

and *Ae. esoensis* as subspecies of the nominative form *Ae. cinereus*. This opinion is not shared, because there is a large overlap between *Ae. cinereus* and *Ae. rossicus* in Europe; very often the larvae occur in the same breeding sites and transitional forms are not known. There is no doubt that the Palaearctic species can be divided into two groups – first, the *cinereus*-group with *Ae. cinereus*, *Ae. geminus*, and *Ae. sasai* described from Japan, second, the *esoensis*-group with the two eastern species *Ae. esoensis* and *Ae. yamadai* and *Ae. rossicus* from Europe. The members of each group closely resemble each other. Whether the two other species of the subgenus, *Ae. dahuricus* (Danilov 1987) and *Ae. mubiensis* (Luh and Shih 1958), belong to one of these groups remains unresolved so far.

Peus (1972) treated *Ae. rossicus* as a subspecies of the eastern *Ae. esoensis* and this opinion was followed by others (Ward 1984). Although the record of *Ae. rossicus* from Japan by Hara (1958) was based on a misidentification (Tanaka et al. 1975) and there is apparently no overlap between the two forms, the arguments given by Peus are not convincing. There are clear and distinct differences between the two species in the shape of the shorter branch of the gonostylus and the structure of the claspettes. In *Ae. rossicus*, the shorter branch of the gonostylus is nearly as half as long as the main branch and the claspettes are divided into a longer and a shorter branch. In *Ae. esoensis* the shorter branch of the gonostylus is only one third as long as the main branch and the claspettes are simple. Furthermore the white basal bands on the abdominal terga are always absent in *Ae. rossicus* and generally present in *Ae. esoensis*, at least as patches (Tanaka et al. 1979). Thus until the distribution and status of all the forms involved are clarified, *Ae. rossicus* should be considered as a valid species.

Aedes (Aedes) cinereus Meigen 1818

Female: Medium sized to rather small mosquitoes. The proboscis is dark brown with lighter scales on its ventral surface, and is about as long as the fore femur (Fig. 6.36a). The palps are entirely dark brown. The head is mainly covered with flat dark scales, the vertex with golden narrow curved scales and lateral parts of the occiput with broad yellowish scales. The integument of the scutum is reddish brown, covered with golden brown narrow scales which are paler on the lat-

eral margins and above the wing roots, giving the scutum a fawn brown colouration. The scutellum has dark setae and pale narrow scales on each lobe. The integument of the pleurites is light brown with patches of broad yellowish white or creamy scales on the propleuron, postspiracular area, mesepisternum, and mesepimeron. The scales on the postpronotum are narrow and hair-like; often the lower portion is paler than the upper one. The prealar area is not scaled, but covered with setae. The mesepimeron is bare on the lower half, and lower mesepimeral setae are absent. The anterior part of the fore coxa has a patch of brown scales. The femora and tibiae are dark scaled, with paler scales on their posterior surfaces. There are small, indistinct patches of pale scales on the apices of the femora, the tarsi are entirely dark brown scaled, and pale rings are absent. The wing veins are covered with dark scales. The terga have dark brown scales on the dorsal surface, but without pale transverse bands. The lateral patches of pale scales on each tergum are usually joined, forming longitudinal stripes at the sides of the abdomen, which are not readily visible in dorsal view. The sterna have yellowish white scales. The apex of the abdomen is pointed, with cerci of short or moderate length.

Owing to the general colouration, adult females of *Ae. cinereus* may, at first glance, be confused with *Cx. modestus*, but the pointed end of the abdomen and cerci, the claw with subbasal tooth, and the lack of pulvilli easily identify it as a member of the genus *Aedes*.

Male: The lobes of tergum IX are as long as broad, widely separated, and each lobe bears several slender spine-like setae. The gonocoxite is about twice as long as broad, conical, with scales, and long setae on its outer surface (Fig. 10.1). The basal lobe is well developed. The basal lobe as well as the part distal to it is covered with dense long setae, and the apical lobe is absent. The gonostylus is inserted well before the apex of the gonocoxite and is unequally divided. The inner and broader branch reaches between 1/3 and 1/2 of the length of the main outer branch, tapers towards the apex, and is rounded at its tip. It bears several setae on the lateral margin. The longer main branch is slightly curved and bifurcated at the apex giving it a fishtail-like appearance. The outer branch of the fork is usually shorter than the inner branch. Their lengths may vary and often the prongs are nearly the same length, but the outer branch is never longer than the inner branch (Fig. 7.18c,d). The prongs appear to be flattened

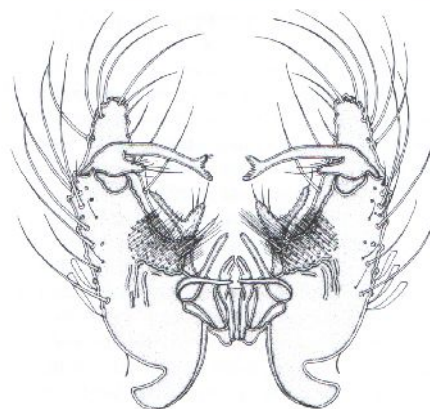


Fig. 10.1 Hypopygium of *Ae. cinereus*

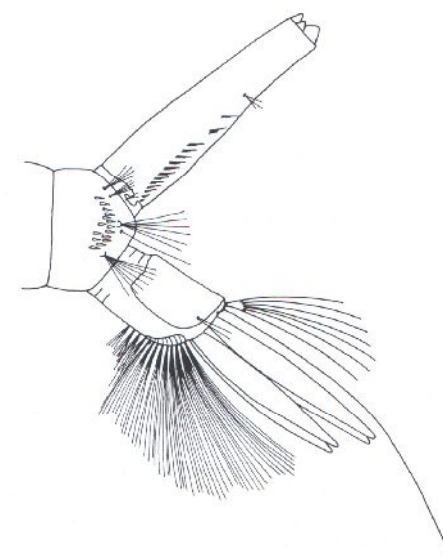


Fig. 10.2 Larva of *Ae. cinereus*

dorsoventrally and are usually stouter than in *Ae. geminus*. The claspettes are unequally bifurcated with a long and slender branch usually bearing 1–6 long setae and a shorter branch usually bearing one apical and 2–3 subapical setae. The paraproot is heavily sclerotized, slender and rod shaped with a narrow apex. The lateral plates of the aedeagus are heavily sclerotized, closed at the base and apex, with the apical half expanded.

Larva: The head is distinctly broader than long, and the antennae, slender and nearly as long as the head. The antennal tuft (1-A) is inserted slightly below the middle at about 2/5 of the length of the shaft (Fig. 8.22b). The setae of the labral brush are simple, not denticulated. The postclypeal seta (4-C) is inserted anterior to the frontal setae, and is small and multiple-branched. The frontal setae (5-C to 7-C) are arranged in a posteriorly curved row (Fig. 8.21b). The inner (5-C) and median (6-C) frontal setae have 5 or more branches, rarely 3–4, the outer frontal seta (7-C) is long and multiple-branched. The comb of abdominal segment VIII usually has 10–16 scales arranged in a double row partly. The individual scale is long with a strong apical spine and small lateral spines. The siphon is slender; the siphonal index 3.0–4.0 (Fig. 10.2). The pecten consists of about 13–21 weakly sclerotized teeth reaching beyond the middle of the siphon, and the distal pecten teeth are unevenly and more widely spaced than the basal teeth. The siphonal tuft (1-S) is

inserted distal to the pecten and usually consists of 3–6 short branches. The saddle is longer than it is wide and extends to the middle of the lateral sides of abdominal segment X or beyond it. The saddle seta (1-X) is double-branched and shorter than the saddle. The ventral brush consists of 8–10 tufts of cratal setae (4-X) on the common base, and 2–4 shorter tufts of precratal setae. The anal papillae are long, at least twice as long as the saddle.

Biology: The larvae can be found in various habitats, but most often they occur at the edges of semi-permanent, partly shaded pools of flood plains, in sedge marshes or *Sphagnum* sp. bogs and at the edges of lakes covered by emergent vegetation. The larvae also occur in woodland pools, but they require a higher temperature for larval development than the typical snow-melt mosquitoes. *Ae. cinereus* larvae can be found in these pools when they are subsequently reflooded after rainfall. The larvae usually hatch at a temperature of 12–13°C and the development starts at 14–15°C, the optimum temperature being 24–25°C (Mohrig 1969). Under these conditions the larvae develop very rapidly and finish their immature stages within 8–10 days. The adults occur

later than the typical snow-melt mosquitoes *Oc. rusticus*, *Oc. communis*, *Oc. cantans*, or *Oc. punctor*. In central Europe the larvae can be found from April on, in the northern parts of Europe a couple of weeks later, and the adults first occur usually in May and through the summer months until late September. The findings of larvae in *Sphagnum* sp. bogs and other acido-oligotrophic habitats indicate that *Ae. cinereus* seems to be slightly acidophilic. The females feed principally on mammals and bite human hosts readily when available. They attack in numbers at dusk and dawn, but do not bite in an exposed sunlit situation. During the day they rest in the low vegetation, but feed readily after arrival of the prospective host biting those parts of the host within the vegetative cover (Wesenberg-Lund 1921). The migration range of *Ae. cinereus* seems to be low, the species is practically never seen in the open unshaded field. It has at least two generations per year, in its more northern range only one generation per year may occur. The oviposition takes place in the summer months in suitable dried up depressions prone to subsequent flooding, and hibernation takes place in the egg stage. In many localities *Ae. cinereus* occurs in masses and causes great annoyance to walkers or people seeking recreation in forested areas.

Distribution: *Ae. cinereus* is distributed in the northern Holarctic region and widely spread over Europe. It can be found from Finland to Italy and from Spain to the eastern shores of the Baltic Sea and the North Caucasus. It is distributed in Middle Asia, Kazakhstan and Siberia, the Far East and North America.

***Aedes (Aedes) geminus* Peus 1970**

Female: *Ae. geminus* closely resembles *Ae. cinereus* and can be identified with certainty solely through hypopygial characteristics. Peus (1972) considered both as sibling species and described the adults of *Ae. geminus* in the typical form usually being smaller than the adults of *Ae. cinereus* and the females of the latter usually with a lighter colouration in the typical form than the females of the former. However, the size of an adult is closely related to the nutritional situation during the immature stages and females of *Ae. cinereus* show a variation in their colouration, e.g. darker forms may exist, thus these characteristics are of no value for identification of the two species.

Male (Fig. 10.3): In *Ae. geminus* the basal lobe is less developed than in *Ae. cinereus* and the covering with long setae seems not to be as dense as it is in the latter species. Whereas in this case it is recommended to compare individuals of the two species to get a clear picture, the immediately visible difference between the two species is the shape of the apical fork of the gonostylus. It is bifurcated in both species, but in *Ae. geminus* the outer branch is longer than the inner one (Fig. 7.18a, b). In *Ae. cinereus* the length of the outer branch never exceeds that of the inner branch. In the typical form the prongs appear to be thinner and much slender in *Ae. geminus* and they are more or less rounded, whereas in *Ae. cinereus* they are often flattened. The claspette is divided into two branches, the shorter branch bearing 2–3 setae, and in *Ae. cinereus* this branch bears usually 3–4 setae.

Larva: No specific differences, neither in the chaetotaxy nor in other characteristics, can be found in the larvae of *Ae. geminus* and *Ae. cinereus*. Both show individual variability, e.g. in the number of the small accessory siphonal setae on the dorsal part of the siphon.

Biology: So far, the information available about the biology of *Ae. geminus* is scanty. There is a large overlap in the preferred breeding sites with *Ae. cinereus*, and very often both species can be found together in the same water bodies. Peus (1972) reported *Ae. geminus* to have a lower tolerance against acidic habitats,

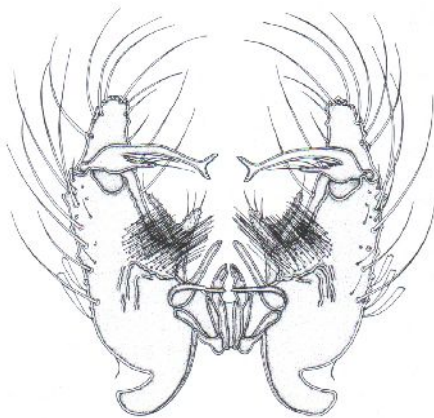


Fig. 10.3 Hypopygium of *Ae. geminus*