

New Species of Mosquitoes in the Fauna of the USSR<sup>1-4</sup>

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This paper is an addition to the review of mosquitoes (Fauna of the USSR, vol. 3, issue 4) published in 1970. It describes mosquitoes, imagoes and larvae, found (165) in the USSR by the authors and other specialists in 1971-1978. Most of these new species belong to the vast genus *Aedes*. A new key has been composed for identification of all the 60 species of this genus found in the USSR: a) by external characters, b) by structure of male genitals, c) by IV instar larvae. Number of mosquito species (family Culicidae) in the fauna of the Soviet Union is over one hundred at present, including several doubtful species.

## FORWARD

A summary of the mosquitoes of the USSR fauna was written about 10 years ago (97) (Gutsevich et al., 1970). This summary included 85 species of mosquitoes (Family Culicidae), found by that time within the USSR. During the time the book was being published 2 new species of mosquitoes were described; 2 species new for the USSR fauna were found, and larvae of 2 species unknown before were discovered. Brief information about these 6 species was placed in this book in the form of a "Supplement", however, these species were not included in the identification keys and their descriptions were not accompanied by drawings.

During the following decade Soviet researchers have described 4 new species, have found 11 species new for the USSR fauna, and have proposed that 3 species be excluded from the list of mosquitoes of the USSR fauna. An earlier unknown male of one species has been described and it has been suggested that the status or

- 1 Translation of "Novyye Vidy Komarov Fauny Sovetskogo Soyuz", *Parazitologicheskii Sbornik* (Akademi Nauk SSSR, Leningrad, "Nauka"), 30:97-165 (1981).
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- 3 Translation edited by Ronald A. Ward, Department of Entomology, Walter Reed Army Institute of Research, Washington, D.C. 20012-5100.
- 4 The pages indicated in the outside margin in parenthesis ( ) correspond to the pagination from the Russian original.
- 5 The Summary was originally written in English.

names of 4 species be changed. All of these data have been "strewn", that is, scattered over various journals and other publications. It appeared that the most important need was to include the new, for the USSR fauna, species in the identification keys so that, we hope, this will substantially help all those persons who have anything to do with the identification of mosquitoes. Of course, the published identification keys for larvae, composed by A. S. Monchadskiy, that appear in the mentioned summary (Gutsevich et al, 1970) as well as the identification keys for adult mosquitoes, composed with the significant participation of A. A. Shtakel'berg, are widely used. Also, brief descriptions are presented of species --imago and larvae--found in the USSR during the last decade, as well as those species that have been modified by some type of change: change of status, name and others. Required information and literature references are also presented for those few cases when we were unable to agree with corresponding proposals.

The additions and changes in our knowledge about the mosquito fauna of the USSR, resulting from studies published in the last decade (1969-1978) pertain to the genera *Anopheles*, *Toxorhynchites*, *Aedes* and *Culex* (subgenus *Neoculex*). For these reasons the following material is presented:

List of mosquito species, found in the USSR (p.98).

Brief descriptions of *Anopheles sacharovi* and *An. maculipennis beklemishevi* (p.102).

Description of the *Toxorhynchites christophi* male (p.103).

Identification key for species in the genus *Aedes*: a) by external features, primarily of females (p.105), b) by male genitalia (p.110) and c) by larvae (p.113).

(98) Descriptions of *Aedes* species of USSR fauna, new for science and discovered first in the USSR, and species whose status or names have been changed (p.00) [sic p.119]

Description of *Culex (Neoculex) rubensis* (p.160).

Bibliography (p.162).

Since the present work is sort of an addition to the summary, published in the series "USSR Fauna" (Gutsevich et al., 1970), references to this work are given in an abbreviated form (Fauna...).

Authors of species are indicated in the list of species and are not repeated in the text. Abbreviations of generic names in those cases when the names of 2 genera start with the same letter (for example, *Anopheles* and *Aedes*, *Culiseta* and *Culex* are presented as was proposed earlier (Dubitskiy, 1970a); this system has taken root in our national literature. These abbreviations (*An.*, *Ae.*, *Cs.*, *Cs.*) coincide with those proposed in a special article on abbreviations of mosquito generic names (Reinert, 1975).

A number of mosquito species, known earlier only for North America, have been found in the Soviet Union in the last 10 years. In this respect, the number of species that may be treated as holarctic has grown. Now, there are 30 (total number is 104) of them counted in the USSR fauna, including 27 holarctic species of *Aedes*; this constitutes almost one-half of all species in this genus of the endemic fauna. Detailed data on the mosquitoes of North America, descriptions and classification keys may be found in the book by Carpenter and La Casse (Carpenter and La Casse 1955) that has been reissued in the USA without changes (Carpenter and La Casse, 1974). Additional information on individual species is given in the articles, for which references are given in corresponding places of the text.

We take the opportunity to express our gratitude to V. N. Danilov for making collection material and some published data from his studies available to us.

#### LIST OF MOSQUITO SPECIES OF USSR FAUNA

##### Family Culicidae (Mosquitoes)

##### Subfamily Anophelinae

##### I. Genus *Anopheles* Meigen — malarial mosquitoes

##### A. Subgenus *Anopheles* Meigen

1. *An. algeriensis* Theobald
2. *An. plumbeus* Stephens
3. *An. claviger* (Meigen)
4. *An. marteri* Senevet et Prunelle (?)
5. *An. maculipennis* Meigen
  - An. m. maculipennis* Mg.
  - An. m. messeae* Fall.
  - An. m. beklemishevi* Steg., Kab.
  - An. m. subalpinus* Hack., Lew.
  - An. m. atroparvus* V. Th.
6. *An. sacharovi* Favre
7. *An. lindesayi* Giles (?)
8. *An. hyrcanus* (Pallas)

##### B. Subgenus *Cellia* Theobald (= *Muzomyia* [sic., *Myzomyia*] Blanchard)

1. *An. pulcherrimus* Theobald
2. *An. superpictus* Grassi

##### Subfamily Toxorhynchitinae

##### I. Genus *Toxorhynchites* Theobald

1. *T. christophi* (Portschinsky)

## Subfamily Culicinae

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I. Genus *Uranotaenia* Lynch Arribalzaga

1. *U. unguiculata* Edwards

II. Genus *Orthopodomyia* Theobald

1. *O. pulchripalpis* (Rondani)

III. Genus *Culiseta* FeltA. Subgenus *Allotheobaldia* Brolemann

1. *Cs. longiareolata* (Macquart)

B. Subgenus *Culiseta* Felt

1. *Cs. glaphyroptera* (Schiner)
2. *Cs. alaskaensis* (Ludlow)  
*Cs. a. alaskaensis* (Ludl.)  
*Cs. a. indica* (Edw.)
3. *Cs. annulata* (Schrank)  
*Cs. a. annulata* (Schr.)  
*Cs. a. subochrea* (Edw.)
4. *Cs. bergrothi* (Edwards)
5. *Cs. morsitans* (Theobald)
6. *Cs. ochroptera* (Peus)
7. *Cs. setivalva* (Maslow)

IV. Genus *Mansonia* Blanchard

1. *M. richiardii* (Ficalbi)
2. *M. buxtoni* (Edwards)

V. Genus *Aedes* MeigenA. Subgenus *Ochlerotatus* Lynch Arribalzaga

1. *Ae. caspius* (Pallas)  
*Ae. c. caspius* (Pall.)  
*Ae. c. dorsalis* (Mg.)
2. *Ae. stramineus* Dubitsky
3. *Ae. campestris* Dyar et Knab
4. *Ae. gutzevichi* Dubitzky et Deshevykh
5. *Ae. pulchritarsis* (Rondani)  
*Ae. p. pulchritarsis* (Rond.)  
*Ae. p. asiaticus* Edw.
6. *Ae. cantans* (Meigen)

7. *Ae. riparius* (Meigen)
8. *Ae. mercurator* Dyar
9. *Ae. behningi* Martini
10. *Ae. excrucians* (Walker)
11. *Ae. euedes* Howard, Dyar et Knab (= *Ae. beklemishevi*)
12. *Ae. increpitus* Dyar (?)
13. *Ae. annulipes* (Meigen)
14. *Ae. fitchii* (Felt et Young)
15. *Ae. sergievi* Danilov, Markovich et Proskuryakova
16. *Ae. flavescens* (Müller)
17. *Ae. cyprius* Ludlow
18. *Ae. kasachstanicus* Gutsevich
19. *Ae. rusticus* (Rossi)
20. *Ae. refiki* Medschid
21. *Ae. subdiversus* Martini
22. *Ae. albescens* Edwards
23. *Ae. communis* (DeGeer)
24. *Ae. pionips* Dyar
25. *Ae. rempeli* Vockeroth
26. *Ae. punctor* (Kirby)
27. *Ae. hexodontus* Dyar
28. *Ae. punctodes* Dyar (?)
29. *Ae. sticticus* (Meigen)
30. *Ae. nigrinus* (Eckstein)
31. *Ae. hungaricus* Mihalyi
32. *Ae. diantacus* Howard, Dyar et Knab
33. *Ae. intrudens* Dyar
34. *Ae. thibaulti* Dyar et Knab
35. *Ae. pullatus* (Coquillett)
36. *Ae. nigripes* (Zetterstedt)
37. *Ae. impiger* (Walker)
38. *Ae. implicatus* Vockeroth
39. *Ae. burjaticus* Kuchartshuk (?)
40. *Ae. cataphylla* Dyar
41. *Ae. leucomelas* (Meigen)
42. *Ae. montchadskyi* Dubitsky
43. *Ae. detritus* (Haliday)
44. *Ae. simanini* Gutsevich

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B. Subgenus *Aedimorphus* Theobald

1. *Ae. vexans* (Meigen)  
*Ae. v. vexans* (Mg.)  
*Ae. v. nipponii* (Theob.)

C. Subgenus *Finlaya* Theobald

1. *Ae. geniculatus* (Oliver)
2. *Ae. nipponicus* LaCasse et Yamaguti
3. *Ae. alektorovi* Stackelberg
4. *Ae. togoi* (Theobald)
5. *Ae. koreicus* (Edwards)
6. *Ae. japonicus* (Theobald)

D. Subgenus *Stegomyia* Theobald

1. *Ae. aegypti* (Linnaeus)
2. *Ae. cretinus* Edwards
3. *Ae. sibiricus* Danilov et Filippova
4. *Ae. galloisi* Yamada
5. *Ae. flavopictus* Yamada

E. Subgenus *Aedes* Meigen

1. *Ae. cinereus* Meigen  
*Ae. c. cinereus* Mg.  
*Ae. c. rossicus* D.G.M.  
*Ae. C. esoensis* Yam.
2. *Ae. yamadai* Sasa, Kano et Takahasi
3. *Ae. sasai* Tanaka, Mizusawa et Sangstad

F. Subgenus *Neomelaniconion* Newstead (= *Banksinella* Theobald)

1. *Ae. lineatopennis aureus* Gutsevich

VI. Genus *Culex* LinnaeusA. Subgenus *Lutzia* Theobald

1. *Ch. [Cx.] fuscans* Wiedemann
2. *Cx. vorax* (Edwards)

B. Subgenus *Barraudius* Edwards

1. *Cx. modestus* Ficalbi
2. *Cx. pusillus* Macquart

C. Subgenus *Neoculex* Dyar

1. *Cx. territans* Walker
2. *Cx. rubensis* Sasa et Takahashi (?)
3. *Cx. hortensis* Ficalbi
4. *Cx. martinii* Medschid
5. *Cx. hayashii* Yamada

D. Subgenus *Culex* Linnaeus

1. *Cx. bitaeniorhynchus* Giles
2. *Cx. sinensis* Theobald
3. *Cx. whitmorei* (Giles)
4. *Cx. mimeticus* Noe'
5. *Cx. jacksoni* Edwards
6. *Cx. orientalis* Edwards
7. *Cx. tritaeniorhynchus* Giles
8. *Cx. univittatus* Theobald
9. *Cx. theileri* Theobald
10. *Cx. vagans* Wiedemann
11. *Cx. torrentium* Martini
12. *Cx. pipiens* Linnaeus
  - Cx. p. pipiens* L.
  - Cx. p. molestus* Forsk.

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Some aspects of the presented list require an explanation.

Two species of malarial mosquitoes of the native fauna--*An. pulcherrimus* and *An. superpictus*--belong to a subgenus, which earlier was commonly designated as *Myzomyia* Blanch. The name *Cellia* Theob. is accepted as having priority based on the date of publication (earlier by 18 days in the catalog of mosquitoes (Stone et al., 1959). We find it expedient to use the name *Cellia* because the catalog recommendation has been accepted by almost all authors.

*Culiseta glaphyroptera* and *Aedes rusticus* are included in the list on the basis that they were found in Zakarpatskaya [Transcarpathian] Oblast and Crimea. Their areas of distribution within the USSR limits apparently include only some mountainous regions of Western Ukraine and Crimea. *Culiseta fumipennis* (Stephens) is not included in the list because this species may be identified with complete reliability only by the larval stage, and the larvae of this mosquito, so far as known, have not been found within the USSR limits.

*Aedes (Stegomyia) aegypti* has not been seen in the USSR for several decades. Probably, the yellow fever mosquito has been eradicated from the USSR. It is included in the list because earlier it was widespread along the Black Sea coast and in some other places of Transcaucasia. Another species of the same subgenus--*Aedes (Stegomyia) cretinus* has not been found within USSR limits for the past 40 years. But since this is a tree hole "wild" species, no control measures have been conducted against it. Possibly, *Ae. cretinus* has been preserved in some places in the forests of Western Transcaucasia.

*Aedes hungaricus* (one female) was found in Ye. I. Tikhon's mosquito collections with the label "Moldavia, Yedinetskiy Rayon, 8 VI 73, ancient river bed of River Prut, flooded forest."

Six species of this list are marked with a question mark.

There are some doubts regarding the presence of *Anopheles lindesayi* and *An. marteri* in the USSR. Both of these species were discovered by M. N. Keshish'yan in Tadzhikistan, in the central part of the republic: Varzobskoye ushel'ye [ravine], Karatag, Bal'dzhuan. *Anopheles lindesayi* was also found in north Tadzhikistan (Hay) and in Western Pamir--Vanchskiy Rayon (Keshish'yan, 1941; Monchadskiy and Shtakel'berg, 1943). Later, we know these mosquitoes were not found in Tadzhikistan. The entomologist V. P. Bulychev visited some of these places in the summer of 1976, but did not find *An. lindesayi* nor *An. marteri*. Nevertheless, we are including these species "with a question mark" in the list of USSR mosquitoes until the time that a special investigation is conducted.

In regard to *Aedes increpitus*, whose discovery in the USSR was reported by V. N. Danilov (1976), there is some doubt whether this mosquito found in the USSR belongs to this species (see p.135). The independence of 3 other species--*Aedes punctodes*, *Ae. burjaticus* and *Culex rubensis* --requires confirmation.

(102) Recently (Danilov, 1978b), a study was published about the discovery of the *Aedes versicolor* (Barraud) mosquito in the Lenkoran region of the USSR. Specifically, it has been reported that the previously unknown larva of this mosquito has been found, but the larva left by Danilov in the collection of the Zoological Institute of the USSR Academy of Sciences, does not appear to differ in any way from the larva of *Ae. geniculatus*. The distinguishing structural features of the *Ae. versicolor* larva are not indicated. For this reason, we do not include *Ae. versicolor* in the List of Mosquito Species of The USSR Fauna.

#### Genus *Anopheles*

The list of malarial mosquitoes of USSR fauna has not undergone any important changes.

In regard to the "*Anopheles maculipennis* complex," whose members are considered as separate species by many authors, we consider them as subspecies, as before, because we do not see any basis for changing our viewpoint, which earlier was substantiated in brief (Fauna..., pp. 90-93). An exception may be made for *An. sacharovi*, which differs, although slightly, from other members of the "*Anopheles maculipennis* complex" in imagoes, larvae and egg structure. Preliminarily, we also consider *An. beklemishevi* as a subspecies (see farther) that has been described as a distinct species (Stegniy and Kabanova, 1976).

#### *Anopheles (Anopheles) sacharovi* Fávre.

It differs from *An. maculipennis*, a very close species, by its lighter colored body. The lateral portions of the mesonotum are yellowish-brown colored almost the same as the median portion. A light longitudinal stripe on the mesonotum, characteristic for *An. maculipennis*, is not present. The scales,



bordering the edge of the wing ("fringe"), are monochromatic, and not light as at the wing apex of *An. maculipennis*. Dark spots on the wings, particularly in males, are poorly developed and are barely distinguishable in old, worn specimens. All the indicated features are not of an absolute nature. In the same way, we were unable to find reliable differences on the basis of genitalia structure in males, and the head and its appendages in females. The specific status of *An. sacharovi* requires additional proof.

Eggs of *An. sacharovi* are unique: they lack air cells (air floats). Eggs, laid in the cool part of the year, have rudimentary air cells whose degree of development is quite variable.

Larva of stage IV (according to A. S. Monchadskiy) practically does not differ from that of *An. maculipennis*; the existing differences are only of a quantitative order, are expressed to an insignificant degree and generally lie within the limits of variation. Larvae of light, yellowish-green tones dominate. Coloring of the sclerotized structures (head, stigmal plate and others) is much less intense than in *An. maculipennis*; on the average, the larvae are smaller. The outer clypeal setae and the antennal seta are relatively longer than in *maculipennis*, whose outer clypeal setae generally extend beyond the margins of the lateral lobe of the labrum.

The stigmal plate differs in size and color intensity from that of *An. maculipennis*. Although this plate varies greatly in size, it is distinctly smaller and less intensely pigmented. The length fluctuates from 0.38 to 0.5 mm, the width between the tips of the lateral lobes is 0.39 to 0.52 mm. On the average, this is the smallest plate of the known representatives of the subgenus *Anopheles*. In shape this plate differs very little from that of *An. hyracanus*.

The central plate has a very poorly developed, light colored median granulation. Posteriorly, its dark section is limited only by the posterior margin, and farther anteriorly, it is usually discontinuous and becomes noticeable only in the middle. The base of the anterior lobe extends only slightly into the anterior part, where it breaks up in the shape of folds; these folds, in rare cases in highly pigmented specimens, extend into the central part as well. (103)

These features do not differ in any way from *An. maculipennis*.

Distribution. The Mediterranean subregion, mostly its eastern part: Italy, south of the Balkan peninsula, and the Near East. In the USSR--Central Asia, where with the exception of Kopet Dagh, *An. maculipennis* is absent. The northern boundary of the distribution area passes along the southern areas of Kazakhstan from the Aral Sea to Lake Balkash and the Dzungarian Alatau Range. It is widespread in the plain regions of Azerbaijan, including the Lenkoran lowlands, as well as in Dagestan, and to the north up to Makhachkala. It is found in the regions of Iran, Afghanistan and Republic of China that border the Soviet Union.

Biology. *Anopheles sacharovi* is characteristic for areas with a dry hot climate; it endures relatively cold winters. The larvae are found mostly in open, well lit shallow water basins that are rich in algae, not too densely overgrown with aquatic plant life, and sometimes have a high level of salts (up to 1.5-2.0%). They often coexist with *Culex modestus*. The larvae are not very mobile and rarely leave the water surface, and then only for a short time.

The imagoes winter mostly in populated localities, and often in natural refuges. They may take blood meals in the winter under suitable temperature conditions. In spring, the species is not very abundant, the maximum is generally in June-July. The numbers are found to be reduced in very hot places during the summer, but there is a new increase at the end of summer and in the fall. It readily flies into populated localities. It feeds on the blood of humans and farm animals. In some places they become very numerous and attack humans in large numbers. In all parts of its area of distribution, it has been in the past (and in some places still remains) a very important transmitter of malaria.

*Anopheles (Anopheles) maculipennis beklemishevi* Stegny et Kabanova.

It was described as an independent species and had been singled out by a "method of cytodiagnosics" (Stegny and Kabanov, 1976). No differences in coloring or external structure of the imagoes or larvae have been reported. The upper surface design of the eggs are similar to the eggs of *An. m. maculipennis*, but differ from them as well as from the eggs of *An. m. messeae* by a lesser width. The authors present the following arguments to prove the specific independence of the described mosquito: "1) Recorded chromosomal differences from all forms of "maculipennis"; 2) presence of fluctuating inversions, characteristic only for this species; 3) morphological differences of eggs; 4) reproductive isolation of *An. m. sp.* from the sympatric form of *An. m. messeae*." (Stegny and Kabanova, 1976, pp. 197-198).

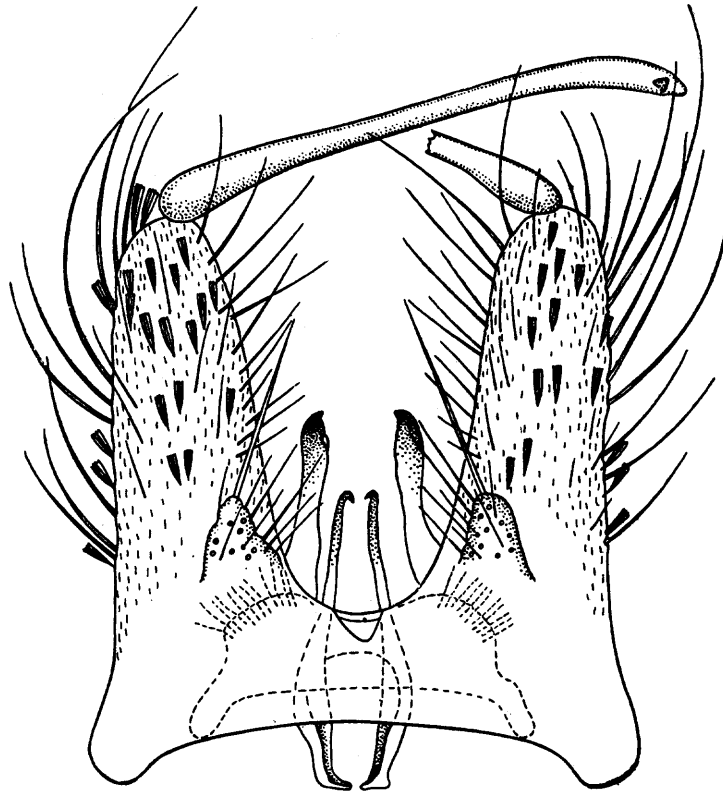
Distribution. Was described on the basis of material from the Tomsk Oblast. Is widespread in western and eastern Siberia (Krasnoyarsk, Gorno-Altai Oblast and Tyumen), is also found in the European part of the USSR (Cheboksary).

In our opinion, this taxon should be considered provisionally as a subspecies of *An. maculipennis* along with the other subspecies.

#### Genus *Toxorhynchites*

*Toxorhynchites (Toxorhynchites) christophi* (Portschinsky).

A description of the male of this mosquito appeared in print for the first time relatively recently (Shamray and Gutsevich, 1974). A specimen was discovered (bred from pupa, obtained from a tree hole in an elm) 64 km northeast of Khabarovsk.



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Fig. 1. Male genitalia of *Toxorhynchites christophi* (according to Shamray and Gutsevich, 1974).

The coloring is basically the same as that of the female. Male genitalia (Fig. 1): tips of the setae of the left and right coxites do not overlap; coxite lobe is conical with one long spine at the apex and several setae; the style is narrow, almost straight, and only in the top 1/4 is slightly bent; the style is significantly longer than the coxite; the end appendage, located a small distance from the style apex is barely noticeable; claspettes are absent; processes of the X sternite are straight and sclerotized; the phallosome is columnar and consists of 2 sclerotized plates, connected by a membrane; tergite IX along the sides of the posterior margin has 2 wide processes, supporting 17-19 long, narrow setae; the tergite margin between the processes is concave.

#### Genus *Aedes*

The list of the *Aedes* species found in the USSR in the last decade has changed significantly: it has been supplemented with 4 species new for science, and 8 species, discovered in the USSR for the first time, not counting the 6 species, appearing in "Fauna..in the "Supplement" section. Also, the names or status of 4 species have been changed. Below, descriptions of all 22 species of the indicated groups are given as well as new identification keys for the *Aedes* species of USSR fauna: a) according to external features b) according to structure of male genitalia and c) according to 4th stage larvae. Further, it is suggested that 3 species of *Aedes* be excluded from the list of mosquitoes of USSR fauna: *Ae. mariae* (p. 126), *Ae. lepidonotus* (p.140) and *Ae. nobukonis* (p.157).

- (105) A) IDENTIFICATION KEY FOR *AEDES* ACCORDING TO EXTERNAL FEATURES  
(MOSTLY ACCORDING TO FEMALES)
- 1 (50). Tarsi have light-colored rings, sometimes very narrow, more developed in hind tarsi.
  - 2 (13). Each light-colored ring encircles 2 tarsal segments: apex of one and base of the next one.
  - 3 (8). Wing veins are covered with light and dark scales, more rarely are covered with only light scales.
  - 4 (7). Abdomen dorsally has a light-colored longitudinal stripe or is entirely light-colored.
  - 5 (6). Mesonotum generally has 1 or 2 longitudinal stripes.  
 . . . . . *Ae. caspius*  
 . . . . . *Ae. campestris*  
 (Are differentiated by structure of male genitalia).
  - 6 (5). Mesonotum and abdomen have light straw-colored scales . . . . .  
 . . . . . *Ae. stramineus*
  - 7 (4). Abdomen dorsally is without a longitudinal light-colored stripe, has light-colored bands at the base of the tergites. . *Ae. gutzevichi*
  - 8 (3). Wing veins have uniformly dark scales.
  - 9 (10). Light-colored rings of the tarsi are very narrow, are developed only on the hindlegs, sometimes also on the midlegs. Palpi of males and females have uniformly dark scales. . . . . *Ae. alektorovi*
  - 10 (9). Light-colored rings are wider, are developed on all tarsi. Palpi are dark, with a white apex in the female and with white rings in the male.
  - 11 (12). Last tarsal segment is white. (Mediterranean subregion). . . . .  
 . . . . . *Ae. pulchritarsis*
  - 12 (11). Last tarsal segment is dark. (Far East) . . . . . *Ae. togoi*
  - 13 (2). Light-colored rings encircle only the base (or greater part, starting from the base) of the tarsal segments.
  - 14 (15). White rings on tarsi are very broad, only apices of segments are dark. On the hindtibiae, in addition to the contiguous scales, there are upright scales . . . . . *Ae. kasachstanicus*

- 15 (14). White rings on the tarsi are not as broad, not wider than 2/3 of the length of the segment, generally narrower.
- 16 (43). Proboscis is distinctly longer than the forefemor. Scales of the scutellum are yellowish or whitish, narrow and curved.
- 17 (20). Cerci are short, barely protrude. White spots along the sides of the abdominal segments are formed by silvery white scales.
- 18 (19). White rings are developed on 4 segments of the hindtarsus. Section below the mesothoracic spinacle has a band of wide white scales. . . . . *Ae. koreicus*
- 19 (18). On the hindtarsi there are white rings only on the first 3 segments. Section below the mesothoracic spiracle is without scales. . . . . *Ae. japonicus*
- 20 (17). Cerci are longer, distinctly protruding. Light-colored scales along the sides of the abdominal segments do not have a shiny silver color.
- 21 (22). White rings on the tarsi are very narrow, generally, do not exceed 1/4 of the length of the segment . . . . . *Ae. vexans*
- 22 (21). Light-colored rings on the tarsi are broader; on the middle segments of the hindtarsus the rings are at least 1/3 of the segment length. (The following species of the *cantans* group cannot always be reliably determined by the females).
- 23 (26). Abdomen has uniformly light-colored scales dorsally, sometimes single dark scales appear among them.
- 24 (25). General coloring of the female body is yellow ochre. Mesonotum has yellowish gold scales. Lateral surface of the thorax has cream-colored scales, which do not differ sharply in coloring from the mesonotum scales. . . . . *Ae. cyprius* (106)
- 25 (24). General coloring of the female body is yellowish-gray. Mesonotum is covered with fine rust brown scales. Lateral surface of the thorax is covered with grayish-white scales, which differ sharply in color from the darker scales of the mesonotum . . . . . *Ae. flavescens*
- 26 (23). Dark scales on the abdominal tergites appear in more or less significant numbers, sometimes they dominate (in some populations of *Ae. excrucians* from Siberia the abdomen is dorsally covered with almost uniformly light-colored scales; doubtful cases, attention is focused on the tarsal claw, characteristic for this species, see couplet 31).
- 27 (28). Wings, proboscis and palpi have uniformly dark scales . . . . . *Ae. mercurator*

- 28 (27). Wings, proboscis and palpi have mixed dark and light-colored scales or dark scales with an admixture of light-colored ones.
- 29 (30). Abdomen has mostly dark scales without light-colored bands, light-colored scales (in the female) generally are grouped into diffuse spots along the midline of the body. The mesonotum has small, uniformly rust-colored scales . . . . . *Ae. behringi*
- 30 (29). Abdomen has more or less developed light-colored bands dorsally or mixed light and dark scales. Mesonotum is of a different coloring: gold scales, light-colored scales with a dark longitudinal stripe or dark brown scales with indistinct light-colored patches. (The following species are determined with greater reliability on the structure of male genitalia).
- 31 (32). Tarsal claw is sharply curved, denticle is directed almost parallel to the top part of the claw. . . . . *Ae. excrucians*
- 32 (31). Tarsal claw is less curved with a clearly diverging denticle.
- 33 (36). Mesonotum has brown or dark brown scales, and is without a dark longitudinal stripe.
- 34 (35). Mesonotum has chocolate brown scales with small light-colored spots. Abdomen has mixed light-colored and dark scales dorsally, more rarely has indistinct light-colored bands at the base of the tergites. . . . . *Ae. cantans*
- 35 (34). Mesonotum has brown bronze scales without light-colored spots. Abdomen has distinct light-colored bands at the base of the tergites, and almost no light-colored scales against the dark background. . . . . *Ae. euedes*
- 36 (33). Mesonotum has a longitudinal stripe formed by dark scales.
- 37 (38). Abdomen has a longitudinal stripe of light-colored scales . . . . . *Ae. sergievi*
- 38 (37). Abdomen does not have a longitudinal light-colored stripe.
- 39 (40). Light-colored bands at the base of the abdominal tergites are clearly present; there are no light-colored scales or very few against the dark background of the posterior portion of the tergite . . . . . *Ae. increpitus*
- 40 (39). Light colored bands on abdominal tergites are indistinct.
- 41 (42). Posterior part of the abdomen has mostly light-colored scales dorsally . . . . . *Ae. fitchii*



- 58 (59). Light-colored bands on the abdominal tergites are not sharply defined and are not widened in the middle; sometimes, the abdomen has mixed light-colored and dark scales, generally the light-colored scales dominate . . . . . *Ae. refiki*
- 59 (58). Light-colored bands on the abdominal tergites are clearly defined and, generally, form a projection along the center line of the body . . . . . *Ae. rusticus*
- 60 (57). Scales of the upper part of the proepimeron are narrow and curved, and, if they are straight, then they are not black (yellowish or light brown). Mesonotum is generally without a dark longitudinal stripe.
- 61 (64). The light-colored scales on the tergites do not form transverse bands; abdomen is either entirely covered with light-colored scales, or a smaller or larger number of dark scales appear among the light-colored ones that sometimes form indistinct spots.
- 62 (63). Abdominal tergites are thickly covered with white scales without a mixture of dark ones or with a single dark one. Scales of the upper part of the proepimeron are almost straight and yellowish-white . . . . . *Ae. albescens*
- 63 (62). Abdominal tergites are less thickly covered with grayish-silvery scales with a considerable mixture of dark ones. Scales of the upper part of the proepimeron are narrow, curved and brown . . . . . *Ae. subdiversus*
- 64 (61). Abdominal tergites have basal bands with light-colored scales; there is also a greater or lesser number of light-colored scales on the posterior half of the tergites.
- 65 (66). Postcoxal scale patch is absent. Thorax integument brown. Light-colored scales are admixed with dark scales on the posterior half of tergites . . . . . *Ae. detritus*
- (108) 66 (65). Postcoxal scale patch is present. Thorax integument is brownish-black. Posterior half of tergites have dark scales with a larger or smaller (sometimes insignificant) mixture of light-colored scales . . . . . *Ae. simanini*
- 67 (56). Apical portions of the tergites have dark scales; light-colored scales form bands or spots along the sides or at the base of the tergites.
- 68 (71). Mesonotum has dense black setae. Setae are scattered over all the posterior half of the proepimeron. (Tundra, northern taiga).
- 69 (70). Light-colored scale patch on the sternopleuron extends to the anterior angle of the sclerite (at base of the forelegs). Tarsal claw is slightly curved and elongated . . . . . *Ae. nigripes*



- 70 (69). Light-colored scale patch on the sternopleuron does not extend to the anterior angle. Tarsal claw is sharply curved . . . *Ae. impiger*
- 71 (68). Setae of the mesonotum are not as long and dense, and are brown or golden. Setae on proepimeron are found only on the posterior margin.
- 72 (77). Light-colored scales are admixed with the dark ones on different parts of the wing, particularly on the costa and first radial veins.
- 73 (76). Proboscis has a significant mixture of light-colored scales, particularly in the middle.
- 74 (75). Mesonotum has golden yellow scales; whitish scales are located along the sides of the mesonotum, and they also form 2 small spots along its middle . . . . . *Ae. montchadskyi*
- 75 (74). Mesonotum has bronze brown scales, and lighter colored scales along its sides . . . . . *Ae. leucomelas*  
*Ae. burjaticus* (?)
- 76 (73). Proboscis has uniformly dark scales . . . . . *Ae. cataphylla*
- 77 (72). Light-colored scales on the wing are present only at its base or not at all.
- 78 (79). Forefemora are variegated anteriorly; numerous light-colored scales are mixed with dark ones . . . . . *Ae. implicatus*  
*Ae. burjaticus* (?)
- 79 (78). Forefemora are not variegated, have mostly dark scales or a small mixture of light-colored scales.
- 80 (83). A small patch of light-colored scales is found below the mesothoracic spiracle (hypostigmal spot).
- 81 (82). Patch of white scales on the mesepimeron extends to its lower margin. Integument of the mesonotum is black . . . . . *Ae. pullatus*
- 82 (81). Patch of white scales on the mesepimeron clearly does not extend to its lower margin. Integument of the mesonotum is brownish . . . . .  
. . . . . *Ae. intrudens*
- 83 (80). Hypostigmal spot is absent.
- 84 (85). Mesonotum has a wide stripe of dark scales that abruptly widens posteriorly; the stripe covers almost all the width of the posterior half of the mesonotum . . . . . *Ae. thibaulti*

- 85 (84). Mesonotum otherwise; uniformly colored or with 2 dark stripes close together, less often with one longitudinal stripe, which more or less is the same width throughout the mesonotum.
- 86 (87). Patch of white scales on sternopleuron does not extend to its anterior angle . . . . . *Ae. diantaeus*
- 87 (86). Patch of white scales on sternopleuron extends to its anterior angle (at the base of the forelegs).
- 88 (97). Patch of white scales on the mesepimeron extends to its lower margin.
- 89 (92). Postcoxal scales are absent (i.e., there are no scales on the membranous part between the sternopleuron and articulation of the prothorax with the forecoxae).
- 90 (91). Light-colored bands at the base of the abdominal tergites are more or less the same width . . . . . *Ae. communis*
- 91 (90). Light-colored bands at the base of the abdominal tergites are narrowed mesally . . . . . *Ae. rempeli*
- (109) 92 (89). Postcoxal scales are present.
- 93 (94). Base of costa with dark scales. Light-colored bands of abdominal tergites II-V are narrowed mesally . . . . . *Ae. punctator*
- 94 (93). Base of costa with some dark and light scales. Light-colored bands of the abdominal tergites II-V are of the same width or somewhat narrower mesally. (The following 3 species can be reliably distinguished by their larvae).
- 95 (96). Mesonotum has grayish-yellow scales with 2 indistinct dark stripes close together . . . . . *Ae. pionips*
- 96 (95). Scales of the mesonotum are rust brown . . . . . *Ae. hexodontus*
- 97 (88). Patch of white scales on the mesepimeron clearly does not extend to its lower margin.
- 98 (101). Hindtibiae are mostly covered with light-colored scales on the outer surface.
- 99 (100). Wings have dark scales. Light-colored abdominal bands are much narrower in the middle. First segment of the antennal flagellum is yellow at the base . . . . . *Ae. sticticus*
- 100 (99). Base of the wing has light-colored scales. The light-colored abdominal bands are more or less the same width. First segment of the antennal flagellum is black . . . . . *Ae. nigrinus*

- 101 (98). Hindtibiae are covered with dark scales on the outer surface . . . . . *Ae. hungaricus*
- 102 (51). Proboscis is not longer than the forefemur or (in *Ae. lineatopennis*) proboscis length slightly longer than forefemora.
- 103(104). Mesonotum has golden scales with a longitudinal dark stripe. Wings have a significant admixture of light-colored scales. Bright golden scales form a large patch on the occiput . . . . *Ae. lineatopennis*
- 104(103). Mesonotum is without a dark stripe. Wings have dark scales. Occiput does not have a patch of golden scales.
- 105(106). General coloring of the body is light, yellowish. Abdominal tergites have yellowish-brown scales without stripes or patches .*Ae. yamadai*
- 106(105). General coloring of the body is darker. Abdominal tergites have brownish scales or dark scales with light-colored bands at the base of the tergites and/or light-colored patches along the sides of the segments. . . . . *Ae. cinereus*  
*Ae. sasai*

(They are differentiated by structure of the male genitalia).

A key is presented below for recognition of taxa, which we treat as subspecies of *Aedes cinereus*, but which many authors consider as independent species (see: Tanaka et al., 1975).

- 1 (4). Abdomen at the top is dark, without light-colored bands.
- 2 (3). Scales of the mesonotum are relatively dark, reddish-brown and sometimes of a golden or bronze shade. Head has mostly dark scales . . . . . *Ae. c. cinereus*
- 3 (2). Scales of the mesonotum are lighter colored, golden brown or yellowish. Head has light-colored, whitish-gray scales . . . . *Ae. c. rossicus*
- 4 (1). Abdomen has light-colored bands at the base of the tergites and/or light-colored spots along the sides of the abdominal segments . . . . . *Ae. c. esoensis*

(110)

B) IDENTIFICATION KEY FOR *AEDES* SPECIES  
 ACCORDING TO MALE GENITALIA

- 1 (98). Simple style, that is, not divided into 2 branches. (Male palpi are approximately equal in length to the proboscis, sometimes slightly longer or slightly shorter than the proboscis).
- 2 (3). Style is articulated, insertion markedly subapical on coxite.  
 . . . . . *Ae. lineatopennis*
- 3 (2). Style is articulated at the apex of the coxite.
- 4 (91). Claspettes are present.
- 5 (80). Coxite has more or less developed basal and apical lobes (or one of these).
- 6 (11). Basal lobe of the coxite supports a number of long, lanceolate scales.
- 7 (8). Appendage of style is curved into an S-shape. . . . . *Ae. rusticus*
- 8 (7). Appendage of style is straight or almost straight.
- 9 (10). Claspette wing is elongated and has transverse striation. *Ae. refiki*
- 10 (9). Claspette wing is shorter and has no striation. . . *Ae. subdiversus*
- 11 (6). Basal lobe of the coxite lacks lanceolate scales.
- 12 (17). Coxite with 3 spines on its inner side, 2 of which are generally located on the basal lobe.
- 13 (14). Coxite has a tuft of thick setae directed inward. . . *Ae. diantaeus*
- 14 (15). Coxite has no tuft of setae directed inward.
- 15 (16). Claspette stem with a finger-shaped process near the middle. Coxite has a distally directed tuft of setae at the apex . . *Ae. intrudens*
- 16 (15). Claspette stem does not have a process. Coxite is without a tuft of setae . . . . . *Ae. pullatus*
- 17 (12). Coxite with 1-2 spines on its inner side or is completely without spines.
- 18 (19). Claspette stem has a lateral appendage on its upper quarter. Claspette wing is wide and leaflike . . . . . *Ae. thibaulti*
- 19 (18). Claspette stem has no lateral appendage. Claspette wing is generally elongated, not leaflike.

- 20 (23). Basal lobe of the coxite has 2 spines.
- 21 (11). Tarsi have light-colored rings<sup>1</sup> . . . . . *Ae. caspius*  
*Ae. stramineus*
- 22 (21). Tarsi are dark, without light-colored rings . . . *Ae. hungaricus*
- 23 (20). Basal lobe of the coxite has one spine (strong bristle) or no spines at all.
- 24 (35). Apical lobe of the coxite is poorly developed, sometimes cannot be distinguished at all.
- 25 (26). Apical lobe is absent. Basal lobe has a long spine, curved apically . . . . . *Ae. pulchritarsis*
- 26 (25). Small apical lobe is present. Basal lobe has setae and bristles; sometimes one of these is distinguished by greater thickness.
- 27 (28). Basal lobe is long, curved and without a spine or strong bristle. . . . . *Ae. rempeli*
- 28 (27). Basal lobe is of a different shape, generally has a spine or strong bristle.
- 29 (30). Basal lobe is extended longitudinally and barely projects into the interspace between the coxites. (Tarsi have light-colored rings) . . . . . *Ae. campestris*
- 30 (29). Basal lobe is convex and projects into the interspace between the coxites. (Tarsi are dark, without light-colored rings). (111)
- 31 (32). Poorly developed basal lobe has no spines or strong bristles. . . . . *Ae. gutzevichi*
- 32 (31). Basal lobe has fairly long bristles, sometimes one of them is distinguished by greater thickness.
- 33 (34). Coxite has long setae. Basal lobe has no spine (strong bristle). Phallosome is strongly sclerotized and bifurcate. Processes of tergite IX have 14-20 bristles each . . . . . *Ae. nigripes*
- 34 (33). Coxite has shorter setae. Basal lobe has a strong bristle. Phallosome is slightly sclerotized and is bidentate. Processes of tergite IX have 4-12 bristles . . . . . *Ae. impiger*
- 35 (24). Apical lobe is well developed.

<sup>1</sup>These species are not differentiated according to males.

- 36 (71). Base of coxite has a spine or strong bristle.
- 37 (42). Claspette wing is without a transparent widening.
- 38 (41). Claspette stem is short, claspette wing is slightly widened.
- 39 (40). Claspette wing is relatively short and wide, and moderately or intensely sclerotized. Spine of basal lobe is clearly distinguishable among proximal bristles . . . . . *Ae. punctor*  
*Ae. hexodontus*  
 (They are differentiated by structure of larvae).
- 40 (39). Claspette wing is elongated, narrow, poorly sclerotized. Spine of basal lobe is difficult to differentiate from proximal bristles . . . . . *Ae. punctodes*
- 41 (38). Claspette stem is long; claspette wing is very narrow and poorly sclerotized . . . . . *Ae. communis*  
*Ae. pionips*  
 (They are differentiated by structure of larvae).
- 42 (37). Claspette wing has a transparent widening, sometimes noticeable only when the claspette is in a certain position.
- 43 (46). Claspette stem is long and sharply curved outward. Coxite with thick, long setae; ends of setae of both coxites overlapping.
- 44 (45). Processes of tergite IX have 6-10 short, straight bristles each . . . . . *Ae. cataphylla*
- 45 (44). Processes of tergite IX have 10-15 relatively long bristles, directed somewhat outward . . . . . *Ae. leucomelas*
- 46 (43). Claspette stem is short (and, if it is long, then it is not sharply curved). Setae of both coxites, generally, do not overlap.
- 47 (50). Apical lobe has a broad base; extending proximally to middle of the coxite. Claspette wing is short.
- 48 (49). Distal part of the basal lobe is narrow . . . . . *Ae. sticticus*
- 49 (48). Distal part of the basal lobe is broader and rounded. . *Ae. nigrinus*
- 50 (47). Apical lobe reaches to distal third of the coxite. Claspette wing is relatively long.
- 51 (52). Basal lobe is narrow, and significantly higher than wide at the base. Claspette wing is very broad, and is wider than long. . *Ae. cantans*

- 52 (51). Basal lobe is conical or is rounded at the apex, and its height does not exceed the width at the base. Claspette wing is narrower, and the width is less than the length. (112)
- 53 (68). Spine at the coxite base is well developed; it is clearly distinct from the proximal bristles and setae.
- 54 (63). Claspette wing has a well developed "handle," that is, a lamellar widening starts away from the wing base.
- 55 (56). Basal lobe has short setae inserted on well developed small tubercles . . . . . *Ae. flavescens*
- 56 (55). Basal lobe, in addition to a spine, has a certain number of relatively long setae.
- 57 (58). Coxite has a prominent group of large setae at the apex, near the base of the style; when the setae are broken, the sites of their insertion can be seen . . . . . *Ae. implicatus*
- 58 (57). There are no groups of especially large setae at the apex of the coxite.
- 59 (60). Length of the handle is more than half the length of the claspette wing. . . . . *Ae. mercurator*
- 60 (59). Length of the handle is not more than half the length of the claspette wing.
- 61 (62). Length of the handle is about 1/3 the length of the claspette wing. (Tarsi have light-colored rings) . . . . . *Ae. sergievi*
- 62 (61). Length of the handle is not more than 1/4 of the claspette wing length. (Tarsi are dark) . . . . . *Ae. montchadskyi*
- 63 (54). Widening of the claspette wing starts almost at its base.
- 64 (65). Claspette stem clasper is long and smoothly curved . . . *Ae. cyprius*
- 65 (64). Claspette stem is short, almost straight.
- 66 (67). Basal lobe narrows toward the apex and (often) is curved; claspette wing has a relatively wide transparent widening . . . *Ae. riparius*
- 67 (66). Basal lobe is large, more often with a rounded apex; claspette wing is narrow, with a barely noticeable transparent widening . *Ae. fitchii*
- 68 (53). Spine (strong bristle) at the base of the coxite is not sharply distinct among the proximal smaller bristles.

- 69 (70). Inner surface of the coxite is covered with long setae, transparent widening of the claspette wing is developed in the middle and top parts of the wing. Phallosome is ovate and without constriction. . . . . *Ae. detritus*
- 70 (69). Inner surface of the coxite is covered with relatively sparse, shorter setae. Transparent widening of the claspette wing is present on a short portion of its middle third. Phallosome is elongated with a slight constriction . . . . . *Ae. simanini*
- 71 (36). Base of the coxite does not have a spine or strong bristle.
- 72 (73). Basal lobe of the coxite is conical or rounded at the apex, its height is about as high as wide at the base . . . . . *Ae. behningi*
- 73 (72). Basal lobe is depressed, and is wider than high.
- 74 (77). Basal lobe protrudes noticeably into the interspace between the coxites.
- 75 (76). Basal lobe is covered with long, very dense setae. Claspette wing is narrow, and at its base has a small hooklike projection on the concave side . . . . . *Ae. kasachstanicus*
- 76 (75). Setae of the basal lobe are relatively short. Claspette wing is wider, and there is a pointed projection on its convex side . . . . . *Ae. increpitus*
- 77 (74). Basal lobe is flat, sometimes barely distinguishable, and does not protrude in the interspace between the coxites.
- (113) 78 (79). Claspette stem is long, thin and distinctly tapering apically . . . . . *Ae. excrucians*  
*Ae. euedes*
- 79 (78). Claspette stem is thicker and not tapering toward the apex. Claspette wing is short . . . . . *Ae. annulipes*
- 80 (5). Coxite is without lobes; sometimes there is a rudimentary basal lobe in the form of a very small tubercle.
- 81 (82). Coxite has a tuft of fairly large scales on the distal part of the inner surface . . . . . *Ae. nipponicus*
- 82 (81). Coxite has fine scales, located mainly on the outer surface.
- 83 (84). Claspette wing is longer than the stem . . . . . *Ae. togoi*
- 84 (83). Claspette wing is not longer than the stem.



- 85 (86). Basal lobe of the coxite with a small tubercle bearing 2 strong bristles on the inner surface . . . . . *Ae. alektorovi*
- 86 (85). Basal lobe of the coxite does not have a small tubercle with strong bristles on the inner surface.
- 87 (88). Processes of tergite IX have 2-6 thick bristles . . . *Ae. geniculatus*
- 88 (87). Processes of tergite IX have 5-10 thin setae.
- 89 (90). Processes of tergite IX are convex, hemispherical. Claw at the apex sternite X is simple. . . . . *Ae. koreicus*
- 90 (89). Processes of tergite IX are flattened. Claw of sternite X bifurcate at the apex . . . . . *Ae. japonicus*
- 91 (4). Claspettes are absent.
- 92 (93). Basal lobe is isolated in the form of a columnar structure, covered with setae at the end. Styles are widened toward the apex. Style appendage is inserted at some distance from its apex. . *Ae. vexans*
- 93 (92). Basal lobe is located in middle of coxite. Style is of a different shape. Style appendage is inserted at the apex or slightly subapical.
- 94 (95). Appendage is situated at apex of style . . . . . *Ae. aegypti*
- 95 (94). Appendage is situated a small distance from the apex of the style.
- 96 (97). Lobe of the coxite is extended in a transverse direction . . . . .  
. . . . . *Ae. sibiricus*
- 97 (96). Lobe of the coxite is extended in a longitudinal direction  
*Ae. flavopictus* (Far East)  
*Ae. cretinus* (Transcaucasia)
- 98 (1). Style consists of 2 branches--medial and lateral. (Palpi are several times shorter than the proboscis, as in the female) . Subgenus *Aedes*
- 99 (102). Lateral (longer) branch of the style is bifurcate at the apex or has a preapical appendage.
- 100(101). Long branch of the style is apically tapering, the apex is bifurcate . . . . . *Ae. cinereus cinereus*
- 101(100). Long branch of the style widens toward the apex; the preapical appendage, jagged at the tip, branches out laterally. . . *Ae. sasai*



- 11 (10). Siphon is longer (index about 3). markedly longer than anal segment. Tuft is near the middle. Gills are longer than anal segment and are lauceolate.
- 12 (13). Pecten teeth are approximately the same distance from each other . . . . . *Ae. koreicus*
- 13 (12). Most distal teeth of pecten, including 1-4, are arranged farther away from each other in the form of large spines, lying at a more acute angle to longitudinal axis of siphon . . . . . *Ae. japonicus*
- 14 (7). Frontal setae forming a triangle on each side: median setae anterior to the inner setae.
- 15 (16). Median and inner frontal setae are displaced to anterior margin of the frontoclypeus, postclypeal setae are not shorter than the median and inner setae; they all are strongly branched. Comb has 8-15 spine-like scales, arranged in one row, and has a pointed main spine . . . . . *Ae. nipponicus*
- 16 (15). Median and inner frontal setae are not displaced towards anterior margin of the frontoclypeus; postclypeal setae are markedly shorter, and if they are not present, then the frontal setae are weakly branched.
- 17 (24). Lobes (auricles) along the posterior margin of the base of the siphon are absent; antennae are short, without spinules, and have a short seta, usually single; gills long.
- 18 (21). Outer frontal setae are simple.
- 19 (20). Comb scales of abdominal segment VIII, have 2-6 or more fine lateral spines in addition to the main spine; of these spines, 1-2 sometimes reach the size of the main one. Additional setae on sides of siphon are absent . . . . . *Ae. aegypti*
- 20 (19). Comb scales of abdominal segment VIII do not have markedly developed additional lateral spines at sides of main spine base, but have only a row of narrow, short setae. A single, simple seta of same length as the tuft is found on each side of the siphon near its apex. . . . . *Ae. cretinus*
- 21 (18). Outer frontal setal consist of 2-3 branches. (115)
- 22 (23). Comb scales of abdominal segment VIII are large, considerably larger than distal spine of pecten . . . . . *Ae. flavopictus*
- 23 (22). Comb scales of abdominal segment VIII are smaller, only slightly larger than distal spine of pecten . . . . . *Ae. sibiricus*

- 24 (17). Well developed lobes (auricles) along the posterior margin of the base of the siphon are present. Antennae are of various types; smooth or more often covered with spinules, with a tuft in the form of a simple or (more often) branching seta.
- 25 (26). Median frontal setae are simple and very long, twice as long as the branched inner setae. Gills are long, the lower pair is same length as siphon, upper pair is longer, pointed at ends . . . *Ae. alektorovi*
- 26 (25). Median frontal setae are approximately same length as inner ones. Gills are of varying lengths.
- 27 (32). Antennae lack spinules that can be seen under low magnification.
- 28 (29). Tuft on antenna is in form of a short, simple seta. Most abdominal setae have stellate branching . . . . . *Ae. geniculatus*
- 29 (28). Tuft on antenna consists of 2-4 short branches. Abdominal setae have the usual type of branching.
- 30 (31). Siphon 4-5 times longer than wide at the base; width at base 1.4-1.5 times wider than at apex. Siphon gradually tapering toward the apex. Gills sausage-shaped, with rounded ends, usually length of siphon . . . . . *Ae. pulchritarsis pulchritarsis*
- 31 (30). Siphon 3-3.3 times longer than wide at the base; 1.5 times wider than at apex; as a result the apical tapering of the siphon is more markedly expressed. Sausage-shaped gills with rounded ends, usually twice as long as the siphon . . . . . *Ae. pulchritarsis asiaticus*
- 32 (27). Body of the antennae is at least covered by infrequent spinules; these spinules are very discernible under low magnification.
- 33 (40). On the anterior surface of the siphon in addition to the subapical setae, there are 2-4 pairs of well developed, secondarily pinnate, coarse setae, equal to siphon width or wider at the attachment site; and, on the lateral surfaces, in addition to the tuft, is a pair of lateral setae near the distal third of the pecten.
- 34 (37). Apical pecten teeth extend behind tuft base of siphon.
- 35 (36). Tuft on siphon has 6-8 branches. The most distal pecten spine does not extend to apical third of siphon . . . . . *Ae. rusticus*
- 36 (35). Tuft on siphon is in the form of a long, simple seta. The most distal pecten spine is situated in apical third of siphon, near its tip. . . . . *Ae. subdiversus*
- 37 (34). The most distal pecten teeth do not extend behind tuft base of siphon.

- 38 (39). There are 3 pairs of setae on the anterior surface of the siphon. The most ventral of the setae behind the siphonal tuft is the shortest. . . . . *Ae. refiki*
- 39 (38). There are 2 pairs of setae on the anterior surface of the siphon. The most ventral of the setae behind the siphonal tuft is the longest. . . . . *Ae. lepidonotus*
- (Probably, corresponds to described *Ae. albescens* from USSR)
- 40 (33). Anterior surface of siphon lacks additional, long setae; only subapical setae present. (116)
- 41 (46). Comb, generally has more than 50 scales; generally scales do not have a main spine; a poorly developed spine may occur in the more lateral comb scales.
- 42 (43). Median and inner frontal setae are simple . . . . . *Ae. communis*
- 43 (42). Median and inner frontal setae are complex.
- 44 (45). All comb scales are without a main spine, and most of them have a narrow median part and a wide apical part . . . . . *Ae. pionips*
- 45 (44). Comb scales have a well expressed main spine, and most of them are narrow apically . . . . . *Ae. pullatus*  
(partially)<sup>1</sup>
- 46 (41). Comb generally has less than 50 scales; scales with a more or less developed main spine or a tapering distal portion consisting of spinules of almost the same length.
- 47 (66). Distal teeth of pecten are more or less set farther apart from each other as compared with those in the basal 2/3 of the comb. Atypical specimens with distal teeth not set apart are found among *Ae. flavescens*, *Ae. riparius* and *Ae. behningi*.
- 48 (51). Bases of the widely spaced distal teeth of the pecten extend behind the siphon tuft.
- 49 (50). Tuft on siphon is at its middle or a little lower . . . *Ae. cataphylla*
- 50 (49). Tuft is distinctly beyond middle of siphon, is closer to its distal third . . . . . *Ae. nigripes*

<sup>1</sup> *Ae. pullatus* larvae vary greatly in the number of comb scales (from 24 to 76) and a number of other features; this is one of the arguments in favor of the polymorphism of this species that we have proposed. For this reason, part of the larvae will be treated in subsequent portions of this key (46, 110, 112).

- 51 (48). Bases of the widely spaced distal teeth of the pecten do not extend behind the siphon tuft.
- 52 (55). Length of siphon tuft is less than width of siphon at its insertion.
- 53 (54). Median frontal setae have 1-3 branches: pecten teeth barely extend to middle of siphon. . . . . *Ae. vexans*
- 54 (53). Median frontal setae have 6-7 branches: pecten occupies approximately 2/3 of the siphon . . . . . *Ae. lineatopennis aureus*

(Diagnostic features of *Ae. lineatopennis aureus* are given according to literature data. In the USSR, verified larvae of this species are not known, probably, because of their great similarity to *Ae. vexans* larvae).

- 55 (52). Length of siphon tuft is equal or exceeds width of siphon at its insertion.
- 56 (57). Tuft is beyond middle of siphon, closer to its distal third . . . . .  
. . . . . *Ae. euedes*
- 57 (56). Tuft is in middle of siphon.
- 58 (61). Comb has 6-18 large scales, arranged in 1-2 rows; scales have a long, pointed spine, framed at the base of very fine spinules.
- 59 (60). Comb has 6-9 scales, arranged in one row . . . . . *Ae. riparius*
- 60 (59). Comb has 10-18 scales, arranged in 2 rows . . . . . *Ae. intrudens*
- 61 (58). Comb has 20-45 not as large scales, arranged in 3 or more rows; scales have a median spine, fringed at the base by medium sized spinules.
- (117) 62 (65). Setae at apex of posterior valves of the stigmal plate are thicker, curved and hook-shaped.
- 63 (64). Comb with 30-40 (more often 32-36) scales . . . . . *Ae. excrucians*
- 64 (63). Comb with 20-28 (average of 22) scales . . . . . *Ae. behningi*
- 65 (62). Setae at apex of posterior valves of the stigmal plate are not thicker and are only slightly curved into an S-shape . . . *Ae. flavescens*
- 66 (47). All pecten teeth are uniformly spaced from each other.
- 67 (72). Saddle, ring-shaped, encircles last abdominal segment.

- 68 (71). Number of comb scales not more than 25. All scales have a large, well developed median spine.
- 69 (70). Number of comb scales is 5-12; scales are large: 0.11-0.13 mm . . . .  
. . . . . *Ae. punctor*
- 70 (69). Number of comb scales is 10-20; scales are smaller: 0.07-0.08 mm . .  
. . . . . *Ae. hexodontus*
- 71 (68). Number of comb scales is 30-45 . . . . . *Ae. rempeli*
- 72 (67). Saddle does not encircle the last abdominal segment.
- 73 (84). Median and inner frontal setae are simple (as an exception, individual specimens of *Ae. caspius*, *Ae. leucomelas* and *Ae. implicatus* may have individual or twin tufts that are double).
- 74 (77). Number of comb scales is 8-16.
- 75 (76). Saddle extends almost to lower border of segment . . *Ae. nigrinus*
- 76 (75). Saddle occupies at least 1/2 or slightly more of segment width . . .  
. . . . . *Ae. impiger*
- 77 (74). Comb has 16-35 scales.
- 78 (83). Length of gills does not exceed length of saddle (length of gills may vary as a function of saline concentration in water where larvae develop, but within the limits of the ratios indicated here).
- 79 (80). Tufts of ventral brush branched far from the base; length of single stem of median tufts of brush 1.5-2 times as long as the base appendages (transverse grid bars). Some of the ventral (closest to abdominal side) comb scales have a long median spine, the rest have 2-3 longer spinules apically and 2-3 shorter ones laterally . . . . .  
. . . . . *Ae. leucomelas*
- 80 (79). Tufts of ventral brush branched from near their base; length of stem of tuft not longer than length of the base appendage. Bottom scales do not differ from the rest, which have a distinctly defined median spine; similar scales may be found singly in any part of the comb.
- 81 (82). Tuft on siphon situated near the middle, has 3-6 branches; inner caudal setae with 4-10 branches, and median seta behind the comb with 5-8 branches . . . . . *Ae. caspius dorsalis*
- 82 (81). Tuft situated beyond middle of siphon, nearer to the apex, has 5-10 branches, inner caudal setae of 12-15 branches and median seta behind the comb with 7-14 branches . . . . . *Ae. caspius caspius*

- 83 (78). Length of gills markedly exceeds length of saddle . *Ae. implicatus*
- 84 (73). At least one pair of median or inner frontal setae has 2 or more branches.
- 85(100). Gills are generally shorter than the saddle.
- 86 (95). Gills are very short, spherical, and constitute 1/6-1/15 of saddle length (halophilous species were not found in fresh water).
- 87 (88). Comb scales have a well defined median spine . . . *Ae. simanini*
- (118) 88 (87). Comb scales do not have a median spine and sometimes only have a tapering apical part; on each scale a central spine stands out that is equal in size to the lateral ones.
- 89 (90). The siphon, compared to the anal segment, is disproportionately small and is covered with fine setae; it is 1.8-2 times the length of the anal segment and is twice as narrow as the segment . *Ae. gutzevichi*
- 90 (89). Siphon is larger and is not covered with fine setae; it is at least twice the length of the anal segment and it is the width of or almost as wide as the segment.
- 91 (92). Median frontal setae consist of 2-3 branches. All body setae have a well developed secondarily pinnate structure . . *Ae. montchadskyi*
- 92 (91). Median frontal setae are generally simple. Secondarily pinnate structure of body setae is poorly developed.
- 93 (94). Inner frontal setae have 4-6 branches. Head capsule generally has dark, medial pigmentation . . . . . *Ae. stramineus*
- 94 (93). Inner frontal setae have one branch, more rarely 2 branches. Head capsule and body integument are hardly pigmented . . *Ae. detritus*
- 95 (86). Gills are longer, from 1/3 to 4/5 of saddle, and have a leaf, or tapering shape.
- 96 (97). All comb scales have a well defined median spine.
- 97 (96). Part of the comb scales have a median spine, and part have only a tapering apex, fringed with spinules of the same length.



- 98 (99). Median frontal setae consist of 2 branches, inner setae have 3 (2-4) branches; the lateral seta is 1.1-1.6 times longer than the saddle. . . . . *Ae. sergievi*
- 99 (98). Median frontal setae have 3 branches, inner setae have 4 (3-5) branches; the lateral seta is just slightly shorter than the saddle. . . . . *Ae. kasachstanicus*
- 100 (85). Gills are distinctly longer than the saddle.
- 101(110). Most of the comb scales have a well defined median spine.
- 102(103). Siphon is long, well developed; index is 4-5. . . . . *Ae. fitchii*
- 103(102). Siphon is less well developed and shorter; index is 2.5-3.5.
- 104(107). Pecten occupies half of siphon length, tuft is inserted beyond middle of siphon.
- 105(106). Saddle occupies half or less of segment width. Some of the comb scales have in addition to a well defined median spine, additional spinules on the apical part that are slightly shorter and thinner . . . . . *Ae. hungaricus*
- 106(105). Saddle occupies at least 2/3 of segment width. Comb scales have only poorly defined spinules at base of median spine or they are completely absent. . . . . *Ae. sticticus*
- 107(104). Pecten occupies 1/3-2/5 of siphon length, tuft is inserted near the middle of siphon.
- 108(109). Length of siphon tuft is less than siphon width at its insertion, the lateral seta is longer than the saddle. . . . . *Ae. cantans*
- 109(108). Length of siphon tuft is equal to or greater than siphon width at its insertion, the lateral seta is shorter than the saddle . . . . . *Ae. mercurator*
- 110(101). Most of the comb scales do not have a median spine or have an inconspicuous median spine.
- 111(112). Median frontal setae are single, rarely double. . . *Ae. increpitus*  
(No verified specimen found in USSR).
- 112(111). Median frontal setae have 3-8 (generally 5-6) branches. . . . . *Ae. pullatus* (partially)

## DESCRIPTION OF SPECIES

(119) This section presents information on 22 species of the genus *Aedes*, reported in the last decade as new for science or for the USSR fauna, and on species whose names or status are proposed for change, as well as species for whom a life cycle stage has been found that was unknown earlier.

The given descriptions are relatively brief, mostly with an indication of characters, which have a diagnostic significance. At the present time, a description of one mosquito species often takes 10-12 pages, and sometimes even more. Such detail seems excessive to us from a practical standpoint. Most of the mosquito species of our native fauna have vast areas of distribution, stretching from Western Europe to the Pacific Ocean. The areas of distribution of many species, as was already indicated, cover broad areas of both hemispheres. Many characters may appear quite constant when studying the populations of one species in relatively small areas. Generally, however, a wide variability is found when comparing specimens from different remote areas. Extensive descriptions are useful when they characterize not simple the "distinctive characters" of a given species, but specifically the range of these characters. Variability of mosquito taxonomic characters has not been adequately researched; such a study is an important task. At the same time, cultivation in a laboratory (not always easy to do) would be a great service, as well as a comparison of the specimens, individually bred from larvae, and determined by the skins discarded during molting to pupa.

1. *Aedes (Ochlerotatus) stramineus* Dubitsky, 1970.

Close to *Ae. caspius*. Described on the basis of females, males and larvae (Dubitskiy, 1970b).

Female. Proboscis has mostly light scales, apex of the proboscis is dark. The palpi have mixed light and dark scales. The mesonotum is without stripes and has yellowish scales, darker along the sides and lighter in the anterior third of the mesonotum. The lateral surface of the thorax has light-colored scales, which extend to the anterior angle of the sternopleurons and to the lower border of the mesepimerons. The proepimerons are bicolored: upper part has brown scales, and the lower part has whitish scales. There are hypostigmal and postcoxal scale spots. The forefemora and foretibiae have light colored rings, encircling the top of one segment and the base of the next one. The wings have light-colored scales, and dark ones are found in small numbers on different veins. The wing membrane is yellowish. The abdomen has uniformly yellowish white scales dorsally and ventrally. The head and its appendage are basically like that of *Ae. caspius*: frons stripe is wide (wider than the area between the eyes and the lower side of the head) and has rather numerous large setae.

Male. Coloring is basically the same as in the female. The genitalia (Fig. 2): coxite has relatively short setae and only at the apex of the coxite are there several long, thick setae; basal lobe is convex, and in its distal part are 2 spines--a large one, curved like a hook, and a smaller one that is straight; in addition, the lobe supports a number of bristles, not inferior to

the spines in terms of thickness, and several rows of setae; the dorsal lobe is poorly developed, barely visible; the claspette stem is straight and short; claspette wing is approximately the same length as the claspette stem, is moderately sclerotized, and somewhat wider in the distal half; processes of tergite IX have 6-8 short bristles; phallosome is wide with a slight constriction.

Larvae of stage IV are a dirty brown to dark brown. Average length in a fixed state is 97 (90-105) [sic, 9.7 (9.0-10.5)] mm. Width of the head is roughly equal to its length. The head capsule has dark medial pigmentation dorsally, extending proximally to its middle. Frontal setae are thick and erect. Outer frontal setae have 9-11 branches; the median ones are generally single, and the inner ones have 5 branches, rarely 4-6. The median setae are the longest and most massive, and lie in front of the inner ones. The antennae are 2/3 of the head length and are covered with sparse, fine spinules. A tuft of 4-6 branches is inserted just barely below the middle of the antenna. The antenna gradually tapers in its distal half.

On the average, the comb has 29 (24-36) scales, arranged in a convex triangle facing upward. The scales vary in size as well as shape, starting from the short ones that support a row of spinules on their tips, and to the longer ones with a tapering medial part, but without a main spine. The setae behind the comb: upper ones have 7-9 branches, the lower setae have 6-7 branches and the median ones are simple.

(120)

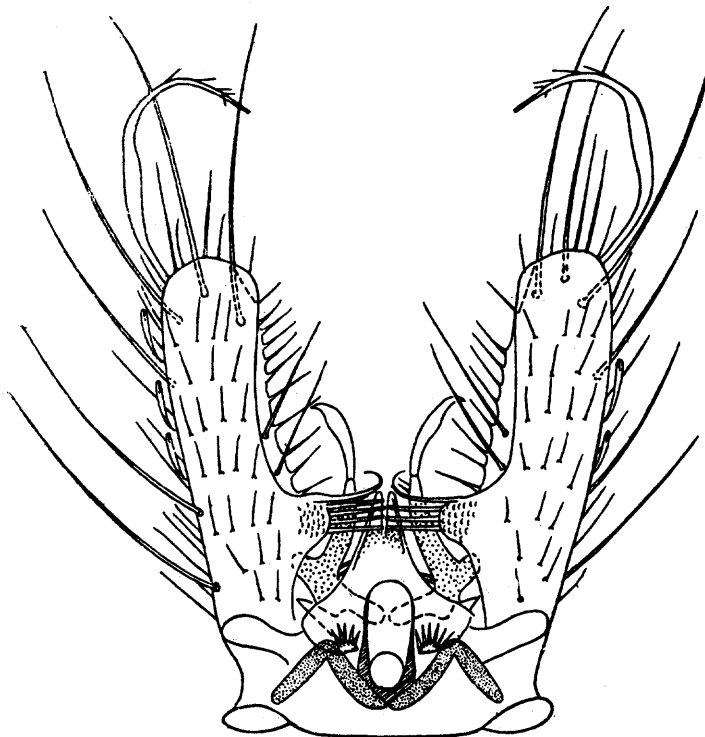


Fig. 2. Male genitalia of *Aedes stromineus* (according to Dubitskiy, 1970b).

(121)

The siphon gradually tapers toward the top. The siphon is 3.1-3.3 times as long as the width of its base and 4-4.5 times longer than its apical width. A tuft of 7-9 branches is inserted just barely beyond the middle of the siphon (in the middle of the middle third). Length of the tuft branches is equal to the siphon length at the attachment site. Other tufts, with the exception of preapical setae, are absent on the siphon. The dark ring and lobes at the siphon base are well developed. The pecten of 29-31 compactly fitting teeth, extends just to the middle of the siphon and does not reach the tuft base by the length of one tooth. The teeth are thin, slightly curved and have a large number of poorly developed denticles, which are 1/2 or 2/3 of the tooth length. Their size is markedly reduced proximally, and 2-3 of the basal denticles are rudimentary.

The saddle is nearly twice as long as wide. The borders of the saddle extend to the middle of the last segment. The lateral setae are single. The outer caudal setae are also simple; just slightly longer than the siphon. The inner caudal setae have 12-14 moderately long branches. The ventral brush has 18-19 well developed tufts, 1-3 of which (generally 2) are not united by a common base. Length of the stem of the tufts is roughly equal to the transverse grid bars. The gills are slightly pigmented, fine and slightly oval and are 1/5-1/6 the length of the saddle.

Distribution. In the USSR: Kazakhstan, Central Asia, south of Western Siberia. Mongolia (Minar, 1976).

Biology. It breeds mostly in brackish water basins, and the larvae are found associated with larvae of *Ae. detritus* and *Ae. montchadskyi*. It attacks humans and domestic animals. It produces only one generation in a season, and the highest number of imagoes is observed in the first half of summer.

Remarks on taxonomy. Recently (Danilov, 1979), it was proposed that *Ae. stramineus* be considered a synonym of *Ae. albineus*, treating the latter as an independent species. Actually, *Ae. albineus* was described from material from Algeria as an independent species (Seguy, 1923), but shortly after was reduced to a synonym of *Ae. caspius* (see: Edwards, 1926) and was considered as such for more than 40 years. *Aedes caspius* is known to be a widely distributed polytypic species. In the USSR it is represented by at least 4 taxa--subspecies (Gutsevich, 1977).

On the basis of a rather short original description of *Ae. albineus* and without comparing the specimens, it is difficult to draw a conclusion about it being identical to *Ae. stramineus*. More likely, *Ae. albineus* will be found identical to *Ae. campestris* (a typical character like the absence of a hooklike spine on the basal lobe of the coxite brings them together). For this reason, we feel the proposed synonymy of V. N. Danilov is without proof.

## 2. *Aedes (Ochlerotatus) campestris* Dyar et Knab, 1907

Belongs to the *caspius* group. V. N. Danilov (1978a) first reported finding it in the USSR.

Female. Proboscis has light and dark scales; the light colored scales dominate basally, and the dark scales apically. Palpi have dark scales with a mixture of light-colored ones. The mesonotum has a wide longitudinal stripe of brown scales, limited laterally by whitish-yellow scales, against whose background 2 dark brown spots stand out clearly on the posterior half of the mesonotum; the lateral borders of the mesonotum have brown scales. Lateral surface of the thorax has white scales, which also cover the space below the mesothoracic spiracle, as well as the postcoxal membrane. Scales on the sternopleurons extend to the anterior angle, on the mesepimerons--to the lower border. The wings have light scales mixed with dark scales, the light-colored ones dominate, particularly on the costal vein. Legs: tarsi have light-colored rings, encircling the base and top of the segments; rings are not sharply outlined due to the presence of light-colored scales on other parts of the tarsi as well. The abdomen has almost uniformly light-colored scales with a small mixture of dark scales, scattered mostly over the anterior tergites.

Male. Coloring is the same as in the female, but the markings of the mesonotum are less contrasting. Structure of the genitalia is basically like that of *Ae. caspius* with some small differences (Fig. 3). The basal tubercle of the coxite is not high, is extended longitudinally, and is covered with setae and bristles which form 2-3 irregular rows. There are no spines on the basal tubercle, but the most distal bristle is somewhat larger than the others. The coxite has numerous strong setae, and the largest ones are at the top. The claspette stem is short, almost straight; claspette is curved, is slightly shorter than stem, is sclerotized, dark and without a transparent widening; the basal part of the wing is a little wider than the top. The processes on tergite IX have 6-9 heavy, short, straight bristles. The process of sternite X is dark, wide and not in the shape of a claw.

(122)



Fig. 3. Male genitalia of *Aedes campestris* (according to: Carpenter and LaCasse, 1955).

Larva of stage IV (Fig. 4). Antennae are shorter than the head; the antennal tuft is multiple, secondarily pinnate, and is inserted near the middle of the shaft. Setae on the head: postclypeal setae are small, multiple; median frontal setae are double or triple (rarely of 4 branches) and very rarely secondarily pinnate; inner setae are generally simple (rarely, double), and rarely pinnate; outer setae have 6-10 branches, which almost reach the insertion of the antennal tuft.

(123)

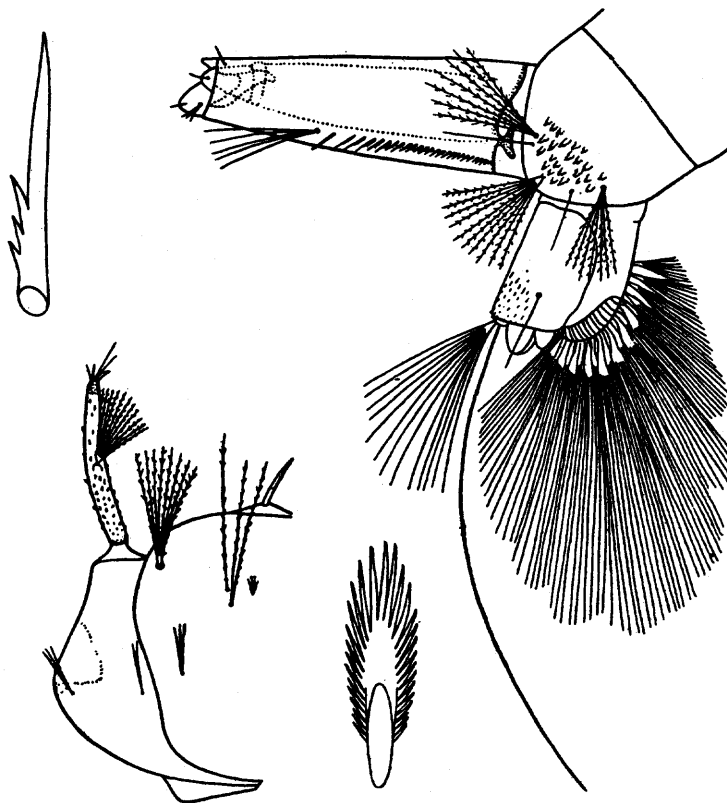


Fig. 4. Larva of stage IV of *Aedes campestris* (according to: Carpenter and La Casse, 1955).

The comb on the eighth segment has 19-33 triangular-shaped scales. The individual scales are apically rounded and fringed with even-sized spines and have a central spine that stands out slightly. The siphon index is about 3.0. The pecten of 19-32 teeth reaches  $\frac{3}{5}$  of the siphon length and 1-4 distal teeth are generally set apart. The siphon tuft has 4-6 branches, is attached behind the pecten and its length is equal to the basal width of the siphon. The saddle encircles almost  $\frac{2}{3}$  of the last segment, and in the dorsoapical part has spines. The lateral seta is simple and shorter than the saddle; the outer caudal setae are simple and long; the inner setae are shorter and multiple. The ventral brush has a great number of tufts, united by a base, and 3-4 shorter tufts in front of it. The gills are small and kidney-shaped, and much shorter than the saddle.

Distribution. In the USSR: Tuvinian ASSR, Vostochno-Kazakhstanskay Oblast. Widely distributed in the Western Hemisphere: USA, Canada and Alaska.

Biology. The species is typical for a semi-desert landscape. Breeds in small temporary water basins. In certain places, they attack humans and domestic animals in great numbers. It is assumed that only one generation develops during a season, but flight continues throughout the summer until fall.

Remarks on taxonomy. The description presented is based on samples received from V. N. Danilov; in details the description differs from the one, cited by American authors (Carpenter and LaCasse, 1955). The most significant discrepancies are the following: the cited authors indicate that the basal tubercle of the coxite, in addition to the setae and bristles, supports "one large spine," which is also shown in the figure. Larvae of stage IV may have median frontal setae that are single, and inner ones that are 2-4 branched. The comb scales have a wide, light-colored base and a more prominent central spine. The siphon index is 2.5-3.0. (124)

3. *Aedes (Ochlerotatus) gutsevichi* Dubitzky et Deshevych, 1978.

Belongs to the *caspius* group. Quite close to *Ae. mariaae*, which at the present time is considered as a complex by some authors, consisting of at least 3 independent species.

Female. Proboscis and palpi have light- and dark-colored scales, the light-colored ones dominate on the proboscis. Dorsally, the head has predominantly light-colored scales. The mesonotum has dense golden yellow scales without spots and stripes. The anterior third of the mesonotum and its lateral sections are covered with relatively long golden brown setae. The lateral surface of the thorax is covered with whitish scales, which on the sternopleurons reach their anterior angle, and on the mesepimerons--up to the lower border. The section directly under the mesothoracic spiracle is free of scales. There is a postcoxal spot. Wings have light scales mixed with dark scales. Legs: fore- and midfemura and tibia are variegated from the front, tarsi have indistinct light-colored rings, each ring encircles 2 segments; the last segment of the hindtarsus is light-colored. The abdomen has distinct, wide, light-colored bands; at the base of the tergites and bands are narrow in the middle. More often there are no light-colored scales against the dark background of the posterior part of the tergites; some specimens also have light-colored scales on the posterior margin of the tergites. Ventrally, the abdomen is light-colored.

Male. Coloring is similar to that of females, but the light-colored bands on the tergites are narrower, and the rings on the tarsi are expressed more distinctly than in females. Genitalia (Fig. 5): coxite has moderate length setae; top of the coxite lobe is barely noticeable; the basal lobe resembles a small protuberance, whose width is 2 times its height; the lobe has no spines or strong bristles, and is covered with 9-11 setae; the claspette stem is short, tapers in the upper third, and is covered with relatively long setae; the claspette wing is 1.5 times the length of the stem; the wing is narrow and

without a transparent widening, and has a beaklike flexure at the tip; the phallosome is elongated-quadrate; processes of tergite IX are small, closely arranged or overlapping, and each has 3-7 bristles.

Larva of stage IV. Average length in a fixed state is 8.62 (7-10.25)mm. Setae on different sections of the body are of moderate length and are only barely pinnate.

The head is 1.1-1.3 times wider than long. Dorsally, head capsule has dark medial pigmentation, extending to the distal border. The outer frontal setae have 7 (6-9) branches, the median setae (found anterior to the inner setae) are generally double, and more rarely single. The inner frontal setae have 3-6 branches, but generally 4-5 branches. The postclypeal setae are thin, have an average of 3 (1-4) branches and are short. The sutural and transsutural setae are single and are shorter than the inner ones by a third. The antennae are  $\frac{2}{3}$  of the head length, are covered with sparse fine spinules and taper gradually toward the distal tip. A tuft of 7 (5-9) branches is inserted medially on the antenna and extends to its tip.

The comb has an average of 27 (23-35) scales, arranged in 2 rows, more rarely 3, that are convex in back in the shape of a half-moon. The scales vary in size and shape, starting from the short ones which support a number of spinules at the tip, to the elongated ones with a tapered median part, but without a main spine. Setae behind the comb: upper ones have 5-6 (4-7) branches, the median ones have 9 (8-10) branches, the lower ones have 5-6 (4-7) branches and the intermediate ones are simple.

(125)

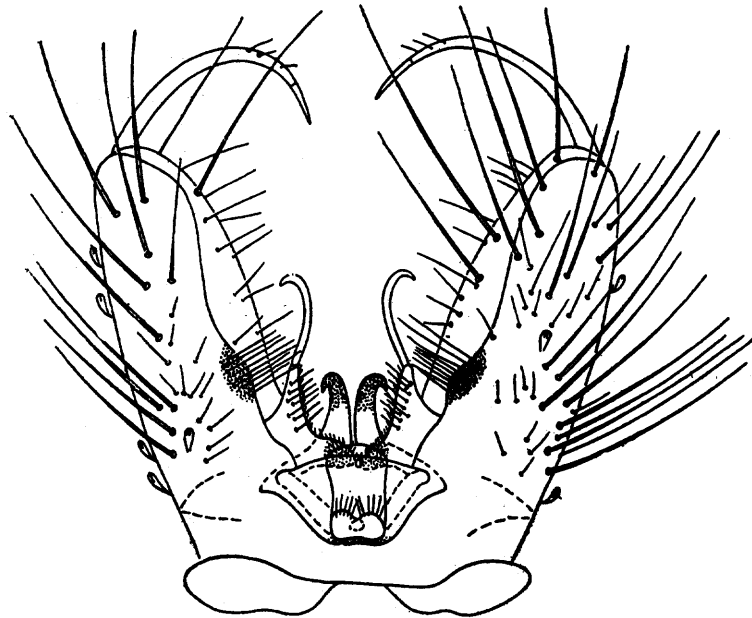


Fig. 5. Male genitalia of *Aedes gutzevichi* (according to: Dubitskiy and Deshevykh, 1978).



The siphon is straight in the proximal half and tapers slightly in the distal half. Small size is its typical special feature. The siphon is only 1.8 times the length of the last segment and is almost twice as narrow. This is striking even with a cursory inspection and, along with the dark spot on the head capsule, helps to differentiate these larvae from other species under field conditions. The ring at the siphon base is highly chitinized and has a bilateral elbow-like articulation. The lobes are long, almost perpendicular to the siphon ring. The siphon is 2.5-3.0 times longer than wide at its base and 4.5-5.1 times its apical width. The most characteristic feature of the siphon is that almost all of its external surface is covered with fine hairs, most noticeable along the borders. The size and number of hairs, covering the siphon, increase toward the base and its outer side. A tuft of 8-9 (7-10) secondary pinnate branches, covering 1/2 the length of the siphon, is inserted slightly beyond its middle. The tuft branches are longer than the siphon width at their origin. There are no other tufts (with the exception of the preapical setae) on the siphon. The pecten, with an average of 18 (15-21) teeth that are closely and uniformly spaced, extends to the middle of the siphon and almost extends to the tuft base. The teeth are thin, moderately long and are of different structures. Their size markedly decreases proximally, and 2-5 of the basal teeth are rudimentary. The setae on the distal tip of the stigmal plate are narrow and are slightly curved or bent into a hook-shape. The posterior valves of the stigmal plate are deeply pigmented and appear black. (125)

The anal segment, compared to the size of the siphon, seems large. The entire dorsal surface of the segment is covered with a fairly massive saddle, whose uneven borders extend behind the middle of the segment. The saddle is 1.5 times longer than wide. The upper part has well developed spinules, and the lower part has a darkly pigmented border. The lateral setae have 3-5 branches, which are roughly 1.5 times longer than the last segment and they are 1.5 times longer than the siphon. The inner caudal setae have 5-9 branches of moderate length. The outer caudal setae are single. Both complexes of caudal setae are located on deeply pigmented, proximally protruding chitinous bulges. The ventral brush has 12-15 well branched tufts, united by a common base. The length of the non-branched part of the tufts just barely exceeds the length of the transverse grid bars. The gills are slightly pigmented, very small and of a spheroid shape. Their length is 1/4-1/5 that of the saddle. (126)

Distribution. Described on the basis of material from Eastern-Kazakhstan Oblast. It is found in the western part of Mongolia (materials of the Soviet-Mongolian Expedition and the collection of the Zoological Institute of the USSR Academy of Sciences). All of these sites are thousands of kilometers away from coastal areas, while for *Ae. mariaae* coastal biotopes are typical. Specimens, undoubtedly belonging to the "*mariaae* complex" are also found in the south of Primorsky [maritime] Kray, but they have not been studied in detail.

Biology. A relatively rare species. Is found in abundance only in the flood plains of the upper course of the Ili River in Kazakhstan (Panfilovskiy Rayon, Taldy-Kurganskaya Oblast). Breeding places are fairly large (40-60 m<sup>2</sup>), open, brackish water basins. The water in these basins is yellowish-brown and

alkaline (pH 8.35-8.5). One liter of water contained 12,503-15,896 mg of various salts, basically chlorides and carbonates. After these basins dry up at the end of May, they often are covered with a fairly thick, white coating of salt.

The larvae appear in the first 10 days of April or in the next 10 days depending on how warm are the water basins. Density of population does not exceed 320 larvae per 1 m<sup>2</sup> of water surface (generally, there were 64-128 specimens per 1 m<sup>2</sup> of water area). Development takes place during 30-40 days. The imagoes emerge from May 5 to May 25 depending on the climatic conditions of the different years. Phenology corresponds to the phenology of the mosquitoes that are abundant in those places-- *Ae. detritus*, *Ae. montchadskyi* and *Ae. stramineus*, with which this species is most often found. This species has one generation a year. This is also confirmed by the imago emergence period, which is generally from mid-May to mid-June. All this indicates that *Ae. gutzevichi* belongs to the late spring, monocyclic species group.

Remarks on taxonomy. It differs from the described close species, *Ae. mariae*, by the lighter coloring of the abdomen: light-colored scales cover the greater part of the tergite surface, and the dark sections have the appearance of transversely extended spots in the posterior half of each tergite. The differences of the larvae are more substantial; it is the larva that the authors chose as a holotype.

Reports that *Ae. mariae* was found in the USSR, particularly in the Ukraine, require proof. At the present time, in our opinion, it is more correct not to include the *Ae. mariae* in the list of mosquito species of USSR fauna. However, the possibility is not excluded that at a later date this species will be found within USSR limits.

#### ABOUT THE *AEDES* (*OCHLEROTATUS*) SPECIES OF THE *CANTANS* GROUP

A new species has been described of the *cantans* (*Ae. sergievi*) group in the USSR in the last 10 years; for the first time 2 species, known earlier only in North America (*Ae. fitchii*, *Ae. increpitus*) have been found, the taxonomic status of one species (*Ae. mercurator*) has been changed, the earlier unknown larva of *Ae. kasachstanicus* has been found and its taxonomic position has been refined. Thus, the *cantans* group at the present time is represented in the USSR not by 8 species, as assumed earlier (see "Fauna..."), but by 13 species.

- (127) With the exception of *Ae. kasachstanicus*, which is easy to identify and which stands somewhat apart, the identification of other representatives of the group is a difficult task. If the species of the group are identified quite reliably according to larvae and males, then positive identification from females in a number of cases is simply impossible, since it depends to a high degree on variability of such characters as coloring of the abdomen, thorax, wings and legs. For this reason, a thorough revision of the mosquitoes of the *cantans* group is a most important task, which requires a study of the specimens that are bred from larvae and are identified from the cast-off pupal skins (method of individual breeding).

4. *Aedes (Ochlerotatus) mercurator* Dyar, 1920.

Belongs to the *cantans* group. Formerly, was considered a subspecies--*Ae. riparius ater* Gutsevich, 1955. The discovery of the formerly unknown larvae and the examination of materials on the imago provided V. N. Danilov (1974b) with a basis for identifying the mosquito with the North American *Ae. mercurator*.

Female. Proboscis, palpi and wings have dark-colored scales; sometimes the palpi have single light-colored scales. The mesonotum has a stripe of dark bronze brown scales that widens posteriorly and is marked laterally with light whitish-yellow scales. The lateral surface of the thorax has whitish scales, generally extending almost to the anterior angle of the sternopleurons, but not as far as the lower border of the mesepimerons. The hypostigmal scale spots are absent, but the postcoxal spots are present. Legs: the anterior surface of the fore- and midfemora and tibia is variegated, that is, has mixed light and dark scales; the tarsi have white rings at the base of the segments, and the last segment of the hindtarsus is dark. The abdomen has light-colored bands at the base of the tergites, width of the bands varies greatly, and generally they are not very wide in the middle; sometimes, single light-colored scales are found in the posterior half of the abdomen and on the posterior margin of the tergites. The second abdominal segment has a longitudinal light-colored stripe, generally extending to the posterior margin of the segment. Along the sides of the tergites, there are light-colored spots, developed particularly at segments VI and VII; the spots on these tergites are also seen from the top. The sternite scales are predominantly light-colored.

Male. Coloring is basically the same as in the female. Genitalia: coxite has dense long setae; basal lobe of the coxite is semicircular, convex, and at its base has a curved spine in the distal half that is prominent among the surrounding setae; the apical lobe is relatively poorly developed and has thin short setae; the claspette stem is curved, and widening is less than half the length of the claspette wing, the processes of tergite IX have 6-12 bristles.

Larva of stage IV (Fig. 6). Moderately large size (length of body is 8-9 mm), and is brown or almost black. Head is 1.4-1.6 times wider than long. Outer frontal setae with 7-13 branches, median setae of 1-3 (more often 2) and inner setae of 3-6 branches; the median setae are anterior to the inner ones and are somewhat thicker (particularly, if they are single); postclypeal setae, that are between the bases of the median frontal setae, have 3-5 short, thin branches. Antennae which are 1/2 to 3/5 the length of the head, are covered with spinules that are shorter at the base; spinules are scattered over the dorsal surface, and on the ventral portion, form several quite irregular rows. A tuft of 8-13 (more often 9-10) branches, 2/5 to 2/3 the length of the antenna, is inserted submedially, 1/3-2/5 of its length from the base.

Setae of the prothorax: I--long, simple, rarely of 2 branches; II--short, simple; III--short, of 2-3 branches; IV--short, simple; V--long, of 2-3 branches; VI--long, simple; VII--long, of 3 branches.

(128)

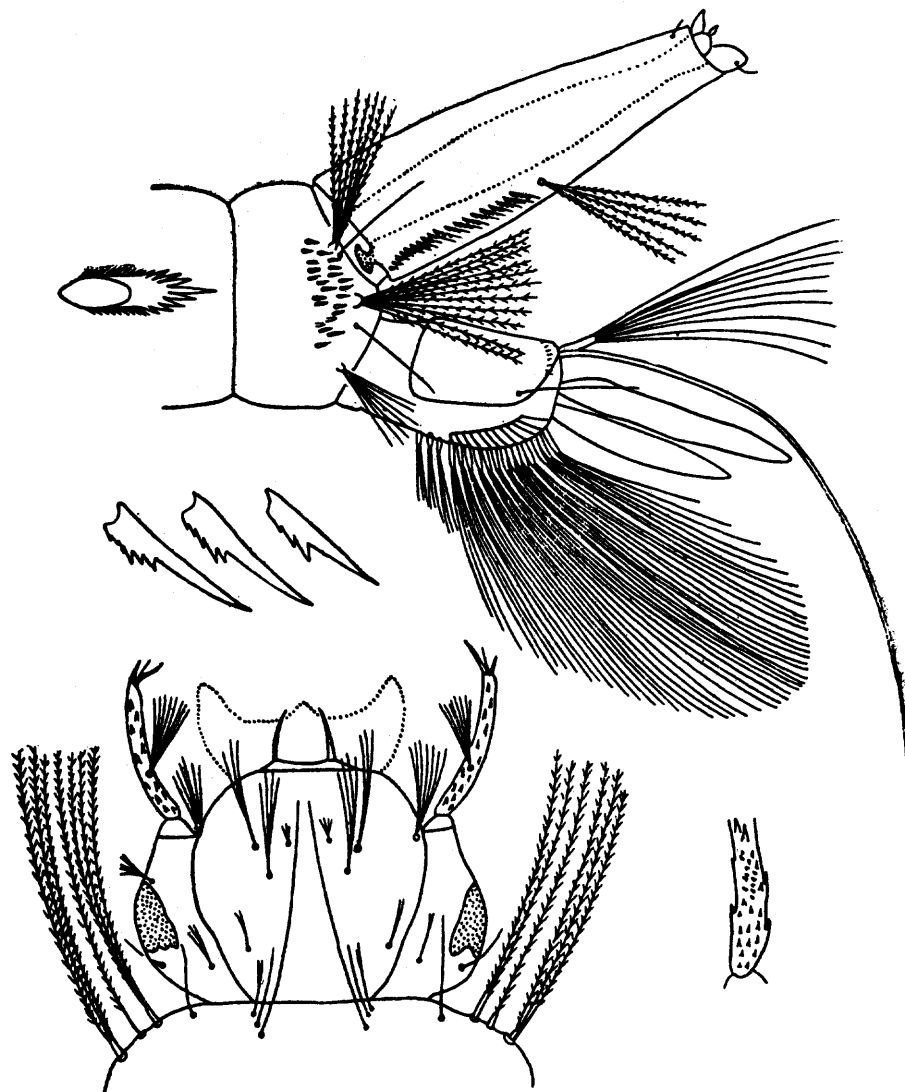


Fig. 6. Larva of stage IV of *Aedes mercurator* (according to: Danilov, 1974b).

The comb on abdominal segment VIII has 23-26 (average 30) scales, arranged in a triangular patch; their number on different sides of the segment often varies. Each scale has an apical main spine and lateral spinules which become smaller toward the base. The main spine is poorly expressed in most of the scales, but it still is conspicuous; the main spine is more developed in the scales of lower portion of the comb, but in this case it also is no more than 2 times the length of the proximal scales. Setae behind the comb; upper ones have 4-8 branches, median setae have 7-14, lower setae have 4-7 branches and the intermediate ones are simple.

The siphon is 1.5-2.0 times wider at the base than at the apex; siphon index is 3.3-3.5. The siphon base has well developed lobes and a dark ring. The comb has 20-29 (average of 24) closely arranged teeth occupying from 1/3 to slightly less than 1/2 of the siphon length; its teeth have 2-6 additional denticles at the base that are at the same angle to the tooth axis; the first of the teeth, particularly those in the middle part of the pecten, generally is not

the largest. Size of teeth gradually decreases proximally, and 1-5 of the basal teeth are rudimentary. A tuft of 4-7 (more often 5) branches, equal in length or exceeding the siphon width at the base, is inserted medially in the siphon or slightly closer to its base. The setae at the top of the posterior valves of the stigmal plate are narrow and slightly curved. The anal segment is longer than wide. The saddle covers from 2/3 to 4/5 of its lateral sides; this segment is covered with considerably larger microspines along the posterior margin than on the remaining surface. The lateral seta is simple, rarely 2-branched, and shorter (3/5-3/4) than the saddle. The outer caudal setae are simple and long, the inner setae are shorter and have 8-13 branches. The ventral brush has 15-20 tufts, united by a common base, and 2-6 tufts in front of them; each tuft has 3-10 branches; the anterior tufts are less branched than the succeeding ones. The gills are slightly pigmented, tapered at the ends, and 1.3-1.9 times longer than the saddle; the dorsal pair is longer than the ventral pair. (129)

Distribution. Discovered in the Far East of USSR (Primorskiy and Khabarovsk Krays, Amur Oblast and Transbaykal), where it is found almost everywhere and, also, in a number of regions in Siberia and Mongolia. In America, it is found in Alaska and the northwestern part of Canada.

Biology. Breeds mostly in temporary water basins, more often those that are shaded. The larvae are found not only in the spring, but in the summer as well. Often, in collections of mosquitoes, some are found that attack humans, but nowhere are these mosquitoes very numerous.

Remarks on taxonomy. In American literature, *Ae. mercurator* was earlier considered a synonym of the widely distributed (in the Western Hemisphere) *Ae. stimulans* (Walker) or its subspecies--*Ae. stimulans albertae* Dyar. Lately, American researchers (Wood, 1977; Enfield, 1977) have subscribed to the view that *Ae. mercurator* is an independent species as documented by V. N. Danilov (1974b). Actually, the differences of male genitalia structure and larval morphology in this mosquito make it very convincing that *Ae. mercurator* be considered as an independent species.

5. *Aedes (Ochlerotatus) sergievi* Danilov, Markovich et Proskuryakova, 1978.

Belongs to the *cantans* group. First mention of finding *Ae. sergievi* sp. nov. (without a description) was in an article of A. M. Proskuryakova and N. Ya. Markovich (1977). Descriptions of the female, male and larvae were given later (Danilov and others, 1978).

Female. Proboscis and palpi have dark scales, sometimes with an insignificant mixture of light-colored ones. The mesonotum has yellowish, bronze scales with a wide dark brown longitudinal stripe. A patch of scales on the sternopleurons is remote from their anterior angle and on the mesepimerons it extends to the lower margin. There is a postcoxal scale patch, but no hypostigmal one. The wings have dark scales with a small number of light scales mixed in on some veins. Legs: femura and tibia are variegated or light-colored anteriorly, and the tarsi have basal white rings. Dorsally, the abdomen has a

distinctly marked longitudinal stripe of light-colored scales, widening at the tergal articulations (Fig. 7). There are no light-colored scales against the dark background of the remaining portion of the tergite or they are few; segment VII is almost completely light-colored.

Male. Coloring is the same as in the female. Genitalia: basal lobe of the coxite is semicircular with a strong spine which is slightly curved in the distal half; the apical lobe is well developed. The structure of the claspette is quite typical; stem is relatively short and slightly curved; the "handle" of the claspette wing is slightly less than half of the wing length; the wing sharply widens near the middle of its length, forming an acute angle whose apex is sometimes curved "in a reverse direction," that is, towards the base of the claspette wing. The handle of the claspette wing is broader (compared to *Ae. mercurator*), and its extension into the area of transparent widening is highly noticeable right up to the apex of the claspette wing.

- (130) Larva of stage IV (according to: Danilov and others, 1978). Is of large size (length of body is 9-10 mm) and brown. Head is 1.3-1.6 times wider than long. Outer frontal setae have 8-13 branches (more often 9-11), median setae have 2 branches, inner setae have 3 (rarely 4, and even more rarely 2) branches; median setae are in front of the inner ones. Postclypeal setae between the median frontal setal bases have 2-7 (more often 3-4) short, narrow branches. The antennae are 2/5 to 1/2 the length of the head and are moderately covered with spinules, scattered over the dorsal side as well as the ventral side of the antenna; only at the base from the ventral side are there short rows of very fine spinules. A tuft of 7-12 (more often 8-10) branches, generally not extending beyond the apex of the antenna, originates roughly at the center of the antenna (0.44-0.56 of its length from the base). Sutural setae have 2-3 and transsutural setae have 2-4 short, narrow branches.

Prothorax setae: I--long, 1-2 branches; II--short, simple; III--a little shorter than II, 2 more rarely 3 branches; IV--short, simple; V--long, 2 more rarely 3 branches; VI--long, simple; VII--long, 3 (rarely 2 or 4) branches. Seta I of the mesothorax is about the same length and thickness as the long setae of the prothorax, and is approximately twice as long and broad as seta III of the mesothorax.

- (131) The comb of abdominal segment VIII has 21-36 (average of 26) scales, arranged in a triangular pattern; their number on different sides of the segment often varies. The scales are of 2 types: some have roughly the same-sized spines at the apex, and the others have a conspicuous main spine that is more than twice the length of the proximal ones; the former are generally arranged on the dorsal half of the comb, the latter on the ventral half. Setae behind the comb: upper ones have 5-8 (more often 5-6) branches, median setae have 5-9 (more often 7), and the lower setae have 4-6 branches; intermediate setae are simple, very rarely 2-branched.

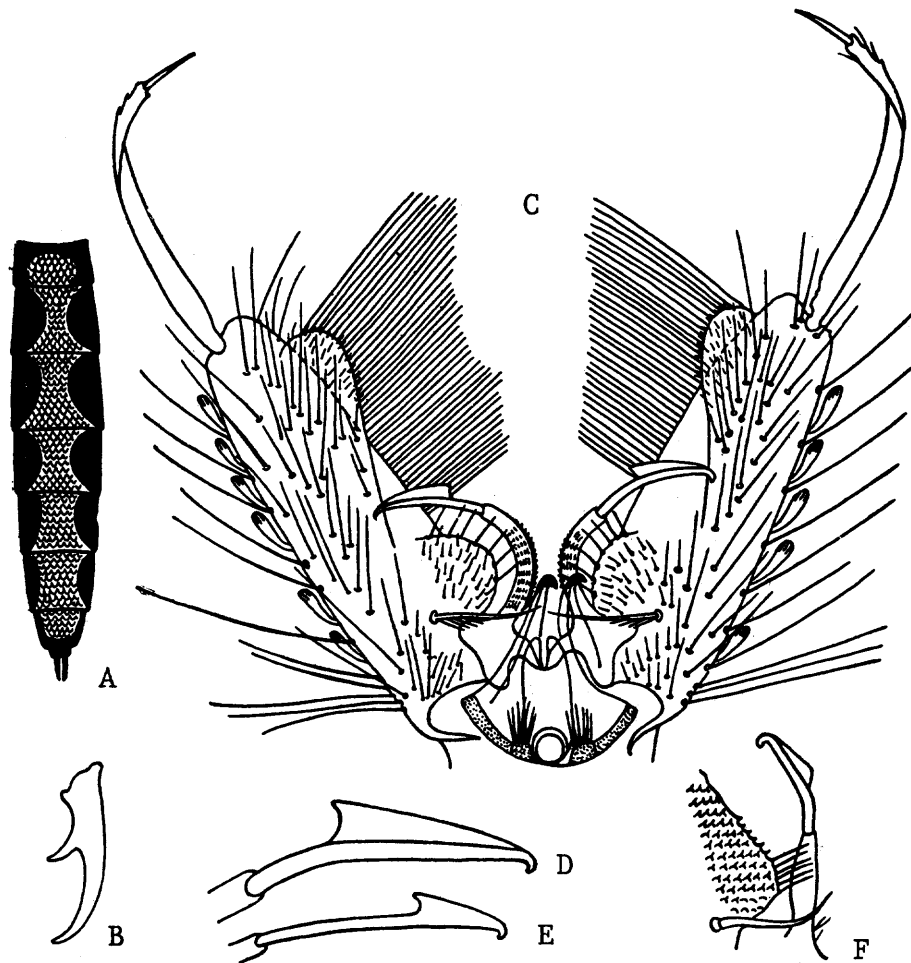


Fig. 7. Imago structural details of *Aedes sergievi*, *Ae. mercurator* and *Ae. flavescens* (according to: Danilov and other, 1978).

A--Abdomen of female *Ae. sergievi* (dorsal view); B--tarsal claw of female *Ae. sergievi*; C--genitalia of male *Ae. sergievi*; D--claspette wing of *Ae. sergievi*; E--claspette wing of *Ae. mercurator*; F--basal lobe of coxite and claspette of *Ae. flavescens*.

The siphon is 1.5-2 times wider at its base than at the apex; siphon index is 2.7-4 (average 3.3); siphon base has lobes and a dark ring. The pecten has 18-27 (average 23) uniformly spaced teeth, occupying about 1/3 of the siphon length from the base; teeth with several (at least 3) additional denticles at the base, are located at the same angle to the tooth longitudinal axis, and the first of them is not the largest. Size of the teeth gradually decreases proximally, and several of the teeth at the siphon base are rudimentary. A tuft of 5-10 (more often 7-8) branches, equal or greater in length than the basal width of the siphon, is inserted beyond the distal tooth of the pecten, about 2/5 the length of the siphon at the base. The setae at the apex of the posterior valves of the stigmal plate are thin and slightly curved.

The anal segment is longer than wide. In front, the saddle extends  $\frac{2}{3}$  to  $\frac{9}{10}$  down the sides of the segment; its height decreases distally; there is a ventral notch. Along the posterior margin, the saddle is covered by rather fine microspines, which nonetheless are clearly larger than the microspines on its remaining surface. The lateral seta is long, 1.1-1.6 (average 1.35) times longer than the saddle, and is simple, rarely 2-branched. The outer caudal setae are simple and long; the inner are shorter by roughly 2.5 times and have 8-15 (more often 10-11) branches. The ventral brush has 17-22 (more often 18-20) tufts, united by a common base, and 1-4 (more often 2-3) tufts anteriorly. The gills are pigmented, leaf-shaped and are  $\frac{1}{3}$  to  $\frac{4}{5}$  (average about  $\frac{1}{2}$ ) the saddle length (only one larva out of 90 had gills 1.5 times longer than the saddle); the dorsal pair is longer than the ventral pair.

Distribution. Described on the basis of material from the Tuvinian ASSR. This species presumably includes specimens from Zabaykal, earlier considered to be transitional forms between *Ae. riparius riparius* and *Ae. riparius ater*.

Biology. Breeds in temporary water basins. Produces one generation during the season. Pupation ends in the spring. Period of emergence comes at the end of spring and the beginning of summer.

Remarks on taxonomy. It differs from the close *Ae. mercurator* in coloring (markings on abdomen, mixture of light-colored scales on palpi and wings) and structure of male genitalia. The structure of male genitalia is similar to that of the widespread *Ae. squamiger* (Coquillett, 1902) in America (California, Mexico), but both species are differentiated by abdominal coloration and larval structure. It differs from *Ae. riparius* by the coloring of the abdominal tergites (*Ae. riparius* has light-colored bands more or less the same width and has many light-colored scales scattered on the dark part of the tergites), genitalia structure, specifically the claspette, and particularly the distinct structure of the larva: a small number of comb teeth is typical for *Ae. riparius*.

6. *Aedes (Ochlerotatus) fitchii* (Felt et Young, 1904).

Belongs to the *cantans* group. P. Ye. Polyakova first found it (1970) within USSR limits.

(132) Female. Proboscis and palpi have dark scales, often with a small mixture of light-colored ones. Thorax integument is dark brown. Mesonotum has an indistinctly marked, wide longitudinal, bronze brown stripe and small vague white spots. The lateral surface of the thorax has white scales, which on the sternopleurons extend to their anterior angle, and on the mesepimerons do not reach their lower border. There are no hypostigmal spots, but there is a postcoxal one. The femora and tibiae are variegated anteriorly, and the tarsi have basal white rings. Wings have dark scales, generally with a small mixture of light-colored ones appearing on different veins. Dorsally, the abdomen has wide, light-colored bands at the base of the tergites; often, there are also narrow bands at the top of the tergites; sometimes, light-colored scales dominate on the posterior abdominal segments.



Male. Coloring is basically that of the female. Genitalia (Fig. 8): coxite has relatively short setae, basal lobe is large, rounded at the apex and slightly asymmetrical; the lobe supports one spine and a great number of densely growing, rather long setae; the apical lobe is very convex; the claspette stem is slightly curved, and barely extends behind the basal lobe; the claspette wing is shorter than the stem, is poorly sclerotized, narrow, and at the base has a small indentation on the depressed side; processes of tergite IX have 5-10 long bristles; phallosome is cylindrical, elongated and has an apical indentation.

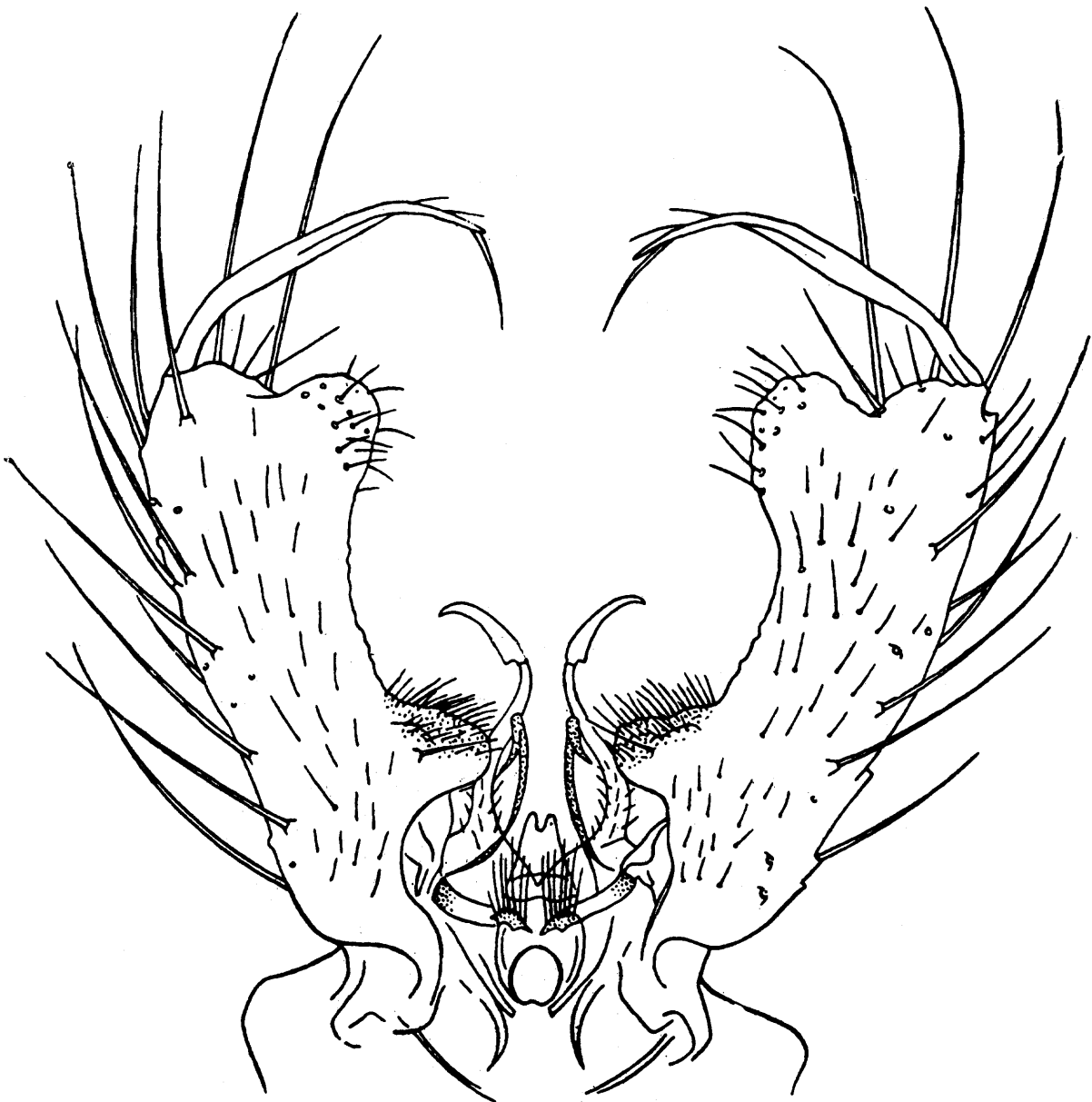


Fig. 8. Male genitalia of *Aedes fitchii* (according to: Polyakova, 1970).

(133)

Larva of stage IV (Fig. 9). Average size. Head is at least 1.5 times wider than long. Frontal setae are secondarily pinnate; the inner setae have 3-4 branches, and as an exception 2 branches; the median setae anterior to the inner ones have 2-3 shorter branches; and, the outer setae are a multiple tuft. The postclypeal setae between the bases of the median frontal setae are shorter and have 3-4 branches. The sutural and transsutural setae are simple. The antennae are about 1/2 the length of the head, are covered with spinules, and has a tuft inserted almost mesally that does not reach the antennal tip.

The median setae of the prothorax are secondarily pinnate; the inner setae are simple or 2-3 branched; and, the outer setae are long, 2-branched or simple.

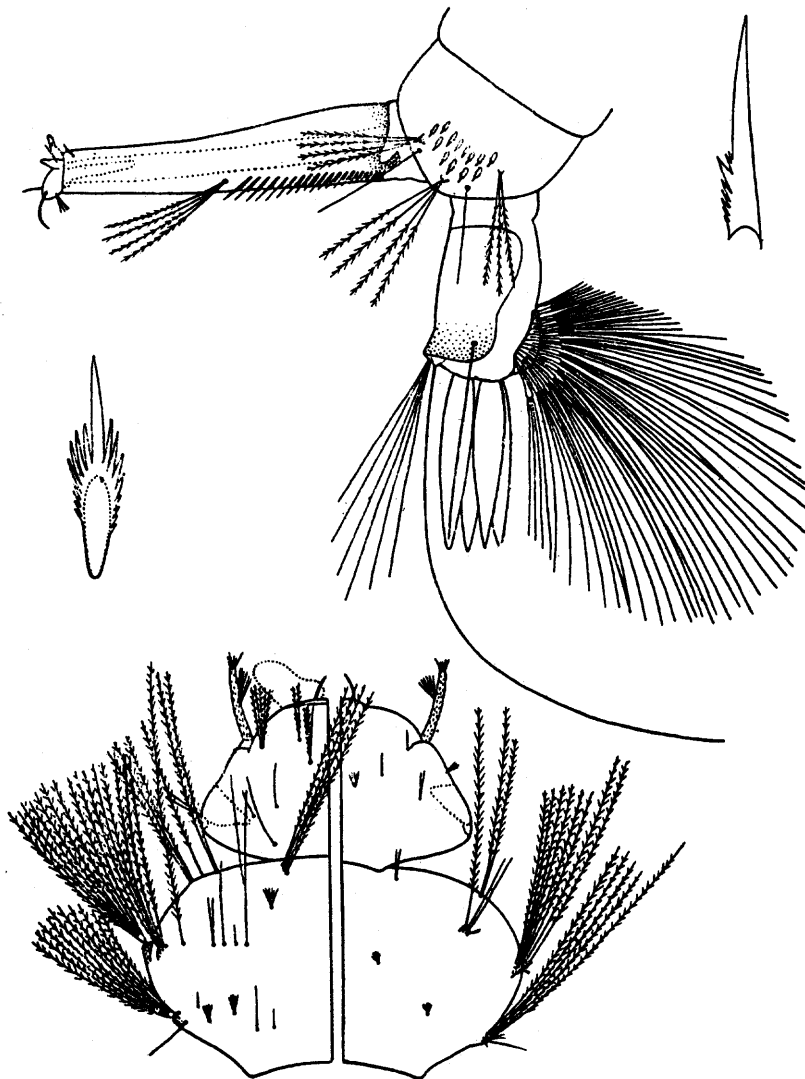


Fig. 9. Larva of stage IV of *Aedes fitchii* (according to: Carpenter and LaCasse, 1955).

Comb has 12-28 scales with a well developed main spine and a row of spinules at the base that are 3-4 times shorter. Setae posterior to the comb are long; the median, upper and lower setae have 3-4 secondarily pinnate branches; and, the intermediate setae are smooth and simple.

The siphon (index 4-5) starts to gradually taper slightly away from the base, and in the apical quarter becomes cylindrical. The pecten of 15-24 uniformly spaced teeth, does not quite reach the middle of the siphon; the teeth increase in size apically. A tuft with 3-6 secondarily pinnate branches is inserted almost medially on the siphon, posterior to the most distal pecten tooth. The setae on the posterior valves are well developed and curved.

The anal segment is elongated, has a saddle which extends slightly down the side of the segment. The lateral seta is simple and smooth, and is the same length as the saddle. The outer caudal setae are long and simple, the inner setae resemble a fan of 6 branches. The ventral brush has 1 or 2 tufts anterior to the common base. The gills are pointed, tapering and 1.5-2 times longer than the saddle. (134)

Distribution. Found in Magadan Oblast on the Anadyr River and in the area of the middle course of the Kolyma River at a latitude of about 64°N. Is widespread in the Western Hemisphere: Alaska, Canada and northern USA.

Biology. It was found to be a very abundant species in Magadan Oblast. It appears in June and flies to the end of August. In certain places, it attacks humans in rather large numbers (Polyakova, 1970).

Remarks on taxonomy. The species cannot always be determined with great reliability by an adult specimen, particularly females, because of similarity with some other species of the *cantans* group, especially with *Ae. riparius*. A more reliable determination can be made on the basis of males and larvae.

7. *Aedes (Ochlerotatus) euedes* Howard, Dyar et Knab, 1913.

Synonyms: *beklemishevi* (Denisova, 1955); *grandilarva* (Sazonova, 1955, 1956); *barri* (Rueger, 1958. In Soviet literature it appears under the name *Ae. beklemishevi* (see: Fauna...; Danilov, 1975, and others).

Recently (Wood, 1977), convincing proof was presented which showed that the species was first described in material from Canada under the name *Aedes euedes* in studies of 1913 and 1917. The other names given, in the latest descriptions of the same mosquito, naturally, are more recent synonyms.

*Aedes euedes* is quite similar to *Ae. excrucians*. Adult mosquitoes of both species are difficult to differentiate. The only completely reliable determinations are made on the basis of larvae.

Female. The proboscis has mixed light and dark scales. The integument of the mesonotum is brown, more rarely dark brown. The scales of the mesonotum are

relatively dark (particularly closer to the center line) brownish-bronze; there is no distinct longitudinal dark stripe. The femora and tibiae are variegated anteriorly, and the light- and dark-colored scales are approximately equal in number. The tarsal claws are large, the lateral tooth is oriented at an angle to the basal branch of the claw; this is the main difference from the *Ae. excrucians* imago. The wings are covered mostly with dark scales and a small mixture of light ones, scattered on the different veins. Dorsally, the abdomen is dark with fairly distinct light-colored basal tergal bands. There are no light-colored scales, or very few, against the dark background.

Male. Coloring of the body and structure of the tarsal claws are the same as those of the female. Genitalia: basal lobe of the coxite appears in the form of a flat, low projection without a spine and with numerous setae. The apical lobe has a wide base, projecting behind the attachment of the stem. The apical lobe of *Ae. excrucians* does not extend as far as the base of the claspette stem; this is the only, though not completely clear, difference from *Ae. excrucians* according to male genitalia structure (see: Wood, 1977). The claspette stem is long and somewhat tapering toward the apex; the claspette wing is without a "handle" and does not have a very wide transparent widening.

Larva of stage IV. Description is presented under the heading *Ae. beklemishevi* (see: Fauna...).

Distribution (see map in the study of V. N. Danilov, 1975). USSR forest zone from the western border to Kamchatka; the most northern location is the city of Zhigansk in Yakut ASSR, latitude 67°N; to the south in Kazakhstan--latitude 48°N. Beyond USSR limits: Poland (Skierska, 1971), North America--Alaska, Canada, northern regions of USA.

(135) Biology. Breeds mainly in temporary water basins of small and medium sizes, more often in meadows and flood plains. Apparently, produces one extended generation during the season. Emergence is from May to September. In certain places, it attacks humans in great numbers, but the numbers are generally much lower than of *Ae. excrucians*.

Remarks on taxonomy. A number of small differences from *Ae. excrucians* are recorded: the coloring of the mesonotum integument and the abdominal scales. The overall coloration is darker compared to *Ae. excrucians*. Body size is somewhat smaller. But, the only more or less reliable difference is the structure of the tarsal claws: *Ae. excrucians* has a lateral tooth that is oriented almost parallel to the main branch of the claw. Both species are differentiated quite clearly on the basis of larvae.

As far as naming of the species is concerned, according to Wood (Wood, 1977), he studied the lectotype *Ae. euedes* as well as the larval skins of the *Ae. barri* type series (this species is reduced to a synonym of *Ae. beklemishevi*, see: Danilov, 1975). Henceforth, the older synonym--*Aedes euedes*--has to be considered valid according to the rules of nomenclature.

8. *Aedes (Ochlerotatus) increpitus* Dyar, 1916.

Belongs to the *cantans* group. V. N. Danilov (1976) was the first to report finding *Ae. increpitus* in the USSR. However, in this case there is some doubt about the correctness of the determination of this species: the only specimen of a male from Kemerovo Oblast that was identified as *Ae. increpitus* (Fig. 1 in the study of V. N. Danilov) does not belong to this species--this is a male of *Ae. behmingi*. For this reason, the description we give is based on the studies of American authors (Carpenter and LaCasse, 1955; Nielsen and Rees, 1961 and others).

Female. The proboscis is dark. Palpi have dark scales with a mixture of light-colored ones. Integument of the thorax is dark brown. The mesonotum has a wide medial stripe of narrow brown scales, limited laterally by light-colored scales. The lateral surface of the thorax has white scales that do not extend to the anterior angle of the sternopleurons (single, isolated scales may be located near the angle) and do not extend to the lower border of the mesepimerons. The hypostigmal scale patch is absent. The abdomen is dorsally dark with light-colored bands at the base of the tergites that become wider along the sides of each segment. The femora and tibiae have dark scales anteriorly, among which there are a few light-colored ones on the anterior part of the wing.

Male. Coloring is basically that of the female. Genitalia (Fig. 10) are similar to those of *Ae. excrucians* and related species: basal lobe is a flat, low projection in the basal quarter of the coxite that is covered with short setae and has no spines or strong bristles; the claspette stem is short; claspette wing is longer than the stem, has a "handle", which gradually widens to form an angular projection in the middle of the claspette wing; phallosome is medially constricted, and has an apical indentation; processes of tergite IX have long bristles.

Larva of stage IV (Fig. 11). Antennae are about 1/2 the length of the head and have spinules; the antennal tuft is multiple, is secondarily pinnate, is inserted mesally and does not reach its apex. Setae of the head: postclypeal setae are smooth and branched; median frontal setae are double or triple (sometimes they are single, rarely are 4-branched); inner setae are single or double (sometimes triple); outer setae, which have 5-11 pinnate branches, extend to the insertion of the antennal tuft.

Comb of the eighth segment generally has 20 or more scales. Individual scales are also laterally fringed by small apical spinules with a central spine that barely stands out. Siphon index is 3.0-3.5; pecten of 16-24 uniformly spaced teeth on the basal 2/5 of the siphon; siphon tuft has 3-7 pinnate branches, inserted directly beyond the pecten. The saddle extends 2/3-3/4 down the lateral sides of the anal segment; the spines on the apical part of the

saddle are well developed, the lateral seta is simple and shorter than the saddle; the outer caudal setae are long and single; the inner setae are long and numerous. The ventral brush has many tufts, united by a base, and has 2-4 shorter tufts in front of it. The gills are the same length or twice the length of the saddle and are pointed.

Distribution. In the USSR, according to the data of V. N. Danilov (1976), the larvae and females of *Ae. increpitus* are found in the Zeyskiy Rayon of Amur Oblast and in Severno-Baykalskiy Rayon of Buryat ASSR; also, found in the area of the city of Mirnyy and southwest of Yakut ASSR (Danilov, 1978a). In America, the species is known in the western states of the USA and the southwestern provinces of Canada.



Fig. 10. Male genitalia of *Aedes increpitus* (according to: Carpenter and LaCasse, 1955).

Remarks on taxonomy. *Ae. increpitus* females are similar to other species of the *cantans* group, specifically *Ae. riparius*, *Ae. fitchii* and *Ae. excrucians*; it differs from the latter by the tarsal claw structure, which in *Ae. increpitus* is curved and has a small denticle. The species is determined by the males with a high degree of reliability. The larval preparations identified as *Ae. increpitus* in the collection of the Zoological Institute of the USSR Academy of Sciences, were determined by V. N. Danilov by the presence of one or 2 central spines in the comb scales and the width of the saddle: that does not completely correspond to the published work of this author and the cited description. Only one preparation (No. 2677) corresponds to the cited description with the absence of a well developed central spine, great width of saddle and complex frontal setae, but even this differs by not having a median tapering of the comb scales. The other preparations better fit the description of *Ae. implicatus* and are found in the same localities as the latter. By stretching some points, larvae found by one of the authors (A. M. Dubitskiy) in South Altay may be included in *Ae. increpitus*. However, they also differ from the nonarctic descriptions by the simple inner setae, round shape of some of the comb scales and their large number (35-45). Inclusion of this species in USSR fauna requires confirmation. (137)

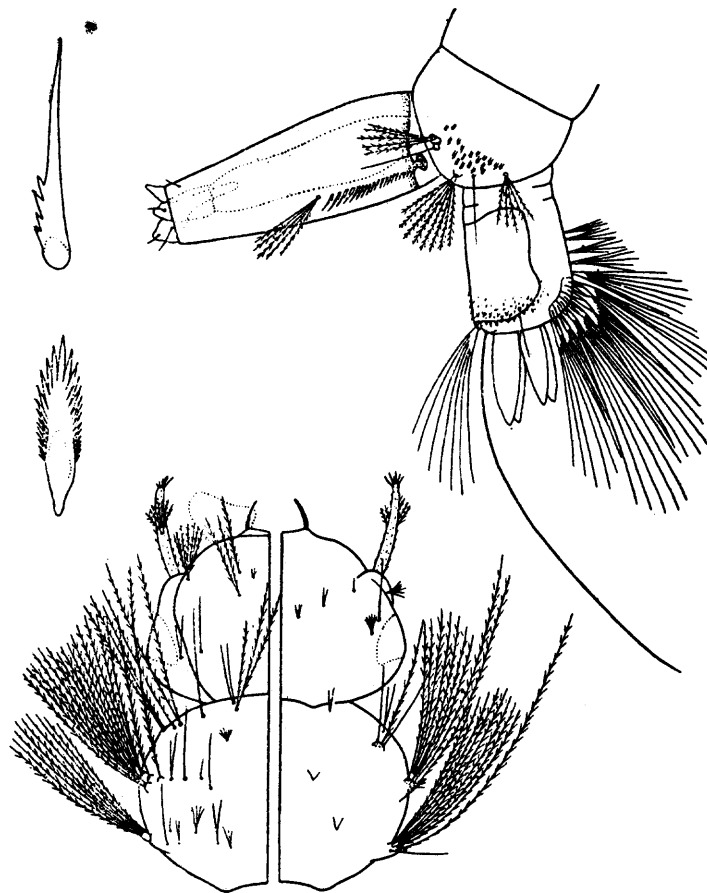


Fig. 11. Larva of setae IV of *Aedes increpitus* (according to: Carpenter and LaCasse, 1955).

9. *Aedes (Ochlerotatus) kasachstanicus* Gutsevich, 1962.

Initially, the taxonomic position of this unique mosquito appeared unclear. At the present time, since *Ae. kasachstanicus* larvae became known, as well as the structure of the head and appendages of the female, there is a basis for including it in the *cantans* group.

(138) Imago. A description of the males and females is available in the literature (see: Fauna...).

Larva. A brief description of the larva has been published (see: Fauna..., Supplement). A detailed description of the larva is given for the first time.

(139) Larve of stage IV (Fig. 12). Is of average size, is dark brown, has dark tracheae and a lighter colored head. The head is 1.4 times wider than long. Frontal setae: outer setae have on the average 8 (6-11) branches, median setae have 3 (2-4), inner setae have 5 (4-7) branches, rarely secondarily pinnate; postclypeal setae between the median frontal setae bases have 3 (2-7) very short branches. The sutural seta has 2 (1-3) and the transsutural seta has 3 (2-4) narrow branches. The antenna is short, about 1/2 the length of the head, covered with sparse spinules and has a tuft of 7-8 (6-11) branches, inserted almost mesally, slightly closer to the base.

(138)

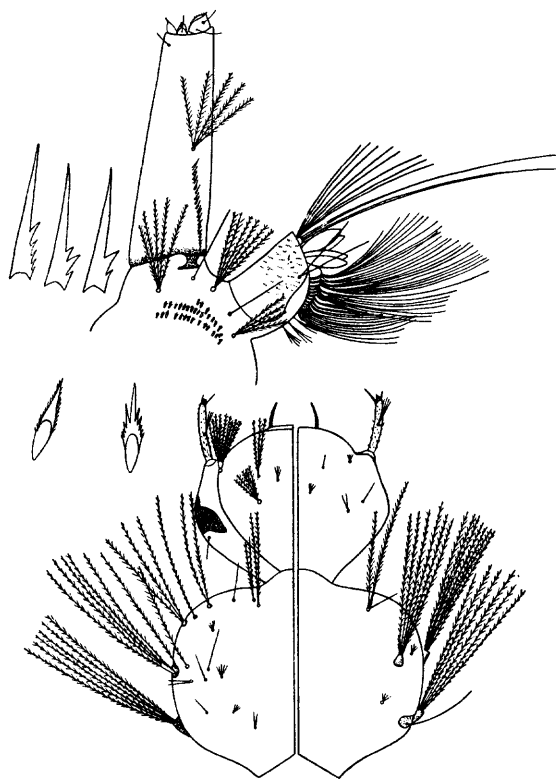


Fig. 12. Larva of stage IV of *Aedes kasachstanicus* (original of A. M. Dubitskiy).



The inner median setae of the prothorax are relatively short: the anterior and median setae have 1-2 branches, the posterior seta has 2-3, as a rare exception has 4, longer, sparsely secondarily pinnate setae not reaching the posterior border of the eyes.

The comb on the average has 31 (27-34) scales, arranged in 2-3 rows that are convex, facing posteriorly in the shape of a halfmoon. Some scales have a well developed main spine with a number of narrower and shorter spinules along the sides of the base. The setae posterior to the comb; upper setae have 4 (3-6), median setae have 6 (5-10), and lower setae have 5 (4-7) branches that are conspicuously secondarily pinnate, the intermediate setae are smooth and simple. The siphon is long and cylindrical in the basal third and gradually tapers toward the apex; index is 3.9-4.0. The pecten has on the average, 20 (16-21) teeth, spaced equidistant from each other, and 2-6 tiny rudimentary denticles at the base. The pecten occupies the basal third of the siphon. Each tooth has 2-4 denticles at a slightly widened base. The tuft, on the average, has 4 (3-5) secondarily pinnate branches, which is very slightly longer than the siphon width at its insertion and extends beyond the apex of the pecten by only a distance of one tooth length.

The saddle is twice as long as wide; its lateral border extends behind the middle of the segment. The lateral seta is single or double, slightly shorter than the saddle length. The caudal setae have 9 (8-10) branches, the ventral brush has 16 (12-18) tufts, united by a common base, and 2-3 shorter tufts anterior to the base. The gills are short, about 1/3 the length of the saddle, and are ovoid- or leaf-shaped.

Distribution. The species is found at a number of points in the Ili River valley in Alma-Ata Oblast. A large part of the distribution area of the species appears to be within the limits of the People's Republic of China.

Biology. Breeds in water basins, which appear as a result of river flooding or melting of snow, mostly in flood forests (tugais). The water basins generally contain many fallen leaves and are characterized by a low mineral content and much shade. Is a late spring species, and has one generation during the season.

10. *Aedes (Ochlerotatus) albescens* Edwards, 1921.

Belongs to the *rusticus* group. It was earlier considered a dubious species (see: Fauna...). A more detailed investigation of mosquitoes of this group from Western Siberia and North Kazakhstan disclosed the presence in this region of 2 species of the *rusticus* group--the darker one is *Ae. subdiversus* Martini and the lighter colored one is *Ae. albescens* Edwards. These correspond adequately to the original descriptions. Both species differ from each other not only in coloring, but also in morphological characters (Gutsevich and Pendikova, 1972).

Female. A relatively large mosquito; length of proboscis is 2.8-3.1mm. The proboscis and palpi have mixed dark and light scales. The palpus is 0.3-0.32 of the proboscis length. Antennal segment III is yellowish. The integument of the clypeus and the mesonotum as well as the gena are brown. The mesonotum is

(140)

covered with white and yellowish scales; the latter form a vaguely outlined longitudinal stripe, sometimes a double stripe. The lateral surface of the thorax has narrow white scales, with the exception of the dorsal part of the proepimeron that is covered with straight yellowish scales. The scales of the sternopleurons extend to their anterior angle, and on the epimerons to their bottom border. The hypostigmal and postcoxal scale patches are present. The postscutellum has no scales. The femora and tibiae are variegated anteriorly with a dominance of light-colored scales. The tarsi have no rings. The claw is extended in length, and has a rather large tooth directed almost parallel to the basal part of the claw. The wings have white scales admixed with dark ones. Dorsally, the abdomen is densely covered with white scales; areas that do not have any scales give the impression of dark spots because the coloring of the abdominal integument is brown.

Male and larva are unknown. They are probably similar to those of *Ae. subdiversus* and are not differentiated in classification. For this reason, individual characteristics of the corresponding stages of *Ae. albescens* cannot be given as yet. For the same reason, it does not appear possible to characterize the distribution and biological features of each of the 2 species. Originally, *Ae. albescens* was described on the basis of one specimen from Omsk. We have available specimens from Omskaya and Kustanayskaya Oblasts of Kazakh SSR.

Since we consider *Ae. albescens* an independent species, the question of it being the same as the Mediterranean *Ae. lepidonotus* is answered negatively: *Ae. lepidonotus* is distinguished by the presence of scales on its postscutellum. Inasmuch as *Ae. lepidonotus* has not been found in the USSR for certain, there is no basis for including it in the list of mosquito species in USSR fauna.

#### AEDES (OCHLEROTATUS) SPECIES OF THE COMMUNIS GROUP

In this instance, the *communis* group is considered in the broad sense of the word that includes species of the subgenus *Ochlerotatus*, which are characterized by the absence of: light-colored rings on the tarsi, scales on the basal lobe of the coxite, and setal tufts on the dorsal side of the larval siphon. During the past 10 years the following have been found in the USSR: 2 new species of the *communis* group-- *Ae. montchadskyi* and *Ae. bujaticus*; 4 species, known earlier in North America-- *Ae. rempeli*, *Ae. punctodes*, *Ae. thibaulti* and *Ae. implicatus*; and, the described earlier unknown larvae of *Ae. simanini*.

According to the present day data, the *communis* group is represented by 22 species in the USSR. An important taxonomic character is the arrangement of scales on the lateral surface of the thorax (Peus, 1933; Vockeroth, 1954b). The taxonomic value of the indicated character is somewhat weakened by its variability in individual species. Thus, *Ae. implicatus* sometimes has hypostigmal scales and sometimes not. The lower mesepimeron setae, which appear in the identification keys of a number of authors as a taxonomic character, may be present or absent in the same species. Species have to be determined by an aggregate of characters that considers wherever possible not only the coloring and arrangement of scales on the thorax, but also the structure of the male genitalia and female head, as well as the morphology of the larvae.

11. *Aedes (Ochlerotatus) rempeli* Vockeroth, 1954.

Belongs to the *communis* group. The first report on finding *Ae. rempeli* in the USSR, without a description of the species, is in the study of A. S. Aksenova and V. N. Anufriyeva (1969). A description of the larva is given in an article by A. M. Dubitskiy and Yu. N. Tupitsin (1970), the imago -- in a study of A. M. Dubitskiy (1977).

Female. Proboscis and palpi are dark and have a small mixture of light-colored scales. The mesonotum has golden brown scales with 2 longitudinal stripes, extending on the sternopleurons to their anterior angle, on the mesepimerons -- to the lower margin. The hypostigmal and postcoxal scale patches are absent. The fore- and midfemora are dark anteriorly with an insignificant mixture of light-colored scales. The tarsi have no light-colored rings. The wings have dark scales, and sometimes there are single light-colored scales at the base of the wing. The abdomen is dark dorsally and has light-colored bands at the base of the tergites, which become wider along the sides of the segments. (141)  
There are no light-colored scales on the dark part of the tergites.

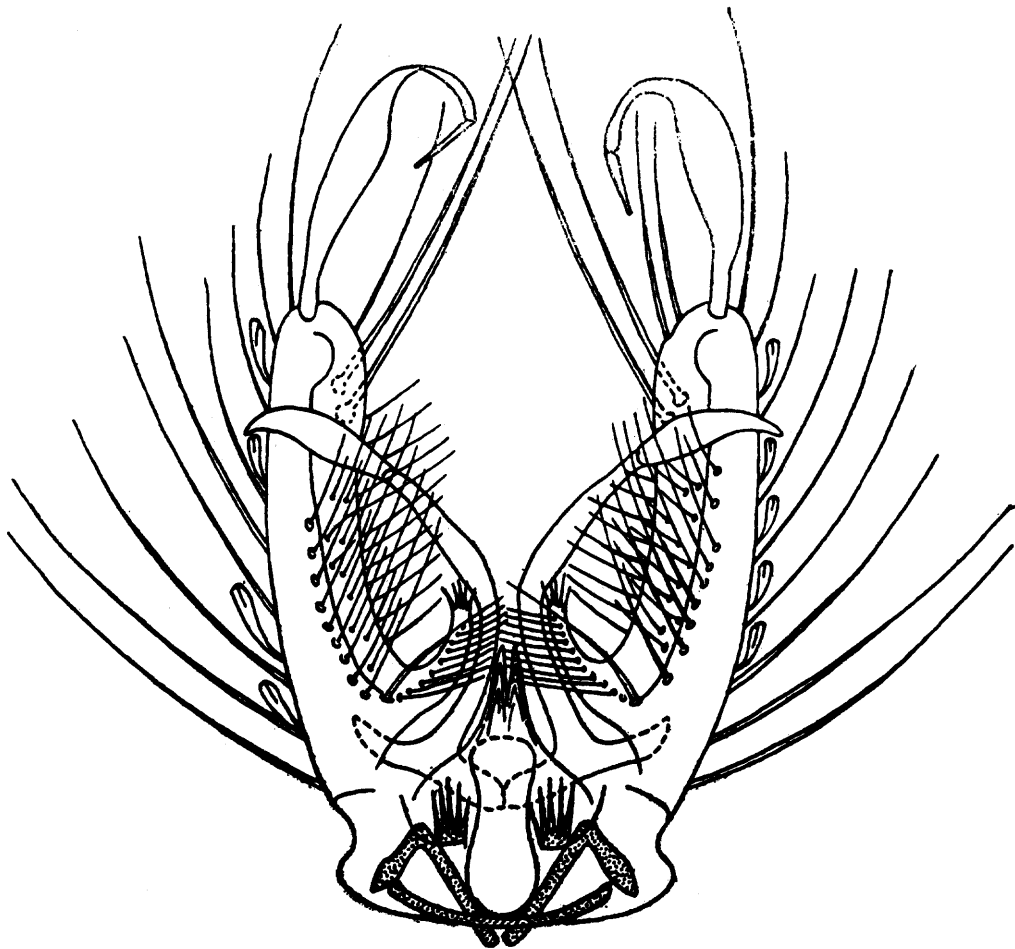


Fig. 13. Male genitalia of *Aedes rempeli* (according to: Dubitskiy, 1977).

Male. Coloring is basically the same as that of the female, but has a more significant mixture of light-colored scales on the palpi, mesonotum, femora, tibiae and at the wing base. In contrast to the females, the white scales on the mesepimerons do not extend to the lower margin. The genitalia are quite unique (Fig. 13): the basal lobe of the coxite is large and elongated (the length is at least more than twice the width at the base), has no spines, has bristles in a row in which they gradually become shorter; the apical lobe is small with several short setae; the coxite has bristles of a moderate length; the dorsal part of the coxite has 2-3 particularly large, long bristles; the clasper stem is long and curved; the claspette wing is at least half the length of the stem and is medially widened; the phallosome is of an elongated, oval shape and is constricted medially; the processes of tergite IX are small with 4-6 bristles.

Larva of stage IV. From dark brown to black. The average length in a fixed state is 7.2 mm. The setae on the different sections of the body are of moderate length, well developed, finely secondarily pinnate.

(142) The head is 1.1-1.3 times wider than long. The greatest width is at the level of the lower margins of the eyes. The clypeal setae are of moderate length and dark; the outer setae are small and have 4-5 branches. The median frontal setae are anterior to the inner ones; both types of setae are single and of moderate thickness and length. The outer frontal setae have 4-6 narrow branches, very weakly pinnate. The sutural setae are fine and simple; the transsutural setae generally have 2 branches. The antennae are short, 0.5-0.6 of the head length, and are covered with small, slightly chitinized spinules. The tuft, made up of 5-7 narrow branches, is inserted just below the middle of the antenna and does not appreciably extend to its tip.

The lateral and inner median prothoracic setae project slightly beyond the distal end of the antennae. The lateral setal tufts on the meso- and metathorax are slightly longer than other setae.

The sensitive, lateral abdominal setae are longer, and are about 2 times as long as the segment width. The comb, on the average, has 38 (32-46) rather large scales, arranged in 3-4 rows in the form of a distally curved, semi-oval patch. The scales vary both in size and shape, starting from elongated, long ones and ending with short, wide ones. The latter were more characteristic for the lower margin of the comb. A median spine is generally not present, although individual scales may have an indication of a central spine. Setae behind the comb: upper setae have 2-4 branches, the median setae have 4-7, the extreme lower setae have 2-6 branches, and the intermediate setae are simple.

The siphon is quite well proportioned, and in the upper third becomes perceptibly narrower apically. The siphon is 3.5-4 times longer than the base width and is 6-7 times longer than the apex. A tuft of 9-12 secondarily pinnate branches is inserted just below the middle of the siphon. The tuft branches are 1.2-1.5 times the siphon width at the attachment site. Except for the rather massive preapical setae, there are no other tufts on the siphon. A dark ring and lobes are well developed at the siphon base. The pecten, which has 20-23

teeth, covers the proximal third of the siphon. The teeth are narrow and straight with 1-2 additional spinules. Proximally, the teeth becomes appreciably smaller, and 2-3 of the basal teeth are rudimentary. The pecten does not reach the base of the siphon tuft by a distance equal to 1.5-2 distal teeth. The setae on the distal end of the stigmal plate are rather massive and are curved in a crescent-shape. The entire siphon and the distal part of the saddle are covered with small spinules.

The saddle encircles the last segment, whose length barely exceeds its width. Intensive pigmentation and sclerotization of the saddle are characteristic. The lateral setae on the saddle are single and are about 1.5 times the length of the saddle. The outer caudal setae are simple and long (1.5 times the length of the siphon), the inner setae have 4-5 branches and are the same length as the siphon. The ventral brush has 14-16 long-stemmed tufts joined by a common base. The length of the unbranched part of the tufts is 2-3 times the length of the transverse grid bars. The gills are slightly pigmented, and they gradually taper toward the apex. The gills are 1.7-2 times longer than the saddle.

Distribution. Various regions of Siberia, East Kazakhstan Oblast. Mongolia (Okhton-Tengri). Canada.

Biology. Lives mostly in the mountains, particularly in the south. In Southern Altay at the Rakhmanovskiye Springs at an altitude of 1900-1950 meters above sea level, larvae were found in shaded and semishaded water basins with a stony bottom; and were generally found together among the stones with larvae of *Ae. pullatus*, *Ae. punctor*, *Ae. communis* and *Ae. sticticus*. It apparently is related to a number of rare species.

Remarks on taxonomy. Appearance, according to females, is similar to *Ae. communis*, from which *Ae. rempeli* females differ only in the shape of the light colored bands of the abdominal tergites--they are narrow in the middle. May be reliably determined by males and larvae.

## 12. *Aedes (Ochlerotatus)? punctodes* Dyar 1922.

Determination of *Ae. punctodes* is not completely reliable because of the difficulty in distinguishing it from species close to it.

Female. Is not reliably distinguishable from *Ae. punctor* and *Ae. hexodontus* (Knight, 1951; Dahl, 1977). In a summary on mosquitoes of North America (143) (Carpenter and LaCasse, 1955), a description of *Ae. punctodes* females is absent. We have no females in our material that can be reliably identified as *Ae. punctodes*.

Male. Among a large number of *Ae. punctor* males, caught on an island in Chukyagirskoye Lake (northern part of Khabarovsk Krai), 3 specimens were singled out that differ from *Ae. punctor* (and are not distinguishable from it according to *Ae. hexodontus* males) in the following characters: 1) spine of the basal

lobe of the coxite is narrow and barely differs from proximal bristles; 2) claspette wing is slightly sclerotized (is lighter colored than the stem), narrow, long and is only slightly shorter than the stem. We preliminarily include these examples in *Ae. punctodes*. It is namely these characters that are noted in the description of a male of this species (Carpenter and LaCasse, 1955). As far as the shape and size of the basal lobe of the coxite is concerned, this character is subject to great variation and depends on the position of the lobe in the preparation. For this reason, small differences in the structure of the basal lobe, in our opinion, cannot serve as a reliable diagnostic character for the given species group. The same holds true for the bristles of the basal lobe (numbers 1-6, see: Dahl, 1974). These bristles are so close to each other that they form a tight group, and it is simply impossible to distinguish their sequence in a number of cases.

Larva of stage IV. The morphological characteristics of *Ae. punctodes* larvae almost completely correspond to the descriptions of *Ae. punctor* and *Ae. hexodontus* (Carpenter and LaCasse, 1955) and a number of transitional characters related to them. Incomplete encircling of the saddle around the anal segment is considered a reliable difference, however, this is also found in atypical specimens of *Ae. punctor* (Fauna...).

Distribution. In the USSR--northern part of Khabarovsk Kray (presumably). Alaska. Sweden.

Biology. Larvae are found in salt marshes in southern Alaska.

Remarks on taxonomy. It is assumed that *Ae. punctodes* is determined most reliably by the structure of the larvae. Sometimes, *Ae. punctodes* is considered a synonym of *Ae. punctor* (Gjullin et al., 1961). Actually, according to a number of characters (number of comb scales and others) *Ae. punctodes* holds an intermediate position between *Ae. punctor* and *Ae. hexodontus*. The question of specific independence of *Ae. punctodes* requires further study.

13. *Aedes (Ochlerotatus) thibaulti* Dyar et Knab, 1910.

Belongs to the *communis* group. Is widespread in North America. One specimen, a male, has been found in the USSR; only a microscope slide preparation has been preserved (Gutsevich and Goritskaya, 1970). We base the descriptions of the female and larvae on American literature sources.

Female. The proboscis and palpi are dark. The anterior half of the mesonotum has a dark longitudinal stripe, which is limited along the sides by golden scales. The posterior half of the mesonotum is dark. The tarsi have no light-colored rings. The wings have dark scales. The abdomen has light-colored spots along the sides of the segments, located at the base of the tergites.

Male. Genitalia (according to preparation of V. V. Goritska, Fig. 14): the coxite has a basal and an apical lobe: the basal lobe is broad, slightly convex, has no spines, and is densely covered with setae; at the proximal border of the tubercle on a small protuberance, there are 3-4 long straight bristles and several fine setae; the apex of the lobe is covered with relatively long setae. The structure of the claspette is completely unique: an almost straight stem forms a projection before the apex that is densely covered with fine setae; the claspette wing is leaf-shaped and wide; the narrow end of the wing is curved into a hook-shape; the processes of tergite IX have 8-10 strong bristles; the phallosome is elongated.

(144)

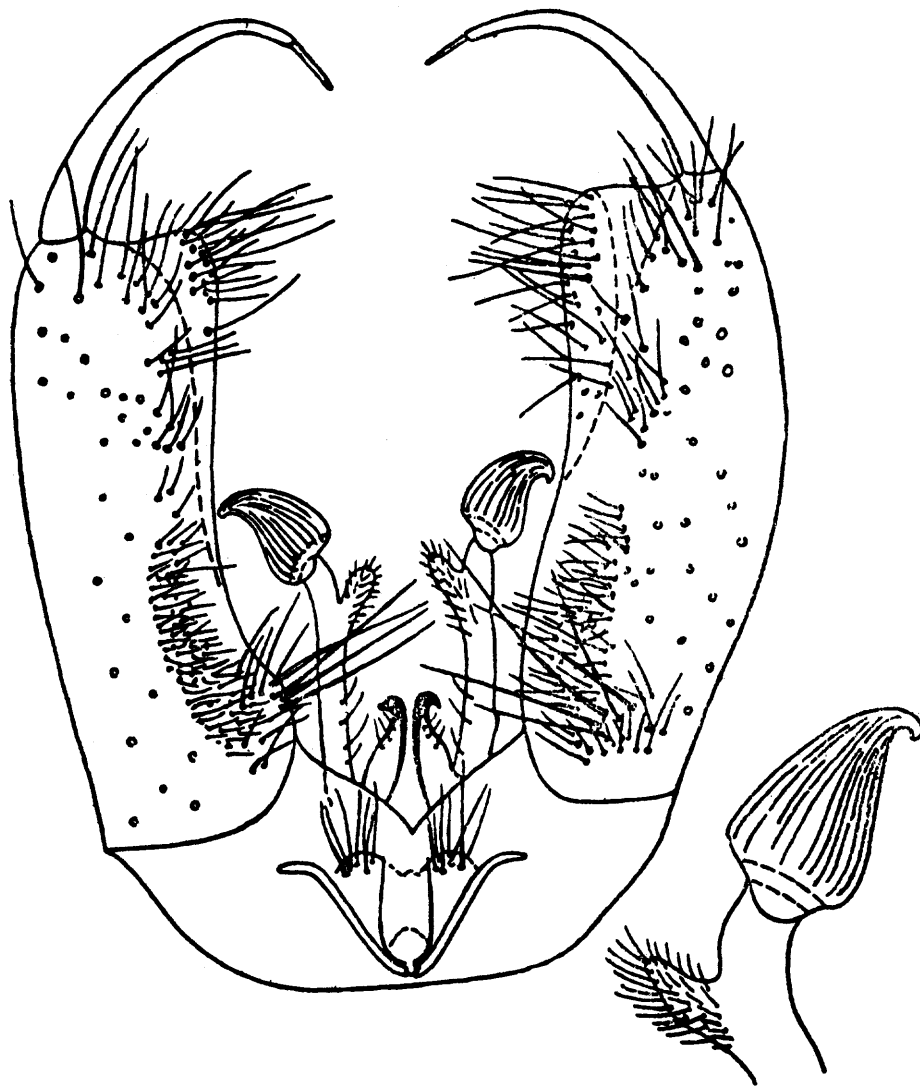


Fig. 14. Male genitalia of *Aedes thibaulti* (according to: Gutsevich, 1970).

Larva of stage IV (Fig. 15). The antennae are narrow, almost the same length as the head, and are covered with spinules; and, the antennal tuft which is large, multiple, and secondarily pinnate, is inserted near the middle of the antenna and almost reaches its apex. The preclypeal setae are long, thin, slightly pigmented and are wider apart than their length. Setae of the head: the postclypeal setae are small and curly; median frontal setae are long, generally have 5-8 pinnate branches; the inner frontal setae are long and have 3-5 pinnate branches (rarely are double). The outer setae are long, multiple and secondarily pinnate. The outer, median and inner frontal setae are arranged almost in a straight line.

The comb of segment VIII has 24-35 scales; individual scales are fringed by rather strong spines of equal length, of which the median one is somewhat longer and stronger. The siphon index is about 4.5-5.0; the pecten has 16-24 uniformly spaced teeth on the basal 2/5 of the siphon; the siphon tuft which has 4-8 secondarily pinnate branches, is inserted beyond the pecten. The anal segment has a saddle that covers 2/3-3/4 of its sides; the upper part of the saddle is covered with spinules; the lateral seta is simple and is slightly longer than the saddle; the outer caudal setae are simple and long, the inner setae are multiple and shorter. The ventral brush has a large number of tufts, united by a base, and has 2-3 tufts anterior to the base; the gills are tapered and 0.7-1.2 times longer than the saddle.

Distribution. Our specimen was found in a flood plain of the Dneper River above Dnepropetrovsk. It is known in the eastern USA and in southeastern Canada.

(145) Biology. Breeds (according to literature data) in root water basins-- accumulations of water at roots of trees or in stumps of fallen trees. As a rule, larvae are not found in tree holes or in ordinary ground basins. Adult mosquitoes seek shelter in vegetation or in hollows; sometimes they attack humans. In a season, the mosquito produces one generation that appears in early spring.

Remarks on taxonomy. The male differs sharply in genitalia structure from all other palaeartic species. the process of the claspette stem is found only in *Ae. intrudens*, but in all other respects the genitalia of *Ae. thibaulti* and *Ae. intrudens* are completely different. In comparing our preparation with the description and drawing of *Ae. thibaulti* (see: Carpenter and LaCasse, 1955), insignificant differences are found: in the preparation the claspette stem is longer, and the claspette wing is shorter and wider, and the apical lobe of the coxite has long straight setae.



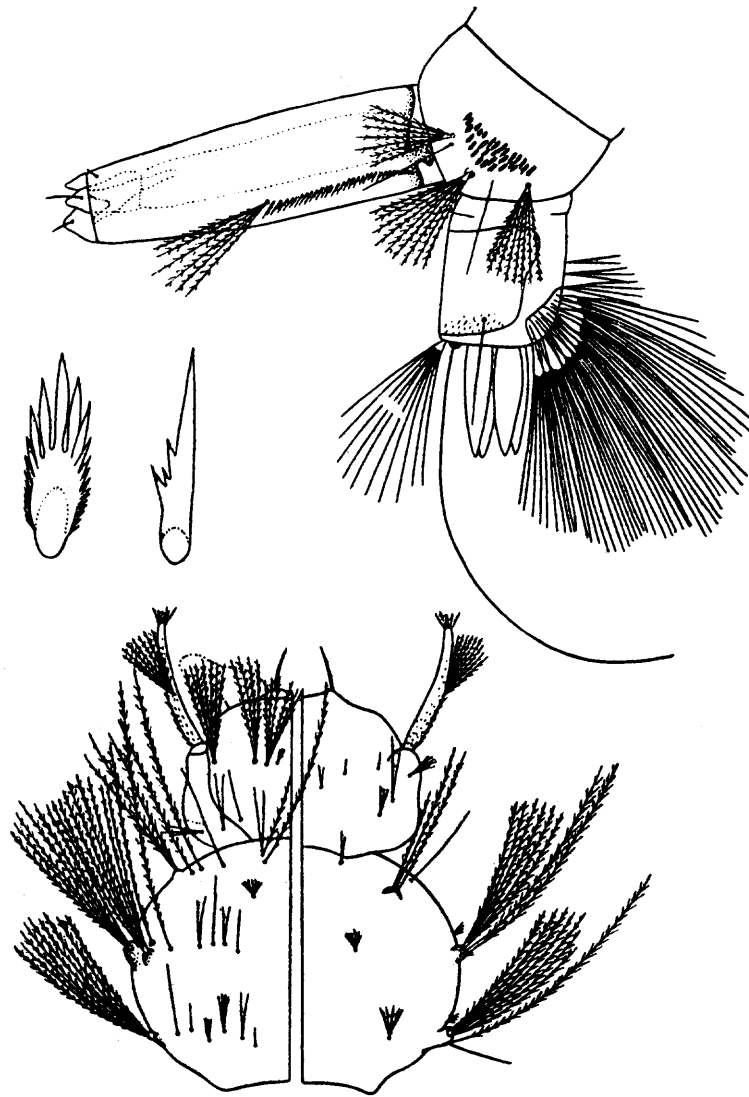


Fig. 15. Larva of stage IV of *Aedes thibaulti* (according to: Carpenter and LaCasse, 1955).

It is surprising that *Ae. thibaulti* (or species close to it) has not been found by anyone else in the USSR or in the Palaearctic generally. The possibility is not excluded that, in regulating the current of the Dneper River, this species completely disappeared as a result of the flooding of its basic biotopes--flooded forests. More likely, *Ae. thibaulti* is living even now in the Ukraine, but has not been caught by the specialist investigators. Several species of mosquitoes may be named that are known in the USSR only by one or several collections: *Toxorhynchites christophi*, *Mansonia burtoni*, *Aedes cretinus*, *Culex sinensis*, *Cx. whitmorei* and others. (146)

14. *Aedes (Ochlerotatus) implicatus* Vockeroth, 1954.

Belongs to the *communis* group. Is widespread in North America. Was discovered by V. N. Danilov in the USSR (1974a).

Female. Proboscis and palpi are dark. The mesonotum has a wide longitudinal stripe, sometimes a double stripe, and dark bronze scales. In the posterior half of the mesonotum there are lateral longitudinal dark stripes that are generally distinguishable. The remaining surface of the mesonotum is covered with whitish scales. The light-colored scales on the lateral surface of the thorax do not reach the anterior angle of the sternopleurons and the lower margin of the mesepimerons. There is a postcoxal scale patch as well as a hypostigmal patch, but more often the latter is absent. The fore- and midfemora and tibiae are variegated anteriorly, that is, have mixed light and dark scales. The wings have dark scales, and light-colored scales are found only at the base of the costa. The tarsi are dark. The abdomen is dark dorsally and has light-colored transverse bands at the base of the tergites; the bands do not become medially narrow.

Male. Coloring is basically that of the female. Genitalia (Fig. 16): the coxite has long dense setae; apices of setae of the left and right coxites overlap; a group of large, long setae in the distal part of the coxite particularly stand out; the basal lobe is moderately convex and has a number of bristles, the last one of which is larger than the others; in some descriptions this large bristle is treated as a "large spine"; the apical lobe is convex and elongated; the claspette stems are curved outward, and the claspette wing has a well developed membranous widening.

Larva of stage IV (according to: Carpenter and LaCasse, 1955). The antennae are about half the length of the head and are covered with spinules; the antennal tuft is multiple and is inserted below the middle of the antenna (but, does not reach its tip). Setae of the head: postclypeal setae are small and, generally, simple; the median frontal setae are simple or double; the inner setae are long and simple; the outer setae are multiple and reach the insertion of the antennal tuft. The comb on segment VIII has 25-35 scales, the individual scales are fringed by rather heavy spinules and the median spine is somewhat longer and thicker than the others. The siphon index is 3.0-3.5; the pecten has 18-24 uniformly spaced teeth on the basal 2/5 of the siphon; the siphon tuft is generally triple (rarely 2 or 4 branches), and is inserted beyond the pecten near the middle of the siphon. The saddle of the anal segment encircles almost 2/3 of the sides of the segment, and the distal part is covered with spinules; the lateral seta is simple and shorter than the saddle; the outer caudal setae are long and simple; the inner setae are multiple and shorter; the ventral brush has a number of tufts, united at the base, and has 3-4 shorter tufts anteriorly; the gills are pointed and almost 1.5 times the length of the saddle.

Distribution. In the USSR is found in Amur Oblast close to the city of Zeya and southeast of the Oblast (Danilov, 1974a); was found by V. A. Smirnov in the north of Khabarovsk Kray and by A. M. Dubitskiy in South Altay. In America, it is widespread in the northern USA, in Canada and in Alaska.

Biology. In Zeyskiy Rayon, the larvae were found in small temporary water basins with cold water (mostly in May). Most of the biting females were collected at the same time; individual specimens were caught up to July 9th. In the Altay Mountains, larvae were found in shaded mountain water basins. In the USA, it is more often found in mountainous regions. It is rare everywhere. (147)

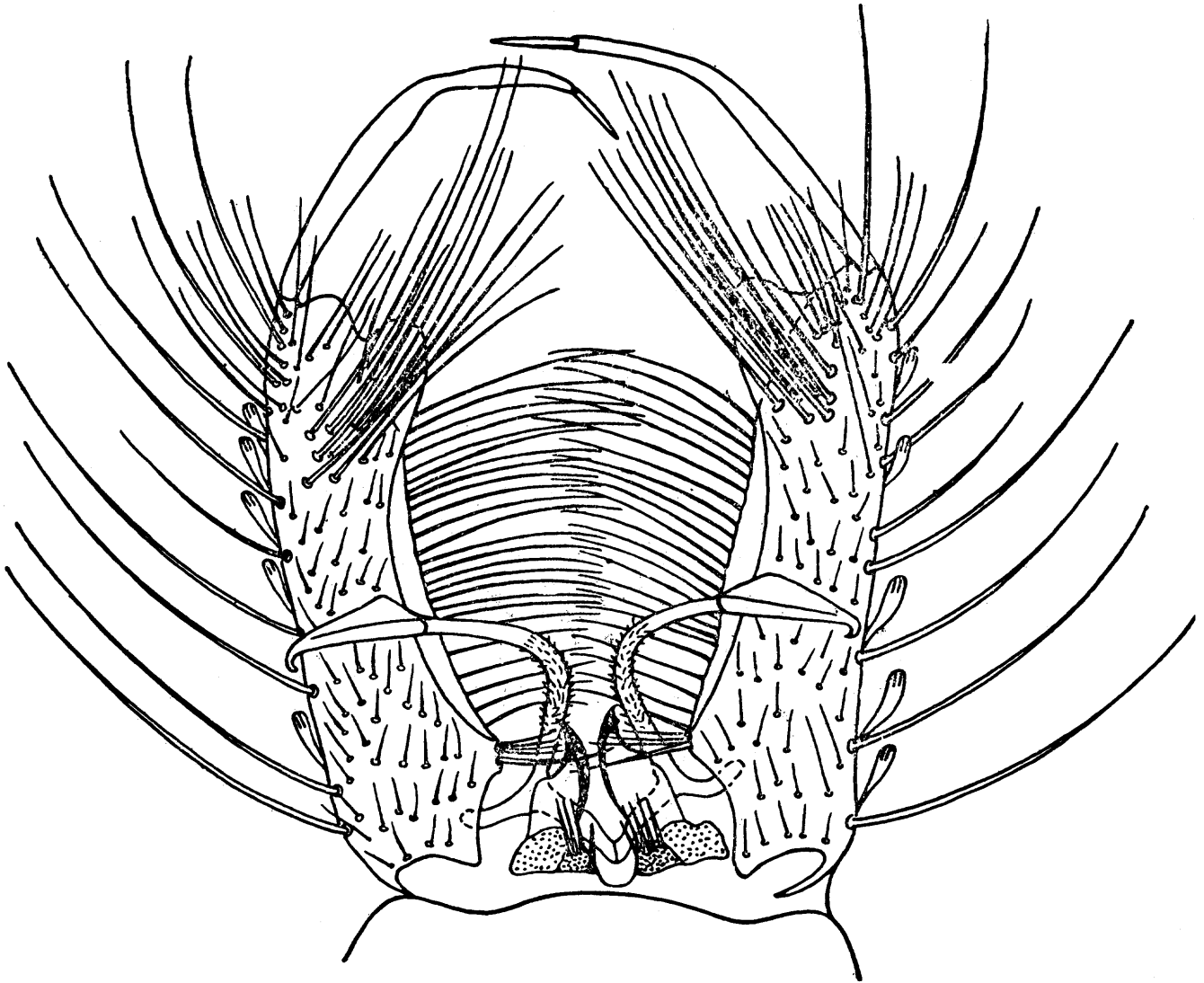


Fig. 16. Male genitalia of *Aedes implicatus* (according to: Danilov, 1974a).

Remarks on taxonomy. The imago of *Ae. implicatus* is quite similar to the imago of *Ae. cataphylla*, with which the described species is probably sometimes confused. The main difference is the coloring of the wing: *Ae. cataphylla* has

light-colored scales that appear among dark scales on the different veins, while *Ae. implicatus* can have light-colored scales only at the base of the wing. *Ae. implicatus* males differ by the presence of a group of long, thick bristles in the distal part of the coxite. The larvae of both species are differentiated by many characters, particularly by the arrangement of the pecten teeth of the siphon. However, the *Ae. implicatus* larvae, if the size of the gills is not considered, are quite similar to *Ae. leucomelas* larvae. They can probably be differentiated reliably by the length of the unbranched part of the ventral tuft, but this character is lacking in the description of V. N. Danilov as well as in the descriptions of the North American authors; and, the length of the gills, as we know, may vary greatly.

(148) According to the description of V. N. Danilov and the examined specimens from the collection of the Zoological Institute of the USSR Academy of Sciences and the Institute of Zoology of the KazSSR Academy of Sciences, larvae with the diagnosis of *Ae. implicatus* vary quite significantly in morphological characteristics and differ from the presented description. As a rule, the comb has a smaller number of scales (20-26); the comb scales may be without a developed central spine, but may have a clearly developed median spine, particularly the scales closest to the anal segment. Their size and shape vary: from small, elongated scales to comparatively large scales with a wide, light colored base. The siphon is shorter with an index of 2.2-3.0. The tuft on the siphon has 4-6 branches. The pecten teeth are short, and most of them have one, large, sharply set apart upper tooth and 1-3 smaller ones. The unbranched part of the ventral tuft is 1.5-2 times the length of the transverse grid bars. These features brings *Ae. implicatus* closer to *Ae. leucomelas*. This problem requires further study.



Fig. 17. Male genitalia of *Aedes burjaticus* (according to: Kukharchuk, 1973).

15. *Aedes (Ochlerotatus) burjaticus* Kuchartshuk, 1973.

Is described as a new species of the *communis* group according to material from Buryat ASSR.

Female. The proboscis and palpi have dark scales, among which are scattered light-colored scales. The mesonotum has a wide longitudinal stripe of brown scales; the area along the sides of the mesonotum and before the scutellum has light-colored and brown scales, arranged in patches. The whitish scales on the lateral surface of the thorax do not extend as far as the anterior angle of the sternopleurons and the lower margin of the mesepimerons. There is no hypostigmal scale patch, but there is a postcoxal patch. The tibiae are variegated. The tarsi have no light-colored rings. The wings have mixed dark and light-colored scales and the dark scales dominate on the costal vein.

Male. The coloring is the same as that of the female. Genitalia (Fig. 17): coxite has long setae; the apices of the setae of the left and right coxites overlap; the basal lobe of the coxite is conical, has brushes and setae, and has no well developed spine; the apical lobe is relatively large; the claspette stems are bent, the claspette wing has a membranous widening; the apex of the claspette wing is narrow and crooked; processes of tergite IX have 4-6 heavy, almost straight bristles.

The larva is "similar to *Ae. caspius caspius*" (Kukharchuk, 1973); a description of the larva is not given.

Distribution. Mosquitoes were bred from larvae, collected close to the small village of Khuzhir, located 150 km from Ulan-Ude.

Biology. The larvae were collected in May in temporary water basins in a flood plain meadow of the Selengi River. The water was slightly alkaline (pH 8.6); the salt content in a liter of water was 3,300 mg.

Remarks on taxonomy. *Aedes burjaticus* is similar to *Ae. implicatus*, but (149) differs by the presence of light-colored scales on the wings and proboscis. Both of these characters bring *Ae. burjaticus* and *Ae. leucomelas* closer, but the latter is characterized by a greater number of bristles on the processes of tergite IX (there are 6-17 of them, more often 10-12); the bristles are narrow, long, and directed posteriorly and to the sides at a slant. *Ae. burjaticus* is similar to *Ae. cataphylla* in genitalia structure. There is a similarity among the larvae of *Ae. implicatus*, *Ae. leucomelas* and *Ae. caspius* in general characteristics; with the absence of a description of the first one, this may serve as a basis for confirming the breeding of *Ae. burjaticus* imagoes from larvae, which are similar to *Ae. caspius*. This also brings the described species closer to the ones known earlier. The question about the status of this species requires further study.

16. *Aedes (Ochlerotatus) montchadskyi* Dubizky [sic. Dubitzsky], 1968.

Is described as a new species of the *communis* group according to material from the Alma-Ata Oblast (Dubitskiy, 1968).

Female. The proboscis and palpi have a mixture of dark and light colored scales. The mesonotum does not have a dark longitudinal stripe, but has mostly golden yellow scales. Whitish scales are located along the borders of the mesonotum, and they also form 2 small patches along its middle. The white scales on the lateral surface of the thorax extend to the anterior angle of the sternopleurons and to the lower border of the mesepimerons. There is a hypostigmal scale patch, but there is no postcoxal patch. The femora and tibiae are variegated anteriorly. The tarsi have no light-colored rings. The wings have dark scales with a significant mixture of light-colored scales on the costal and first radial veins. The abdomen is dark dorsally with light-colored bands at the base of the tergites that widen laterally; the bands cover about 1/4 of each tergite; there are no light-colored scales against the dark background.

The species is easily determined by preparations of the female head: the longitudinal suture on the frontal vitta is incomplete or absent; the setae along the posterior border of the eyes clearly stand out because of their large size; the apical half of palpal segment IV is considerably thicker than the basal half ("club-shaped").

Male. The coloring is basically that of the female, but the light-colored abdominal bands are wider and cover about 1/3 of each tergite. Genitalia (Fig. 18): coxite setae are of moderate length; the basal lobe of the coxite is large, has a curved spine, a number of bristles and several rows of setae; the apical lobe is of moderate size; the claspette stem is slightly curved, the claspette wing is narrow and is slightly widened; and, the processes of tergite IX each have 5-8 bristles.

Larva of stage IV. From whitish gray to brown in color. Average length in a fixed state is 8.5 (7.5-9.4)mm. The setae on different sections of the body are rather long and are clearly secondarily pinnate.

The head is 1.2-1.4 times wider than long. (Fig. 19) (the greatest width is barely below the eyes). The preclypeal setae are of moderate length and dark; the postclypeal setae are small and have 2-3 branches. The frontal setae are secondarily pinnate; the median setae are the thickest and most massive and lie in front of the inner frontal setae. The outer frontal setae have 8-10 branches, the median setae have 2-3, and the inner setae have 3-4 branches (generally, 2 and 3 branches). The sutural setae are thin and simple, and the transsutural setae generally have 2 branches. The antennae are short--0.4-0.5 the length of the head, and they are covered with sparse, slightly chitinized spinules. The body of the antenna tapers somewhat and curves inward at the insertion of the 6-8 branched tuft.

The lateral setae of the prothorax, when straightened, extend to the base of the antennae. The lateral setal tufts on the meso- and metathorax, are of the same length, the others are shorter.

The sensitive, lateral setae on the abdominal segments are long, and exceed (150) the segment width at their insertions. The comb (Fig. 20), on the average, has 27 (22-33) scales, arranged in 2-3 rows as a semioval, distal, convex patch. The scales vary both in size and shape, ranging from short scales with a number of apical spinules, to longer scales with a well developed median spine, surrounded by shorter spinules. Seta posterior to the comb: upper setae have 4-7 branches, the median setae have 5-7, the lower setae have 3 branches, and the intermediate setae are simple.

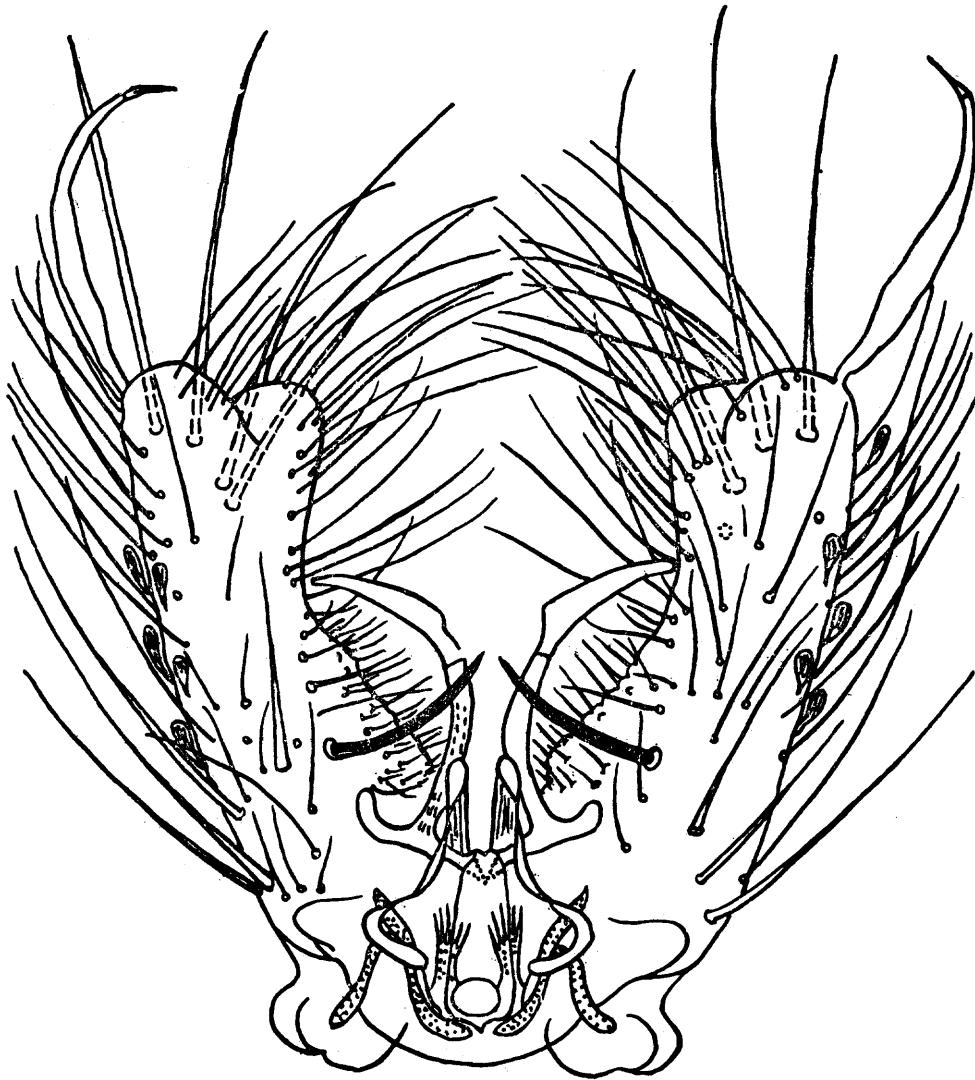


Fig. 18. Male genitalia of *Aedes montchadskyi* (according to: Dubitskiy, 1968).

The siphon is quite well proportioned and gradually tapers apically. The siphon length is 3.3-3.5 times the width of its base and 6-7 times the width of its apex. The tuft has 5-8 secondarily pinnate branches, is inserted just below the middle of the siphon. The tuft branches are 1.5-2 times longer than the siphon width at their insertion. There are no other tufts on the siphon except for the preapical setae. The dark ring and lobes at the siphon base are well developed. The pecten, of 19-20 teeth, covers  $\frac{2}{5}$  of the siphon length. The teeth are thin, slightly curved and have 2-5 additional spinules. Proximally, their size decreases perceptibly, and 2-4 of the basal teeth are rudimentary. The pecten does not extend to the siphon tuft base. The setae on the distal end of the posterior valve of the stigmal plate are rather massive and slightly curved (or hooklike).

(151) The saddle is noticeably longer than wide. The saddle extends to the ventral margin of the anal segment. The anterior portion has poorly developed spinules and the posterior portion has a border of dark chitin. Lateral setae consisting of 3 (very rarely 2 or 4) secondarily pinnate branches are very characteristic, and they are appreciably longer than the saddle. The outer caudal setae are simple and long (1.5 times the siphon length) and the inner setae have 8-10 branches of moderate length and are secondarily pinnate. The ventral brush has 18-19 well developed tufts, one is often not united by the common base. In most of the specimens examined, the branched tufts are inserted close to the base, although specimens are found with the non-branched part 1.5 times longer than the transverse grid bars. The gills are small, oval-shaped and lightly pigmented. They are  $\frac{1}{4}$  -  $\frac{1}{5}$  the length of the saddle.

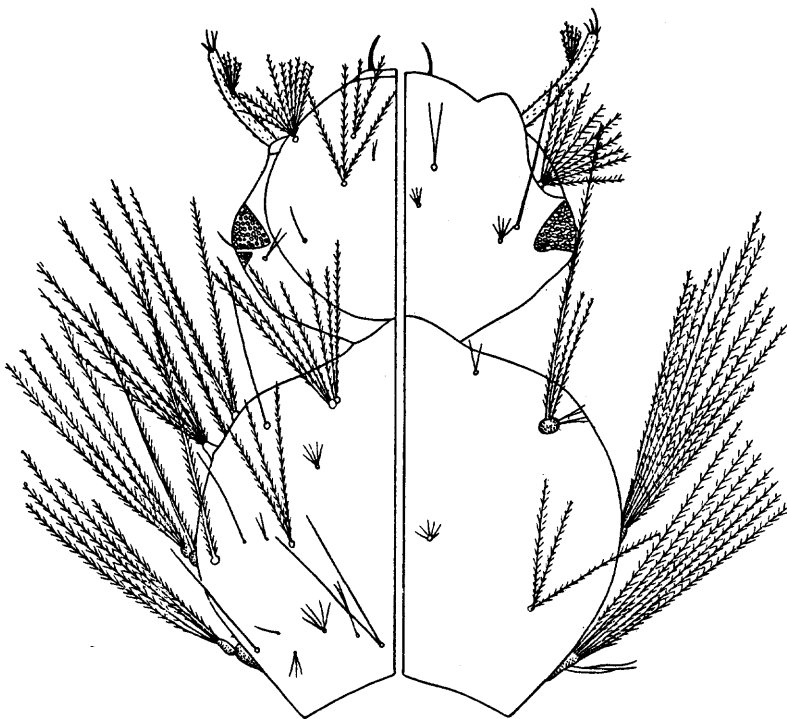


Fig. 19. Larva of stage IV of *Aedes montchadskyi* --head and thorax (original by A. M. Dubitskiy).



Distribution. Southeast Kazakhstan, Ili River water basin. Also, found in East Kazakhstan Oblast.

Biology. A relatively rare species. Breeds in small temporary water basins, more often in water basins located in tugai [bottomland complex with forests, bushes and meadows in river valleys] thickets or near them. Generally, is found together with larvae of *Ae. flavescens* and *Ae. kaschstanicus*, sometimes together with larvae of *Ae. caspius*. Belongs to the group of late spring species. Emergence from pupae occurs in May. Attacks on humans are extremely rare, probably because of small number of individuals.

Remarks on taxonomy. Closest to *Ae. leucomelas*, from which it differs in coloring of thorax, structure of frons and palpi of female as well as male genitalia.

17. *Aedes (Ochlerotatus) simanini* Gutsevich, 1966.

Described on the basis of material from Uzbekistan. A description of the males and females is in the literature (see: Fauna...). A short description of the larvae has also been published (see: Fauna..., Supplement). A detailed description of the *Ae. simanini* larva is given for the first time.

Larva of stage IV (Fig. 21). Is of average size, and is yellowish-brown with a darker pigmented head and a lighter colored siphon.

The head is almost 1.5 times wider than long. Frontal setae: outer setae, on the average, have 5 (3-8) branches, the median setae are simple, the inner setae are simple (in 60%) or 2-branched (in 40%), all are only barely secondarily pinnate. The postclypeal setae between the bases of the median frontal setae have 2 branches, as an exception 3-4 short, narrow branches. The sutural and transsutural setae are longer than the postclypeal setae and are 1- or 2-branched. The antennae are short, about 0.4 the length of the head, and are covered with sparse spinules; the tuft near the middle, which is closer to the base, has 4-5 (3-6) branches that clearly do not reach the apex of the antenna. (152)

The median setae of the prothorax are slightly secondarily pinnate: the anterior and median setae are simple or 2-branched, the posterior setae have 2-3 longer branches that extend to the posterior margin of the eyes.

The comb, on the average, has 22 (16-36) scales, arranged in 2, more rarely 3 rows forming a half-moon shaped convex patch posteriorly. Each scale has a well developed median spine and a small number of basal spinules. The bases of the dorsal and ventral scales in the patch are appreciably wider than the others. Setae posterior to the comb: upper setae have 5 (4-7) branches, the median setae have 7 (6-9) and the lower setae have 5 (4-8) secondarily pinnate branches; the intermediate setae are smooth and simple; darker sclerotized plates of an irregular shape are around the bases of the upper and median setae. The siphon

(index about 3.4) tapers slightly apically. The pecten has an average of 13 (12-17) uniformly spaced teeth and 2-4 small rudimentary denticles at the base; the pecten covers about  $\frac{1}{5}$ , no more than  $\frac{1}{4}$  of the basal part of the siphon. Each tooth is of moderate length with a wider base, whose border generally supports one larger and 2-3 smaller denticles. A tuft with 5 (4-7) secondarily pinnate branches is slightly longer than siphon width at its attachment; the tuft is near the middle of the siphon, closer to the base and distinctly before the most distal tooth of the pecten.

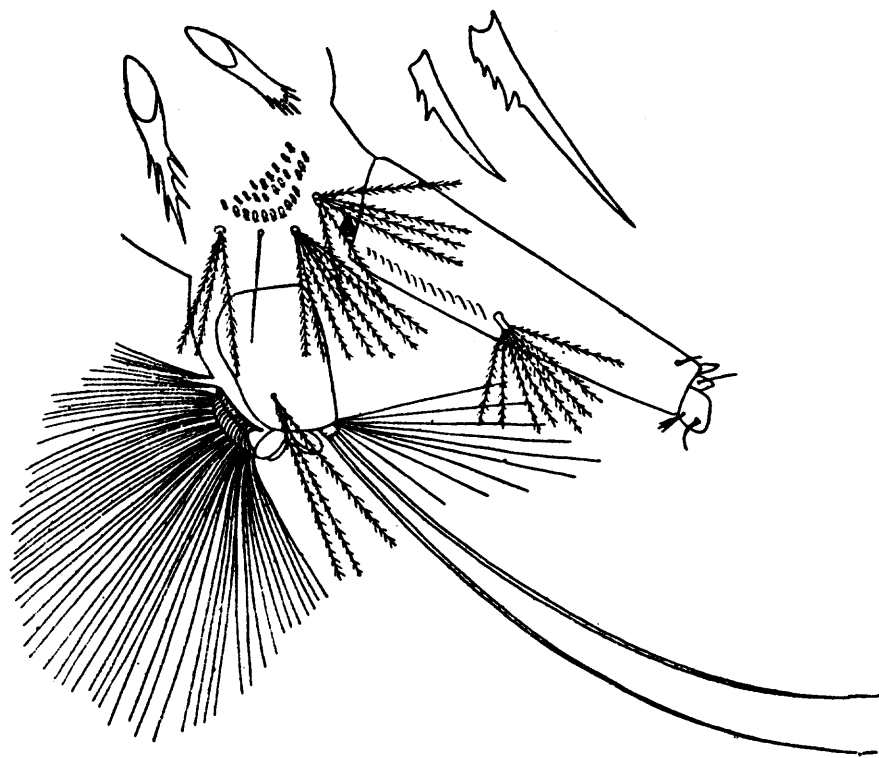


Fig. 20. Larva of stage IV of *Aedes montchadskyi* --posterior end of the abdomen (original by A. M. Dubitskiy).

(153) The last segment is 1.5 times longer than wide. The lateral borders of the saddle in the middle of the segment extend beyond only the anterior half of the segment. The lateral seta is simple, rarely 2-branched, and is no more than half the saddle length. Caudal setae: the outer setae are simple, on the average are the same length as the siphon, and the inner setae which are half their length have 5 (4-8) branches. The ventral brush has 17 (14-18) tufts, united by a common base, and 1, more rarely 2, shorter tufts before the base. The gills are short, leaf-shaped and are less than  $\frac{1}{4}$  of the saddle length.

Distribution. Uzbekistan: Fergana Valley, Kokan. Kazakhstan: Alma-Ata Oblast, Ili River valley.

Biology (according to: Dubitskiy, 1970a). Breeds in temporary water basins, such as the shallow waters in tugai areas, ditches, accumulations of melted snow in depressions and others. Often, the larvae are found in contaminated holes on the outskirts of a settlement and in meadows with last year's foliage. The water in these water basins was characterized by higher alkalinity (pH 7.9-8.4) and significant mineral content (up to 3,680 mg/liter); the color of the water ranged from light yellow to reddish-brown. *Aedes leucomelas* larvae were found associated with the *Ae. simanini* larvae, and later with those of *Ae. flavescens* and *Ae. kasachstanicus*. The number of larvae reached 70 per square meter. *Aedes simanini* larvae were not found at a depth below 50 cm. (154)

The species produces one generation per year. The imagoes fly from the end of April through May. They do not fly into houses, but attack humans and domestic animals outdoors.

Remarks on taxonomy. The species is somewhat similar to *Ae. leucomelas* and *Ae. detritus*. It differs from the first by the large number of light-colored scales in the posterior half of each tergite, and from the second by the presence of a postcoxal patch of scales and darker (brownish-black) abdominal integument. It differs from both species by the structure of the male genitalia and the morphology of larvae.

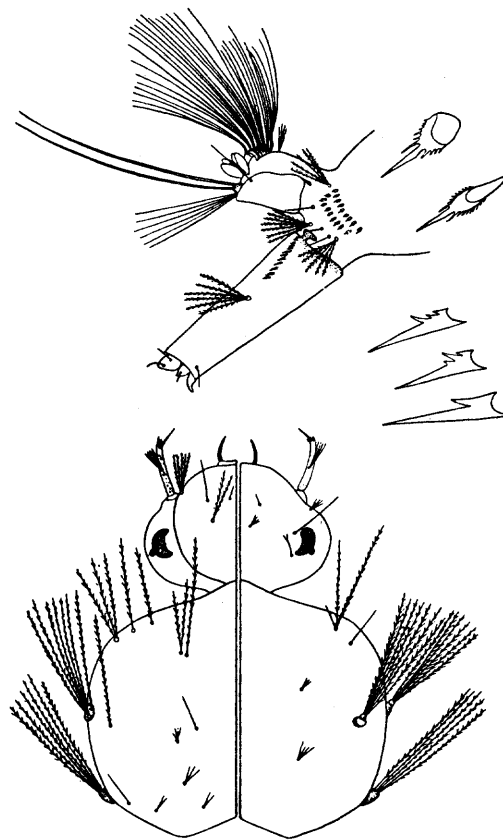


Fig. 21. Larva of stage IV of *Aedes simanini* (original of A. M. Dubitskiy).

18. *Aedes (Finlaya) japonicus* (Theobald, 1901).

Previous reports on "*Aedes japonicus*" in the USSR belong basically to *Aedes koreicus* that appeared earlier in our literature as *Ae. japonicus* (see: Fauna...). Recently, however, it was found that *Ae. japonicus* is found in the extreme south of Primorskiy Kray [Maritime Kray] (Kukharchuk, 1974).

A description of females, males and larvae is available in the literature (Fauna...; LaCasse and Yamaguti, 1955). The difference between the 2 close species consists of the following: in *Ae. japonicus* the area below the mesothoracic spiracle has no scales (in *Ae. koreicus* --has a stripe of white scales), the white rings are developed on the first 3 hindtarsal segments (in *Ae. koreicus* --on 4 segments).

Distribution. In the Soviet Union--extreme south of Primorskiy Kray. Abroad: Japan, including the island of Hokkaido, and China.

Biology. Larvae are found in various small bodies of water, mostly artificial, that are rich in decomposing organic matter. Rarely attacks humans.

19. *Aedes (Stegomyia) sibiricus* Danilov et Filippova, 1978.

Mosquitoes of this species, found in various localities of the Asian part of the USSR, were earlier identified as *Ae. (St.) galloisi*. It was found that these mosquitoes should be identified as a special species that is described as a new one (Danilov and Filippova, 1978). *Ae. galloisi* within USSR limits is reliably known only on Sakhalin Island (Yamada, 1921).

Female. Proboscis has uniformly dark scales. The palpi are dark with a white apex. The mesonotum has chestnut brown scales with a longitudinal light-colored stripe; laterally, less distinct light-colored stripes are developed that are curved in the anterior half of the mesonotum, and straight scales are in the posterior half. The tarsi have narrow white rings at the base of the segments; segments III and IV of the hindtarsi are white, with the exception of the apices. The last segment of the hindtarsus is dark (in *Ae. galloisi* -- completely white or white with a dark apex). The wings have dark scales, with the exception of a small white spot at the base of the costal vein. Abdomen: tergites with white bands at the base of the segments and white patches along the sides; sternite VIII is strongly developed and the cerci are short.

(155) Male. The palpi are somewhat longer than the proboscis or the same length, have white rings, and have no tufts or setae. The genitalia are characterized by the absence of a claspette (Fig. 22). The lobe of the coxite is well developed, is elongated in a transverse direction, and has 2 types of setae at the top--shorter ones and longer ones; the latter form a tuft at the apex of the lobe. The style is thin and long; its sticklike appendage is articulated a small distance away from the top of the style. The posterior margin of tergite IX has the shape of a slanting bow with a denticulate margin; the convexity of the bow faces backward.

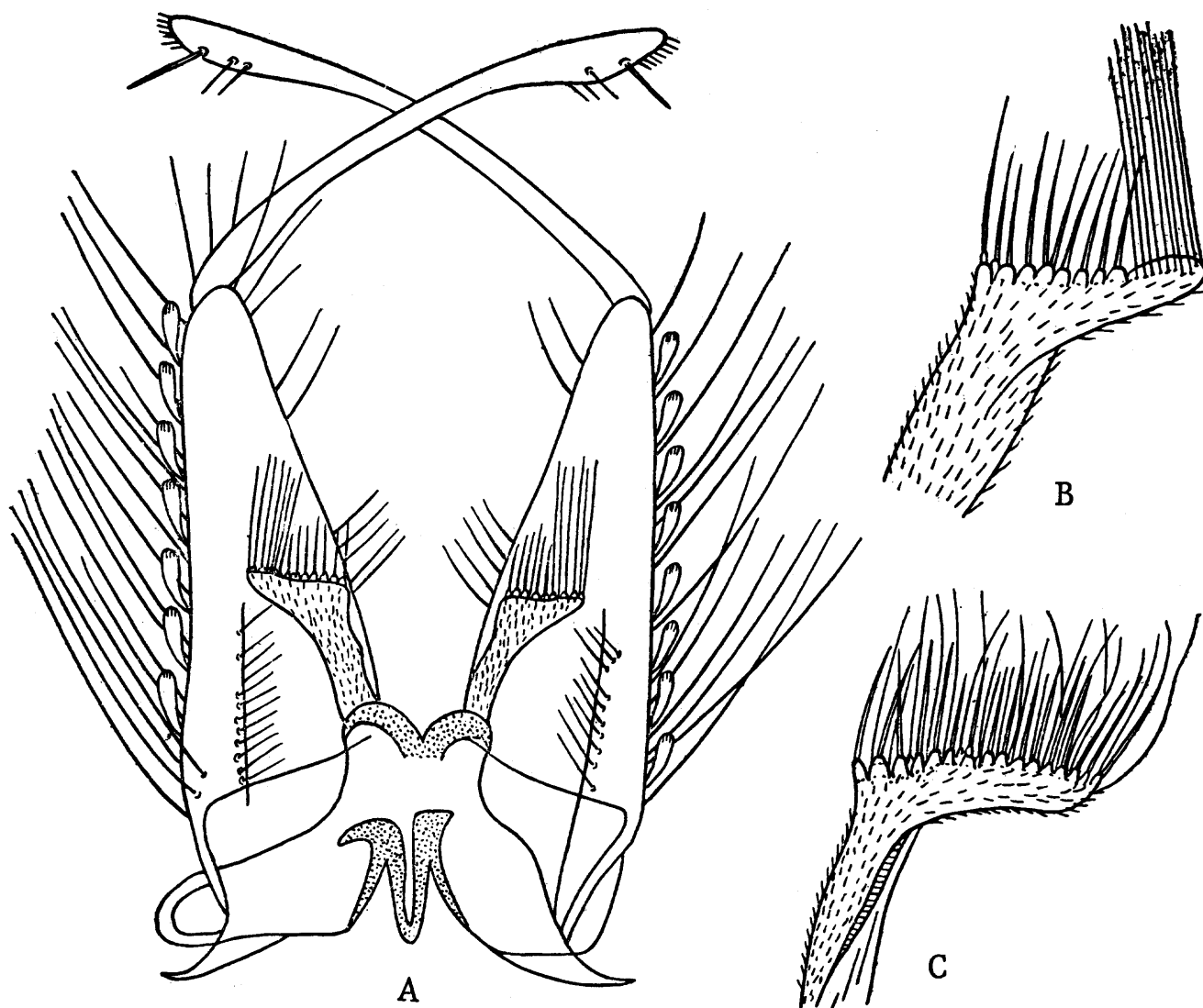


Fig. 22. Male genitalia of *Aedes sibiricus* (according to: Danilov and Filippova, 1978).

A - general view; B - coxite lobe of *Ae. sibiricus*; C - coxite lobe of *Ae. galloisi*.

Larva of stage IV. A detailed description of this species is available in the book "Fauna..." under the description of *Ae. galloisi*. There is only one inaccuracy in this description according to V. N. Danilov and V. V. Filippova (1976) and a reference citing Japanese authors. The length of one branch of the lateral saddle seta is equal to the saddle length, and the other branch (lower) is even longer.

Distribution. Is widespread in Primorskiy Kray. Is found in Sakhalin, south of Khabarovsk Kray and in a number of regions of Eastern and Western Siberia, as well as in the northeast of Kazakhstan.

Biology. Breeds primarily in tree and root holes of trees, as well as in accumulated water in stumps and fallen trunks. Often, the larvae are found in barrels and other man-made water storage containers that are partially or completely shaded. It winters in the egg stage. Several generations develop in a season. Mosquitoes of this species rarely attack humans.

(156) Remarks on taxonomy. The establishment of the fact that a distinct species of the subgenus *Stegomyia* which is different from *Ae. galloisi* lives in the Asiatic part of the USSR is of considerable interest. Both species, quite similar morphologically, are differentiated by biological features, specifically the adaptability of *Ae. sibiricus* to the rather severe climatic conditions of Siberia. Both species are quite similar ecologically. In Primorye and in Khabarovsk Kray, there is still one other species of the subgenus *Stegomyia* -- *Ae. flavopictus*, which differs from *Ae. sibiricus*, specifically in the coloring of the hindtarsus; first 4 segments have white rings and the last segment is white. The lateral light-colored stripes of the mesonotum in *Ae. flavopictus* are developed only on the posterior half. Structure of the male genitalia in *Ae. flavopictus* is characterized by the location of the coxite lobe which is extended not in a transverse direction (as in *Ae. sibiricus*), but in a longitudinal direction.

20. *Aedes (Aedes) yamadai* Sasa, Kano et Takahasi, 1950.

A special report was published (Danilov, 1978c) about finding this mosquito in the Far East of USSR. This species, described as new by Japanese authors, belongs to the *cinereus* group of the subgenus *Aedes*. The short description of the species that we present is based mostly on literature data. The specimens (females), partially corresponding to the presented description, are available in the collection of the Zoological Institute of the USSR Academy of Sciences. Some ideas on the taxonomic position of *Ae. yamadai* are presented in the section "Remarks on taxonomy."

Female. The proboscis is dark and about the same length as the forefemur. The palpi are dark. The integument of the mesonotum is yellowish-brown and the scales are golden. There are no spots or stripes on the mesonotum. The lateral surface of the thorax has small spots of white scales. The tarsi are dark. The wings have uniformly dark scales. The abdominal tergites are covered with yellowish scales, they have no spots or stripes; the "yellowishness" of the tergites is more expressed in the posterior half of the abdomen.

Male. The palpi, similar to all species of the subgenus *Aedes*, are short as in the female. The structure of the male genitalia almost coincides with the genitalia of *Aedes cinereus esoensis*.

Larva. The description is borrowed from the work of V. N. Danilov (1978c).

Head is 1.4-1.5 times wider than long. The frontal setae are arranged in one row. The outer setae have 8-11 branches, the median setae have 4-6, the inner setae have 6-7 branches; the postclypeal setae between the bases of the

median frontal setae have 8-12 thin short branches. The antennae are  $\frac{3}{5}$  to  $\frac{2}{3}$  the length of the head, are covered with well developed spinules, and are scattered, except for the top half of the ventral side of the antenna, where they form several short rows. The tuft has 6-7 branches that extend to the apex of the antenna, inserted at  $\frac{2}{5}$ - $\frac{1}{2}$  the length of the antenna from its base.

Setae of the prothorax: I - average length and have 1-3 branches; II - short and have 2-3 branches; III - short and have 3-5 branches; IV - short and have 3-4 branches; V-long and have 1-2 branches; VI - long and simple; VII - long and have 3 branches. Seta 3 of the mesothorax (3-M) has 2 branches, seta 6 of the metathorax (6-T) has 2-3 branches.

The comb of abdominal segment VIII has 8-13 large scales, arranged in 1-2 irregular rows; the scales have a long central spine and small basal spinules. Setae posterior to the comb: upper one (I) and lower one (V) has 6-10 branches, median (III) has 7-10, intermediate upper (II) has 2-4 and intermediate lower (IV) has 2 branches.

The siphon is 1.7-1.8 times wider at the base than at the apex, the siphon index is 2.5-3.5, and there are lobes and a dark ring at the siphon base. The pecten has 14-15 teeth, extends to the middle of the siphon, 1-2 distal teeth are set farther apart than the others; the teeth of the pecten have a long main spine and 1-2 small basal spinules. The tuft of 7-8 thin short branches, is inserted behind the comb, about  $\frac{3}{5}$  the length of the siphon from its base. Three, more rarely 4, tufts are inserted on each side of the siphon, in addition to the preapical setae, that have narrow and short setae, lying approximately in a straight line; one of these tufts is subapical, the other subdorsal.

The saddle covers about  $\frac{2}{3}$  of the lateral surface of the anal segment, the microspines along the posterior margin of the saddle are very small, only (157) slightly larger than the microspines on the rest of the surface; the lateral seta has 2 thin short branches, more rarely it is simple. The outer caudal setae are long and simple; the inner setae are shorter and have 8-11 branches. The ventral brush has 7 tufts, united by a common base, and has 5 tufts before the base. The gills of all the larvae studied were broken off. In Hattori's drawing (Hattori, 1960) the gills of the *Ae. yamada* larva are roughly twice the saddle length.

As seen from the description presented, *Ae. yamadi* does not differ significantly in structure from *Ae. esoensis*, except for some details that lie within the limits of ordinary variability of the latter.

Distribution. Within the USSR limits, it is found in the basin of the Amur River, more to the south than Blagoveshchensk. Larvae were also found there that presumably belong to *Ae. yamadai*. The male, according to V. N. Danilov, belongs to the same species that was found in Khasanskiy Rayon in Primorskiy Kray [Maritime Kray].

Biology. The females were caught while they were attacking humans. There are no detailed data on the biology of *Ae. yamadai*.

Remarks on taxonomy. According to the morphological characters of *Ae. yamadai*, there are no substantial differences from *Ae. esoensis*. The question of the specific independence of the latter was investigated, and on this basis the conclusion was drawn that *Ae. esoensis* may not be treated as an independent species (Monchadskiy, 1951; Lvov, 1956; Fauna...). There are gradual transitions between *Ae. esoensis* and other members of the "cinereus complex." In addition to the basis taxonomic characters, there are also various combinations--structure of claspette stem, coloring of abdomen, setae on siphon and others. Gradual transitions are observed for each of these characters individually. Specifically, the presence of small setae on the dorsal side of the siphon, considered a typical character of *Ae. esoensis*, has no taxonomic importance. As A. S. Monchadskiy demonstrated, "typical" *Ae. esoensis* with light-colored bands on the abdominal tergites emerge from larvae with 4, 3, 2 and one pair of dorsal setae, as well as with none of these setae.

Recently, two new palaeartic species of the *cinereus* subgenus have been described: *Ae. geminus* Peus, 1970 and *Ae. sasai* Tanaka, Mizusawa and Saugstad, 1975. The time has come to conduct a new investigation of this complex. The question about the specific independence of *Ae. yamadai* remains open until such an investigation is completed. However, the typical distinguishing characters of this mosquito--yellowish abdominal scales and the absence of light-colored bands on the tergites--actually attracts our attention because in *Ae. esoensis* the abdominal scales are of different shades of brown, and the light-colored bands on the tergites are generally present, although sometimes they are more or less vestigial.

Preliminarily, we consider *Ae. yamadai* an independent species.

As far as *Ae. nobuconis* Yamada, 1932, is concerned, whose males and larvae are unknown, we propose that it be excluded from the list of mosquitoes of USSR fauna until the time we have the additional data, requisite for establishing the validity and taxonomic position of the species.

21. *Aedes (Aedes) sasai* Tanaka, Mizusawa et Saugstad, [1975].

We record this species as new for USSR fauna.

(158) Female. According to the females, this species is quite similar to *Ae. cinereus cinereus* and *Ae. c. esoensis*. The body integuments are dark. The abdominal tergites have light-colored spots along the sides that are developed only in the anterior part of each segment, and do not extend as far as the posterior margin of the segments; and, in contrast to *Ae. c. cinereus* they do not form a solid light-colored stripe along the sides of the abdomen. The abdomen does not have light-colored transverse bands dorsally. Only at the base of tergites II-IV there are small patches of light-colored scales. Thus, according to abdominal coloring, the species is intermediate between *Ae. c. esoensis* and *Ae. c. cinereus* (closer to the latter).



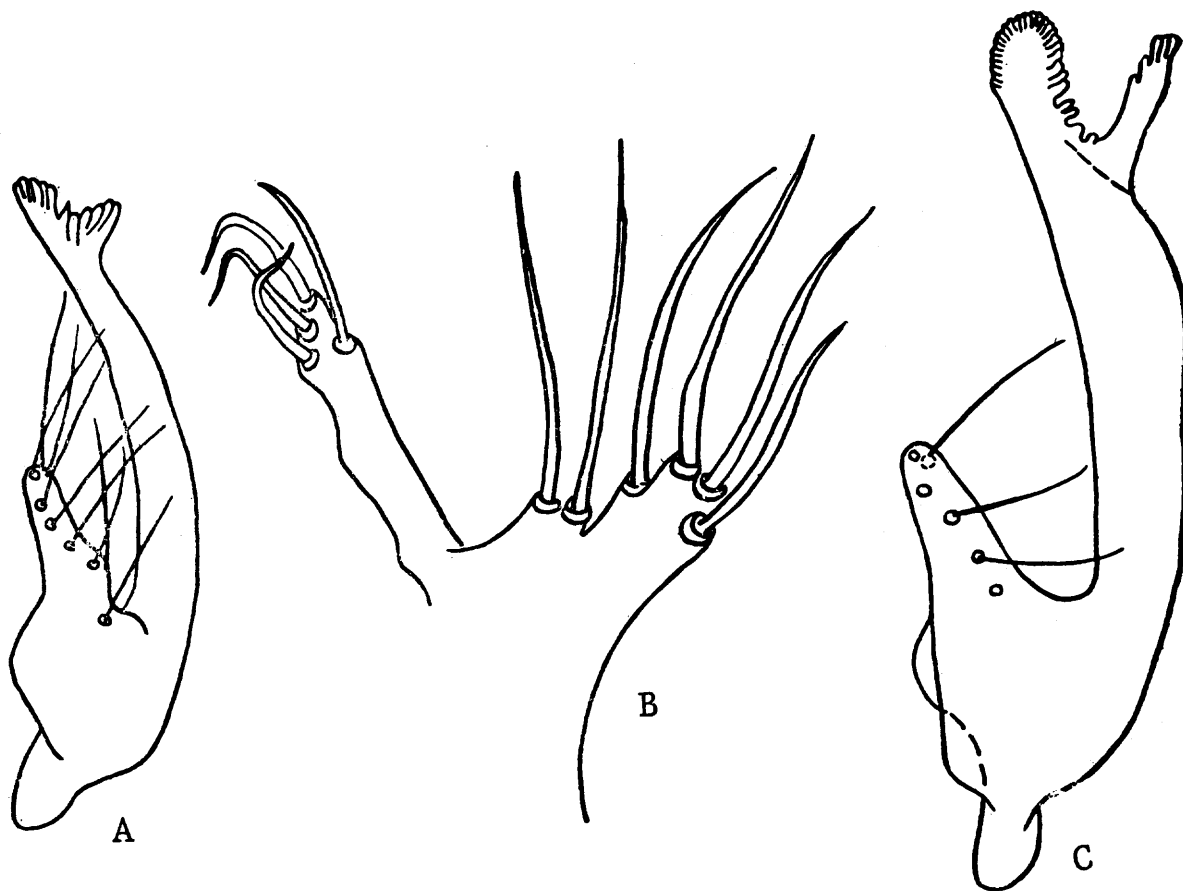


Fig. 23. Details of male genitalia structure of two species of the subgenus *Aedes* (according to: Tanaka et al., 1975).

Style and exterior branch of the basal lobe of the coxite: A - *Aedes cinereus*; B, C - *Aedes sasai*.

Male (Fig. 23). The style is split. Its long branch from the base to the apex does not become narrow as in *Ae. c. cinereus*, but widens slightly. The apex of the style is relatively wide and pointed; a much narrower process originates laterally, before the apex, that is also pointed at the apex.

The medial part of the dorsal basal lobe ("claspettoid" as the Japanese authors designate it) is wide and supports 4-6 apical setae; in *Ae. c. cinereus* this part is narrow and has 2-4 apical setae.

Larva of stage IV. After describing this species, including the larvae, the authors were unable to find significant differences among the larvae of *Ae. sasai*, *Ae. cinereus*, *Ae. fuscus*, *Ae. esoensis* and *Ae. yamadai* even with statistical analysis of the material. For this reason, it is proposed that the descriptions of *Ae. cinereus cinereus* and *Ae. c. esoensis* (Fauna...) be taken as the basis for the description of the *Ae. sasai* larvae.

Distribution. In the USSR--southern part of Primorskiy Kray [Maritime Kray]. In the collection of the Zoological Institute of the USSR Academy of Sciences, there are 4 preparations of male genitalia that correspond completely to the description of *Ae. sasai*: 3 specimens from the Cedar Pad' [?] National Forest, collected by A. S. Monchadskiy in August 1940, and females that were collected in the same place in June of the same year. In addition, there is a preparation of the genitalia of a male from the village of Omon on the Bikin River (Primorskiy Kray), and the collection of A. V. Maslov dated 7 July 1939. In Japan, *Ae. sasai* is widespread on the islands of Hokkaido and Honshu.

Biology. It breeds in temporary pools in forests according to literature data.

Remarks on taxonomy. The species belongs to the "*cinereus* complex." Preliminarily, we consider *Ae. sasai* a separate species, considering the unique structure of the male genitalia.

(159)



Fig. 24. Male genitalia of *Aedes lineatopennis* (according to: Knight and Hull, 1953).

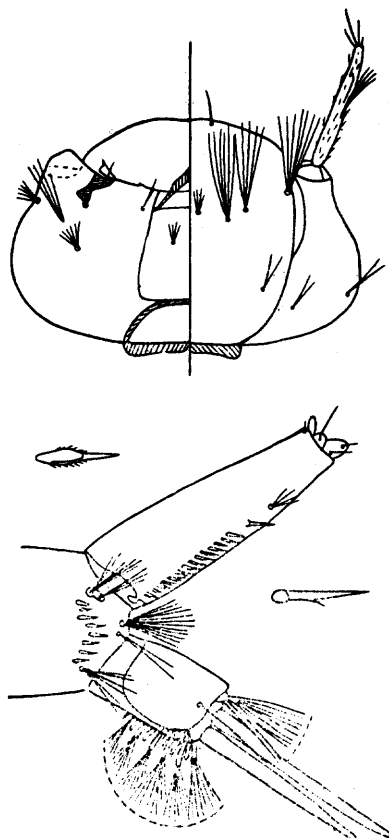


Fig. 25. Larva of stage IV of *Aedes lineatopennis* (according to: Knight and Hull, 1953).

22. *Aedes (Neomelaniconion) lineatopennis* (Ludlow, 1905).

Was first described in the USSR as *Aedes aureus* Gutsevich, 1955. Later, it was established that it belonged to the subgenus *Neomelaniconion* Newstead, 1907 (= *Banksinella* Theobald, 1907) (see: Gutsevich, 1973). V. N. Danilov (1977) proved that the mosquito belonged to the widespread species *Ae. lineatopennis* and treated the form that is found in Primorskiy Kray as a subspecies--*Ae. lineatopennis aureus*. One can preliminarily agree with such a proposal by putting aside the final decision about the status of the taxon in the subgenus *Neomelaniconion* found in the USSR, until the males and larvae of this taxon are investigated. V. I. Shestakov secured larvae and males of this mosquito; the material was turned over to A. V. Maslov, but his untimely death prevented completion of the investigations and publications of the results obtained.

Female. A description is available in the literature (see: Fauna...).

Male. The description that we give is based on literature data (Knight and Hull, 1953). The palpi are slightly longer than the proboscis. The mesonotum has yellow bristles and a broad, dark longitudinal stripe of brown scales. The legs are dark. The wings have mostly dark scales admixed with a few light-colored scales on some veins. Dorsally, the abdomen has mostly dark scales with light-colored transverse bands at the base of the segments. The genitalia (Fig. 24): inner surface of the coxite is covered with relatively short, but dense setae; the basal part of the coxite has a small projection with 2 short spines; short, spinelike bristles are scattered among longer setae in the apical half of the inner surface of the coxite; the style is just before the apex of the coxite; the posterior margin of tergite IX has a semi-circular indentation, with 3 setae along each side. (160)

Larva of stage IV (Fig. 25). According to the available meager descriptions, *Ae. lineatopennis* larvae differ from *Ae. vexans* by greater branching of median frontal setae (6-7 branches), structure of pecten teeth (with one median spine), length of pecten which covers 2/3 of the siphon, and corresponding location of setal tuft in the distal 1/3 of the siphon.

Distribution. In the USSR--south of Primorskiy Kray, Khasanskiy Rayon. *Aedes lineatopennis* is found in foreign countries of the Far East (China, South Korea) as well as in Oriental, Australian and Ethiopian zoogeographical areas. Recently, it was found in the Ryukyu Islands (Miyagi and Toma, 1977).

Biology. Generally, is not found in large numbers. It attacks humans and domestic animals. Is capable of long range migrations. The larvae often develop together with the larvae of *Ae. vexans* (to which they are morphologically similar) in temporary water basins.

Genus *CULEX*

*Culex (Neoculex) rubensis* Sasa et Takahashi, 1948.

The specific status of this form requires confirmation.

Female. The proboscis and palpi are brown. The mesonotum is without markings and has golden brown scales. The tarsi are dark and without rings. Light-colored spots are on the joints of the femora and tibiae; those on the tibiae and first tarsal segment are well developed, more clearly than generally in *Cx. territans*. The wings have uniformly dark scales. The abdominal tergites have light-colored transverse bands at the anterior border of each segment. The bands are relatively narrow and of uniform width, without any widening in the center.

Male. The palpi are longer than the proboscis; the terminal segments of the palpi have long dense setae. Genitalia: the preapical lobe does not have a membranous appendage. The phallosome consists of 2 parts, joined by a narrow vertical bridge.

Larva of stage IV (Fig. 26). Is of average size and is yellow or light brown. The head is 1.3-1.6 times wider than long (average 1.5). The median frontal setae consist of 2-3 branches, located before the 2-branched inner frontal setae (according to literature data, the latter may be 3-branched as well); both types are of same length (the median setae are no more than 1/6 longer than the inner frontal setae); the outer frontal setae consist of 6-9 (more often 7-8) branches. The postclypeal setae are short, simple, and located between the bases of the median frontal setae. The antennae are long, 0.7-0.9 of the head length; tapering in the apical third, and are pigmented basally and in the apical third; dorsally, excluding the apex, the antennae are covered by rather long spinules. A tuft of 24-34 branches is inserted directly before the narrow part of the antenna; 2 long pigmented, preapical bristles originate at a distance of 1/8-1/5 of the length of the apical third of the antenna. The labial plate has a large central tooth and 7-8 teeth on each side; the 3-4 teeth that are closer to the apex and the tooth at the base of the plate are smaller than the rest.

The thorax is covered with sparse microspines. The setae of the prothorax: I and II - very long, simple; III - short, 2-4 branches; IV - long, 2 branches; V and VI - long, simple; VII - long, 2-3 branches.

(161)

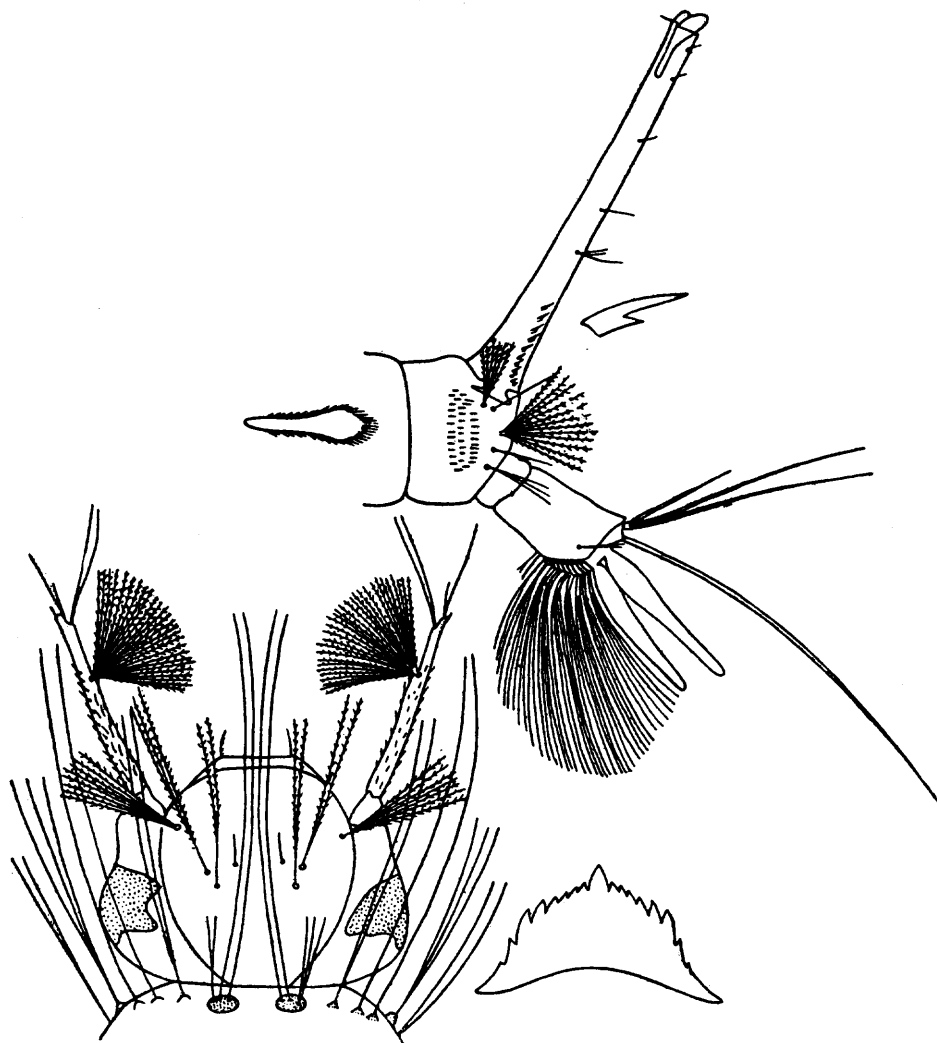


Fig. 26. Larva of stage IV of *Culex rubensis* (according to: Danilov and Kupriyanov, 1976).

The comb on abdominal segment VIII has 36-54 (an average of 45) scales, arranged in a triangular patch; the scales have a number of tiny spines at the apex and along the margins. Setae behind the comb: upper setae have 4-6 branches, median setae have 6-12, bottom setae have 3-5 branches and the intermediate setae are simple.

The siphon is long and well proportioned; it is 1.9-2.6 times wider than at the apex (average 2.2). The siphon index is 6.0-8.1, an average of 7.2. The pecten has 11-17 (average 14) teeth, covers from 1/6 to 1/3 (more often 1/4) of the siphon length; its placement on different sides of a siphon is often not the same. Each tooth has one additional denticle at the base. Distally, the distance between the teeth increases gradually, only rarely is the last tooth set appreciably further apart than the proximal ones. Tufts of 1-4 (more often 2) branches, which do not exceed the siphon width at their insertions, are arranged near the central axis on the posterior surface of the siphon in pairs

(162) or zigzag, 5-6 on each side, all tufts more distal than the pecten; their length and branching decreases toward the apex of the siphon. The length of the basal tufts is 0.4-0.7 (average 0.55) of the width of the siphon at the base and from 1/10 to 1/16 of its length. The apex of the siphon is not widened; the preapical bristle is short and straight. The main tracheal trunks are narrow, less than 1/2 of the siphon diameter, and have a round cross-section. The stigmal plate is of the "*Culex territans*" type.

The saddle is the same or 1.5 times longer than the width of the siphon; covered apically with significantly larger microspines than the rest of the surface. The lateral seta is short and has 2-5 (more often 3) branches. The outer caudal setae are simple and long; the inner setae are shorter and have 2-5 (more often 4) branches, of which 1-2 are longer and thicker than the rest; the length of the branches generally increases distally. The ventral brush has 10-14 tufts, united by a common base, and has 1-3 tufts before the base, of which 1-2 can perforate the saddle; the first tufts have 4-8 branches, and the second tufts have 1-4 branches; in some specimens, the tufts that do not have a common base may be absent. The gills are narrow, tapered and rounded apically, and are as long as the saddle or 2.5 times its length; the dorsal pair is slightly longer than the ventral pair.

Distribution. The report on the presence of *Cx. rubensis* in the USSR is based on finding the larvae of this species in Primorskiy Kray (Danilov and Kupriyanova, 1976). The larvae were found in the vicinity of Ussuriysk (Suputinskiy National Forest), Arsen'yev and Kraskino. Abroad, *Cx. rubensis* is known in Japan and South Korea.

Biology. Larvae were found in semipermanent water basins, often shaded, together with larvae of *Cx. territans* and *Cx. orientalis*.

Remarks on taxonomy. *Culex rubensis* almost does not differ from *Cx. territans* in external characters and in structure of male genitalia; namely, it does not differ from *Cx. territans*, and not *Cx. apicalis* because in the latter the left and right parts of the phallosome are not joined by a cross-bridge. Taking into consideration only the insignificant differences in the structure of the larvae, A. S. Monchadskiy made the proposal that it is more correct to consider *Cx. rubensis* as a Far Eastern subspecies than as a synonym of *Cx. territans* (Fauna...). Other authors (Sasa and Takahasi, 1948; LaCasse and Yamaguti, 1955; Danilov and Kupriyanova, 1976) consider *Cx. rubensis* an independent species on the basis of the morphological characteristics of the larva. However, it is clear from the presented description that the small differences in *Cx. territans* larvae are within the limits of normal variation of the species. This was also confirmed by examination of *Cx. territans* specimens from different regions of the USSR and adjoining areas and by the preparations determined as *Cx. rubensis*, sent to the Zoological Institute of the USSR Academy of Sciences by V. N. Danilov. The only substantial differences between the larvae of these proposed 2 species are the doubling of the median frontal setae in *Cx. rubensis* and their single condition in *Cx. territans*. Further investigations will show how stable and reliable is this character.

Just what the differences of the *Cx. rubensis* imago from the *Cx. territans* imago (widespread in the USSR) are, unfortunately, not stated in the article of V. N. Danilov and Ye. S. Kupriyanova. For this reason, we place *Cx. rubensis* in the list of mosquito species of USSR fauna under a question mark.

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