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MOSQUITOES OF THE SUBGENUS EDWARDSAEDES OF THE
FAUNA OF THE PALAEARCTIC, WITH A DESCRIPTION OF
THE LARVAE OF AEDES (EDW.) BEKKUI

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As the result research it has been established that in the Palaearctic two species of the subgenus *Edwardsaedes* are distributed: *Ae. pingpaensis* Chang, which has previously been known only in China, and *Ae. bekkui* Mogi, which is spread in Japan and in the Far East of the USSR (South Primorye). The name *Ae. (Edw.) antuensis* Su, Wang et Li, 1978 should be considered a synonym of *Ae. (Edw.) pingpaensis* Chang, 1965; as larva of *Ae. antuensis* the authors of this species erroneously described the larva of *Ae. (Ochlerotatus) sticticus* Mg. Distinguishing features of *Ae. pingpaensis* and *Ae. bekkui* are presented for females, the genitalia of males and the fourth stage of the larva. The fourth stage larva of *Ae. bekkui* from the South Primorye is described for the first time in the Soviet literature.

The subgenus *Edwardsaedes* of genus *Aedes*, which was identified comparatively recently (Belkin, 1962) was at first represented by only one species, *Ae. (Edw.) imprimens* Walk., which is widespread in the Oriental region and, it was previously believed, extended to the southeastern Palaearctic (Japan). A second species of that subgenus was soon described, *Ae. (Edw.) pingpaensis* Chang from Southern China (Guichzhou province - Chang, 1965). It was later established (Mogi, 1977) that the mosquitos from Japan previously identified as *Ae. imprimens* (Waku, 1950, 1952; La Casse, Yamaguti, 1955; Tanaka et al., 1979) actually belong to a new species called *Ae. bekkui* Mogi, 1977. Finally, in 1978 from Northeastern China (Girin province - Su et al., 1978) yet another species of

the subgenus *Edwardsaedes* was described, *Ae. antuensis*. Thus within the Palearctic (China and Japan) three species of that subgenus are now counted: *Ae. pingpaensis*, *Ae. bekkui* and *Ae. antuensis*.

Females of *Ae. bekkui* were also recently found in the USSR (South Primorye) simultaneously by Sazonova (1983) and ourselves (our data are included in the work of that author). Because there are no reports of the subgenus *Edwardsaedes* in the Soviet literature, with the exception of a description of a female *Ae. bekkui* (Sazonova, 1983), a brief description is given below of that subgenus, which is new to the fauna of the USSR.

The females are similar to the subgenus *Aedimorphus*, but are characterized by the absence of scales on the parathergite (the narrow side sclerite extending from the anterior spiracle to the base of the wing) and on the upper part of the sternopleura ("prealar button"). With respect to the color of the feet (with very narrow light rings at the bases of the segments) the imago of subgenus *Edwardsaedes* is closest to *Ae. (Adm.) vexans* Mg.; differences among the females of *Ae. imprimens*, *Ae. bekkui* and *Ae. vexans* are given by Sazonova (1983).

The antennae of the males are long, somewhat longer than the proboscis. The genitalia of the males have a stylet that is bifurcated at the base, which makes them similar to the males of subgenus *Aedes*, but without the notches at the apex of the lateral branch of the stylet characteristic of the latter. The stylet extends from the apex of the coccyx; the appendages of the stylet, clasper and apical wart are absent; the basal (sternomesal) wart is covered with thick and quite strong spines.

The larvae of subgenus *Edwardsaedes* are very similar in morphology to larvae of subgenus *Aedes*, from which they are distinguished at the fourth stage, according to the data of Tanaka et al. (Tanaka et al., 1979), by branched hairs 3-X and large nodules at the bases of the hairs 9-12-M, T, from which hairs 13-M and 8-T also branch. However, it has been found that in fact these distinguishing features are not typical of the entire subgenus *Edwardsaedes*, but only of the larvae of *Ae. imprimens*, the only species of that subgenus figuring in the work of those authors.¹ For example, in larvae of the other species of the subgenus *Edwardsaedes*, *Ae. bekkui*, the 3-X hairs are simple, while the 13-M and 8-T hairs do not proceed from the nodules at the bases of hairs 9-12-M, T (Mogi, 1977), i.e., they do not differ with respect to those features from larvae of the subgenus *Aedes*. Thus, on the basis of the presently available data, there are no subgeneric differences between the larvae of *Edwardsaedes* and *Aedes*.

¹ As was stated above, in Japan among mosquitoes of the subgenus *Edwardsaedes* *Ae. bekkui*, and not *Ae. imprimens*, is actually distributed, and to it the females and males of *Ae. imprimens* described by those authors should be related. Regarding the larvae, Tanaka et al. (1979) present reports on their morphology based not on material from Japan, but on Belkin's data (Belkin, 1962) for mosquitoes from the southern part of the Pacific Ocean, for which reason we are concerned in this case with larvae of the actual *Ae. imprimens*, and not of *Ae. bekkui*.

Differential diagnosis of *Ae. bekkui* and *Ae. pingpaensis*

Phase of development and gender of imago	Feature	<i>Ae. bekkui</i>	<i>Ae. pingpaensis</i>
Female	Scales on alula	Short, narrow	Long, broad
Male genitalia	IX sternite	With deep notches along sides, resulting in distal section having almost round shape (Fig. 1, A)	Without notches along sides, smoothly widening toward the base (Fig. 1, B)
Larva	Siphon	Convex on dorsal and straight or somewhat concave on ventral side	Convex on both sides
	Siphonal index	Over 3 (3.3-3.9)	Not over 3 (2.4-3.0)
	Length of anal segment	Equal to or somewhat exceeding its height	Less than its height

Study of the literary data on mosquitoes of the subgenus *Edwardsaedes* of the fauna of the Palaearctic (*Ae. pingpaensis*, *Ae. bekkui* and *Ae. imprimens*) showed that *Ae. pingpaensis* and *Ae. bekkui* are independent species distinguished by their females, male genitalia and larvae (see Table). The matter is different with *Ae. antuensis*. According to the data of Su et al. (Su et al., 1978), these mosquitoes differ from *Ae. pingpaensis* primarily in their larvae. In fact the larvae of *Ae. pingpaensis* and *Ae. antuensis* are entirely different, but as our research has shown, the larva described by Su et al. (1978) does not actually belong to subgenus *Edwardsaedes* but is identical to the larvae of *Ae. (Ochlero-*

tatus) sticticus Mg. Obviously these authors did not perform individual breeding of the mosquitoes, and the larvae of *Ae. sticticus*, bred in the same body of water in which the development of the preimaginal phases of mosquitoes of the subgenus *Edwardsaedes* took place, were taken to be larvae of *Ae. antuensis*. The morphological features of the larvae described as *Ae. antuensis* correspond better to the subgenus *Ochlerotatus* (the triangular position of the bases of the frontal hairs, unseparated distal prongs of the ridge, position of the scales of the brush of segment VII of the abdomen as a triangular spot) than to the subgenus *Edwardsaedes* (arrangement of the bases of the frontal hairs in a straight line, separated distal prongs of the siphon ridge, arrangement of the scales of the brush in a single irregular row). Regarding the insignificant differences between females and the male genitalia of *Ae. antuensis* and *Ae. pingpaensis* offered by Su et al. (1978), in all probability they fall within the range of individual variation and are not sufficient to distinguish *Ae. antuensis* as an independent species. Moreover, one of the main differences between females of *Ae. antuensis* and *Ae. pingpaensis* presented by those authors in the table in English (the alula rimmed with bristles in the first species and with scales in the second) is unfounded, because in the corresponding table in Chinese the set of hieroglyphs on that point is the same in both cases, and concern only scales, and not bristles and scales (Fig. 1).

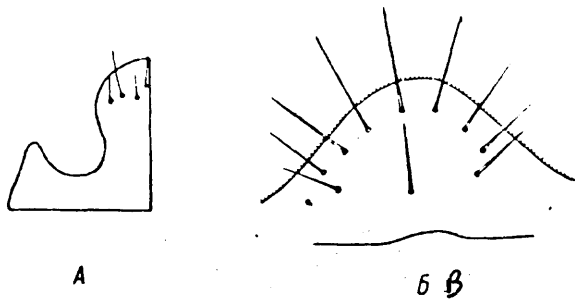


Fig. 1. IX sternite of genitalia of male *Aedes bekkui*
 A - right half of sternite, according to Mogi, 1977 and *Ae. pingpaensis*; B -
 according to Chang, 1965.

These data provide evidence of the fact that the name *Ae. (Edw.) antuensis* Su, Wang et Li, 1978 should by right of priority be considered a synonym of the name *Ae. (Edw.) pingpaensis* Chang, 1965. Thus in the Palaearctic are distributed not three, as previously thought, but two species of the subgenus *Edwardsaedes* - *Ae. pingpaensis* and *Ae. bekkui*.

As was indicated above, until now only female *Ae. bekkui* have been known from the USSR. Below is presented the first description in the Soviet literature of a larvae of the fourth stage of that species from South Primorye, a preparation of which (unfortunately not very well preserved) we found in the mosquito collection of the Institute of Medical Parasitology and Tropical Medicine named for Ye.I. Martsinovskiy (Fig. 2).

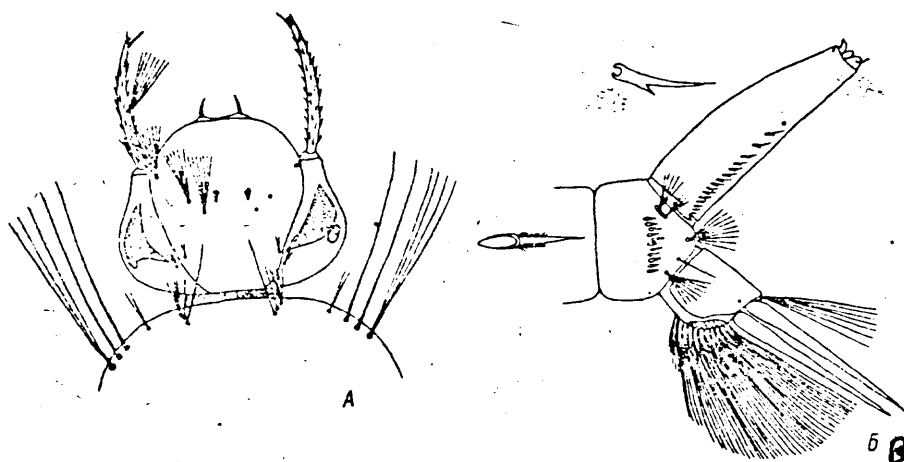


Fig. 2. Larva of fourth stage of *Ae. bekkui*.

A - head and prothorax (from above); B - posterior end of body (from side)

The head is 1.5 times greater in width than in length. The bases of the frontal hairs are positioned in a straight line; the 5-C hairs have 7 branches, 6-C have 6, 7-C have 12, 4-C are thin, short, with multiple branches, branching between the bases of 5-C at the level of 6-C; 8-C have 3 and 9-C have 2 branches. The antennae, $\frac{2}{3}$ the length of the head, are covered with microspines arranged without definite order on both sides of the antenna; the 1-A hairs have multiple branches, branching at a distance $\frac{2}{5}$ to $\frac{1}{2}$ of the length of the antenna from the base.

The hairs of the prothorax: 1-P is short, simple; 2-P is still shorter, simple; 3-P is almost the same length as the previous, consisting of 4-5 branches; 4-P is short, with two branches; 5- and 6-P are long, simple; 7-P is long, with 3-4 branches.

The brush of segment VIII of the abdomen consists of 11 scales positioned in a single irregular row; each scale has a large central spine and very small spinelets at its base. The hairs posterior to the brush: 1-VIII consists of 5 branches, 2-VIII of 3, 3-VIII of 9, 5-VIII of 7, 4-VIII is simple. The siphon is convex dorsally and somewhat concave ventrally; the siphon index is 3.4. The ridge of 16 prongs occupies $\frac{2}{5}$ to $\frac{1}{2}$ of the length of the siphon from the base; its two distal prongs are more widely spaced than the others. The prongs of the ridge are thin, curved, with convex vertex and one additional prong at the base. The 1-S hair branches distal to the ridge of the siphon (both of these hairs were broken off in the larva under examination). Segment X of the abdomen is of approximately the same length as height; hairs 1- and 3-X were broken off, 2-X consists of 7 branches. The fin (4-X) consists of 9 tufts joined by a common base, and 3 tufts anterior to it. The gills are narrow, pointed at the ends, their length exceeding the length of the saddle by 2.5 times; the upper pair are somewhat longer than the lower.

Material. A preparation of one larva of the fourth stage, collected in the vicinity of Ussuriysk (southern Primorskiy Kray) in 1939 (Plyater-Plokhotskaya) together with larvae of *Ae. vexans nipponii*.

Differential diagnosis. As our analysis showed, the larva of stage four of *Ae. bekkui* differs from the larva of the subgenus *Aedes* in its thick and short (spinelike) 1-C hairs (thin and long, bristle-like in subgenus *Aedes*), which is observed for the first time, and also in the absence on the surface of the siphon of the small additional tufts of hairs that are generally typical of larvae of subgenus *Aedes*.

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