

Notes on systematics: A subspecies of *Cs. alaskaensis*, ssp. *indica* Edwards 1920, has been described with a distribution range from the Caucasus to Middle Asia and southern India. Its general colouration is much lighter than the nominate form, the scutum is covered with golden yellowish scales and the pale basal bands on the terga are often broader. The male genitalia and larvae do not distinctly differ from the nominate form.

***Culiseta (Culiseta) annulata* (Schrank 1776)**

Female: *Cs. annulata* is a large, dark brown mosquito with whitish markings on the abdomen and the legs. It can be distinguished from *Cs. alaskaensis* by the presence of subapical white rings on the femora and conspicuous white rings in the middle of tarsomeres I. *Cs. annulata* is closely related to *Cs. subochrea*, the characteristics distinguishing the two species are given in the description of the latter. The proboscis of *Cs. annulata* is speckled with pale and dark scales, which are darker in the apical part, and the labellum is dark brown. The clypeus is dark brown, the palps are dark with scattered pale scales, which are especially abundant at the apices and with a conspicuous pale spot at the joint of palpomeres II–III. The antennae are dark brown, and the pedicel has a few whitish scales on the inner surface. The head has pale narrow scales and dark erect forked scales on the occiput, and the eyes are bordered with yellowish white scales and dark, stout setae. The scutum has narrow dark brown and pale scales. The posterior submedian area has two pale spots, and the prescutellar area has whitish scales. The scutellum is brown with whitish scales and black setae, and the postnotum is brown or dark brown. The pleurites have patches of broad, whitish scales, and the postpronotum is predominantly pale scaled. Hypostigmal, subspiracular, and postspiracular patches are present. The mesepimeral patch of scales almost reaches the lower margin of the mesepimeron. Prespiracular setae and lower mesepimeral setae are present. The legs have dark brown scales and conspicuous white rings. The femora are predominantly dark scaled with scattered pale scales, distinct white subapical rings and pale knee spots, and the tibiae have pale and dark scales intermixed basally and are white scaled apically. Tarsomere I has a noticeable white ring in the middle and white rings

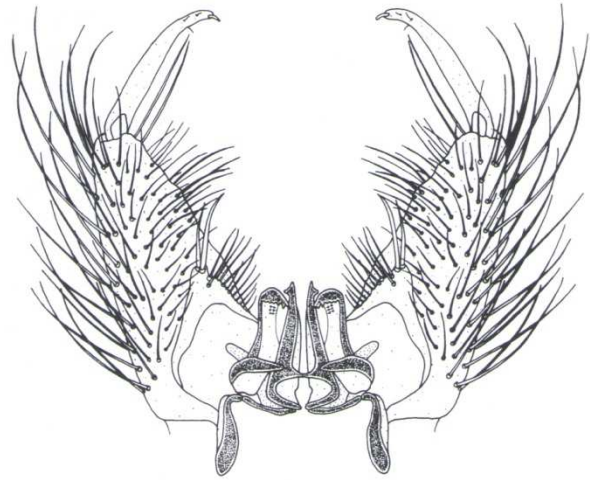


Fig. 10.129 Hypopygium of *Cs. annulata*

also at the bases of tarsomeres II–IV, and tarsomeres V of all the legs are entirely dark scaled (Fig. 6.62a). The wings are largely covered with dark scales, which are aggregated to form distinct dark spots at the base of R_s , at the cross veins and the furcations of R_{2+3} and M. Some scattered pale scales are mainly found in the basal part of the costa (C), subcosta (Sc), and radius (R). The cubitus (Cu) is entirely dark scaled. The cross veins (r-m and m-cu) usually form a straight line (Fig. 6.63a). The abdominal terga have whitish basal bands, and the apical parts are uniformly dark scaled. Tergum II has a narrow basal band and a characteristic longitudinal median white band. Tergum VIII is predominantly pale scaled. The sterna have yellowish white scales.

Male: The posterior margin of tergum VIII is usually without stout setae or occasionally a few setae may be present. The lobe of tergum IX has 8–12 hair-like setae. The gonocoxite is conical, gradually tapered towards the tip (Fig. 10.129). The basal lobe of the gonocoxite is well developed, with 2 (rarely 3) strong setae conspicuously stouter than the rest. The apical lobe is usually absent or indistinct. The gonostylus is long and slender, with a short apical spine. The paraproct is strongly sclerotized, recurved, with apical teeth, and the sclerites of the aedeagus are separated and also strongly sclerotized.

Larva: The head is broader than long, and the antennae are less than half as long as the head and straight. The antennal seta (1-A) is inserted just beyond the middle of the antennal shaft, with 10–15 branches,

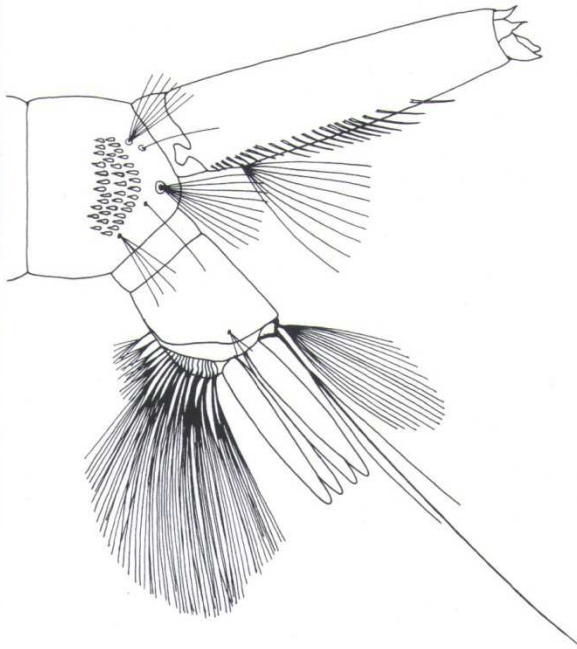


Fig. 10.130 Larva of *Cs. annulata*

not reaching to the apex of the antenna. The distance between the postclypeal setae (4-C) is about the same as the distance between the inner frontal setae (5-C) (Fig. 8.82a). 5-C has 4–8 branches, the median frontal seta (6-C) has 1–3 branches, and the outer seta (7-C) has 6–14 branches (Fig. 8.78a). The comb usually consists of 35–50 scales, rarely more (Fig. 10.130). The individual scales are slightly narrowed in the middle part, blunt ended and uniformly fringed with small spines. The siphon distinctly tapers apically, with a siphonal index of 3.2–4.0. The siphonal tuft (1-S) is inserted close to the base of the siphon, usually with 9–10 branches, and is about as long as the width of the siphon at the base. The pecten has 11–18 spine-like teeth, followed by a row of 11–21 thin, hair-like setae occupying approximately $2/3$ the length of the siphon. The saddle completely encircles the anal segment, and its ventral surface is only half as long as its dorsal surface. The saddle seta (1-X) is much shorter than the saddle, usually with 3 branches. The upper anal seta (2-X) has 13–19 branches, and the lower anal seta (3-X) has 3 branches. The ventral brush usually has 16–18 cratal setae (4-X) and 2–3 precratal setae, 1 or 2 of which perforate the saddle. The anal papillae are lanceolate, and usually as long as the saddle.

Biology: In central Europe the larvae usually occur from early spring onwards. The population increases in the summer months and reaches its maximum in September. Depending on the latitude of its occurrence, *Cs. annulata* may have 1–3 generations per year. The eggs are laid in rafts, which are composed of approximately 200 eggs. The species breeds in a wide variety of permanent and semipermanent habitats including natural and artificial water recipients, both in open and shaded situations. Larvae can be found in stagnant pools, ponds, ditches, water troughs, and other artificial containers such as barrels collecting rain water. Dense populations could be found in tanks containing manure water, so it seems probable that a high content of nitrogen provides an additional attraction for the females to lay their eggs (Mohrig 1969). The larvae are able to tolerate a high content of salinity and can also be found in brackish water (Marshall 1938). Aitken (1954a) found larvae breeding in a tree-hole in Corsica. In artificial containers they are often found in association with those of *Cx. p. pipiens*. In natural breeding sites the larvae occur together with those of *Cs. subochrea* and *Cs. morsitans* (Natvig 1948). Hatching of *Cs. annulata* larvae takes place 3–5 days after egg deposition, the larval development depends on the temperature. Martini (1931) estimated the overall time from egg deposition to the emergence of the adult being 18 days at a temperature of 20–23°C and 16 days at a temperature of 24–27°C, above 31°C no larvae survived. Usually the species hibernates in the adult stage and the first females appear in early spring when they leave their winter shelters. At this time they readily attack humans and mammals during the day, but in the summer months they show a more nocturnal biting activity and frequently enter houses or stables to feed on humans or domestic animals. Occasionally they may also take their blood meal from birds. In former Yugoslavia, the females could be sampled more efficiently in CO₂ baited traps than on humans (Petric 1989). The females of *Cs. annulata* can often be found inside houses even during the day from early autumn on, when they search for their winter habitats. They hibernate in cellars, attics of dwellings, or in sheds of domestic animals, where they can be extremely annoying during wintertime, when the hibernation is interrupted by rising temperatures or humidity. Winter habitats can also be found far away from human settlements in tree cavities, stacks of

wood, or other natural shelters. When the winter is mild, or in the southern range of its distribution, hibernation can also take place in the larval stage.

Distribution: *Cs. annulata* is widely distributed throughout Europe, but it is more common in the north than in the south, where it seems to be largely replaced by *Cs. longiareolata* (Edwards 1921). The distribution range of *Cs. annulata* extends into northern Africa, Asia Minor, and southwest Asia.

Medical importance: The species is known to be a potential vector of Tahyna virus (Ribeiro et al. 1988) and transmitter of some plasmodia of birds (Gutsevich et al. 1974).

***Culiseta (Culiseta) bergrothi* (Edwards 1921)**

Female: The integument is dark brownish with some lighter pleural parts. The colour of the light scales is variable, from white to creamy white. The antennae have some white scales on the pedicel, and the eyes are bordered with white scales. The proboscis is covered with black scales, and the palps are dark with scattered pale scales. The vertex has white flat scales, and the occiput has upright narrow golden scales and brown setae. The scutum is covered with narrow bronze scales and a more or less distinct varying pattern of white scales and bronze brown setae. White broader scales cover the front, sides, and back of the scutum in an irregular pattern and form a narrow, incomplete acrostichal stripe. Dorsocentral stripes of narrow white scales and a postacrostichal patch of white scales are usually present forming a scutal pattern similar to that of *Cs. subochrea*. However, submedian stripes are not present. The scutellum is covered with whitish scales and light setae. The anteprenotal and propleural setae are long and dominating, the postpronotum has narrow bronze and some lower, broader whitish scales. The mesepisternal patch is large with elongated white scales in its upper part, and the mesepimeron is covered with scales in its upper third. Usually not more than 15 prespiracular setae and not more than 10 lower mesepisternal setae are present (Fig. 6.61a). The coxae of the fore and hind legs have long, conspicuous setae. The femora have white scales on the ventral surface and a mixture of white and dark scales on the dorsal surface. The tibiae are dark with either light dorsal stripes or mixed scales, especially on the front legs,

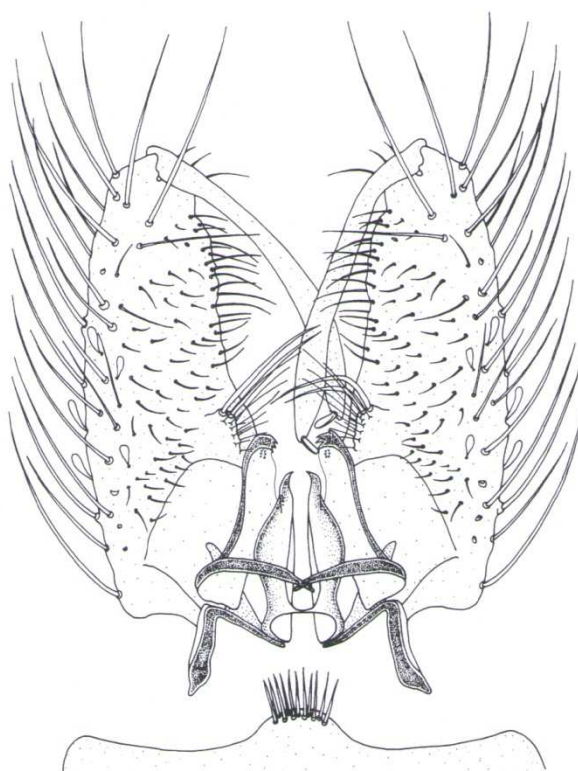


Fig. 10.131 Hypopygium of *Cs. bergrothi*

and the knee spots are white. Tarsomeres I–V of all the legs are dark, with occasionally some white scales on tarsomere I; the claws are simple. The wing veins are covered with elongated, dark scales, and spots are always present, although often inconspicuous. The spots result from aggregations of dark scales at the furcations of R_{2+3} and M and the cross veins (r-m and m-cu). The lining up of r-m and m-cu can vary from nearly a straight line to a slight displacement of m-cu towards the wing root, but never distal to r-m. The abdomen is dark with pale basal bands on the terga, which are narrower in the last segments. The sterna are pale with some scattered dark scales.

Male: Somewhat smaller than the males of other northern European *Culiseta* species. They share the feature of having an extremely long tarsomere I of the fore leg (exceeding the length of tarsomeres II–V of about one fifth) with males of *Cs. fumipennis*. The median lobe of tergum VIII has 4–18, usually >10, strong spine-like setae (Fig. 7.71b). The gonocoxite has long and numerous setae laterally and apically (Fig. 10.131). The basal lobe is weakly developed,