ACADEMY OF SCIENCES OF THE USSR
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INSTITUTE OF BIOLOGY AND SOIL SCIENCES

KEYS TO THE INSECTS OF THE FAR EAST OF THE USSR

IN SIX VOLUMES

Volume II

HOMOPTERA AND HETEROPTERA

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INTRODUCTION TO THE ENGLISH TRANSLATION

This translation is purported for free distribution only, not for printing or purchase. It was ordered by the Systematic Entomology Laboratory, Research Service, U. S. Department of Agriculture, Washington, DC. The Cicadinea have been translated by Vera A. Richter, the Heteroptera by Lilyana I. Farka, and all other groups by A.V. Stekolshchikov. The layout is by Tatiana V. Dolnik. All the work was carried out under supervision of I.M. Kerzhner.

For convenience of users, the text is divided into the Title and Introduction, introductory text to Homoptera, and six separately paginated chapters corresponding to the major taxonomic subdivisions. Indices are separate to each chapter and attached at their ends. The original page numbers are given in brackets in bold face within the text of the translation; the indices refer to these original pages. The numeration of figures follows the Russian original work.

Information on the taxa occuring in the Russian Far East and their names is updated where possible. These updatings are given in { }. Footnotes, especially those containing holotype information, were usually inserted in the text.

Only the following abbreviations are used in the translation:

Amur. – Amur Province
C – Central (in distribution only)
Chuk. – Chukotka Autonomous District
E – Eastern
Kamch. – Kamchatka Peninsula
Khab. – Khabarovsk Territory
Koryak. – Koryak Autonomous District
Kur. – Kuril Islands
Mag. – Magadan Province
N – Northern
Prim. – Primorsk Territory
Prov. – Province
S – Southern
Sakh. – Sakhalin Island
W – Western

The names of veins are abbreviated as follows:

A – anal vein;
C – costal vein;
Cu – cubital vein;
CuA – anterior cubital vein;
CuP – posterior cubital vein;
M – medial vein;
pt – pterostigma;
R – radial vein;
RS – radial sector;
Sc – subcostal vein.

Roman numbers are used in the figures for segments, sternites, and tergites of abdomen.

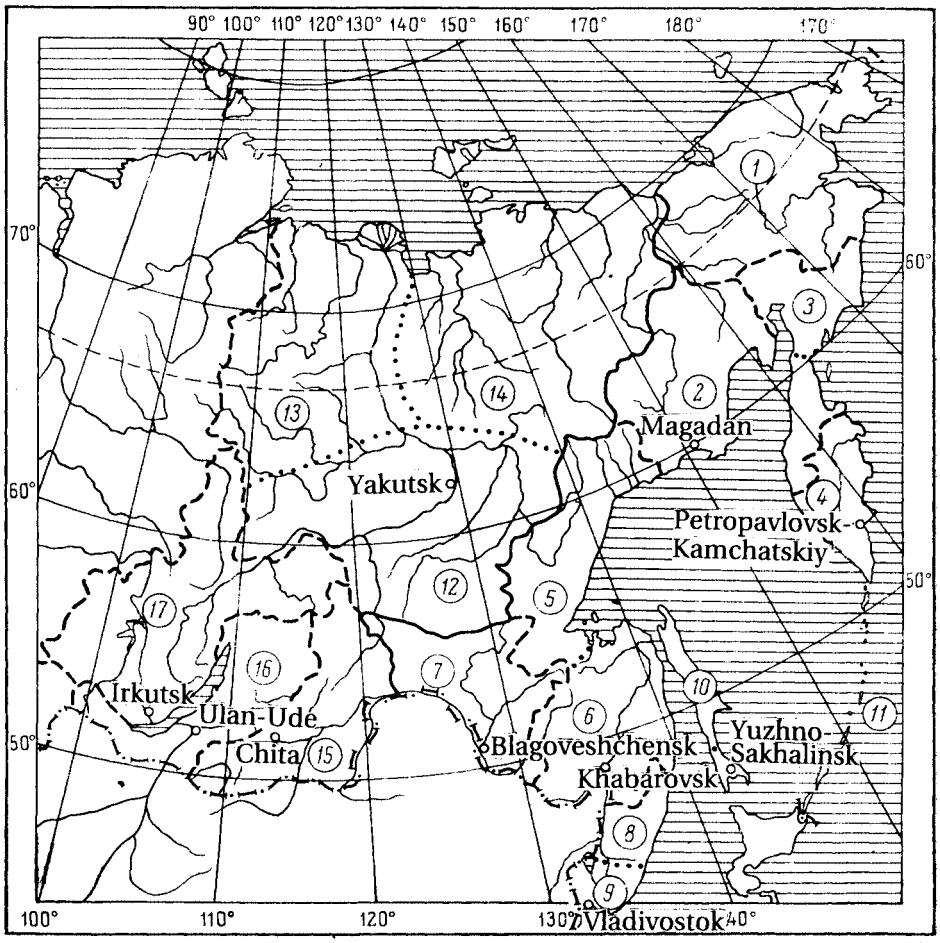
I.M. Kerzhner

INTRODUCTION

The 2nd volume of the "Keys to the insects of the Far East of the USSR" is the first attempt to summarize the information on two economically important orders of Hemimetabola: Homoptera and Heteroptera. All chapters of this book are original and written by specialists working on respective groups. The chapters on cicadellids and scale insects are based on recently published monographs (see References in these chapters), whereas the keys to cicadina other than cicadellids, to psyllids, white flies, aphids, and bugs are published for the first time and represent a result of many years of studies by the authors. The chapter on aphids is particularly worthy of note. Before the start of this work, only 120 species of aphids were recorded from the Far East of the USSR, but now more than 400 species are known. The information on the bug fauna has sufficiently changed in the last decade, 797 species are currently known. Most of insect species included in this volume develop on plants, many of them are important agricultural or forest pests and vectors of viral diseases of plants. Some bugs, especially of the families Nabidae and Anthocoridae, are useful predators.

The following specialists have taken part in preparation of this volume: G.A. Anufriev (Gor'ki State University) and A.F. Emeljanov (Zoological Institute, USSR Academy of Sciences, Leningrad) – suborder Cicadinea; Z.V. Konovalova (Institute of Biology and Soil Sciences, Far East Branch of the USSR Academy of Sciences, Vladivostok) – suborder Psyllinea; E.M. Danzig (Zoological Institute, USSR Academy of Sciences) – suborders Aleyrodinea and Coccinea; N.F. Pashtshenko (Institute of Biology and Soil Sciences, Far East Branch of the USSR Academy of Sciences) – suborder Aphidinea. The work on the families of Heteroptera was subdivided as follows: I.M. Kerzhner (Zoological Institute, USSR Academy of Sciences) – Dipsocoridae, Enicocephalidae, Microphysidae, Miridae, Nabidae, Anthocoridae, Cimicidae; E.V. Kanyukova (Institute of Biology and Soil Sciences, Far East Branch of the USSR Academy of Sciences) – Nepidae, Belostomatidae, Corixidae, Ochteridae, Naucoridae, Aphelocheiridae, Notonectidae, Pleidae, Mesoveliidae, Hebridae, Hydrometridae, Veliidae, Gerridae, Reduviidae, Aradidae, Piesmatidae, Berytidae, Pyrrhocoridae, Urostylidae, Plataspididae, Acanthosomatidae, Cydnidae, Scutelleridae, Pentatomidae; N.N. Vinokurov (Biological Institute, Yakutian Division of the Siberian Branch of the USSR Academy of Sciences, Yakutsk) – Saldidae, Lygaeidae; V.B. Golub (Voronezh State Pedagogical Institute) – Tingidae; G.P. Tshernova (Chuvash State Pedagogical Institute, Cheboksary) – Stenocephalidae, Coreidae, Rhopalidae.

The borders of the Far East and adjacent territories of the USSR, with their abbreviated names used in the text are shown in the map. Abbreviations (see respective lists) are used for some frequently occuring words and names of the authors of the genera and species. For most genera and families, the numbers of species in the World and the USSR faunas are given. The number of species in the Far East is given after description of each taxon. In the distributions, the Far East regions are listed first and followed (after semicolon) by adjacent and other territories of the USSR. The distribution in foreign countries is given at the end, after full stop and dash. The regions are listed in the following sequence: Chuk., Mag., Koryak., Kamch., Komandorskie Islands, Khab., Amur., Prim., Sakh., S Kur. (Kunashir); Yakutia, Chita Prov., Buryatia, Irkutsk Prov., Siberia, Kazakhstan, Middle Asia (Soviet Central Asia),



Map of the Far East and adjacent territories of the USSR.

1-11, Far East, i.e. territory of the USSR east of Yakutia and Chita Prov.: 1, 2, Magadan Prov.: 1, Chukotka Autonomous District (Chuk.), 2, remaining territory of the province (Mag.); 3, 4, Kamchatka Prov.: 3, Koryak Autonomous District (Koryak.), 4. Kamchatka Peninsula (Kamch.); 5, 6, Khabarovsk Territory: 5, north of the Tugur River (N Khab.), 6, south of the Tugur River (S Khab.); 7, Amur Prov. (Amur.); 8, 9, Primorsk Territory (Prim.): 8, north of the line lake Malaya Khanka – Rudnaya Pristan' (N Prim.) and south of the above line (S Prim.); 10, Sakhalin Island (Sakh.): north of Poyasok Isthmus (N Sakh.) and south of Poyasok Isthmus (S Sakh.); 11, Kuril Islands (Kur.): Paramushir, Shumshu and neighboring small islands (N Kur.), from Onekotan to Urup (C Kur.), and south of Urup (S Kur.); 12-17, territories adjacent to the Far East: 12-14, Yakutian SSR: south of Aldan and Vilyuy Rivers (S Yakutia), west of Verkhoyansk Range and north of Vilyuy River (W Yakutia), east of the Lena valley and north of Aldan River (E Yakutia); 15, 16, Transbaikal: 15, Chita Prov., 16, Buryat ASSR; 17, Irkutsk Prov.

Caucasus, European USSR. – Japan (Hokkaido, Honshu), Korean Peninsula, China (including Taiwan), Mongolia, Aghanistan, Iran, Asia anterior, W Europe, N Africa, N America, Philippines, SE Asia, India, Australia. If the species occurs in all regions of the Far East, "everywhere" is given in the distribution without listing of regions. Body sizes (except if noted otherwise) are given in millimetres ("mm" is omitted). Harmful species are marked with an asterisk (*). The names of vascular plants follow S.K. Cherepanov (Vascular plants of the USSR, Leningrad, 1981, 510 pp.).

The editorial work was subdivided among the members of the editorial board as follows: E.V. Kanyukova – Heteroptera, Aleyrodinea and Coccinea; Z.A. Konovalova – Psyllinea; S.Yu. Storozhenko – Cicadinea; A.S. Lelej – Aphidinea and general editing of the volume.

The editorial board is thankful to all authors for their work. In addition to the authors, artists O.V. Zvyagintseva, S.I. Karpov, N.E. Zakharova and T.G. Kuchina participated in making figures. M.M. Kazantseva helped in the work with the manuscript. The editors are thankful to all those who contributed to publication of this book.

A.S. Lelej

ABBREVIATIONS OF THE AUTHORS' NAMES

Aiz. – Aizenberg
Am. et Serv. – Amyot et Serville
Anufr. – Anufriev
Bal. – Balachowsky
Bär. – Bärensprung
B. d. F. – Boyer de Fonscolombe
Bergr. – Bergroth
Boh. – Boheman
Borchs. – Borchsenius
Buckt. – Buckton
Burm. – Burmeister
Car. – Carayon
C. B. – C. Börner
Chol. – Cholodkovsky
Ckll. – Cockerell
C. Sahlb. – C. Sahlberg
Curt. – Curtis
Dahlb. – Dahlbom
Dall. – Dallas
DeL. – DeLong
Dist. – Distant
Dlab. – Dlabola
Duf. – Dufour
Dwor. – Dworakowska
Edw. – Edwards
Em. – Emeljanov
E. Wagn. – E. Wagner
F. – Fabricius
Fall. – Fallén
Fieb. – Fieber
Fl. – Flor
Först. – Förster
Funkh. – Funkhouser
Geoffr. – Geoffroy
Germ. – Germar
Gill. – Gillette
Gmel. – Gmelin
Goot – van der Goot
Guér. – Guérin-Méneville
Guerc. – del Guercio
Gz. – Goeze(Goetze)
Hart. – Hartig
Heyd. – Heyden
Hob. – Hoberlandt
Hodk. – Hodkinson
Horv. – Horváth
Hpt. – Haupt
H. R. L. – Hille Ris Lambers
H.-S. – Herrich-Schäffer
Hung. – Hungerford
Hutch. – Hutchinson
Ish. – Ishihara
Iv. – Ivanovskaja
Jacz. – Jaczewski
Jak. – Jakovlev
Jos. – Josifov
J. Sahlb. – J. Sahlberg
Kalt. – Kaltenbach
Kbm. – Kirschbaum
Kby. – Kirby
Kerzh. – Kerzhner
Kir. – Kiritshenko
Kirk. – Kirkaldy
Klimasz. – Klimaszewski
Kol. – Kolenati
Konov. – Konovalova
Korm. – Kormilev
Kusn. – Kusnezov
Kuw. – Kuwayama
L. – Linnaeus
Lansb. – Lansbury
Lap. – Laporte de Castelnau
Latr. – Latreille
Lep. et Serv. – Lepeletier et Serville
Lest. – Leston
Leth. – Lethierry
Lindb. – Lindberg
Lndgr. – Lindinger
Lnv. – Linnavuori
Log. – Loginova
Lundbl. – Lundblad
MacG. – MacGillivray
Mam. – Mamontova
Mats. – Matsumura
M.-D. – Meyer-Dür
Mel. – Melichar
Metc. – Metcalf
Miy. – Miyamoto
Miyaz. – Miyazaki
Mont. – Montandon
Mordv. – Mordvilko
M. R. – Mulsant et Rey
Motsch. – Motschulsky
Nevs. – Nevsky
Newst. – Newstead
Ol. – Olivier
Osh. – Oshanin
Oss. – Ossiannilsson
Panz. – Panzer
Pass. – Passerini
Pér. – Péricart
Popp. – Poppius
Put. – Puton
Rem. – Remane
Reut. – Reuter
Rib. – Ribaut
R. Sahlb. – R. Sahlberg
Schell. – Schellenberg
Schill. – Schilling
Schumm. – Schummel
Scop. – Scopoli
Scudd. – Scudder

Seid. – Seidenstücker
Shap. – Shaposhnikov
Sign. – Signoret
Sir. – Siraiwa
Southw. – Southwood
Spin. – Spinola
Steph. – Stephens
Stich. – Stichel
Szeleg. – Szelegiewicz
Tam. – Tamanini
Targ. – Targioni-Tozzeetti
Terezn. – Tereznikova
Theob. – Theobald
Tullgr. – Tullgren
Uhl. – Uhler
Us. – Usinger
V. D. – Van Duzee
Vilb. – Vilbaste
Vin. – Vinokurov
Walk. – Walker
Wall. – Wallengren
Walt. – Walton
Westw. – Westwood
Will. – Williams
Wróbl. – Wróblewski
W. Wagn. – W. Wagner
Wyg. – Wygodzinsky
Zachv. – Zachvatkin
Zett. – Zetterstedt

[p. 495] 2. Suborder **PSYLLINEA – JUMPING PLANT LICE**

Z.A. Konovalova

Small sucking insects (1.2-5.8), closely related to Aleyrodinea, with right-angled anterior margin of the head, more or less filiform antennae, reduced longitudinal venation of the wings and saltatorial hind legs.

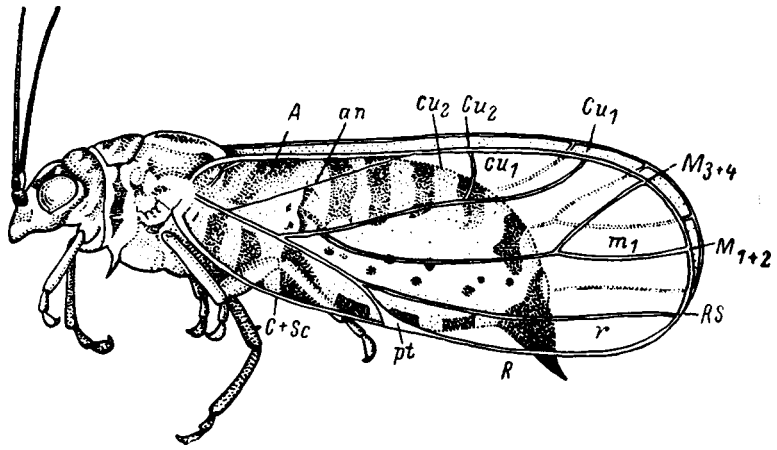


Fig. 395. Homoptera, Psyllinea. *Psylla mali*. (After Dobreanu and Manolache).

A, anal vein; *an*, anal suture; *C*, costal vein; *Cu*, cubital vein; cu_1, cu_2, 1st and 2nd cubital cells; *M*, medial vein; m_1, 1st medial cell; *pt*, pterostigma; *R*, radial vein; *r*, radial cell; *RS*, radial sector; *Sc*, subcostal vein.

Head (Figs. 396: 10-14) more or less separated from thorax, usually slanting ventrally, in the Liviidae porrect. Vertex triangular or rectangular, divided by the coronal suture into halves. The ratio of length of vertex to its breadth is used as a diagnostic character. Head with 2 large eyes and 3 ocelli. The compound eyes are usually spherical; [**p. 496**] the compound eyes of Liviidae are more or less flat, not projecting laterally beyond the margin of the postorbital ridges (Fig. 396: 15), which border them posteriorly and ventrally. Two ocelli in the posterior angles of the vertex or at the sides; a 3rd ocellus at the apex of the coronal suture or on the small frontal sclerite, which lies between the genae or is covered completely by the anterior processes of the genae, the genal cones. The degree of development of the genal cones, their size and form are important diagnostic characters. The places of attachment of antennae to the head are called sockets. Antennae usually 10-segmented (rarely 8- or 9-segmented), first 2 segments always thicker than the others, including the flagellum (Figs. 396: 5-9); the 10th segment bears 2 bristles of different size; 3rd segment usually the longest (2nd segment the longest only in Liviidae); apex of several segments (4th to 9th) with olfactory pits (rhinaria) (Figs. 397: 7, 9). Clypeus containing the suctorial musculature, more or less inflated, sometimes produced anteriorly into a conical or clavate process (in *Aphalara*, *Craspedolepta*) (Figs. 396: 2; 400: 5); in species with genal cones, clypeus not visible.

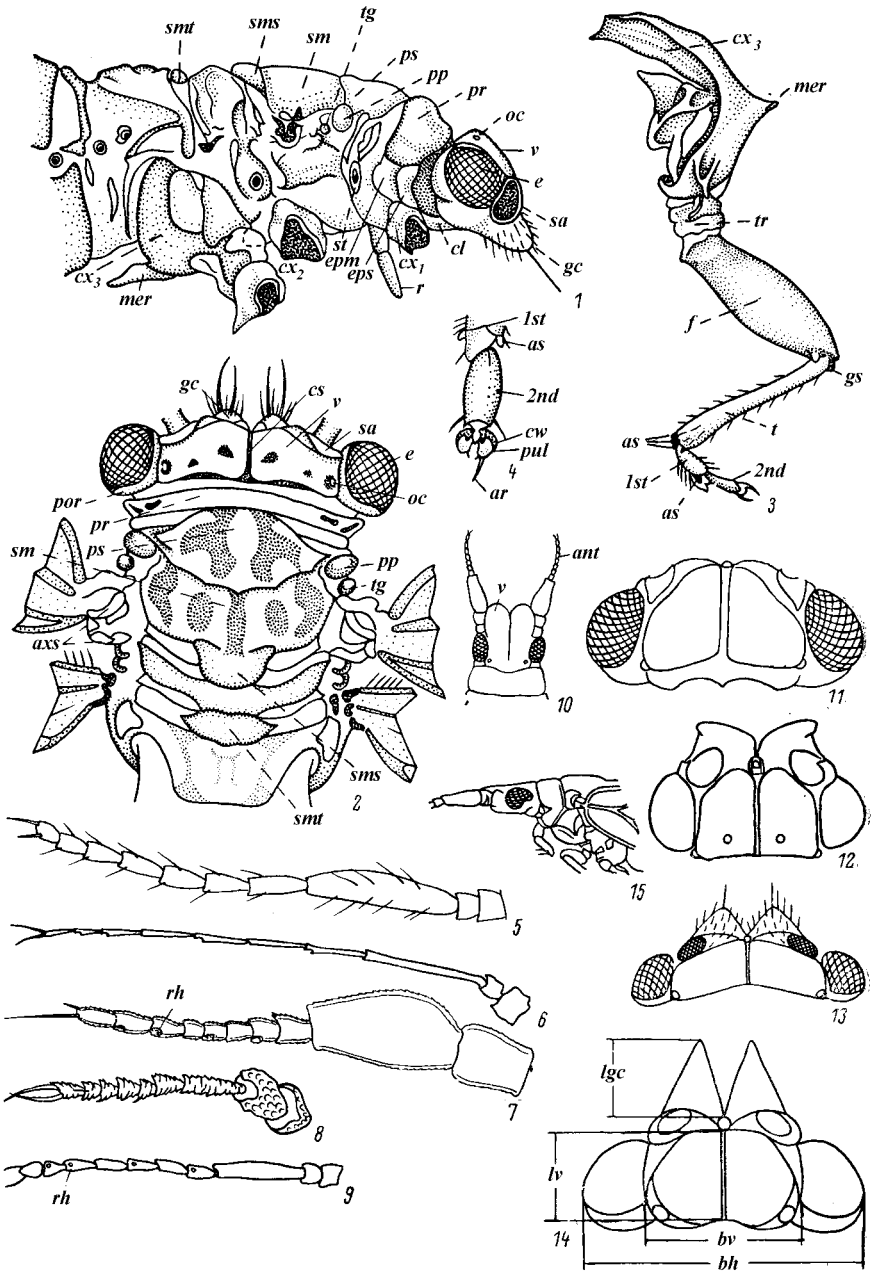


Fig. 396. Homoptera, Psyllinea. (After Vondracek, Haupt, Loginova, and original).

1, 2, *Arytaina genistae* Latr., head and thorax: 1, lateral; 2, dorsal; 3, 4, *Psylla mali*: 3, hind leg; 4, hind tarsus; 5-9, antenna: 5, *Eotrioza ussuriensis*; 6, *Amblyrhina maculata* Löw; 7, *Livia juncorum*; 8, *Calophya nigridorsalis*; 9, *Bactericera perrisi* Put.; 10-13, head, dorsal: 10, *L. juncorum*; 11, *Aphalara polygoni*; 12, *C. nigridorsalis*; 13, *Psylla foersteri*; 14, measurements of parts of head; 15, *L. juncorum*, head and thorax, lateral. *ant,* antenna; *ar*, arolium; *as*, apical spurs; *axs*, axillary sclerites; *bh*, breadth of head; *bv*, breadth of vertex; *cl*, clypeus; *cs*, coronal suture; *cw*, claws; cx_1, cx_2, and cx_3, coxae of fore, middle and hind leg; *e*, eye; *epm*, epimeron of prothorax; *eps*, episternum of prothorax; *f*, femur; *gc*, genal cone; *gs*, genual spurs; *lgc*, length of genal cone; *lv*, length of vertex; *mer*, meracantha; *oc*, ocellus; *por*, postorbital ridge; *pp*, parapteron; *pr*, prothorax; *ps*, praescutum; *pul*, pulvilli; *r*, rostrum; *rh*, rhinarium; *sa*, socket of antennae; *sm*, scutum of mesothorax; *sms*, scutellum of mesothorax; *smt*, scutellum of metanotum; *st*, stigma; *t*, tibia; *tg*, tegula; *tr*, trochanter; *v*, vertex; *1st*, *2nd*, segments of tarsus.

Structure of clypeus is used as an important diagnostic character in *Aphalara*, *Craspedolepta* and *Eurotica* Log., the latter not recorded from the Far East. Rostrum 3-segmented, lying between fore femora.

Mesothorax well developed. The following characters are of great diagnostic importance: form and structure of pleurites (epimeron and episternum of prothorax), size and shape of parapteron and tegula, and development of axillary sclerites of fore wings (Fig. 396: 2). All 3 pairs of legs of similar structure, but the hind legs are saltatorial, better developed, and their structure is of great diagnostic importance (Fig. 396: 3). The hind coxae usually bear a small posterior process – the meracantha – supporting the insect during leaps. Basis of tibiae sometimes provided with genual process; apex of tibiae widened, usually with apical spurs (Fig. 396: 3); the number, formula and arrangement of the apical spurs are used for the diagnosis of genera. Tarsi 2-segmented; the 2nd tarsal segment ends in a pair of claws and bears a setaceous empodium and a broad arolium (Fig. 396: 4).

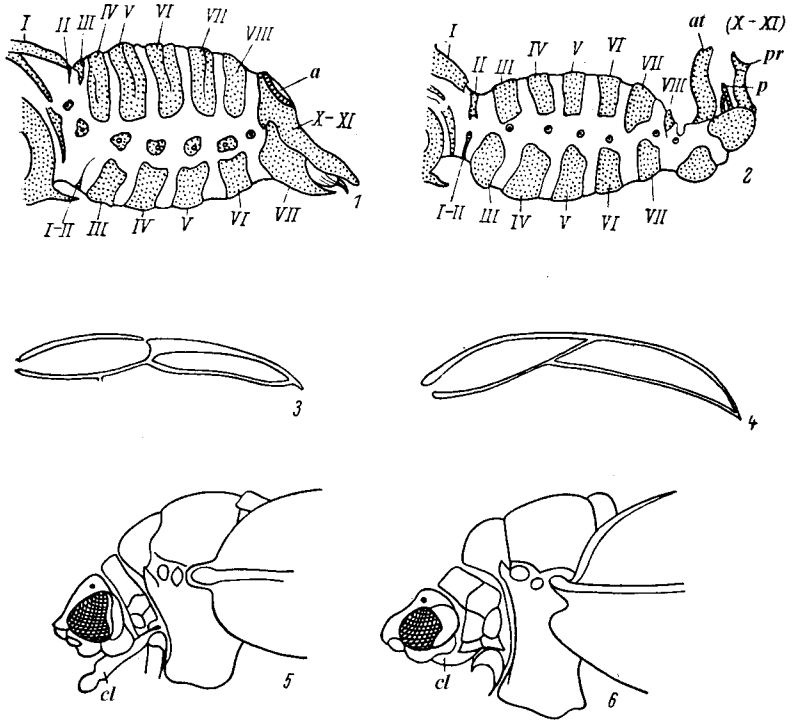


Fig. 397. Homoptera, Psyllinea. (After Vondracek).

1, 2, *Arytaina genistae*, abdomen, lateral: 1, female; 2, male; 3, 4, pterostigma: 3, *Psylla colorata* Löw; 4, *P. fusca* Zett.; 5, 6, anterior part of body, lateral: 5, *Aphalara maculipennis*; 6, *Craspedolepta innoxia* Först. *a*, anus with ring of pores of wax glands; *at*, anal tube; *cl*, clypeus; *p*, penis; *pr*, parameres; *I-XI*, abdominal segments.

Venation of fore and hind wings similar; fore wings markedly better developed than hind wings; fore and hind wings are folded at rest in a rooflike manner (Fig. 395). Fore wings with pattern of different form and richness of color, leathery, thick or more frequently membranous, their margin surrounded by the ambient vein, which is formed by ends of costa and other veins turned back. Venation reduced, longitudinal (Fig. 395); *C+R+M+Cu* fused into a common stem, branching into 2 veins, *C+R* and *M+Cu*; M branching from *M+Cu* (Psyllid type of venation); in Triozidae, one point of the above common stem gives off 3 veins **[p. 498]** (Triozid type of venation) or 2 veins, but *M* is not connected with *Cu*. The name of the cells is derived from the veins

forming their anterior margin; cell Cu_2 is divided by the anal suture; A_1 with a gap at end of anal suture; this gap is very close to the apex of Cu_2 in Liviidae and Aphalaridae, at a slight distance from the apex of Cu_2 in Psyllidae and almost in the middle of the anal vein in Triozidae. Fore wings of *Camarotoscena personata* with nodal (transverse) fold (Fig. 400: 10) between costal and cubital break. The costal vein (Figs. 400: 3; 408: 1; 410: 1-5) also often shows a break before the pterostigma. Pterostigma not always present, sometimes indicated by a thickening of veins at the costal margin and *R* (Figs. 397: 3, 4) or consisting of a very leathery, thick membrane. Fore wings with distinct clavus (Fig. 405: 8). Dorsal and ventral side of membrane of fore wings often covered with minute spinules rarely visible to the naked eye. Groups of marginal spinules present at apex of cells (more often m_1, m_2, cu_1) at the apical margin of the fore wings (Figs. 421: 5; 424: 1, 9); the density and arrangement of surface and marginal spinules are very important diagnostic characters of species of Psyllidae. Venation of hind wings faintly marked. During flight both pairs of wings are coupled by hooklike bristles on *C+Sc* of hind wings locking with the ventrally folded margin of the clavus of fore wings. Psyllids as a rule do not fly well.

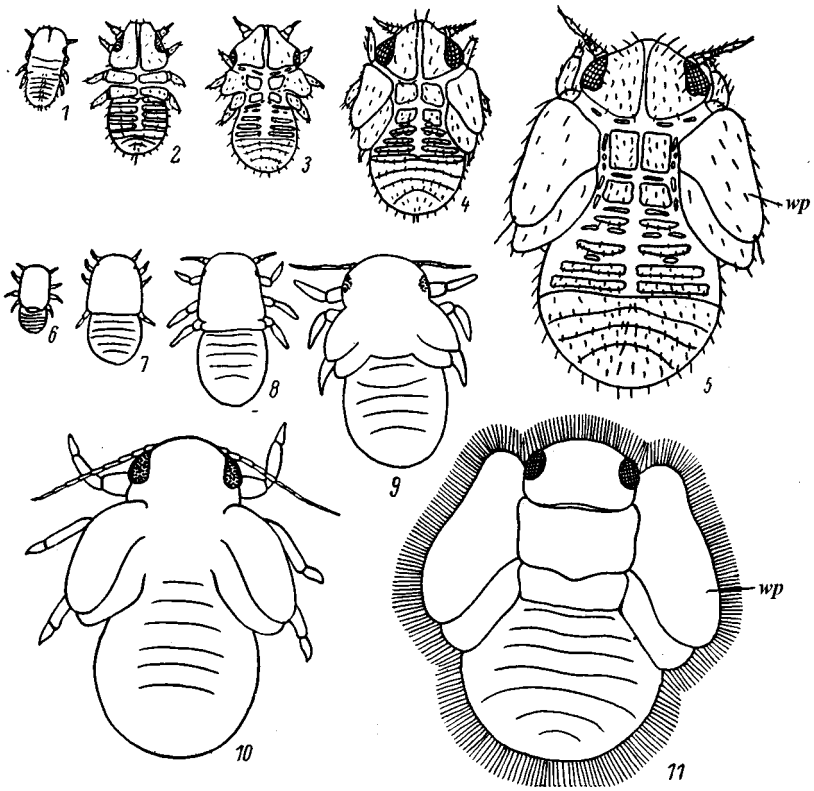


Fig. 398. Homoptera, Psyllinea. Nymphs of different instars. (After Vondracek and Schreiner).

1-5, *Aphalara polygoni*, 1st-5th instars; 6-10, *Psylla mali*, 1st-5th instars; 11, *Trioza remota*, 5th instar. *wp*, wingpads.

Abdominal sclerites I and II markedly reduced or lost. Tergites III-VIII and sternites III-VIII are well developed in the female; tergites X and XI form the anal segment; sternite VII forms the genital segment; the anus is usually surrounded by a ring consisting of 2 or more rows of pores of wax glands (Fig. 397: 1). Tergites II-VIII and sternites III-VIII are well developed in the male; tergite IX forms the genital segment (called hypandrium by some authors); tergites X and XI form the anal tube

(proctiger), which bears the anus at the apex (Fig. 397: 2). The genital segment of the male [**p. 499**] bears the genital forceps (parameres) of varying form and structure and a 2-segmented penis; apex of penis widened, with specific structure, usually with a tubular process dorsally; the ejaculatory duct opens at the apex of this process.

Reproduction is usually bisexual; parthenogenesis detected in arctic species (Hodkinson, 1978). Larvae (nymphs) have 5 instars; the larvae possess wingpads and compound eyes already from the 1st instar (Fig. 398: 10). The larvae do not resemble the imagines, their body is dorsoventrally flattened; body size and the number of antennal segments increases at each instar. The systematics of the nymphal stages have not been worked out. However, different families of Psyllinea are known to have nymphs of specific structure: Psyllid type in Psyllidae (Figs. 398: 6-10), Triozid type in Triozidae (Fig. 398: 11).

All Psyllinea are phytophagous: mono- or oligophagous. Usually they reproduce in large numbers, often living in colonies during the larval stage, but sometimes living singly. Many species living openly, but sometimes larvae form galls on the stems, leaves and inflorescenses of host-plant. Some Psyllinea transmit viral diseases.

The harm Psyllinea cause in agriculture and forestry is not sufficiently known. The well-known pests of fruit trees are the pear psylla and the apple psylla. Some other species are injurious to forest trees.

The present key is based mainly on characters recognizable with the binocular microscope. However, the making of slides is often necessary for diagnostics of closely related species. For this purpose the specimens are kept in a 10% solution of KOH [**p. 500**] until the soft tissues are dissolved; they are then rinsed 2 or 3 times in distilled water, passed through 40% (60 min.), 75% (45 min.) and 96% (5 min.) alcohol and cleared in oil of cloves.

After clearing specimen or its parts are transferred in drop of Canada balsam on a slide and covered with a cover glass.

The systematics of the group is insufficiently known. There exist about 2000 species; about 500 species occur in the USSR. – 14 genera, more than 160 species (132 species are included in the keys). {The family classification of Psyllinea is now reconsidered: Liviidae and Aphalaridae are included in Psyllidae and *Calophya* placed in the family Calophyidae}.

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KEY TO FAMILIES

1. Vertex markedly longer than broad at posterior margin; a supplementary wart-shaped sensory organ present anterior to each eye; eyes flattened, small, not projecting beyond lateral margins of postorbital ridges; 2nd antennal segment thickest and longest (Figs. 396: 7, 10, 15). Tegulae large, in the form of a flattened pentagon; no axillary sclerites in fore wings (Fig. 396: 15) ..... 1. **Liviidae** (p. 501)
– Vertex shorter than broad at posterior margin; no supplementary sensory organ anterior to eyes; eyes convex, more or less spherical, projecting beyond lateral margins of postorbital ridges. 2nd antennal segment narrower than 1st and shorter than 3rd segment (Fig. 396: 9). Tegulae usually in the form of a small rounded tubercle; axillary sclerites present (Figs. 395: 1, 2) 2
2. Genal cones absent; frons in form of small sclerite, usually at anterior or ventral surface of head; unpaired ocellus on apex of frons, not always visible in dorsal view. Antennae often little longer than breadth of head, not filiform..... ..... 2. **Aphalaridae** (p. 559)
– Genae forming anteriorly inflated ridges or usually produced into 2 conical [**p. 501**] processes (genal cones), projecting anteriorly or ventrally slanting; frons enclosed between the genal cones, as a rule not visible in dorsal view 3
3. Apex of fore wings more or less broadly rounded, but not angular; pterostigma always present. Only two veins (*C+R* and *M+Cu*) branching from base of fore wings; *M* has a common stem with *Cu*, branching from this (Psyllid type of venation). Costal vein usually with break; break in anal vein slightly before apex of Cu_2. Cross section of antennae round, antennae without long bristles..... 3. **Psyllidae** (p. 515)
– Apex of fore wings more or less acute-angled; pterostigma absent. All 3 veins (*R*, *M* and *Cu*) usually begin at one point at the base of fore wings (Triozid type of venation), or *M* branches from *R*, and is not connected with *Cu* (Figs. 421: 1, 5). Costal vein without break; break of anal vein in its middle ..... 4. **Triozidae** (p. 532)

1. Family **LIVIIDAE**

Slender, with more or less flat body and porrect head. Vertex little depressed, protruding anteriorly in 2 lobes, with a more or less deep, acute-angled notch in the middle; vertex longer than broad at posterior margin. Eyes small; a supplementary sensory organ in the form of a small tubercle anterior to each eye. 2nd antennal segment longer and broader than the other segments. Fore wings thick, leathery, usually with coral-like pattern. In humid habitats, on *Juncus* and *Carex*. In the USSR 1 genus.

KEY TO SPECIES OF FAMILY LIVIIDAE

1. **Livia** Latr. Anterior margin of vertex with notch; anterior lobes of vertex narrowly rounded and only partly covering the 1st antennal segment; 2nd antennal segment the longest, convex-cylindrical, almost twice as long as 1st segment, 0.66 times as long as segments 3-10 combined (Figs. 396: 7, 10, 15). Fore wings more or less oval, narrower at apex than at base, broadest in the middle; pterostigma formed by markedly thickened veins (*C+Sc* and *R*). Widely distributed; rises high in the mountains. – 4 species (in USSR 6 species).

1. Notch of anterior margin of vertex deep. – Anterior lobes of vertex triangular blade-shaped (Fig. 396: 10). Fore wings yellow, almost opaque, with pattern, narrowly rounded at apex, their maximum width 0.5-0.66 times the length of wings. (Figs. 399: 2-5). 2.5-3.2. – Everywhere. – Palearctic. – Producing galls. {Junior synonym of *L. junci* Schrank} ..... **L. juncorum** Latr.

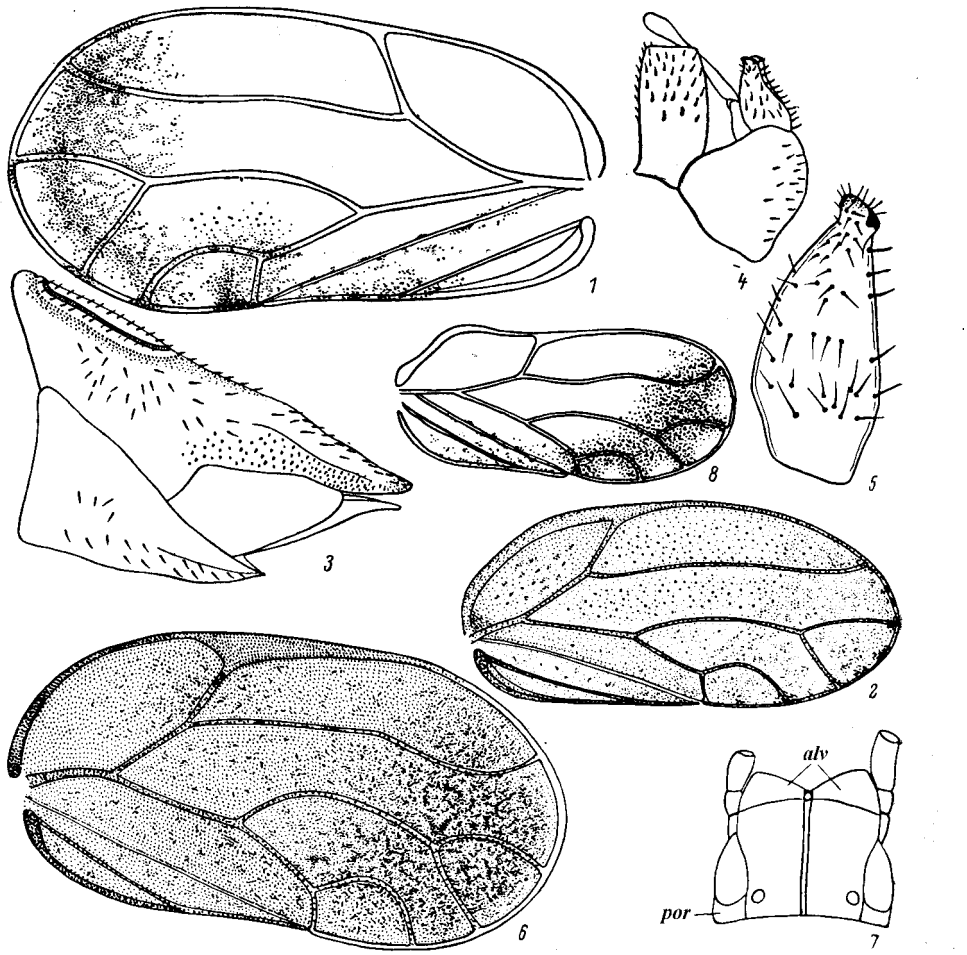


Fig. 399. Homoptera, Psyllinea. Fam. Liviidae. (After Vondracek, Kuwayama, Loginova, and original).

1, *Livia livioides*, fore wing; 2-5, *L. juncorum*: 2, fore wing; 3, 4, genitalia, lateral (3, female; 4, male); 5, paramere, inner view; 6, 7, *L. rufipennis*: 6, fore wing; 7, head, dorsal; 8, *L. jezoensis*, fore wing. *alv*, anterior lobes of vertex; *por*, postorbital ridge.

– Notch of anterior margin of vertex not deep 2

2. Anterior lobes of vertex triangular blade-shaped, with apices shifted to antennae. Inner margin of 2nd antennal segment not strongly swollen. (Fig. 399: 8). 2.7-2.9. – Prim. – Japan, Korea, China. {Valid name: *L. jesoensis* Mats.} .... **L. jezoensis** Kuw.

– Anterior lobes of vertex of another shape. Inner margin of 2nd antennal segment stronger swollen 3

3. Anterior lobes of vertex oval, blade-shaped. 2nd antennal segment cylindrical. Fore wings leathery, yellowish, with broad brown edging at apical margin around anal suture in cell Cu_2 (Fig. 399: 1). 2.3-2.65. – Amur., Prim. {Junior synonym of *L. jesoensis* Mats.} ..... **L. livioides** Log.

– Anterior lobes of vertex broadly blade-shaped, rounded, their lateral margins raised so that apical half of vertex trough-shaped. 2nd antennal segment barrel-shaped. Fore wings strongly [**p. 502**] leathery, ochre, with pattern consisting of coral-like branching brown spots scattered all over the wings (Figs. 399: 6, 7). 2.85-3.3. – Amur., Prim. ..... **L. rufipennis** Log.

2. Family **APHALARIDAE**

Thickset; head short, adpressed to thick thorax; pronotum broad, flat, forming level passage between head and thorax. Genal cones absent; genae more or less rounded towards anterior margin of vertex, smoothly passing into it. Antennae short, not filiform; segments of flagellum broader at apex than at base. Fore wings frequently thick, leathery, usually with pattern; break on costal vein present; break on anal vein at apex of Cu_2. Apex of hind tibiae with 5-14 saltatorial spines; 1st tarsal segment with 2 spines (except genus *Camarotoscena*). In the subfamily Aphalarinae, posterior margin of anal tube with long horizontal processes. On trees and herbs. Generally of desert or steppe origin. – 6 genera, 40 species (in the USSR 88 species). [**p. 503**]

KEY TO GENERA

1. Posterior margin of anal tube without processes 2
– Posterior margin of anal tube with long processes 4
2. Fore wings more or less rhomboidal, membranous 3
– Fore wings oblong-oval, their apical margin slanting posteriad to Cu_2, with more or less parallel veins, nodal line, and long membranous pterostigma; pattern on wings developed (Fig. 400: 10) ..... 3. **Camarotoscena**
3. Head markedly narrower than thorax. Fore wings widened to apical third; apical margin of wings broadly rounded; pterostigma narrow. Female genitalia short, wedge-shaped; anal tube of male S-shaped, not widened apically (Figs. 400: 14, 15) ..... 2. **Syringilla**
– Width of head equals to or greater than width of thorax. Fore wings even at apices; pterostigma indistinct; *R* distant from costal margin. Female genitalia narrow, strongly stretched; anal tube of male simple (Figs. 400: 17, 18) ..... 1. **Ligustrinia**
4. Fore wings strongly widened to apical third (where they are twice as broad as at bases), thick, whitish, with brown pattern. Veins rib-shaped, with dark mark ..... 4. **Epheloscyta**
– Fore wings oblong-oval, not strongly widened to apices. Veins not rib-shaped. 5
5. Clypeus long, conically inflated anteriorly, reaching anterior margin of head (Fig. 397: 5). Vertex distinctly angular anteriorly, divided from genae by narrow grooves; genae forming tubercles ventral to antennal sockets ..... 5. **Aphalara**
– Clypeus short, pillow-shaped, not markedly projecting from genae (Fig. 397: 6). Vertex with little-developed anterior lobes, passing imperceptibly into the uniformly convex genae ..... 6. **Craspedolepta**

KEY TO SPECIES OF FAMILY APHALARIDAE

1. **Ligustrinia** Log. Head concave posteriorly. Vertex less than half as long as broad, not forming lobes anteriorly, passing into narrow flat genae without sharp border. Fore wings rhomboidal, slightly swollen. – 1 species.

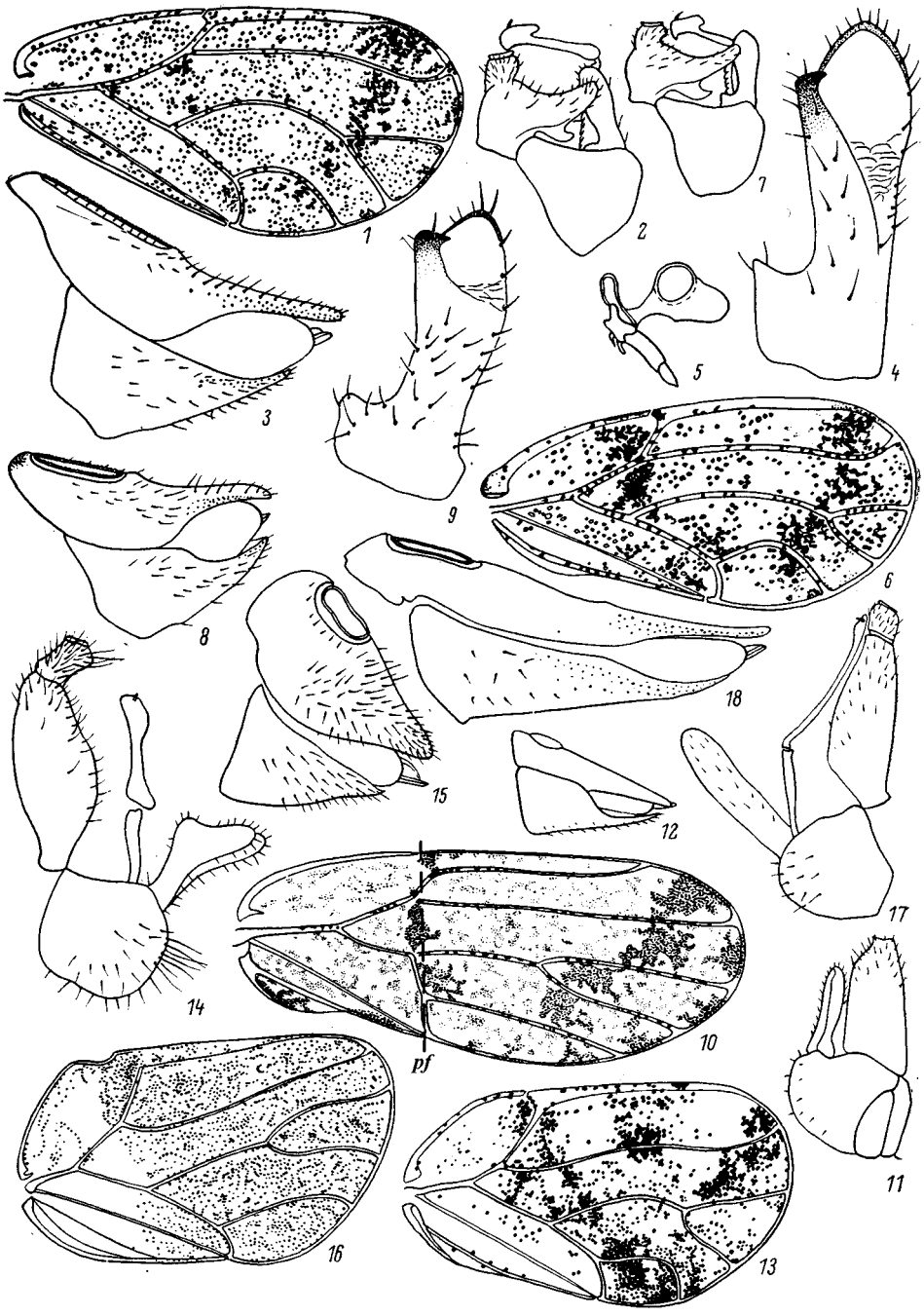


Fig. 400. Homoptera, Psyllinea. Fam. Aphalaridae. (After Loginova).

1-5, *Epheloscyta sancta*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, paramere, inner view; 5, clypeus and rostrum, lateral; 6-9, *E. kalopanacis*: 6, fore wing; 7, 8, genitalia, lateral (7, male; 8, female); 9, paramere, inner view; 10-12, *Camarotoscena personata*: 10, fore wing; 11, 12, genitalia, lateral (11, male; 12, female); 13-15, *Syringilla humerosa*: 13, fore wing; 14, 15, genitalia, lateral (14, male; 15, female); 16-18, *Ligustrinia herculeana*: 16, fore wing; 17, 18, genitalia, lateral (17, male; 18, female). *pf*, nodal (transverse) fold.

1. Basic background of body green-orange; head and thorax dorsally, and also femora and tibiae with small (brown to black) spots. Fore wings yellow-orange with dense brown spots. Veins reddish or orange. Postorbital ridges narrow, not curved outward. Antennae thin, a little longer than half of head width. Fore wings rhomboidal, in male with anterior apical angle strongly drawn, with parallel anterior and posterior margins. Pterostigma broad, not distinctly outlined, so that *R* along inner margin of pterostigma not always visible. Veins slightly sinuous. Cell cu_1 long, area of cu_1 greater than area of m_1. Female genitalia very long; parameres of male high, long-triangular. (Figs. 400: 16-18). 3-4. – Prim. – On *Syringa amurensis* and *Fraxinus rhynchophylla*, usually in mass. Very injurious ..... ***L. herculeana** Log.

2. **Syringilla** Log. Eyes not extending beyond the posterior margin of vertex, with broad postorbital ridges, which form laterally processes covering propleurites. Vertex with transverse tooth in posterior third, convex along posterior margin, with sharp border between vertex and flat genae anteriorly. – 1 species.

1. Basic background of body from greenish to dirty orange-yellow; head and thorax dorsally, and sometimes femora with small dark brown spots. Fore wings widest in apical third; apical margin of wings broadly rounded; their anterior and posterior margins not parallel. Pterostigma narrow; Cu_1 [**p. 505**] steeply curved to marginal vein, so that cell of cu_1 distinctly less than cell of m_1. Apex of hind tibia slightly widened, usually with 10 saltatorial spines. Female genitalia broadly wedge-shaped. Anal tube of male twice as high as genital segment and twice as long as parameres, slightly widened, lobate apically. Parameres narrow, lobate. (Figs. 400: 13-15). 3-3.8 – Prim. – On *Syringa wolfii*..... **S. humerosa** Log.

3. **Camarotoscena** Haupt. Propleurites almost twice as high as broad, divided by a longitudinal suture; ventral part of suture curved anteriad. On *Populus*. In the European USSR often occurs in large numbers, in the Far East rare. – 1 species (in USSR 5 species).

1. Fore wings dull, white, not transparent, densely covered with rounded brown spots often fused into larger maculae; apical third of *A* black; veins narrow, strongly swollen, rib-shaped, with dense dark strokes. Pterostigma of fore wing well developed, long. (Figs 400: 10-12). 2.1-2.45. – Amur., Prim. – On *Populus*... ..... **C. personata** Log.

4. **Epheloscyta** Log. Thickset, with broad, swollen thorax. Vertex more than half as long as broad, not forming anterior lobes and with barely noticeable notch anterior to unpaired ocellus. Genae slightly convex. Clypeus not great, not reaching far to anterior margin of head, projecting from genae (see from above). Postorbital ridges very narrow. Fore wings whitish, thick, with brown pattern, veins rib-shaped. On *Kalopanax septemlobus*. – 2 species.

1. Body from yellow to orange; hind wings, sclerites of abdomen, coxae and femora almost entirely brown. Pattern of fore wings consists of rounded spots often fused into 2 transverse bands in apical third of wings and at branching of veins *RC* and *MCu*; veins thick, cowered with brown strokes, rib-shaped. Genital segment of female terminates at the level of anal segment. Inner finger-shaped process of parameres short, straight, with oblique apical margin, with several

web-like, weakly developed folds at base. (Figs. 400: 6-9). 2.15-2.65. – S Prim., Sakh. ..... **E. kalopanacis** Log.

– Body much darker; sclerites of abdomen, coxae and femora dark brown. Pattern of fore wings consists of small spots (denser than in previous species) covering all cells; spots sparser at base and in apical third of wings; transverse bands consisting of fused spots not always marked; veins thin, not shaded. Genital segment of female longer than in *E. kalopanacis* Log. Inner finger-shaped process of parameres long and narrow, with more web-like folds at base. (Figs. 400: 1-5). 2.65-3.05. – S Prim., Sakh. ..... **E. sancta** Log.

5. **Aphalara** Först. Vertex shorter than broad, with small rounded tubercles on anterior margin, divided from genae by narrow grooves. Genae forming small rounded lobes ventral to antennal sockets. Frons well developed. Antennae slightly longer than breadth of head with eyes; rhinaria of same size, situated on apices of 4-9th antennal segments. Fore wings oblong-oval, widest in apical third, without pterostigma, usually with more or less swollen part of *C* situated distal to connection with *R*; surface spinules small, disk-like. Male genitalia of similar shape, differing in size and form of genital forceps (parameres), especially their subapical processes. Body usually reddish brown. Fore wings transparent, more or less yellowish, often with additional pattern. On *Caltha* sp., *Polygonum* and *Rumex*. – 11 species (in USSR 27 species). [**p. 506**]

1. Fore wings without pattern, yellowish 2
– Fore wings with pattern, colorless or yellowish, sometimes not colored at base 6
2. Body orange or red-orange with brown abdomen 3
– Body from brown to pitch-black; 3rd to 8th antennal segments, tibiae, tarsi and in male also processes of anal tube yellow. – Fore wings transparent, more intensely colored in apical half, yellow; wings densely covered with surface spinules, closely approaching to veins. Anal segment of female beak-shaped [**p. 507**], curved down at apex; posterior pole of perianal ring with wide apron-shaped extension, processes of anal tube of male not projecting beyond genital segment (Figs. 401: 8-12). 2.85-3.25. – Amur.; Siberia, European USSR. – W and N Europe ..... **A. affinis** Zett.
3. Fore wings amber-colored or yellow amber-colored, sometimes darker to apex; surface spinules dense, forming more or less regular transverse or curved rows in cells. – Posterior pole of perianal ring of pores on anal segment of female with apron-shaped extension, but this extension much small than in *A. affinis* Zett. Apices of parameres almost square, subapical processes small. Horizontal processes of anal tube of male slightly projecting beyond genital segment (Figs. 401: 1-3). 2.85-3.25 – Everywhere. – Palearctic. – On *Caltha* ..... **A. calthae** L.
– Fore wings light, at least at base; surface spinules less numerous and covering fore wings uniformly 4
4. Subapical processes of parameres long, separated by a deep notch 5
– Subapical processes of parameres short, very slightly separated from parameres and situated almost at level of their straight apical margin. Fore wings light at base, yellowish to apices. Surface spinules less numerous than in *A. calthae* and covering fore wings uniformly. Processes of anal tube of male large, not projecting beyond genital segment. (Figs. 401: 13-17). 2.53-3.2. – Khab., Amur., Prim. – China, Mongolia, Europe, N America, India, the Himalayas. – On *Polygonum*. {Misidentification, valid name: *A. freji* Burckhardt & Lauterer} .... **A. polygoni** Först.

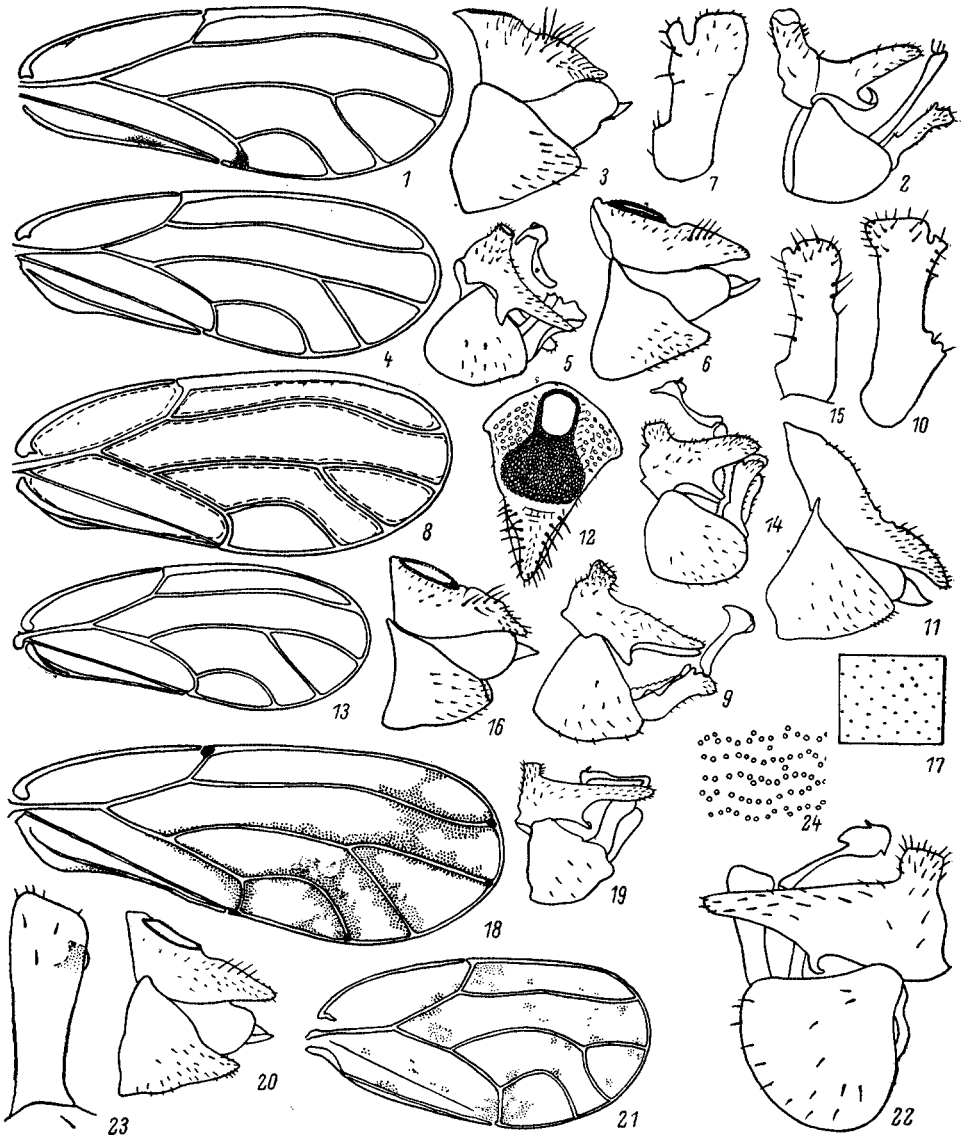


Fig. 401. Homoptera, Psyllinea. Fam. Aphalaridae. (After Klimaszewski, Loginova, and original).

1-3, *Aphalara calthae*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4-7, *A. borealis*: 4, fore wing; 5, 6, genitalia, lateral (5, male; 6, female); 7, paramere, inner view; 8-12, *A. affinis*: 8, fore wing; 9, male genitalia, lateral; 10, paramere, inner view; 11, female genitalia, lateral; 12, anal plate of female, dorsal; 13-17, *A. polygoni*: 13, fore wing; 14, male genitalia, lateral; 15, paramere, inner view; 16, female genitalia, lateral; 17, arrangement of surface spinules anterior to branching of *M*; 18-20, *A. maculipennis*: 18, fore wing; 19, 20, genitalia, lateral (19, male; 20, female); 21-24, *A. kunashirensis*: 21, fore wing; 22, male genitalia, lateral; 23, paramere, inner view; 24, arrangement of surface spinules anterior to branching of *M*.

5. Fore wings dirty yellow, darker to apices, veins brownish; apex of clavus not dark; surface spinules covering wings uniformly. Subapical processes of parameres directed anteriad and inward. Processes of anal tube of male slightly projecting beyond posterior margin of genital segment. Apex of parameres rectangular, slightly inclined posteriad [**p. 508**] and broadly rounded inward. Bases of long, curwed anteriad and inward, subapical processes situated much lower than subapical margins of parameres. (Figs. 401: 4-7). 2.5-3.1. – Prim.; Yakutia, Siberia, European USSR. – Finland ..... **A. borealis** Heslop-Harrison

– Fore wings entirely dull, weakly smoky; veins dirty yellow; apex of clavus dark; surface spinules form dense transverse rows. Subapical processes of parameres directed anteriad. Processes of anal tube of male slightly projecting beyond posterior margin of genital segment. Apices of parameres arc-like, bases of processes situated at level of subapical margin of parameres. 2.3-2.8. – Amur.; European USSR. – On *Rumex*. {Junior synonym of *A. polygoni* Först.} ..... **A. rumicicola** Log.

6. Fore wings with dense, distinct pattern ..... 7 [**p. 509**]

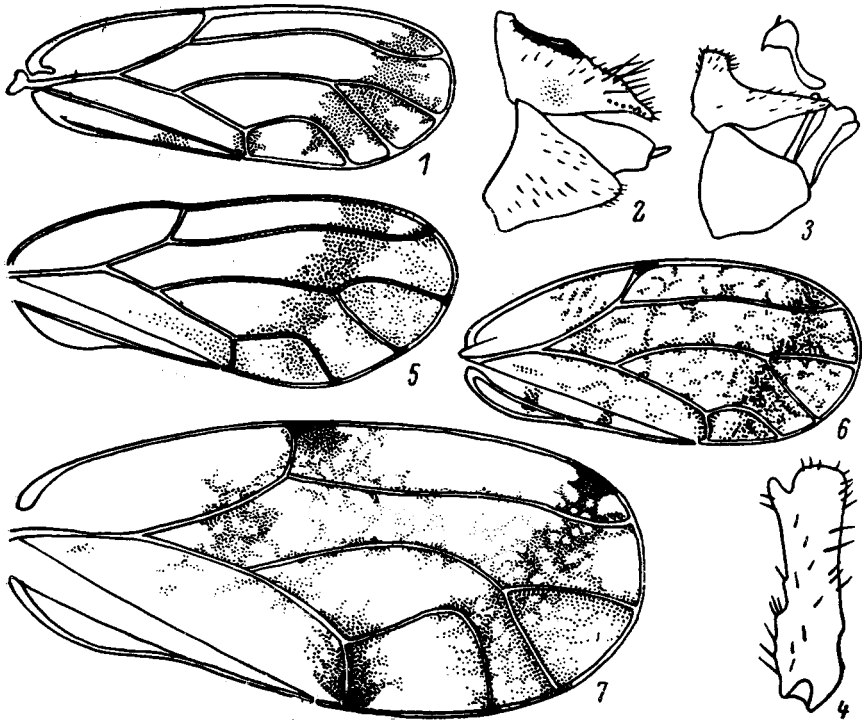


Fig. 402. Homoptera, Psyllinea. Fam. Aphalaridae. (After Kuwayama and Loginova).

1-4, *Aphalara sibirica*: 1, fore wing; 2, 3, genitalia, lateral (2, female; 3, male); 4, paramere, inner view; 5-7, fore wing: 5, *A. fasciata*; 6, *A. exilis*; 7, *A. itadori*.

– Fore wings with indistinct, sometimes shade-like pattern 8

7. Fore wings transparent. Brown pattern of wings formed by small spots of different forms and sizes scattered on all surface of wing; on fore wings, spots fused into 2 transverse rows (Fig. 402: 7): one at apex, the other in the middle. 2.8-3.2. – Sakh., Kur. (Kunashir). – Japan, Korea. On *Polygonum sachalinense* ..... **A. itadori** Shinji

– Fore wings whitish, almost not transparent. Brown pattern of wings formed by large oblique band from apex of cell *rs* (Fig. 402: 6) to marginal vein in cell cu_1 and large spots around Cu_2 and furca of *RM* and *Cu*. 2.45-3.12. – Prim.; Siberia. – China, Mongolia, Asia Minor, Europe, Java ..... **A. exilis** Weber et Mohr

8. Fore wings yellowish, light at base. Pattern of wing formed by dark yellow, indistinct, oblique band from apex of cell *r* to Cu_1; small spots present around Cu_2 and apex of clavus. Perianal ring of wax glands in female with wide, apron-shaped extension on posterior pole, like in *A. affinis*. Processes of anal tube of male long; parameres with long subapical processes. (Figs. 402: 1-4). 2.75-3.25 – Amur.; Yakutia – On *Caltha sibirica* ..... **A. sibirica** Log.

– Fore wings transparent or milky 9

9. Fore wings milky; pattern in form of interrupted band from subcostal break to apex of Cu_2. (Figs. 401: 21-24). 2.45-2.5. – Kur. (Kunashir). {Junior synonym of *A. itadori* Shinji} ..... **A. kunashirensis** Klimasz.

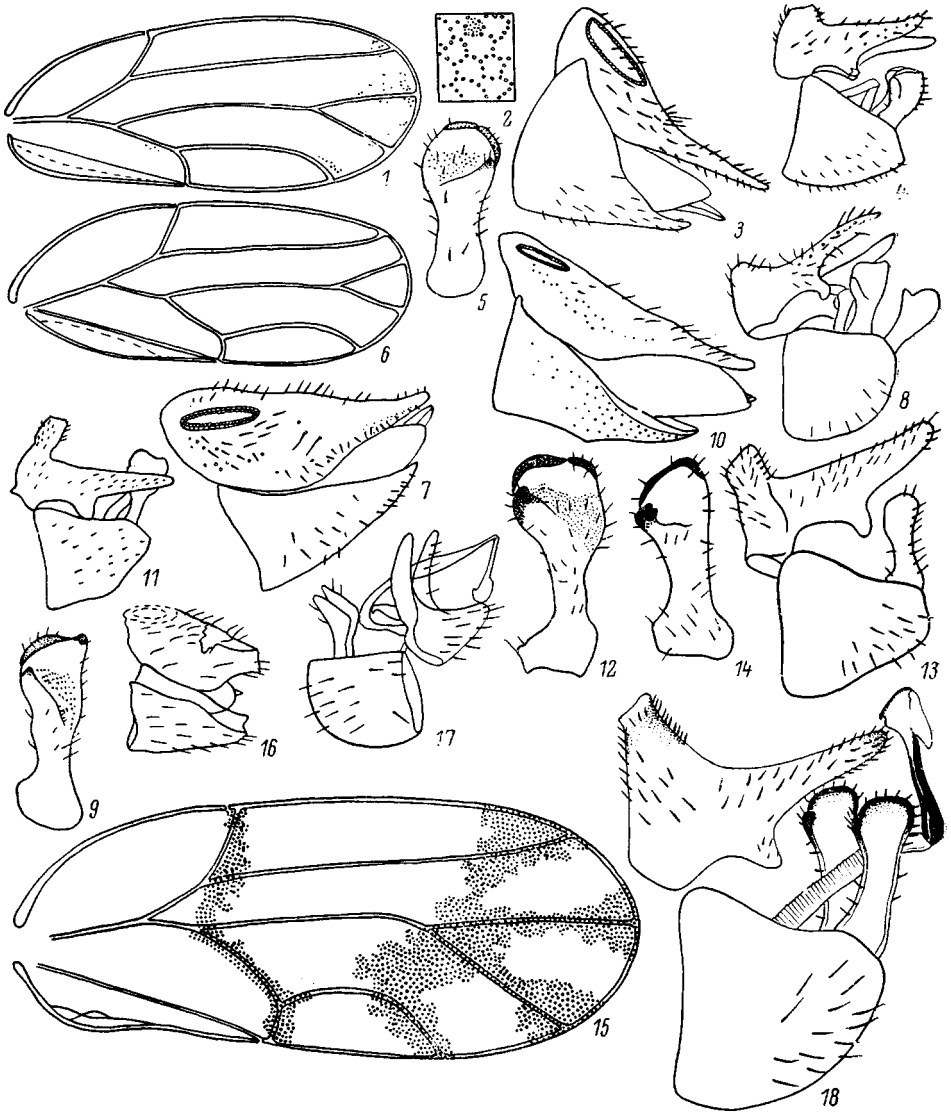


Fig. 403. Homoptera, Psyllinea. Fam. Aphalaridae. (After Loginova and original).

1-5, *Craspedolepta dorecinica*: 1, fore wing; 2, arrangement of surface spinules anterior to branching of *M*; 3, 4, genitalia, lateral (3, female; 4, male); 5, paramere, inner view; 6-9, *C. chasanica*: 6, fore wing; 7, 8, genitalia, lateral (7, female; 8 male); 9, paramere, inner view; 10-12, *C. capitata*: 10, 11, genitalia, lateral (10, female; 11, male); 12, paramere, inner view; 13, 14, *C. malachitica*: 13, male genitalia, lateral; 14, paramere, inner view; 15-17, *C. alexei*: 15, fore wing; 16, 17, genitalia, lateral (16, female; 17 male); 18, *C. latior*, male genitalia, lateral.

– Fore wings transparent 10

10. Fore wings near the apex almost twice as broad as at base, broadly rounded at apex, shiny; veins light, dark brown at the end. Pattern of fore wings variable, in form of more or less large diffuse spots and stripes bordering veins, often fused into an oblique band from apex of cell *r* to middle of Cu_1; anal vein with 2

brown areas. Processes of anal tube of male narrow, long, projecting beyond genital segment; parameres slightly narrowed and rounded to apex. (Figs. 401: 18-20). 2.45-3. – Amur.; Siberia, European USSR. – England. – On *Polygonum* sp. ..... **A. maculipennis** Löw

– Fore wings oblong-oval, 2.5 times as long as wide, glassy; veins yellow. Pattern of fore wing in form of not wide, oblique, branching into 2-4 prongs band from apex of cell *r* to Cu_2, brown in basal half; apex of clavus dark (Fig. 402: 5). Processes of anal tube of male very narrow and strongly projecting beyond posterior margin of genital segment; parameres plate-like, of equal width throughout. 2.47-2.52. – Prim. – Japan (Hokkaido, Honshu) ..... **A. fasciata** Kuw.

6. **Craspedolepta** Enderlein. Vertex shorter than broad, with weak notch in the middle of anterior margin and usually not forming projecting rounded lobes. Unpaired ocellus usually visible dorsally. Genae uniformly moderately convex, smoothly (without grooves) passing into vertex. Antennae as long as or slightly longer than breadth of head. Fore wings oblong-oval; vein *C* in the area of pterostigma not thickened (except *C. sonchi*, *C. omissa*). Posterior margin of anal tube of male with 2 long horizontal processes, each with hooklike, curved inward process ventrally near base. Female genitalia more uniform and rarely used for identification of species. Living on various Asteraceae; especially numerous on *Artemisia*; 3 species occur on *Chamaenerion*. – 24 species (in USSR 54 species).

1. Fore wings without pattern 2
– Fore wings with pattern 6
2. Fore wings transparent, glassy or not transparent, white, milky ..... 3 [**p. 510**]
– Fore wings oblong-oval, with broadly rounded apex, yellowish, veins light. – Female genitalia short, straight dorsally, with small notch in the middle and apex curved dorsally. Apical posterior angle of parameres turned inward. (Figs. 404: 6-8). 2-2.75. – Amur.; Soviet Central Asia (Tajikistan) ..... **C. terminata** Log.
3. Fore wings not transparent, white, milky, with apex lying in cell m_1, oblong-oval. – Processes of anal tube of male slightly projecting beyond genital segment. Parameres hardly dilated towards apex, with strongly retracted apical posterior angle. (Figs. 403: 6-9). 2-2.4. – S Prim. – On *Artemisia* ..... **C. chasanica** Konov.
– Fore wings transparent, glassy 4
4. Veins of fore wings with brown bands (Fig. 404: 3). 2.5-3.1. – Amur., Prim.; Buryatia, W, E and S Siberia, Soviet Central Asia, Kazakhstan, European USSR. – On *Artemisia* ..... **C. lineolata** Log.
– Veins dark at apex, without brown bands 5
5. Fore wings transversely wrinkled. Veins brownish. Processes of anal tube of male not projecting beyond genital segment. Parameres broadly capitate at apex. (Figs. 405: 1-4). 2.4-2.9. – Prim.; S Siberia, mountains of Kazakhstan, South of European USSR. – S Europe. – On *Artemisia* ..... **C. omissa** W. Wagn.
– Fore wings smooth. Veins light. Apical posterior angles of parameres strongly retracted and curved inward; inner processes of parameres very long, flattened and curved posteriad so that their broad sides [**p. 511**] turned dorsad after crossing (Fig. 407: 1). 3.3-3.6. – Kamch., Prim.; Irkutsk Prov., mountains of Kazakhstan, North of European USSR, Transcarpathia. – Europe. – On *Chamaenerion* ..... **C. subpunctata** Först.
6. Pattern in apical half of fore wings 7
– Pattern located all along membrane or absent only at base of fore wings 14

7. Pattern of fore wings variable 8
– Pattern of fore wings constant, consisting of transparent spots, stripes, bands or edging 9

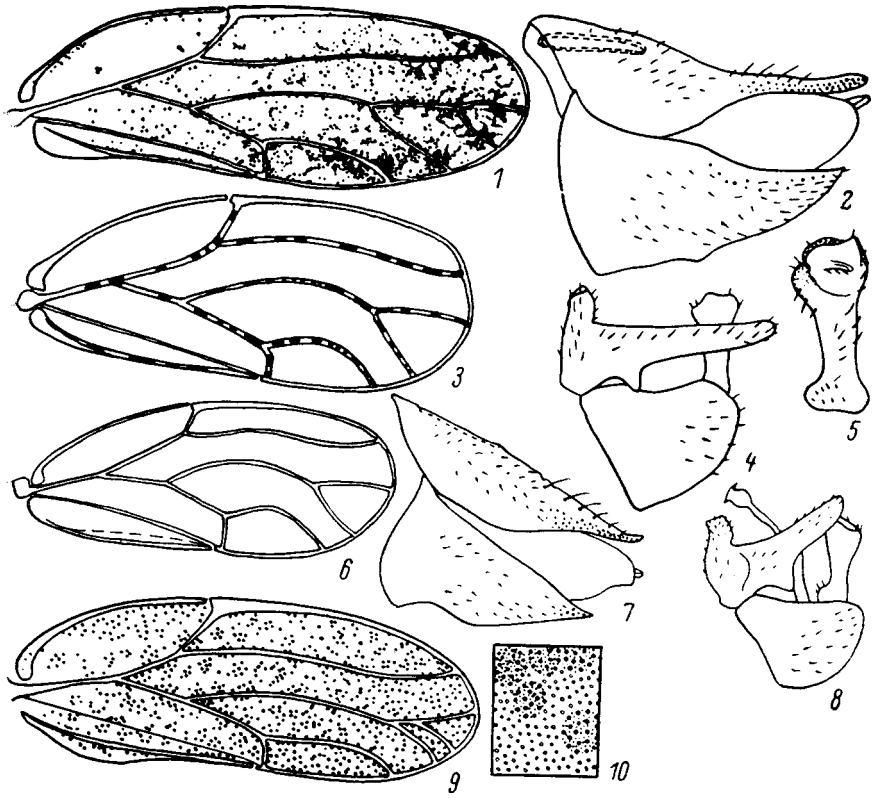


Fig. 404. Homoptera, Psyllinea. Fam. Aphalaridae. (After Vondracek and Loginova).

1, 2, *Craspedolepta angusta*: 1, fore wing; 2, female genitalia, lateral; 3, *C. lineolata*, fore wing; 4, 5, *C. sonchi*: 4, male genitalia, lateral; 5, paramere, inner view; 6-8, *C. terminata*: 6, fore wing; 7, 8, genitalia, lateral (7, female; 8, male); 9, 10, *C. artemisiae*: 9, fore wing; 10, arrangement of surface spinules anterior to branching of *M*.

8. Brown small spots of pattern situated in apical third of fore wings or in cells m_1 and cu_1. Fore wings semitransparent, slightly wrinkled, oblong-oval. Veins of same color as wing, not convex. Anal segment of female sharply narrowed in apical part; processes of anal tube of male not projecting beyond genital segment. (Figs. 403: 1-5). 2.25-2.5. – S Prim. ..... **C. dorecinica** Konov.
– Sparse brown spots of pattern situated in apical half of fore wings or sometimes fused into hardly noticeable marginal edging. Fore wings yellowish at apex, not wrinkled, narrow, 2.5 times as long as wide; veins convex. Anal segment of female not sharply narrowed in apical part. Processes of anal tube projecting beyond genital segment by one-third. Parameres capitate at apex. (Figs. 406: 8-11). 3.25-3.3. – Prim. – Japan ..... **C. flava** Kuw.
9. Narrow yellow-brown stripes present along apices of veins of fore wings. Fore wings whitish. Female genitalia very large, long, covered by sparse small spinules; parameres weakly dilated to apex; inner processes of parameres thick, finger-shaped. (Figs. 405: 8-10). 1.7-2.1. – Everywhere, widely distributed in USSR. – Europe, Iraq. – On *Achillea* ..... **C. nervosa** Först [**p. 512**]
– Stripes along apices of veins of fore wings absent 10

10. Pattern at apex of fore wings consisting of sparse spots or edging 12
– Pattern at apex of fore wings consisting of bands 11
11. Yellow-brown spots on fore wings forming 1 band at the level of branches of *M*. Parameres as in *C. subpunctata*. (Figs. 403: 15-17). – Komandorskie Islands. – On *Chamaenerion* ..... **C. alexei** Konov.

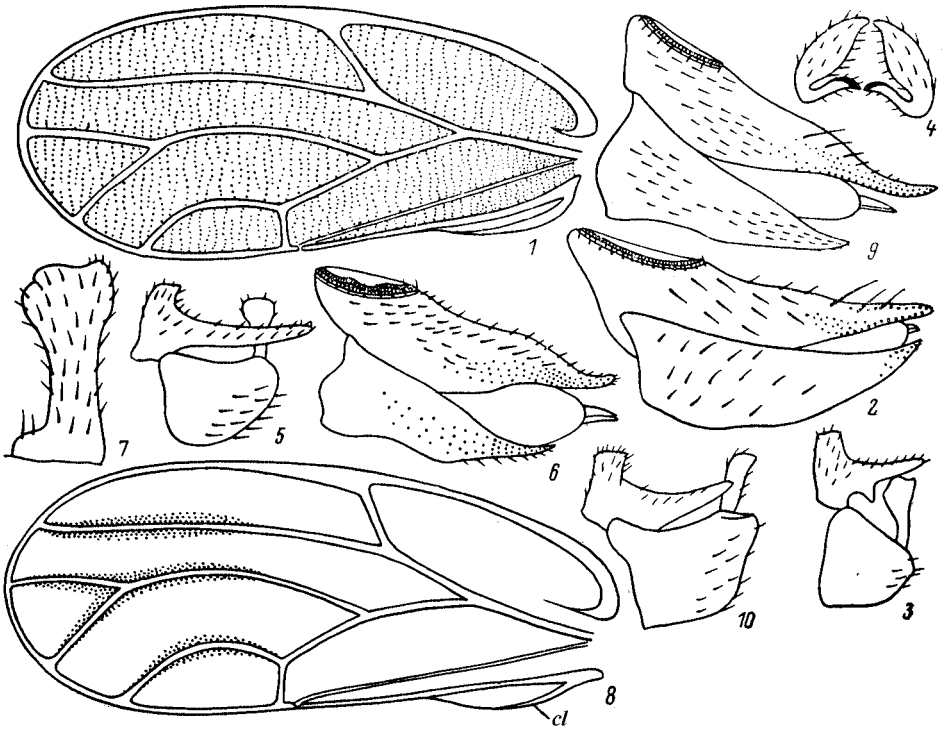


Fig. 405. Homoptera, Psyllinea. Fam. Aphalaridae. (After Loginova).

1-4, *Craspedolepta omissa*: 1, fore wing; 2, 3, genitalia, lateral (2, female; 3, male); 4, apices of parameres, dorsal; 5-7, *C. flavipennis*: 5, 6, genitalia, lateral (5, male; 6, female); 7, paramere, inner view; 8-10, *C. nervosa*: 8, fore wing; 9, 10, genitalia, lateral (9, female; 10, male). *cl*, clavus.

– Brown spots on fore wings forming 2 bands around apices of all veins at the level [**p. 513**] of branches *RS* and *M* and also from apex *RS* to *Cu*. Processes of anal tube oval, with deep constriction at base (Fig. 407: 5). 2.6-2.8. – Kamch., Prim., Sakh.; Yakutia, North and Center of European USSR, Kazakhstan. – Japan, Europe, England. – On *Chamaenerion*..... **C. nebulosa** Zett.
12. Brown spots at apex of fore wing fused and forming an edging. – Veins brown, strongly convex. Processes of anal tube projecting beyond apex of abdomen; parameres capitate (Figs. 404: 4, 5). 3.5-4.3. – Everywhere; widely distributed in USSR. – In European USSR on *Sonchus* sp. ..... **C. sonchi** Först.
– Brown spots at apex of fore wings not fused 13
13. Pattern of fore wings consisting of faintly marked dense small brown spots on yellow background; veins of same color as wing. Parameres rounded at apex. Male and female genitalia as in Figs. 405: 5-7. 3.8-4.75. – Everywhere; widely distributed in USSR. – Europe, N America. – On *Leucanthemum* sp. .... **C. flavipennis** Först.
– Pattern of fore wings consisting of sparse, large, yellow, rarely brownish spots; veins yellow. Parameres capitate, with thick process on inner surface. Male and female genitalia as in Figs. 403: 10-12. 2.15-2.75. – Amur. ..... **C. capitata** Log.

14. Pattern of fore wings consisting of fine speckles usually forming rounded spots of various sizes (Fig. 406: 17) 15
– Pattern of fore wings consisting of dark, larger spots fused in apical third (Fig. 406: 14) 19

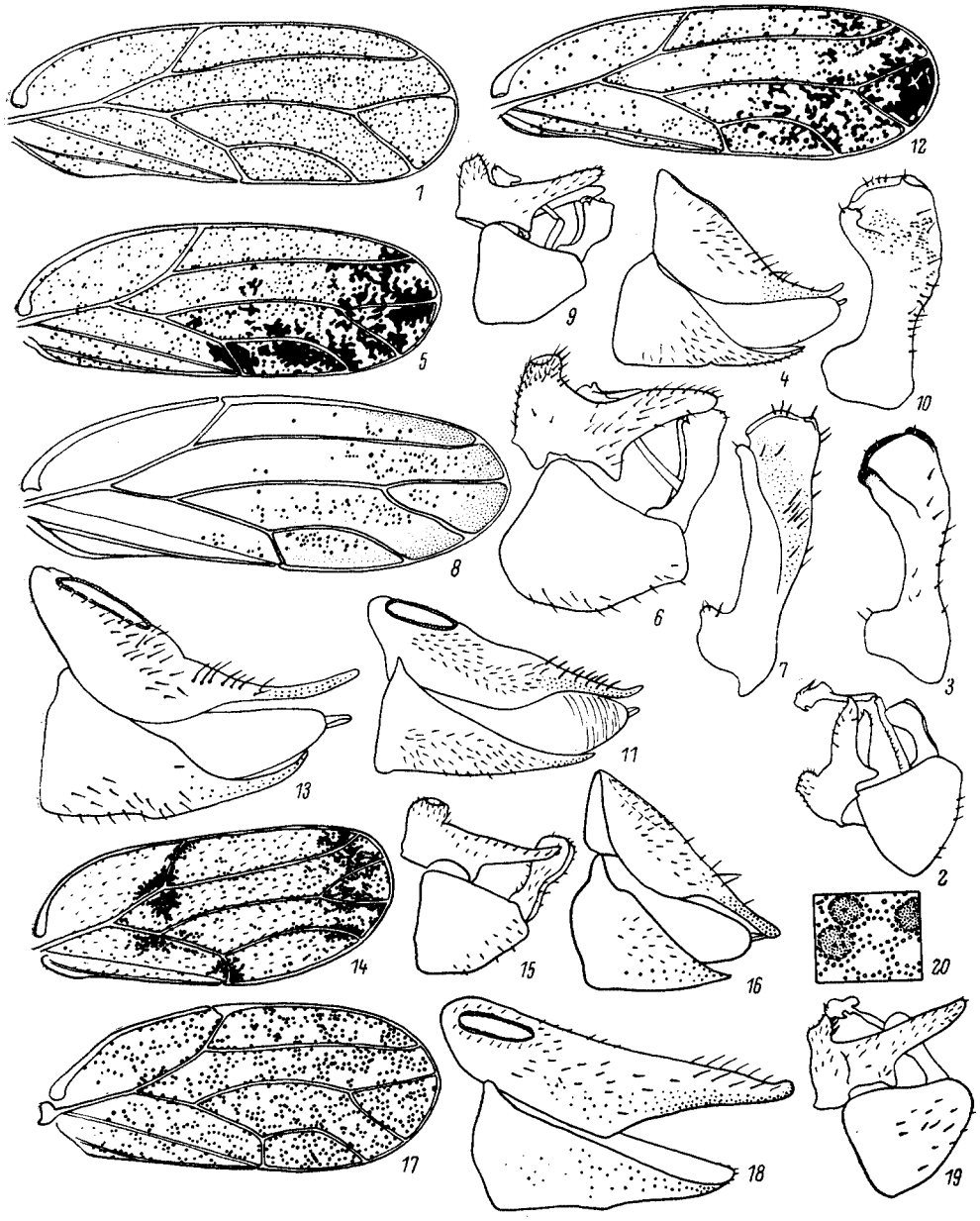


Fig. 406. Homoptera, Psyllinea. Fam. Aphalaridae. (After Kuwayama and Loginova).

1-4, *Craspedolepta emeljanovi*: 1, fore wing; 2, male genitalia, lateral; 3, paramere, inner view; 4, female genitalia, lateral; 5-7, *C. fraterna*: 5, fore wing; 6, male genitalia, lateral; 7, paramere, inner view; 8-11, *C. flava*: 8, fore wing; 9, male genitalia, lateral; 10, paramere, inner view; 11, female genitalia, lateral; 12, 13, *C. conspersa*: 12, fore wing; 13, female genitalia, lateral; 14, *C. villosa*, fore wing; 15, 16, *C. formosa*, genitalia, lateral (15, male; 16, female); 17-20, *C. topicalis*: 17, fore wing; 18, 19, genitalia, lateral (18, female; 19, male); 20, arrangement of surface spinules anterior to branching of *M*.

15. Fore wings broad with broadly rounded apex; pattern consisting of brownish, uniformly distributed spots 16
– Fore wings oblong-oval, broadest in the middle, transparent, shiny; pattern consisting of small, dense, brown spots, sometimes denser in apical third 18
16. Fore wings whitish, dull, semitransparent; surface spinules as in Fig. 406: 20. Parameres with broadly rounded apex, apical posterior angle ear-like, curved inward and dorsad; inner processes long, with numerous rows of spinules on inner side. Male and female genitalia as in Figs. 406: 18, 19. 2.6-3.4. – Prim., S Sakh., S Kur. (Shikotan, Kunashir) ..... **C. topicalis** Log.
– Fore wings transparent. Spinules on inner surface of parameres absent .... 17 [**p. 514**]

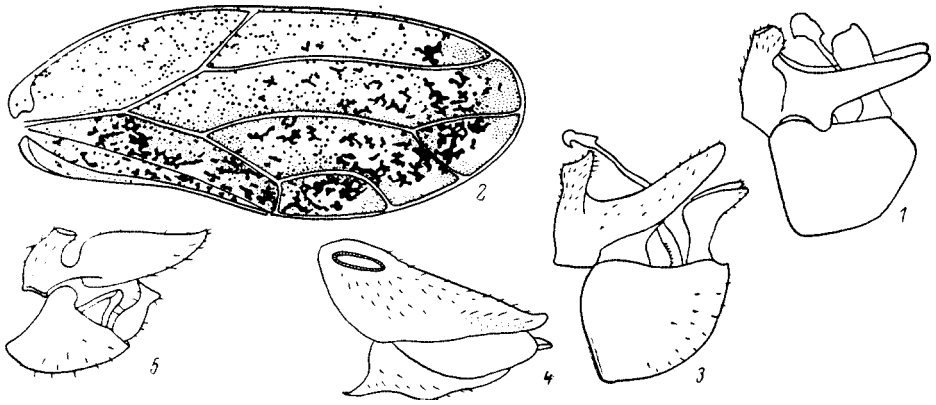


Fig. 407. Homoptera, Psyllinea. Fam. Aphalaridae. (After Vondracek and Loginova).

1, *Craspedolepta subpunctata*, male genitalia, lateral; 2-4, *C. kerzhneri*: 2, fore wing; 3, 4, genitalia, lateral (3, male; 4, female); 5, *C. nebulosa*, male genitalia, lateral.

17. Horizontal processes of anal tube of male almost not projecting beyond genital segment; parameres weakly capitate at apex; apical posterior angle of parameres rounded; inner processes narrow, long (Fig. 403: 18). 2.2-3.1. – Everywhere; widely distributed in USSR. – Japan, Europe ..... **C. latior** W. Wagn.
– Horizontal processes of anal tube of male markedly projecting beyond genital segment; parameres not dilated at apex, almost straight at posterior margin, apical posterior angle slanting, inner processes of parameres short. 2.2-3.3. – Everywhere; USSR (widely distributed). – Mongolia, W Europe. (Figs. 403: 13, 14) .... **C. malachitica** Dahlb.
18. Pattern in all cells of fore wings dense; spots small (Figs. 404: 9, 10). Parameres hardly dilated to apex, with short process on inner surface; genital segment of female straight dorsally. 2.4-2.8. – Khab., Amur., Prim.; Kazakhstan, Soviet Central Asia, Volga area. – Japan, Europe. – On *Artemisia* ..... **C. artemisiae** Först.
– Pattern on fore wings sparse; yellow-brown spots larger. Parameres slightly dilated and curved anteriorly at apex; narrow apical third of genital segment of female curved dorsally. (Figs. 406: 1-4). 2.35-2.8. – Amur; Chita Prov. .... **C. emeljanovi** Log.
19. Body bare, sometimes fore wings with spinules 20
– Body covered with setae, wings without spinules 22
20. Fore wings with spinules bordering veins and situated in cells. – Fore wings broad, slanting in apical part from M_{1+2} to Cu_2, whitish, dull, with brown pattern consisting of rounded spots, fused at apices of veins and on level branch of *RS* and *MCu*, often pattern absent. Female genitalia slightly curved dorsad at apex.

Parameres gradually dilated to apex, with strongly retracted inward and rounded apical posterior angle; inner processes rather long. 2.2-2.6. – Amur.; Prim.; Chita Prov. – On *Artemisia*. (Fig. 406: 14) ..... **C. villosa** Log.

– Fore wings without spinules 21

21. Fore wings light, transparent, oblong-oval, narrowed at apex, wings almost 3 times as long as wide; pattern consisting of brown or yellow-brown spots, densest in apical half of wings and fused at apices of veins, sometimes males without pattern. Female genitalia broad at base, curved dorsad at apex; parameres stumpy, slightly dilated to apex, inner processes finger-shaped. (Figs. 404: 1, 2). 2.4-2.7. – Amur; Chita Prov. – On *Artemisia* ..... **C. angusta** Log.

– Fore wings semitransparent, glassy, apically whitish, narrowly rounded at apex, beyond apex slanting to Cu_2, costal margin noticeably thickened; pattern consisting of dense yellow-brown spots, concentrated in small groups near apex and on anal margin; distinct yellow stripes usually present along veins in apical part; veins more or less yellowish. Female genitalia elongate conical, long; anal segment slightly wavy dorsally; parameres in apical part twice as broad as in the narrow basal part of base. (Figs. 407: 2-4). 2.2-2.9. – Amur., Prim. – On shrub-like species of *Artemisia* ..... **C. kerzhneri** Log.

22. Fore wings broad, oblong-oval, with broadly rounded apex, whitish, dull, with brown pattern consisting of small spots scattered all over the wing and large spots at apices and at branches of veins. Parameres capitate at apex; inner processes strong, thick, pointed at apex. (Figs. 406: 15, 16). 2.4-3.12. – Amur., S Sakh. – On *Artemisia* ..... **C. formosa** Log.

– Fore wings narrow, oblong-oval, narrowly rounded at apex; fore wings of female slanting to Cu_2 23

23. Pattern of fore wings consisting of light brown spots condensed at apex and forming diffuse patches of different **[p. 515]** sizes at apices of veins (spots keep their outlines). Fore wings whitish. Bristles of body without waxy secretion. Female genitalia high at base; anal segment in its middle sharply narrowed and curved dorsad; parameres narrow at base, widened as a rectangle to apex, curved anteriad like elbow. (Figs. 406: 12, 13). 2.45-2.98. – Prim. – Europe .... **C. conspersa** Löw

– Pattern of fore wings consisting of brown spots fused into large spots of irregular shape in apical third. Fore wings yellow in apical third. Bristles of body often with waxy secretion. Female genitalia very thick, anal segment wavy dorsally; parameres with weakly broadened apical half. (Figs. 406: 5-7). 2.1-2.8. – Amur.; Chita Prov. ..... **C. fraterna** Log.

3. Family **PSYLLIDAE**

Slender. Head usually as broad as thorax, distinctly separated from thorax. Pronotum more or less strongly curved. Thorax dorsally strongly curved-inflated. Antennae (except *Calophya*) filiform, slender, much longer than breadth of head. Posterior margin of anal tube of male without processes. Venation of fore wings similar to that of the preceding family: 2 veins (*C+R* and *M+Cu*) branch from the base of the wing, *M* has a common stem with *Cu*, branching from it. Fore wings membranous; break of costal vein always present, break of anal vein at a small distance from apex of Cu_2. Almost all species of the family feed on various trees and shrubs. *Psylla* is the commonest genus in the Far East. – 3 genera, 62 species (in USSR 12 genera, more than 200 species).

KEY TO GENERA

1. Antennae as long as width of head; segments of flagellum widened from 1st segment to the penultimate segment. Fore wings broadest distal to middle, apex lying in cell m_1. *Cu* very long, so that cell cu_1 is more than 3 times as long as cell m_1. – Apices of hind tibiae almost not widened and with 1+3 saltatorial spines and a crown of thick bristles ..... 1. **Calophya**

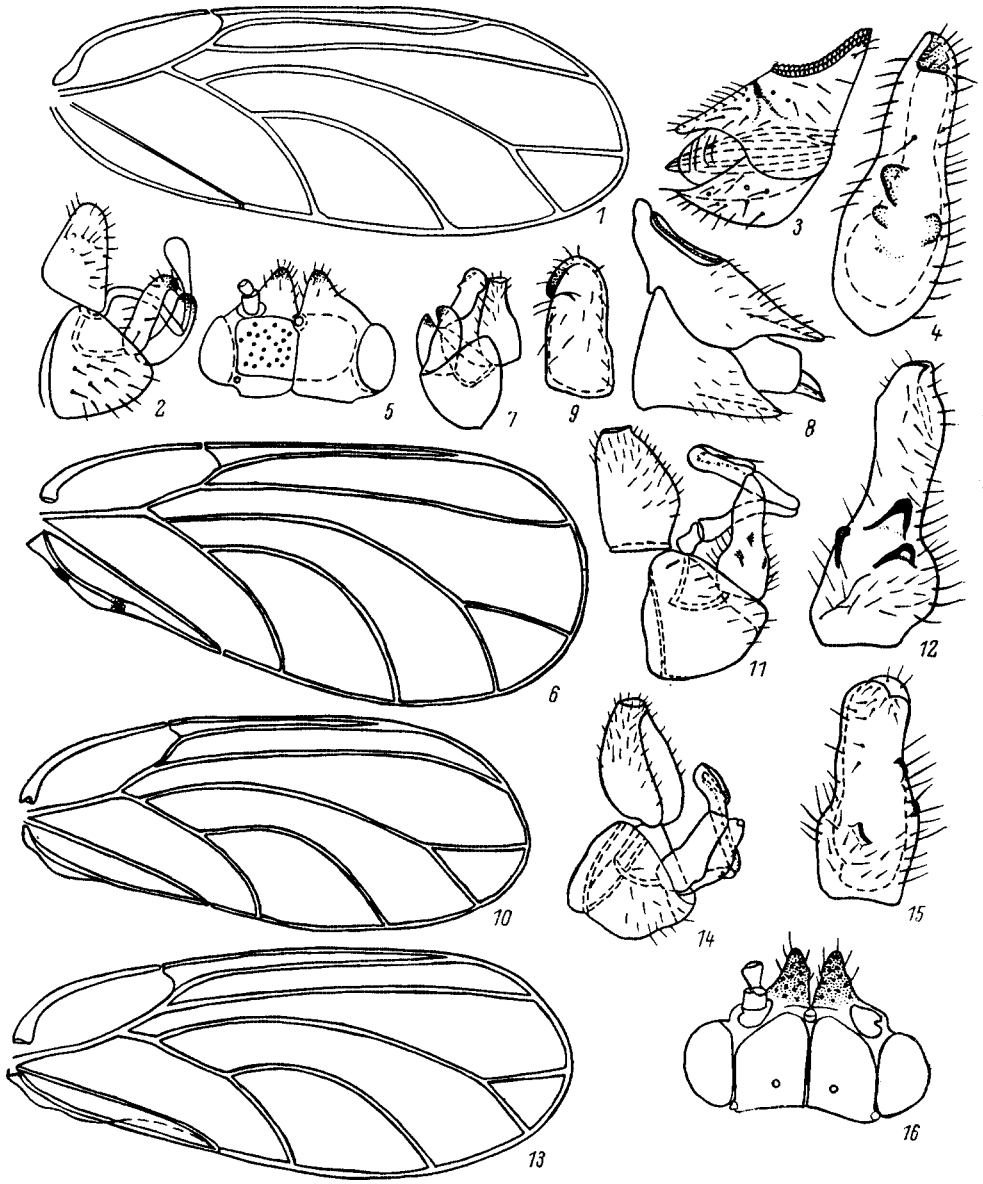


Fig. 408. Homoptera, Psyllinea. Fam. Psyllidae. (After Loginova and original).

1-5, *Calophya viridiscutellata*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, paramere, inner view; 5, head, dorsal; 6-9, *C. nigridorsalis*: 6, fore wing; 7, 8, genitalia, lateral (7, male; 8, female); 9, paramere, inner view; 10-12, *C. nigra* : 10, fore wing; 11, male genitalia, lateral; 12, paramere, inner view; 13-16, *C. phellodendri*: 13, fore wing; 14, male genitalia, lateral; 15, paramere, inner view; 16, head, dorsal.

– Antennae much longer, filiform. Fore wings with uniformly rounded apex, which usually lies in cell *rs* 2

2. Propleurites twice or more than twice as high as their width, covered by sclerite of thorax. Branches of *M* on fore wings very long (Fig. 409: 1) .... 2. **Cyamophila**

– Propleurites less than twice as high as their width, not covered by sclerite of thorax. Branches of *M* on fore wings shorter (Fig. 410: 1) ..... 3. **Psylla**

KEY TO SPECIES OF FAMILY PSYLLIDAE

1. Calophya Löw. Small insects. Antennae not longer than width of head. Fore wings without pattern. About 30 species in the genus. Far Eastern species on *Phellodendron*. – 4 species (in USSR 5 species).

1. Genal cones strongly directed laterad (Fig. 396: 12), half as long as vertex, not conical. Antennae light at apex. – Head and thorax from red brown to black. Fore wings transparent. (Figs. 408: 6-9). 2-2.14. – S Kur. (Kunashir). – Japan (Hokkaido). – On *Phellodendron sachalinense*. {Junior synonym of *C. nigra* Kuw.} ..... **C. nigridorsalis** Kuw.

– Genal cones directed anteriad and downward, conical. Antennae brown at apex 2

2. Genal cones entirely light or dark in upper part only 3

– Genal cones entirely black. – Anal segment of female straight dorsally, not inflated; narrow subapical part long. (Figs. 408: 13-16). 2.1-2.55. – [**p. 516**] S Prim., Sakh., Kur. – On *Phellodendron sachalinense* and *Ph. amurense* .... **C. phellodendri** Log.

3. Genal cones always light. Anal segment of female dorsally inflated distal to anus, sometimes inflation hardly noticeable; narrow subapical part short; transverse groove well marked. Parameres with 3 brown tubercles on inner surface: two in middle of plate and one on posterior margin. Wintering or overwintering specimens black, summer specimens from green to yellow. (Figs. 408: 10-12). 2.45-2.80. – Khab., Prim., S Sakh., Kur. [**p. 517**] (Kunashir and Shikotan). – Japan. – On *Phellodendron amurense* ..... **C. nigra** Kuw.

– Genal cones black at apex. Anal segment of female long, tapering; groove distal to anus hardly marked. Parameres narrower and more elongate than in *C. nigra*. Autumnal specimens black. (Figs. 408: 1-5). 1.9-2.1. – S Kur. (Kunashir). – Japan (Hokkaido) ..... **C. viridiscutellata** Kuw.

2. **Cyamophila** Log. All species of the genus feed on Fabaceae. Distribution range of the genus ocuppies arid territories of Europe and Asia from the South-East of European USSR over Transcaucasus, Kazakhstan, Soviet Central Asia and S Siberia to Mongolia and Prim. – 1 species (in USSR 50 species).

1. Anal tube of male without processes, weakly widened in the middle half of posterior margin. Fore wings oblong-oval; surface spinules not reaching veins; marginal spinules in cells m_1, m_2 and cu_1 form dark brown spots. (Figs. 409: 1-3). 3.7-3.96. – Khab., Prim. ..... **C. hexastigma** Horv.

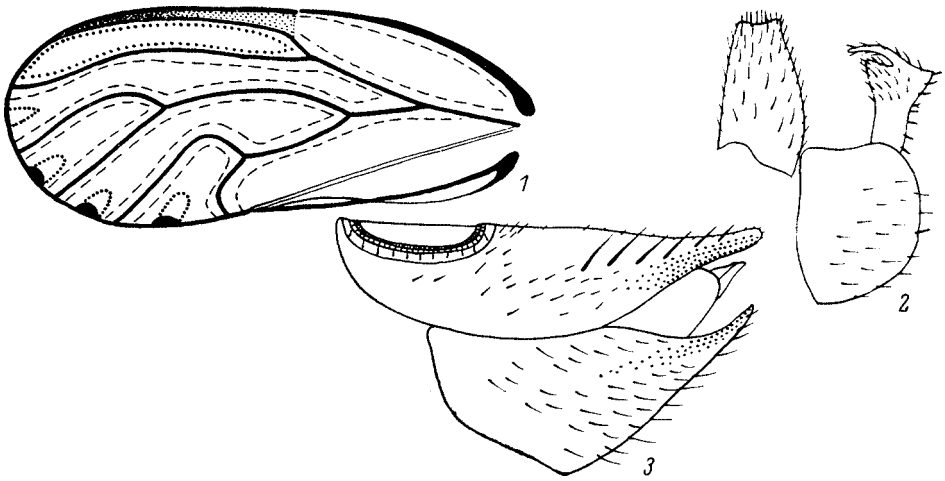


Fig. 409. Homoptera, Psyllinea. Fam. Psyllidae. (After Šulc).

1-3, *Cyamophila hexastigma*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female).

3. **Psylla** Geoffr. The most numerous Palearctic genus, mainly living on trees and shrubs, with very few gall-producing species; some species are injurious. The species are very morphologicaly similar and it is usually impossible to identify them from the female. – 57 species (in USSR more than 200). {Of the Far Eastern species, only *P. magnifera*, *P. alni*, *P. betulae*, and *P. betulaenanae* are now included in *Psylla*. *P. foersteri* is placed in *Baeopelma* Enderlein, and all the other species in *Cacopsylla* Oss.}.

1. Longer than 3.5 (3.5-5.6). Antennae 2-2.8 times as long as width of head. Parameres capitate to apex or thickened 2
– Not longer than 3.5 (1.9-3.5). Antennae less than twice as long as width of head. Parameres with apex not as above 6
2. Female genitalia very long, longer than the other segments of body together. Parameres with 2 denticles at apex..... 3
– Female genitalia slightly shorter, thickened at apex. Fore wings 2.5 times as long as broad, transparent, shiny; veins brown. Genal cones almost as long as vertex. 4.2-5. – Sakh. – Japan. – On *Alnus japonica* ..... **P. magnifera** Kuw.
3. Fore wings colorless, broadest in the middle; veins brown. Vertex markedly less than half as long as broad, but longer than genal cones (Figs. 410: 13-16). 4.9-5.6. – Everywhere. – Holarctic. – On *Alnus*..... **P. alni** L.
– Fore wings yellow or yellowish, broadest in apical third ..... 4 [**p. 519**]
4. Narrow part of anal segment of female with denticles. Fore wings yellowish, shiny, slanting to cu_2 in apical part, veins greenish yellow. (Figs. 410: 5-8). 4-4.7. – Prim. – Palearctic. – On *Betula* ..... **P. foersteri** Fl.
– Anal segment of female without denticles. Fore wings not as above 5
5. Fore wings transparent, oblong-oval; veins brown. Male and female genitalia as in Figs. 411: 4, 5. 3.9-4.5. – Everywhere. – Palearctic. – On *Betula*.... **P. betulae** L.
– Fore wings smoky, rounded-oval; veins light. (Figs. 411: 1-3). 3.48-3.56. – Chuk., Mag. – Circumboreal. – On *Betula nana* ..... **P. betulaenanae** Oss.
6. Fore wings along apical margin with pattern as an edging, several spots or darkenings at apices of clavus, Cu_2 and anal suture..... 7
– Fore wings without distinct pattern along apical margin 23
7. Fore wings with pattern along apical margin consisting of edging, spot-shaped shades or several spots at apex of veins 8

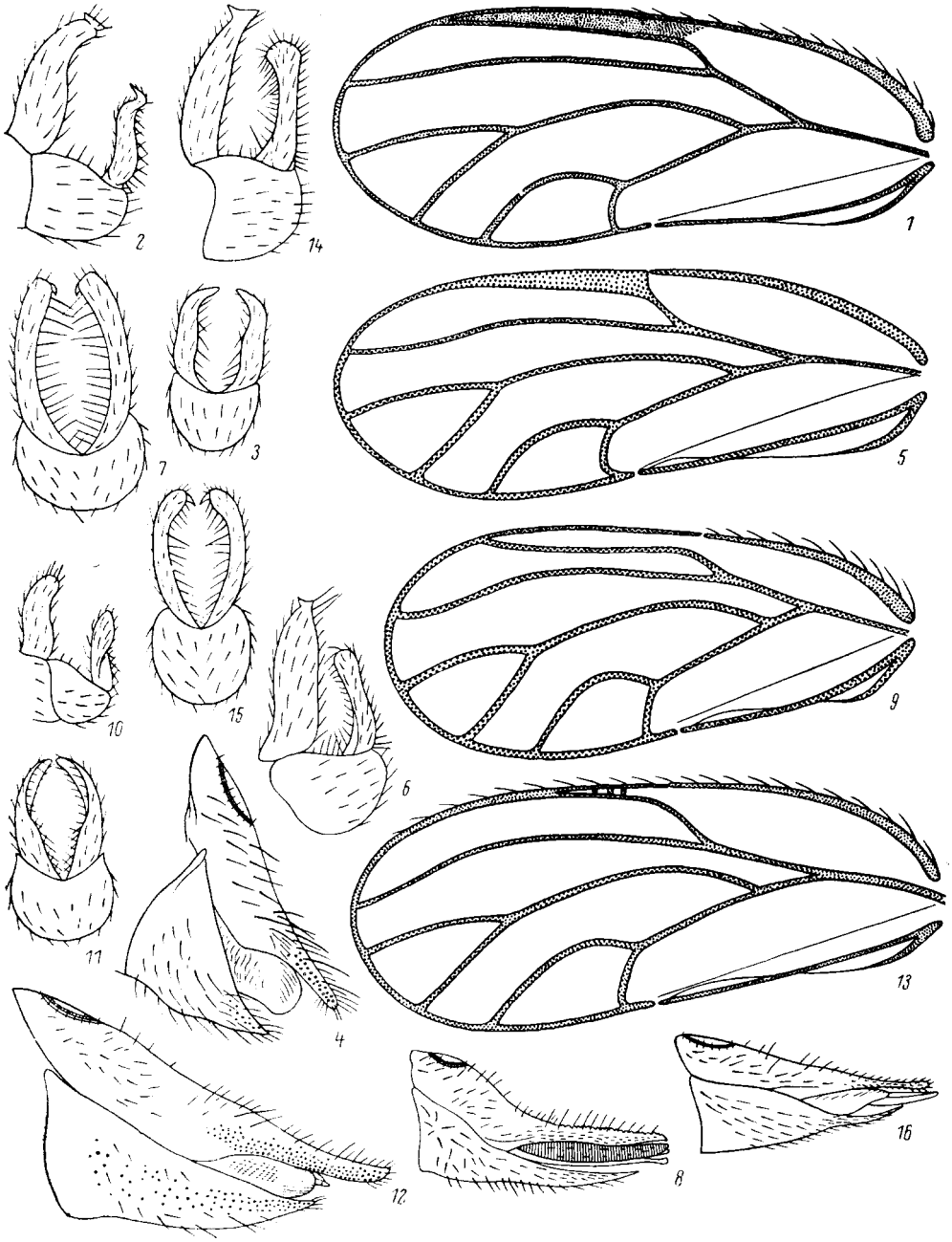


Fig. 410. Homoptera, Psyllinea. Fam. Psyllidae. (After Vondracek, Dobreanu and Manolache).

1-4, *Psylla mali*: 1, fore wing; 2, 3, male genitalia (2, lateral; 3, back view); 4, female genitalia, lateral; 5-8, *P. foersteri*: 5, fore wing; 6, 7, male genitalia (6, lateral; 7, back view); 8, female genitalia, lateral; 9-12, *P. melanoneura*: 9, fore wing; 10, 11, male genitalia (10, lateral; 11, back view); 12, female genitalia, lateral; 13-16, *P. alni*: 13, fore wing; 14, 15, male genitalia (14, lateral; 15, back view); 16, female genitalia, lateral.

– Fore wings without pattern; apices of clavus, Cu_2 and anal suture with a spot or darkening 13

8. Fore wings with pattern consisting of rich brown edging from apex of *RS* to Cu_2, leaving colorless right-angled areas at apices of veins on margins of wings (Fig.

412: 1). Fore wings elongate lanceolate, slightly slanting to Cu_2, completely yellow, veins of same color as wing, light at apices. Genal cones covered with setae at apex. Male and female genitalia as in Figs. 412: 2, 3. 3.7-3.95. – S Khab., Prim. – On *Acer ginnala* ..... **P. ginnali** Konov. et Log.

– Fore wings with pattern consisting of spot-shaped shades and spots 9

9. Fore wings in male with pattern consisting of spot-shaped shades, in female without pattern (Fig. 412: 11); wings elongate lanceolate, whitish, transparent. – Genal cones slightly shorter than vertex. Genitalia as in Figs. 412: 12-14. 3.1-3.6. – Kamch., N Khab.; Yakutia, Irkutsk Prov., Estonia. – Scandinavia, Alaska. – On *Salix* ..... **P. flori** Put.

– Fore wings with pattern consisting of spots 10

10. Fore wings rounded or elongate-rounded, transparent, without large spots in cell *rs* and at apex of Cu_2 11

– Fore wings elongate lanceolate, yellow, with large spots in cell *rs* and at apex of Cu_2 12

11. Fore wings glassy, veins yellowish. Genal cones almost as long as vertex, triangular. Parameres light, C-shaped, with apical dark tooth. (Figs. 413: 15-18). Female genitalia straight. 3.80-3.95. – S Prim. – On flowers of *Viburnum burejaeticum* ..... **P. octomaculata** Konov.

– Fore wings elongate-rounded, light, veins pale yellow. Genal cones shorter than vertex, triangular-conical. Parameres dark, with yellowish margin, simple, equally broad in their whole length. Female genitalia sharply curved dorsally. 2.3-2.5. – S Sakh. – Japan, Korea, China ..... **P. elaeagni** Kuw.

12. Fore wings yellow, with veins darker than wings and clearly outlined spots. Genal cones hardly shorter than vertex. (Figs. 411: 10-13). 3.5-3.8. – Everywhere. – Palearctic, to India. – On *Crataegus* sp. ..... **P. crataegi** Schrank

– Fore wings with light veins and with hardly visible spots at base of wing (Fig. 412: 6). Genal cones very large, two-thirds as long as vertex. Genitalia as in Figs. 412: 7, 8. 3.58-4.15. – Prim., S Sakh. – On *Acer mono* ..... **P. moni** Konov. et Log.

13. Fore wing with clearly outlined brown spot at apices of anal suture and clavus 14

– Fore wing without spot; apices of anal suture and clavus darkened or thickened ..... 19 [**p. 521**]

14. Fore wings yellow or smoky 15

– Fore wings half as long as broad, transparent 18

15. Fore wings yellow, oblong-oval (Fig. 414: 12) 16

– Fore wings smoky, elongate lanceolate 17

16. Body lemon yellow-brownish, old specimens brown. Genitalia as in Figs. 414: 13, 14. 2.40-2.56. – Khab., Prim.; European USSR. – Japan, Europe, N America. – On *Pyrus* ..... **P. pyricola** Först. [**p. 522**]

– Body red with black tinge. (Figs. 415: 13-15). 2.7-3.1. – S Kur. (Kunashir). – On *Ledum* sp. ..... **P. cunashiri** Konov.

17. Fore wings of overwintering specimens with yellow-brown shades in cells, veins light. Parameres with bifid processes (Figs. 414: 19, 20); female genitalia wedge-shaped. 2.2-2.6. – Chuk., Kamch.; Altai, Siberia, Urals. – Finland, Sweden, Alaska. – On *Salix* ..... **P. zaicevi** Šulc

– Fore wings without any shadows, veins of same color as wing, brown at apices. Parameres not as above; female genitalia narrow, longer than the other abdominal segments together (Figs. 413: 4, 5). 3.07-3.40. – Prim., Sakh., S Kur. (Kunashir). – Japan ..... **P. haimatsucola** Miyatake

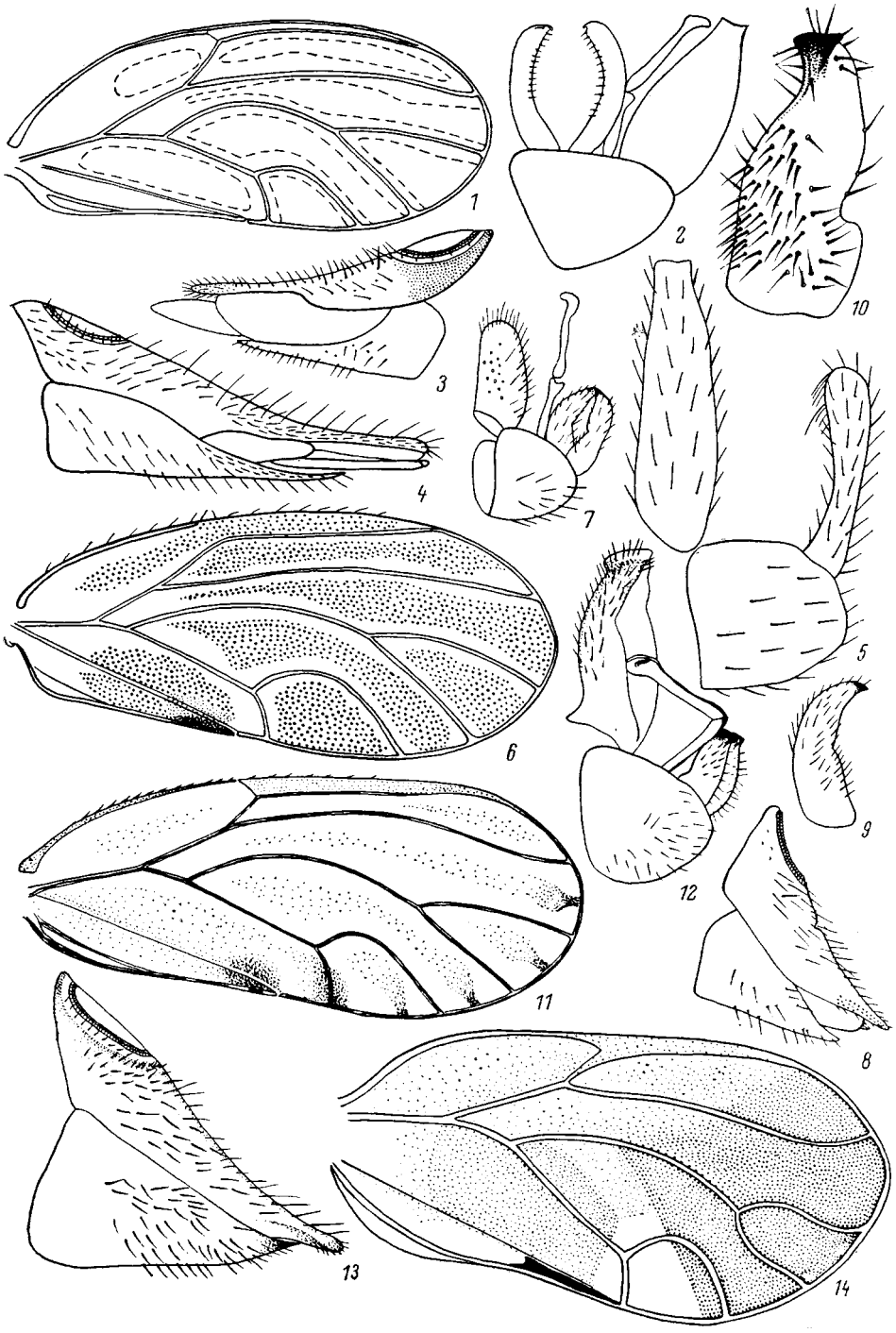


Fig. 411. Homoptera, Psyllinea. Fam. Psyllidae. (After Vondracek, Kuwayama, and original).

1-3, *Psylla betulaenanae*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, 5, *P. betulae*, genitalia, lateral (4, female; 5, male); 6-9, *P. araliae*: 6, fore wing; 7, 8, genitalia, lateral (7, male; 8, female); 9, paramere, inner view; 10-13, *P. crataegi*: 10, paramere, inner view; 11, fore wing; 12, 13, genitalia, lateral (12, male; 13, female); 14, *P. fulguralis*, fore wing.

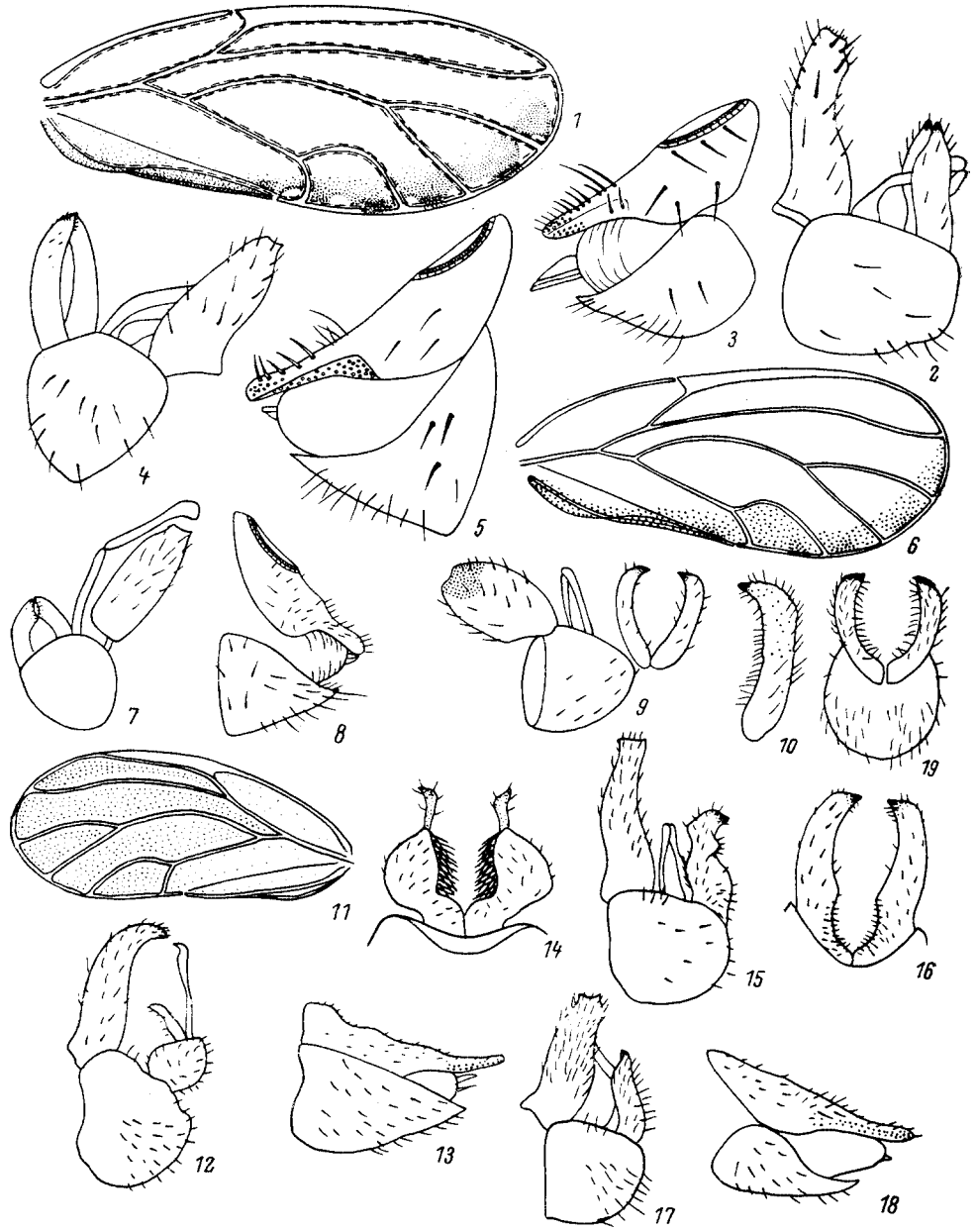


Fig. 412. Homoptera, Psyllinea. Fam. Psyllidae. (After Loginova, Ossiannilsson, Šulc, and original).

1-3, *Psylla ginnali*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, 5, *P. pseudosieboldiani*, genitalia, lateral (4, male; 5, female); 6-8, *P. moni*: 6, fore wing; 7, 8, genitalia, lateral (7, male; 8, female); 9, 10, *P. amabilis*: 9, male genitalia, lateral; 10, paramere, inner view; 11-14, *P. flori*: 11, fore wing; 12, 13, genitalia, lateral (12, male; 13, female); 14, male genitalia, back view; 15, 16, *P. moscovita*, male genitalia (15, lateral; 16, back view); 17-19, *P. myrtilli*: 17, 18, genitalia, lateral (17, male; 18, female); 19, male genitalia, back view.

18. Vertex markedly less than half as long as broad. Fore wings oblong-oval, with apex lying in cell *m* and with spot around clavus; veins brownish, lighter at base of wing; marginal spinules form bands in cells *rs*, m_1, m_2, cu_1, cu_2. Anal segment of female straight dorsally; parameres curved. (Figs. 416: 13-17). 3.05-3.40. – Mag., Chuk., Prim.; Yakutia, Siberia, Altai. – Mongolia. – On *Salix* .... **P. arcuata** Log.

– Vertex half as long as broad. Fore wings oval, with broadly rounded apex, broadest in apical third, with large black spot at the apex of clavus and anal suture; veins yellow, marginal spinules not visible only in cell cu_2 (Fig. 411: 6). Anal segment of female slightly concave dorsally, with not deep groove; parameres falcate (Figs. 411: 7-9). 3.30-3.75. – S Prim., S Kur. (Kunashir). – On *Aralia elata* ..... **P. araliae** Konov.

19. Apex of clavus not thickened 20
– Apex of clavus thickened 21

20. Fore wings oblong-oval, light, but black in autumnal specimens. Genal cones dark at base. Parameres compound (Figs. 414: 15-18). 3.3-3.5. – N Kur. (Paramushir). – Japan (Hokkaido) ..... **P. matsumurai** Miyatake
– Fore wings rounded-oval, slightly smoky. Genal cones light. Parameres simple (Figs. 412: 9, 10). 2.15-2.25. – Komandorskie Islands (Mednyy Island), S Kur. (Kunashir). – On *Vaccinium* sp. ..... **P. amabilis** Oss.

21. Fore wings with apical margin markedly slanting to Cu_2, transparent, colorless; veins brown; surface spinules not reaching veins; pterostigma at base half as broad as bordering area of cell *r*. – Body of overwintering specimens brown. Genal cones conical. Female genitalia long, straight dorsally, with anal segment flattened and curved downward at apex; parameres straight, broadest in the middle, their narrow apex curved inward (Figs. 413: 10, 11). 3.07-3.80. – Amur.; Altai, E Kazakhstan. – Japan, N Korea, Mongolia. – On *Salix* ..... **P. vondraceki** Klimasz.
– Apical margin of fore wings not slanting to Cu_2 22

22. Fore wings oval, broadest in the middle, transparent, rich yellow; veins of same color as wing; surface spinules reaching veins. Pterostigma narrow, long. Genal cones very large, broad. Male and female genitalia as in Figs. 412: 4, 5. 3.12-3.97. – Prim. – On *Acer pseudosieboldianum* ..... **P. pseudosieboldiani** Konov. et Log.
– Fore wings oblong-oval, broadest just distal to middle, smoky; veins light; surface spinules not reaching veins. Pterostigma short. Genal cones not large. Male genitalia as in Figs. 414: 10, 11. Body of overwintering specimens dark red. 2.9-3.1. – In mountains of Khab. and Prim.; North of European USSR. – Japan, Finland, Poland. – On *Ledum palustre* ..... **P. ledi** Fl.

23. Surface spinules on fore wings form darkenings 24
– Surface spinules on fore wings form no darkenings 32

24. Surface spinules densely covering fore wings, leaving a few light areas 25
– Surface spinules concentrated along veins or at apex of fore wings 26

25. Fore wings yellow, strongly darkened on margins and with light median zone (Fig. 419: 13). Genal cones very large, stumpy, slightly shorter than vertex, densely covered with setae, light. Parameres tapering toward apex, slightly rounded in the middle. 3.20-3.51. – S Prim., S Sakh. – Japan (Hokkaido, Kyushu). – On *Acer* ..... **P. japonica** Kuw.
– Fore wings almost entirely dark in apical third, little transparent, with light base of wing and area along Cu_2 (Fig. 411: 14). Genal cones slender, as long as vertex, not covered with setae, darkened to apex. Parameres not tapering toward apex. 2.35-2.50. – S Kur. (Kunashir). – Japan. In Japan on *Elaeagnus glabra* . **P. fulguralis** Kuw.

26. Surface spinules concentrated along veins of fore wings 27
– Surface spinules concentrated at apex of fore wings. – Fore wings slanting to Cu_2. Genal cones half as long as vertex 31

27. Body pitch-black. Veins convex, covered with bristles. Fore wings rounded, elongate. Surface spinules reaching veins, central part of cells without spinules. Genal cones broad at base, shorter than vertex. (Figs. 416: 22-25). 3.1-3.4. – Prim. – On cultured varieties of *Pyrus* ..... **P. nigella** Konov.

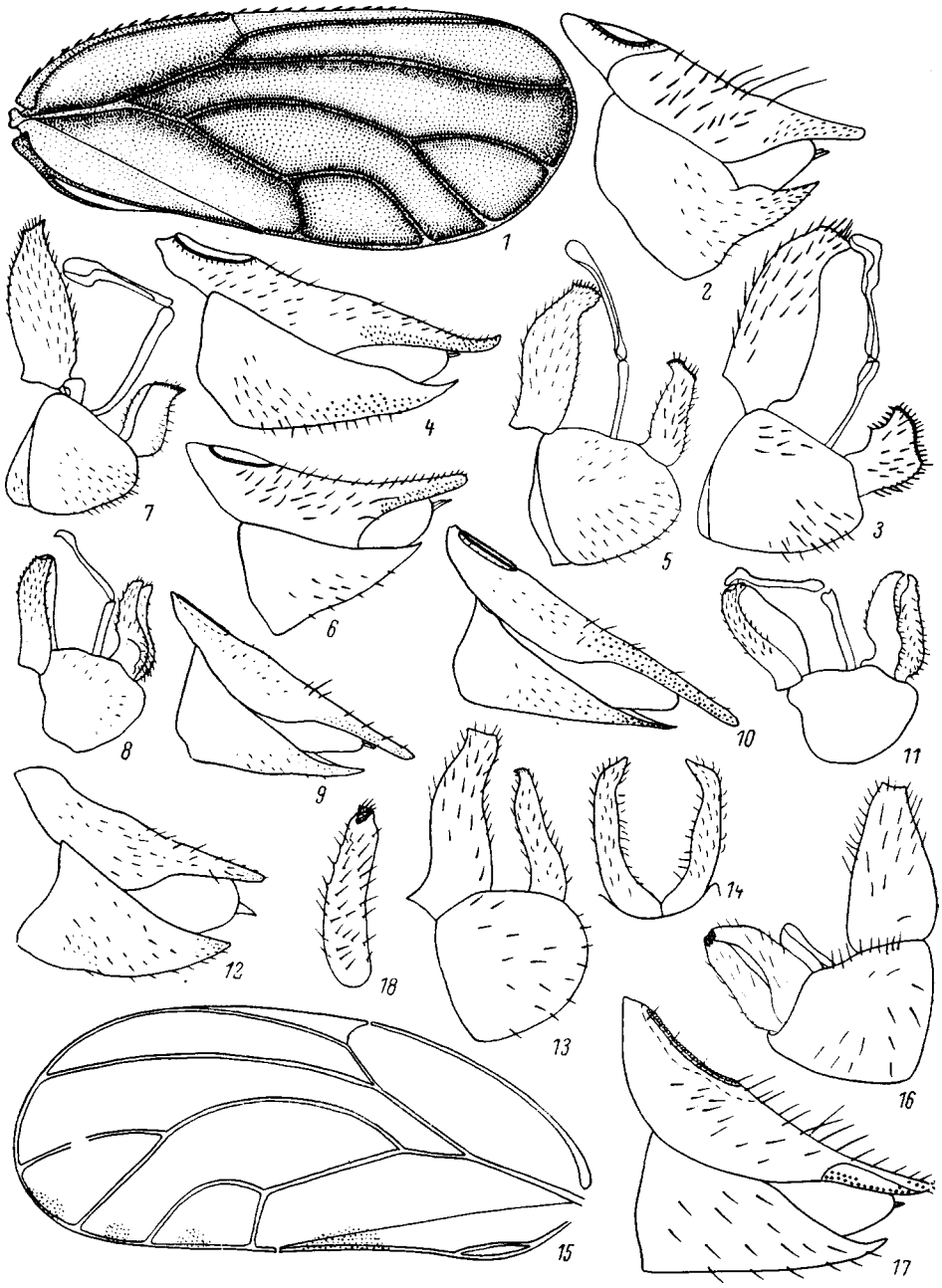


Fig. 413. Homoptera, Psyllinea. Fam. Psyllidae. (After Loginova, Miyatake, and original).

1-3, *Psylla malivorella*: 1, fore wing; 2-3, genitalia, lateral (2, female; 3 male); 4, 5, *P. haimatsucola*, genitalia, lateral (4, female; 5, male); 6, 7, *P. sorbicola*, genitalia, lateral (6, female; 7, male); 8, 9, *P. intacta*, genitalia, lateral (8, male; 9, female); 10, 11, *P. vondraceki*, genitalia, lateral (10, female; 11, male); 12-14, *P. sorbi*, genitalia, lateral (12, female; 13, male); 14, parameres, back view; 15-18, *P. octomaculata*: 15, fore wing; 16, 17, genitalia, lateral (16, male; 17, female); 18, paramere, inner view.

– Body much lighter. Veins not convex, without spinules 28

28. Surface spinules form large dark stripes along veins of fore wings. Fore wings transparent, oblong-oval. Genal cones not broad, as long as vertex, triangular-conical. Parameres not broad at base, sharply dilated to apex. (Figs. 413: 1-3). 2.5-2.85. – S Prim. – Japan (Honshu). – On *Malus* ..... **P. malivorella** Sasaki

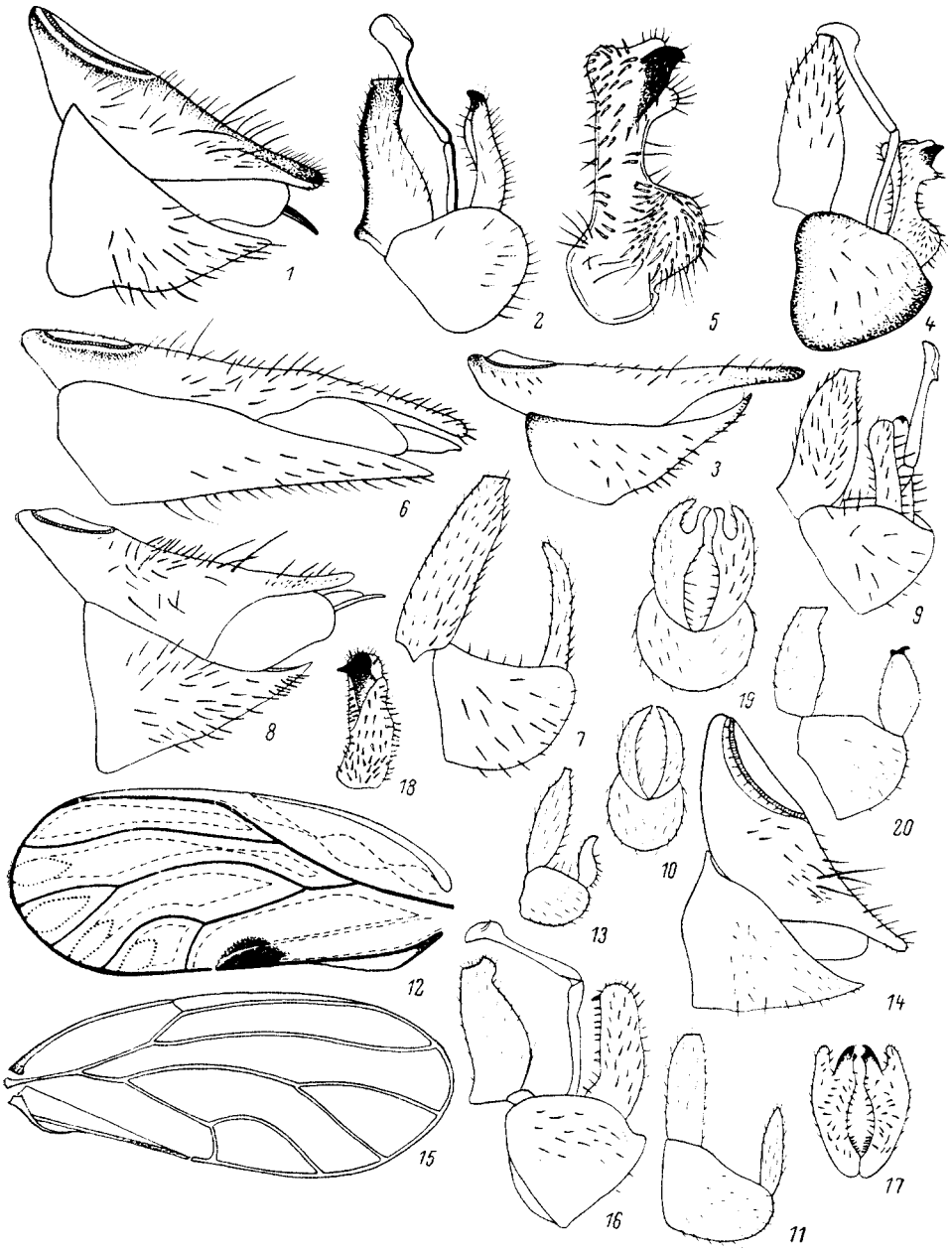


Fig. 414. Homoptera, Psyllinea. Fam. Psyllidae. (After Dobreanu and Manolache, Loginova, and Miyatake).

1, 2, *Psylla peregrina*: 1, 2, genitalia, lateral (1, female; 2 male); 3-5, *P. saliceti*: 3, 4, genitalia, lateral (3, female; 4, male); 5, paramere, inner view; 6, 7, *P. hartigi*, genitalia, lateral (6, female; 7, male); 8, 9, *P. rhododendri*, genitalia, lateral (8, female; 9, male); 10, 11, *P. ledi*, male genitalia (10, back view; 11, lateral); 12-14, *P. pyricola*: 12, fore wing; 13, 14, genitalia, lateral (13, male; 14, female); 15-18, *P. matsumurai*: 15, fore wing; 16, genitalia, lateral; 17, 18, parameres (17, back view; 18, inner view); 19, 20, *P. zaicevi*, male genitalia (19, back view; 20, lateral).

– Surface spinules form broad, lighter stripes along veins only in apical two-thirds of fore wings 29

29. Fore wings with light brown stripes, oblong-oval, smoky. Genal cones stumpy, broad, two-thirds as long as vertex. (Figs. 417: 1-3). 2.45-2.64. – S Prim. – On *Crataegus maximowiczii* ..... **P. orientalis** Konov.

– Fore wings with yellow stripes, oblong-oval 30

30. Surface spinules form large yellow stripes along veins; fore wings light yellow. Genal cones conical, shorter than vertex. Genital segment of female elongate, with deep transverse groove beyond perianal ring (Figs. 417: 4-7). 2-2.87. – S Prim. ..... **P. eximia** Konov.

– Surface spinules form narrow dark yellow stripes along veins of fore wings; fore wings yellow. Genal cones triangular-conical, markedly longer than vertex. Genital segment of female longer, straight, without groove. (Figs. 414: 6, 7). 2.75-2.9. – Sakh.; Caucasus, European USSR. – Japan, Europe, N America. – On *Betula* .... **P. hartigi** Flor

31. Fore wings uniformly yellow, narrowly oval (Fig. 417: 8). Veins not convex, without spinules. Vertex more than half as long as broad. Genal cones broad at base, blunt at apex. Parameres with apical processes (Fig. 417: 9). 2.5-3.2. – Kamch.; Yakutia, Irkutsk Prov., mountains of Altai, Kazakhstan, Caucasus. – Mongolia. – On *Spiraea* ..... **P. sarmatica** Löw

– Fore wings yellowish, lanceolate; veins convex, covered with sparse spinules. Vertex less than half as long as broad. Genal cones uniformly broad. Parameres oval, elongate; lateral margin retracted and curved inward in middle; sclerotized right-angled apical margin overhanging lateral margin. (Figs. 418: 9-12). 2.8-2.95. – Kamch. – On *Spiraea* sp. ..... **P. mirabilis** Konov.

32. Surface spinules on fore wings present only in cell cu_2. Groups of marginal spinules situated in cells *rs,* m_1, m_2, cu_1 of fore wings. Genal cones shorter than vertex, broadly triangular. Female genitalia long (at least as long as body), curved ventrad. Female and male genitalia as in Figs. 417: 10, 11. 3.65-4.5. – Prim.; Soviet Central Asia. – In Soviet Central Asia, on *Acer turkestanicum* .... **P. aceris** Log.

– Surface spinules on fore wings dense or sparse, present in apical half 33

33. Surface spinules reaching veins of fore wings 34

– Surface spinules not reaching veins of fore wings 42

34. Surface spinules on fore wings sparse. Fore wings oblong-oval, transparent, light 35

– Surface spinules on fore wings dense. Fore wings not as above, glassy 36

35. Female genitalia longer than the other abdominal segments together, sharply inclined downward. Body uniformly whitish apple-green. Genal cones slightly shorter than vertex. Fore wings thin; veins yellowish, hardly stand out against the background of wing. 3.57-3.87. – S Prim. – On *Padus asiatica* .... **P. longicauda** Konov.

– Female genitalia shorter, triangular-conical, not inclined downward. Body coral-red. Genal cones one-third as long as vertex. Fore wings shiny, thick; veins dark yellow. 2.9-3.2. – S Prim. – Japan (Hokkaido), China (including Taiwan) .... **P. coccinea** Kuw.

36. Fore wings oblong-oval, with uniformly rounded apex 37

– Fore wings elongate lanceolate, slightly slanting to Cu_2 along apical margin 40

37. Marginal spinules present in apices of all cells, except r. Veins convex. Fore wings transparent; pterostigma and veins darkish (Fig. 418: 5). Genal cones broad at base. Male and female genitalia as in Figs. 418: 6-8. 1.90-2.37. – Kamch. – On *Empetrum nigrum* ..... **P. minima** Konov.

– Marginal spinules absent. Veins not convex 38

38. Parameres S-shaped, narrowed to apex (Figs. 415: 7, 8). Fore wings oblong-oval, with broadly rounded apex. Cells m_1 and cu_1 nearly equal. 1.9-2.1. – Chuk.,

Mag. – Alaska. {Correct spelling: *phlebophyllae*} ..... **P. phlaebophylae** Hodk.
– Parameres not as above 39
39. Fore wings yellow, transparent, veins light. Genal cones triangular-conical, pointed at apex, diverging, half as long as vertex. Anal segment of female long, strongly concave and sharply narrowed to apex; posterior margin of parameres straight, anterior margin roundly dilated. (Figs. 415: 1-4). 2.5-2.8. – Prim. – On *Sorbus alnifolia* ..... **P. micromeli** Konov.
– Fore wings whitish, not transparent; veins of same color as wings. Genal cones thick, blunt at apex, close together, as long as vertex. Anal segment of female short, slightly pointed and curved dorsally at apex. Parameres simple, narrowed to apex. (Figs. 419: 9-12). 3.10-3.45. Everywhere. – Palearctic. – On *Salix* .... **P. ambigua** Först.
40. Parameres S-shaped; apical posterior angle sclerotized and retracted 41
– Parameres narrow, very long, straight posteriorly, convex anteriorly. – Fore wings whitish yellow, broadest in the middle, narrowly rounded and slightly slanting to Cu_2 along apical margin. Female genitalia long; anal segment straight dorsally, narrowed and strongly flattened at apex. (Figs. 415: 5, 6). 2.75-3.15. – Chuk., Mag., Kamch. – Holarctic. – On *Salix* ..... **P. palmeni** Löw
41. Fore wings transparent, narrow. Genal cones very large, broad at base, almost not diverging, as long as vertex. Parameres S-shaped posteriorly, apical margin retracted posteriad. (Figs. 413: 6, 7). 3.22-3.49. – N Prim., Kur. (Paramushir, Shumshu). – Japan (Hokkaido). – On *Sorbus sambucifolia* .... **P. sorbicola** Miyatake
– Fore wings semitransparent, elongate lanceolate. Genal cones sharply narrowed to apex, deeply notched along external margin, markedly shorter than vertex. Parameres as S-shaped plates; apical posterior angle retracted upward and inward and ending by sclerotized tooth. (Figs. 418: 1-4). 3.2-3.5. – Kamch. – On *Sorbus amurensis* ..... **P. fumosa** Konov.
42. Fore wings transparent 48
– Fore wings not transparent 43
43. Fore wings whitish or dirty whitish 44
– Fore wings yellow 45
44. Fore wings whitish, uniformly rounded along apical margin. Vertex half as long as broad. Genal cones slightly shorter than vertex, pointed at apex, as if flattened on sides. Anal segment of female with apex curved downward; parameres with angular lobe in the middle of posterior margin. (Figs. 416: 9-12). 2.9-3.5. – Chuk., Mag.; Yakutia. – On *Salix* ..... **P. sibirica** Log.
– Fore wings dirty whitish, oblong-oval, rounded and slanting to Cu_2 at apex. Vertex less than half as long as broad. Genal cones as long as vertex, conical. Anal segment of female slightly concave or straight dorsally; parameres weakly rounded, lobate, dilated ventrad. (Figs. 419: 5-8). 3-3.5. – Everywhere. – Palearctic. – On *Salix* ..... **P. pulchra** Zett.
45. Pterostigma narrow, long, lighter than fore wing 46
– Pterostigma broader, short, darker than fore wing 47
46. Fore wings narrow, broadest in apical third, slightly slanting from cell rs to Cu_1, transparent, yellow; veins convex. Female genitalia long, wedge-shaped; anal segment straight dorsally, flattened and curved ventrad at apex; parameres tapering toward apex (Figs. 413: 8, 9). 2.9-3.6. – Amur.; Kazakhstan, Volgograd. – Korea, Mongolia. – On *Salix* ..... **P. intacta** Log.
– Fore wings oblong-oval, with broadly rounded apex, light yellow; veins not convex. Female genitalia very long; anal segment concave dorsally. Parameres S-

shaped, elongate, broad, with small lobe. (Figs. 416: 5-8). 2.65-3.17. – Amur.; Chita Prov., Altai. – On *Salix* ..... **P. subpropinqua** Log.

47. Fore wings rounded, broadest in the middle. Genal cones hardly shorter than vertex, conical. Female genitalia wedge-shaped; anal segment slightly concave dorsally. Body rich brown. (Figs. 414: 8, 9). 2.1-2.4. – Palearctic. – On *Rhododendron* ..... **P. rhododendri** Put.

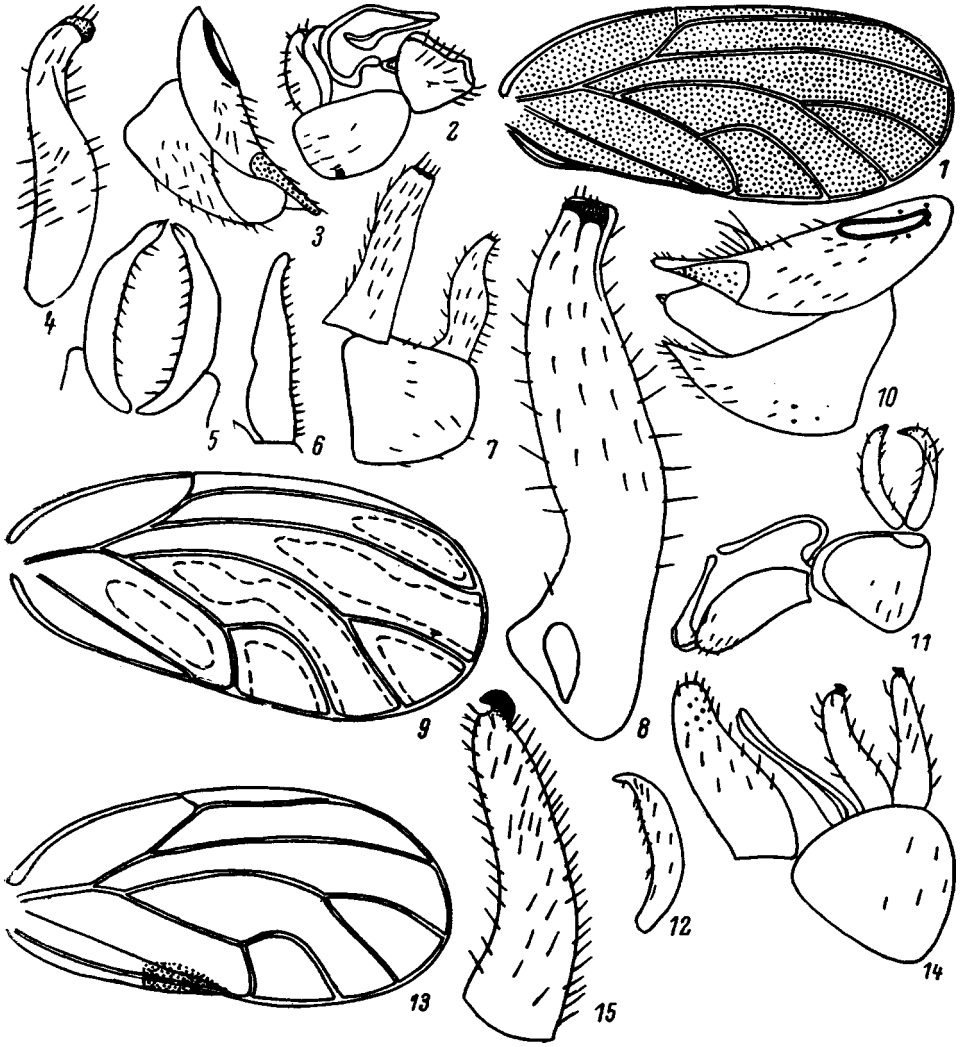


Fig. 415. Homoptera, Psyllinea. Fam. Psyllidae. (After Loginova, Hodkinson, and original).

1-4, *Psylla micromeli*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, paramere, inner view; 5, 6, *P. palmeni*: 5, male genitalia, back view; 6, paramere, inner view; 7, 8, *P. phlaebophylae*: 7, male genitalia, lateral; 8, paramere, inner view; 9-12, *P. diaphana*: 9, fore wing; 10, 11, genitalia, lateral (10, female; 11, male); 12, paramere, inner view; 13-15, *P. cunashiri*: 13, fore wing; 14, male genitalia, lateral; 15, paramere, inner view.

– Fore wings rounded oblong, broadest in apical half. Genal cones markedly shorter than vertex, strongly narrowed to apex. (Figs. 412: 17-19). 2.57-2.93. – Chuk., Khab., Prim.; North of European USSR. – Holarctic. – On *Vaccinium* sp. .. .. **P. myrtilli** W. Wagn.

48. Fore wings oblong-oval or oval, with uniformly rounded apex 50

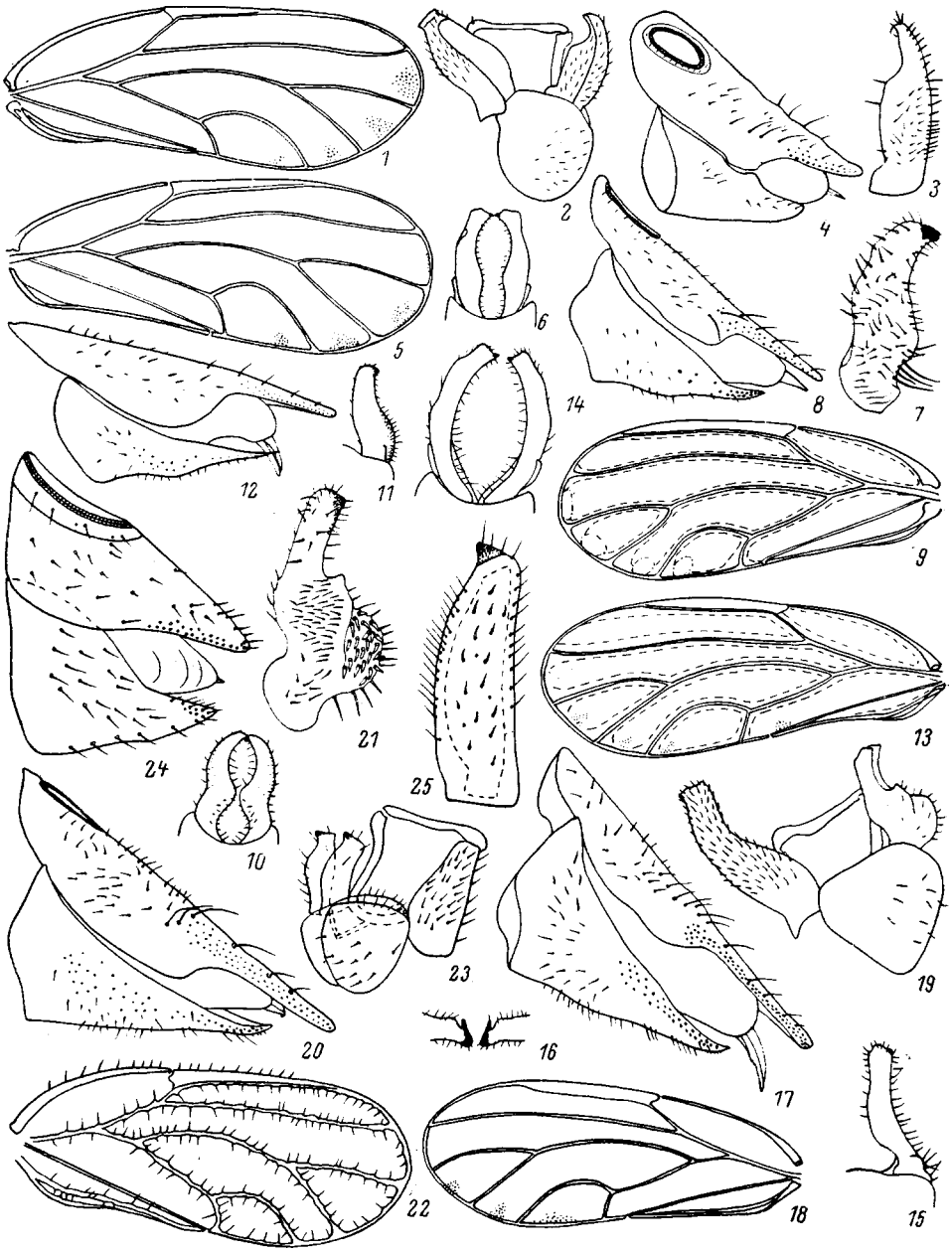


Fig. 416. Homoptera, Psyllinea. Fam. Psyllidae. (After Vondracek, Loginova, and original).

1-4, *Psylla unguigera*: 1, fore wing; 2, male genitalia, lateral; 3, paramere, inner view; 4, female genitalia, dorsal-lateral; 5-8, *P. subpropinqua*: 5, fore wing; 6, 7, parameres (6, back view; 7, inner view); 8, female genitalia, lateral; 9-12, *P. sibirica*: 9, fore wing; 10, 11, parameres (10, back view; 11, inner view); 12, female genitalia, lateral; 13-17, *P. arcuata*: 13, fore wing; 14-16, parameres (14, back view; 15, lateral; 16, dorsal); 17, female genitalia, lateral; 18-21, *P. zinovjevi*: 18, fore wing; 19, 20, genitalia, lateral (19, male; 20, female); 21, paramere, inner view; 22-25, *P. nigella*: 22, fore wing; 23, 24, genitalia, lateral (23, male; 24, female); 25, paramere, inner view.

– Fore wings transparent, oblong, slanting to Cu_2 at apex 49

49. Pterostigma narrow, darker than fore wings; veins brown, light at bases of fore wings (Fig. 416: 1). Genal cones slightly shorter than vertex, narrowly triangular. Female genitalia wedge-shaped; anal segment wavy dorsally (Fig. 416: 4). Parameres as in Figs. 416: 2, 3. 2.50-2.95. – Amur. – On *Salix*.. **P. unguigera** Log.

– Pterostigma broad, darker than fore wing at apex; veins light. Genal cones hardly longer than vertex, broadly triangular. Female genitalia triangular; anal segment straight dorsally, somewhat lowering apically. Parameres as in Figs. 414: 1, 2. 2.8-3.4. – Everywhere. – Palearctic. – On *Crataegus maximowiczii* .... *__P. peregrina__ Först.

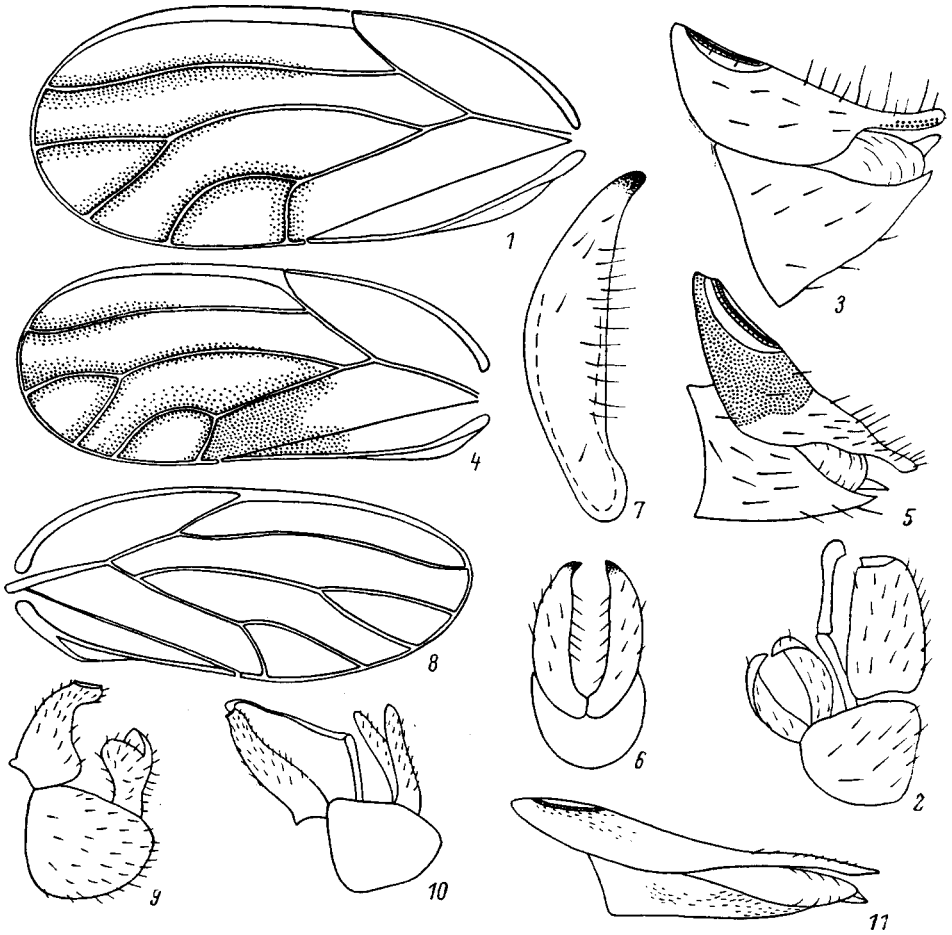


Fig. 417. Homoptera, Psyllinea. Fam. Psyllidae. (After Kuwayama and original).

1-3, *Psylla orientalis*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4-7, *P. eximia*: 4, fore wing; 5, female genitalia, lateral; 6, male genitalia, back view; 7, paramere, inner view; 8, 9, *P. sarmatica*: 8, fore wing; 9, male genitalia, lateral; 10, 11, *P. aceris*, genitalia, lateral (10, male; 11, female).

50. Fore wings oval, with uniformly rounded apex, broadest in apical third. – Pterostigma long, ending distal to middle of cell *r*, base of pterostigma almost as long as base of cell *r* (Fig. 415: 9). Veins convex. Female genitalia broad; anal segment straight dorsally. Anal tube of male slightly S-chaped anteriorly. (Figs. 415: 10-12). 2.97-3.45. – Prim. – On *Sorbus alnifolia* ..... **P. diaphana** Konov.
– Fore wings oblong 51
51. Pterostigma darker than fore wing 52
– Pterostigma not darker than fore wing 55
52. Pterostigma elongate, narrow, yellowish or smoky 53
– Pterostigma broad, of same color as wing. – Surface spinules of fore wings well marked. Genal cones triangular, diverging, slightly more than half as long as vertex. Female genitalia slender; anal segment slightly convex in the middle

dorsally. (Figs. 419: 1-4). 3.24-3.65. – Khab., Prim. – South of Palearctic. – On cultured varieties of *Pyrus* ..... ***P. pyrisuga** Först.

53. Pterostigma yellowish; fore wings transparent; veins yellowish at base, brown at apex. Genal cones not shorter than vertex, conical, little pointed at apex. (Figs. 416: 18-21). 2.77-3.15. – Amur.; Soviet Central Asia. – China ..... **P. zinovjevi** Log.

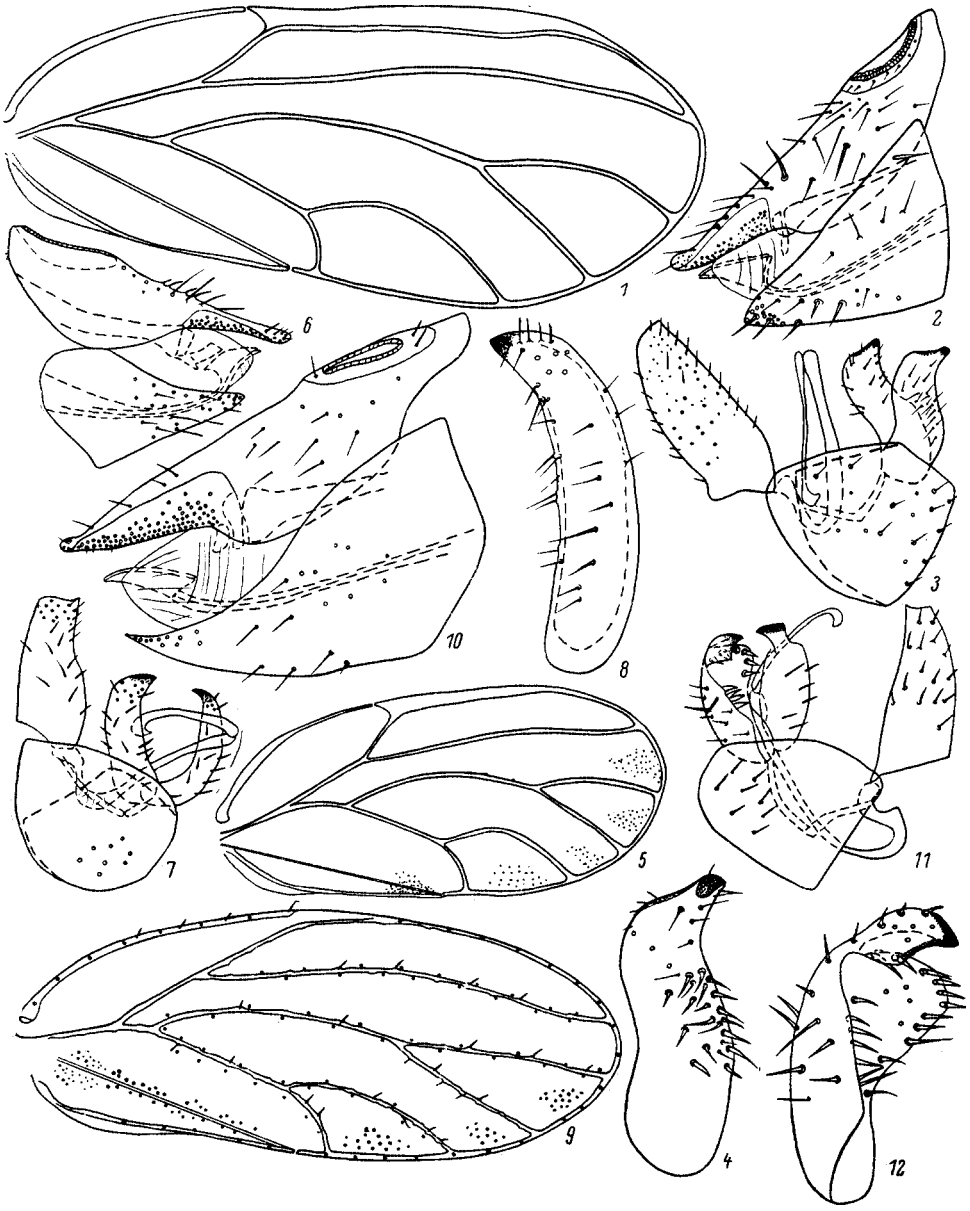


Fig. 418. Homoptera, Psyllinea. Fam. Psyllidae. (Original).

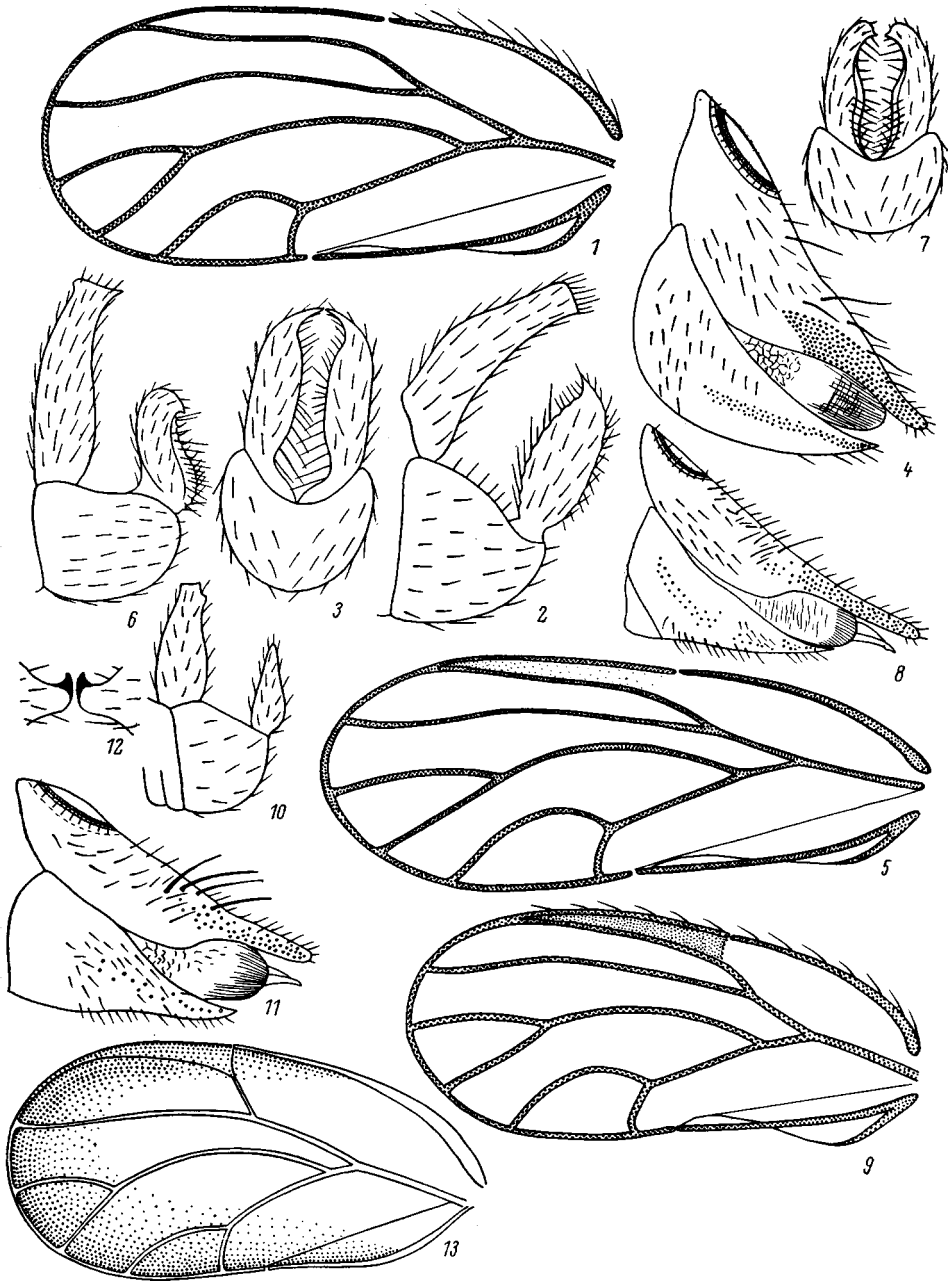
1-4, *Psylla fumosa*: 1, fore wing; 2, 3, genitalia, lateral (2, female; 3, male); 4, paramere, inner view; 5-6, *P. minima*: 5, fore wing; 6, 7, genitalia, lateral (6, female; 7, male); 8, paramere, inner view; 9, 10, *P. mirabilis*: 9, fore wing; 10, 11, genitalia, lateral (10, female; 11, male); 12, paramere, inner view.

– Pterostigma smoky. Fore wings light, transparent 54

54. Vertex hardly shorter than broad; genal cones longer than vertex, slender, triangular. Anal segment of female straight dorsally; posterior margin of parameres

with salience (Figs. 414: 3-5). 3.1-3.5. – Khab., Prim. – Palearctic. – On *Salix*..... ..... **P. saliceti** Först.

– Vertex half as long as broad; genal cones as long as vertex, conical. Anal segment of female dorsally almost straight, hardly curved at apex; parameres slightly inflated near base of posterior margin (Figs. 412: 15, 16). 3.1-3.45. – Khab., Prim. – Palearctic. – On *Salix*..... **P. moscovita** Andrianova



Pile. 419. Homoptera, Psyllinea. Fam. Psyllidae. (After Loginova, Vondracek, and original).

1-4, *Psylla pyrisuga*: 1, fore wing; 2, 3, male genitalia (2, lateral; 3, back view); 4, female genitalia, lateral; 5-8, *P. pulchra*: 5, fore wing; 6, 7, male genitalia (6, lateral; 7, back view); 8, female genitalia, lateral; 9-12, *P. ambigua*: 9, fore wing; 10, 11, genitalia, lateral (10, male; 11, female); 12, parameres, dorsal; 13, *P. japonica*, fore wing.

55. Surface spinules small, hardly visible. Fore wings shiny, transparent (Fig. 410: 1) 56
– Surface spinules larger. Fore wings shiny (Fig. 410: 9). Genal cones slender, long, their outer side notched, truncate at apex. Female genitalia long; anal segment straight dorsally, slightly curved dorsally at apex; parameres spiral, narrowed to apex, ending with sclerotized tooth (Figs. 410: 10-12). 3.2-3.5. – Prim.; Siberia, European USSR, Crimea. – Japan, China, Mongolia. – On *Crataegus maximowiczii* ..... ***P. melanoneura** Först.
56. Pterostigma darkened, elongate. Genal cones triangular. Male and female genitalia as in Figs. 410: 2-4. 3.4-3.7. – Everywhere. – Palearctic. – On *Malus mandshurica* ..... ***P. mali** Schmidberger
– Pterostigma darker and narrower. Genal cones conical. Male and female genitalia as in Figs. 413: 12-14. 2.85-3.20. – Prim. – Palearctic. – On *Sorbus amurensis* ..... ***P. sorbi** Edw.

4. Family **TRIOZIDAE**

Slender, with distinctly separated head; mesothorax little inflated, elongate, with semiconical prescutum; apex of prescutum rounded, overhanging pronotum to some extent. Propleurites turned up dorsad, visible as a small area on sides of pronotum. Fore wings membranous, usually without pattern, with more or less convex costal margin, angularly and gradually tapering toward apex; pterostigma and break of costal vein anterior to *R* absent. Break of anal vein far from apex of Cu_2; 3 principal veins originating at one point at base of wing. Apex of hind tibia with 3 or 4 (1+2, 1+3) saltatorial spines, tarsus without saltatorial spines. On grasses, herbs and trees. The family is not sufficiently known in Far East. – 4 genera, 26 species (in USSR more than 80 species).

KEY TO GENERA

1. General cones absent. – Genae as rounded lobes on sides of frontal sclerite. Vertex on posterior margin twice as broad as on anterior margin (Fig. 420: 11) ..... 1. **Rhinopsylla**
– Genal cones present 2
2. Fore wings with large, dark brown spot at branching of *M*, *Cu*, and *R; RS* thickened; veins with setae in basal half of fore wings. – 3rd antennal segment strongly thickened, completely covered with setae (Fig. 420: 13) ..... 2. **Eotrioza**
– Fore wings without spots; veins not thickened and not covered with setae 3
3. Body (especially head and thorax) covered dorsally with light setae. Genal cones more or less clavate, separated from vertex and genae by a slight constriction, below the vertex. Vertex markedly narrower between posterior angles than between anterior angles, little notched anteriorly, broadly rounded. 3rd antennal segment thickened ..... 3. **Trichochermes**
– Body (including head and thorax) dorsally without setae, sometimes except genal cones. Genal cones more or less conical, directed downward. Vertex between posterior angles not narrower than between anterior angles. 3rd antennal segment not thickened ..... 4. **Trioza**

KEY TO SPECIES OF FAMILY TRIOZIDAE

1. **Rhinopsylla** Riley. Most species in the New World. In USSR 1 species. {*Rhinopsylla* is a junior synonym of *Bactericera* Put., but *Rh. takahashii* is now placed in *Trioza*}.

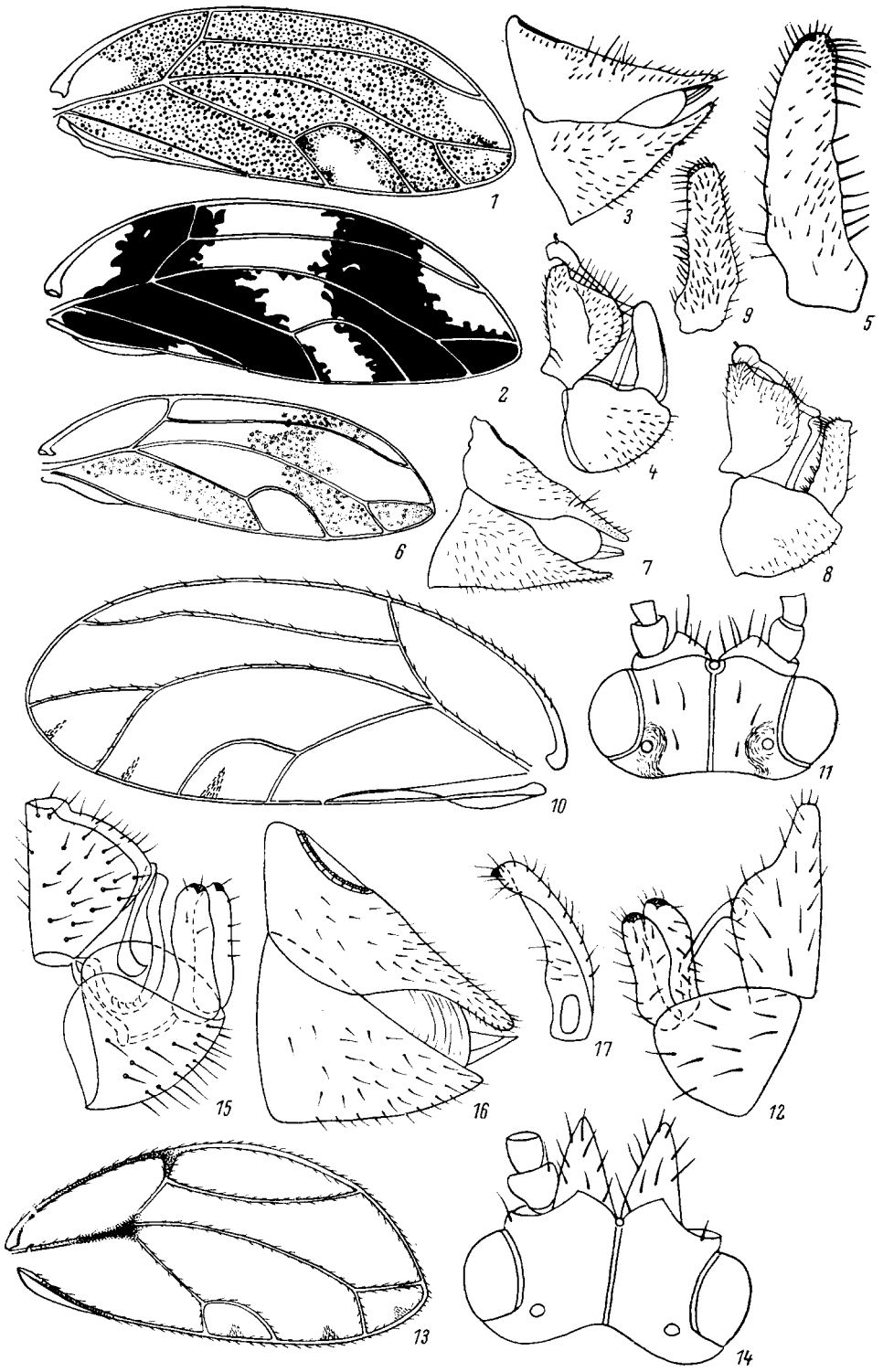


Fig. 420. Homoptera, Psyllinea. Fam. Triozidae. (After Loginova and original).

1-5, *Trichochermes gemellus*: 1, 2, fore wing (variation); 3, 4, genitalia, lateral (3, female; 4, male); 5, paramere, inner view; 6-9, *T. grandis*: 6, fore wing; 7, 8, genitalia, lateral (7, female; 8, male); 9, paramere, inner view; 10-12, *Rhinopsylla takahashii*: 10, fore wing; 11, head, dorsal; 12, male genitalia, lateral; 13-17, *Eotrioza ussuriensis*: 13, fore wing; 14, head, dorsal; 15, 16, genitalia, lateral (15, male; 16, female); 17, paramere, inner view.

1. Body with small, sparse setae. Pattern on head and thorax yellow-brown; abdomen and antennae, except 2 basal segments, brown. Fore wings transparent, glassy; veins light. (Figs. 420: 10-12). 4.54-4.82. – Sakh., S Kur. (Kunashir). – Japan (Hokkaido) ..... **Rh. takahashii** Boselli

2. **Eotrioza** Konov. Closely related to *Trichochermes* in several characters. Monotypic genus.

1. Yellow-brown, abdomen, 1st-3rd and 9-10th antennal segments and femora brown; abdominal tergites and antennal sockets pink. Fore wings light brown, semitransparent; dark brown spot present at branching of *C*+*R* and *M*+*Cu*; apices of *R* and *C* thickened and darkened; marginal spinules in cells m_1, m_2 and cu_2. Thorax, abdomen, head, 1st-3rd antennal segments and base of fore wings with bristles. (Figs. 420: 13-17). 4.16-4.30. – S Prim. ..... **E. ussuriensis** Konov.

3. **Trichochermes** Kirk. All species feeding on *Rhamnus*, gall-producing. – 2 species (in USSR 4 species).

1. Yellow-white, reddish on sides, pattern on head and thorax yellow-orange. Fore wings with 2 brown stripes: from apex of cell *r* to base of cell m_1 and from base of fore wings all along cell cu_2 (Fig. 420: 6). Median part of anal segment of female markedly inflated dorsally; male and female genitalia as in Figs. 420: 3-5. 5.2-5.6. – Prim. – On *Rhamnus davurica*..... **T. grandis** Log.
– Rich red, tergites pink, pattern on head, thorax, 1st-3rd and 9-10th antennal segments brown. Fore wings with rich brown, variable pattern (Figs. 420: 1, 2). Median part of anal segment of female not inflated dorsally; female and male genitalia as in Figs. 420: 3-5. 4.32-4.75. – Prim. – Mongolia ..... **T. gemellus** Log.

4. **Trioza** Först. On trees, shrubs and grasses, some species are gall-producing. – 35 species (in USSR more than 80 species), 22 species are included in the keys. {The following species are now placed in *Bactericera* Put.: *T. curvatinervis, T. calcarata, T. nigricornis, T. versicolor, T. arctica, T. atkasookensis, T. maura, T. albiventris, T. acutipennis, T. salicivora*, and *T. femoralis*}.

1. Fore wings markedly rounded at apex, transparent, 2.5 times as long as broad; *RS* ending distal to fork of *M* (Fig. 421: 1). – Surface spinules absent. Genal cones more than half as long as vertex. Antennae light; 9th and 10th antennal segments dark brown. Male and female genitalia as in Figs. 421: 2-4. 2.65-2.8. – Amur.; Altai. – Mongolia, Austria. {Correct spelling: *thomasii*} ..... **T. thomasi** Löw
– Fore wings angular at apex (Figs. 422: 11) 2
2. Surface spinules on fore wings absent 3
– Surface spinules present at least at bases of fore wings 10
3. Posterior margin of anal tube of male slightly inflated, without horizontal processes 4
– Anal tube of male with horizontal processes on posterior margin 5
4. Parameres S-shaped, tapering toward apex. Body yellow-orange. Genal cones half as long as vertex, broad at base and sharply narrowed in apical third. Male and female genitalia as in Figs. 422: 12-14. 3.45-4.15. – S Prim. – On *Eleutherococcus* ..... **T. eleutherococci** Konov.
– Parameres uniformly broad, with rib-shaped longitudinal ridge on convex external surface. Body brown. Genal cones as long as vertex, conical, weakly

diverging. (Figs. 423: 1-4). 4.6-5.8. – Prim. – On *Acanthopanax*. 2 generations, larvae in bladderlike galls on branches, leaves and inflorescences .... *__T. stackelbergi__ Log.

5. Genal cones as long as or longer than vertex 6
– Genal cones shorter than vertex 7

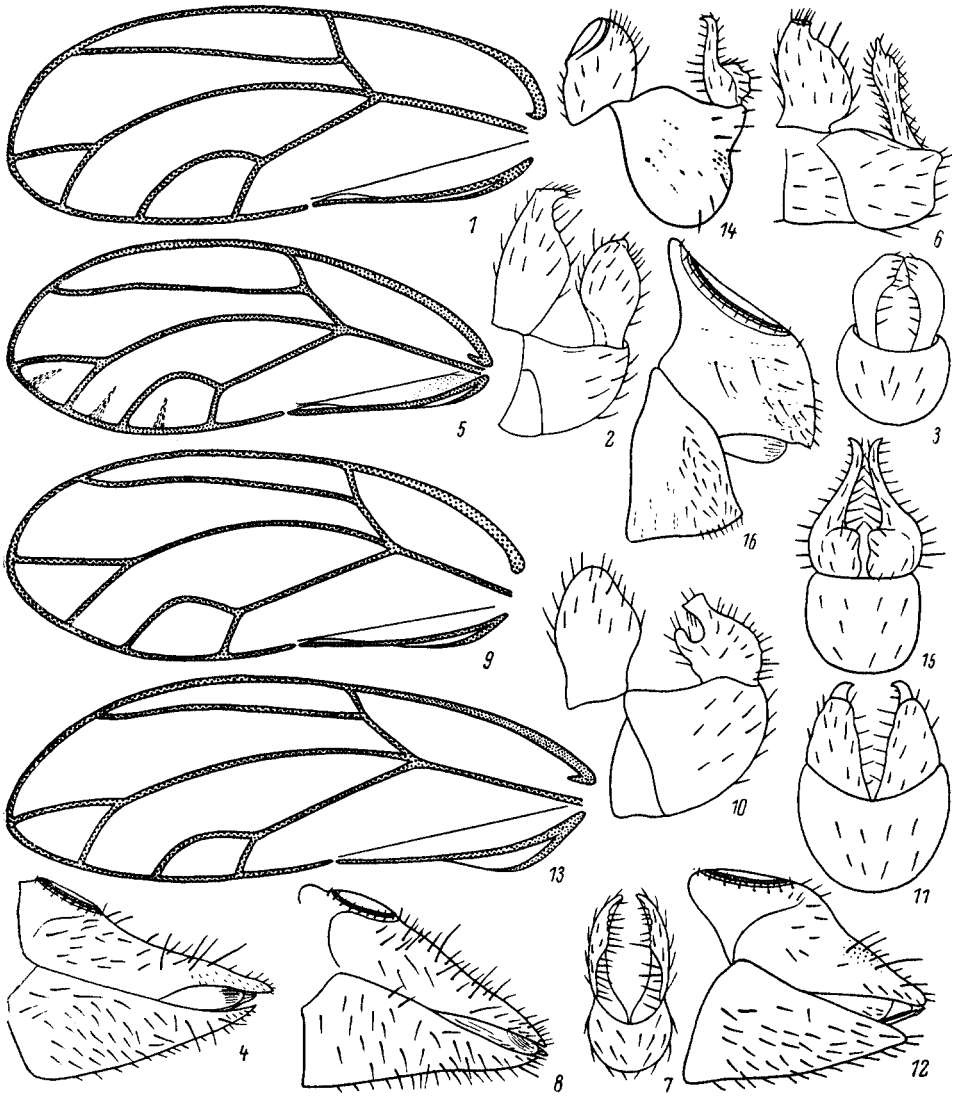


Fig. 421. Homoptera, Psyllinea. Fam. Triozidae. (After Vondracek, Dobreanu and Manolache, and Šulc).

1-4, *Trioza thomasi*: 1, fore wing; 2, 3, male genitalia (2, lateral; 3, back view); 4, female genitalia, lateral; 5-8, *T. urticae*: 5, fore wing; 6, 7, male genitalia (6, lateral; 7, back view); 8, female genitalia, lateral; 9-12, *T. munda*: 9, fore wing; 10, 11, male genitalia (10, lateral; 11, back view); 12, female genitalia, lateral; 13-16, *T. albiventris*: 13, fore wing; 14, 15, male genitalia (14, lateral; 15, back view); 16, female genitalia, lateral.

6. Genal cones longer than vertex. Antennae brown, except 3rd segment. Body brown. Fore wings broadest in apical third. Processes on posterior margin of anal tube of male triangular. Male and female genitalia as in Figs. 422: 1, 2. 3.35-3.8. – Prim. – Japan, Europe ..... **T. curvatinervis** Först.

– Genal cones as long as vertex. Antennae brown. Fore wings broadest just distal to middle. Body pitch-black. Processes on posterior margin of anal tube of male broader. – Figs. 424: 18, 19. 3.5-3.75. – Khab., Amur., Prim.; European USSR .... **T. calcarata** Schaefer

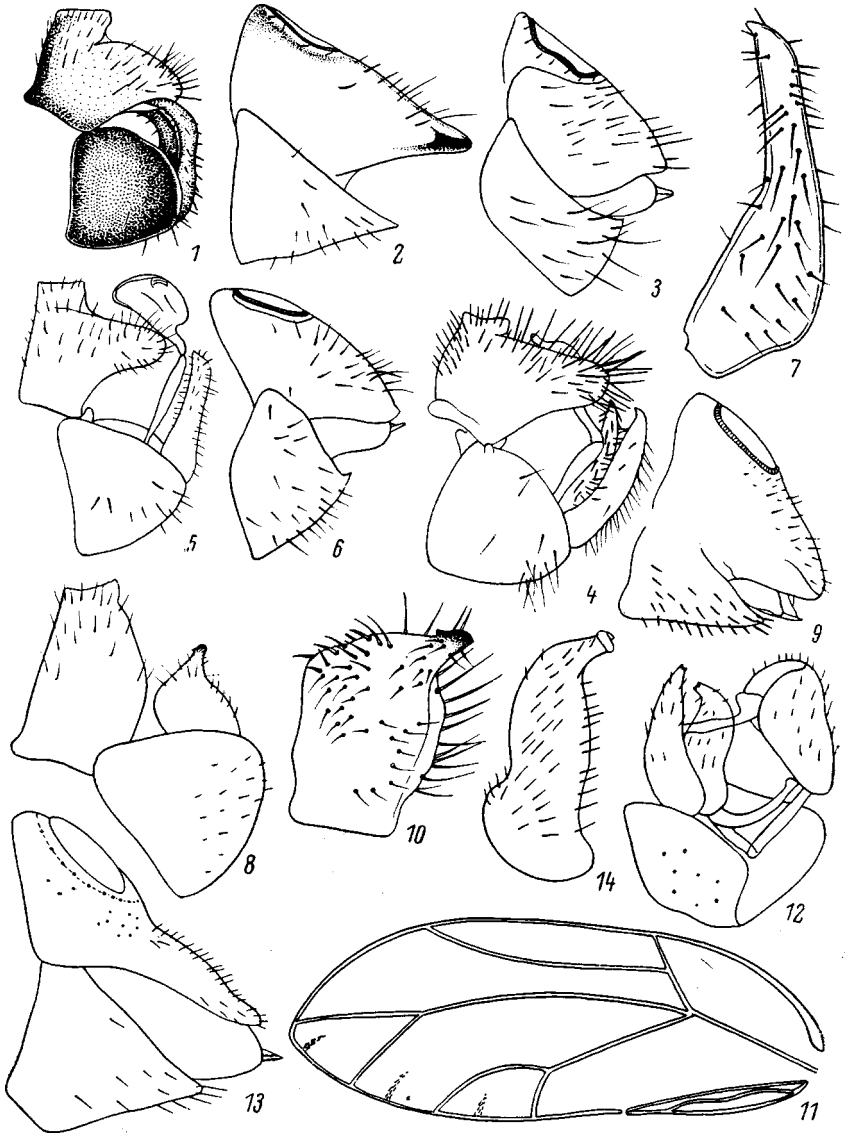


Fig. 422. Homoptera, Psyllinea. Fam. Triozidae. (After Vondracek, Šulc, and original).

1, 2, *Trioza curvatinervis*, genitalia, lateral (1, male; 2, female); 3, 4, *T. maura*, genitalia, lateral (3, female; 4, male); 5-7, *T. versicolor*: 5, 6, genitalia, lateral (5, male; 6, female); 7, paramere, inner view; 8-10, *T. apicalis*: 8, 9, genitalia, lateral (8, male; 9, female); 10, paramere, inner view; 11-14, *T. eleutherococci*: 11, fore wing; 12, 13, genitalia, lateral (12, male; 13, female); 14, paramere, inner view.

7. Genal cones less than half as long as vertex. – Vertex brown, with light edging laterally. Antennae dark; 4th antennal segment half as long as 3rd segment. Subcostal margin of fore wing inflated. Male and female genitalia as in Figs. 424: 2-4. 3.15-3.5. – Khab.; Kazakhstan, Transcaucasus, European USSR. – Mongolia, Asia Minor, Poland, Morocco ..... **T. nigricornis** Först.

– Genal cones slightly shorter than vertex 8
8. Processes on posterior walls of anal tube of male long. Genal cones straight along inner margin, slightly notched along external margin, dark in apical half. Antennae dark, 1st-3rd and base of 4th antennal segment light. Fore wings narrow, transparent. Male and female genitalia as in Figs. 422: 5-7. 3.1-3.7. – Amur. – Hungary ..... **T. versicolor** Löw
– Processes on posterior walls of anal tube of male rounded, short. Genal cones black 9
9. Vertex slightly more than half as long as broad. Genal cones as long as or slightly longer than vertex. Fore wings yellowish; veins yellow. Processes of anal tube rounded along lower margin. Figs. 423: 12, 13. 2.85-3.28. – Chuk., Mag. – Alaska. – On *Salix* ..... **T. arctica** Hodk.
– Vertex half as long as broad. Genal cones slightly shorter than vertex. Fore wings transparent, light, veins brown. Processes of anal tube obliquely truncate along lower margin. Male and female genitalia as in Figs. 423: 14-16. 2.57-3.12. – Chuk., Mag. – Alaska. – On *Salix* ..... **T. atkasookensis** Hodk.
10. Surface spinules present only at base of fore wing 11
– Surface spinules present on the whole wing 15
11. Anal tube of male with long processes on posterior margin or dilated to apex. Fore wings thin, shiny, transparent, apex in the middle cell m_1. Genal cones slightly longer than vertex, triangular, weakly diverging 12
– Posterior margin of anal tube of male slightly inflated 13
12. Anal tube of male with long processes at posterior margin. Surface spinules sometimes covering entire cell cu_2. Male and female genitalia as in Figs. 422: 3, 4. 4.3-4.68. – Amur.; European USSR. – N Mongolia, N Europe, USA. – On *Salix*. {Author: Först.} ..... **T. maura** L.
– Posterior margin of anal tube of male broadly dilated toward apex. Surface spinules situated in cell cu_1. Male genitalia as in Figs. 423: 17, 18. 3.3 – Sakh., Prim. ..... **T. kurentzovi** Konov.
13. *RS* of fore wings long, slightly sinuous, ending distal to fork of *M* (Fig. 421: 5). – Genal cones acute triangular, widely divided. Antennae black, except 3rd segment. Male and female genitalia as in Figs. 421: 6-8. 2.9-3.7. – Everywhere. – Transpalearctic species, to N India. – On *Urtica* ..... **T. urticae** L.
– *RS* of fore wings short, straight, slightly curved away from convex costal margin 14
14. Antennae 2.5 times as long as width of head, 3rd antennal segment 2.5 times as long as 4th segment. *RS* of fore wings ending far from fork of *M*. (Figs. 424: 5-8). 2.2-3. – Khab., Amur.; Siberia, Altai, Kazakhstan, Caucasus. – Japan, China (Taiwan), Mongolia, Europe. – On *Galium* sp. ..... **T. galii** Först.
– Antennae less than 2.5 times as long as width of head, 3rd antennal segment 4 times as long as 4th segment. *RS* of fore wings ending beyond level of fork *M*. Male and female genitalia as in Figs. 423: 10, 11. 2.65-3.10. – Amur., Prim.; Kazakhstan, Soviet Central Asia, European USSR. – Europe. – On *Atriplex*. {Junior synonym of *T. chenopodii* Reut.} ..... **T. obliqua** Thomson
15. Anal tube of male without horizontal processes on posterior margin 16
– Anal tube of male with horizontal processes on posterior margin 21
16. Fore wings more than 3 times as long as broad. Posterior margin of vertex with arched notch. Surface spinules sometimes in cells *r* and cu_1 of fore wings as small basal spots. (Figs. 421: 13-16). 3.20-3.65. – Everywhere. – Transpalearctic forest species. – On *Salix* ..... **T. albiventris** Först.
– Fore wings 2.3 times as long as broad. Posterior margin of vertex straight .. 17

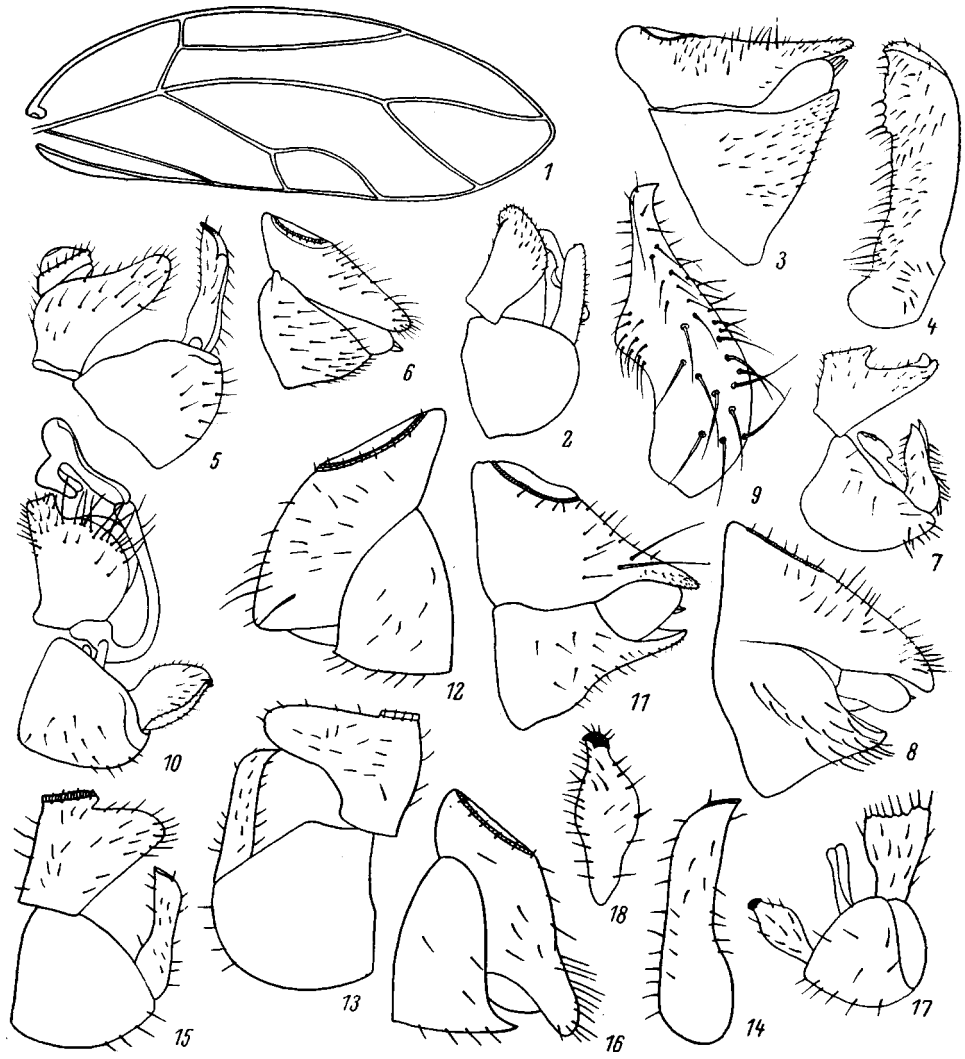


Fig. 423. Homoptera, Psyllinea. Fam. Triozidae. (After Hodkinson, Šulc, and original).

1-4, *Trioza stackelbergi*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, paramere, inner view; 5, 6, *T. acutipennis*, genitalia, lateral (5, male; 6, female); 7-9, *T. femoralis*: 7, 8, genitalia, lateral (7, male; 8, female); 9, paramere, inner view; 10, 11, *T. obliqua*, genitalia, lateral (10, male; 11, female); 12, 13, *T. arctica*, genitalia, lateral (12, female; 13, male); 14-16, *T. atkasookensis*: 14, paramere, inner view; 15, 16, genitalia, lateral (15, male; 16, female); 17, 18, *T. kurentzovi*; 17, male genitalia, lateral; 18, paramere, inner view.

17. Fore wings transparent; cell cu_1 much larger than cell m_1. Surface spinules reaching veins. Antennae light; 9th and 10th antennal segments black. 2.7-3.2. – Prim. – Europe. – In Europe, on *Aegopodium* sp. ..... **T. flavipennis** Först.
– Fore wings transparent, glassy; cells m_1 and cu_1 subequal 18
18. Surface spinules reaching veins of fore wings, not leaving free stripes. Genal cones triangular conical, half as long as vertex. Male and female genitalia as in Figs. 424: 15-17. 2.7-3.1. – Prim.; Transcaucasus. – Europe. – On *Rumex*..... **T. rumicis** Löw
– Surface spinules not reaching veins of fore wings 19
19. Posterior margin of anal tube of male straight; parameres drop-shaped, with apical margin retracted posteriad. (Figs. 422: 8-10). 2.6-2.9. – Sakh. – Transpalearctic species. {Figs. 422: 8-10 from Dobreanu and Manolache refer to *T. laserpitii*, not occurring in the Far East} ..... **T. apicalis** Först.

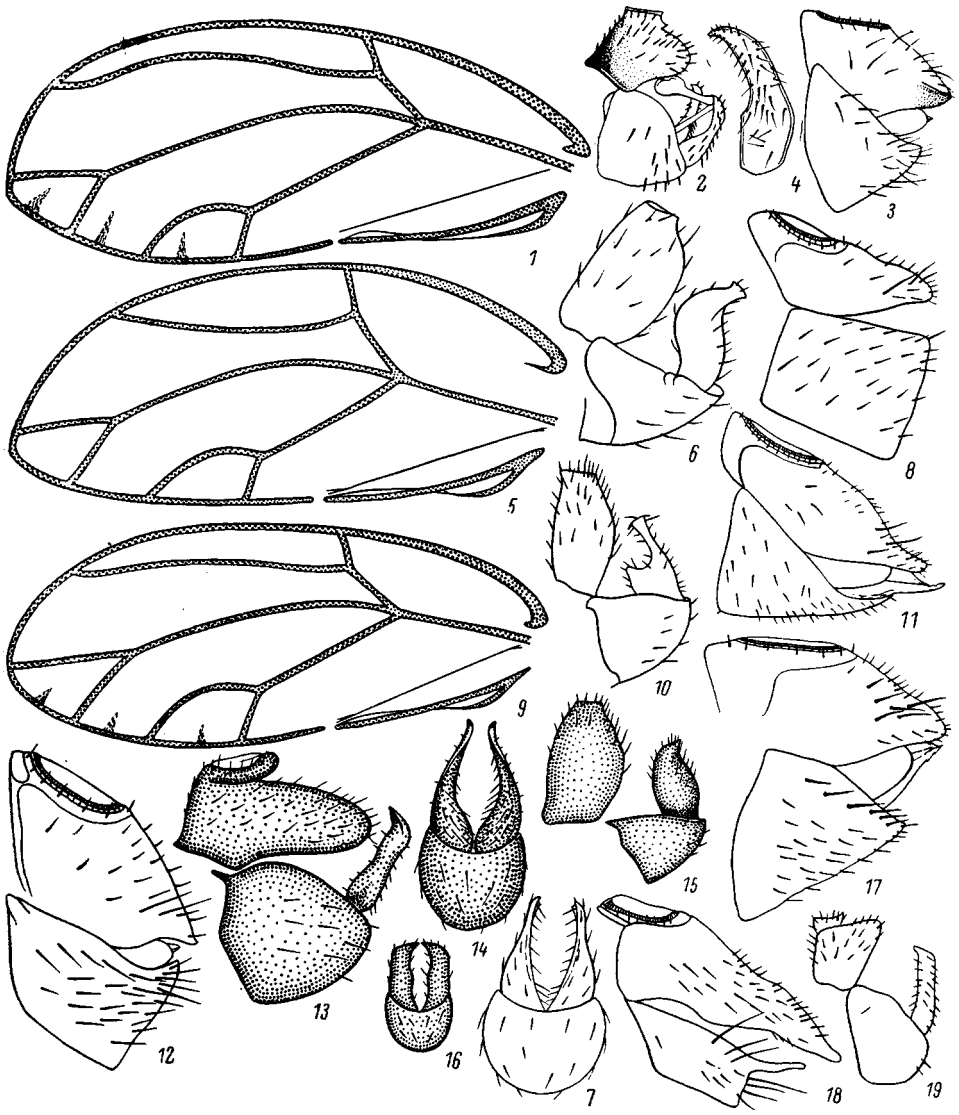


Fig. 424. Homoptera, Psyllinea. Fam. Triozidae. (After Šulc).

1-4, *Trioza nigricornis*: 1, fore wing; 2, 3, genitalia, lateral (2, male; 3, female); 4, paramere, inner view; 5-8, *T. galii*: 5, fore wing; 6, 7, male genitalia (6, lateral; 7, back view); 8, female genitalia, lateral; 9-11, *T. viridula*: 9, fore wing; 10, 11, genitalia, lateral (10, male; 11, female); 12-14, *T. salicivora*: 12, female genitalia, lateral; 13, 14, male genitalia (13, lateral; 14, back view); 15-17, *T. rumicis*: 15, 16, male genitalia (15, lateral; 16, back view); 17, female genitalia, lateral; 18, 19, *T. calcarata*, genitalia, lateral (18, female; 19, male).

– Anal tube of male inflated as a triangle along posterior margin; parameres with 2 apices (in lateral view!) 20

20. Anal segment of female slightly lowering apically. Genal cones isosceles triangular, with strongly diverging inner sides, light. Costal margin of fore wings inflated (Fig. 424: 9); veins light; 1st-4th antennal segments and half of 5th segment light, other segments dark. Male and female genitalia as in Figs. 424: 10, 11. 2.7-3.1. – Amur.; Siberia. – Japan, E China, Europe. {Misidentification; probably of *T. cirsii* Löw} ..... **T. viridula** Zett.

– Anal segment strongly lowering apically. Genal cones more stretched, dark at apex. Arcuate costal margin of fore wings (Figs. 421: 9) and veins brown; 1st, 9th

and 10th antennal segments black, other segments yellow. Male and female genitalia as in Figs. 421: 10-12. 2.7-2.9. – Amur.; Caucasus, Crimea. – Mongolia, W Europe ..... **T. munda** Först.

21. Surface spinules reaching veins of fore wings. Genal cones acute triangular, diverging at apex, as long as vertex, light. Fore wings amber-yellow; costal margin weakly convex. Male and female genitalia as in Figs. 423: 5, 6. 3.10-3.45. – Everywhere. – Palearctic ..... **T. acutipennis** Zett.

– Surface spinules leaving free stripes along veins of fore wings. Apex of fore wings lying in cell m_1, vein*s* darker than wing 22

22. Costal margin of fore wings straight. Fore wings yellowish. Head and thorax brick-red. Antennae filiform, black, 3rd antennal segment light. Processes of anal tube of male with broadly rounded apex (Figs. 424: 13, 14). Female genitalia as in Fig. 424: 12. 3.45-4.10. – Sakh.; North of European USSR. – Japan, N Europe . ..... **T. salicivora** Reut.

– Costal margin of fore wings strongly convex. Fore wings light yellow. Head and thorax dark. Antennae light; outer apical angles of 4th and 6th antennal segments pointed, saw-shaped. Processes of anal tube of male not as above. Male and female genitalia as in Figs. 423: 7-9. 3.05-3.50. – Amur. – Poland, Italy. – On *Alchemilla* ..... **T. femoralis** Zett.

INDEX: PSYLLINEA

Note. All page references correspond to the original Russian text, not to the translation. Junior synonyms are in italics and the names of families and taxa above family in bold-face type. Asterisked page numbers refer to pages with figures and the boldfaced ones, to first pages of the main texts on genera and suprageneric taxa.