

**NOTES ON *CULISETA (CULICELLA) ATRA* (LEE)  
(DIPTERA: CULICIDAE) IN WESTERN AUSTRALIA**

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NOTES ON *CULISETA (CULICELLA) ATRA* (LEE)  
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Abstract

Adults of *Culiseta (Culicella) atra* (Lee) are redescribed; the larva is described for the first time and the pupa is figured. The relationships and origin of *C. atra* are discussed.

The present distribution of the genus *Culiseta* is typical of the southern element in the Australian fauna. Most species of this genus occur in the Bassian Sub-region with a northern extension into the Torresian Sub-region on the eastern side of the continent, mainly along, and east of the Great Dividing Range. In the south *Culiseta (Culicella) inconspicua* Lee reaches the south-eastern part of the Eyrean Sub-region. One species *Culiseta atra* Lee occurs in the South-Western Province.

The following description of the previously unknown larva of *C. atra* and redescription of the adults are based on substantial collections made by Mr. E. J. Britten and the author.

In the absence of any account of the larva of *C. atra*, Stone, Knight & Starcke (1952) did not attempt to determine its subgeneric position. However, Maslov (1964) on the basis of the structure of the male terminalia placed *C. atra* in the subgenus *Culicella*. The structure of the larva has confirmed Maslov's opinion. It may be noted that Maslov assigned only two Australian species, *C. atra* and *C. inconspicua*, to this subgenus.

*Culiseta (Culicella) atra* (Lee)

*Theobaldia atra* Lee, 1944, *Proc. Linn. Soc. N.S.W.*, 59: 220-221.

*Culiseta atra* Stone, Knight and Starcke 1959, *Syn. Cat. Mosquitoes World, Thomas Say Found.* 6: 222. Holotype ♀, Allotype ♂ and Paratype ♂ and 8 ♀♀, from Perth, Western Australia in the Western Australian Museum.

*Material examined*.—17 ♂♂, 20 ♀♀, 43 larvae and 12 pupae; 2 ♂♂ and 4 ♀♀ have their associated larval and pupal skins.

The male of *C. atra* differs from all other species of the genus by the presence of a large patch of long setae at the base of the coxite. These setae arise on a tongue-like sclerotization on the tergal side of the coxite (Figs. 1, 2). The second peculiarity of the male terminalia is seen in the structure of the so-called basal lobe of the coxite. These lobes are conical structures joined to one another by a narrow bridge on the sternal side; each is joined to the corresponding coxite by membrane (Fig. 3). Whether they are properly referred to as basal lobes is open to doubt. The female and larva are very similar to those of *C. inconspicua*. The female can be recognised by having 2 to 4 black spiracular bristles and a few pale hairs in postspiracular area, and the larva by having the head setae 5, 3-6 branched, 6, 2 branched; the prothoracic setae 7, 3 branched.

Male

*Head*.—Vertex clothed with narrow, curved pale scales and black forked scales; lateral flat scales pale. Proboscis dark scaled above, pale scaled below, darker towards base and apex. Palps longer than proboscis with labella by about half the terminal segment; apex of shaft with about 7 long strong setae; penultimate segment with a number of long strong setae; terminal segment directed upwards with long and short setae.

*Thorax*.—Integument dark brown; anterior pronotum with black bristles; posterior pronotum with a few hairs and 3-5 proepimeral bristles; postspiracular area with 2-8 fine pale hairs and rarely with

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1-3 pale reflecting scales; scutum with bronzy-brown scales and strong black bristles; scutellum with a few narrow curved pale scales and 7-8 border bristles on central lobe and 5-7 bristles on each lateral lobe. 2-4 black spiracular bristles. Lower part of sternopleuron with row of fine bristles, single, strong, black bristle and a few pale scales all on posterior border; mesepimeron with single, strong, long, black bristle and a second weaker, pale one above it; 7-9 upper mesepimeral bristles and a few fine pale bristles below them. Halteres with pale scaled knob.

Legs. Femora dark scaled above, pale below with small pale knee spots; tibiae and tarsi dark scaled with some pale scaling posteriorly on tibiae and first tarsal segment.

*Abdomen*.—Tergites black scaled, sternites pale scaled. *Terminalia* (Figs. 1-4). Lobes of tergite 9 with 3-7 setae. Coxites about three times as long as broad at base, tapering, with a number of long strong, black setae, but no scales; tergal side of coxite with large basal patch of long mesially directed setae; mesial face of coxites membranous at base with associated small triangular basal lobe sparsely clothed with short and long setae, three or four slightly thickened. Style narrow about two thirds length of coxite; terminal appendage small; paraproct with two or three teeth. Phallosome simple, oval in shape, smooth.

### Female

The female differs from the male as follows.—Palps about one seventh length of the proboscis, black scaled with a few pale scales. There are usually 4 long spiracular bristles. Some specimens have two strong bristles on lower part of sternopleuron, and two strong lower mesepimeral bristles.

### Pupa

Details shown in Figure 7, 8.

### Larva (Figs. 5, 6)

*Brown. Head*.—Large, only slightly narrower than width of thorax. Head seta 4, single fine, relatively long; 5, 3-6 branched; 6, the longest, 2 branched; 7, 5-6 branched; 8 and 9, small, 2 branched; setae 5, 6 and 7, slightly plumose. Antennae as long as length of head, with fine spicules; seta 1, with about 30 branches; setae 2 and 3 removed from tip of antennae by about the width of antenna at their origin. Mentum with a small central tooth and 12-13 small lateral teeth on each side.

*Thorax*.—Prothoracic setae 1, 2, 5 and 6, single; 3, 2 branched; 4, 2-3 branched; 7, 3 branched.

*Abdomen*.—VIIIth segment: lateral comb triangular patch of 50-60 small scales fringed distally; setae 1, 8-9 branched, plumose; 2 and 4, single; 3, 6-8 branched, plumose; 5, 4-5 branched. Siphon long, slightly tapering with index of about 6; basal seta 1, long, single; pecten of 12-13 spines finely barbed on ventral side. *Anal segment*: saddle complete ring, dorsal and lateral sides with very fine, small spines; seta 1, single, about as long as saddle; 2, 6-10 branched; 3, with one long and 2 short branches; 4 (ventral brush) of 15-16 tufts; anal papillae short, about half the length of saddle.

### Records

WESTERN AUSTRALIA: Yanchep, Toodyay, Bunbury, Darkan, Nornalup, Albany, Denmark, Katanning, Tambellup, Porongorup, Midland Junction, E. J. Britten; Stirling Range, Nannup, N. V. Dobrotworsky.

### Biology and Distribution

*C. atra* is distributed mainly to the south of the 20 inches isohyet; it is occasionally found slightly to the north of this line. This region receives a winter-maximum rainfall and the summer is dry and hot. Average daily maximum temperatures during December-February are close to 80°F in most parts of the region, reaching 90°F in some places, with extreme temperatures as high as 106.0-115.2°F. The annual average rainfall is from 33.2 to 50.9 inches but in most parts the monthly rainfall from November to March is only 3-4 inches; a few areas receive from 5.5 to 7.0 inches (Anon 1956).

In the course of a survey of mosquito larvae in south Western Australia during the period May-August E. J. Britten (1958) observed larvae of *C. atra* in many localities. They were particularly numerous in the south-west corner of Western

Australia bordered by Bunbury, Darkan and Nornalup, and also in the Albany and Denmark district.

Most of these pools dry out during November or even earlier. In the Stirling Range, which is on the northern border of the distribution of the species all creeks had ceased flowing in mid October 1965 and only a few deep and heavily shaded pools remained in the creek beds. In one of these pools with decayed leaves on the bottom and discoloured water a large number of larvae and pupae of *C. atra* were found.

The eggs of *C. atra* are not known, but it seems probable that, like those of *C. inconspicua*, they are laid in the form of rafts on the water surface and cannot withstand desiccation; as far as is known no Australian species of *Culiseta* lay

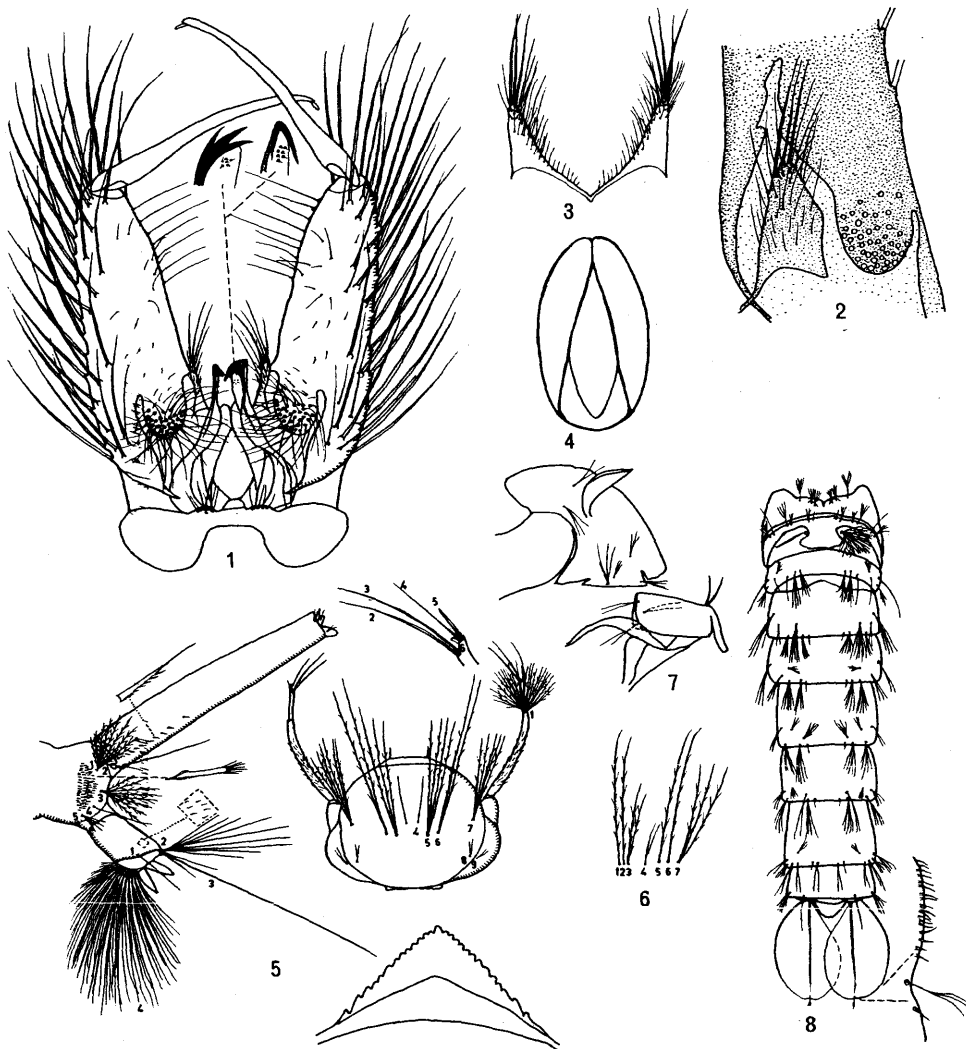


FIG. 1-8.—*Culiseta atra* Lee: (1-4) male terminalia—(1) tergal aspect, (2) inner aspect of basal part of coxite, (3) basal lobes of coxites, sternal aspect, (4) phallosome; (5,6) larva—(5) head, terminal segments and mentum, (6) prothoracic setae; (7,8) pupa—(7) cephalothorax, (8) metanotum and abdomen.

drought resistant eggs. It is possible that in moist pockets, *C. atra* may continue to breed throughout the summer making use of deep shaded pools which dry out for only short periods, if at all. However, the climate conditions in this area are such that, in general, *C. atra* could survive the summer chiefly in the adult stage. As its distribution indicates, the adults capacity for aestivation is limited and is not comparable to that of some *Culex* species of the arid zone (Marks 1967).

#### DISCUSSION

It is believed that the genus *Culiseta* entered Australia from the north and dispersed southwards probably along the coast and mountain ranges of eastern Australia (Dobrotorsky 1965, 1966).

The majority of the species in south-eastern Australia are limited to a moist environment; many breed in underground water, for example *C. victoriensis* Dobr., *C. drummondi* Dobr., *C. hilli* (Edw.) etc.. *C. inconspicua*, however, is more adaptable. It is the most common species in Victoria and is abundant in the Mount Lofty Ranges of South Australia. In this state it occurs as far west as the Flinders Ranges, where it breeds in pockets containing permanent fresh water, for example Wilpena Pound, with an average annual rainfall of 13.7 inches.

The Nullarbor Plain at the present time is an impassable barrier for mosquitoes such as *Culiseta* which do not lay drought resistant eggs and which are able to survive only relatively short dry spells as adults. However, during the Pleistocene glaciations the rainfall in southern Australia was probably much higher than it is at present in its arid phase. The impact of climatic changes during the Pleistocene on distribution and speciation have been described by Mackerras (1960, 1962) in relation to Tabanidae, and by Main, Lee and Littlejohn (1961) in relation to frogs. These authors agree that during wet phases the Nullarbor Plain became the corridor for migration between east and west. However, the major movement was of Bassian elements from the east. Migration in the opposite direction seems to have been rare and limited to more mobile animals such as birds (Serventy 1951, Littlejohn 1961).

The ecological requirements of mosquitoes are similar to those of frogs. It seems probable that the dispersal of *Culiseta* to Western Australia occurred during the Pleistocene glaciation and that *C. atra* and *C. inconspicua* evolved from a common stock after isolation due to the return of arid conditions in the Nullarbor Plain.

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