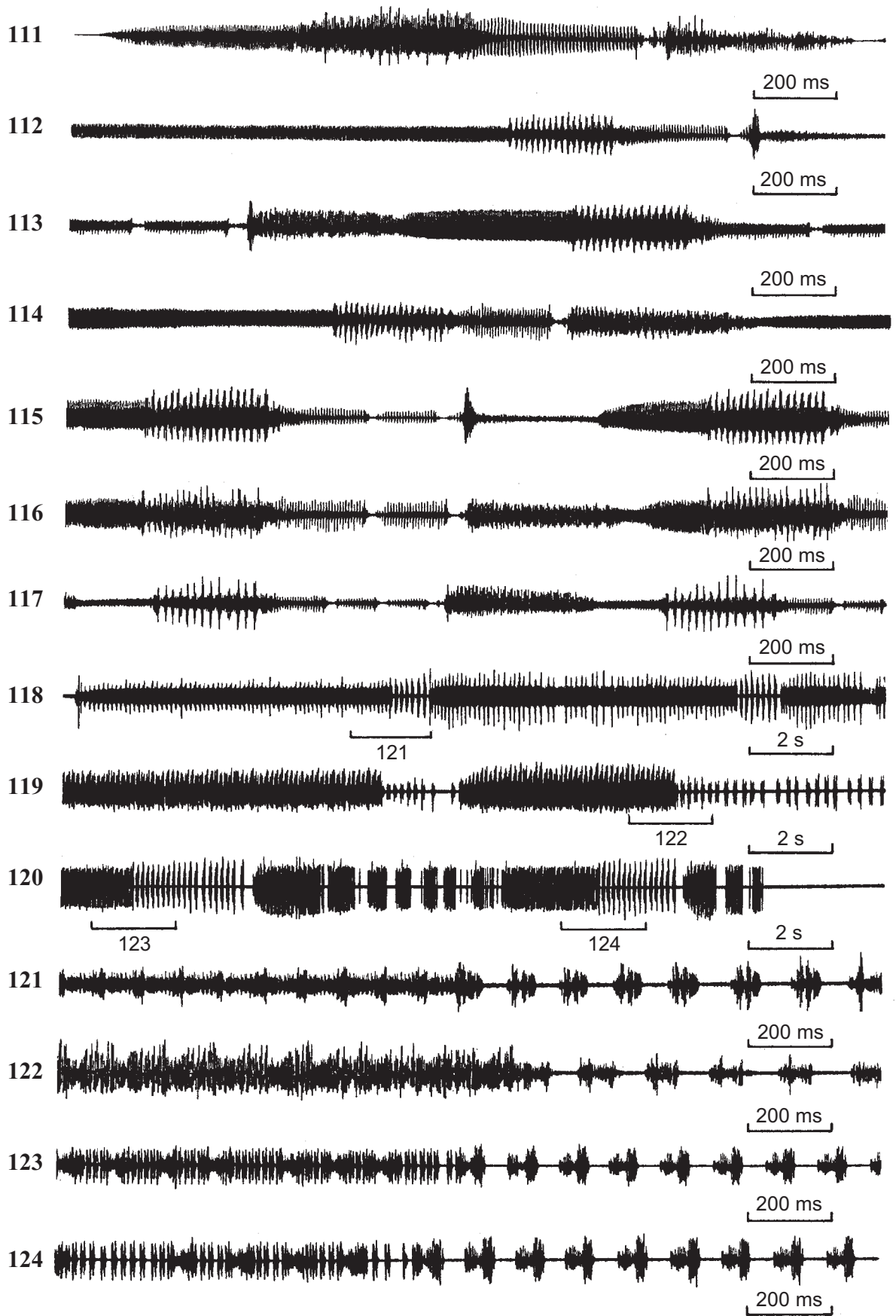


Figs. 91–110. *Macropsis marginata* (H.-S.): 91–94 — ♂, dorsal view of a body, 95–98 — same, ♀, 99 — nymph, 100–103 — apodemes of 2nd ♂ abdominal segment, 104–106 — aedeagus, side view, 107 — stylus, 108 — pygofer appendage, 109–110 — 2nd valvulae of ovipositor.

Рис. 91–110. *Macropsis marginata* (H.-S.): 91–94 — ♂, вид сверху, 95–98 — то же, ♀, 99 — личинка, вид сбоку, 100–103 — аподемы 2-го брюшного сегмента ♂, 104–106 — эдеагус, вид сбоку, 107 — стилус, 108 — отросток доли пигофора, 109–110 — внутренние гонапофизы яйцеклада.

Figs. 111–124. Oscillograms of male calling signals of *Macropsis marginata* (H.-S.) (111–117) and *M. notata* (Proh.) (118–124). Faster oscillograms of the parts of signals indicated as “121–124” are given under the same numbers.

Рис. 111–124. Осциллограммы призывных сигналов самцов *Macropsis marginata* (H.-S.) (111–117) и *M. notata* (Proh.) (118–124). Фрагменты сигналов, помеченные цифрами “121–124”, представлены при большей скорости развертки на осциллограммах под такими же номерами.





Wagner, 1950: 87, 89–90, 101–103, figs. 2–7, 9, 12 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plant, synonymy, phenology);

Ribaut, 1952: 421, 424–425, figs. 1110–1113, 1125. (key, description, distribution, host plants);

Vilbaste, 1968: 63–64, fig. 48 (primary description of *M. salicicola* from the Southern Maritime Province);

Anufriev, 1981: 170–171, figs. 33–49 (male genitalia of specimens from different localities, variability of dark pattern, distribution, synonymy);

Hamilton, 1983: 36, 54–57, figs. 70, 135, 148–149 (*M. xena*: primary description, based on the material from Japan and North America; *M. notata*: description, based on North American material; key);

Zhantiev, Tishechkin, 1989: 473, fig. 1 (acoustic signals of specimens from population near Moscow);

Tishechkin, 1998: 423–425, figs. 5, 1–15, 6 (signals of specimens from different populations, description, synonymy, host plants);

Tishechkin, 2000a: 87–90, figs. 179–204 (description of nymph and imago, based on the material from the Russian Far East, synonymy, host plants, signals of specimens from different populations).

**NYMPH** (Fig. 135). Uniformly-green or brownish, sometimes dorsal crest of abdomen is partly darkened. Setose covering is almost entirely absent. Upper profile of abdomen is even, not serrated.

**MALE** (Figs. 125–127). The most abundant colour form is uniformly bright-green with black frontal and thyrical spots on face; occasionally any of the spots may be absent (Figs. 131–133). Sometimes, dark spots on the fore margin of pronotum and in the side angles of scutellum also present. In some populations pale-yellow or pale-greenish colour form with two longitudinal black stripes in the fore half of the dorsal side of body may be found (Fig. 127). Dark pattern of face in such specimens is either the same, as in green form described above, or consists of two dark markings in side part of vertex (Fig. 134). Frontal spot in this case may be reduced.

Tergal apodemes of 2nd abdominal sternum are wide, rounded (Figs. 139–140). Sternal ones are very wide, triangular, usually, with inner margin of irregular shape (Figs. 136–138). Aedeagus is wider, than in most part of willow-dwelling species (Figs. 141–143). Styles and pygofer appendages are of typical shape (Figs. 144–146).

Body length 4.0–4.5 mm.

**FEMALE** (Figs. 128–130). Similar with male. In green colour form usually only frontal spot on head presents, other spots are absent or hardly distinguishable (Fig. 128). The least pigmented specimens lack any dark pattern at all. In yellow-black form dark stripes as a rule are more bright and contrasting than in males (Figs. 129–130).

2nd valvulae are with 3–5 additional teeth each (Figs. 147–148).

Body length 4.7–5.0 mm.

**HOSTS**. On *Salix triandra* L. in Western Europe [Wagner, 1950], European Russia, North-west Caucasus and South Urals, occasionally also on *Salix fragilis* L.; on *Salix pierotii* Miq. in the Russian Far East.

**ACOUSTIC SIGNALS**. (Figs. 119–124). Signal recordings were made in the following localities:

1. Moscow Area. Several points in central and southern parts. More than 10 ♂♂ both from *S. triandra* and *S. fragilis* were studied. All recordings were made under laboratory conditions at the temperature 22–23 and 26°C.

2. North-west Caucasus, 12 km S of Anapa, Sukko River, on *S. triandra*, 4 ♂♂. 30.VI.1997. Shade air temperature — 27–28°C.

3. Orenburg Area.

a. Sakmara River near Churaevo Village, 20–25 km NNE of Kuvandyk Town, on *S. triandra*, 2 ♂♂. 29.VI.1996. Shade air temperature — 25–28°C.

b. Guberlya River near Guberlya railway station, 25 km W of Orsk, on *S. triandra*, 2 ♂♂. 6.VII.1996. Shade air temperature — 27–28°C.

4. Amur Area, approximately 30 km W of Svobodny, on *S. pierotii*, 5 ♂♂. 6, 8.VII.1995. Shade air temperature — 22–24°C.

5. The Southern Maritime Province, Pogranichny District, Komissarovka River near Barabash-Levada Village, on *S. pierotii*, 3 ♂♂. 13, 19.VII.1995. Shade air temperature — 25–26°C.

Calling signal consists of two alternating parts with different temporal pattern. Signals of individuals from different localities are quite similar.

**RANGE**. Central and southern parts of Western Europe, Ukraine, central and southern parts of European Russia, South Urals, Northern and Eastern Kazakhstan, the Russian Far East and Japan; evidently transpalearctic, but was not found in Siberia. Introduced to North America.

Specimens were examined from Moscow Area, Middle Volga Region, Crimea, North-west Caucasus, South Urals and trans-Uralian parts of Orenburg Area, the Russian Far East (Amur Area, Khabarovsk Province and the Southern Maritime Province) and Japan (holotype of *M. xena*).

**SIMILAR SYMPATRIC SPECIES**. In external appearance differs from the most part of willow-dwelling green species, having small number of additional teeth on 2nd valvulae, by well developed black spots on face, especially in males. Similar colour forms of *M. prasina* Boh. may be distinguished from *M. notata* by well-developed discoidal spots and also, by more numerous additional teeth on 2nd valvulae. Besides, *M. notata* distinctly differs from all similar species by wide, almost triangular tergal apodemes and partially, by very wide shaft of aedeagus.

**NOTES**. Interpretation of *M. notata* is accepted after Wagner [1950], who investigated one male from Prohaska collection. Types are evidently lost [Wagner, 1950]. Type series of *M. punctata* was reinvestigated by Anufriev [1981]. Interpretation of *M. xena* is based on reinvestigation of holotype, interpretation of *M. salicicola* — on studying of numerous material from different localities in the Russian Far East.

Several female paratypes of *M. vestita* from the collection of H. Ribaut (Muséum National d'Histoire Naturelle, Paris) are investigated by me. The series includes black-yellow colour forms of both *M. marginata* and *M. notata*, but the male (holotype) belongs to the latter species judging by the drawings of genitalia structures in original description, especially by very wide and short aedeagus (Ribaut, 1952: 423, fig. 1123).

## 6. *Macropsis ocellata* Provancher, 1872 Figs. 149–167, 175–184.

= *M. albae* Wagner, 1950 (Hamilton, 1983);

Wagner, 1950 (as *M. albae*): 89–90, 99–100, figs. 2–7, 9, 12 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plants, synonymy, phenology);

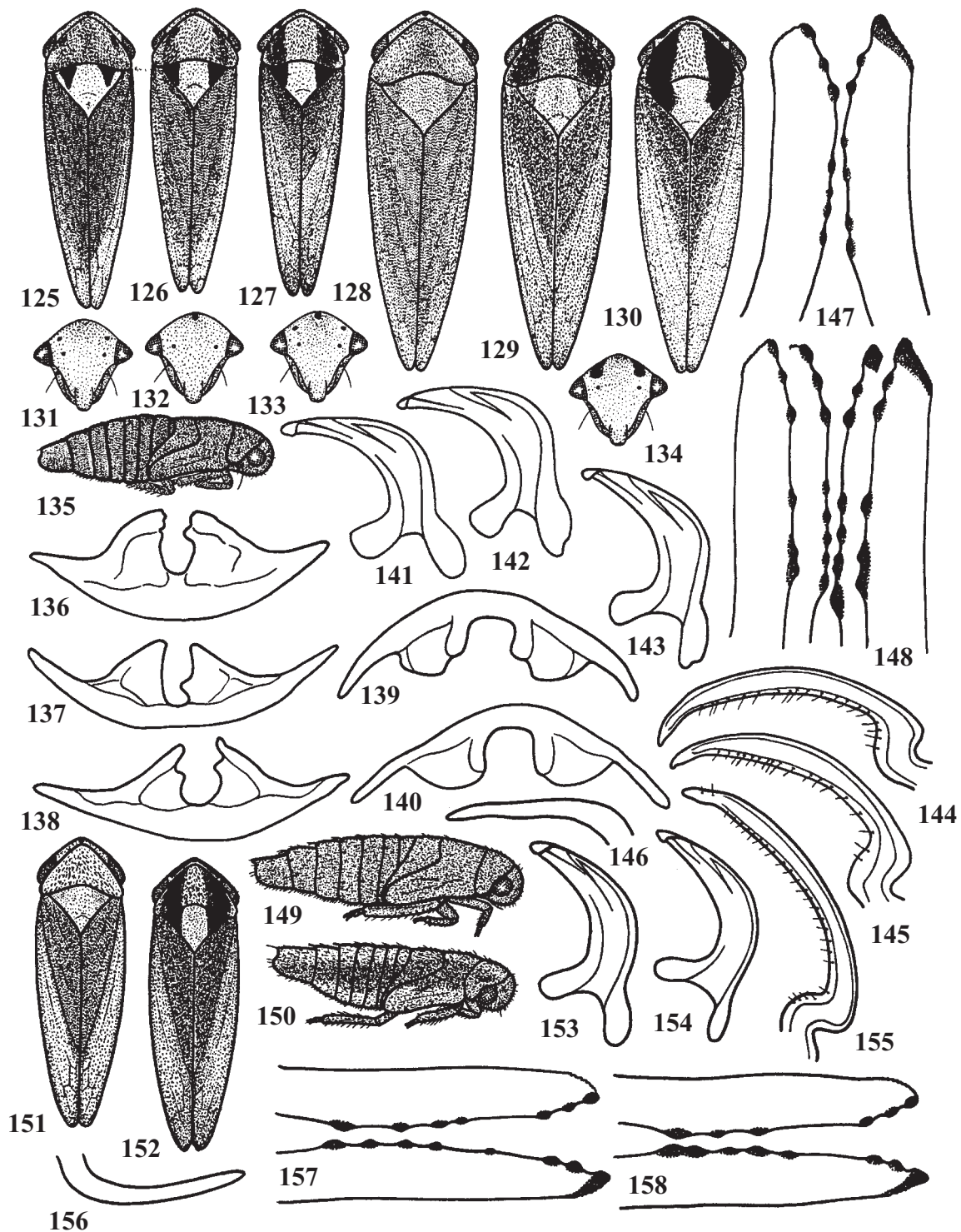
Ribaut, 1952 (as *M. albae*): 420–421, 424, figs. 1120–1122 (key, description, distribution, host plants);

Hamilton, 1983: 45–49, figs. 67–68, 134, 146 (description, hosts, range, key);

Zhantiev, Tishechkin, 1989: 471, fig. 1 (acoustic signals of specimens from population near Moscow).

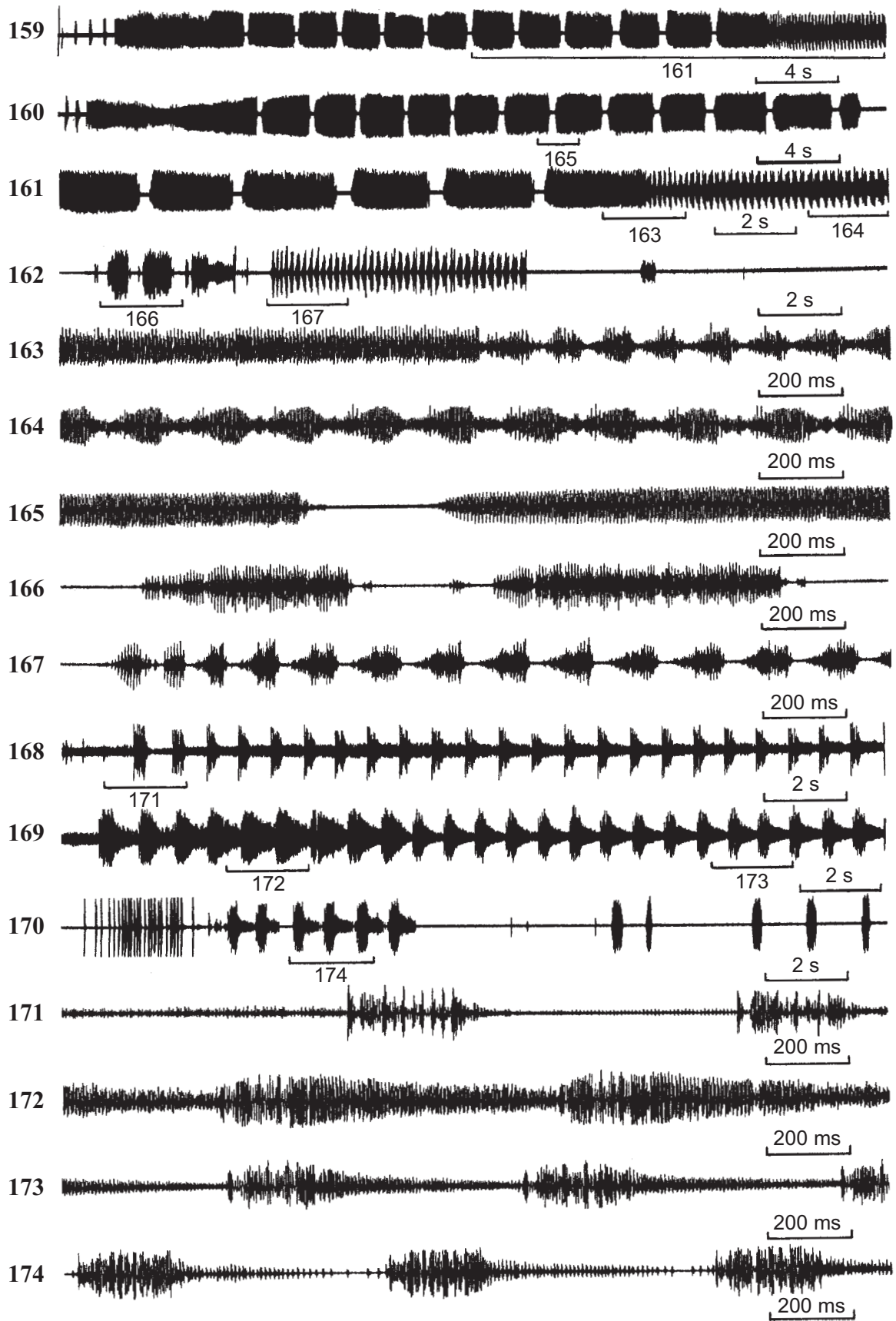
**NYMPH** (Figs. 149–150). Uniformly-green or pale yellowish with more or less developed dark longitudinal stripes on the sides of body. Sometimes traces of such stripes presents in green colour form. Upper profile of abdomen is more or less even or slightly dentified. Setose covering is well-developed.

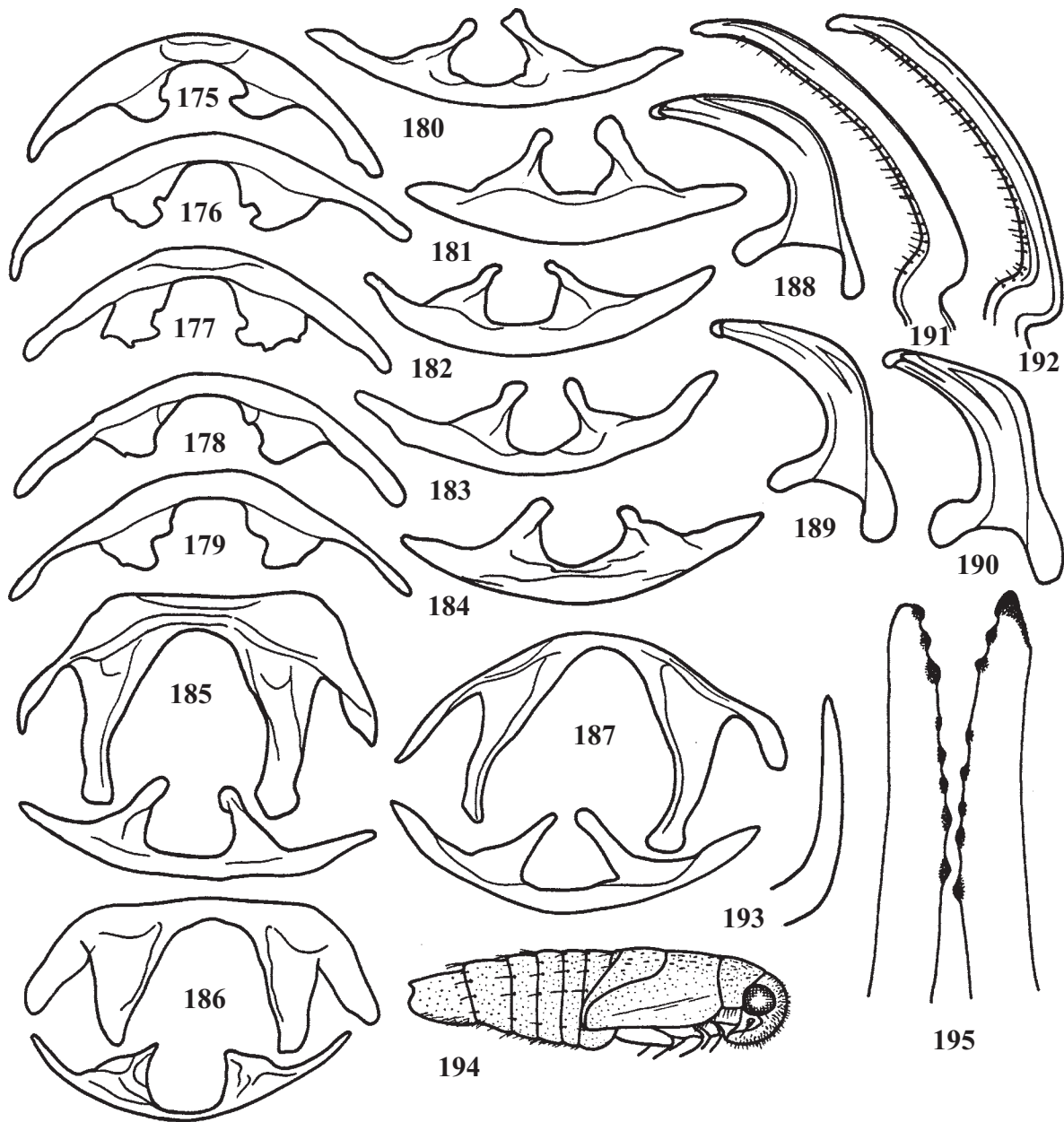




Figs. 125–158. *Macropsis notata* (Proh.) (125–148): 125–127 — ♂, dorsal view of a body, 128–130 — same, ♀, 131–134 — face, 135 — nymph, 136–138 — apodemes of 2nd ♂ abdominal sternite, 139–140 — same, apodemes of 2nd abdominal tergite, 141–143 — aedeagus, side view, 144–145 — stylus, 146 — pygofer appendage, 147–148 — 2nd valvulae of ovipositor; *M. ocellata* Prov. (149–158): 149–150 — nymph, 151–152 — ♂, dorsal view of a body, 153–154 — aedeagus, side view, 155 — stylus, 156 — pygofer appendage, 157–158 — 2nd valvulae of ovipositor.

Рис. 125–158. *Macropsis notata* (Proh.) (125–148): 125–127 — ♂, вид сверху, 128–130 — то же, ♀, 131–134 — лицо, 135 — личинка, вид сбоку, 136–138 — аподемы 2-го брюшного стернита ♂, 139–140 — то же, аподемы 2-го брюшного тергита, 141–143 — эдеагус, вид сбоку, 144–145 — стилус, 146 — отросток доли пигофора, 147–148 — внутренние гонапофизы яйцеклада; *M. ocellata* Prov. (149–158): 149–150 — личинка, вид сбоку, 151–152 — ♂, вид сверху, 153–154 — эдеагус, вид сбоку, 155 — стилус, 156 — отросток доли пигофора, 157–158 — внутренние гонапофизы яйцеклада.





Figs. 175–195. *Macropsis ocellata* Prov. (175–184): 175–179 — apodems of 2nd ♂ abdominal tergite, 180–184 — same, apodems of 2nd abdominal sternite; *M. vocalis* Tish. (185–195): 185–187 — apodems of 2nd ♂ abdominal segment, 188–190 — aedeagus, side view, 191–192 — stylus, 193 — pygofer appendage, 194 — nymph, 195 — 2nd valvulae of ovipositor.

Рис. 175–195. *Macropsis ocellata* Prov. (175–184): 175–179 — аподемы 2-го брюшного тергита ♂, 180–184 — то же, аподемы 2-го брюшного стернита; *M. vocalis* Tish. (185–195): 185–187 — аподемы 2-го брюшного сегмента ♂, 188–190 — эдеагус, вид сбоку, 191–192 — стилус, 193 — отросток доли пифофора, 194 — личинка, вид сбоку, 195 — внутренние гонапофизы яйцеклада.

Figs. 159–174. Oscillograms of male calling signals of *Macropsis ocellata* Prov. (159–167) and *M. vocalis* Tish. (168–174). Faster oscillograms of the parts of signals indicated as “161”, “163–167” and “171–174” are given under the same numbers.

Рис. 159–174. Осциллограммы призывных сигналов самцов *Macropsis ocellata* Prov. (159–167) и *M. vocalis* Tish. (168–174). Фрагменты сигналов, помеченные цифрами “161”, “163–167” и “171–174”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



MALE (Figs. 151–152). For the most part uniformly-green, sometimes with fore wings slightly fumose (Fig. 151). Also, pale-yellow colour form with two dark longitudinal stripes on the upper side of body presents in small number in several populations studied (Fig. 152). Dark pattern of face is absent, only frontal black spot may present.

2nd tergal apodems are rounded, usually with tips bent inwards and with margins of irregular shape (Figs. 175–179). Sternal apodems are more slender and narrow, than in most part of willow-feeding *Macropsis* species (Figs. 180–184). Genitalia are of usual structure (Figs. 153–156).

Body length 4.1–4.5 mm.

FEMALE. Same as male, but usually more pale. 2nd valvulae are with 3–5 additional teeth (Figs. 157–158).

Body length 4.6–5.3 mm.

HOSTS. *Salix alba* L. in Western Europe, throughout all European Russia and in North America.

ACOUSTIC SIGNALS (Figs. 159–167). Signals recordings were made in the following localities:

1. Moscow Area, Serpukhov District, environs of Luzhki Village, *S. alba* on the bank of Oka River. 16.VII.1985 and 30.VII.1994. Signals of 6 ♂♂ were recorded at 22–23°C under laboratory conditions.

2. North-west Caucasus, 12 km S of Anapa, Sukko River, on *S. alba*, 4 ♂♂. 2.VII.1997. Shade air temperature — 29–31°C.

3. Astrakhan' Area, Dosang Railway Station, on *S. alba* (possibly, *S. alba* x *S. fragilis*) in a flood-plain between Volga and Akhtuba rivers, 7.VII.2000. Signals of 2 ♂♂ were recorded at 26°C under laboratory conditions.

4. Orenburg Area, Sakmara River near Churaevo Village, 20–25 km NNE of Kuvandyk Town, on *S. alba*, 5 ♂♂. 29.VII.1996. Shade air temperature — 24–28°C.

Calling signal is a phrase lasting for approximately 10–40 s and consisting of two different parts (Fig. 159). Sometimes male does not produce the second part (Fig. 160); occasionally inverse situation takes place and the first part may be somewhat reduced but the second one is well-developed (Fig. 162).

RANGE. Central and southern parts of Western Europe, Ukraine, European Russia, South Urals and trans-Ural part of Orenburg Area. Also, introduced to North America.

SIMILAR SYMPATRIC SPECIES. In external appearance and in number of additional teeth on 2nd valvulae is similar with *M. notata*, *M. vocalis* Tish., *M. prasina* and *M. gravesteini* Wagn. Differs from all these species by the shape of 2nd abdominal apodems, especially by narrow and slender sternal ones. From *M. prasina* also can be distinguished by the number of additional teeth on 2nd valvulae (6–7 in the latter species). From *M. tuvensis* Vilb., *M. iliensis* Mit. and *M. tarbagataica* Mit. occurring in Western Siberia (the former species) and in the extreme South-East of European Russia (the latter two ones) differs both by the shape of apodems and by larger size.

NOTES. Interpretation of species is accepted after Wagner [1950] with due respect of the work of Hamilton [1983].

#### 7. *M. vocalis* Tishechkin, 1994

Figs. 168–174, 185–195.

NYMPH (Fig. 194). Body light-green, upper outline of abdomen is rather smooth, ledges at the back borders of tergites for the most part are indistinct. Setose covering is more or less developed.

MALE. Uniformly-green, rarely with black spot at the apex of crown.

Apodems of 2nd abdominal tergite are very long, triangular or with extended, band-like lobes (Figs. 185–187). Sternal apodems are triangular, of usual shape, occasionally with somewhat expanded tips. Stem of aedeagus as a rule is widest in the middle part, at the point of bending (Figs. 188–190). Styles and pygofer processes are of the same shape as in other willow-dwelling species (Figs. 191–193).

Body length 4.2–4.5 mm.

FEMALE. Similar with male, 2nd valvulae are with 4–5 additional teeth (Fig. 195).

Body length 5.1–5.2 mm.

HOSTS. Until now was found only on *Salix alba*.

ACOUSTIC SIGNALS (Figs. 168–174). Signals recordings were made in the following localities:

1. N Caucasus, Chechnya, environs of Grozny City, from *S. alba*. 22.VI.1986. Calling signals of 3 ♂♂ including holotype are recorded at 24°C.

2. NW Caucasus, Krasnodar Area, Sukko River in the environs of Sukko Village 12 km South of Anapa, from *S. alba*. 30.VI.1997. Calling signals of 1 ♂ are recorded at 26°C.

Calling signal is a succession of repeating fragments, lasting from 4–5 up to 25 s and more. Fragments follow with a period 0.45–1 s and may be either partially merged or separated by distinct intervals. In the original description [Tishechkin, 1994b] one of the oscillograms (p. 36, fig. 3, 4) is turned upside-down.

RANGE. Was found only in the lands at the northern foot of Caucasus Mountains (Ciscaucasia). Material was studied only from two localities cited above.

SIMILAR SYMPATRIC SPECIES. In external appearance is similar with most part of other willow-feeding species of the genus, but differs from all known ones by unusually long tergal apodems.

NOTES. Type series is deposited in ZMMU.

#### 8. *Macropsis viridinervis* Wagner, 1950

Figs. 196–210, 226–231.

Anufriev, Zhiltsova, 1982 (comparison with *M. verbae* Anufr., Zhilts.);

Zhantiev, Tishechkin, 1989: 471, figs. 1–2 (acoustic signals of specimens from population near Moscow).

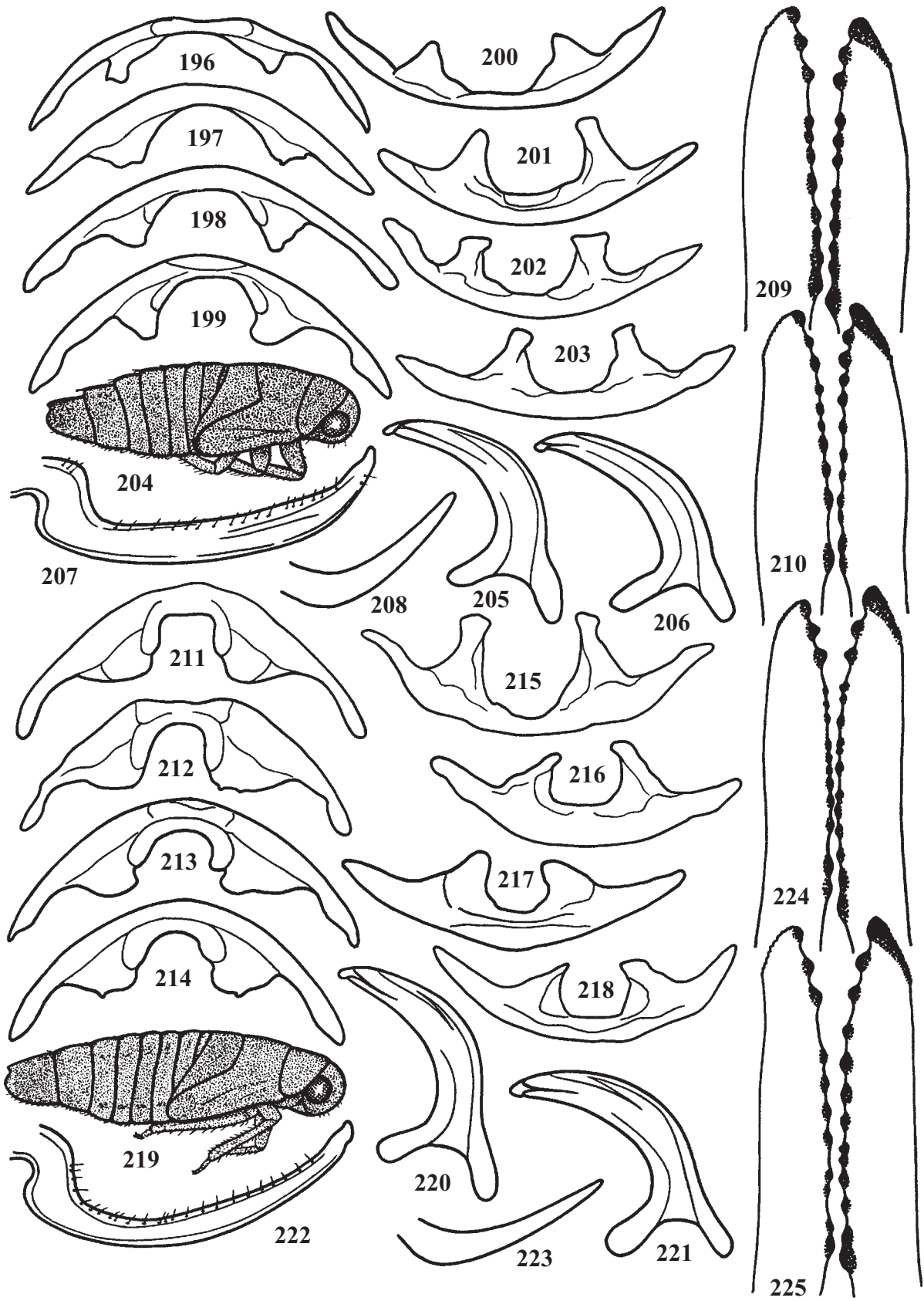
NYMPH (Fig. 204). Uniformly green with even upper profile of abdomen and almost entirely absent setose covering.

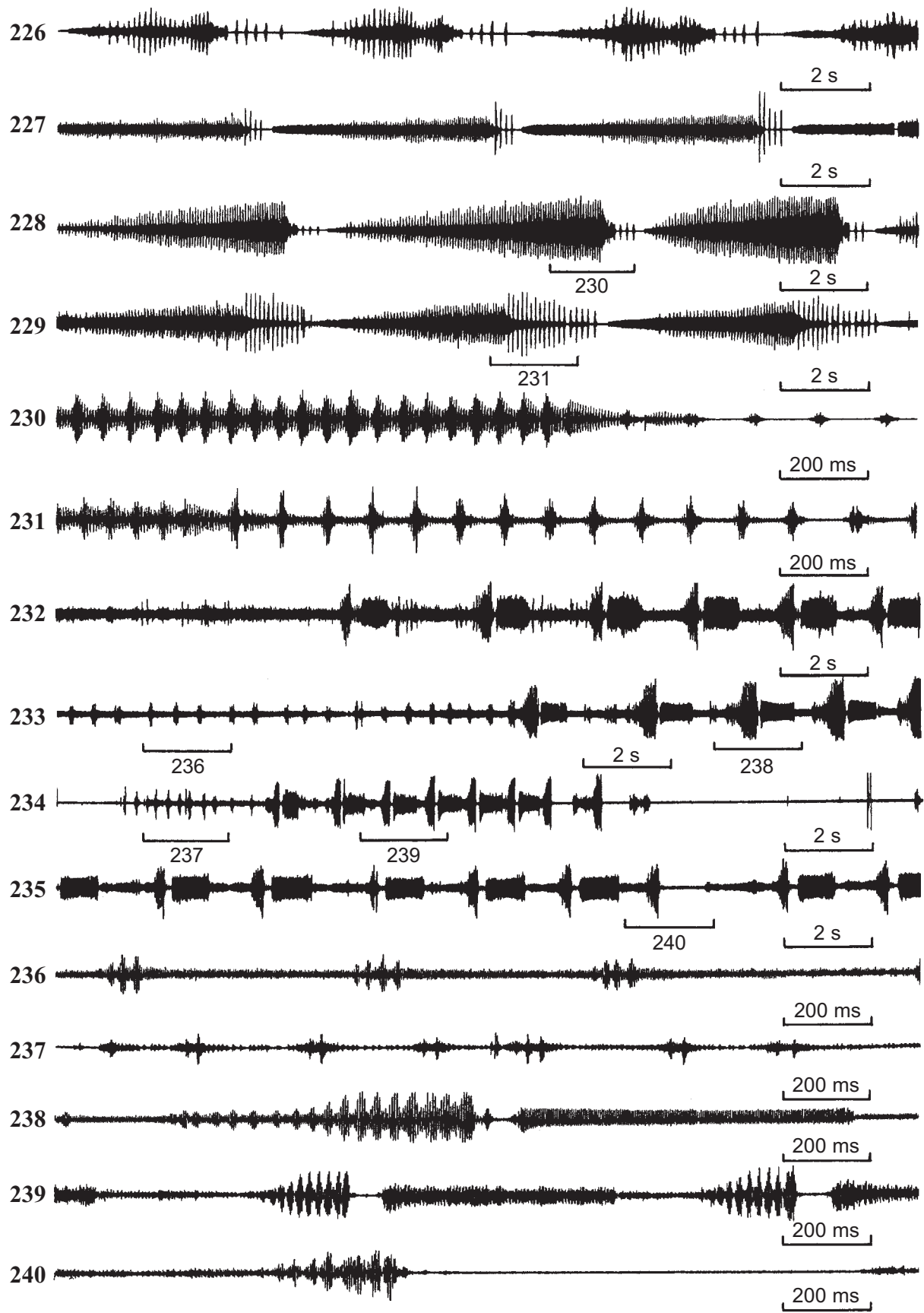
MALE. As a rule are uniformly green without any black spots on head, pronotum and scutellum. Recently the form

Figs. 196–225. *Macropsis viridinervis* Wagn. (196–210): 196–199 — apodems of 2nd ♂ abdominal tergite, 200–203 — same, apodems of 2nd abdominal sternite, 204 — nymph, 205–206 — aedeagus, side view, 207 — stylus, 208 — pygofer appendage, 209–210 — 2nd valvulae of ovipositor; *M. verbae* Anufr., Zhilts. (211–225): 211–214 — apodems of 2nd ♂ abdominal tergite, 215–218 — same, apodems of 2nd abdominal sternite, 219 — nymph, 220–221 — aedeagus, side view, 222 — stylus, 223 — pygofer appendage, 224–225 — 2nd valvulae of ovipositor.

Рис. 196–225. *Macropsis viridinervis* Wagn. (196–210): 196–199 — аподемы 2-го брюшного тергита ♂, 200–203 — то же, аподемы 2-го брюшного стернита, 204 — личинка, вид сбоку, 205–206 — эдеагус, вид сбоку, 207 — стилус, 208 — отросток доли пигифора, 209–210 — внутренние гонапофизы яйцеклада; *M. verbae* Anufr., Zhilts. (211–225): 211–214 — аподемы 2-го брюшного тергита ♂, 215–218 — то же, аподемы 2-го брюшного стернита, 219 — личинка, вид сбоку, 220–221 — эдеагус, вид сбоку, 222 — стилус, 223 — отросток доли пигифора, 224–225 — внутренние гонапофизы яйцеклада.







with moderately developed black pattern was described from Austria by Holzinger [1999].

Tergal apodems are weakly developed, more or less triangular (Figs. 196–199), sternal ones are short and wide, more or less parallel or only slightly converging, with tips of variable shape (Figs. 200–203). Basal part of aedeagus shaft is of uniform width along all its length, or widest at the base (Figs. 205–206). Styles and pygofer processes are of usual shape (Figs. 207–208).

Body length 4.4–5.0 mm.

FEMALE. Similar with male, 2nd valvulae are with 7–9 additional teeth (Figs. 209–210).

Body length 4.8–5.3 mm.

HOSTS. *Salix triandra* L.

ACOUSTIC SIGNALS (Figs. 226–231). Signals recordings were made in the following localities:

1. Moscow Area. Signals of more than 10 ♂♂ collected from *S. triandra* in several localities were recorded at 20–25°C under laboratory conditions.

2. Ukraine, Crimea.

a. Environs of Glubokiy Yar Village N of Bakhchisaray Town, from *S. triandra*. 8.VI.1997. Calling signals of 5 ♂♂ were recorded at 21–22°C.

b. Environs of Pereval'noe Village halfway from Simferopol to Alushta, from *S. triandra*. 18.VI.1997. Calling signals of 2 ♂♂ are recorded at the temperature 22–23°C.

3. North-west Caucasus, 12 km S of Anapa, Sukko River, on *S. triandra*, 1 ♂. 1.VII.1997. Shade air temperature — 28°C.

Calling signal consists of phrases, repeating with a period about 6–10 s. Sometimes male sing ceaselessly for several minutes. Signals of specimens from different localities are indistinguishable.

RANGE. From Western Europe to Southern Urals and trans-Uralian regions of Orenburg Area. In European Russia northwards at least up to latitude of Moscow.

Specimens were examined from Austria, Ukraine (Crimea), several localities in European Russia, North-west Caucasus, Southern Urals and trans-Uralian part of Orenburg Area.

SIMILAR SYMPATRIC SPECIES. From most part of green willow-dwelling species, having the similar number of additional teeth on 2nd valvulae (*M. microcera*, *M. marginata*, *M. prasina*, green form of *M. impura*) may be distinguished due to rather narrow aedeagus with basal part having uniform width, or widest at the base, but not at the point of bending, as in all species mentioned above. From the last three species also differs by more large size.

Very similar with *M. verbae*, but differs from it by another shape of tergal apodems (Figs. 196–199 and 211–214) and more wide 2nd valvulae. Also, in the latter species aedeagus is slightly widened in the middle part (in the point of bending of shaft, Figs. 220–221).

NOTES. Interpretation of species is accepted after Wagner [1950].

### 9. *Macropsis verbae* Anufriev, Zhiltsova, 1982

Figs. 211–225, 232–240.

Zhantiev, Tishechkin, 1989: 473, figs. 1, 3 (acoustic signals of specimens from population near Moscow).

NYMPH (Fig. 219). Uniformly green, dorsal crest of abdomen is even, setose covering is almost entirely absent.

MALE. Uniformly green. Tergal apodems are with wide, rounded lobes (Figs. 211–214), sternal ones are similar in shape with these of the previous species (Figs. 215–218). Shaft of aedeagus is rather narrow, widest in the middle part (Figs. 220–221). Styles and pygofer processes are of typical shape (Figs. 222–223).

Body length 4.5–5.0 mm.

FEMALE. Similar with male, 2nd valvulae are with 8–12 additional teeth (Figs. 224–225).

Body length 4.9–5.6 mm.

HOSTS. Evidently, monophagous on *Salix acutifolia* Willd.

ACOUSTIC SIGNALS (Figs. 232–240). Calling signals recordings were made in the following localities:

1. Moscow Area, Serpukhov District, Pushchino-na-Oke Town, from *S. acutifolia* on the bank of Oka River. 2.VII.1985. Signals of 4 ♂♂ are recorded at 21°C under laboratory conditions.

2. Volgograd Area, Ilovlya River about 5–7 km from the mouth, from *S. acutifolia*. 10.VI.1996. Signals of 3 ♂♂ are recorded at 31–32°C.

Full calling signal consists of two parts with different temporal pattern, the first having lower amplitude, than the second. Occasionally, the first part may be omitted.

RANGE. Apparently, Ukraine and European Russia within the range of *S. acutifolia*, maybe, also adjacent parts of Western Kazakhstan. Until now is known only from several localities in Russia.

Specimens were studied from Moscow and Nizhniy Novgorod areas (type locality) and from Lower Volga Region.

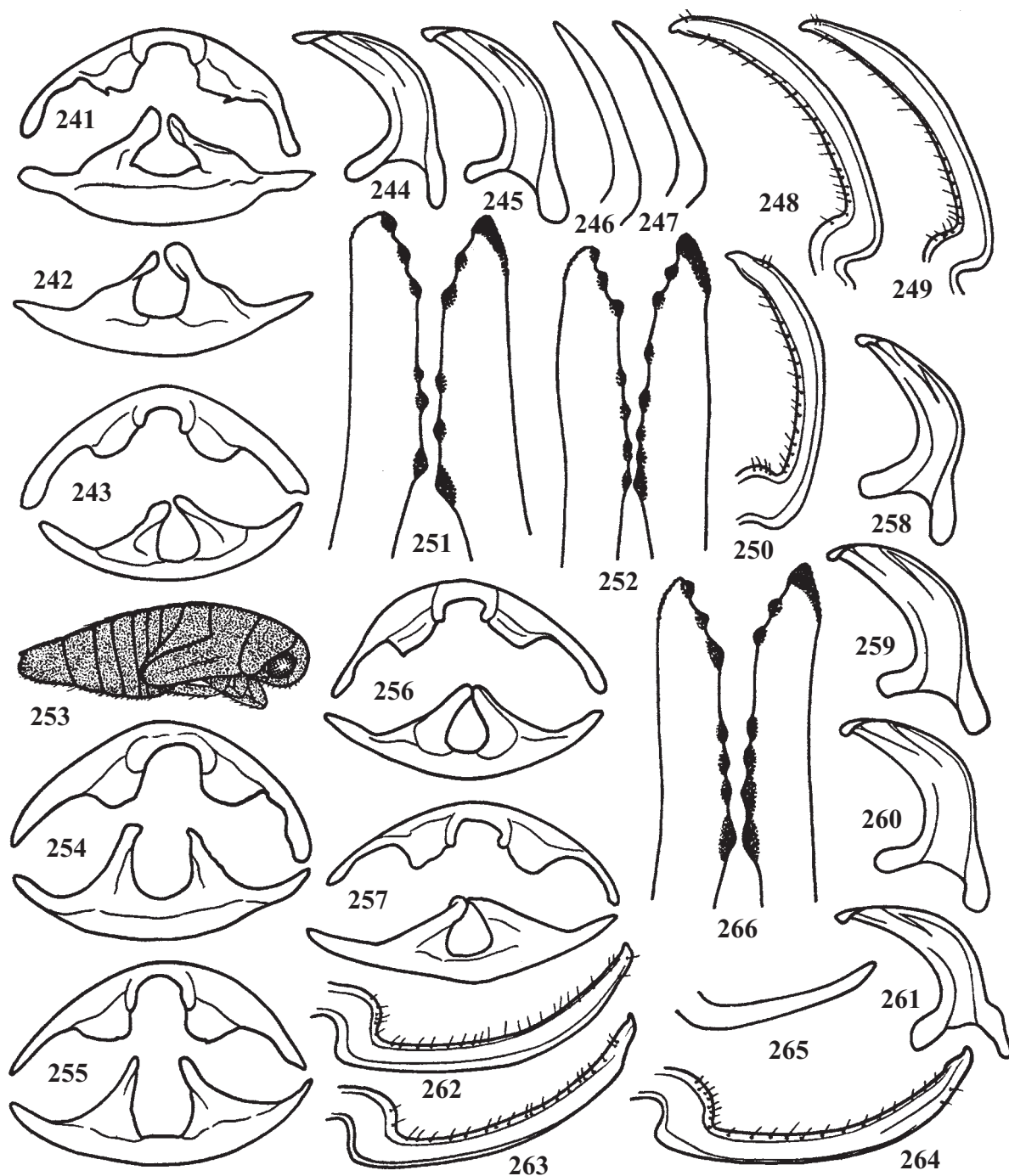
SIMILAR SYMPATRIC SPECIES. From *M. marginata*, *M. prasina* and green form of *M. impura*, having the similar shape of 2nd valvulae may be distinguished due to larger size, from the latter two species also, due to more narrow aedeagus stem. Differs from *M. microcera* by more bright coloration (the latter species is usually more pale), slender aedeagus and the shape of styles (widened before the apex in *M. microcera*). Very closely related with *M. viridinervis*, differing from it by the shape of aedeagus stem (widest at the base in *M. viridinervis*, widest in the middle part in *M. verbae*) and more long and narrow identified part of 2nd valvulae.

NOTES. Original description is based on the material from Nizhniy Novgorod Area and from Serpukhov District of Moscow Area (flood-land of Oka River in the environs of Luzhki Village). Pushchino-na-Oke Town where material for signals recording was collected is situated on the opposite bank of Oka River about 5 km SE from the latter locality.

Interpretation of species is based on original description [Anufriev, Zhiltsova, 1982] and on investigation of the material from the environs of Luzhki Village and Nizhniy Novgorod Area. According to Anufriev and Zhiltsova [1982], original description was based on 34 specimens from Nizhniy Novgorod Area and on more than one hundred specimens from Luzhki Village, taken from *S. acutifolia* at 22.VI.1947 and 10–19.VI.1948 by L. Zhiltsova; the part of the latter series is deposited in ZMUM. Rather numerous material on this species, collected in this place by L. Zhiltsova in 1947–1948,

Figs. 226–240. Oscillograms of male calling signals of *Macropsis viridinervis* Wagn. (226–231) and *M. verbae* Anufr., Zhilts. (232–240). Faster oscillograms of the parts of signals indicated as “230–231” and “236–240” are given under the same numbers.

Рис. 226–240. Осциллограммы призывных сигналов самцов *Macropsis viridinervis* Wagn. (226–231) и *M. verbae* Anufr., Zhilts. (232–240). Фрагменты сигналов, помеченные цифрами “230–231” и “236–240”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



Figs. 241–266. *Macropsis iliensis* Mit. (241–252): 241, 243 — apodemes of 2nd ♂ abdominal segment, 242 — same, apodemes of 2nd abdominal sternite, 244–245 — aedeagus, side view, 246–247 — pygofer appendage, 248–250 — stylus, 251–252 — 2nd valvulae of ovipositor; *M. tarbagataica* Mit. (253–266): 253 — nymph, 254–257 — apodemes of 2nd ♂ abdominal segment, 258–261 — aedeagus, side view, 262–264 — stylus, 265 — pygofer appendage, 266 — 2nd valvulae of ovipositor.

Рис. 241–266. *Macropsis iliensis* Mit. (241–252): 241, 243 — аподемы 2-го брюшного сегмента ♂, 242 — то же, аподемы 2-го брюшного стернита, 244–245 — эдеагус, вид сбоку, 246–247 — отросток доли пигофора, 248–250 — стилус, 251–252 — внутренние гонапофизы яйцеклада; *M. tarbagataica* Mit. (253–266): 253 — личинка, вид сбоку, 254–257 — аподемы 2-го брюшного сегмента ♂, 258–261 — эдеагус, вид сбоку, 262–264 — стилус, 265 — отросток доли пигофора, 266 — внутренние гонапофизы яйцеклада.



presents in the collection indeed, but it does not include any specimens designated as paratypes.

10. *Macropsis iliensis* Mitjaev, 1971  
Figs. 241–252, 267–273.

NYMPH. Unknown.

MALE. Uniformly green, without any black pattern, fore wings occasionally somewhat fumose. Tergal apodems of 2nd abdominal segment are rounded, occasionally with small denticles on the outer margin (Figs. 241, 243). Sternal apodems usually strongly convergent, of irregular shape, with lobes for the most part rounded and expanded. Genitalia are of usual shape and provide no diagnostic characters (Figs. 244–250).

Body length 3.5–4.2 mm.

FEMALE. Similar with male. 2nd valvulae are with 3–5 additional teeth (Figs. 251–252).

Body length 3.9–4.5 mm.

HOSTS. I have collected this species only once on *Salix vinogradovii* A. Skvorts. (see the next item). According to the labels on the material collected by Prof. I.D. Mityaev, in Kazakhstan was found on *Salix wilhelmsiana* M.B., *S. caspica* Pall. (sect. *Helix* s.l.) and *S. songarica* Anderss. (sect. *Amygdalinae*).

ACOUSTIC SIGNALS (Figs. 267–273). Signals of 1 ♂, collected on *S. vinogradovii* on the bank of Guberlya River near Guberlya railway station, 25 km W of Orsk, Orenburg Area, 5.VII.1996, were recorded at the shade air temperature 23–24°C.

Calling signal consists of two different parts, which vary greatly in duration. Occasionally male produces the second part only.

RANGE. All the Kazakhstan and extreme South-East of European Russia.

Material was studied from many localities in Kazakhstan and from Orenburg Area.

SIMILAR SYMPATRIC SPECIES. From the most part of green willow-dwelling species (*M. notata*, *M. prasina*, *M. gravesteini*, *M. vocalis*, *M. ocellata*) having 3–5 additional teeth on 2nd valvulae, differs by the shape of abdominal apodems and somewhat smaller size. Also, data on distribution must be taken into account, because this species occurs only in south-eastern part of European Russia near the border of Kazakhstan. Similar in these characters with *M. tuvensis*, but the latter species has more pale coloration and distinctly darkened apices of tibiae and tarsi, especially in male. Very similar and in some cases is almost indistinguishable from *M. tarbagataica*, differing from it only in the shape of sternal apodems in male (see Figs. 241–243 and 254–257).

NOTES. Was briefly described in the key for the species of *Macropsis* from Kazakhstan [Mityaev, 1971]. Interpretation of species is based on reinvestigation of type series from the Southern Kazakhstan (Figs. 241–242, 244–249), with the label “Iliysk Railway Station, at light, 9.VI.1964. G. Rustambekova”. Several paratypes are deposited in the collection of ZMUM.

11. *Macropsis tarbagataica* Mityaev, 1971  
Figs. 253–266, 274–280.

NYMPH (Fig. 253). Uniformly green, upper profile of abdomen is smooth, not denticled, setose covering is poorly developed.

MALE. Uniformly green, fore wings are often fumose, sometimes almost entirely darkened with the exception of costal zone. In the shape of internal structures is quite similar

with the previous species (Figs. 254–265), differing only in the shape of sternal apodems, which are more slender, straight and elongate (Figs. 254–257).

Body length 3.8–4.3 mm.

FEMALE. Similar with male, but fore wings are never darkened. 2nd valvulae usually with 4 additional teeth each (Fig. 266).

Body length 4.2–5.0 mm.

HOSTS. Was collected on *Salix viminalis* L. in the environs of Orsk (Southern Urals) and on *S. tenuijulus* Ledebour in the environs of Almaty. Conspecificity of specimens from both series is corroborated by signals analysis. In Kazakhstan also was collected by Prof. I.D. Mityaev on *S. wilhelmsiana* (sect. *Helix* s.l.) and *S. songarica* (sect. *Amygdalinae*).

ACOUSTIC SIGNALS (Figs. 274–280). Signals recordings were made in the following localities:

1. Orenburg Area, Guberlya River near Guberlya railway station, 25 km W of Orsk, on *S. viminalis*, 2 ♂♂. 6.VII.1996. Shade air temperature — 25–27°C.

2. Kazakhstan, environs of Almaty, *S. tenuijulus* near the brook, 4 ♂♂. 5.VII.1994. Recording was made at the temperature 29°C under laboratory conditions.

As in the previous species, calling signal consists of two different parts, but their temporal pattern is quite different from this in *M. iliensis*.

RANGE. Throughout all the territory of Kazakhstan, also was found in the environs of Orsk not far from the boundary of Kazakhstan.

Specimens were studied from numerous localities in Kazakhstan and from Orenburg Area.

SIMILAR SYMPATRIC SPECIES. Very similar with *M. iliensis*, but differs from it by more slender, straight and elongate sternal apodems. From other green willow-dwelling species may be distinguished by the same characters, as *M. iliensis* (see the same item in the description of this species). Also, as in the previous species, data on distribution must be taken into account.

NOTES. As *M. iliensis*, was briefly described in the key [Mityaev, 1971]. Interpretation of species is based on reinvestigation of type series from South-Eastern Kazakhstan with the label “Semipalatinsk Area, Urdzharsk District, mouth of Urdzharka River. 15.VI.1963. I. Mityaev” (Figs. 254–255, 259, 265–266). Several paratypes are deposited in the collection of ZMUM.

12. *Macropsis microcera* Vilbaste, 1980  
Figs. 281–296, 307–318.

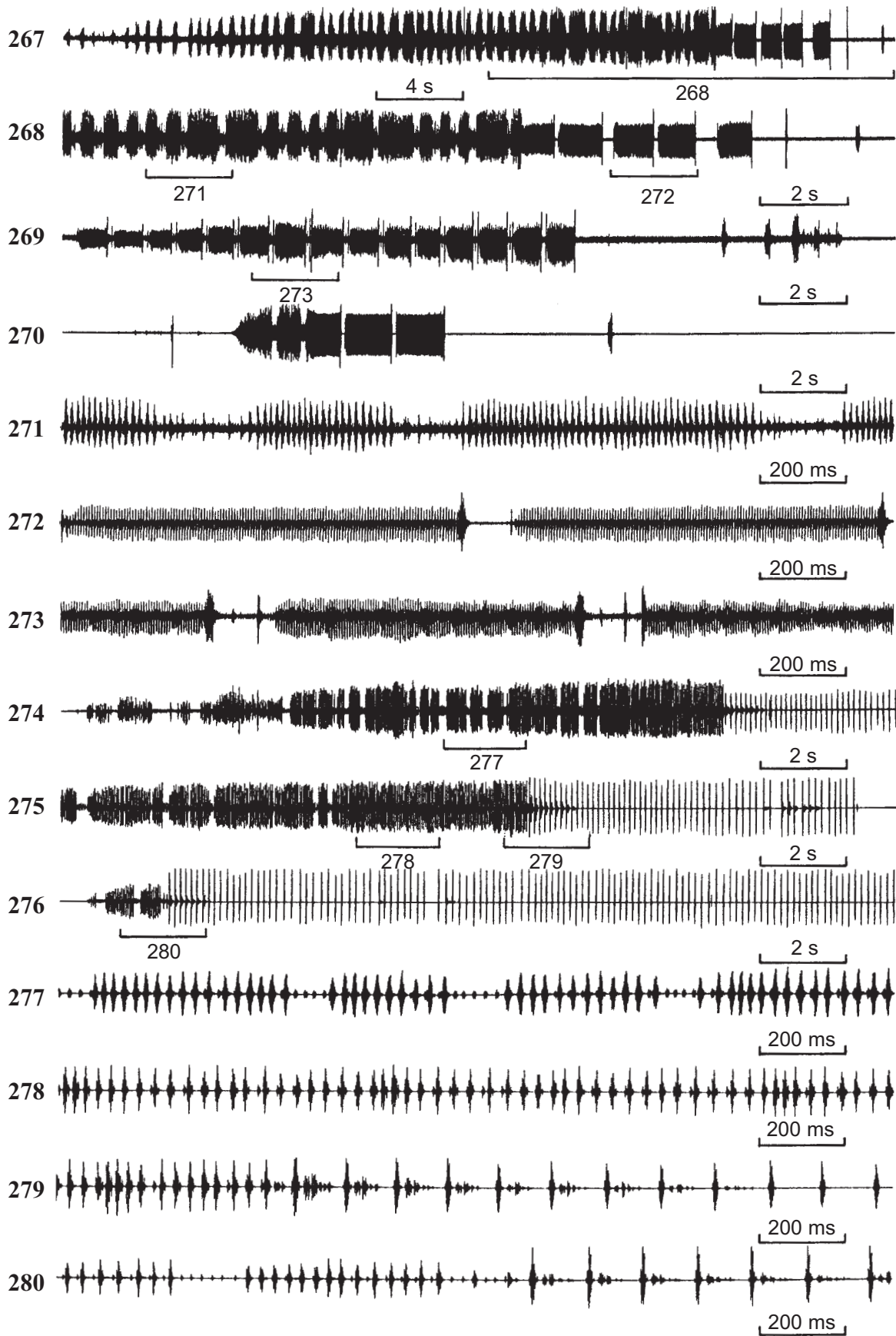
Zhantiev, Tishechkin, 1989 (as *Macropsis* sp.): 473, fig. 2 (acoustic signals of specimens from population near Moscow);

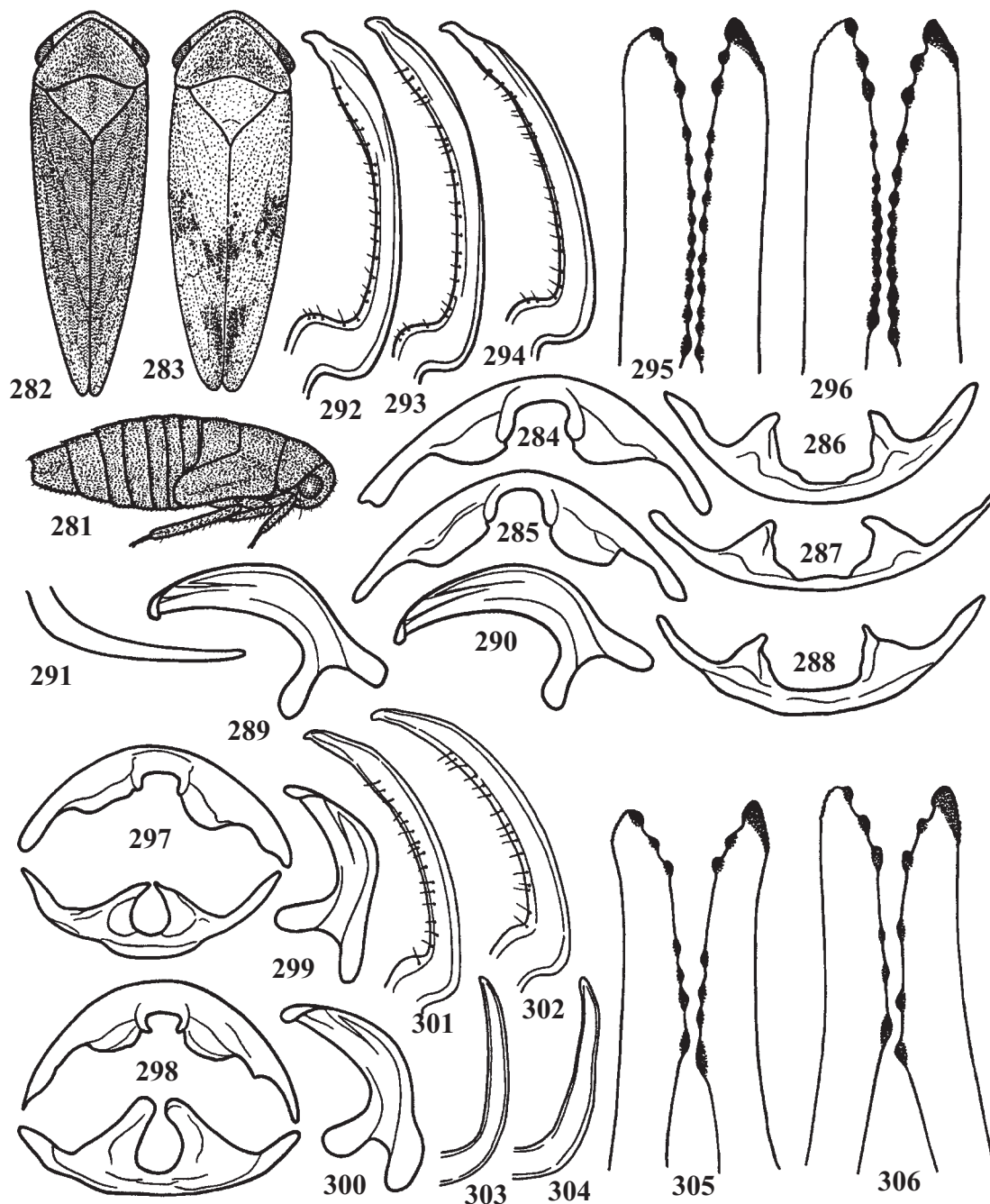
Tishechkin, 1994a: 43–47, figs. 1–3 (description, acoustic signals, host plants, range).

NYMPH (Fig. 281). Uniformly pale-green, or greyish green. Upper profile of abdomen is even, setose covering is very weakly developed.

MALE. Uniformly pale-green or emerald-green (Fig. 282). Occasionally, with black frontal spot on crown and/or with traces of thyridial and discoidal spots on face. Any pattern on the dorsal side of body is absent.

Tergal apodems of 2nd abdominal segment are with wide, rounded lobes (Figs. 284–285). Sternal ones are more or less triangular, with tips somewhat pointed and bent inwards (Figs. 286–288). Aedeagus and pygofer appendages are of usual shape (Figs. 289–291), styles are distinctly widened before the apex (Figs. 292–294).



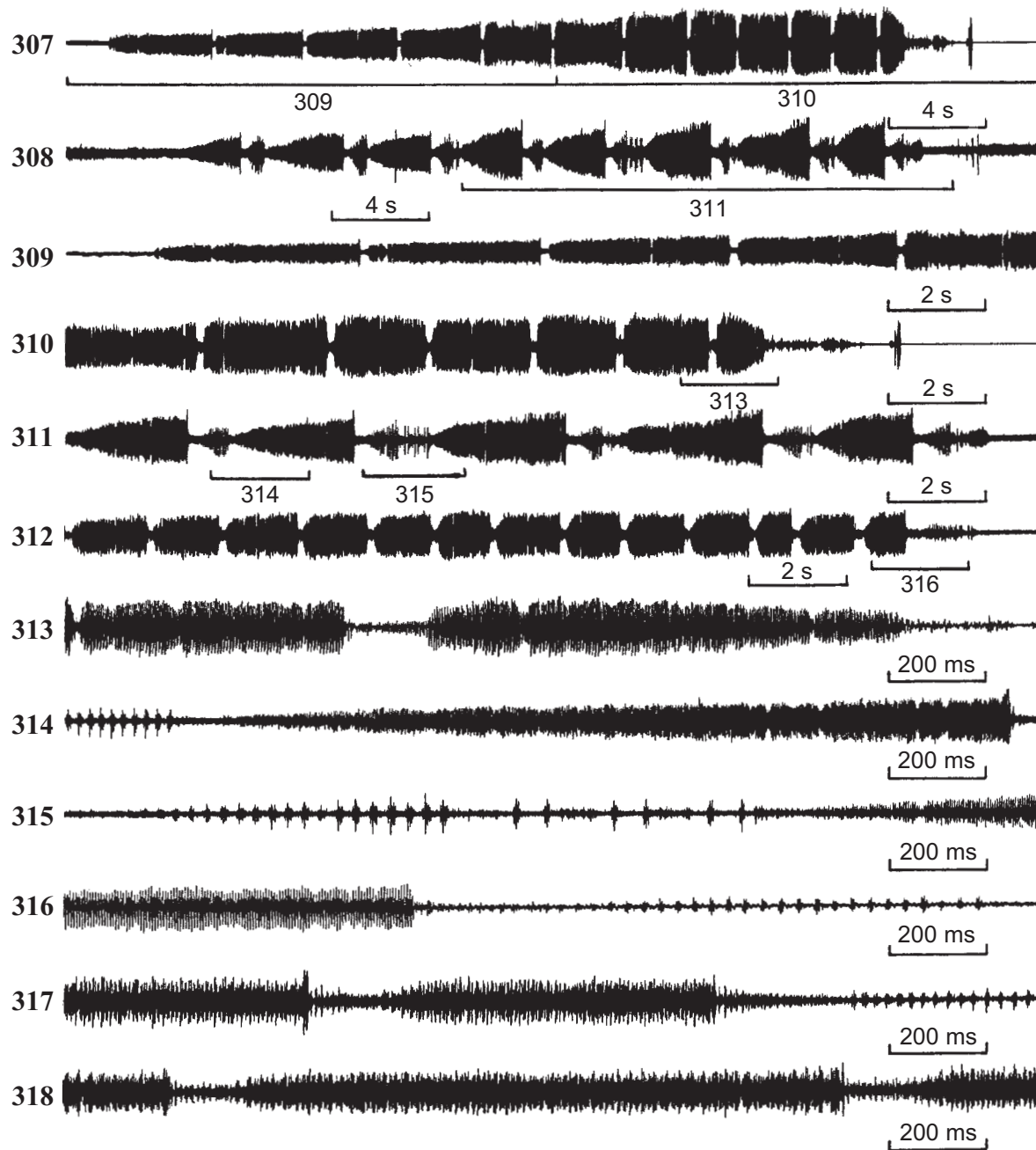


Figs. 281–306. *Macropsis microcera* Vilb. (281–296): 281 — nymph, 282 — ♂, dorsal view of a body, 283 — same, ♀, 284–285 — apodemes of 2nd ♂ abdominal tergite, 286–288 — same, apodemes of 2nd abdominal sternite, 289–290 — aedeagus, side view, 291 — pygofer appendage, 292–294 — stylus, 295–296 — 2nd valvulae of ovipositor; *M. tuvensis* Vilb. (297–306): 297–298 — apodemes of 2nd ♂ abdominal tergite, 299–300 — aedeagus, side view, 301–302 — stylus, 303–304 — pygofer appendage, 305–306 — 2nd valvulae of ovipositor.

Рис. 281–306. *Macropsis microcera* Vilb. (281–296): 281 — личинка, вид сбоку, 282 — ♂, вид сверху, 283 — то же, ♀, 284–285 — аподемы 2-го брюшного тергита ♂, 286–288 — то же, аподемы 2-го брюшного стернита, 289–290 — эдеагус, вид сбоку, 291 — отросток доли пигофора, 292–294 — стилус, 295–296 — внутренние гонапофизы яйцеклада; *M. tuvensis* Vilb. (297–306): 297–298 — аподемы 2-го брюшного сегмента ♂, 299–300 — эдеагус, вид сбоку, 301–302 — стилус, 303–304 — отросток доли пигофора, 305–306 — внутренние гонапофизы яйцеклада.

Figs. 267–280. Oscillograms of male calling signals of *Macropsis iliensis* Mit. (267–273) and *M. tarbagataica* Mit. (274–280). Faster oscillograms of the parts of signals indicated as “268”, “271–273”, and “277–280” are given under the same numbers.

Рис. 267–280. Осциллограммы призывных сигналов самцов *Macropsis iliensis* Mit. (267–273) и *M. tarbagataica* Mit. (274–280). Фрагменты сигналов, помеченные цифрами “268”, “271–273”, и “277–280”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



Figs. 307–318. Oscillograms of male calling signals of *Macropsis microcera* Vilb. Faster oscillograms of the parts of signals indicated as “309–311” and “313–316” are given under the same numbers. 307–316 — males from Moscow Area, 317–318 — male from Tuva.

Рис. 307–318. Осциллограммы призывных сигналов самцов *Macropsis microcera* Vilb. Фрагменты сигналов, помеченные цифрами “309–311” и “313–316”, представлены при большей скорости развертки на осциллограммах под такими же номерами. 307–316 — самцы из Московской обл., 317–318 — самец из Тувы.

Body length 4.2–4.8 mm.

FEMALE. In Moscow Area only uniformly pale-green specimens similar with males were found. In Western Siberia (Altai Mts., Tuva) very pale greenish or yellowish variation with two dark transverse stripes on fore wings also occurs (Fig. 283). It is this colour form, on which original description was based. 2nd valvulae are with 10–12 additional teeth (Figs. 295–296).

Body length 4.8–5.4 mm.

HOSTS. *Salix viminalis* L., sometimes also *S. dasyclados* Wimm.

ACOUSTIC SIGNALS (Figs. 307–318). Signals recordings were made in the following localities:

1. Moscow Area, Serpukhov District, Pushchino-na-Oke Town, from *S. viminalis* on the bank of Oka River. 26. VI. 1985. Signals of 8 ♂♂ are recorded at 21–22°C under laboratory conditions.

2. Southern Siberia, Southern Tuva, environs of Erzin Village, flood-plain of Tes-Khem River. 6. VIII. 1989. Signals of 1 ♂ are recorded at 26°C.



Calling signal consists of repeating fragments, usually somewhat changing and increasing in amplitude towards the end of song. Signals of specimens from Moscow Area (Figs. 307–316) and Tuva (Figs. 317–318) are quite similar.

RANGE. Central part of European Russia (southern half of Moscow Area, several points in the valley of Oka River), Western Siberia (Altai Mountains, Tuva), Mongolia. However, was never found on *S. viminalis* in Lower Volga Region and in South Urals. Thus, the localities in Moscow Area stands apart from the main part of the area.

Material was studied from Moscow Area, Western Siberia (Altai Mountains, several localities in Tuva, Tomsk Area, Krasnoyarsk Province) and Northern Mongolia.

SIMILAR SYMPATRIC SPECIES. From *M. viridinervis*, *M. verbae*, *M. marginata* and green form of *M. impura* having similar number of additional teeth on 2nd valvulae may be distinguished by more pale coloration. From the former two species differs also by more wide aedeagus, from *M. marginata* — by another shape of abdominal apodems, from *M. impura* — by larger size and less developed or entirely absent black pattern.

NOTES. Interpretation of species is based on reinvestigation of one paratype specimen from Tuva (deposited in Institute of Zoology and Botany of Academy of Sciences of Estonia, Tartu) and on investigation of material from central and southern Tuva, including signal recordings.

### 13. *Macropsis tuvensis* Vilbaste, 1980 Figs. 297–306.

Tishechkin, 1994a: 47–48, figs. 4–5 (description, host plants, range).

NYMPH. Unknown.

MALE. Pale emerald-green, without any black pattern, only apices of tibiae and tips of end tarsomers are distinctly darkened. 2nd tergal apodems are wide and rounded, sternal ones are rather long, more or less triangular (Figs. 297–298). Genitalia are of usual shape and does not provide any diagnostic characters (Figs. 299–304).

Body length 3.3–4.1 mm.

FEMALE. Similar with male, but black pigmentation at the tips of tibiae and tarsi usually is not so distinct. 2nd valvulae are with 3–4 additional teeth each (Figs. 305–306).

Body length 4.4–4.8 mm.

HOSTS. I have collected this species from *Salix viminalis* L. on the bank of Enisey River in Kyzyl (Tuva).

ACOUSTIC SIGNALS. Unknown.

RANGE. Until now was found in Tuva, Kazakh part of Altai Mountains (environs of Ust'-Kamenogorsk) and in North-Western Mongolia. Material was studied from all the regions mentioned above.

SIMILAR SYMPATRIC SPECIES. Differs from all other willow-dwelling species by small size, pale coloration and darkened apices of tibiae and tips of end tarsomers. In the shape of apodems differs from all central-european green willow-feeding species, having 3–5 additional teeth on 2nd valvulae. Nevertheless, is very similar in this character with *M. iliensis* and *M. tarbagataica*.

Also, it must be noted, that the species until now is known only from southern part of Western Siberia and adjacent territories of Kazakhstan and Mongolia.

NOTES. Identification of species is based on reinvestigation of two paratype specimens (deposited in Institute of Zoology and Botany of Academy of Sciences of Estonia, Tartu) and on investigation of material from central Tuva.

### 14. *Macropsis prasina* (Boheman, 1852) Figs. 319–343, 356–362.

Wagner, 1950: 87, 89–90, 101, figs. 2–7 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plants, synonymy, phenology);

Ossiannilsson, 1981: 282–284, plate-fig. 80, text-figs. 901–907 (description, key, host plants for European populations, distribution);

Zhantiev, Tishechkin, 1989: 473, fig. 2 (acoustic signals of specimens from population near Moscow).

NYMPH (Fig. 319). Uniformly green with very thick setose covering. Upper profile of abdomen is distinctly ledged, especially in back half.

MALE (Figs. 320–327). For the most part uniformly green, occasionally, with black frontal spot on crown (Figs. 320–321, 324). In some populations from central part of European Russia dark-coloured specimens also can be found (Figs. 325–327). Light areas on dorsal side of body in such specimens always remains green and never becomes yellow, as in *M. marginata* and some other species. In dark colour variation crown always with frontal spot, thyridial and discoidal spots usually also present (Figs. 322–323). Pronotum with black spots behind eyes, scutellum with black triangles in side angles, in most pigmented males fore part and side margins of pronotum are blackened (Fig. 327). Fore wings with membrane darkened, fumose (Figs. 325–326). In strongly pigmented specimens wings are entirely blackened with the exception of costal zone and anal veins, which remains green-coloured (Fig. 327).

2nd abdominal apodems are rather short and weakly developed. Tergal apodems are more or less rounded (Figs. 329–332), sternal ones are more or less triangular, with pointed or rounded tips (Figs. 333–336). Aedeagus is comparatively wide in side view (Figs. 337–338), styles and pygofer appendages are of usual shape (Figs. 339–341).

Body length 4.1–4.6 mm.

FEMALE. Similar with male, but less pigmented. In most dark-coloured specimens black pattern on face, pronotum and scutellum is well-developed, but fore wings are only slightly fumose (Figs. 328). 2nd valvulae of ovipositor are with 5–7 additional teeth (Figs. 342–343).

Body length 4.3–5.1 mm.

HOSTS. I have found this species on *Salix cinerea* L. and sometimes also on *S. viminalis* L. Also, was recorded from *S. caprea* L. and *S. aurita* L. by Wagner [1950].

ACOUSTIC SIGNALS (Figs. 356–362). Calling signals of males from the following localities were recorded:

1. Moscow Area, environs of Pushkino (about 15 km from the north-eastern boundary of Moscow), from *S. cinerea* on the bank of Ucha River. 23, 25.VI.1984 and 24.VI.1988. Signals of 8 ♂♂ are recorded at the temperature 20–21 and 27°C under laboratory conditions.

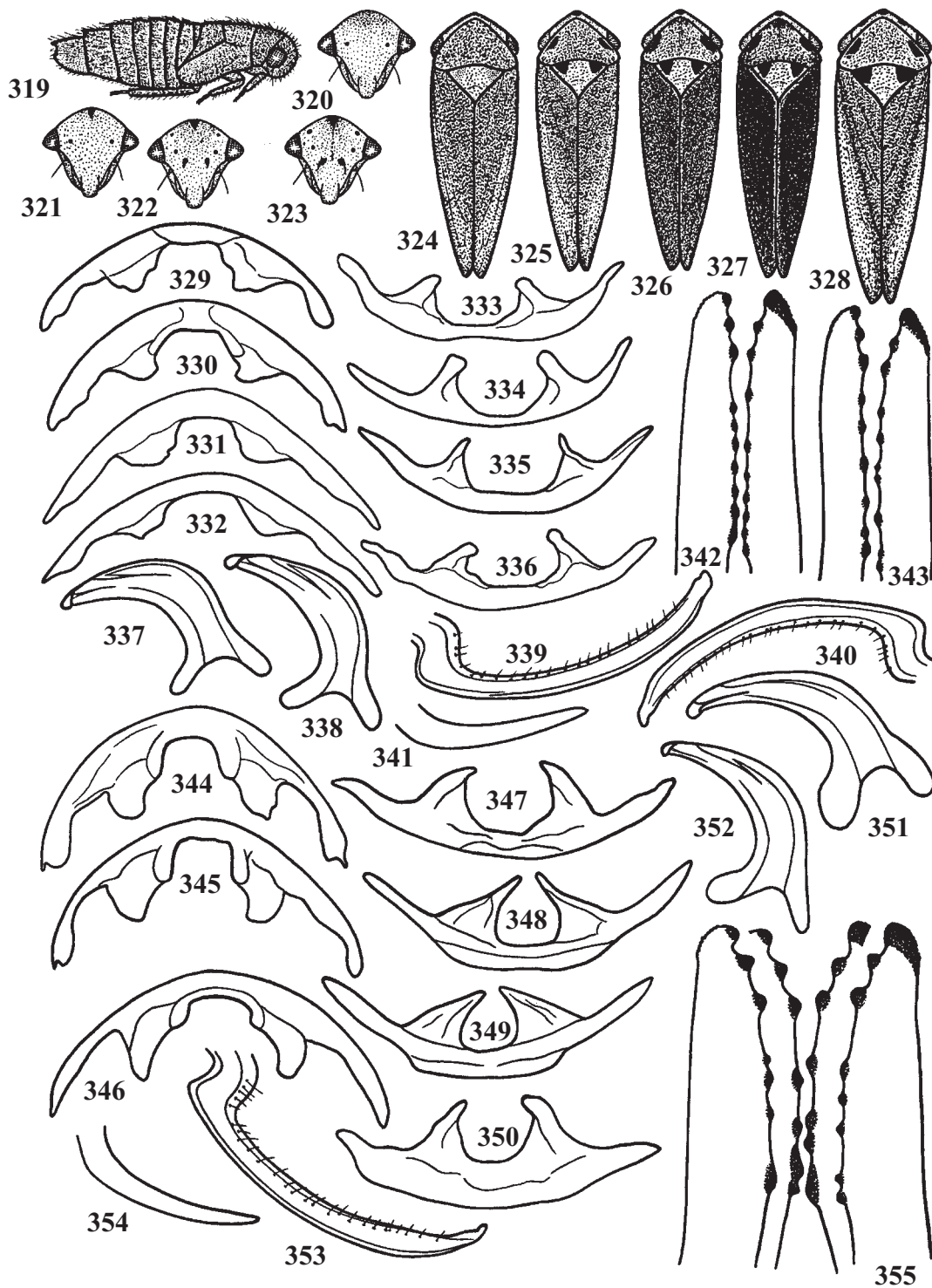
2. Northern part of Saratov Area, environs of Khvalynsk, near Ulyanino Village, on *S. cinerea*. 15, 17.VI.1996. Signals of 5 ♂♂ are recorded at the temperature 23 and 33°C.

3. East of Saratov Area, 10 km E of Ozinki Town towards Ural'sk, on *S. cinerea*. 24.VI.1996. Signals of 3 ♂♂ are recorded at the temperature 27–30°C.

4. Orenburg Area, Sakmara River near Churaevo Village, 20–25 km NNE of Kuvandyk Town, on *S. viminalis*, 2 ♂♂. 29.VI.1996. Shade air temperature — 27–28°C.

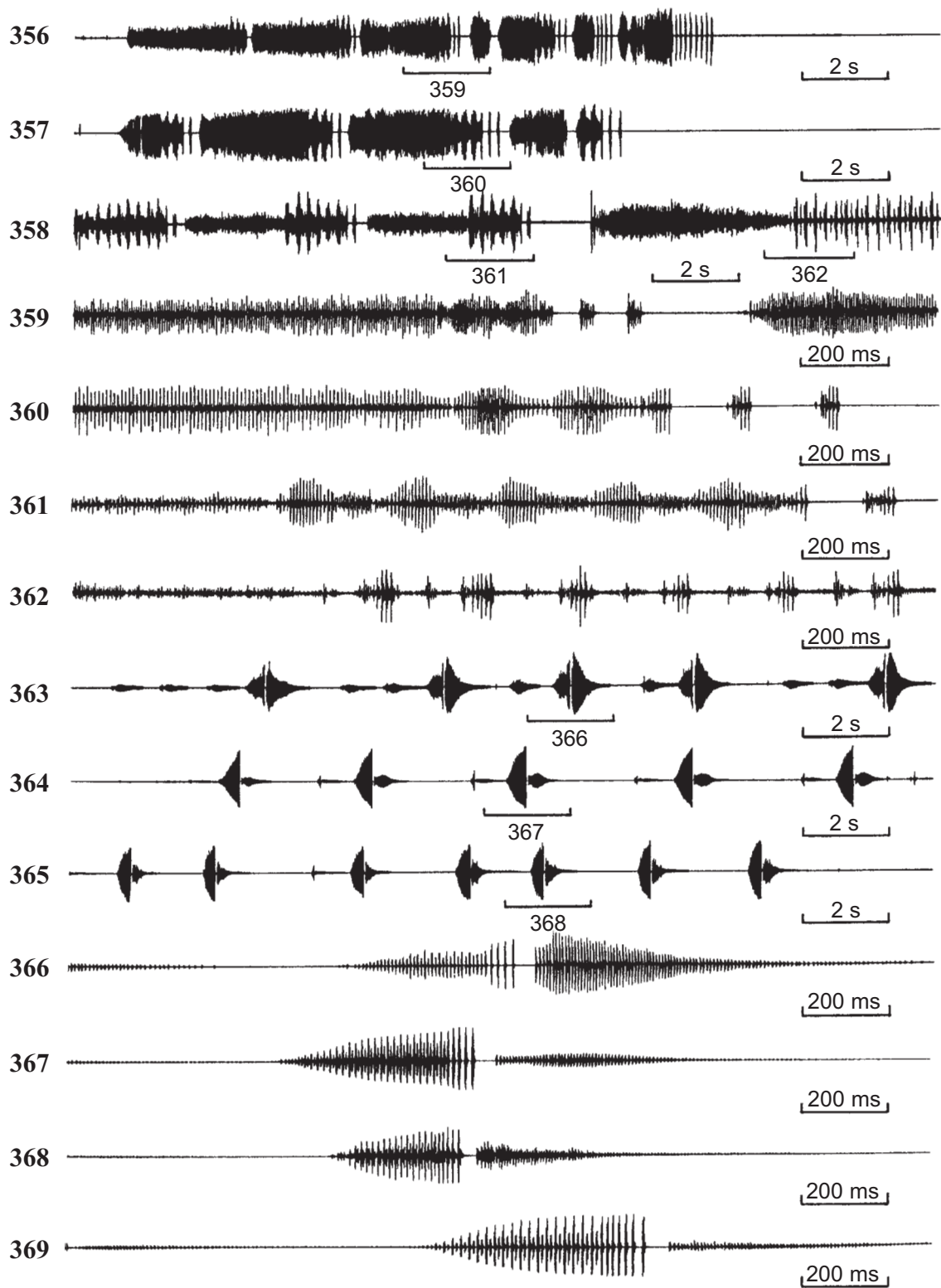
5. Altai Mountains, S shore of Teletskoe Lake, Chiri, mouth of Kyga River, on *S. viminalis*. 11.VII.1999. Calling signals of 1 ♂ are recorded at the temperature 22°C.

Calling signal is a succession of repeated phrases with overall duration about 10–15 s (Figs. 356–361). Male court-



Figs. 319–355. *Macropsis prasina* (Boh.) (319–343): 319 — nymph, 320–323 — face, 324–327 — ♂, dorsal view of a body, 328 — same, ♀, 329–332 — apodemes of 2nd ♂ abdominal tergite, 333–336 — same, apodemes of 2nd abdominal sternite, 337–338 — aedeagus, side view, 339–340 — stylus, 341 — pygofer appendage, 342–343 — 2nd valvulae of ovipositor; *M. gravesteini* Wagn. (344–355): 344–346 — apodemes of 2nd ♂ abdominal tergite, 347–350 — same, apodemes of 2nd abdominal sternite, 351–352 — aedeagus, side view, 353 — stylus, 354 — pygofer appendage, 355 — 2nd valvulae of ovipositor.

Рис. 319–355. *Macropsis prasina* (Boh.) (319–343): 319 — личинка, вид сбоку, 320–323 — лицо, 324–327 — ♂, вид сверху, 328 — то же, ♀, 329–332 — аподемы 2-го брюшного тергита ♂, 333–336 — то же, аподемы 2-го брюшного стернита, 337–338 — эдеагус, вид сбоку, 339–340 — стилус, 341 — отросток доли пифофора, 342–343 — внутренние гонапофизы яйцеклада; *M. gravesteini* Wagn. (344–355): 344–346 — аподемы 2-го брюшного тергита ♂, 347–350 — то же, аподемы 2-го брюшного стернита, 351–352 — эдеагус, вид сбоку, 353 — стилус, 354 — отросток доли пифофора, 355 — внутренние гонапофизы яйцеклада.



Figs. 356–369. Oscillograms of male calling signals of *Macropsis prasina* (Boh.) (356–362) and *M. gravesteini* Wagn. (363–369). 356–361 and 362 — two different types of signals of *M. prasina*. Faster oscillograms of the parts of signals indicated as “359–362” and “366–368” are given under the same numbers.

Рис. 356–369. Осциллограммы призывных сигналов самцов *Macropsis prasina* (Boh.) (356–362) и *M. gravesteini* Wagn. (363–369). 356–361 и 362 — два разных типа сигналов *M. prasina*. Фрагменты сигналов, помеченные цифрами “359–362” и “366–368”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

ing female produce a signal of another type, consisting of syllables, repeating with a period approximately 150–200 ms (Figs. 358, 362). Nevertheless, signals of this type occasionally also were registered from single male. Similar situation exists in poplar-dwelling *Macropsis* species, which also spontaneously produce two different types of signals, one of which is calling in a strict sense, but another is also produced on the first stage of courtship behaviour.

RANGE. Western Europe, Ukraine, European Russia, Western Siberia.

In the former times the most part of green willow-feeding *Macropsis* species were regarded as a subspecies of *M. virescens* F., 1794, which was believed to be widespread throughout all the Palaearctic and was the type species of the genus. Then the name *M. virescens* was rejected and *M. prasina* became the type species of the genus *Macropsis*, so all the data on the range of the former species formally were referred to as concerning *M. prasina*. For this reason sometimes is regarded erroneously as transpalaearctic species [Nast, 1972].

Specimens were examined from Germany, Lithuania, Moscow Area, Lower Volga Region, Southern Urals and Altai Mountains.

SIMILAR SYMPATRIC SPECIES. From *M. marginata*, *M. microcera*, *M. viridinervis* and *M. verbae* differs by smaller number of additional teeth on 2nd valvulae. *M. notata*, *M. vocalis* and *M. marginata* has another shape of abdominal apodems. *M. ocellata* differs from *M. prasina* by more slender aedeagus shaft. *M. tuvensis*, *M. iliensis* and *M. tarbagataica* are distinctly smaller and have up to 5 additional teeth on 2nd valvulae (5–7 in *M. prasina*). Besides, there is some difference in the shape of abdominal apodems between these three species and *M. prasina*. Green colour form of *M. impura* is distinctly smaller and always has well-developed black pattern on face and more light brownish or green, but never blackened fore wings.

NOTES. Interpretation of species is accepted after Wagner [1950], who reinvestigated type specimen deposited in the collection of Naturhistoriska Riksmuseet, Stockholm.

#### 15. *Macropsis gravesteini* Wagner, 1953 Figs. 344–355, 363–369.

NYMPH. Unknown.

MALE. Uniformly-green, sometimes with black spot at the apex of crown. Fore wings are whitish with bright-green veins.

2nd tergal apodems are narrowed towards the ends, with inner margin rounded or almost straight (Figs. 344–346). Sternal apodems triangular, sometimes with pointed and extended tips strongly converging (Figs. 347–350). Aedeagus widest at the base, uniformly narrowed towards the end or of the same width in proximal part from the base to the point of bending of the stem (Figs. 351–352). Styles and pygofer processes are of usual shape (Figs. 353–354).

Body length 4.2–4.6 mm.

FEMALE. In external appearance is similar with male. 2nd valvulae are with 4–5 additional teeth (Fig. 355).

Body length 4.7–5.5 mm.

HOSTS. *Salix alba* L. in Western Europe [Wagner, 1953], *S. alba* and *S. fragilis* L. in Ukraine and European Russia.

ACOUSTIC SIGNALS (Figs. 363–369). Insects for recording were collected in the following localities:

1. Ukraine, Crimea, environs of Pereval'noe Village halfway from Simferopol to Alushta, from *S. alba*. 16–17.VI.1997. Calling signals of 3 ♂♂ are recorded at the temperature 22–25°C.

2. Saratov Area, environs of Khvalynsk Town, near Ulyanino Village, from *S. alba* and *S. fragilis*. 15, 17.VI.1996. Signals of 5 ♂♂ are recorded at 31 and 22°C.

3. Volgograd Area, Ilovlya River about 5–7 km from the mouth, from *S. alba*. 8.VI.1996. Calling signals of 3 ♂♂ are recorded at 20–26°C.

Calling consists of repeated fragments with complex temporal pattern, following with a period from 1.5 up to 10 s.

RANGE. Western Europe, Ukraine and southern half of European Russia, evidently with the exception of North Caucasus. Was never found neither on *S. alba* nor on any other willow in Ciscaucasia (the lands at the northern foot of Caucasus Mountains). This species is replaced here by *M. vocalis* Tishechkin, 1994 and/or *M. ocellata*; both species may dwell together on *S. alba* in the same locality.

Material was studied from several geographical points in Crimea and also from Saratov and Volgograd Areas (see localities 2 and 3 in the previous item).

SIMILAR SYMPATRIC SPECIES. Differs from most part of green willow-dwelling species by rather long tergal apodems with convex inner margin. Similar in this character with *M. marginata*, but has only 4–5 additional teeth on 2nd valvulae (10–12 in the latter species). Aedeagus usually is widest at the base, as in *M. viridinervis*, but the shape of apodems is different.

NOTES. Interpretation of species is based on original description [Wagner, 1953].

Colour form with dark stripes on fore wings, described by Wagner [1953] from Netherlands was not found in populations from Ukraine and Russia.

#### 16. *Macropsis haupti* Wagner, 1941 Figs. 370–386, 399–406.

Wagner, 1950 (as *M. planicollis* (Thomson, 1870): 89, 111–112, figs. 3–7, 14 (detailed description of imago, based on material from Western Europe, colour polymorphism, host plant, synonymy, phenology);

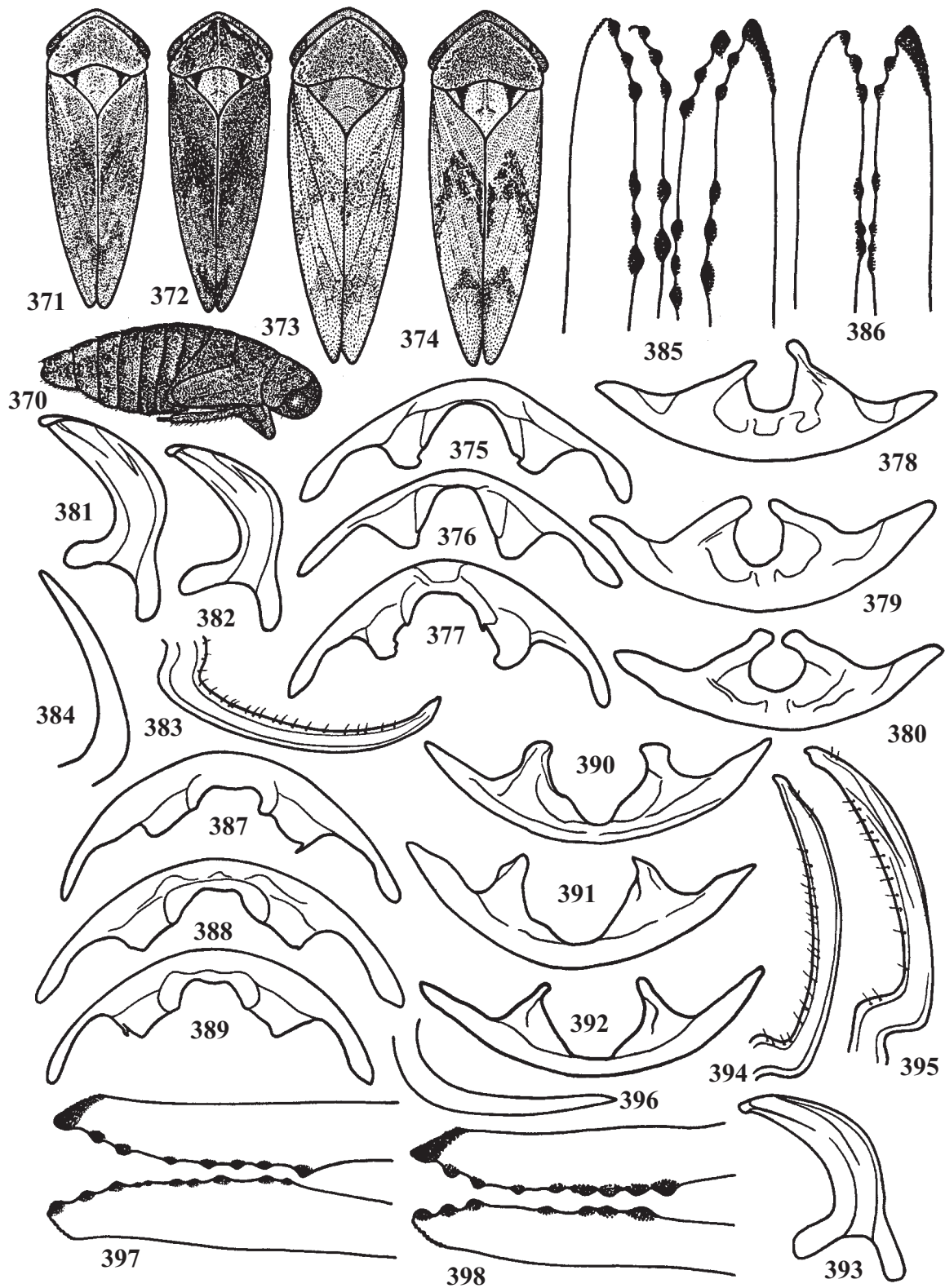
Ribaut, 1952 (as *M. planicollis*): 420, 428–429, figs. 1132–1136, 1142 (key, description, distribution, host plants).

NYMPH (Fig. 370). Pale-brown with strongly developed dark-grey pattern all over the body. Upper profile of abdomen is even, setose covering is almost entirely absent.

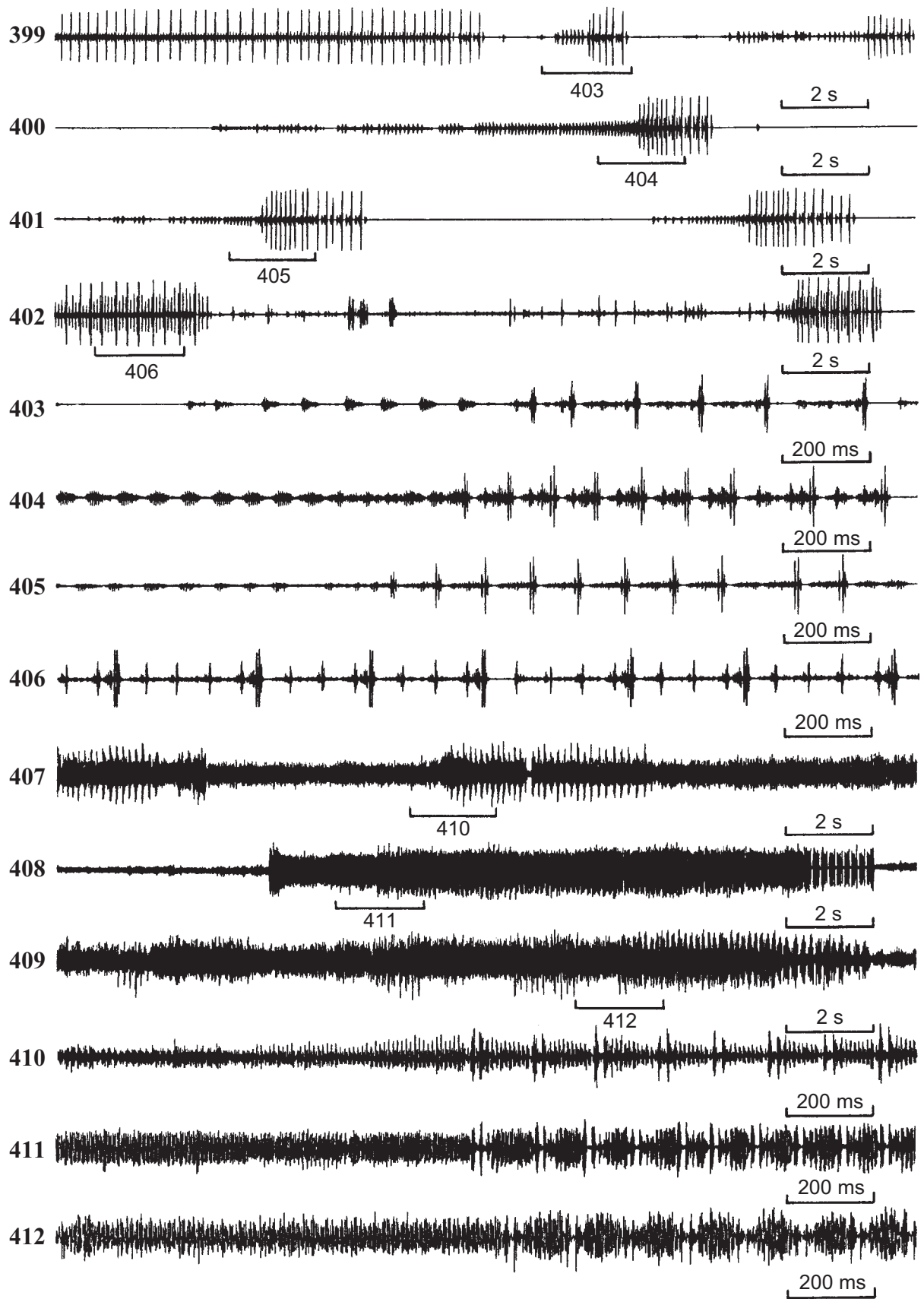
MALE (Figs. 371–372). Face pale-brown, upper part is darkened, any black pattern is absent. Pronotum is of the same colour, but usually darkened in the middle area, so that only margins remain light-brown. The traces of dark spots on the fore margin next to eyes as a rule are distinctly visible. Scutellum light-brown with black triangles in side angles and sometimes with darkened longitudinal middle part. Under-side of thorax is almost entirely black. Fore wings are brown, occasionally with main veins whitish at the base. In most part

Рис. 370–398. *Macropsis haupti* Wagn. (370–386): 370 — личинка, вид сбоку, 371–372 — ♂, вид сверху, 373–374 — то же, ♀, 375–377 — аподемы 2-го брюшного тергита ♂, 378–380 — то же, аподемы 2-го брюшного стернита, 381–382 — эдеагус, вид сбоку, 383 — стилус, 384 — отросток доли пигофора, 385–386 — внутренние гонапофизы яйцеклада; *M. najas* Nast (387–398): 387–389 — аподемы 2-го брюшного тергита ♂, 390–392 — то же, аподемы 2-го брюшного стернита, 393 — эдеагус, вид сбоку, 394–395 — стилус, 396 — отросток доли пигофора, 397–398 — внутренние гонапофизы яйцеклада.





Figs. 370-398. *Macropsis baпти* Wagn. (370-386): 370 — nymph, 371-372 — ♂, dorsal view of a body, 373-374 — same, ♀, 375-377 — apodemes of 2nd ♂ abdominal tergite, 378-380 — same, apodemes of 2nd abdominal sternite, 381-382 — aedeagus, side view, 383 — stylus, 384 — pygofer appendage, 385-386 — 2nd valvulae of ovipositor; *M. najas* Nast (387-398): 387-389 — apodemes of 2nd ♂ abdominal tergite, 390-392 — same, apodemes of 2nd abdominal sternite, 393 — aedeagus, side view, 394-395 — stylus, 396 — pygofer appendage, 397-398 — 2nd valvulae of ovipositor.



of specimens traces of two transverse dark stripes, one at the level of middle of clavus, another — at its end, presents.

Tergal apodems are well-developed, triangular, usually with rather straight side margins and broadly rounded tips (Figs. 375–377). Sternal ones are also of more or less triangular shape (Figs. 378–380). Genitalia are of usual type (Figs. 381–384).

Body length 4.2–4.5 mm.

FEMALE (Figs. 373–374). Similar with male, but dark pattern on scutellum is more pale: triangular spots in side angles are brown, sometimes hardly visible, dark median line sometimes is absent. Fore wings are more light, pale-grey or brownish. M-shaped transverse stripes are well-developed, contrasting, usually complete, not fragmented into separate spots.

2nd valvulae are with 2–4 additional teeth (Figs. 385–386).

Body length 4.8–5.3 mm.

HOSTS. *Salix* spp. from the section *Helix*: *S. purpurea* L. in Crimea, *S. elbursensis* Boiss. in Krasnodar Area (North-western Caucasus) and *S. vinogradovii* Skvortsov in Lower Volga Region.

ACOUSTIC SIGNALS (Figs. 399–406). Signals recordings were made in the following localities:

1. NW Caucasus, Krasnodar Area, Sukko River in the environs of Sukko Village 12 km South of Anapa, from *S. elbursensis*. 30.VI.1997. Calling signals of 1 ♂ were recorded at 26°C.

2. Volgograd Area, Ilovlya River 5–7 km from the mouth, from *S. vinogradovii*. 10.VI.1996. Calling signals of 2 ♂♂ were recorded at 22–25 and 29–30°C.

Calling signal is a single or repeated phrase, consisting of low- and high-amplitude parts. Duration of signal varies from 1.5–2 up to 10–15 s.

RANGE. Central and southern parts of Western Europe, Ukraine, southern part of European Russia eastwards as far as Volga.

Material was studied from Crimea, Voronezh Area, Lower Volga Region (Rostov and Volgograd areas), North-western Caucasus.

SIMILAR SYMPATRIC SPECIES. Belongs to the group of brown willow-dwelling species. Differs from *M. infuscata* J.Sahlb., *M. impura* and *M. remanei* Nickel due to absence of black pattern on face and small number of additional teeth on 2nd valvulae. In external appearance is similar with *M. cerea*, but can be easily distinguished from it due to M-shaped fore stripe on fore wings and much more developed tergal apodems. *M. najas* Nast has another shape of tergal apodems and more even reddish-brown coloration without any stripes or spots.

NOTES. Interpretation of species is accepted after Wagner [1950].

Rather scarce species, in all localities studied was found in small number in contrast with *M. marginata*, living on the same host plant.

#### 17. *Macropsis najas* Nast, 1981 Figs. 387–398.

NYPH. Absent in my material. According to original description, brownish-red, glabrous, with very distinct dots on the whole body [Nast, 1981]. Upper profile of abdomen is slightly ledged.

MALE. Uniformly brown, face without dark pattern. Spots on the fore margin of pronotum next to eyes and triangles in side angles of scutellum are dark-brown. Tergal apodems are short and wide, with distal margin more or less straight or somewhat concave (Figs. 387–389), sternal ones are triangular, sometimes with more or less expanded tips (Figs. 390–392). Male genitalia are similar in shape with these of other willow-dwelling species (Figs. 393–396).

Body length 4.7–4.9 mm.

FEMALE. In external appearance is similar with male. 2nd valvulae are with 4–7 additional teeth (Figs. 397–398).

Body length 5.1–5.7 mm.

HOSTS. Evidently, monophagous on *Salix alba* L.

ACOUSTIC SIGNALS. Unknown.

RANGE. At present is known only from Central part of Western Europe.

Material was studied from Poland (paratypes) and Western Germany (Gottingen).

SIMILAR SYMPATRIC SPECIES. Due to brown coloration and small number of additional teeth on 2nd valvulae of ovipositor is similar with *M. cerea* and *M. haupti*, but differs from both species by even reddish brown coloration without stripes on fore wings and another shape of tergal apodems (weakly developed, of rather irregular shape in *M. cerea*, well-developed, more or less triangular in *M. haupti*, wide, with straight or somewhat concave, parallel to the base outer margin in *M. najas*).

NOTES. Determination of species is based on reinvestigation of 5 paratypes, deposited in the collection of Institute of Zoology of Polish Academy of Sciences (Warsaw, Poland).

#### 18. *Macropsis impura* (Boheman, 1847) Figs. 413–432, 453–465.

Wagner, 1941: 103, 107, 122 (description, host plant, key);

Wagner, 1950: 89–90, 106–107, figs. 3–7 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plants, phenology);

Ribaut, 1952: 421, 427 (key, description, distribution, host plants);

Ossiannilsson, 1981: 282, 291–292, text-figs. 933–937 (description, key, host plant for European populations, distribution).

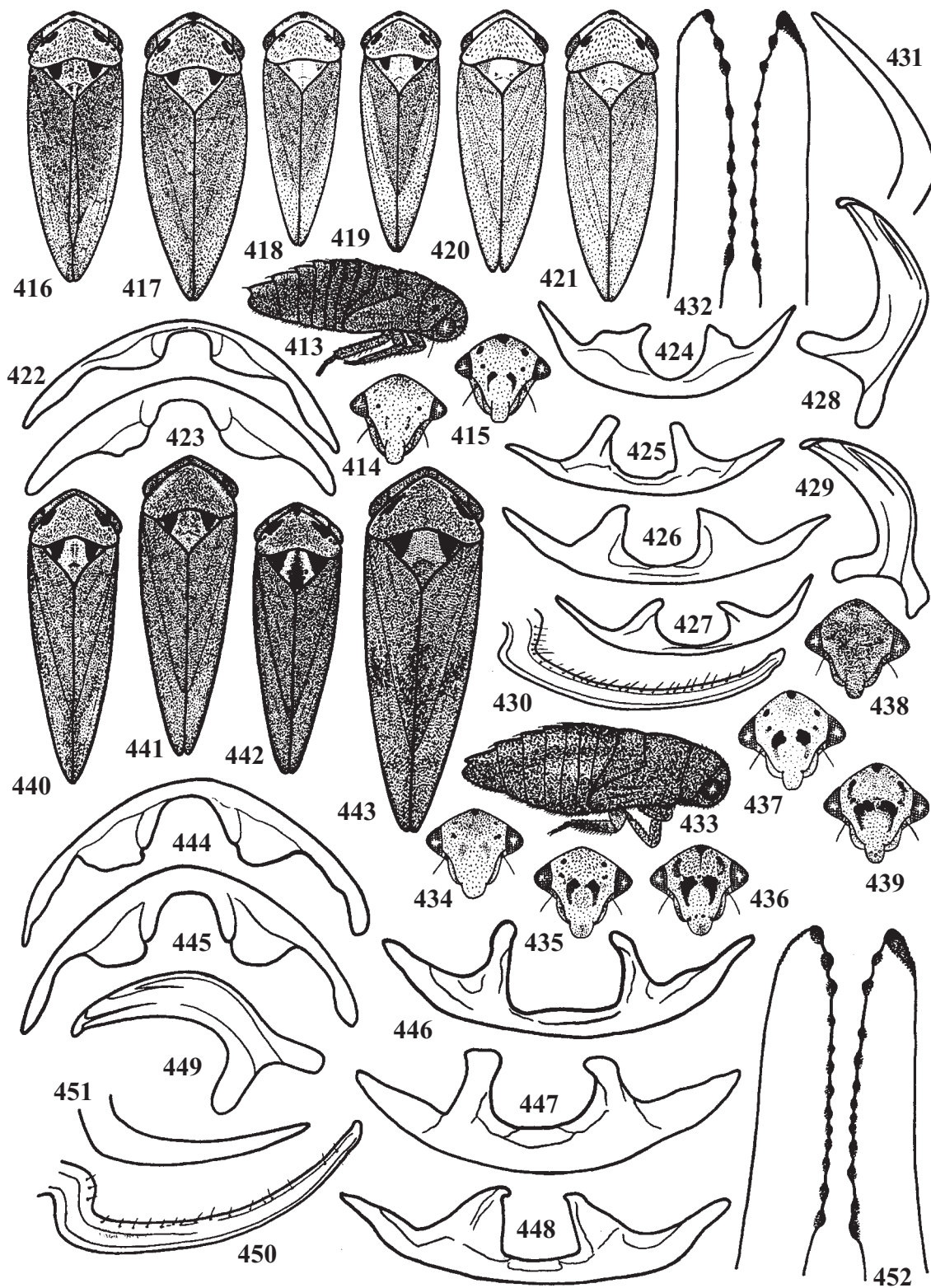
NYPH (Fig. 413). Brown, sometimes with more or less developed dark pattern. Upper profile of abdomen is distinctly ledged, especially in back half. Setose covering is moderately developed.

MALE. In Northern and Central Europe and also, in central part of European Russia only brown form occurs (Fig. 416). Face pale-yellow, with frontal, thyridial, ocellar and discoidal spots well-developed (Fig. 415). Pronotum is greyish-brown, sometimes is more dark in the middle, with two black spots on the fore margin behind eyes. Scutellum yellowish with black triangles in side angles and sometimes with darkened middle line. Fore wings are dark brown without any pattern, veins are of almost the same tinge, as membrane.

In specimens from steppes of Southern Ukraine and Volga Region ground coloration is more pale, sometimes with greenish tinge or even bright-green, still the black pattern on head, pronotum and scutellum at least partially remains (Figs. 418–419).

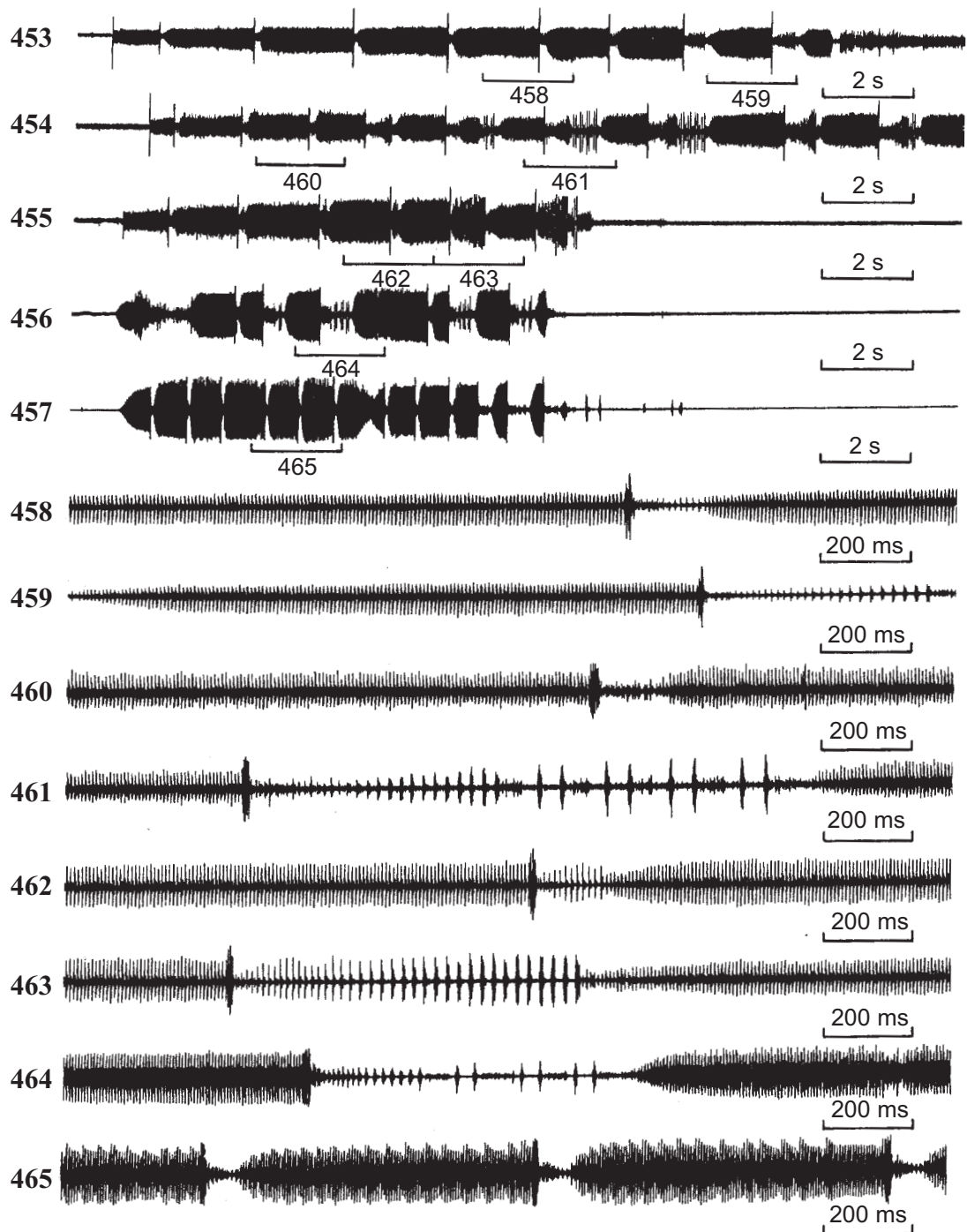
Figs. 399–412. Oscillograms of male calling signals of *Macropsis haupti* Wagn. (399–406) and *M. infuscata* (J.Sahlb.) (407–412). Faster oscillograms of the parts of signals indicated as “403–406” and “410–412” are given under the same numbers.

Рис. 399–412. Осциллограммы призывных сигналов самцов *Macropsis haupti* Wagn. (399–406) и *M. infuscata* (J.Sahlb.) (407–412). Фрагменты сигналов, помеченные цифрами “403–406” и “410–412”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



Figs. 413-452. *Macropsis impura* (Boh.) (413-432): 413 — nymph, 414-415 — face, 416, 418-419 — ♂, dorsal view of a body, 417, 420-421 — same, ♀, 422-423 — apodems of 2nd ♂ abdominal tergite, 424-427 — same, apodems of 2nd abdominal sternite, 428-429 — aedeagus, side view, 430 — stylus, 431 — pygofer appendage, 432 — 2nd valvulae of ovipositor; *M. remanei* Nickel (433-452): 433 — nymph, 434-436 — ♂, face, 437-439 — same, ♀, 440-442 — ♂, dorsal view of a body, 443 — same, ♀, 444-445 — apodems of 2nd ♂ abdominal tergite, 446-448 — same, apodems of 2nd abdominal sternite, 449 — aedeagus, side view, 450 — stylus, 451 — pygofer appendage, 452 — 2nd valvulae of ovipositor.





Figs. 453–465. Oscillograms of male calling signals of *Macropsis impura* (Boh.). 453–455, 458–463 — males from Moscow Area (brown colour form), 456–457, 464–465 — males from Volgograd Area (green colour form). Faster oscillograms of the parts of signals indicated as “458–465” are given under the same numbers.

Рис. 453–465. Осциллограммы призывных сигналов самцов *Macropsis impura* (Boh.). 453–455, 458–463 — самцы из Московской обл. (коричневая цветовая форма), 456–457, 464–465 — самцы из Волгоградской обл. (зеленая цветовая форма). Фрагменты сигналов, помеченные цифрами “458–465”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Рис. 413–452. *Macropsis impura* (Boh.) (413–432): 413 — личинка, вид сбоку, 414–415 — лицо, 416, 418–419 — ♂, вид сверху, 417, 420–421 — то же, ♀, 422–423 — аподемы 2-го брюшного тергита ♂, 424–427 — то же, аподемы 2-го брюшного стернита, 428–429 — эдеагус, вид сбоку, 430 — стилус, 431 — отросток доли пигофора, 432 — внутренние гонапофизы яйцеклада; *M. remanei* Nickel (433–452): 433 — личинка, вид сбоку, 434–436 — ♂, лицо, 437–439 — то же, ♀, 440–442 — ♂, вид сверху, 443 — то же, ♀, 444–445 — аподемы 2-го брюшного тергита ♂, 446–448 — то же, аподемы 2-го брюшного стернита, 449 — эдеагус, вид сбоку, 450 — стилус, 451 — отросток доли пигофора, 452 — внутренние гонапофизы яйцеклада.

2nd tergal apodems are short, wide and rounded (Figs. 422–423), sternal ones are of usual shape, more or less triangular (Figs. 424–427). Genitalia does not provide diagnostic characters (Figs. 428–431).

Body length 3.6–4.2 mm.

FEMALE. In Central-European populations is similar with male (Fig. 417). Specimens from Southern Ukraine and Volga Region, collected from *Salix rosmarinifolia* L., growing in hollows in sandy steppes, usually are yellowish-green or bright-green, either with black pattern more or less than in male, or without black spots (Figs. 414, 420–421).

2nd valvulae are with 7–9 additional teeth (Figs. 432).

Body length 4.0–4.4 mm.

HOSTS. *Salix repens* L., rarely *S. aurita* L. in Western Europe [Wagner, 1950], *S. rosmarinifolia* L. in European Russia and Kazakhstan.

ACOUSTIC SIGNALS (Figs. 453–465). Signals recordings were made in the following localities:

1. South-eastern part of Moscow Area, environs of Golutvin Town, from *S. rosmarinifolia*. 3.VI.1995. Signals of 5 ♂♂ were recorded under laboratory conditions at 25–26°C (Figs. 453–455, 458–463).

2. Volgograd Area, Ilovlya River about 5 km from the mouth, *S. rosmarinifolia* in hollows in sandy steppe. 11.VI.1996. Signals of 2 ♂♂ are recorded at 31–33°C (Figs. 456–457, 464–465).

Calling signal is a single phrase, consisting of repeating somewhat variable fragments. Signals of specimens from different localities have not any significant difference.

RANGE. Western Europe, Ukraine, European Russia, steppes and semideserts of Kazakhstan. Eastern limits of the range is unclear (see “Notes”).

Material was studied from Western Germany, Belarus', northern, central and southern parts of European Russia and from numerous localities in Northern and Central Kazakhstan.

SIMILAR SYMPATRIC SPECIES. Typical form is similar with two other brown willow-dwelling species, having more than 4–5 additional teeth on 2nd valvulae, namely, *M. infuscata* and *M. remanei*. Differs from the former species by smaller size and more wide aedeagus. Very similar with the latter one and indistinguishable from it in structure of apodems and genitalia. Still, *M. remanei* is distinctly larger and has more variable dark pattern. Besides, it is monophagous on *Salix elaeagnos* Scop. and until now is known from Bavaria only.

Green colour form in external appearance is similar with *M. marginata* (but has another shape of abdominal apodems), *M. notata* (differs in number of additional teeth on 2nd valvulae and shape of sternal apodems) and strongly pigmented males of *M. prasina* (but distinctly smaller).

NOTES. Interpretation of species is accepted after Wagner [1950].

Conspicuity of typical brown and green forms is corroborated by calling signals analysis. Seemingly, the latter variation is closely related with *M. impura cencovica* Dlabola, 1967, described from relict sandy biotope near Dunai in Southern Slovakia.

In structure of genitalia and abdominal apodems in males is indistinguishable from *M. flavida* Vilbaste, 1980, occurring throughout all the southern Siberia and the Russian Far East. For this reason, determination of species from Eastern Kazakhstan and Western Siberia is almost impossible, unless uniformly reddish- or yellowish-brown females intrinsic for the latter species present in material. Calling signals of these two species only slightly differ from each other, so it is possible, that they are geographical forms of a single polymorphic species.

#### 19. *Macropsis remanei* Nickel, 1999 Figs. 433–452.

NYMPH (Fig. 433). Brown, sometimes sides of abdomen are somewhat lighter than the remaining parts of a body. Setose covering is well developed, upper outline of abdomen is slightly serrated.

MALE. Brown, usually with more or less developed black pattern on face, pronotum and scutellum (Figs. 434–436, 440–442). Black spots on face are of the same shape as in West-European specimens of *M. impura* (Fig. 436), but sometimes are less developed or even almost entirely absent (Figs. 434–435). Pronotum with black spots on the fore margin next to eyes, occasionally also with a spot in the fore angle. Scutellum with triangular spots in side angles; in well-pigmented specimens longitudinal middle stripe also presents.

Tergal apodems with rounded lobes, slightly shorter than their width at the base (Figs. 444–445). Sternal apodems are elongate or triangular, with more or less parallel inner margins (Figs. 446–448). Genitalia are of usual shape (Figs. 449–451).

Body length 4.0–4.6 mm.

FEMALE. Similar with male, but the black pattern usually is somewhat less developed (Figs. 437–439, 443). Fore wings occasionally are with traces of two dark transverse stripes. 2nd valvulae are with 10 additional teeth each (Fig. 452).

Body length 4.5–5.2 mm.

HOSTS. Evidently, monophagous on *Salix elaeagnos* Scop.

ACOUSTIC SIGNALS. Unknown.

RANGE. Until now is known only from Bavaria. However, the range of the host plant includes almost all mountain regions of southern half of Western and Central Europe (from Spain to Ukrainian Carpathians), so further records of this species from the localities outside Bavarian Alps are quite possible.

SIMILAR SYMPATRIC SPECIES. In the shape of genitalia and apodems is almost indistinguishable from *M. impura*. Differs from West- and Central-European specimens of this species by the larger size and far more variable black spots pattern. Specimens of *M. impura* with poorly developed spots on head, pronotum and scutellum and/or with dark pattern on the fore wings were found only in Southern Slovakia (*M. impura cencovica* Dlabola, 1967) and in steppes of Southern Russia and Kazakhstan. Besides, these two species dwell on different species of willows.

In external appearance is also similar with *M. infuscata*, but differs from it in shape of tergal apodems and more wide aedeagus. May be easily distinguished from other brown willow-dwelling species (*M. cerea*, *M. haupti*, *M. najas*) due to well-developed black spots on head, pronotum and scutellum and due to high number of additional teeth on 2nd valvulae (10 in *M. remanei*, up to 6–7 in *M. cerea*, *M. haupti* and *M. najas*).

NOTES. Determination of species is based on investigation of the part of type series and topotypes. Type series is deposited in the collection of Dr. Herbert Nickel (Göttingen), several specimens are also in Zoologische Staatssammlung, München and Staatliches Museum für Tierkunde, Dresden. Series of topotype specimens is deposited in ZMUM.

Original description was illustrated by me; in the present work the same figures are given with kind permission of Dr. H.Nickel.

#### 20. *Macropsis cerea* (Germer, 1837) Figs. 466–484, 521–530.

= *M. fieberi* Ossiannilsson, 1938: 76 [Tishechkin, 1998];

Wagner, 1950: 89–90, 107, 109–110, figs. 2–7, 14 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plants, synonymy, phenology);

Ribaut, 1952: 420, 428, figs. 1137–1139 (key, description, distribution, host plants);

Ossiannilsson, 1981: 283, 285, 287–288, plate-fig. 52, text-figs. 917–921 (description, key, host plants for European populations, distribution);

Zhantiev, Tishechkin, 1989: 471–472, figs. 1–2 (acoustic signals of specimens from population near Moscow);

Tishechkin, 2000a: 94, figs. 264–278, 290–298 (description of imago, based on the material from the Russian Far East, host plants, signals of specimens from different populations).

**NYMPH.** Absent in my material. According to Wagner [1950], grey with dark pattern, upper profile of abdomen is slightly ledged in back half, setose covering is moderately developed.

**MALE** (Figs. 466–469). Brown. As a rule, head and pronotum are without any dark pattern. Scutellum with dark triangular spots in side angles. Fore wings are uniformly brown, sometimes with two transverse stripes: behind the middle of clavus and at its end (Fig. 469). Very rarely dark pattern on face, pronotum and scutellum is more or less developed, as in *M. infuscata* (as in Figs. 490, 492).

Tergal apodemes of 2nd abdominal segment are weakly developed (Figs. 475–476), sternal ones are rather wide, of triangular shape (Figs. 477–478). Aedeagus with comparatively wide shaft (Figs. 479–480). Styles and pygofer appendages are of usual type (Figs. 481–482).

Body length 4.5–5.0 mm.

**FEMALE.** The most abundant colour form is similar with male, but usually paler, with more dark and contrasting stripes on fore wings (Figs. 470–471). In another colour variation basal part of fore wings is brown, but apical one is pale, almost translucent (Figs. 472–473). As a rule, pronotum and scutellum in this form are with two longitudinal stripes, as in yellow-black variation of *M. notata* or *M. ocellata* (Fig. 473). Occasionally, specimens with well-developed black pattern on pronotum and scutellum may be found (Fig. 474).

2nd valvulae are with 3–5 additional teeth (Figs. 483–484).

Body length 4.9–5.6 mm.

**HOSTS.** In contrast with all other willow-dwelling *Macropsis* species, feeds on different species of willows.

**ACOUSTIC SIGNALS** (Figs. 521–530). Signals recordings were made in the following localities:

1. Moscow Area. Several geographical points in central and southern parts. Signals of more than 15 ♂♂ from different species of willows were recorded under laboratory conditions at the temperature 21–26°C.

2. East of Saratov Area, 10 km from Ozinki Town towards Ural'sk, from *Salix vinogradovii* Skvortsov, 1 ♂. 24.VI.1996. Shade air temperature — 28–30°C.

3. Orenburg Area, Sakmara River near Churaevo Village, 20–25 km NNE of Kuvandyk, from *S. triandra*, 1 ♂. 29.VI.1996. Shade air temperature — 26–27°C.

4. Southern Tuva, environs of Erzin Village, from *S. ledebouriana*. 30.VII.1989. Signals of 1 ♂ were recorded under laboratory conditions at the temperature 25°C.

5. Amur Area, approximately 30 km W of Svobodny, from *S. udensis*, 1 ♂. 6.VII.1995. Shade air temperature — 25°C.

6. The Southern Maritime Province, Pogranichny District, Komissarovka River near Barabash-Levada Village, on *Salix udensis*, 1 ♂. 13.VII.1995. Shade air temperature — 25°C.

Signal is a succession of repeated phrases. Duration of phrase and relative amplitude of its different parts may vary, but general scheme of temporal pattern in individuals from different populations is quite similar.

**RANGE.** Transpalearctic species.

Specimens were studied from numerous localities in European Russia, from Western, Northern and Eastern Kazakhstan,

Siberia (Tyumen' Area, Tuva, Transbaikalia) and the Russian Far East (Amur Area and Southern Maritime Province).

**SIMILAR SYMPATRIC SPECIES.** Belongs to the group of brown willow-dwelling species. Differs from *M. infuscata* J.Sahlb., *M. impura* and *M. remanei* Nickel due to absence of black pattern on face and small number of additional teeth on 2nd valvulae. Similar in these characters with *M. najas* and *M. haupti*, but differs from both species by very short and weakly developed tergal apodemes.

**NOTES.** Interpretation of species is accepted after Wagner [1950].

Evidently, *M. kaahemica* Vilbaste, 1980 described from Tuva basing on single male is a junior synonym of *M. cerea*, but formal establishing of synonymy seems to be premature without investigation of material from different localities in Southern Siberia.

## 21. *Macropsis infuscata* (J. Sahlberg, 1871) Figs. 407–412, 485–511.

Wagner, 1950: 89, 103–106, figs. 2–7, 13 (detailed description of nymph and imago, based on material from Western Europe, colour polymorphism, host plant, synonymy, phenology);

Ribaut, 1952: 420–421, 426, figs. 1128–1131 (key, description, distribution, host plants);

Ossiannilsson, 1981: 282–283, 285–286, plate-fig. 50, text-figs. 908–916 (description, key, host plants for European populations, distribution);

Zhantiev, Tishechkin, 1989: 474, fig. 2 (acoustic signals of specimens from population near Moscow).

**NYMPH** (Fig. 485). Green or brown with dense setose covering. Upper profile of abdomen is strongly serrated.

**MALE.** Brown. Face yellow, usually with all groups of spots well-developed (Figs. 486–487). Occasionally, any of the spots may be absent. Pronotum with black spots on the fore margin next to eyes (Figs. 492–493). Scutellum with black triangular spots and, as a rule, with longitudinal middle line. Fore wings with traces of two transverse stripes: behind the middle of clavus and at its end.

Tergal apodemes are rather short, sometimes of irregular shape (Figs. 499–501). Sternal ones are parallel or strongly converging, sometimes with overlapping lobes (Figs. 502–504). Aedeagus is more long and slender, than in related species (Figs. 505–506). Styles and pygofer appendages are of usual shape (Figs. 507–509).

Body length 4.8–5.1 mm.

**FEMALE.** Brown colour form is similar with male, but transverse stripes on fore wings for the most part are more dark and contrasting (Figs. 490–491, 494–495). Also, green colour variation presents in this species (Figs. 496–498). In green females face is without any pattern, or has black frontal spot only (Figs. 488–489). Dorsal side of body is green, fore wings as a rule are with more or less developed dark transverse stripes, as in brown specimens. Rarely pale-coloured light-brownish or yellowish females similar with green ones may be found.

2nd valvulae are with 5–7 additional teeth (Figs. 510–511).

Body length 5.0–5.4 mm.

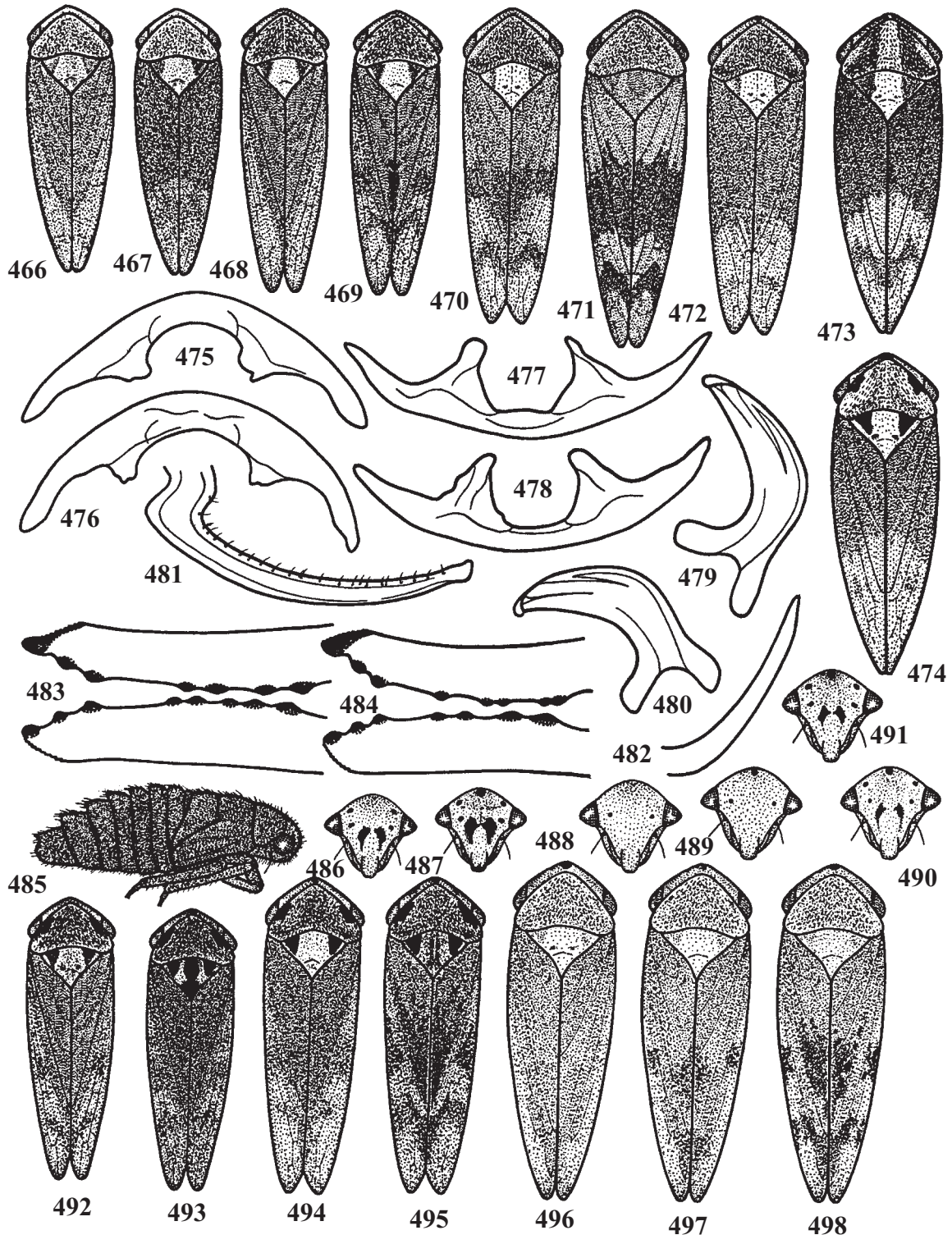
**HOSTS.** For the most part on *Salix caprea* L., rarely on *S. myrsinifolia* Salisb. and *S. starkeana* Willd.

**ACOUSTIC SIGNALS** (Figs. 407–412). Insects for signals recording were collected in several localities in northern half of Moscow Area. Signals of more than 15 ♂♂ were recorded at 21–23°C under laboratory conditions.

Calling signal consists of successions of short repeating series alternating with monotonous buzzing fragments.

**RANGE.** Western Europe and northern half of European Russia. Never found in Northern Caucasus, Lower Volga region and South Urals.

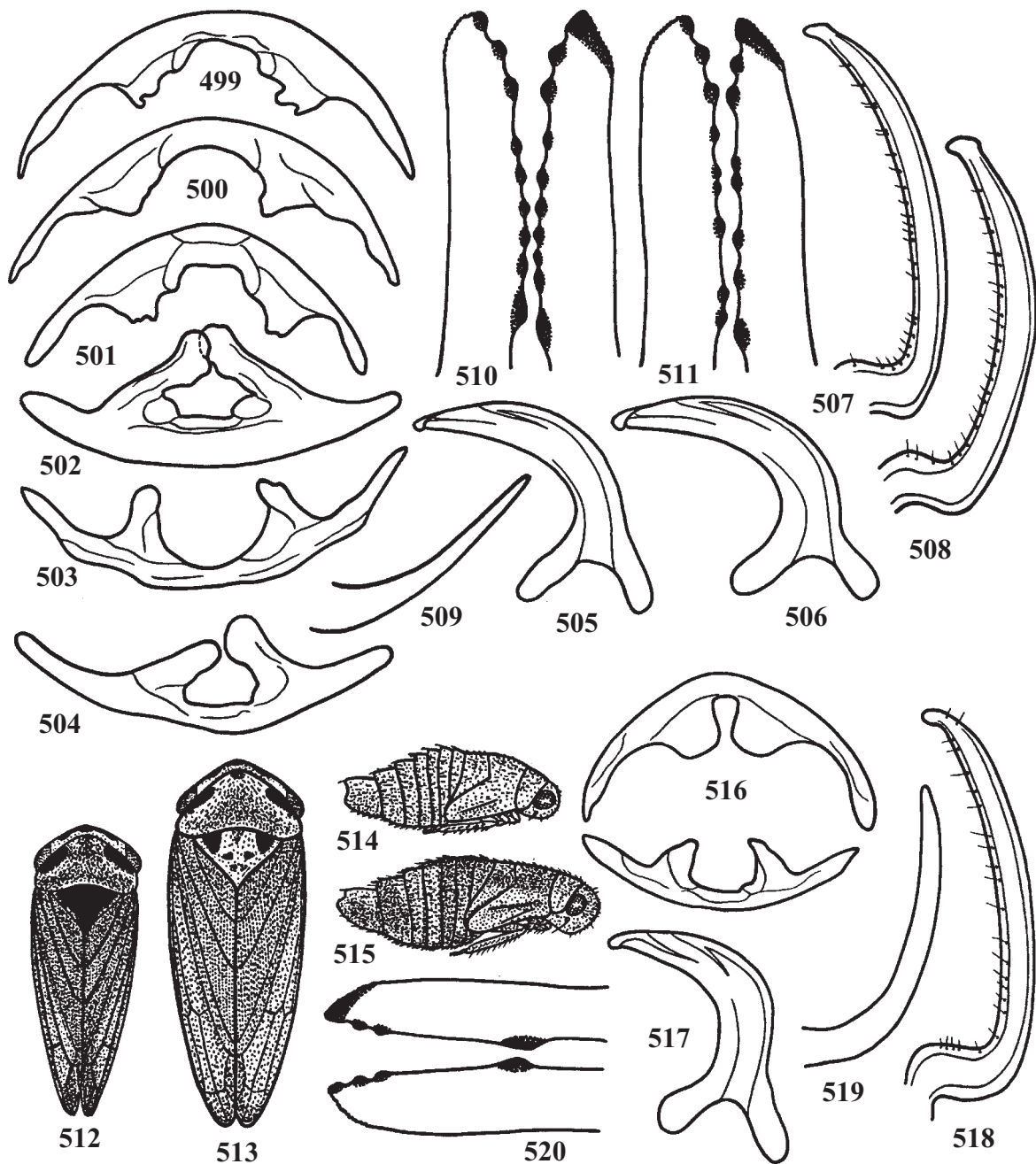




Figs. 466-498. *Macropsis cerea* (Germ.) (466-484): 466-469 — ♂, dorsal view of a body, 470-474 — same, ♀, 475-476 — apodems of 2nd ♂ abdominal tergite, 477-478 — same, apodems of 2nd abdominal sternite, 479-480 — aedeagus, side view, 481 — stylus, 482 — pygofer appendage, 483-484 — 2nd valvulae of ovipositor; *M. infuscata* (J.Sahlb.) (485-498): 485 — nymph, 486-487 — ♂, face, 488-491 — ♀, 492-493 — ♂, dorsal view of a body, 494-498 — same, ♀.

Рис. 466-498. *Macropsis cerea* (Germ.) (466-484): 466-469 — ♂, вид сверху, 470-474 — то же, ♀, 475-476 — аподемы 2-го брюшного тергита ♂, 477-478 — то же, аподемы 2-го брюшного стернита, 479-480 — эдеагус, вид сбоку, 481 — стилус, 482 — отросток доли пигофора, 483-484 — внутренние гонапофизы яйцеклада; *M. infuscata* (J.Sahlb.) (485-498): 485 — личинка, вид сбоку, 486-487 — ♂, лицо, 488-491 — то же, ♀, 492-493 — ♂, вид сверху, 494-498 — то же, ♀.





Figs. 499–520. *Macropsis infuscata* (J.Sahlb.) (499–511): 499–501 — apodems of 2nd ♂ abdominal tergite, 502–504 — same, apodems of 2nd abdominal sternite, 505–506 — aedeagus, side view, 507–508 — stylus, 509 — pygofer appendage, 510–511 — 2nd valvulae of ovipositor; *M. sibirica* Kusn. (512–520): 512 — ♂, dorsal view of a body, 513 — same, ♀, 514–515 — nymph, 516 — apodems of 2nd ♂ abdominal segment, 517 — aedeagus, side view, 518 — stylus, 519 — pygofer appendage, 520 — 2nd valvulae of ovipositor.

Рис. 499–520. *Macropsis infuscata* (J.Sahlb.) (499–511): 499–501 — аподемы 2-го брюшного тергита ♂, 502–504 — то же, аподемы 2-го брюшного стернита, 505–506 — эдеагус, вид сбоку, 507–508 — стилус, 509 — отросток доли пигофора, 510–511 — внутренние гонапофизы яйцеклада; *M. sibirica* Kusn. (512–520): 512 — ♂, вид сверху, 513 — то же, ♀, 514–515 — личинка, вид сбоку, 516 — аподемы 2-го брюшного сегмента ♂, 517 — эдеагус, вид сбоку, 518 — стилус, 519 — отросток доли пигофора, 520 — внутренние гонапофизы яйцеклада.

Specimens were studied from Moscow, Tver' and St. Petersburg areas.

**SIMILAR SYMPATRIC SPECIES.** Brown colour form in external appearance is similar with other brown willow-dwelling species with strongly developed black pattern of

face, namely, *M. impura*, *M. remanei* and one of the colour forms of *M. cerea*. Differs from these species by more narrow and slender aedeagus shaft. May be easily recognised basing on serial material due to peculiar sexual dimorphism: brown males and both brown and green females. Single green fe-

males may be identified due to black pattern on fore wings (similar colour form was found only in Siberian populations of *M. microcera*.)

NOTES. Interpretation of species is accepted after Wagner [1950].

## 22. *Macropsis sibirica* Kusnezov, 1929

Figs. 512–520, 531–533.

= *M. obscurinervis* Vilbaste, 1965 [Tishechkin, 1994a].  
Emelyanov, 1964: 374, fig. 171, 13–14 (mentioned in the key);  
Vilbaste, 1965: 31–32 (primary description of *M. obscurinervis*, based on female specimens only);  
Vilbaste, 1980: 29, fig. 15 (description of male of *M. obscurinervis*);

Tishechkin, 1994a: 48–49, fig. 6, 4–5 (description, synonymy);  
Tishechkin, 2000a: 106, figs. 423–448 (description of nymph and imago, host plants, signals of specimens from different populations).

NYMPH (Figs. 514–515). Light-brown or yellowish, sometimes with dark pattern. Upper profile of abdomen is distinctly serrated, setose covering is well-developed.

MALE (Fig. 512). Pale, yellowish, with strongly developed black pattern on face, pronotum and scutellum. Fore wings are pale, semitransparent, with all veins broadly marked with black.

Tergal apodemes are wide, rounded, with a narrow gape between the inner margins (Fig. 516). Sternal ones are of more or less triangular shape (Fig. 516). Aedeagus is more broad, than in other species, feeding on Rosaceae (Fig. 517). The ends of styles are broadly rounded and bent inwards (Fig. 518). Pygofer appendages are almost straight (Fig. 519).

Very small species, body length 3.2–3.4 mm.

FEMALE (Fig. 513). Similar with male, but black pattern usually less developed. 2nd valvulae are wide, with 1–3 additional teeth (Fig. 520). Body length 3.4–3.9 mm.

HOSTS. *Spiraea* spp. In European Russia and Kazakhstan for the most part on *S. hypericifolia* L., in Transbaikalia usually on *S. aquilegifolia* Pall. Also, I have seen material collected from *S. crenata* L. and *S. media* Franz Schmidt.

ACOUSTIC SIGNALS (Figs. 531–533). Calling signals of individuals from the following localities were recorded:

1. Guberlya River near the Guberlya Railway Station 25 km W of Orsk; *S. hypericifolia* on the rocky outcrops on the hills. 8.VII.1996. Signals of 1 ♂ recorded at the temperature 24–25°C.

2. Kazakhstan, environs of Almaty, on *S. hypericifolia*, 3 ♂♂. 30.VI.1994. Recording under laboratory conditions at the temperature 30°C.

3. Chita Area.

a. Onon District, the bank of Onon River 5 km west of Nizhniy Tsasuchey Village. 1 ♂ taken on *S. aquilegifolia*. 20.VI.1995. Recording at the temperature 31 and 24–26°C.

b. Karymskiy District, Ingoda River near the mouth of Talacha River (15 km E of Urul'ga Village). 25.VI.1995. Signals of several males from *S. aquilegifolia* were recorded at the temperature 27°C.

Calling signal consists of repeating fragments (phrases) with very complex structure. Phrases in the signals of individuals from Orenburg Area and Kazakhstan are somewhat longer, than in ones from Transbaikalia.

RANGE. Central and south-eastern parts of European Russia within the limits of steppe zone, Kazakhstan, mountains of Middle Asia, all the South Siberia from Altai Mountains to Transbaikalia, Mongolia.

Material was studied from several localities in European Russia (Kursk, Volgograd, Saratov and Orenburg areas),

from Kazakhstan, Kyrgyzstan, South Siberia (Altai Mountains, Kemerovo Area, Chita Area).

SIMILAR SYMPATRIC SPECIES. The species may be easily recognised due to very distinctive appearance, coloration and small size. Light-coloured females superficially resemble the representatives of the genus *Macropsidius*.

NOTES. Type locality — Troitskosavsk (near Kyakhta, Southern Transbaikalia). Identification of species is based on reinvestigation of types deposited in Zoological Institute of Russian Academy of Sciences (St. Petersburg).

## 23. *Macropsis fuscula* (Zetterstedt, 1828)

Figs. 534–555, 576–583, 596–605.

Ribaut, 1952: 422, 432, figs. 1148–1152 (key, description, distribution, host plants);

Wagner, 1964: 123–132, 134–135, figs. 1–6 (description of nymph and imago, based on European material, comparison with related species, host plants, distribution, synonymy, key);

Ossiannilsson, 1981: 283, 292–294, text-figs. 938–943 (key, description, host plants for European populations, distribution);

Hamilton, 1983: 61–62, figs. 72, 150 (description, hosts, range, key);

Tishechkin, 1994c: 8, fig. 1 (acoustic signals of specimens from population near Moscow);

Tishechkin, 2000a: 106–109, figs. 449–489 (description of imago, based on the material from the Russian Far East, host plants, signals of specimens from different populations).

NYMPH (Fig. 534). Uniformly pale-greenish with very thick and long setose covering. Dorsal crest of abdomen is high and strongly jagged. 1–2 additional small denticles present on dorsal line of each abdominal tergite.

MALE. Face, pronotum and scutellum are pale-yellow with dark pattern (Figs. 535–537, 542–544). Frontal spot is always absent, other spots are more or less developed. Fore wings translucent, slightly fumose, as a rule, with all or main veins strongly darkened.

2nd tergal apodemes are wide, with somewhat angular or rounded tips (Figs. 576–578). Sternal ones are of triangular shape, more or less parallel to each other (Figs. 579–581). Aedeagus is narrow (Figs. 551–552), styles with pointed tips (Figs. 553–554), pygofer appendages straight, or with apices slightly bent inwards (Fig. 555).

Body length 4.0–4.5 mm.

FEMALE. Similar with male, but black pattern is less developed (Figs. 538–541, 545–547). 2nd valvulae are with 6–8 additional teeth (Figs. 582–583).

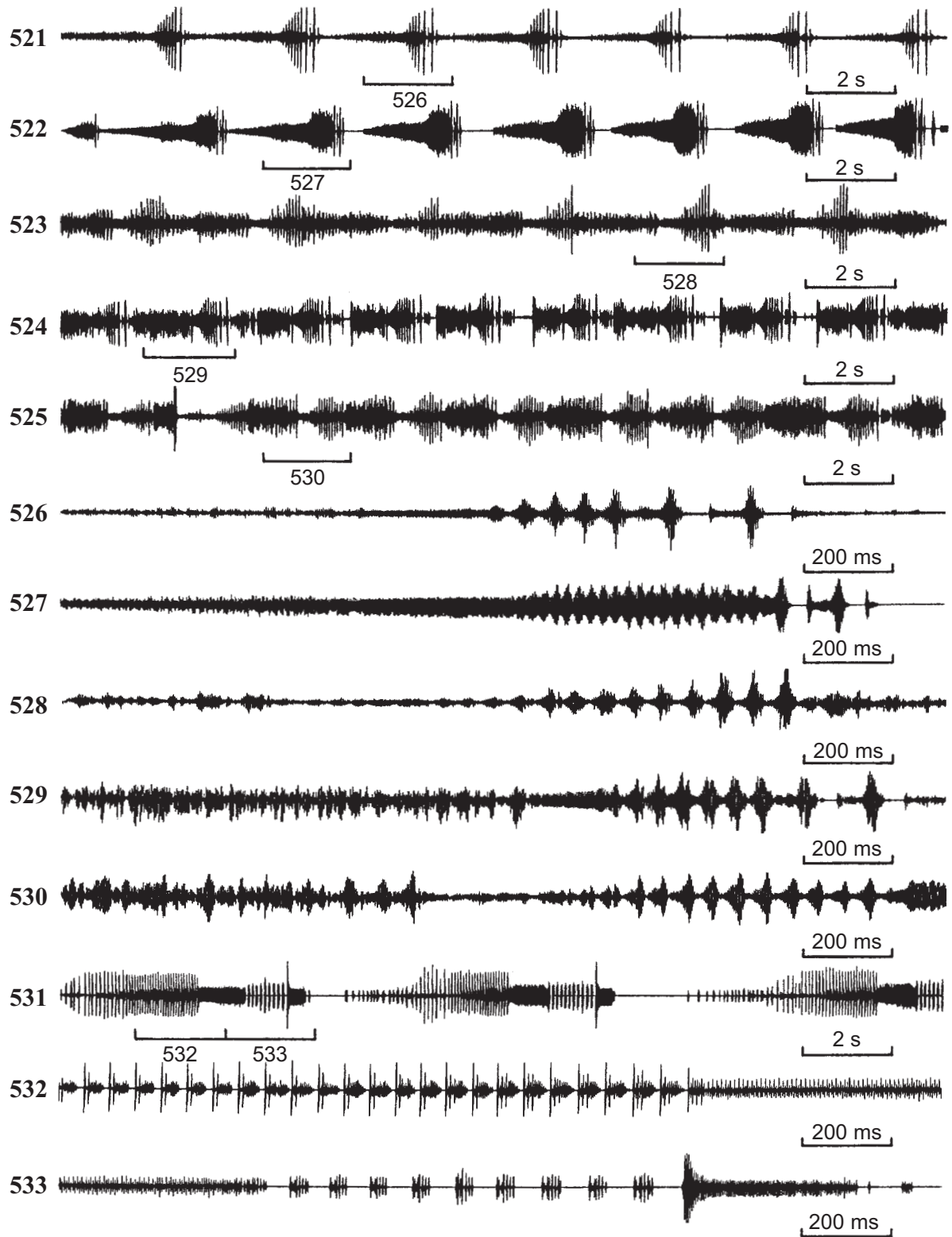
Body length 4.5–5.0 mm.

HOSTS. *Rubus* spp. in Western Europe, European Russia and Kazakhstan. I have collected this species on *R. idaeus* L., *R. caesius* L. and *R. nessensis* W. Hall in Moscow Area and on *R. caesius* in Southern Kazakhstan. Investigation of acoustic signals of the specimens from all these host plants corroborates their conspecificity. Wagner [1964] have never found this species on *R. caesius* in nature, but he notifies, that it can live on this plant under laboratory conditions.

ACOUSTIC SIGNALS (Figs. 596–605). Signals recordings were made in the following localities:

1. Moscow Area: (a) environs of Serpukhov Town; (b) environs of Bronnitsy Town. Signals of more than 10 specimens from all the three *Rubus* species listed above were recorded under laboratory conditions at the temperature 24–26°C.

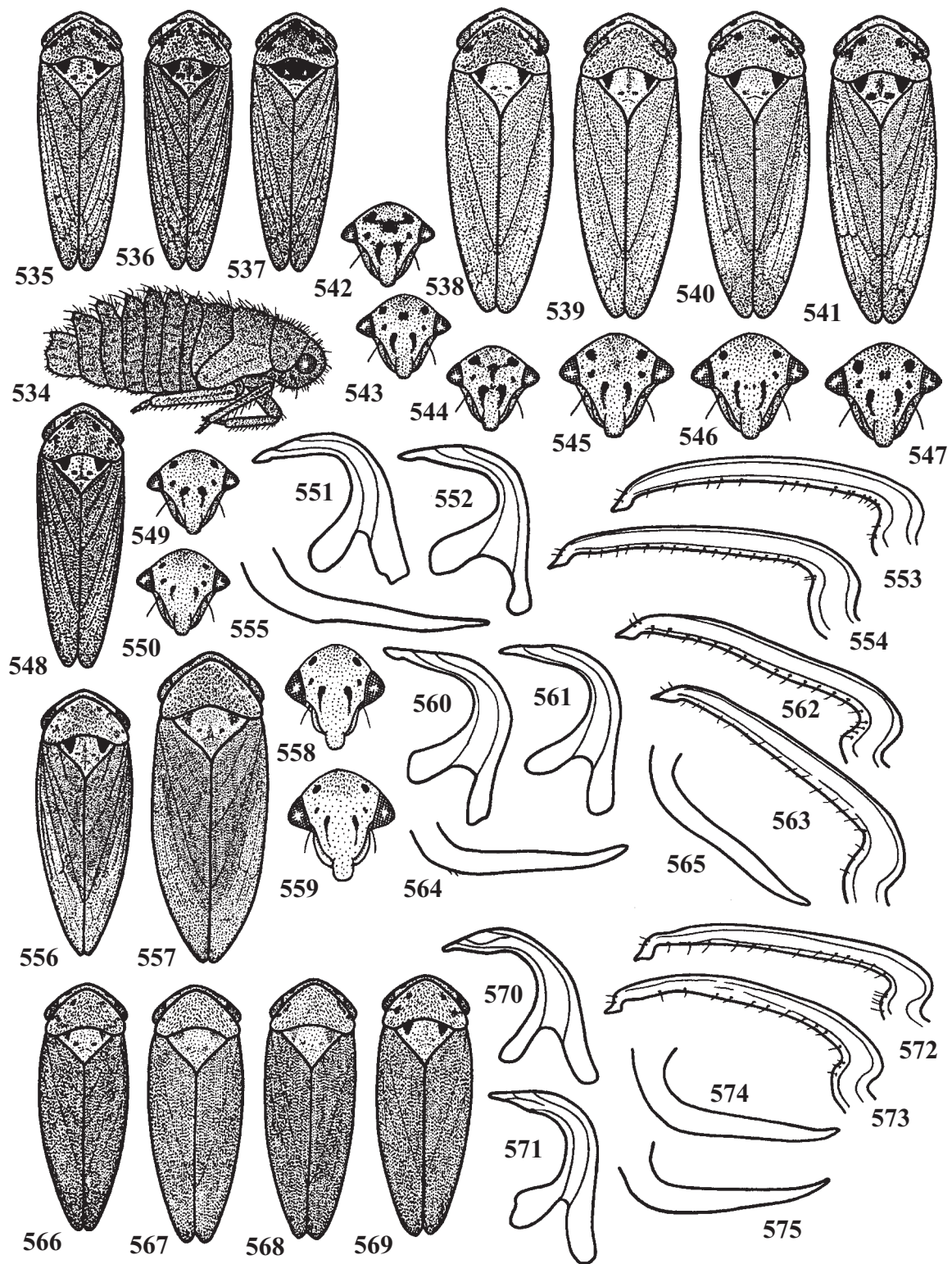
2. Southern Kazakhstan, Almaty and Zailiyskiy Alatau Mt. Ridge in the environs of the city, on *R. caesius*. 3.VII.1994. Signals of 4 ♂♂ were recorded under laboratory conditions at the temperature 30–31°C.



Figs. 521–533. Oscillograms of male calling signals of *Macropsis cerea* (Germ.) (521–530) and *M. sibirica* Kusn. (531–533). Faster oscillograms of the parts of signals indicated as “526–530” and “532–533” are given under the same numbers.

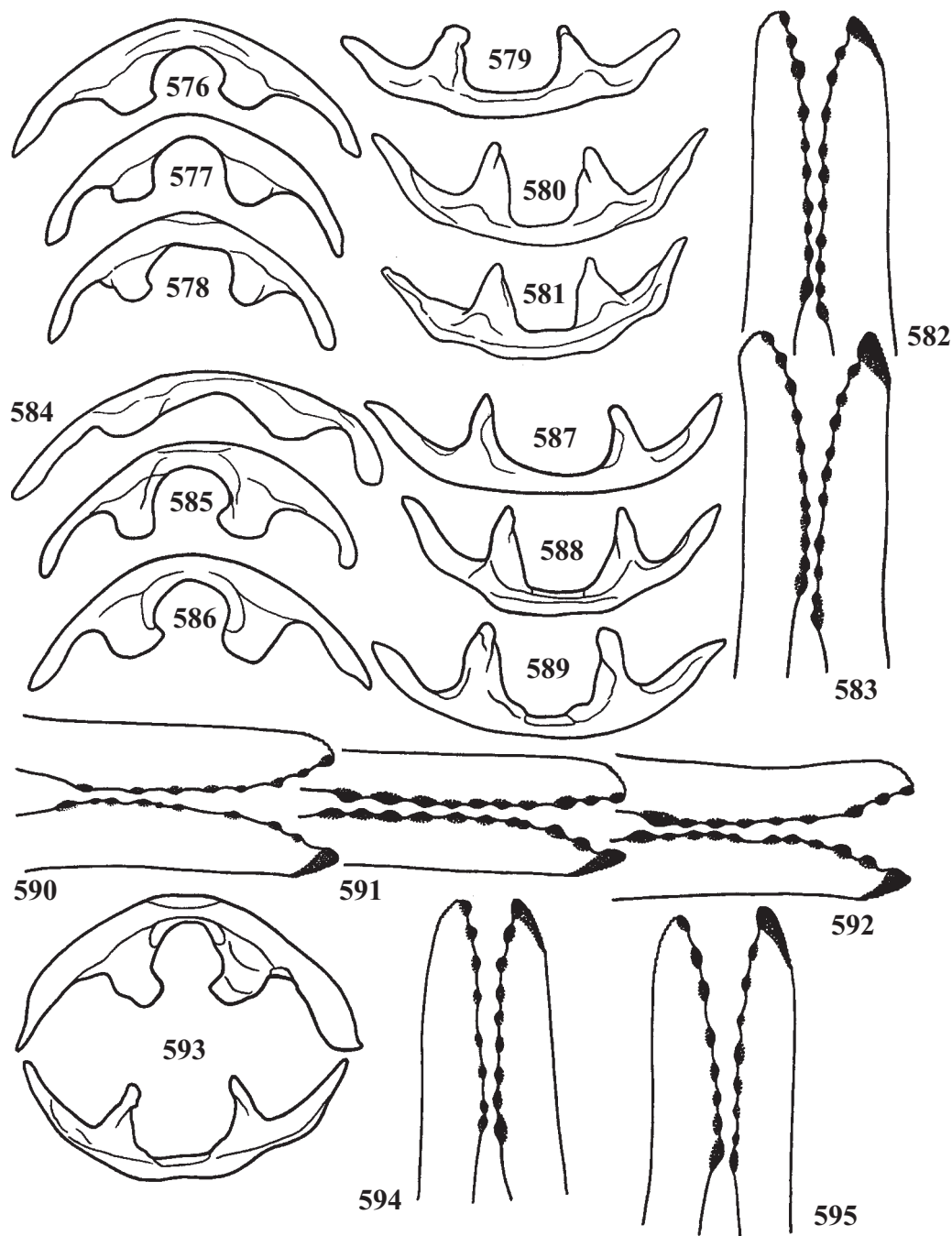
Рис. 521–533. Осциллограммы призывных сигналов самцов *Macropsis cerea* (Germ.) (521–530) и *M. sibirica* Kusn. (531–533). Фрагменты сигналов, помеченные цифрами “526–530” и “532–533”, представлены при большей скорости развертки на осциллограммах под такими же номерами.





Figs. 534-575. *Macropsis fuscula* (Zett.) (534-555): 534 — nymph, 535-537 — ♂, dorsal view of a body, 538-541 — same, ♀, 542-544 — ♂, face, 545-547 — same, ♀, 548 — ♂ from *Rubus caesius* L., dorsal view of a body, 549-550 — same, face, 551-552 — aedeagus, side view, 553-554 — stylus, 555 — pygofer appendage; *M. brabantica* Wagn. (556-565): 556 — ♂, dorsal view of a body, 557 — same, ♀, 558 — ♂, face, 559 — same, ♀, 560-561 — aedeagus, side view, 562-563 — stylus, 564-565 — pygofer appendage, 556-560, 563-564 — paratypes; *M. acrotirica* Dlab. (566-575): 566 — ♂, dorsal view of a body, 567-569 — same, ♀, 570-571 — aedeagus, side view, 572-573 — stylus, 574-575 — pygofer appendage.

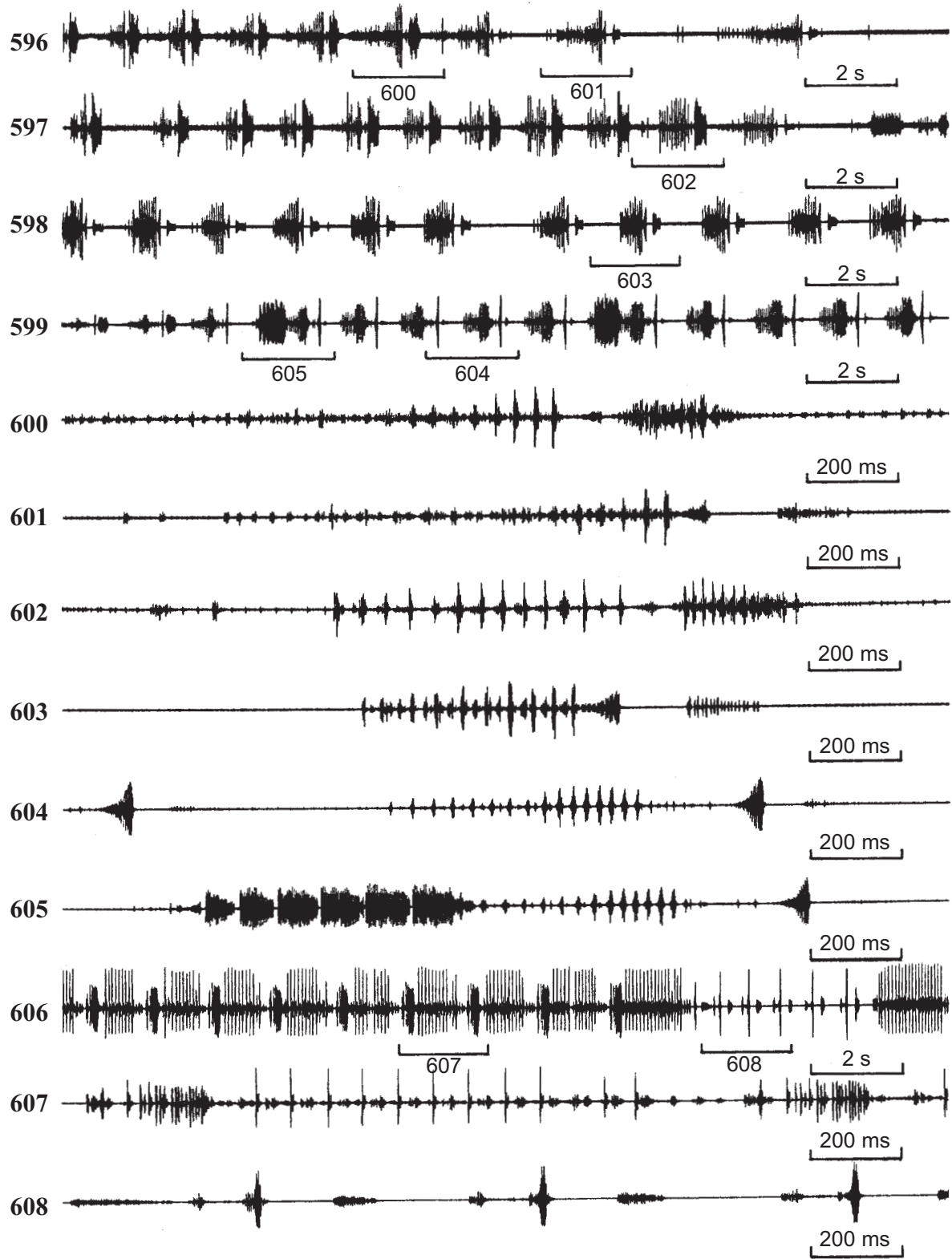




Figs. 576–595. *Macropsis fuscula* (Zett.) (576–583): 576–578 — apodemes of 2nd ♂ abdominal tergite, 579–581 — same, apodemes of 2nd abdominal sternite, 582–583 — 2nd valvulae of ovipositor; *M. brabantica* Wagn. (584–592): 584–586 — apodemes of 2nd ♂ abdominal tergite, 587–589 — same, apodemes of 2nd abdominal sternite, 590–592 — 2nd valvulae of ovipositor, 584, 587, 590 — paratypes; *M. acrotirica* Dlab. (593–595): 593 — apodemes of 2nd ♂ abdominal segment, 594–595 — 2nd valvulae of ovipositor.

Рис. 576–595. *Macropsis fuscula* (Zett.) (576–583): 576–578 — аподемы 2-го брюшного тергита ♂, 579–581 — то же, аподемы 2-го брюшного стернита, 582–583 — внутренние гонапофизы яйцеклада; *M. brabantica* Wagn. (584–592): 584–586 — аподемы 2-го брюшного тергита ♂, 587–589 — то же, аподемы 2-го брюшного стернита, 590–592 — внутренние гонапофизы яйцеклада, 584, 587, 590 — паратипы; *M. acrotirica* Dlab. (593–595): 593 — аподемы 2-го брюшного сегмента ♂, 594–595 — внутренние гонапофизы яйцеклада.

Рис. 534–575. *Macropsis fuscula* (Zett.) (534–555): 534 — личинка, вид сбоку, 535–537 — ♂, вид сверху, 538–541 — то же, ♀, 542–544 — ♂, лицо, 545–547 — то же, ♀, 548 — ♂ с *Rubus caesius* L., вид сверху, 549–550 — то же, лицо, 551–552 — эдеагус, вид сбоку, 553–554 — стилус, 555 — отросток доли пигофора; *M. brabantica* Wagn. (556–565): 556 — ♂, вид сверху, 557 — то же, ♀, 558 — ♂, лицо, 559 — то же, ♀, 560–561 — эдеагус, вид сбоку, 562–563 — стилус, 564–565 — отросток доли пигофора, 556–560, 563–564 — паратипы; *M. acrotirica* Dlab. (566–575): 566 — ♂, вид сверху, 567–569 — то же, ♀, 570–571 — эдеагус, вид сбоку, 572–573 — стилус, 574–575 — отросток доли пигофора.



Figs. 596–608. Oscillograms of male calling signals of *Macropsis fuscula* (Zett.) (596–605) and *M. scutellata* (Boh.) (606–608). Faster oscillograms of the parts of signals indicated as “600–605” and “607–608” are given under the same numbers.

Рис. 596–608. Осциллограммы призывных сигналов самцов *Macropsis fuscula* (Zett.) (596–605) и *M. scutellata* (Boh.) (606–608). Фрагменты сигналов, помеченные цифрами “600–605” и “607–608”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Signals consist of repeated short syllables with rather variable temporal pattern. Also, the amplitude of different parts of syllable may vary greatly from signal to signal. Nonetheless, all the main variants of temporal pattern of syllable may be found in the same population after investigation of sufficient number of specimens.

RANGE. Western Europe, Ukraine, all the European Russia, Caucasus, Transcaucasia, Kazakhstan and Middle Asia, eastwards as far as the Russian Far East and Japan. In the Russian Far East represented by more pale colour form, resembling *M. brabantica* Wagner, 1964. Also, was found in Nearctic [Hamilton, 1983].

SIMILAR SYMPATRIC SPECIES. Belongs to so-called “*fuscula*-group”, which includes in Western Europe and European Russia also *M. brabantica* Wagn., *M. acrotirica* Dlab., *M. scotti* Edw. and *M. scutellata* Boh. Differs from other species with narrow aedeagus by another coloration and shape of dark pattern. Rather similar with some species dwelling on sea-buckthorn (*Hippophae rhamnoides* L.), but has not frontal spot on crown. Within *fuscula*-group differs from *M. scotti* and *M. scutellata* by shape of black pattern on face and straight tips of sternal apodems. *M. brabantica* and *M. acrotirica* are much paler, also in the latter species aedeagus is with inner margin distinctly convex.

NOTES. Interpretation of species is accepted after Wagner [1964], who reinvestigated type specimens.

In several males, collected in Moscow Area from *R. caesius* black pattern is poorly developed, as in *M. brabantica* (Figs. 548–550). However, judging by signals structure, these specimens belong to *M. fuscula*.

#### 24. *Macropsis brabantica* Wagner, 1964 Figs. 556–565, 584–592.

NYPH. Absent in my material. According to Wagner [1964], is similar with this of the previous species.

MALE. Very similar with *M. fuscula* both in external appearance (Figs. 556, 558) and in the shape of inner structures (Figs. 560–565, 584–589), but distinctly paler with less developed black pattern on face, pronotum and scutellum.

As in previous species, body length 4.0–4.5 mm.

FEMALE. Similar with male, but more pale (Figs. 557, 559). 2nd valvulae are with 5–8 additional teeth (Figs. 590–592).

Body length 4.5–5.0 mm.

HOSTS. Monophagous on *Rubus caesius* L.

ACOUSTIC SIGNALS. Unknown.

RANGE. Western Europe, also was found in several localities in central part of European Russia (Moscow and Tula areas) and in Middle Volga Region (Tatarstan) [Anufriev, 1997].

SIMILAR SYMPATRIC SPECIES. Within *fuscula*-group differs from *M. fuscula*, *M. scotti* and *M. scutellata* by less developed dark pattern. In external appearance is very similar with *M. acrotirica*, but in the latter species aedeagus is with inner margin distinctly convex, whereas in *M. brabantica* it is almost straight. Concerning difference between *M. brabantica* and other species with narrow aedeagus see the same item in the description of the previous species.

NOTES. Determination of species is based on reinvestigation of several paratype specimens (Figs. 556–560, 563–564, 584, 587, 590).

*M. fuscula* and *M. brabantica* are two closely related forms differing from each other only in intensity of development of black pattern: in the former species it is far more

developed, than in the latter one. Still, sometimes specimens with intermediate characters may be found. According to Wagner [1964], *M. brabantica* is monophagous on *R. caesius*, whereas *M. fuscula* lives on this plant only under laboratory conditions. Nevertheless, I collected *M. fuscula* on *R. caesius* in Moscow Area, Krasnodar Province and Southern Kazakhstan. Identification of species in most cases is based on signals analysis. In this material several pale-coloured males similar with strongly pigmented *M. brabantica* presents. One could conclude, that these two forms are only colour variations of single species, but I have in my disposal rather numerous series (about 50 specimens) collected from *R. caesius* in Tula Area (central part of European Russia), where only pale-coloured form (*M. brabantica*) presents (Figs. 561–562, 565, 585–586, 588–589, 591–592). So, at present I treat this form as separate species.

#### 25. *Macropsis acrotirica* Dlabola, 1967 Figs. 566–575, 593–595.

NYPH. Unknown.

MALE. In external appearance is similar with *M. brabantica*, but distinctly smaller (Fig. 566). Aedeagus is with inner margin distinctly convex in proximal part (Figs. 570–571). Other internal structures are of the same shape as in two previous species (Figs. 572–575, 593).

Body length 3.9–4.1 mm.

FEMALE. Similar with male, but paler, sometimes is almost without any dark pattern (Figs. 567–569). 2nd valvulae are with 5–6 additional teeth (Figs. 594–495).

Body length 4.4–4.8 mm.

HOSTS. According to original description, material from Cyprus, including holotype was collected from *Rubus ulmifolius anatolicus* (Focke) Focke ex Hausskn. in marshy biotope [Dlabola, 1967].

ACOUSTIC SIGNALS. Unknown.

RANGE. Was described basing on the material from Cyprus and Dagestan (North-eastern Caucasus). No other records are known to me.

A series of topotypes with the labels “Cyprus: Akrotiri Bay marshes. G. Mavromoustakis” and “B.[ritish] M.[useum] 1957-395” collected at 22 and 24.X.1954 was studied.

SIMILAR SYMPATRIC SPECIES. In external appearance is very similar with *M. brabantica*, but differs from it by smaller size and convex inner margin of proximal part of aedeagus. Concerning discrimination from other species with narrow aedeagus see the same item in the description of the previous species.

NOTES. Identification of species is based on the series of topotypes from British Museum of Natural History mentioned above. These specimens were collected at the same place and date by the same collector as holotype and a part of paratypes, but bear no label with information on host plant.

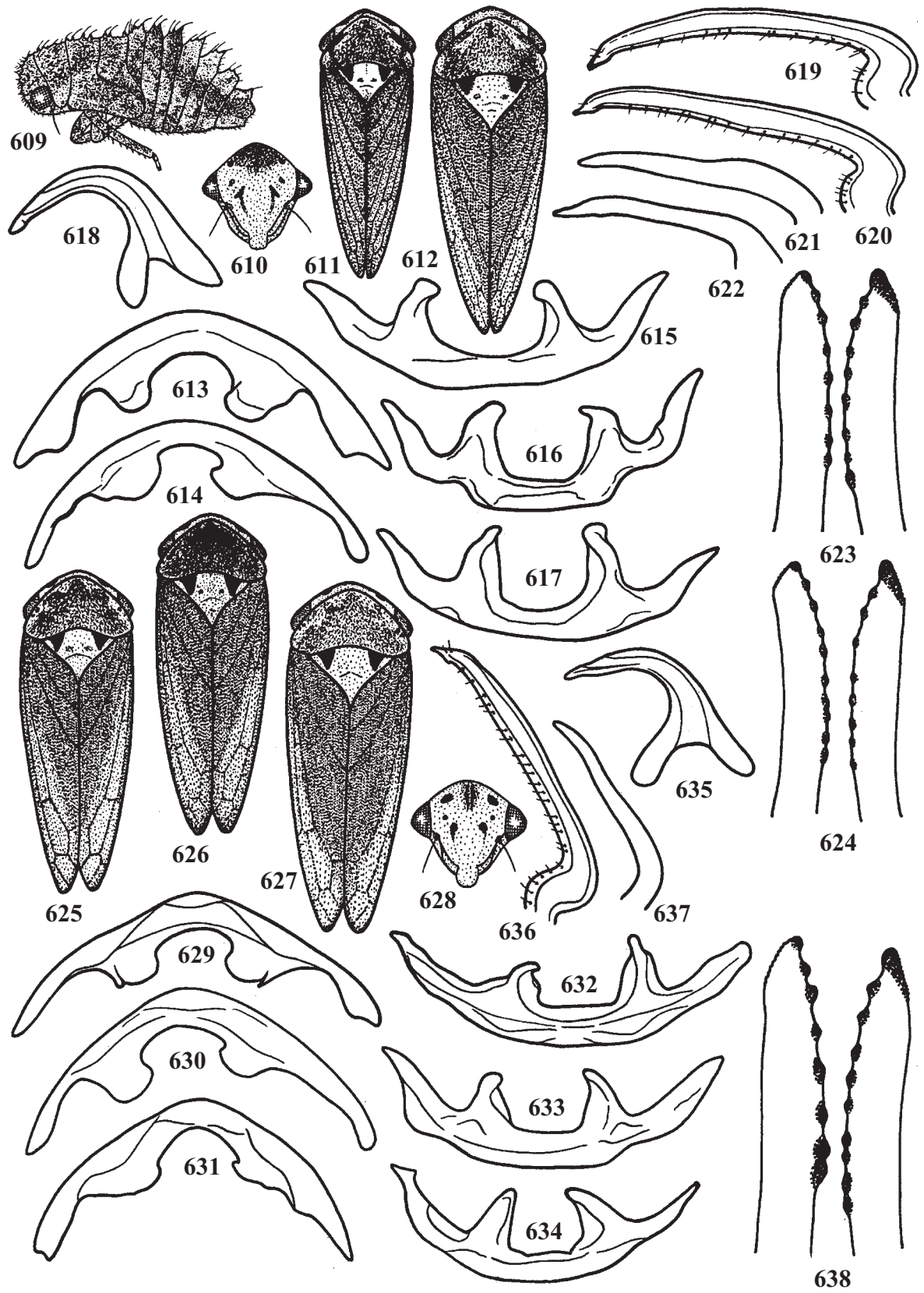
#### 26. *Macropsis scutellata* (Boheman, 1845) Figs. 606–624.

Ribaut, 1952 (as *M. tibialis*): 422, 434–435, figs. 1153 (key, description, distribution, host plants);

Wagner, 1964: 123–131, 133, 135, figs. 1–6 (description of nymph and imago, based on European material, comparison with related species, host plants, distribution, synonymy, key);

Ossiannilsson, 1981: 283, 294–295, text-figs. 944–947 (key, description, host plants for European populations, distribution);

Tishechkin, 1994c: 8, fig. 2 (acoustic signals of the specimens from population near Moscow);





Tishechkin, 2000a: 109–110, figs. 490–507 (description of imago, host plants, signals of specimens from different populations, distribution).

**NYMPH** (Fig. 609). Pale, yellowish with dark pattern. Dorsal crest of abdomen is well-developed and strongly serrated. 1–2 additional denticles are visible in side view on each tergite before the apex. Setae on dorsal side of body are very long and dense.

**MALE**. Pale-yellow with strongly developed grey pattern on the dorsal side of body (Fig. 611). Face yellowish with thyrudial, ocellar and discoidal spots, the latter are shaped as ticks turned upside down (Fig. 610). Upper part of face usually darkened in the middle. Pronotum with diffused grey pattern on almost all the surface and with black spots on the fore margin next to eyes. Scutellum pale-yellow, much lighter, than the surrounding areas, with black spots in side angles. Fore wings semitransparent, greyish, with black veins.

Sternal apodems are with ends slightly bent inwards (Figs. 615–617), tergal ones and genitalia are of the same shape, as in other species of *fuscus*-group (Figs. 613–614, 618–622).

Body length 4.2–4.5 mm.

**FEMALE**. Similar with male, but the dark pattern is less developed (Fig. 612). 2nd valvulae are with 5–7 additional teeth (Figs. 623–624).

Body length 4.9–5.3 mm.

**HOSTS**. Stinging nettle (*Urtica dioica* L.).

**ACOUSTIC SIGNALS** (Figs. 606–608). Signals of males from the following localities were studied:

1. Moscow Area, Voskresensk District, environs of Beloozerskiy Town, on *U. dioica*. 29.VII.1991. Signals of one ♂ were recorded under laboratory conditions at the temperature 24°C.

2. North-west Caucasus, Krasnodar Province, environs of Praskoveevka Village 15 km S of Gelendzhik, on *U. dioica*, 1 ♂. 12.VII.1997. Shadow air temperature — 26°C.

Calling signal consists of two parts with different temporal pattern (Figs. 607 and 608). There is no any difference between the songs of males from Moscow Area and Krasnodar Province.

**RANGE**. According to Ossiannilsson [1981], transpalearctic, southwards as far as Morocco, Palestine, Syria, Turkey and Middle Asia, also, Oriental region. I have studied material from Western Europe (Spain, France, Denmark, Bulgaria), from several localities in European Russia, from North-west Caucasus and from Northern and Eastern Kazakhstan (including Kazakh part of Altai Mountains). The latter point is the easternmost locality known to me. I have never seen any specimens from Eastern Siberia and the Russian Far East.

**SIMILAR SYMPATRIC SPECIES**. Within *fuscus*-group differs from *M. brabantica*, *M. acrotirica* and for the most part from *M. fuscus* (with the exception of the most strongly pigmented specimens) by much more developed black pattern. Also, can be distinguished from these three species by the tips

of sternal apodems somewhat bent inwards. Very similar with *M. scotti* both in external appearance and in the structure of apodems and genitalia, but has another shape of dark pattern on face. From other species with narrow aedeagus differs in the same characters, as *M. fuscus* and related species.

**NOTES**. Interpretation of species is accepted after Wagner [1964], who reinvestigated type specimens.

### 27. *Macropsis scotti* Edwards, 1920

Figs. 625–638.

Ribaut, 1952: 422, 434 (key, description, distribution, host plants).

Wagner, 1964: 123–132, 134–135, figs. 1, 3–6 (description, comparison with related species, host plants, distribution, synonymy, key).

**NYMPH**. Absent in my material. According to Wagner [1964], is similar with this of *M. fuscus*.

**MALE** (Figs. 625–626, 628, 629–637). Both in external appearance and in the structure of abdominal apodems and genitalia is similar with the previous species, but differs in details of dark pattern of face (Fig. 628). Upper part of face is not darkened, frontal spot has a shape of double vertical stroke. Discoidal spots are of comma shape.

Body length 4.4–4.6 mm.

**FEMALE**. Similar with male, but usually less pigmented (Fig. 627). 2nd valvulae are with 5–7 additional teeth (Fig. 638).

Body length 5.2–5.4 mm.

**HOSTS**. According to Wagner [1964], dwells on various *Rubus* species with the exception of *R. idaeus*.

**ACOUSTIC SIGNALS**. Unknown.

**RANGE**. Western Europe eastwards as far as Western Germany, also Morocco.

Specimens were investigated from Portugal, France, Great Britain and Western Germany.

**SIMILAR SYMPATRIC SPECIES**. See the same item in the description of *M. scutellata*.

**NOTES**. Identification of species is based on reinvestigation of types (1 ♂ and 1 ♀, glued on the same piece of paper) deposited in British Museum of Natural History (Figs. 629, 632, 635–637).

### 28. *Macropsis megerlei* (Fieber, 1868)

Figs. 639–651, 664–671.

= *M. venusta* Emeljanov, 1964 [Tishechkin, 1994a].

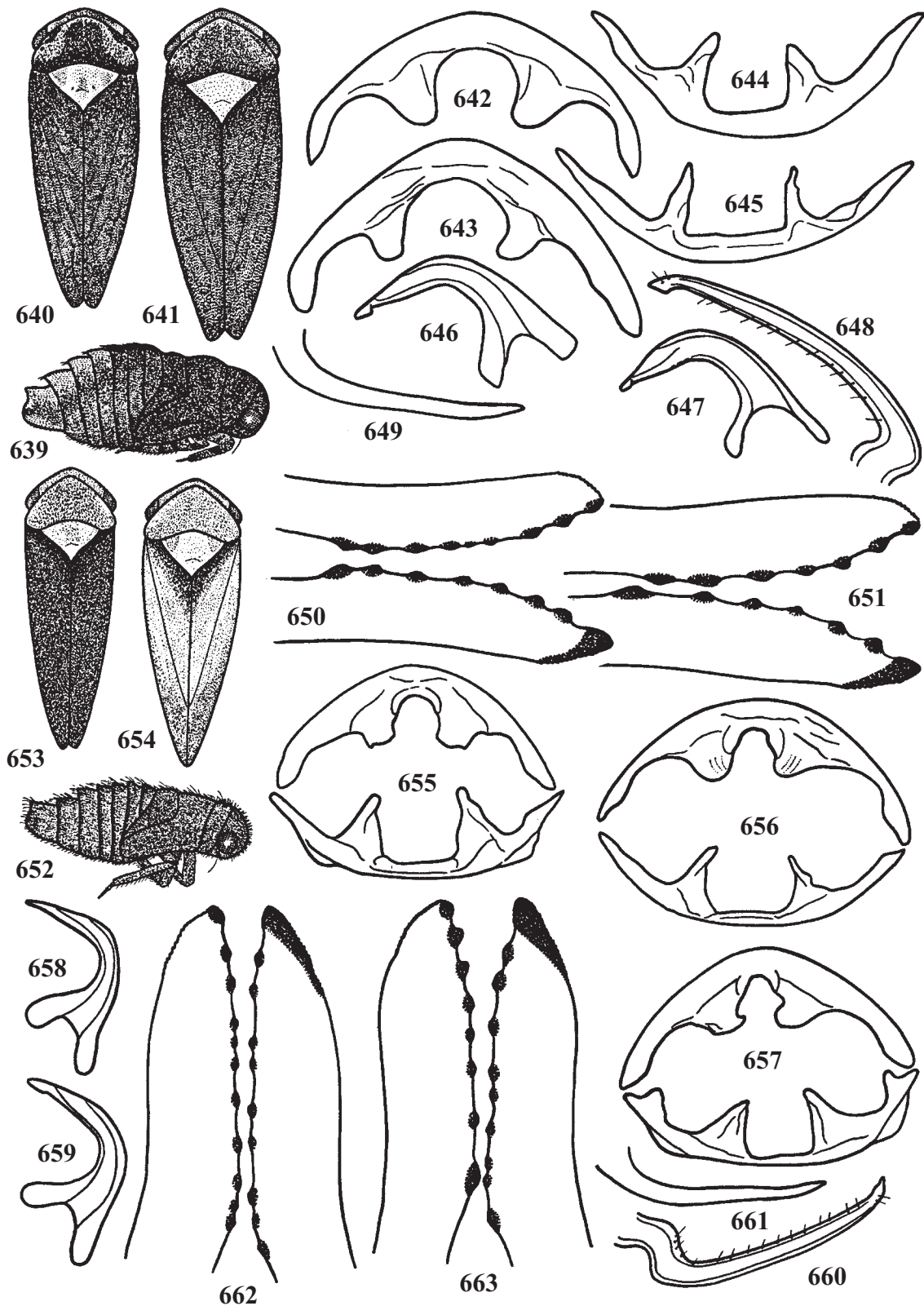
Wagner, 1964: 123–129, 131–133, 135, fig. 1 (description, based on European material, comparison with related species, host plants, distribution, synonymy, key);

Ribaut, 1952: 422, 435–436 (key, description, distribution, host plants);

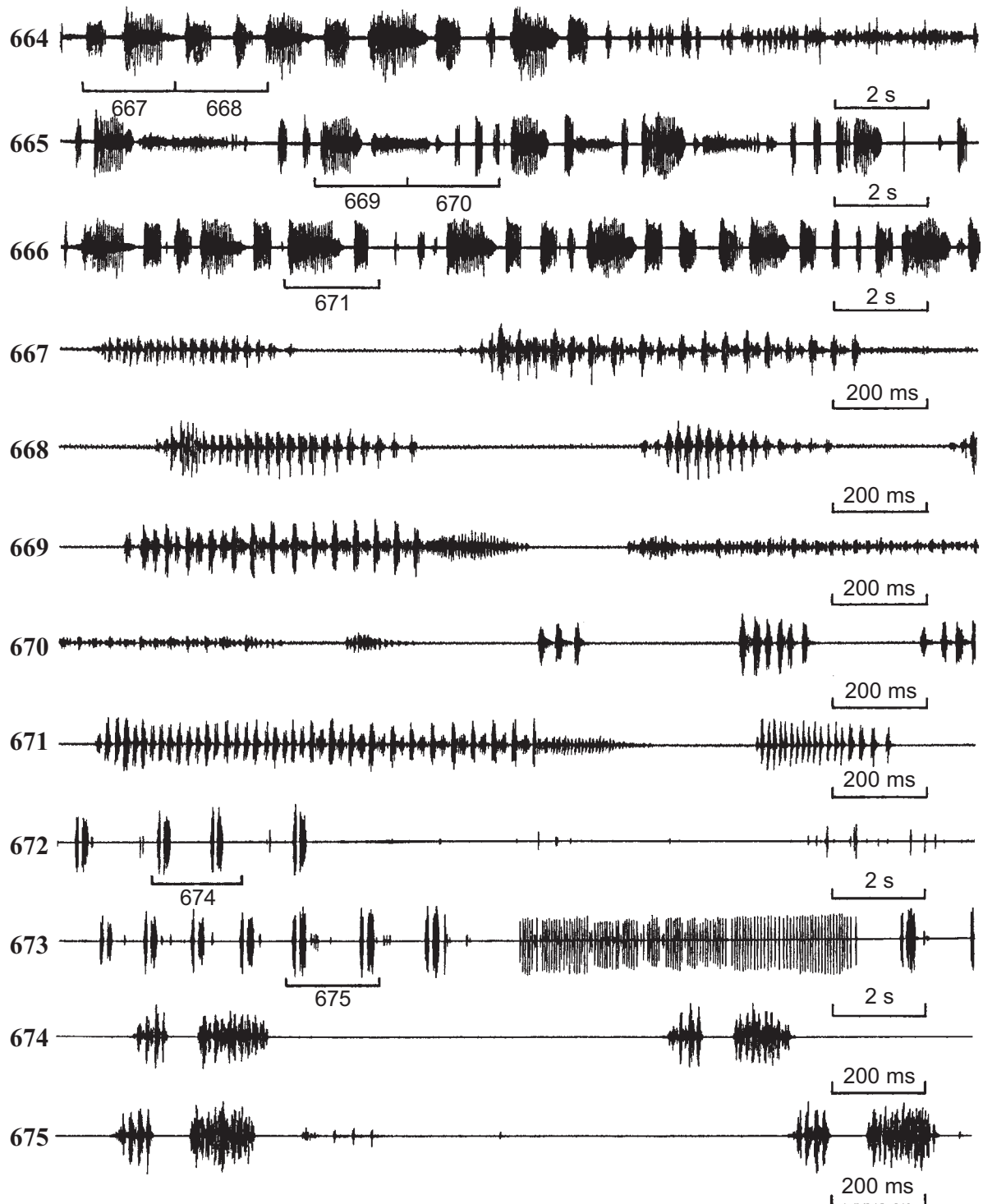
Ossiannilsson, 1981: 283, 295–296, text-figs. 948–951 (key, description, host plants for European populations, distribution);

Figs. 609–638. *Macropsis scutellata* (Boh.) (609–624): 609 — nymph, 610 — face, 611 — ♂, dorsal view of a body, 612 — same, ♀, 613–614 — apodems of 2nd ♂ abdominal tergite, 615–617 — same, apodems of 2nd abdominal sternite, 618 — aedeagus, side view, 619–620 — stylus, 621–622 — pygofer appendage, 623–624 — 2nd valvulae of ovipositor; *M. scotti* Edw. (625–638): 625–626 — ♂, dorsal view of a body, 627 — same, ♀, 628 — face, 629–631 — apodems of 2nd ♂ abdominal tergite, 632–634 — same, apodems of 2nd abdominal sternite, 635 — aedeagus, side view, 636 — stylus, 637 — pygofer appendage, 638 — 2nd valvulae of ovipositor, 629, 632, 635–637 — holotype.

Рис. 609–638. *Macropsis scutellata* (Boh.) (609–624): 609 — личинка, вид сбоку, 610 — лицо, 611 — ♂, вид сверху, 612 — то же, ♀, 613–614 — аподемы 2-го брюшного тергита ♂, 615–617 — то же, аподемы 2-го брюшного стернита, 618 — эдеагус, вид сбоку, 619–620 — стилус, 621–622 — отросток доли пигофора, 623–624 — внутренние гонапофизы яйцеклада; *M. scotti* Edw. (625–638): 625–626 — ♂, вид сверху, 627 — то же, ♀, 628 — лицо, 629–631 — аподемы 2-го брюшного тергита ♂, 632–634 — то же, аподемы 2-го брюшного стернита, 635 — эдеагус, вид сбоку, 636 — стилус, 637 — отросток доли пигофора, 638 — внутренние гонапофизы яйцеклада, 629, 632, 635–637 — голотип.



Figs. 639–663. *Macropsis megerlei* (Fieb.) (639–651): 639 — nymph, 640 — ♂, dorsal view of a body, 641 — same, ♀, 642–643 — apodems of 2nd ♂ abdominal tergite, 644–645 — same, apodems of 2nd abdominal sternite, 646–647 — aedeagus, side view, 648 — stylus, 649 — pygofer appendage, 650–651 — 2nd valvulae of ovipositor; *M. idae* Em. (652–663): 652 — nymph, 653 — ♂, dorsal view of a body, 654 — same, ♀, 655–657 — apodems of 2nd ♂ abdominal segment, 658–659 — aedeagus, side view, 660 — stylus, 661 — pygofer appendage, 662–663 — 2nd valvulae of ovipositor.



Figs. 664–675. Oscillograms of male calling signals of *Macropsis megerlei* (Fieb.) (664–671) and *M. idae* Em. (672–675). Faster oscillograms of the parts of signals indicated as “667–671” and “674–675” are given under the same numbers.

Рис. 664–675. Осциллограммы призывных сигналов самцов *Macropsis megerlei* (Fieb.) (664–671) и *M. idae* Em. (672–675). Фрагменты сигналов, помеченные цифрами “667–671” и “674–675”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Рис. 639–663. *Macropsis megerlei* (Fieb.) (639–651): 639 — личинка, вид сбоку, 640 — ♂, вид сверху, 641 — то же, ♀, 642–643 — аподемы 2-го брюшного тергита ♂, 644–645 — то же, аподемы 2-го брюшного стернита, 646–647 — эдеагус, вид сбоку, 648 — стилус, 649 — отросток доли пигофора, 650–651 — внутренние гонапофизы яйцеклада; *M. idae* Em. (652–663): 652 — личинка, вид сбоку, 653 — ♂, вид сверху, 654 — то же, ♀, 655–657 — аподемы 2-го брюшного сегмента ♂, 658–659 — эдеагус, вид сбоку, 660 — стилус, 661 — отросток доли пигофора, 662–663 — внутренние гонапофизы яйцеклада.

Tishechkin, 1994a: 48, figs. 6, 1–3 (synonymy).

**NYMPH** (Fig. 639). Brown. Mesonotum is strongly convex, dorsal crest of abdomen is high, distinctly serrated in back half. Setose covering is almost entirely absent.

**MALE** (Fig. 640). Face pale-yellow, usually with thyridial, ocellar and discoidal spots. Frontal spot is always absent. Pronotum yellowish-brown with more dark central and back parts and with dark spots on the fore margin behind eyes. Scutellum yellow, with traces of typical dark pattern. Fore wings brown, somewhat darker near the base, veins are of more or less the same tinge, as membrane.

Abdominal apodems and genitalia are of the same type as in species from *fuscula*-group (Figs. 642–649), but aedeagus is somewhat wider (Figs. 646–647).

Body length 4.0–4.4 mm.

**FEMALE** (Fig. 641). Same as male, but less pigmented. Face as a rule with thyridial spots only, or unspotted. 2nd valvulae are with 4–6 additional teeth (Figs. 650–651).

Body length 4.5–5.0 mm.

**HOSTS**. Wild species of *Rosa* [Wagner, 1964], *R. spinosissima* L. [Ossiannilsson, 1981]. I have found this species on *R. majalis* Herrm. in Moscow Area.

**ACOUSTIC SIGNALS** (Figs. 664–671). Calling signals of 8 ♂♂ collected from *R. majalis* in the environs of Luzhki Village, Serpukhov District of Moscow Area were recorded at 12 and 16.VII.1990 at 22–23°C under laboratory conditions.

Calling signal consists of alternating fragments of two different types, one of which is about twice shorter, than another. Usually one long fragment is followed by 1–3 short ones.

**RANGE**. Western Europe, Ukraine, European Russia, South Urals, Northern Africa, Caucasus, Transcaucasia, plains part of Kazakhstan and Mongolia.

Material was studied from Crimea, several localities in European Russia, South Urals, Armenia, Turkey, Northern and Eastern Kazakhstan.

**SIMILAR SYMPATRIC SPECIES**. Due to characteristic appearance may be easily distinguished from all other European species with narrow aedeagus. Somewhat resembles *M. idae* Em. but larger and has comparatively narrow 2nd valvulae (in *M. idae* 2nd valvulae are unusually wide — see Figs. 662–663).

**NOTES**. Interpretation of species is accepted after Wagner [1964].

### 29. *Macropsis idae* Emeljanov, 1964

Figs. 652–663, 672–675.

= *Macropsis gracilis* Dubovskiy, 1966, **syn.n.**

**NYMPH** (Fig. 652). Green or light yellowish-brown, with strongly developed setose covering throughout all the surface of body. Upper profile of abdomen is strongly identified.

**MALE** (Fig. 653). Head and pronotum pale, brownish, sometimes with a slight rose tinge, scutellum of the same colour or yellowish, usually more pale than pronotum, with traces of triangular spots in side angles. Fore wings brown, most strongly pigmented next to scutellum.

Apodems of 2nd abdominal tergite are rounded (Figs. 655–657), sternal ones are slender, triangular, with narrow tips. Aedeagus with narrow stem, as in other Rosaceae-dwelling *Macropsis* species (Figs. 658–659), pygofer processes are almost straight or somewhat sinuated (Fig. 661), styles are with pointed tips (Fig. 660).

Body length 3.7–4.1 mm.

**FEMALE** (Figs. 654). Head, pronotum and scutellum are pale-brownish, of the same tinge as in male, or greenish.

Scutellum usually more pale, than pronotum, with traces of triangular spots. Fore wings are greenish, transparent or slightly darkened, the margins allied to scutellum are broadly marked with brown.

2nd valvulae are very wide, with 5–8 additional teeth (Figs. 662–663).

Body length 4.5–4.7 mm.

**HOSTS**. Various species of *Rosa*. I have found this species on *R. cinnamomea* L. in Saratov Area, type series was collected on *R. acicularis* Lindl.

**ACOUSTIC SIGNALS** (Figs. 672–675). Signals of 6 ♂♂ collected from *Rosa* sp. in the Botanical Garden in Almaty (Kazakhstan) were recorded at 3.VII.1994 at 32°C under laboratory conditions.

Calling signal consists of short fragments repeated with a period about 1–2 s.

**RANGE**. In European Russia only Trans-Volga part of Saratov Area and south of Orenburg Area; also, southern part of Chelyabinsk Area, almost all the territory of Kazakhstan, mountains of Middle Asia.

Specimens were investigated from Saratov and Orenburg areas, from the southernmost region of Chelyabinsk Area (Troitsk), from several localities in Kazakhstan, from Kyrgyzstan and Tadzhikistan.

**SIMILAR SYMPATRIC SPECIES**. Differs from all other European species due to characteristic coloration. Males in external appearance are somewhat similar with ones of *M. glandacea* Fieb., but distinctly differ by shape of both abdominal apodems and genitalia. Slightly resembles *M. megerlei*, but distinctly smaller.

**NOTES**. Identification of *M. idae* is based on reinvestigation of type series deposited in Zoological Institute of Russian Academy of Sciences (St. Petersburg), interpretation of *M. gracilis* is based on original description [Dubovskiy, 1966]. According to Dubovskiy [1966], type series (3 specimens) was collected on willows. I also have found single specimens of *M. idae* on willows in a mixed thickets of various bushes in Orenburg Area; evidently these were insects flying from their host plant growing nearby.

### 30. *Macropsis glandacea* (Fieber, 1868)

Figs. 676–690, 700–710.

= *M. mendax* (Fieber, 1868);

= *M. ulmi* (Scott, 1873);

Wagner, 1941: 103–105, 121, fig. 71 (description, colour variation, host plants, synonymy, key);

Hamilton, 1983: 65–67, figs. 80–81, 155–156 (as *M. mendax* and *M. ulmi*; description, hosts, range, key);

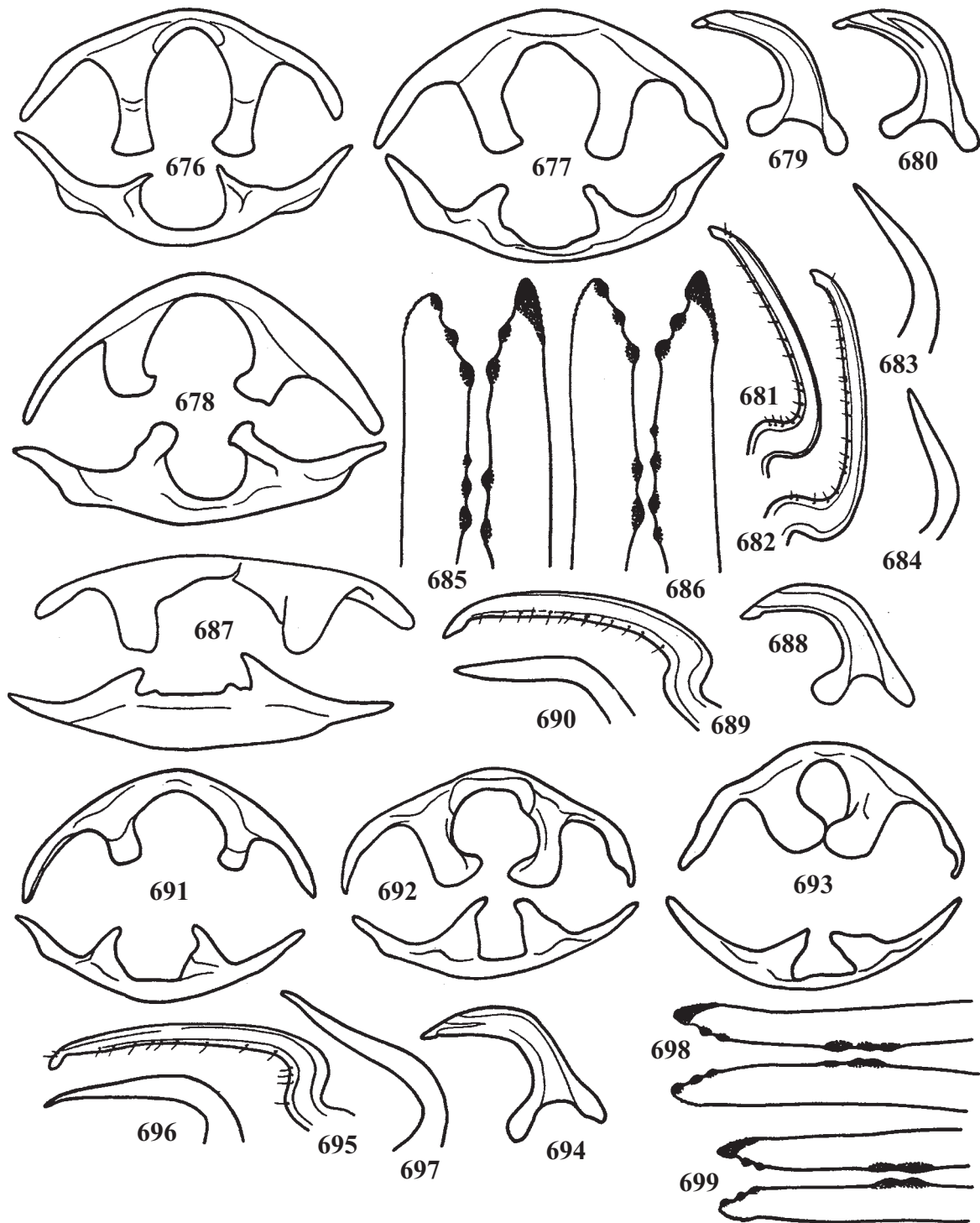
Zhantiev, Tishechkin, 1989: 473, fig. 2 (as *M. mendax*; acoustic signals of specimens from Northern Caucasus).

**NYMPH**. Unknown.

**MALE**. Head, pronotum and scutellum are yellowish-brown or greenish. Spots on the fore margin of pronotum next to eyes and triangles in side angles of scutellum are distinguishable only due to tinge and sculpture of cuticle slightly different from these in surrounding areas. Fore wings are brown, as a rule, are darker than the fore part of body. Veins of almost the same coloration, as membrane.

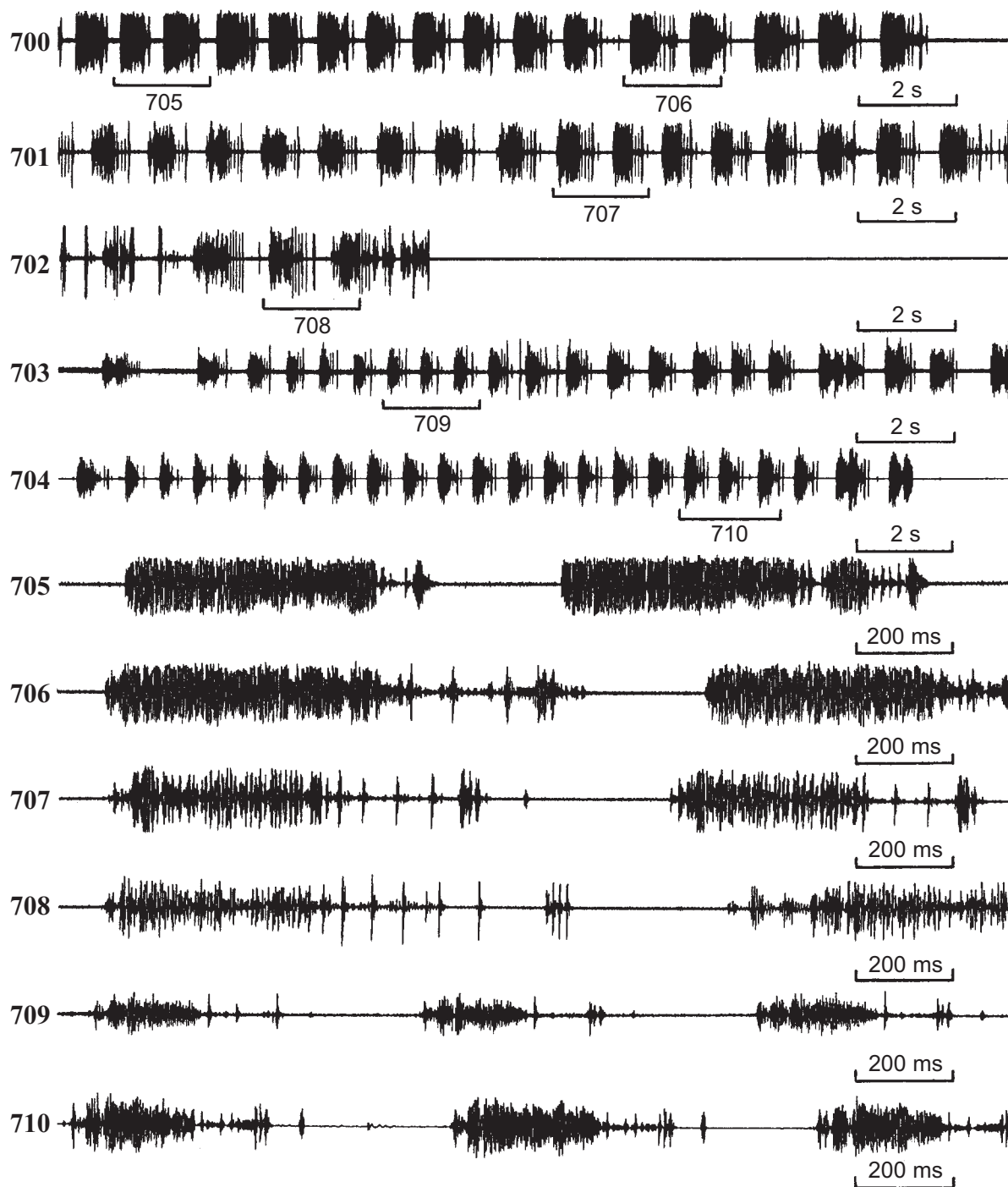
Sternal apodems are rather long and narrow (Figs. 676–678), usually with concave sides and convex tips of lobes (Fig. 676). Tergal apodems are more or less triangular (Figs. 676–678). Shaft of aedeagus is curved more uniformly, than in species from *fuscula*-group (Figs. 679–680). Apices of styles are less pointed, than in species, described above (Figs. 681–682). Pygofer appendages are almost straight (Figs. 683–684).





Figs. 676-699. *Macropsis glandacea* (Fieb.) (676-690): 676-678, 687 — apodemes of 2nd ♂ abdominal segment, 679-680, 688 — aedeagus, side view, 681-682, 689 — stylus, 683-684, 690 — pygofer appendage, 685-686 — 2nd valvulae of ovipositor, 687-690 — holotype of *M. ulmi* (Scott); *M. illota* (Horv.) (691-699): 691-693 — apodemes of 2nd ♂ abdominal segment, 694 — aedeagus, side view, 695 — stylus, 696-697 — pygofer appendage, 698-699 — 2nd valvulae of ovipositor.

Рис. 676-699. *Macropsis glandacea* (Fieb.) (676-690): 676-678, 687 — аподемы 2-го брюшного сегмента ♂, 679-680, 688 — эдеагус, вид сбоку, 681-682, 689 — стилус, 683-684, 690 — отросток доли пигофора, 685-686 — внутренние гонапофизы яйцеклада; 687-690 — голотип *M. ulmi* (Scott); *M. illota* (Horv.) (691-699): 691-693 — аподемы 2-го брюшного сегмента ♂, 694 — эдеагус, вид сбоку, 695 — стилус, 696-697 — отросток доли пигофора, 698-699 — внутренние гонапофизы яйцеклада.



Figs. 700–710. Oscillograms of male calling signals of *Macropsis glandacea* (Fieb.). Faster oscillograms of the parts of signals indicated as “705–710” are given under the same numbers.

Рис. 700–710. Осциллограммы призывных сигналов самцов *Macropsis glandacea* (Fieb.). Фрагменты сигналов, помеченные цифрами “705–710”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Body length 3.2–3.4 mm.

Reinvestigated holotype of *M. ulmi* Scott in most characters does not differ from typical *M. glandacea* (Figs. 688–690), but has weakly developed apodems (Fig. 687), which is not rare case in young or traumatised specimens.

FEMALE. There are two different colour forms in females of this species. Brown one is similar with male, but head,

pronotum and scutellum are of the same tinge, as fore wings, not lighter. Another variation is bright-green without any pattern. In all localities studied both forms were found together. 2nd valvulae are with 2–4 additional teeth (Figs. 685–686).

Body length 4.2–4.9 mm.

HOSTS. On elms (*Ulmus* spp.). I have found this species on *U. carpinifolia* Gled. in Krasnodar Province and Chechnya

and on *U. carpinifolia* var. *suberosa* Moench. in Ossetia. In North America on *U. glabra* Huds. and probably other European elms [Hamilton, 1983].

ACOUSTIC SIGNALS (Figs. 700–710). Signals of males from the following localities were studied:

1. North-west Caucasus, 12 km S of Anapa, Sukko River, on *U. carpinifolia*. 1.VII.1997. Signals of 1 ♂ are recorded at 27–29°C.

2. North-east Caucasus, Chechnya, Terskiy Mountain Ridge in the environs of Grozny Town, on *U. carpinifolia*. 27.VI.1986. Signals of 4 ♂♂ are recorded at the temperature 24°C.

Calling signal is a succession of short fragments, repeating with a period about 0.5–1.5 s. There is no any significant difference between signals of specimens from two populations studied.

RANGE. Western Europe, Ukraine (including Crimea), Moldova, Lithuania, south-western part of European Russia northwards as far as Kursk, Northern Caucasus. Was never found in Middle or Lower Volga Region. *M. mendax* was described basing on material from France, Austria and Russia (Moscow) [Fieber, 1868], I have never found this species in Moscow Area, however.

Material was studied from Great Britain, Germany, Lithuania and several points in European Russia and Northern Caucasus.

SIMILAR SYMPATRIC SPECIES. In external appearance and size is similar with *M. illota* Horv., which also dwells on elms. Differs from it by more slender tergal apodems and more uniformly curved aedeagus shaft. Besides, green colour variation is absent in females of the latter species. Somewhat resembles males of *M. idae*, but differs from it in shape of apodems and genitalia. May be easily distinguished from other species with narrow aedeagus due to characteristic coloration and small size.

NOTES. Interpretation of *M. glandacea* and *M. mendax* is accepted after Wagner [1941], who reinvestigated types of the latter form (4 females). Identification of *M. ulmi* is based on investigation of holotype deposited in British Museum of Natural History (London).

Certain authors treat all or some of these three forms as separate species (e.g. Ribaut, 1952, Hamilton, 1983). Here I accept the point of view of Wagner [1941] and regard these three forms conspecific.

### 31. *Macropsis illota* (Horvath, 1899)

Figs. 691–699, 711–725.

= *M. ulmaria* Anufriev, 1971 [Tishechkin, 1998];  
Anufriev, 1971: 96–97, figs. 13–16 (primary description of *M. ulmaria*);

Emelyanov, 1977 (as *M. ulmaria*): 124 (record from Mongolia);  
Anufriev, 1978 (as *M. ulmaria*): 27, 29, figs. 77–80;  
Anufriev, Emelyanov, 1988: 86, fig. 54, 1–4 (mentioned in the key as *M. ulmaria*);

Tishechkin, 1998: 425, figs. 5, 16–22, 7, 1–8 (description, synonymy);

Dmitriev, 1999 (as *M. ulmaria*): 83 (record from European Russia);

Tishechkin, 2000a: 102–103, figs. 376–401 (description, based on the material from Japan, the Russian Far East, Transbaikalia and Mongolia, hosts, range).

NYMPH. Unknown.

MALE. Uniformly brown, sometimes with traces of dark spots on the fore border of pronotum and with dark triangles in side angles of scutellum.

2nd tergal apodems are wide, with lobes widely expanded and bent towards each other, if well-developed (Figs. 691–

693). Sternal apodems are triangular, usually with inner margins more or less parallel to each other (Figs. 691–693). Aedeagus with narrow stem (Figs. 694), pygofer processes are straight or with tips somewhat bent forward or backwards (Figs. 696–697). Apices of styles are with distinct lobes, bent inwards (Figs. 695).

Body length 3.6–3.9 mm.

FEMALE. Similar with male, but as a rule more pale. In the material from European Russia individuals with light-brown coloration, as among Mongolian specimens (Tishechkin, 2000a) presents. 2nd valvulae have one very broad additional tooth, or 2–3 fully or partially merged ones (Figs. 698–699).

Body length 4.2–4.5 mm.

HOSTS. On elms (*Ulmus* spp.), I have collected this species on *Ulmus pumila* L. in Astrakhan' Area and on *Ulmus carpinifolia* Gled. in Crimea.

ACOUSTIC SIGNALS (Figs. 711–725). Signals recordings were made in the following localities:

1. Crimea, environs of Pereval'noe Village (halfway from Simferopol to Alushta), from *U. carpinifolia* (Figs. 718, 725). 17.VI.1997. Signals of 2 ♂♂ are recorded at 21–22°C.

2. Astrakhan' Area, Dosang Village, from cultivated *U. pumila* (Figs. 711–717, 719–724). 1.VII.2000. Signals of 1 ♂ were recorded at 26°C under laboratory conditions.

Calling signal is a very variable phrase, lasting from 2–3 s up to 1 minute and more. The structure of phrase changes distinctly towards its end.

RANGE. The Far-Eastern species, occurring westwards as far as Eastern Transbaikalia and Mongolia. Recently introduced in European Russia. Was found in several localities in Lipetsk and Voronezh areas (Dmitriev, 1999), in Crimea, in Astrakhan' Area (see the previous item) and also in Chelyabinsk (S. Urals). Material was studied from Crimea, Astrakhan' Area, Chelyabinsk and Voronezh.

SIMILAR SYMPATRIC SPECIES. Among *Macropsis* species with narrow aedeagus shaft may be confused only with *M. mendax*, but differs from it by another shape of tergal apodems. Besides, females of *M. mendax* have green colour variation, which is absent in *M. illota*.

NOTE. Identification of species is based on reinvestigation of holotype deposited in the Hungarian Natural History Museum (Budapest).

### 32. *Macropsis mulsanti* (Fieber, 1868)

Figs. 726–742, 760–766.

Ribaut, 1952: 419, 435 (key, description, distribution, host plants);

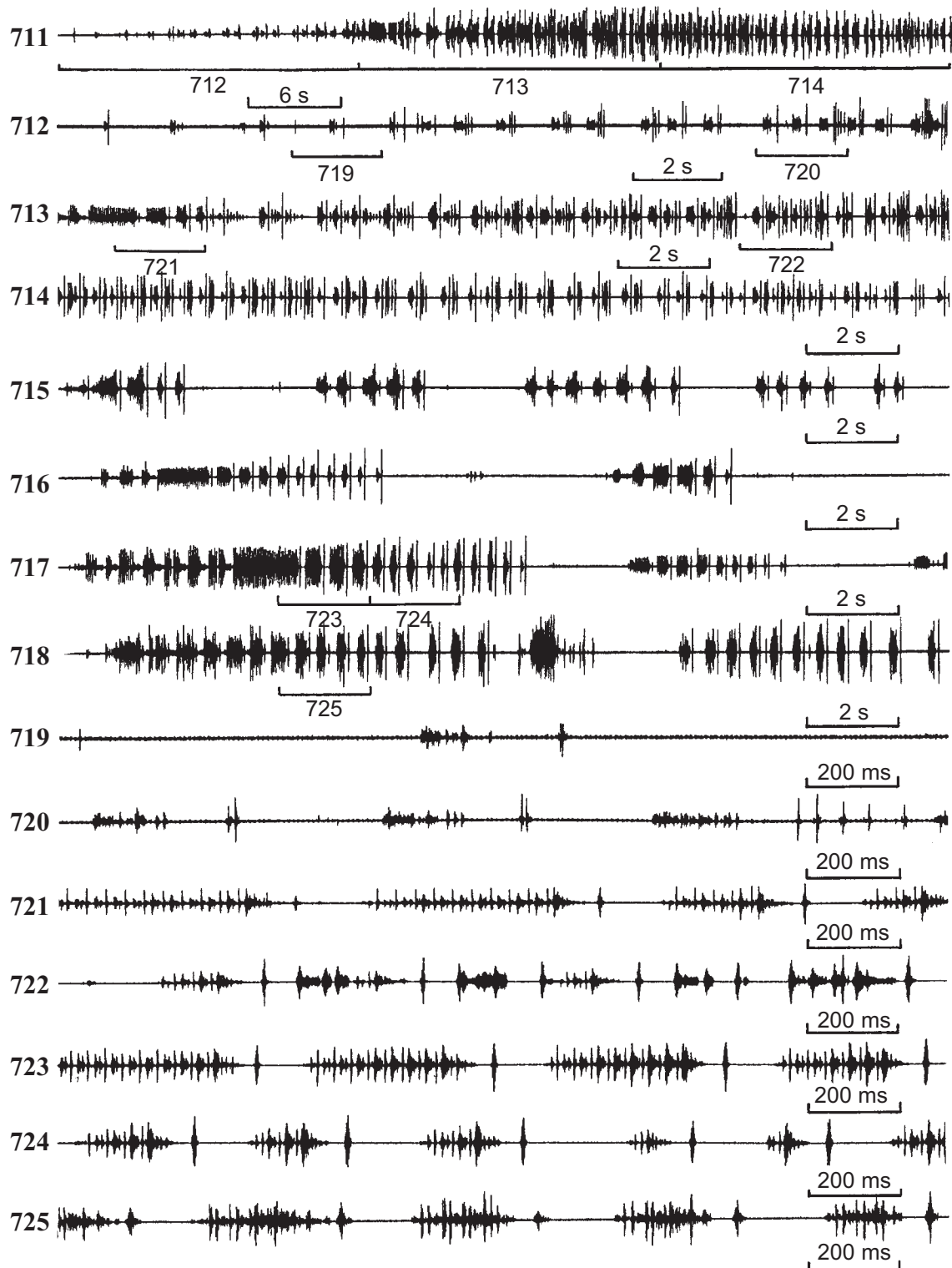
Dubovskiy, 1966: 90, 99, figs. 24, 1–4 (key, description, host plant);

Tishechkin, 1993: 57–58, 60, figs. 1, 4–6, 2, 7, 3, 2, 6, 10, 14 (description, comparison with related species, distribution);

Tishechkin, 1994c: 8, fig. 2 (acoustic signals of specimens from Northern Caucasus).

NYMPH (Fig. 726). Pale brownish, usually with well-developed brown pattern. Face with two pairs of black spots. Setose covering is moderately developed, upper profile of abdomen is slightly jagged in back half.

MALE (Fig. 727). Ground coloration pale-brownish or yellowish. Face with all spots more or less developed (Fig. 730). Usually, dark spots at the bases of antennae and a longitudinal median stroke on anteclypeus are also present. Upper end of each discoidal spot is darkened, almost black, but of the same width, or only slightly wider, than the remaining part of spot. Thyridial spots for the most part are black, whereas

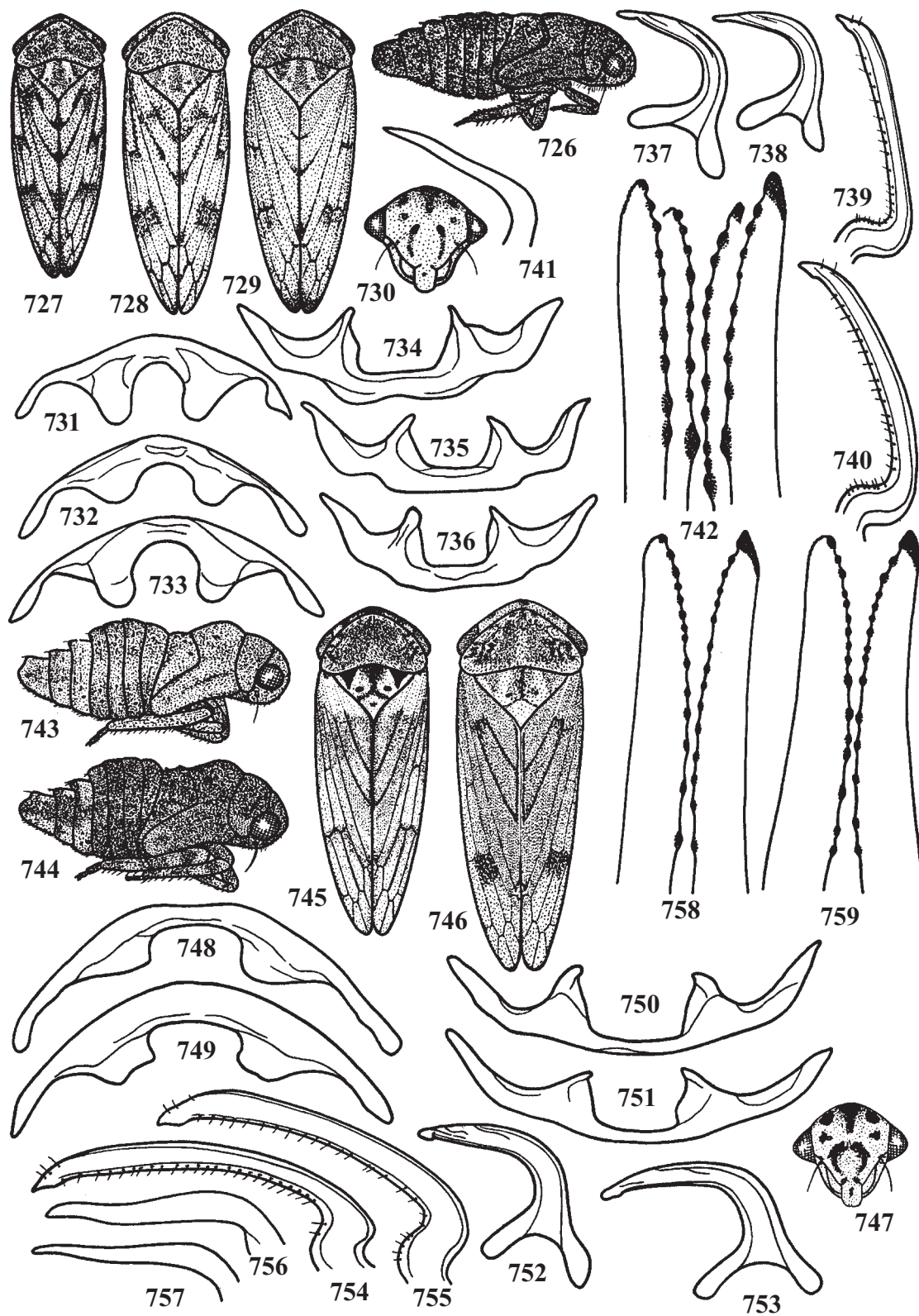


Figs. 711–725. Oscillograms of male calling signals of *Macropsis illota* (Horv.). Faster oscillograms of the parts of signals indicated as “712–714” and “719–725” are given under the same numbers.

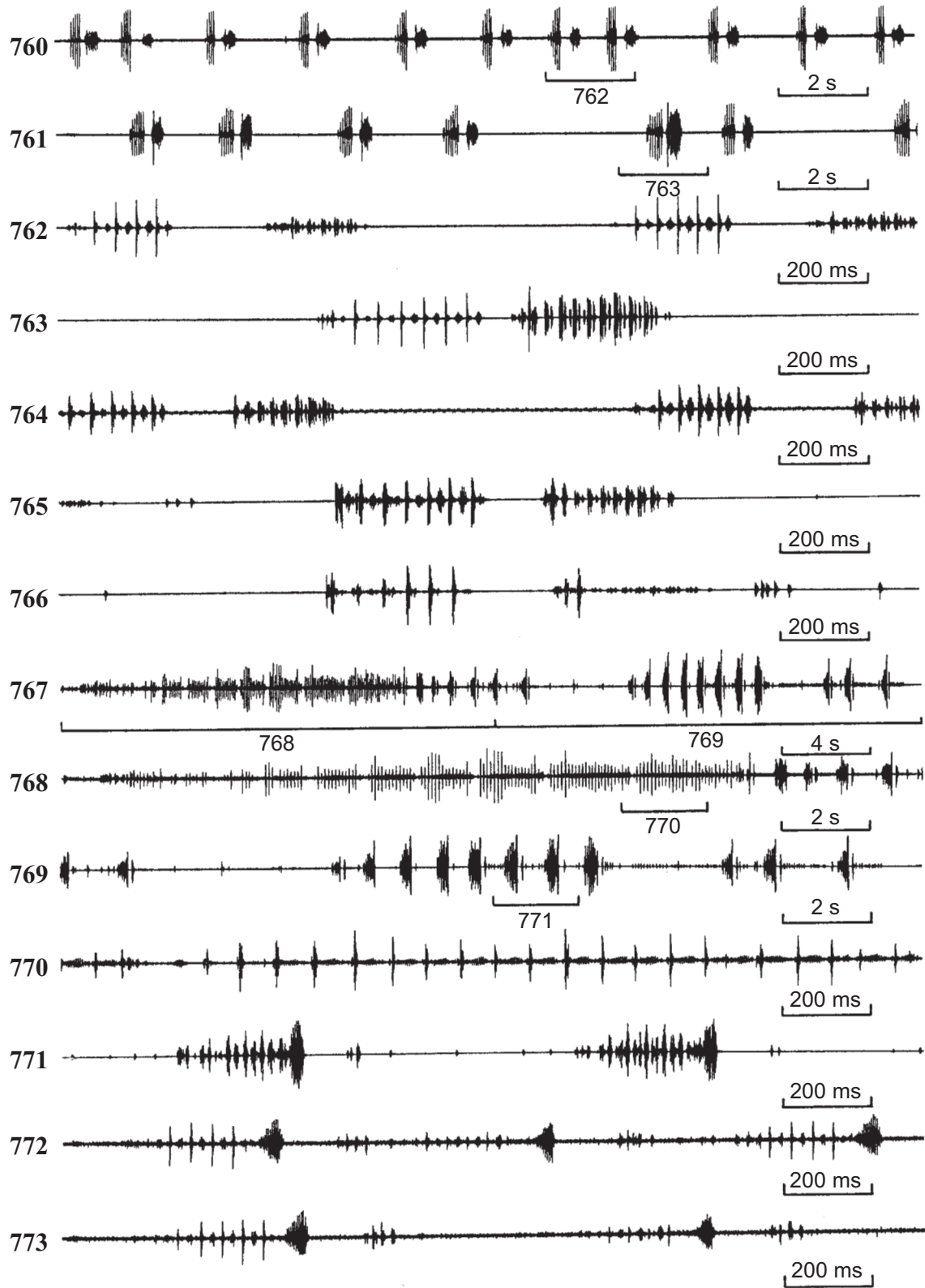
Рис. 711–725. Осциллограммы призывных сигналов самцов *Macropsis illota* (Horv.). Фрагменты сигналов, помеченные цифрами “712–714” и “719–725”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

Рис. 726–759. *Macropsis mulsanti* (Fieb.) (726–742): 726 — личинка, вид сбоку, 727 — ♂, вид сверху, 728–729 — то же, ♀, 730 — лицо, 731–733 — аподемы 2-го брюшного тергита ♂, 734–736 — то же, аподемы 2-го брюшного стернита, 737–738 — эдегус, вид сбоку, 739–740 — стилус, 741 — отросток доли пигофора, 742 — внутренние гонапофизы яйцеклада; *M. pictipes* (Horv.) (743–759): 743–744 — личинка, вид сбоку, 745 — ♂, вид сверху, 746 — то же, ♀, 747 — лицо, 748–749 — аподемы 2-го брюшного тергита ♂, 750–751 — то же, аподемы 2-го брюшного стернита, 752–753 — эдегус, вид сбоку, 754–755 — стилус, 756–757 — отросток доли пигофора, 758–759 — внутренние гонапофизы яйцеклада.





Figs. 726-759. *Macropsis mulsanti* (Fieb.) (726-742): 726 — nymph, 727 — ♂, dorsal view of a body, 728-729 — same, ♀, 730 — face, 731-733 — apodems of 2nd ♂ abdominal tergite, 734-736 — same, apodems of 2nd abdominal sternite, 737-738 — aedeagus, side view, 739-740 — stylus, 741 — pygofer appendage, 742 — 2nd valvulae of ovipositor; *M. pictipes* (Horv.) (743-759): 743-744 — nymph, 745 — ♂, dorsal view of a body, 746 — same, ♀, 747 — face, 748-749 — apodems of 2nd ♂ abdominal tergite, 750-751 — same, apodems of 2nd abdominal sternite, 752-753 — aedeagus, side view, 754-755 — stylus, 756-757 — pygofer appendage, 758-759 — 2nd valvulae of ovipositor.



Figs. 760–773. Oscillograms of male calling signals of *Macropsis mulsanti* (Fieb.) (760–766) and *M. pictipes* (Horv.) (767–773). Faster oscillograms of the parts of signals indicated as “762–763” and “768–771” are given under the same numbers.

Рис. 760–773. Осциллограммы призывных сигналов самцов *Macropsis mulsanti* (Fieb.) (760–766) и *M. pictipes* (Horv.) (767–773). Фрагменты сигналов, помеченные цифрами “762–763” и “768–771”, представлены при большей скорости развертки на осциллограммах под такими же номерами.

frontal spot is brown. As a rule, upper part of face is more or less darkened, so that frontal and thyrical spots are somewhat confluent. Pronotum with diffused brown pattern. Scutellum with triangular spots in side angles, brown longitudinal middle line and small round spots on each side of it. Fore wings are whitish with veins widely marked with brown, especially, transverse ones. Apices of wings are also darkened.

Abdominal apodemes and genitalia are of almost the same shape, as in species from *fuscata*-group (Figs. 731–741).

Body length in European specimens 3.8–4.0 mm. Males from Kazakhstan and Middle Asia are somewhat smaller — 3.5–3.7 mm.

FEMALE. Similar with male, but less pigmented, especially, fore wings (Figs. 728–729). 2nd valvulae are with 6–8 additional teeth (Fig. 742).

Body length in specimens from European populations 4.4–4.8 mm, in specimens from Kazakhstan and Middle Asia 4.0–4.3 mm.

HOSTS. Sea-buckthorn (*Hippophae rhamnoides* L.).

ACOUSTIC SIGNALS (Figs. 760–766). Signals of males from the following localities were recorded:

1. Moscow Area, Voskresensk Region, on cultivated *H. rhamnoides* in the garden. 27.VII.1992 and 11.VII.1998. Signals of 5 ♂♂ are recorded at 24–26°C under laboratory conditions.

2. Northern Caucasus, North Ossetia, Ardon River flood-plain in the environs of Alagir Town, on *H. rhamnoides*. 14.VIII.1990. Signals of 2 ♂♂ are recorded at 25°C under laboratory conditions.

Calling signal is a succession of short fragments, repeating with a period about 1–5 s and consisting of two different parts each. Signals of specimens from Moscow Area (Figs. 760–764) and Northern Caucasus (Figs. 765–766) are identical.

RANGE. From France and Switzerland throughout all the Western and Eastern Europe up to Northern Caucasus and Mountains of Middle Asia. Recently was introduced into central part of European Russia with cultivated sea-buckthorn and now is quite abundant on it in gardens in Moscow Area. Until now was not found on sea-buckthorn in Southern Siberia and Mongolia.

Material was studied from France (several specimens from Ribaut collection, Muséum National d'Histoire Naturelle, Paris), North Ossetia, several localities in Moscow Area and from mountains of Southern Kazakhstan and Middle Asia.

SIMILAR SYMPATRIC SPECIES. Somewhat similar with *M. emeljanovi* Dub., but differs in shape of discoidal spots (narrow in *M. mulsanti*, of comma shape in *M. emeljanovi*), brown spots around transverse veins on fore wings (absent in *M. emeljanovi*) and brown pattern on pronotum and scutellum (black, if present in *M. emeljanovi*). Due to characteristic coloration can be easily distinguished from other species with narrow aedeagus.

NOTES. Identification of species is based on the work by Ribaut [1952] and investigation of a series of specimens from his collection.

### 33. *Macropsis pictipes* (Horvath, 1904)

Figs. 743–759, 767–773.

= *M. grossa* Dubovskiy, 1966 [Tishechkin, 1994a]; Dubovskiy, 1966: 91, 100–101, figs. 24, 9–12 (original description of *M. grossa*, key, host plant);

Korolevskaya, 1968 (as *M. grossa*): 103–104, fig. 2 (description);

Emelyanov, 1977 (as *M. grossa*): 125 (record from Mongolia);

Tishechkin, 1993 (as *M. grossa*): 58–59, figs. 2, 1–3, 8, 3, 3, 7, 11, 15 (description, comparison with related species, distribution); Tishechkin, 1994a: 48 (synonymy);

Tishechkin, 1994c (as *M. grossa*): 8, fig. 2 (acoustic signals of specimens from Tuva);

Gnezdilov, 2000 (as *M. grossa*): 801 (record from NW Caucasus).

NYMPH (Figs. 743–744). Pale or brown with diffused dark pattern all over the body. Mesonotum and fore half of abdominal crest are strongly convex. Setose covering is almost entirely absent.

MALE (Fig. 745). Ground coloration pale, yellowish. On head all groups of spots are well-developed (Fig. 747). Pronotum with diffused greyish-brown pattern throughout almost all its surface. Scutellum with black triangular spots in side angles, dark middle area and two small round spots medially and somewhat distally of the caudal apices of the lateral spots. Basal part of fore wings is whitish, sometimes with milky-white veins. The main part of wings is translucent with brown veins. In specimens with well-developed pigmentation two brown transverse stripes presents: at the level of the middle of clavus and at its end. The fore stripe is wider and brighter, than the back one.

Tergal apodemes are short and wide, with lobes slightly angular or rounded (Figs. 748–749). Sternal ones are triangular (Figs. 750–751). Aedeagus with proximal part (before bending) distinctly shorter than distal one (Figs. 752–753). Styles are of usual shape (Figs. 754–755), pygofer processes are slightly sinuated (Figs. 756–757).

Body length 4.3–4.5 mm.

FEMALE. Similar with male, but less pigmented (Fig. 746). Fore wings as a rule are almost translucent, without dark stripes. 2nd valvulae are with 10–13 additional teeth (Figs. 758–759).

HOSTS. Sea-buckthorn (*Hippophae rhamnoides* L.).

ACOUSTIC SIGNALS (Figs. 767–773). Signals recorded were made in the following localities:

1. Southern Tuva, environs of Erzin Village, flood-plain of Ersin River, on *H. rhamnoides*. 21.VII.1989. Signals of 2 ♂♂ are recorded at 24°C under laboratory conditions (Figs. 772–773).

2. Kazakhstan, environs of Almaty, Zailiyskiy Alatau Mountain Ridge, on *H. rhamnoides* near the river. 30.VI.1994. Signals of 1 ♂ are recorded at 31°C under laboratory conditions (Figs. 767–771).

Full calling signal consists of a long trill of pulses, followed by the train of short fragments, somewhat similar with these in the signal of two previous species (Figs. 767–771). Occasionally male can miss the trill and produces the second part of signal only. In males from Tuva only reduced signals were recorded (Figs. 772–773).

RANGE. North Caucasus, Kazakhstan, Middle Asia, Tuva, Mongolia. For the most part in mountains on sea-buckthorn on river banks.

Material was studied from several localities in eastern half of Northern Caucasus, from mountains of Kazakhstan, Kyrgyzstan and Tadzhikistan and from Southern Siberia (Tuva). Also I have seen one specimen, collected in 19th century, with the label “Sarepta”; in a strict sense this is a region on the southern side of Volgograd, but as far as I know sea-buckthorn does not grow here. In the former times this name sometimes was used for the wide region covering all the Lower Volga from Volgograd to the Caspian Sea and also some adjacent territories.

SIMILAR SYMPATRIC SPECIES. May be easily distinguished from other *Macropsis* species due to large size and peculiar coloration. From all species with narrow aedeagus



differs also in high number of additional teeth on 2nd valvulae and long distal part of aedeagus shaft.

NOTES. Identification of species is based on reinvestigation of holotype deposited in the Hungarian Natural History Museum (Budapest).

34. *Macropsis emeljanovi* Dubovskiy, 1966  
Figs. 774–805.

= *M. pseudomulsanti* Tishetshkin, 1993, **syn.n.**  
Dubovskiy, 1966: 90, 99–100, figs. 24, 5–8 (key, description, host plant);

Emeljanov, 1977 (as *M. mulsanti*): 125 (record from Mongolia);  
Vilbaste, 1980: 29 (record from Tuva);

Tishechkin, 1993: 55–57, 59–60, figs. 1, 1–3, 2, 4–6, 3, 1, 4–5, 8–9, 12–13 (original description of *M. pseudomulsanti*, comparison with related species, distribution).

NYMPH (Fig. 774). Pale-greenish or brown with two pairs of dark spots on face. Setose covering is very weakly developed, upper profile of abdomen is even.

MALE. From light emerald-green with only several small dark markings on face and pronotum (Figs. 775, 784) to light yellowish-brown with moderately or even strongly developed dark-brown or black pattern (Figs. 776–779, 785–786). Colour polymorphism has a pronounced geographical pattern: in northern part of the range (Western Siberia, Mongolia) brown form occurs, whereas in its southern part (mountains of Tadzhikistan) only green specimens are found. In material from intermediate populations (for instance, from mountains of southern and south-eastern Kazakhstan) a mixture of light-brown and greenish specimens presents.

Abdominal apodemes and genitalia are similar with these in *fuscula*-group (Figs. 791–798).

Body length 3.4–3.7 mm.

FEMALE. In external appearance and in geographic variation of coloration is similar with male, but dark pattern is less developed (green form — Figs. 780, 787, brown form Figs. 781–783, 788–790). 2nd valvulae are with 5–7 additional teeth (Figs. 799–800).

Body length 4.2–4.5 mm.

HOSTS. Sea-buckthorn (*Hippophae rhamnoides* L.).

ACOUSTIC SIGNALS (Figs. 801–805). Signals recordings were made in the following localities:

1. Southern Tuva, environs of Erzin Village, flood-plain of Ersin River, on *H. rhamnoides*. 31.VII.1989. Signals of 3 ♂♂ are recorded at 23°C under laboratory conditions.

2. Kazakhstan, Almaty, Botanical Garden, on *H. rhamnoides*. 28.VI.1994. Signals of 5 ♂♂ are recorded at 29–30°C under laboratory conditions.

As in the previous species, calling signal consists of short repeating fragments (syllables), but their temporal pattern is different. Syllables in signals of specimens from Kazakhstan are somewhat shorter (Figs. 803–804) than in specimens from Tuva (Fig. 805), but their temporal structure is identical.

RANGE. Mountains of Kazakhstan and Middle Asia, Southern Tuva (Western Siberia), Mongolia. Until now was not found on its host plant in Altai Mountains.

SIMILAR SYMPATRIC SPECIES. Green colour variation differs distinctly from all other *Macropsis* species with narrow aedeagus. Besides, it occurs only in mountains of Middle Asia. Brown form is somewhat similar with *M. mulsanti* (see the same item in the description of this species). From species from *fuscula*-group differs by the shape of black pattern on face and smaller size.

NOTES. Was described by Dubovskiy [1966] from Middle Asia basing on light-green colour form; later I described

the brown colour form from Tuva as *M. pseudomulsanti* [Tishechkin, 1993]. Investigation of material from different localities in Kazakhstan and Middle Asia, including analysis of male calling signals from southern Kazakhstan, revealed that these forms are only two extreme colour variations of the same species.

35. *Macropsis elaeagni* Emeljanov, 1964  
Figs. 806–834.

Dubovskiy, 1966: 90, 97, figs. 23, 12–15 (key, host plant);  
Zhantiev, Tishechkin, 1989: 474, fig. 2 (acoustic signals of specimens from population near Moscow).

NYMPH (Fig. 814). Very pale emerald-green, sometimes almost whitish, with dense setose covering throughout all the body surface. Upper profile of abdomen uneven, but not jagged.

MALE (Fig. 815). Pale emerald-green, sometimes somewhat greyish. Any dark pattern entirely absent. Tergal apodemes are wide, with subquadrate lobes sometimes slightly overlapping with each other (Figs. 817–820). Sternal apodemes are of similar shape, but not so wide and never overlapping (Figs. 817–820). Stem of aedeagus narrow (Figs. 821–824), pygofer appendages are straight or with ends somewhat bent backwards (Figs. 828–831). Styles are of typical shape (Figs. 825–827).

Body length 3.5–3.7 mm.

FEMALE. Same as male, but usually more pale, without greyish tinge (Figs. 816). 2nd valvulae are with 3–5 additional teeth (Figs. 832–834).

Body length 3.9–4.3 mm.

HOSTS. *Elaeagnus angustifolia* L. in European Russia, apparently, also on some other species of *Elaeagnus* in Kazakhstan and Middle Asia.

ACOUSTIC SIGNALS (Figs. 806–813). Signals recordings were made in the following localities:

1. Moscow, on ornamental trees of *E. angustifolia* in the park near the Moscow State University. 14, 24.VII.1998. Signals of 7 ♂♂ are recorded at 25 and 29°C under laboratory conditions.

2. Crimea, Kerchenskiy Peninsula, E shore of Kazantip-skiy Bay, Zolotoe Village, from cultivated *E. angustifolia*. 27.VI.1997. Signals of 5 ♂♂ are recorded at the temperature 30–31°C.

3. North-western Caucasus, 12 km S of Anapa, Sukko River, on *E. angustifolia*. 3.VII.1997. Signals of 5 ♂♂ are recorded at 27–28°C.

4. Northern Caucasus, Chechnya, Terskiy Mountain Ridge in the environs of Grozny Town. 19–22.VI.1986. Signals of 10 ♂♂ are recorded at the temperature 22–24°C.

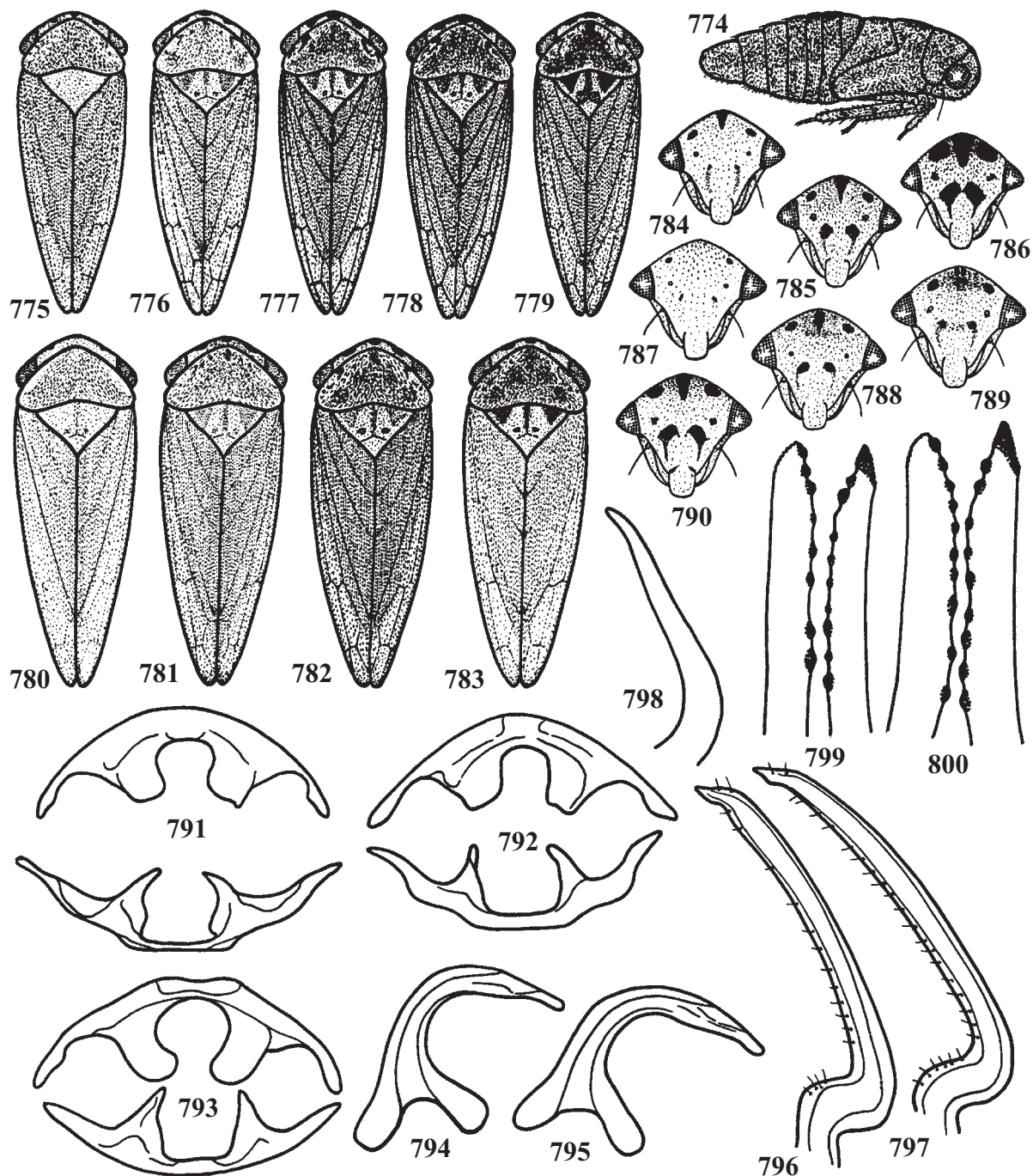
5. Southern Urals, Guberlya River near Guberlya railway station, 25 km W of Orsk, on *E. angustifolia*. 5.VII.1996. Signals of 5 ♂♂ are recorded at 25–30°C.

6. Kazakhstan, Almaty and foothills of Zailiyskiy Alatau Mountain Ridge in the environs of the city, *Elaeagnus* sp. 2.VII.1994. Calling signals of 5 ♂♂ are recorded at 31°C.

Calling signal consists of syllables, repeating with a period about 1.5–3 s. Occasionally a succession of more short syllables of another type precedes the main one. There is no any difference between signals of specimens from different localities.

RANGE. Southern Europe, including European part of Russia, Kazakhstan and Middle Asia. Recently was introduced far and wide outside natural range with ornamental trees of *E. angustifolia*.





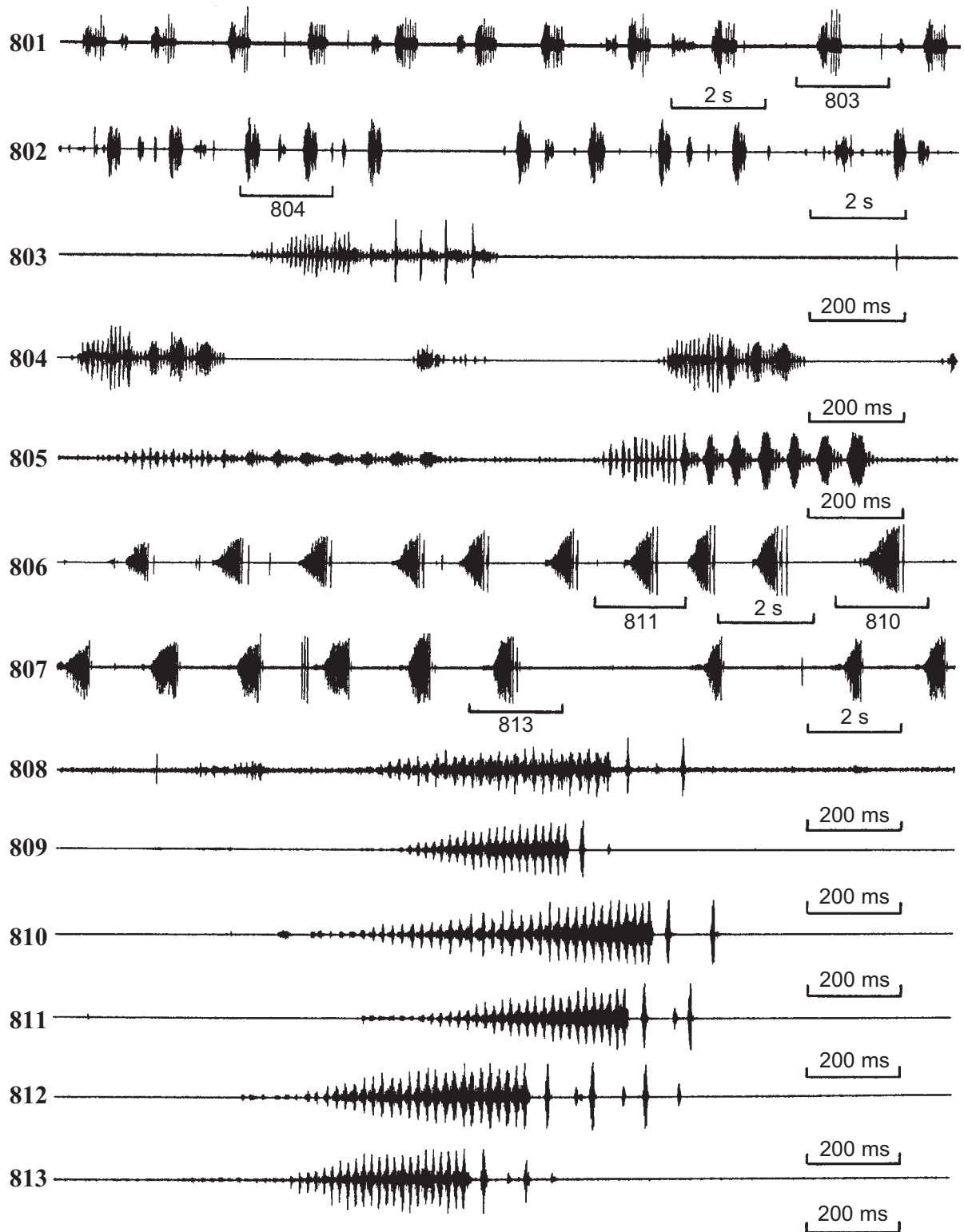
Figs. 774–800. *Macropsis emeljanovi* Dub.: 774 — nymph, 775–779 — ♂, dorsal view of a body, 780–783 — same, ♀, 784–786 — ♂, face, 787–790 — same, ♀, 791–793 — apodemes of 2nd ♂ abdominal segment, 794–795 — aedeagus, side view, 796–797 — stylus, 798 — pygofer appendage, 799–800 — 2nd valvulae of ovipositor.

Рис. 774–800. *Macropsis emeljanovi* Dub.: 774 — личинка, вид сбоку, 775–779 — ♂, вид сверху, 780–783 — то же, ♀, 784–786 — ♂, лицо, 787–790 — то же, ♀, 791–793 — аподемы 2-го брюшного сегмента ♂, 794–795 — эдеагус, вид сбоку, 796–797 — стилус, 798 — отросток доли пифофора, 799–800 — внутренние гонапофизы яйцеклада.

Material was studied from Moscow Area, Ukraine (including Crimea), North Caucasus, Lower Volga Region, South Urals, Kazakhstan and Kyrgyzstan.

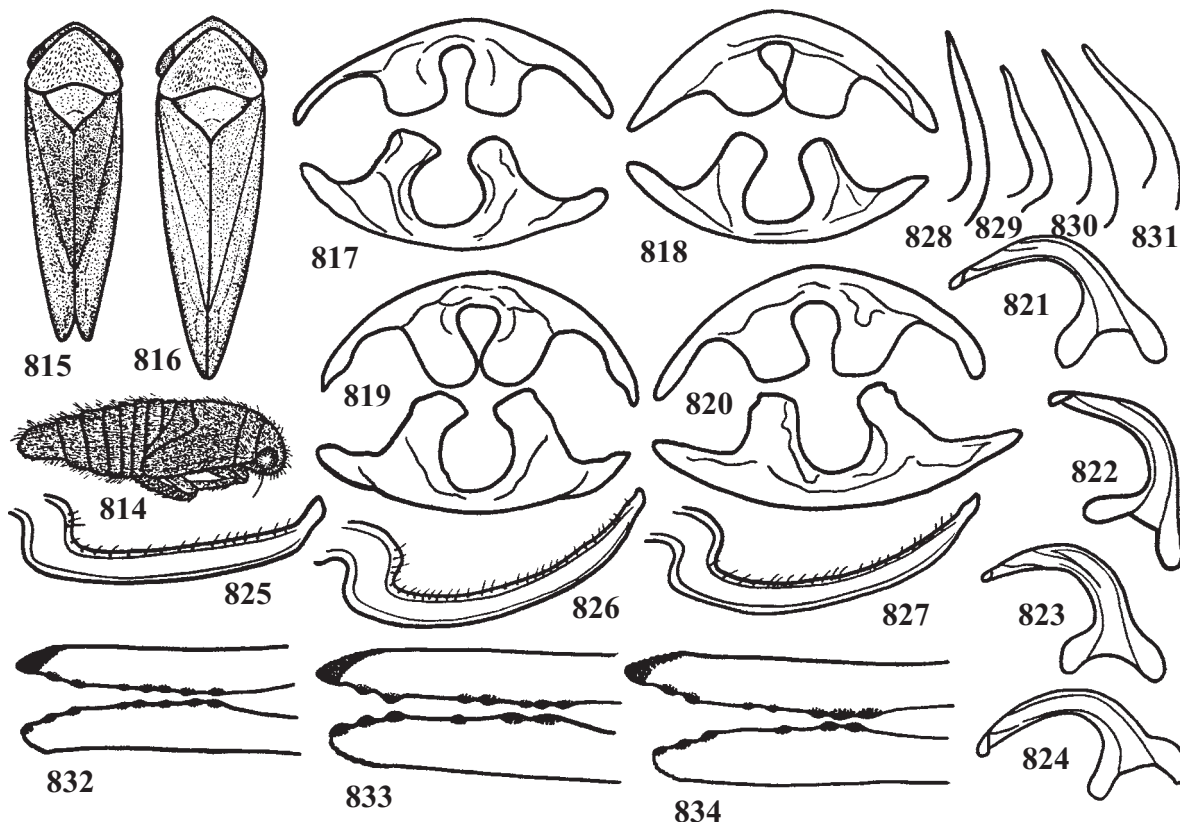
**SIMILAR SYMPATRIC SPECIES.** The only European specimen, dwelling on *E. angustifolia*. May be easily recognised due to small size and uniform very pale emerald-green

coloration, having exactly the same tinge as young twigs and underside of leaves of its host plant. From pale-coloured specimens of willow-dwelling *Macropsis* species differs by the narrow stem of aedeagus, from green form of *M. emeljanovi* — by more slender appearance and absence of any dark pattern on face and pronotum.



Figs. 801–813. Oscillograms of male calling signals of *Macropsis emeljanovi* Dub. (801–805) and *M. elaeagni* Em. (806–813). Faster oscillograms of the parts of signals indicated as “803–804”, “810–811” and “813” are given under the same numbers.

Рис. 801–813. Осциллограммы призывных сигналов самцов *Macropsis emeljanovi* Dub. (801–805) и *M. elaeagni* Em. (806–813). Фрагменты сигналов, помеченные цифрами “803–804”, “810–811” и “813”, представлены при большей скорости развертки на осциллограммах под такими же номерами.



Figs. 814–834. *Macropsis elaeagni* Em: 814 — nymph, 815 — ♂, dorsal view of a body, 816 — same, ♀, 817–820 — apodemes of 2nd ♂ abdominal segment, 821–824 — aedeagus, side view, 825–827 — stylus, 828–831 — pygofer appendage, 832–834 — 2nd valvulae of ovipositor.

Рис. 814–834. *Macropsis elaeagni* Em: 814 — личинка, вид сбоку, 815 — ♂, вид сверху, 816 — то же, ♀, 817–820 — аподемы 2-го брюшного сегмента ♂, 821–824 — эдеагус, вид сбоку, 825–827 — стилус, 828–831 — отросток доли пигофора, 832–834 — внутренние гоналофизы яйцеклада.

NOTES. Identification of species is based on reinvestigation of type series deposited in Zoological Institute of Russian Academy of Sciences (St. Petersburg).

Was erroneously listed under the name *Macropsis unicolor* Lindberg, 1926 (now *Hephathus unicolor* = *Hephathus freyi* (Fieber, 1868), see Tishechkin, 2000b) by certain authors (e.g. Dlabola, 1961, 1981, Linnavuori, 1962, 1965).

KEY FOR IDENTIFICATION OF THE SPECIES OF *MACROPSIS* FROM EUROPEAN RUSSIA AND ADJACENT TERRITORIES

Notes:

1. In most cases identification is possible only if both males and females are available. Due to the variability of dark pattern of face and dorsal side of a body and also of the shape of 2nd abdominal apodemes in males and 2nd valvulae in females for correct identification investigation of several specimens of each sex is advisable.

2. For correct interpretation of the characters used in the key collating with figures in all cases, when the references are given is necessary.

3. The numbers of species in the key corresponds to the ones in the description of species.

1. Shaft of aedeagus in a side view rather broad (for instance, as in Figs. 14, 104–106, 205–206), styles are with more or less pointed apices (for instance, as in Figs. 15, 25, 107).

- On willows and poplars ..... 15
- Shaft of aedeagus in a side view narrow (for instance, as in Figs. 551–552), if it is more or less broadened (Figs. 517, 694), than the apices of styles are rounded, usually with distinct lobes bent inwards (Figs. 518, 695). On different plants, but never on willows and poplars ..... 2
- 2. Small (♂ 3.5–3.7 mm, ♀ 3.9–4.3 mm) slender species with very pale uniform whitish-green coloration without any dark markings on head and pronotum. On *Elaeagnus angustifolia* ..... 35. *M. elaeagni* Em. — Coloration is different, if very rarely pale-green (in some colour forms of *M. emeljanovi*), than dark pattern on face and pronotum presents ..... 3
- 3. Fore wings in males are with even brown coloration, only margins allied to scutellum may be somewhat more darkened. Veins are of almost the same colour as a membrane. Females occasionally are also entirely green (one of the colour forms of *M. glandacea*) or green with brown margins of fore wings allied to scutellum (in *M. idae*, Fig. 654) ..... 4
- Membrane of fore wings is usually pale, translucent, only in strongly pigmented specimens is more or less darkened, veins are blackened and distinctly visible (as in Figs. 535–537, 611–612). In poorly pigmented specimens only main veins at the base of wings are darkened, or all veins are of the same colour as a membrane, but the latter in this case is pale-yellowish or translucent, not brown (as in Figs. 557, 566–569) ..... 7

4. Tergal apodems are rather short, with rounded lobes (Figs. 642–643, 655–657). 2nd valvulae are with 5–8, occasionally with 4 additional teeth. On *Rosa* spp. .... 5
- Tergal apodems are more long, usually, with lobes expanded at the ends (Figs. 676–678, 691–693). 2nd valvulae usually are with 2–3 additional teeth, occasionally one of the valvulae is with 4 additional teeth. On *Ulmus* spp. .... 6
5. 2nd valvulae are of usual shape, narrow (Figs. 650–651). Rather large species (body length 4.0–4.4 mm in male, 4.5–5.0 mm in female). Female in external appearance is similar with male (Figs. 640–641). Throughout all the territory studied ..... 28. *M. megerlei* (Fieb.)
- 2nd valvulae are wide (Figs. 662–663). Smaller species (body length up to 4.1 mm in male and up to 4.7 mm in female). Species with distinct sexual dimorphism (Figs. 653–654). Only in the extreme South-East of European Russia ..... 29. *M. idae* Em.
6. Tergal apodems usually are more or less long and narrow (Figs. 676–678), aedeagus is uniformly curved (Figs. 679–680). Males are always brown, females are brown or green ..... 30. *M. glandacea* (Fieb.)
- Tergal apodems usually are shorter and wider (Figs. 691–693). Aedeagus as a rule with shaft bending more angular. Both sexes are brown or light-brown ..... 31. *M. illota* (Horv.)
7. Small species, body length of male 3.2–3.4 mm, of female — 3.4–3.9 mm. Aedeagus is rather wide (Fig. 517). Apices of styles are with distinct lobes bent inwards (Fig. 518). 2nd valvulae are with 1–3 additional teeth each. On *Spiraea* spp. .... 22. *M. sibirica* Kuns.
- Larger. Aedeagus is more narrow. Apices of styles are pointed. 2nd valvulae are with more than 4 additional teeth ..... 8
8. 2nd valvulae are with 11–13 additional teeth (Fig. 758–759). Large species usually with two transverse brown stripes on fore wings which are more distinct in males (Figs. 745–746). On *Hippophae rhamnoides*. Only in the extreme South-East of European Russia and in Northern Caucasus ..... 33. *M. pictipes* (Horv.)
- 2nd valvulae are with 5–8 additional teeth. Fore wings sometimes are with dark spots around transverse veins, but without transverse stripes ..... 9
9. Fore wings are with brown spots around transverse veins (Figs. 727–729). All or several veins are brown (not black). On *Hippophae rhamnoides*, widespread on cultivated trees ..... 32. *M. mulsanti* (Fieb.)
- Fore wings are without brown spots around transverse veins. Veins are blackened or pale ..... 10
10. Frontal spot in most part of specimens is well-developed, widened upwards (Figs. 784–790). Rather small species (body length in male 3.4–3.7 mm, in female 4.2–4.5 mm) with pale-brown or green coloration and dark pattern (Figs. 775–783). On *Hippophae rhamnoides* in Kazakhstan, Middle Asia and Western Siberia; may be found in the extreme South-East of European Russia ... 34. *M. emeljanovi* Dub.
- Frontal spot is absent (in this case upper part of face sometimes is darkened) or has a shape of vertical double stroke ..... 11
11. Upper part of face is darkened (Fig. 610) or with vertical double stroke (Fig. 628). Sternalapodems as a rule are with tips distinctly bent inwards (Figs. 615–617, 632–634). More dark species (Figs. 611–612, 625–627) ..... 12
- Upper part of face is pale, without frontal spot (Figs. 542–547, 549–550, 558–559). Sternal apodems as a rule are with straight tips (Figs. 579–581, 587–589, 593). Usually more pale species (Figs. 535–541, 548, 556–557, 566–569) ... 13
12. Frontal spot has a shape of vertical double stroke, discoidal spots are of comma shape (Fig. 628). On *Rubus* spp. Western Europe, eastwards as far as Western Germany ..... 27. *M. scotti* Edw.
- Upper part of face is darkened, frontal spot is absent. Discoidal spots are shaped as ticks turned upside down (Fig. 610). On *Urtica dioica*. Throughout all the territory studied ..... 26. *M. scutellata* (Boh.)
13. Aedeagus with inner margin distinctly convex in proximal part (Figs. 570–571). Smaller: body length in male 3.9–4.1 mm, in female 4.4–4.9 mm. Until now is known only from Cyprus and N. Caucasus (Daghestan) ..... 25. *M. acrotirica* Dlab.
- Aedeagus with inner margin almost straight in proximal part (Figs. 551–552, 560–561). Larger: body length in male 4.0–4.5 mm, in female 4.5–5.0 mm ..... 14
14. Dark pattern on face, pronotum and scutellum is more strongly developed (Figs. 535–547). On *Rubus* spp., including *R. idaeus* L. .... 23. *M. fuscula* (Zett.)
- Dark pattern on face, pronotum and scutellum is less developed (Figs. 556–559). On *Rubus* spp., but not on *R. idaeus* L. .... 24. *M. brabantica* Wagn.
- 15(1). 2nd valvulae are with 1–2 additional teeth each, maximal number of additional teeth on both valvulae is 4 (2+2). On *Populus* spp. .... 16
- 2nd valvulae are at least with 2–3 additional teeth each, minimal number of additional teeth on both valvulae is 5 (2+3). On *Salix* spp. .... 18
16. Tergal apodems are rather narrow, with inner margins distinctly concave (Figs. 10–11). Usually with well-developed black pigmentation, especially, in males (Figs. 2–6). On aspen ..... 1. *M. fuscinervis* (Boh.)
- Tergal apodems are more wide (Figs. 55–57, 69–71). On poplars ..... 17
17. Ground coloration is pale-green or greyish, sometimes with more or less developed dark pattern (Figs. 61–67). Male abdominal apodems as in Figs. 69–71. On *Populus alba* L. .... 3. *M. vicina* (Horv.)
- Ground coloration is brown or green. Male abdominal apodems as in Figs. 55–57. On *P. nigra* L. .... 2. *M. graminea* (F.)
18. Both the fore part of the body and tegmina in males (and usually also in females) are brown, sometimes with any dark pattern (usually, transverse stripes or spots) .... 19
- Head, pronotum and scutellum both in male and in females are green; tegmina are also green or translucent with green veins. In some species pale yellowish colour variation with two longitudinal dark stripes on the dorsal side of the fore half of the body (Figs. 96, 127, 129–130, 152), or specimens with darkened fore wings (black with lightened costal margin in most strongly pigmented specimens, Figs. 93–94, 97–98, 326–327) associated with more numerous green ones also present ..... 24
19. Aedeagus is rather narrow and slender (Figs. 505–506). Males are brown with well-developed black pattern on face, pronotum and scutellum. Females are similar with males or green. On *Salix caprea* L. .... 21. *M. infuscata* (J.Sahlb.)
- Aedeagus is more wide (Figs. 381–382, 393, 428–429, 449, 479–480). Black pattern on face, pronotum and scutellum is either presents or absent ..... 20
20. 2nd valvulae are with more than 6 additional teeth. Black pattern on face, pronotum and scutellum as a rule is well-developed ..... 21
- 2nd valvulae are with 3–6 additional teeth. Black pattern on face, pronotum and scutellum as a rule is absent ..... 22



21. Smaller: body length in male 3.6–4.2 mm, in female 4.0–4.4 mm. Fore wings always without dark spots (Figs. 416–417). Black pattern on face is always well-developed (Fig. 415). On *S. repens* L., *S. rosmarinifolia* L. Throughout all the territory studied ..... 18. *M. impura* (Boh.), brown colour form. In steppe zone of Ukraine and European Russia also green one presents.
- Larger: body length in male 4.0–4.6 mm, in female 4.5–5.2 mm. Fore wings sometimes are with dark pattern (Fig. 433). Black spots on face sometimes are partly or entirely reduced (Figs. 434–439). On *Salix elaeagnos* Scop. Until now is known only from Bavaria ..... 19. *M. remanei* Nickel.
22. Tergal apodems are rather long, well-developed, with lobes narrowed and rounded at the tips (Figs. 375–377). Dark transverse stripes on fore wings as a rule present, strongly angular, M-shaped. On *Salix* spp. from section *Helix* (*S. purpurea* L., *S. vinogradovii* Skvortsov, *S. elbursensis* Boiss.) ..... 16. *M. haupti* Wagn.
- Tergal apodems are rather short, weakly developed (Figs. 475–476), or with lobes wide and somewhat angular at the tips (Figs. 387–389) ..... 23
23. Tergal apodems with lobes wide and somewhat angular at the tips (Figs. 387–389). Dark pattern on fore wings is absent. Monophagous on *S. alba* L. Until now is known only from Western Europe ..... 17. *M. najas* Nast.
- Tergal apodems are rather short, weakly developed, with tips more or less rounded, narrowed towards the ends (Figs. 475–476). Dark pattern on fore wings sometimes is more or less developed (Figs. 466–474). Polyphagous on various species of willows. Transpalearctic ..... 20. *M. cerea* Germ.
- 24(18) As a rule, 2nd valvulae are at least with 5–6 additional teeth each; number of teeth on both valvulae exceeds 10 (5+6 or more) ..... 25
- 2nd valvulae as a rule are with 4–5 additional teeth or less; number of teeth on both valvulae does not exceeds 9 (4+5 or less) ..... 30
25. 2nd tergal apodems are rather elongate, their length is approximately equal to their width at the base; sternal ones are with lobes strongly converging, almost touching each other (Figs. 100–103). On willows from the section *Helix* (*Salix purpurea* L., *S. vinogradovii* Skvortsov, etc.) ..... 4. *M. marginata* (H.-S.).
- 2nd tergal apodems are shorter than their width at the base, sternal ones are with tips separated by wide gap ..... 26
26. Pale-green, females occasionally with two transverse stripes on fore wings (Figs. 282–283). Styles with preapical part distinctly widened on inner margin (Figs. 292–294). 2nd valvulae with 10–12 additional teeth each. On *Salix viminalis* L. in Western Siberia, very locally in European Russia ..... 12. *M. microcera* Vilb.
- Bright-green with fore wings occasionally darkened. Styles with inner margin straight or concave before the apex. If on *S. viminalis*, then 2nd valvulae with less than 9 additional teeth each ..... 27
27. Aedeagus more wide and short (Figs. 337–338, 428–429). Sometimes with dark spots on face and crown. Smaller (body length in male 3.6–4.6 mm, in female — 4.0–4.5 mm) . 28
- Aedeagus more elongate and slender (Figs. 205–206, 220–221). Only frontal spot occasionally presents on crown. Larger (body length in male 4.4–5.0 mm, in female — 4.8–5.6 mm) ..... 29
28. Black pattern on face presents in almost all males. Usually not only frontal, but also any other spots are developed. 2nd valvulae with 7–9 additional teeth. Body length in male 3.6–4.2 mm, in female — 4.0–4.4 mm. On *Salix rosmarinifolia* L. in steppes of Ukraine and European Russia ..... 18. *M. impura* (Boh.), green colour form. In Western Europe and forest zone of Russia typical brown form occurs (see 21).
- Males usually lack black pattern on face and pronotum or have frontal spot only. Thyridial and discoidal spots are developed only occasionally in strongly pigmented specimens, occurring in several East-European populations. 2nd valvulae are with 5–7 additional teeth. Larger: body length in male 4.1–4.6 mm, in female — 4.3–5.1 mm. On *Salix cinerea* L. and *S. viminalis* L. throughout all the territory studied ..... 14. *M. prasina* (Boh.).
29. Tergal apodems are more or less triangular (Figs. 196–199), aedeagus is widest at the base or of the same width at the base and in the point of bending of the shaft (Figs. 205–206). 2nd valvulae are rather wide (Figs. 209–210). On *Salix triandra* L. .... 8. *M. viridinervis* Wagn.
- Tergal apodems are more or less rounded (Figs. 211–214), aedeagus is widest in the point of bending of the shaft (Figs. 220–221). 2nd valvulae are more narrow than in the previous species (Figs. 224–225). On *Salix acutifolia* Willd. .... 9. *M. verbae* Anufr., Zhiltz.
- 30(24). Tergal apodems are very long (Figs. 185–187). On *Salix alba* L. Northern Caucasus (Krasnodar Province, Chechnya) ..... 7. *M. vocalis* Tish.
- Tergal apodems are shorter, of usual length ..... 31
31. Pale-green with apices of tibiae and tips of apical tarsomers distinctly blackened, especially in males. Small species (body length in male 3.3–4.1 mm, in female — 4.4–4.8 mm). Western Siberia, Altai Mts., adjacent territories of Mongolia. On *Salix viminalis* L. ... 13. *M. tuvensis* Vilb.
- Usually bright-green with fore wings occasionally somewhat darkened. Apices of tibiae and tips of apical tarsomers not blackened ..... 32
32. Males usually with distinct frontal and thyridial spots (Fig. 133). Sternal apodems are wide, triangular (Figs. 141–143). On *Salix triandra* L., occasionally also on *S. fragilis* L. .... 5. *M. notata* (Proh.).
- Only frontal spot if any usually presents in males ..... 33
33. Tergal apodems wide, more or less rounded, occasionally with small denticle on each lobe (Figs. 241–243, 254–257). Rather small species (body length in male 3.5–4.3 mm, in female — 3.9–5.0 mm), occurring in Kazakhstan and in the extreme south-east of European Russia .... 34
- Tergal apodems either more elongate (Figs. 344–346) or rounded, but with inner margins of irregular shape (Figs. 175–179). European species ..... 35
34. Sternal apodems more or less uniformly narrowed towards the ends, with straight side margins (Figs. 254–257) .... 11. *M. tarbagataica* Mit.
- Sternal apodems with side margins more or less sinuate and with tips somewhat expanded (Figs. 241–243) ..... 12. *M. iliensis* Mit.
35. Tergal apodems are rather elongate (Figs. 344–346), sternal ones are usually with pointed tips (Figs. 347–350). On *Salix triandra* L. and *S. fragilis* L. .... 15. *M. gravesteini* Wagn.
- Tergal apodems are more short, with margins of irregular shape (Figs. 175–179), sternal ones with rounded tips (Figs. 180–184). On *Salix alba* L. .... 6. *M. ocellata* Prov.

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