

Mosquito Eggs VII

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Genus Uranotaenia

Two modes of oviposition have been described in this genus. In the first the eggs are packed together, upright, in rafts, as in many Culex, the rafts being formed directly on the water surface. In the second they are laid individually on the water surface.

The earliest description of the first mode is that of Dyar¹¹⁸ for U. sapphirina (Osten Sacken). He is the only author who describes the mode of dehiscence and thus enables us to orient the egg. He does not figure the raft, but describes it as resembling that of Culex pungens (i.e., C. pipiens fatigans Wiedemann) but smaller, with fewer eggs, and less regularly elliptical, more angular. It is said to float less on the surface, the middle eggs being nearly half submerged.

From his description and figure (Fig. 1) it is clear that, as in Culex, the individual eggs are oriented with the blunt anterior end downwards so that hatching takes place directly into the water. The eggs are described as "Dark brown, shading to black on the apical fourth". Their most striking feature is the ornamentation of the apical end which is described as "roughly granular with large projecting granules".

Belkin and McDonald¹¹⁹ give a good description and figure of the egg of U. anhydor Dyar (Fig. 2). They do not describe the dehiscence or the orientation of the pre-larva but the homologies with the egg of U. sapphirina seem self-evident. The rafts are described as pointed at one end, rounded at the other, about 3x as long as their median breadth and containing, generally, about 80-100 eggs. The individual egg is said to be uniformly dark brown, almost black with the apex angled as in the figure. The outer chorion is apparently thicker on the concave side and is marked with minute hexagonal reticulations over the entire surface except for the extreme upper end. The apex bears a group of two dozen or more roughly hemispherical translucent projections which appear to arise from hexagonal bases. (I take these to be clearly homologous with the "projecting granules" described by Dyar though, in this case, unsclerotized). The lower surface of the raft, as seen in alcohol preserved material, is said to be "covered with a continuous amorphous translucent pellicle which forms an opaque white disc at the lower end of each egg".

Chapman¹²⁰ adds the information, based on fresh rafts from a laboratory colony of this species, that the egg rafts exhibit "an abundance of easily discernable apical drops". Taylor¹²¹ gives the following brief description of the third North American species, U. lowii Theobald, based on material from Cuba; the eggs "are brownish in color, and are deposited on the surface of water in a manner similar to those of Culex pipiens, that is in a boat-shaped mass, but both the group and the individual eggs are smaller. They average about 50 to 75 in a group."

The only available description of the eggs of an Old World raft-forming species is that of U. colocasiae Edwards from Fiji. Paine¹²² describes these as laid in small parallel-sided rafts. Like Dyar, he contrasts the shape of the raft with that of Culex and notes that the eggs are less numerous than those of the latter. The individual eggs are said, however, to be considerably larger than those of the local Culex spp.

The first account of the second mode of oviposition is that by De Meijere¹²³ of the very aberrant plant pitcher breeding species U. ascidiicola De Meij. His description is as follows: "Die Eier sind langgestreckt, ca. 0.85 mm. lang und 0.2 mm. breit, von weisser Farbe, die Oberfläche ist glatt, ohne sculptur. Sie schwimmen auf dem wasser in den Bechern." His figure is reproduced here as Fig. 3.

Bohart and Ingram¹²⁴ describe the eggs of U. bimaculata Leicester as laid "flat on the water and singly" in the laboratory. From their general appearance it would seem that this is most probably true also in nature. These authors cite a general description by Blanchard¹²⁵ as evidence for single laying elsewhere in Uranotaenia. (Oeufs semblables à ceux des Aèdes, pondus isolément".) This statement is, however, clearly a lapsus. It is based on the figure of the egg of U. sapphirina by Dyar¹¹⁸ which Blanchard reproduces direct from his paper and which shows only the isolated egg, not the raft, as noted above. The eggs of U. bimaculata are described as about 0.6 mm. in length and black with dorsal surface dull granular and delimited by a low ridge, sides and bottom smooth and shiny. It is clear from the accompanying figure (Fig. 4) that "dorsal" here means upper (i.e., most probably morphologically ventral).

The existence of two modes of oviposition in Uranotaenia is interesting in view of the occurrence in this genus of two well marked series (series Uranotaenia s. str. and Pseudoficalbia of Edwards²¹). U. sapphirina, anhydor and lowii belong to Uranotaenia s. str., U. ascidiicola and bimaculata to Pseudoficalbia and to this extent the modes of oviposition are representative. However, U. colocasiae is generally placed in Pseudoficalbia. It is not an absolutely typical member of this series and it is possible that the eggs when further studied may prove to be in some way annectent, though this is difficult to imagine. Information about the eggs of other Pseudoficalbia would be very welcome.

Through the kindness of Dr. Shivaji Ramalingam I recently received eggs of two species of Uranotaenia s. str., U. bimaculiala Leicester and U. lateralis Ludlow, from Selangor. These were obtained, in both cases, from wild caught gravid females in the laboratory. Only isolated eggs are at present available so that I am unable to describe the rafts.

Descriptions of individual eggs follow.

U. bimaculiala. (Fig. 6). The egg tapers strongly at the posterior end and has a double flexure. It is mid brown for most of its length with the apex darker, almost black and a pale off-white subapical area occupying about a third of the length. The extreme tip is furnished with a delicate, detachable cap with a number of refringent papillae much as described by Belkin and McDonald for U. anhydor. The general surface is covered with smaller refringent bodies varying in size but tending to be larger on the convex aspect. No chorionic sculpturing is visible even in ruptured chorion except where the apical cap is attached and there is no corolla or other specialization at the anterior end. A few smaller refringent bodies accompany the detached cap, as shown in the figure, from which I infer that the cap is merely a specialized portion of a continuous outer chorionic pellicle.

U. lateralis (Fig. 5). The posterior end of the egg tapers less strongly than in U. bimaculiala and has a single flexure only. The extreme tip is blackish, the rest pale brown, darkening slightly towards the tip. The latter is furnished with refringent papillae similar to those seen in U. bimaculiala but apparently less firmly attached to one another since some or all are missing from individual eggs. The general surface is covered with small refringent bodies as in U. bimaculiala but these are larger on the concave aspect. No sculpturing is visible even in ruptured chorion apart from a little flattening beneath each of the apical papillae. There is no corolla or other anterior specialization.

The apical papillae in both species are very similar to those distributed over the general surface of many Aedes eggs, though in the latter they tend to be enlarged at the anterior, rather than the posterior end of the egg. Despite the superficial resemblance of the egg raft (and in the case of U. lateralis the egg shape) to those of some Culex I suspect that the relationship is not particularly close. I do not think that the "opaque white disc" seen by Belkin and McDonald at the posterior end of the egg of U. anhydor bears any relation to the corolla of Culex, particularly as none of the Uranotaenia eggs so far described shows any trace of an egg spike. However, the presence of a "posterior polar specialized area" (Hinton; Christophers¹²⁶) and of an apical droplet is interesting, though the latter needs confirming. The resemblance to Aedes seems to me closer and I am inclined to regard the apical papillae and the other refringent bodies as homologous with the small outer chorionic papillae of Aedes on the one hand and the more elaborate chorionic papillae found in Toxorhynchites and Trichoprosopon on the other. (See my previous papers in this series). I would therefore tentatively postulate the following four evolutionary grades:-

1. Toxorhynchites grade. Eggs mutually repellent, entirely covered by hydrophobe outer chorion.
2. Trichoprosopon grade. Eggs largely covered with hydrophobe outer chorion but with hydrophil inner chorion exposed along three longitudinal axes permitting attachment to form an open hexagonal reticulum.
3. Uranotaenia grade. Eggs with hydrophobe chorion vestigial. Attachment possible at all points on circumference, permitting closed hexagonal packing.

4. Aedes grade. As 3 but eggs laid singly, usually above water, without any tendency to raft formation.

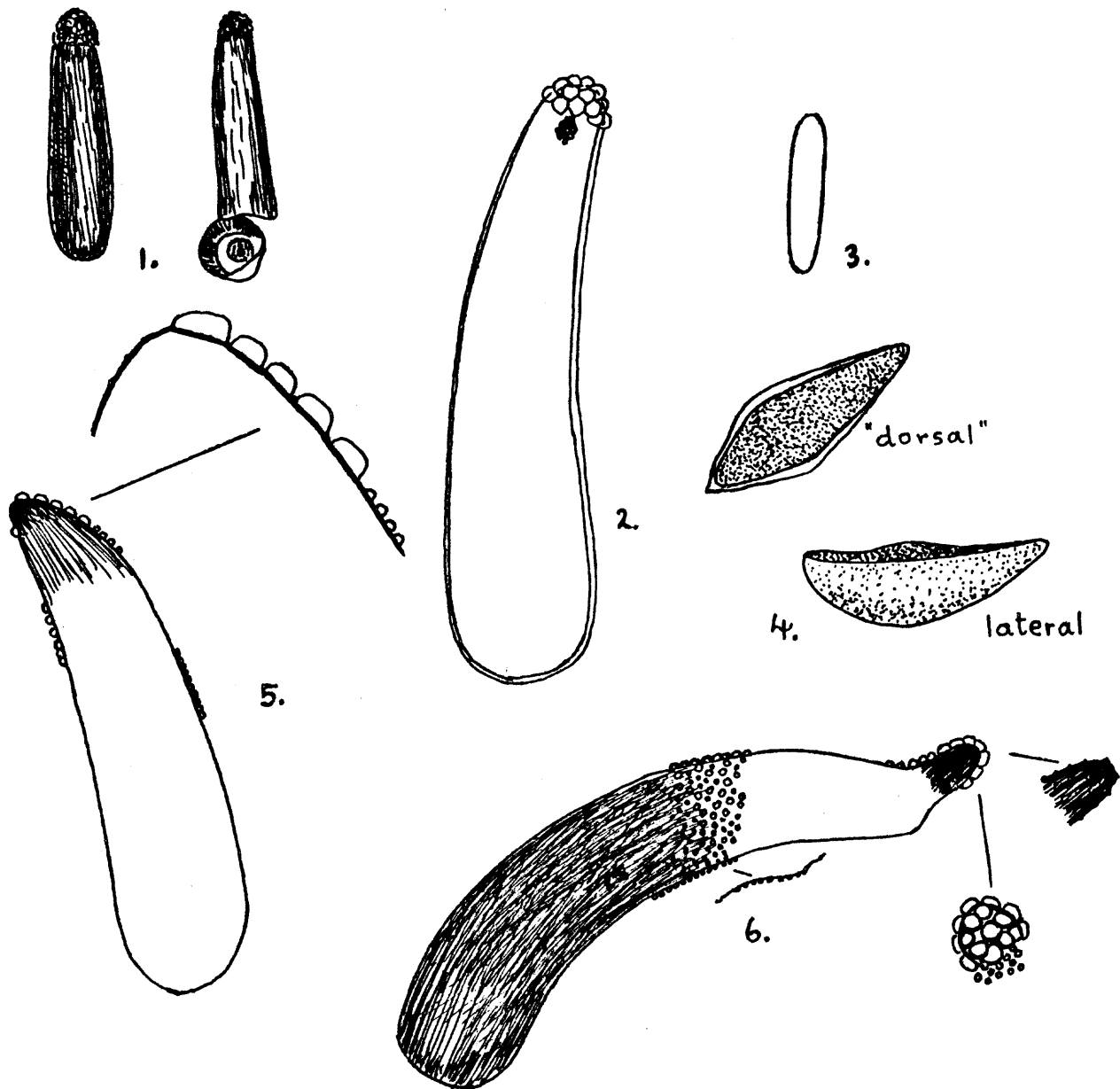
The principal difficulty of fitting Culex into any such scheme lies in the presence, in subgenus Microculex, of frog-spawn-like eggs¹²⁷ which can be paralleled only outside the Culicidae, either in the Dixidae^{128, 129} or the Chironomidae. One is led to suspect that this genus may have pursued an independent evolution from a very early stage (the presence in one species of Toxorhynchites of a Culex-like corolla cannot, however, be ignored).

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ADDENDUM

Since the above was written Prof. Belkin very kindly sent me a large number of eggs of U. anhydor. From these I was able to confirm that the apical "cap" is in fact, as suggested, simply a specialized portion of a continuous outer chorionic sheath. The egg quite closely resembles that of U. lateralis in general shape but differs in having the apical papillae larger and more numerous and in the fact that the papillae themselves are finely sculptured while the smaller papillae scattered over the general surface are linked by slender bridges forming a conspicuous reticulum (Fig. 2). A few eggs, presumably sterile, show longitudinal fractures recalling those seen in sterile eggs of Aedes and Armigeres s. str.



Genus Uranotaenia. Eggs.

Fig. 1. U. sapphirina, after Dyar. 2. U. anhydor, after Belkin & McDonald. 3. U. ascidiicola, after De Meijere. 4. U. bimaculata, after Bohart & Ingram. 5. U. lateralis. Original. 6. U. bimaculiala. Original, showing detached cap and appearance of apex after detachment.

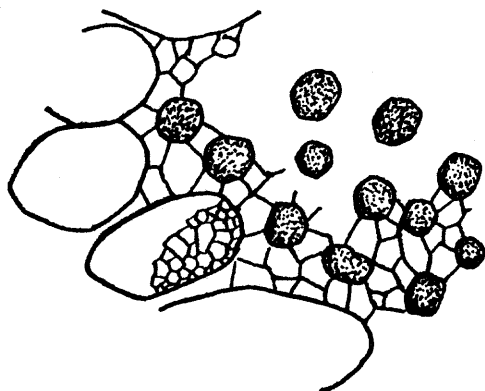


Fig. 2. U. anhydor, showing apical papillae, reticulated chorion and some of the smaller papillae (stippled) scattered over the general surface. The fine sculpturing of one of the apical papillae is shown in part.