Mosquito Eggs XXI

Genus *Culiseta* Felt

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Subgenus *Culiseta*

C. *alaskaensis* (Ludlow). I have not seen eggs of this species. Frohne[284,285] considers that, in Alaska, engorgement and oviposition are delayed until the summer following that in which mating takes place. Egg rafts were found in sheltered "nests" formed by entangled, dead *Carex* plants. They often occurred in groups of 4-12 forming "rosettes" on the surface of the water. They are described as "typically triangular or boat-shaped, one end pointed, the other rounded, both upturned from curvature of raft"[284] and as "large" with "considerable spherical curvature, which raises the edge of an arrowhead or falling drop outline boatlike from the water"[285]. The number of eggs per raft ranged from less than 100 to more than 300 with a mean of 183. Rafts with less than 100 eggs were considered to be incomplete. The individual eggs are described as "distinctly curved" with "3 tan annular zones included between 4 dark brown ones (rarely blotched)[284] and as "commonly several microns more than a millimeter long"[285]. When laid they are creamy white. Shortly before hatching the egg stripes become blotchy. Hatching takes place by "rupture of the chorion a little above the frill"[285]. After hatching the coloured zones are lost. The outer chorion is said to exhibit "a faint depressed hexagonal network" and "columellae, which are lacking along this network"[284].

C. *annulata* (Schrank). The eggs of this species have been described by Christophers[11] and Bresslau[286]. My own material consists of two slides, one of apparently immature eggs devoid of outer chorion, the other of hatched eggs. I am able to add some further details from the latter. Bresslau's and Christophers' descriptions both take the form of a comparison with the eggs of *Culex pipiens* s.l. Bresslau notes, in particular, the much larger size of those of C. *annulata* (length 0.93-1 mm., greatest breadth 0.23-0.27 mm.) and figures the eggs of the two species superimposed (Fig. 1a). At the same time he contrasts the well developed corolla of C. *pipiens* with the wider, but much shallower, apical frill (0.18-0.2 mm. in diameter at base, expanding to 0.21-0.22 mm. at free edge) found in C. *annulata*. Both authors comment on the absence of the egg spike projecting in the centre of the corolla in C. *pipiens*. Christophers notes the presence of an apical droplet, at the posterior end, in both species. He describes the outer chorion as "almost identical with that in *Culex* with minute closely set cylindro-conical projections" but having "an entirely different specialization at the anterior pole...surrounded... by a thickened white rim or frill...entirely devoid of chorionic papillae and....wettable and powerfully hydrophilic" (Fig. 1b). The egg raft is described as "very similar... to that of C. *fatigans* though much larger, due to the larger size of the eggs"and as "oval or pear-shaped" and consisting of about 120 eggs.

My material bears out these descriptions in the main but I am unable to accept Christophers' interpretation of the hydrophilic area at the anterior end of the egg. I think it much more likely that this is an exposed area of hydrophilic inner chorion than that it is an area of specialized outer chorion. I cannot confirm this from my material because the apical frill is apparently lost on hatching though its position is marked by a ring of radial thickenings of the inner chorion (Fig. 1c). However, Newkirk[229] notes that the outer chorion is absent from this area in the related *C. inornata*. The comparison with *Trichoprosopon digitatum* is interesting. Here also inversion of the egg is achieved, though in a much cruder fashion, by exposure of the inner chorion[97]. In *C. annulata*, as in *C. pipiens*[1], there is also a small area of exposed inner chorion at the posterior tip of the egg, associated, presumably, with the attachment of the apical droplet. There is, however, a difference between the two species, not mentioned by either of the previous authors, in that this area is concave, and surrounded by enlarged chorionic papillae in *C. pipiens*, whereas in *C. annulata* it has the form of a conical projection and no enlarged papillae are visible (Fig. 1d). Hatching is by dehiscence, sometimes incomplete, of a shallow apical cap (Fig. 1c), the edges of which tend to fold inwards as is the case with other eggs in which the radius of curvature of the cap is very short[222,250].

Marshall[180] adds nothing by way of description but has a good photograph of the raft, showing the apical drops, and an outline drawing of the egg (Fig. 1e). He notes the resemblance to the egg of *Mansonia* (*Coquillettidia*) *richiardii*, citing as the main difference the larger chorionic papillae of the latter. It is this, I feel sure, which is responsible for the looser attachment of these eggs in the raft. Whatever may be the unexplained mechanism by which such eggs are held together I feel convinced that the firm adherence of the eggs of *C. annulata* and *C. pipiens* is dependent on the enormous surface presented by the minute and extremely numerous chorionic papillae (Fig. 1c). A similar effect is noticeable in *Armigeres* subgenus *Leicesteria*[222,238]. In *M. richiardii* a similar result is achieved, though less effectively, by secondary sculpturing of the papillae themselves. An additional very interesting difference between *Culiseta* s. str. and *Coquillettidia* is suggested by the observation by Newkirk[229] that the area at the anterior end, surrounded by the frill, is covered by outer chorion in *M.* (*Coq.*) *perturbans*.

C. bergrothi (Edwards). No description of the eggs is available and I have seen no material. Maslov [287] gives the number of eggs per raft as 54-341 with a mean of 172.9.

C. impatiens (Walker). Howard, Dyar & Knab[226] note that the eggs are laid in large boat-shaped masses, floating on the water, by females emerging from hibernation. They hatch within a few days of being laid. Frohne[285] considers, however, that these remarks may have been based on misidentified eggs of *C. alaskaensis*. According to his observations rafts of *C. impatiens* are generally flat-bottomed, the individual eggs adhering only near the anterior end, and rectangular or sub-linear. It is only occasionally that the eggs adhere for about half their length so that the rafts are round-bottomed and oval or triangular.[284] The rafts are formed by deposition of the eggs between the hind tarsi in successive transverse rows. In the one case in which oviposition was observed in detail in the laboratory they were laid in about 15 rows of 3-5 (mostly 4) eggs each. The number per raft varied from 26 to 182 but was usually less than 100. (This contradicts his statement, elsewhere, that they are laid in "rafts of 100 or more"[288]). The individual eggs differ from those of C. *alaskaensis* in being less strongly curved, smaller (less than 1 mm. long) and ornamented with a pale brown central band between two dark brown terminal ones. The chorionic reticulation and columellae are similar. The anterior tip is said to be black which would suggest to me that the outer chorion is lacking at this point. The columellae are hydrofuge and usually somewhat pruinose but eggs from fragmented rafts lost their powdery appearance and usually sank. Hatching is generally explosive, occasionally gradual, the chorion being perforated by the egg tooth above (i.e., I presume, posterior to) the frill. The eggs are laid by the females, after emergence from hibernation, followed by engorgement, in various semi-permanent collections of ground water, both natural and artificial, either along the open edges or under overhanging vegetation. Polluted water appears to be preferred. Hatching normally takes place 3-5 days after deposition but can be delayed at least a week by near freezing temperatures. Chilling for 2 weeks kills the eggs. This is an abundant species and late in the season hatched rafts are typical objects among the flotage.

C. *incidens* (Thomson). Howard et al.[226] describe the eggs as laid in large boat-shaped rafts, floating on the water, usually at the margin where they are drawn by capillary action, and hatching a few days after deposition, the interval depending on the temperature. The rafts are formed between the hind tarsi, the eggs emerging narrow end first and being ejected upwards so that each takes its place beside the one previously laid. The tip of the abdomen is then moved slightly to one side ready for the next egg. The first egg is deposited alone. This is followed by a row of two, then three, after which the rows are irregular, each with 4-6 eggs. In the example seen the raft narrowed after the 22nd row and was finally rounded off with 3 eggs. The completed raft contained 275 eggs and was formed in two minutes. Darkening took 1 3/4 hours. Hatching took place about two days after laying. Hubert[289] also watched egg laying in progress and confirms that the pointed end of the raft is formed first.

C. *indica* (Edwards). Maslov[287] treats this as a subspecies of C. *alaskaensis*. He gives the number of eggs per raft as 98-277 with a mean of 175.

C. *inornata* (Williston). Howard et al.[266] describe the rafts as large and boat-shaped, found, usually, at the edge of pools to which they are drawn by capillary attraction. The same authors[225] include figures of the egg and egg-raft redrawn by Mitchell from her book [200]. In the latter the species is figured as "*Culex consobrinus*." She notes that eggs are laid after 3-4 bloodmeals, usually only one batch but sometimes up to six. Eggs placed on blotting paper shrivel but swell again on immersion. If dried for more than a few hours they fail to hatch. When separated they sink but will still come to maturity. If placed in formalin while still white they fail to darken. Hatching takes place 1-10 days later, 3 days at 70°F., 8 days at 52°F. Owen[290] obtained 1-8 successive egg batches from laboratory reared females, with a mean of 5. Females reared from larvae and pupae collected in the field averaged 3.5 successive ovipositions with a maximum of 5. With one exception the largest number of eggs was always laid in the first raft, subsequent rafts being progressively smaller. The average number of eggs in the first raft was 207 and in the last raft 99. The 14 females recorded produced an average of 700.79 eggs each. One female produced 1100. Three females produced autogenous rafts with a maximum of 15 eggs. Proportions of eggs with dead embryos and of sterile eggs varied widely. Sterile eggs were often small, misshapen and pale in colour. Wilkins & Breland[291] obtained larvae by flooding dry tree-hole debris in Texas. This was felt to suggest the possibility of aestivation in the egg stage in the southern part of the range. Buxton & Breland[292] investigated the matter further and found that eggs would survive in the absence of free water for 96 hours if covered with moist leaves. Eggs kept at -8°C. remained viable for 24 hours but larvae emerging from eggs kept at this temperature for 48 hours died shortly after hatching. Thompson[293], working in Nebraska, found eggs in nature shortly after ice free water became available for oviposition. It appeared certain that these were laid by over-wintering females. McLintock[294] found that eggs could be stored at 4-5°C. if first allowed to darken for 2-3 hours at 20-21°C. Under these conditions hatching was delayed for about 21 days. At 20-21°C. hatching took place after 7 days. Eggs were successfully obtained in the laboratory on a meal of defibrinated, heparinized, oxalated or citrated blood provided this was diluted with at least one part in six of 10% sucrose. There is a PhD thesis by this author giving details of the egg and egg raft[295] but I have not seen this. Nor have I seen the thesis by Larsen[296] on pre-larval development. Newkirk[229] obtained oviposition exclusively on water even when wet sand was provided as an alternative.

C. *subochrea* (Edwards). Shute[297] says that the eggs are indistinguishable from those of C. *annulata*. Marshall[180] has an outline sketch of the egg (Fig. 2b) and records the laying of autogenous eggs in the laboratory. Maslov[287] treats this as a subspecies of C. *annulata* and gives the number of eggs per raft as 22-256 with a mean of 114.8.

Subgenus *Culicella* Felt

C. *atra* (Lee). The eggs are unknown but Dobrotworsky[298] speculates that "... like those of C. *inconspicua*, they are laid in the form of rafts on the water surface and cannot withstand desiccation." He notes that "as far as is known no Australian species of *Culiseta* lay drought resistant eggs".

C. *dyari* Coquillett. Maslov[287] treats this as a subspecies of C. *morsitans* following a suggestion by Barr[299] that the Old and New World populations of the latter might be biologically distinct. Wallis & Whitman[300] supported Barr's suggestion when they found that C. *dyari* lays its eggs in rafts. For reasons given below, however, it seems to me very doubtful that the Old World form (C. *morsitans* s. str.) really differs in this respect. Wallis & Whitman obtained 9 egg masses in the laboratory, deposited 1 1/2 - 2 inches above the water line. The average number of eggs per mass was 197. From their photograph the eggs appear to be sharply pointed posteriorly (Fig. 2c), recalling in this respect the eggs of some *Culex* spp. which deposit them above the water line[127]. A drawing by Marshall[180] suggests that British C. *morsitans* eggs are similar and this is confirmed below. Wallis & Whitman's eggs, though embryonated, failed to hatch, possibly suggesting an egg diapause. Howard et al.[226] suggested that the winter was passed in the egg and Price[301] also favoured this assumption. British C. *morsitans* are well known to overwinter as larvae[180] and I can confirm this myself. The larval diapause is a rigid one which remains unbroken when the larvae are brought inside. As against this Callot & Van Ty[302] found first stage larvae in February after a period of drought and this would seem strongly suggestive of hibernation in the egg. Martini[303] has a similar argument based on finding older larvae during the winter and younger larvae early the following year. Observations both by Wallis & Whitman and by Price seem to rule out overwintering by adults (*pace* Sommerman[304]) but it seems possible that both forms of C. *morsitans* may overwinter either in the egg or as larvae depending on conditions. Dimorphism of this kind is known to occur in *Aedes triseriatus*[305].

C. *fumipennis* (Stephens). Marshall[180] has an outline drawing of the egg (Fig. 2e). He notes that "Evidence provided both by larval records and by field observations indicates that eggs of this species ..... are laid either in dried-up hollows, or above the water level in partly-filled ones." He does not say what the evidence is but it is clearly of an indirect kind and not such as would distinguish between eggs laid singly and those laid above the water line but in a coherent mass as in C. *m. dyari*. His figures show the individual egg as much less sharply pointed than in C. *morsitans* but this is not borne out by the eggs available to me (Fig. 2f). These are mounted on two slides, one with 4 closely adherent eggs, the other with a group of 4 and another of 2 closely adherent eggs and 3 scattered eggs. Both have identical data, "P. G. Shute, 1920", and have very much the appearance of having been derived from a single disrupted egg mass. The outer chorion is covered with small papillae, larger towards the anterior end with a group of 3 or 4 large papillae at the extreme apex which if fused would recall the apical cup of *Aedes*. The extreme posterior tip bears a sharply pointed spicule. The papillae on the general surface are much larger than those of C. *annulata* (Fig. 2g).

C. *inconspicua* (Lee). Dobrotworsky[306] has a figure of the egg showing the chorionic ornamentation (Fig. 3a). The eggs are described as "deposited in rafts, which are rounded or oval in shape with raised margins, and look like a basket." The rafts are said to contain up to 217 eggs and exceed 4 mm. x 2 mm. The eggs are described as black, thick at one end, tapering to the other and 0.9 - 1.0 mm. long with index of about 4.0. The same author[76] has outline drawings of the egg and a photograph of the raft (Fig. 3b). It is evident from both that the eggs are much less sharply pointed than in C. *morsitans* or C. *fumipennis* as would be expected from the situation in which they are deposited.

C. *litorea* (Shute). Service[87] recovered eggs of this species or C. *morsitans* from leaf litter, soil or a mixture of both. Apart from this no information is available.

C. *morsitans* (Theobald). The suggestion by Barr[299] that the North American and European forms of this species might be biologically distinct was noted above under C. *dyari*. This suggestion is accompanied by a summary of statements by Marshall[180] regarding the biology of British C. *morsitans*. In it Marshall is misquoted as saying that "The eggs are laid singly in dried-up hollows or above the water level of partly filled ones....". What he in fact says is that".... the females deposit their eggs either in dried-up hollows or above the water-level of partly filled ones.". He makes no mention of the eggs being laid singly. Elsewhere in his book (p. 33) he describes the eggs as laid "separately" and the choice of this word is probably deliberate. In his main account of the biology of the species he quotes the observation by Wesenberg-Lund[307] that in the laboratory some eggs were laid singly and others in small batches. So far as I can ascertain eggs of this species have never been observed in nature though they may have been recovered by a mass collecting technique by Service[87]. (See under C. *litorea*). The only other evidence is provided by James[308], also on the basis of laboratory observations. In this case the eggs were laid singly but the conditions do not seem to have been such as would reflect those prevailing in nature. (One female was in captivity for 74 days before laying any eggs). Shute[309] states that the eggs are laid singly but he quotes James in support and tells me he has never found eggs in nature. Elsewhere[297] he gives details of seasonal distribution of eggs but it seems these are based on the flooding of dried pools or immersion of leaves and soil from the bottom of them rather than on direct observation of the eggs themselves[308]. Statements by James and Shute, repeated by Marshall, to the effect that the eggs can withstand long periods of drying are based on similar evidence. I suspect that we may be dealing with unusual powers of aestivation on the part of the gravid females rather than on any particular drought resistance in the eggs. (See the observation by James just quoted). It is true, however, that, as already noted, the eggs of Culicella are distinctly more aedine than those of Culiseta s. str. and this may reflect some enhancement of drought resistance. In this connection it would be very interesting to see eggs of the only known specialized tree hole breeder in the genus (C. *fraseri* (Edwards)). A propos of the observations of tree hole breeding in C. *inornata*, noted under that species, it is interesting that C. *morsitans* has also been found breeding in a tree hole[310].

The only eggs available to me for description are four obtained by James in the laboratory (Fig. 3c). Two of them are strongly curved, suggesting that they are aberrant eggs, but this may be an artifact resulting from their being mounted before hardening. They were mounted in an aqueous medium which has long since hardened and cracked. The outer chorion mostly became detached during remounting, making it possible to observe some details not clearly visible in the case of C. *fumipennis*. The ornamentation in both cases is very similar, the chorionic papillae being much the same size. The small, sharply pointed spicule at the extreme posterior tip is clearly seen to be an unsclerotized projection of the inner chorion. The outer chorion of the anterior end is incomplete but two or three enlarged papillae, similar to those found in C. *fumipennis*, can be seen and it appears that these are associated with a circular area of exposed inner chorion, though without the outer chorionic frill found in C. *annulata* (Fig. 3c).

C. *silvestris* (Shingarev). No description of the eggs is available. Val'kh[311] gives the number of eggs per batch as 47-201.

C. *victoriensis* (Dobrotworsky). Dobrotworsky[306] describes the eggs as similar to those of C. *hilli* but with more pointed ends. He gives the length as 0.8 mm. and the length/breadth index as 2.8-3.2. His figure shows the chorionic ornamentation as reticular and the anterior end provided with a small cup or frill arising obliquely immediately to one side of the mid point (Fig. 3d). Elsewhere[76] he has a photograph which clearly shows the reticular ornamentation but in which the apical cup cannot be seen unless indistinctly in one egg (Fig. 3e). The eggs are said to have been laid singly, on soil, in the laboratory. Open water was provided as an alternative substrate (Dobrotworsky, in litt.). Maslov[312] transferred this species to *Neotheobaldia*. His suggestion has not been followed in the World Catalog but in view of the marked difference between its eggs and those so far described for *Culicella* it might be worth bearing in mind.

Subgenus *Climacura* Howard, Dyar & Knab

C. *antipodea* Dobrotworsky. Dobrotworsky[313] records an egg raft, from a teatree swamp, with 102 eggs. Elsewhere[76] he notes that the rafts are laid on the water surface and gives a drawing of the individual egg (Fig. 4a).

C. *marchettei* Garcia, Jeffery & Rudnick. The original authors[314] describe the egg as "about 0.6 mm long and 0.12 mm wide at midpoint, elongate oval with posterior end narrower, gray with dark posterior end, deposited in raspberry-shaped clusters of up to 149 eggs. The eggs were obtained in the laboratory from wild-caught, gravid females, usually 1-3 days after capture. Hatching took place after about 5 days. Dobrotworsky[315] merely summarises their description of the egg.

C. *melanura* (Coquillett). Dyar[316] describes the eggs as "laid singly, floating on the surface of the water". Howard, Dyar & Knab[226] add that "Dr. Dyar found them in a pail of water that he had dipped from a spring-pool and carried to the house. On examining the water, after it had been carried home, two small whitish-gray specks were noticed, floating separately upon the surface. These proved to be the eggs of this species, and afterwards hatched, one of them developing into an adult. It does not seem probable that there could have been a mass of eggs which had been broken up by dipping in the water." It is evident from the description of the colour that the eggs were freshly laid. Felt[317], quoting Dyar, subsequently described them as black and they may be presumed to have darkened in the usual way. My guess would be that the mother was disturbed by Dyar while ovipositing and flew away thus contributing yet another source of legends as to single egg laying in this genus. Wallis[318] obtained a raft in the laboratory from which about 100 larvae emerged. Photographs of the egg and raft by Chamberlain et al.[319] include a lateral view of the raft showing the same raspberry-like appearance as described for C. *marchettei* (Fig. 4b,c). The rafts are described as 2.0-2.5 mm. in diameter and bowlshaped. Some were perfectly round, others oval with one side incomplete. The bottom of the rafts was strongly rounded so that only centrally located eggs were in contact with the water. Each raft contained about 100 eggs. Two average sized rafts contained 85 and 102 respectively. Individual eggs were about 0.84 mm. long with greatest breadth 0.22 mm. Some eggs collapsed, probably because they were infertile. A white spot at the tip of many of the eggs in their photographs may represent an apical droplet but there is no mention of this. Nor can the chorionic ornamentation be discerned. These eggs failed to hatch. Siverly & Schoof[320] give the duration of the egg stage as 2 days.

C. *tonnoiri* (Edwards). Pillai[321] obtained eggs in the laboratory but gives no description.

Subgenus *Allotheobaldia* Brolemann

C. *longiareolata* (Macquart). Christophers[11], after describing the egg raft of C. *annulata*, goes on to say that "The other subgenus in *Theobaldia* as at present constituted, viz., *Allotheobaldia*...does not lay eggs in raft form." I think this is clearly a *lapsus* for *Culicella*. The statement is, in any case, incorrect. The eggs of the present species are laid in rafts several of which were kindly sent to me by Dr. Mario Coluzzi who collected them in the Cittá Universitaria in Rome. Neither the egg nor the raft has previously been described. The only information hitherto available has been the statement by Maslov[287] that the numbers of eggs in 33 batches varied from 34 to 291 with a mean of 157.5. The rafts sent by Dr. Coluzzi vary in shape from roughly hexagonal to pyriform (Fig. 4d). The former are possibly incomplete. A few eggs became detached in transit though not enough to prevent the number of eggs per raft being estimated in round numbers (100-190 with a mean of 150 for 5 rafts). The rafts (Fig. 4d) are quite deeply concave though not sufficiently so to prevent the anterior ends of the outermost eggs from touching the water. The individual eggs (Fig. 4e) are strongly tapered but with the posterior end smoothly rounded rather than sharply pointed. Unhatched eggs are pale in colour except at the extreme anterior and posterior ends which are blackish. The posterior end bears an apical drop. The anterior end is relatively flat and devoid of outer chorion, the exposed area of inner chorion being delimited by an extremely delicate frill, much as described for C. *annulata*, visible only in unhatched eggs and fragmentary, at best, in most of those available.

Hatching is by apical dehiscence at the level of, or just posterior to, the frill, giving rise to a shallow apical cap, nearly always incompletely detached and with a small piece of outer chorion adhering to it. The edges of the cap fold inwards as described under *C. annulata*. The outer chorion is entirely covered with minute papillae similar to thoseof *C. annulata* but slightly larger, much smaller than in *C. morsitans* or *fumipennis*. These are arranged in elongated hexagonal patches, very narrowly separated, clearly visible only towards the anterior end tending to coalesce towards the posterior. At the posterior tip the outer chorion is pierced by a small projection of inner chorion, as in *C. annulata* but shallower, only slightly raised above the general surface. This serves, no doubt, for the attachment of the apical drop.

Subgenus *Neotheobaldia* Dobrotworsky

C. frenchii (Theobald). Dobrotworsky[76,306] has drawings of the egg (Fig. 4f). He describes it as similar to that of *C. hilli*, about 0.7 mm. long with an index of 3.4-3.5. The eggs were laid singly, in the laboratory, above the water level.

C. hilli (Edwards). Dobrotworsky[306] has a drawing of the egg (Fig. 4g). He describes it as "elongate-oval, silvery in colour with a black base and a short transparent stem.... about 0.88 mm. long with an index of about 4.3". In his book[76] he says that the eggs were laid singly above the water level in the laboratory. He has kindly told me in litt., that the "stem" in this species, *C. frenchii* and *C. victoriensis* is a more or less solid structure resembling the apical cup of *Aedes* rather than the *Culex* corolla and serving to attach the apex of the egg to the substrate. Hatching must clearly present some problems as in certain *Neoculex*[127].

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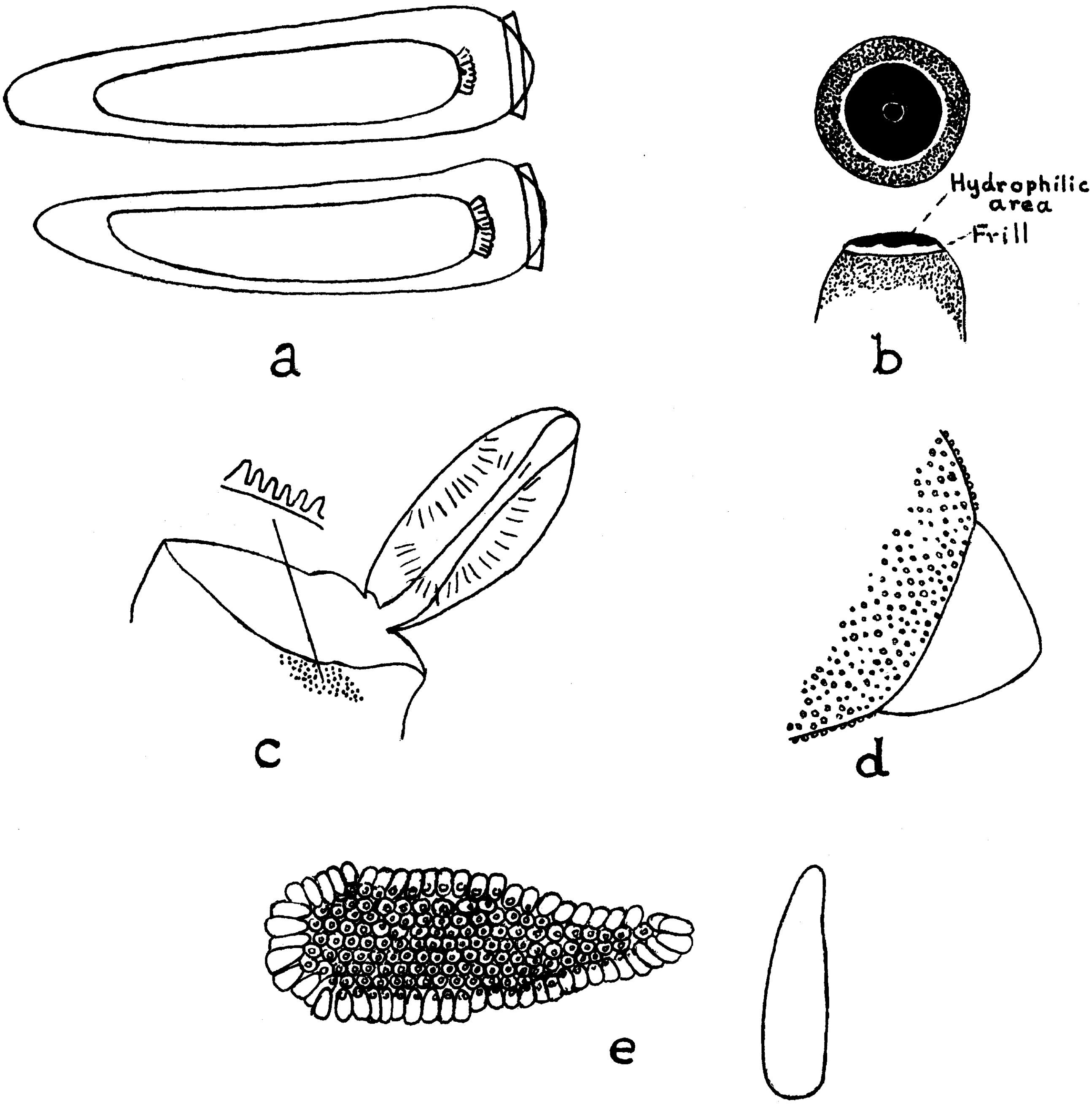

Fig. 1. Eggs of *Culiseta annulata*. a. Side view (bottom) and ventral view (top) with eggs of *Culex pipiens* superimposed (after Bresslau), b. Anterior pole (after Christophers), c. Apex of hatched egg (original), d. Posterior pole (original), e. Raft and individual egg (after Marshall).

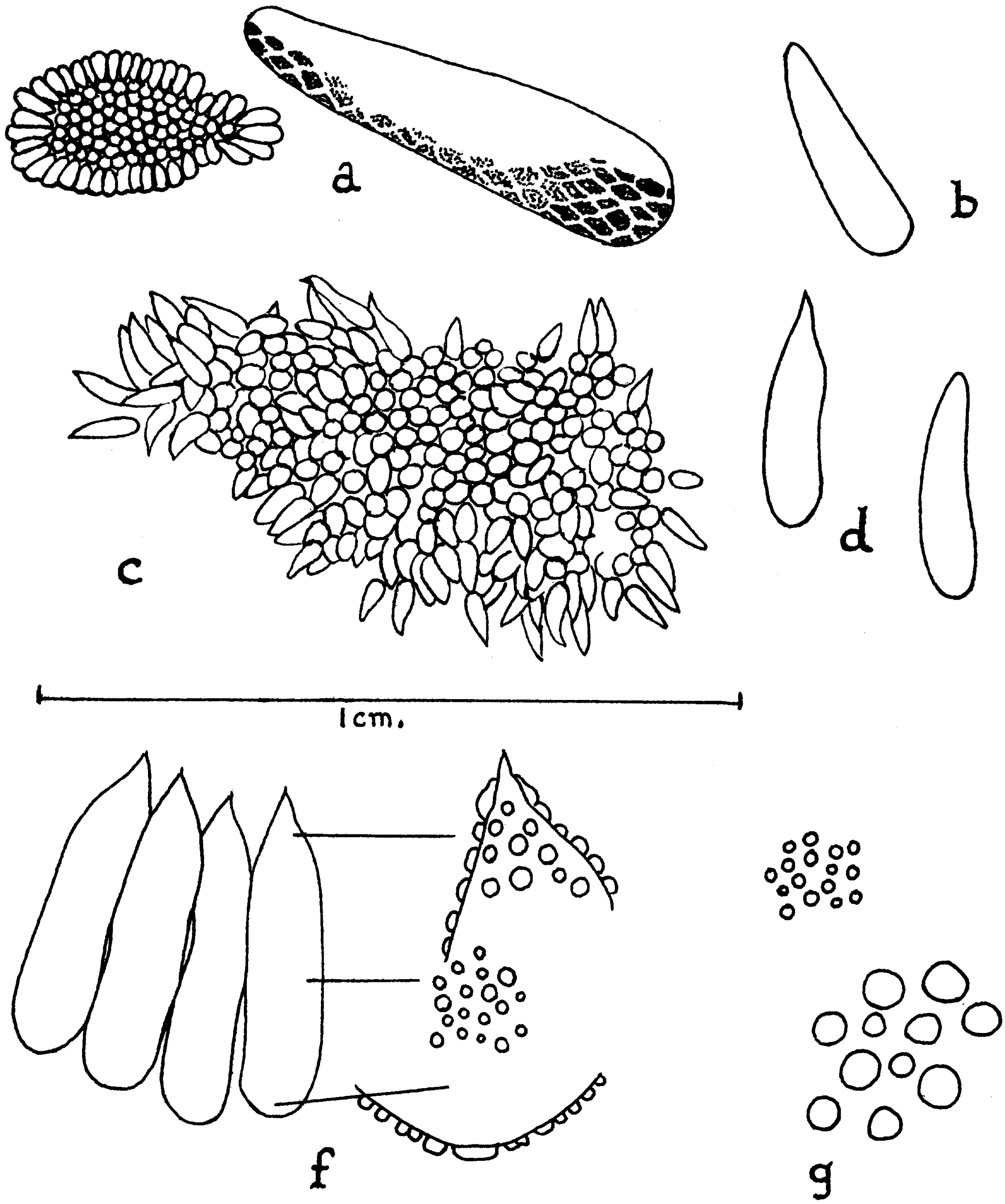

Fig. 2. a. Egg and raft of C. *inornata* (after Mitchell), b. Egg of C. *subochrea* (after Marshall), c. Egg mass of C. *morsitans dyari* (after Wallis & Whitman), d. Egg of C. *morsitans* (after Marshall), e. Egg of C. *fumipennis* (after Marshall), f. Eggs of C. *fumipennis* (original), g. Chorionic papillae of C. *annulata* (above) and C. *fumipennis* (below) to same scale for comparison.

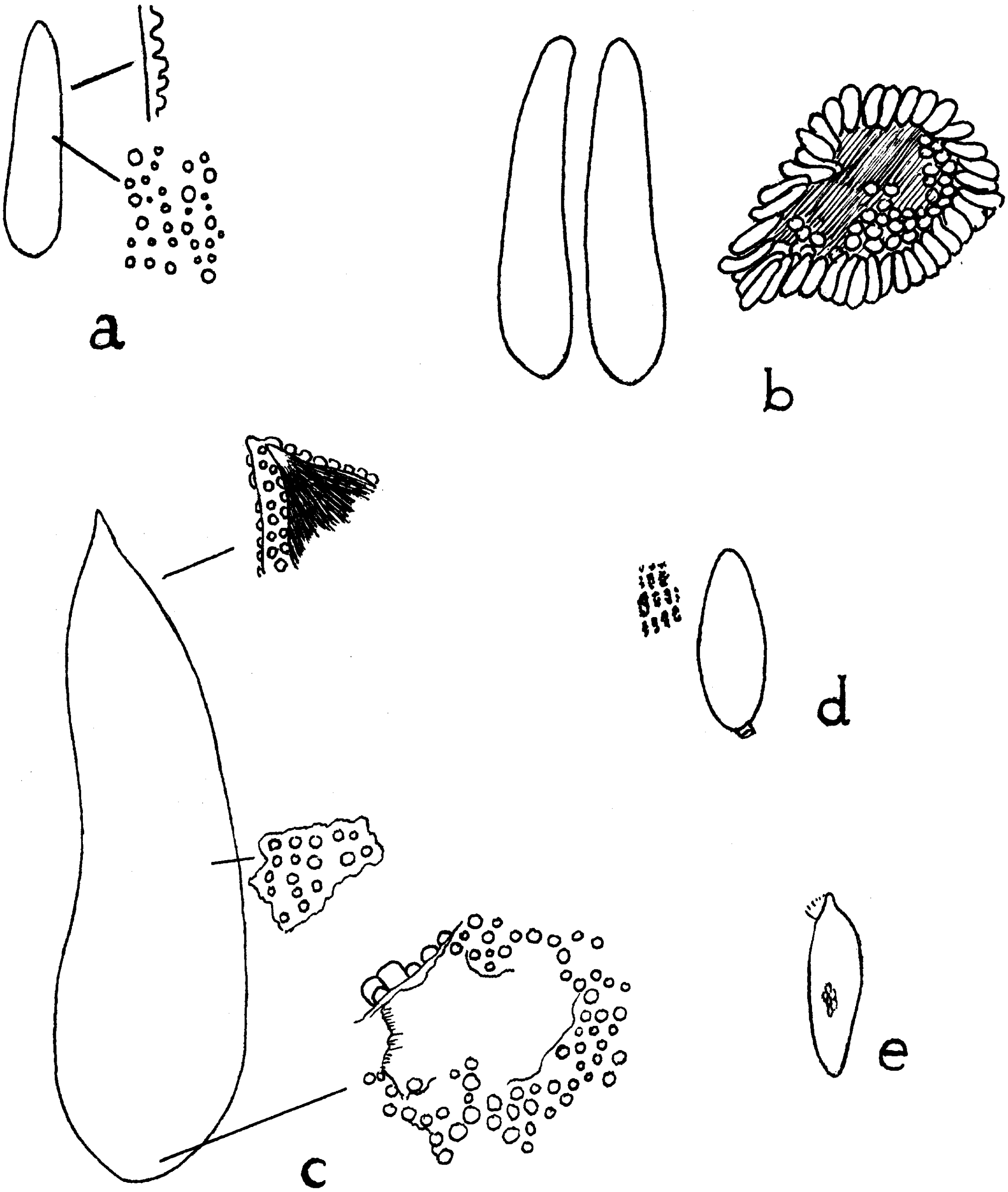

Fig. 3. Eggs of subgenus *Culicella*. a. *C. inconspicua* (after Dobrotworsky[306]), b. The same (after Dobrotworsky[76]), c. *C. morsitans*, with fragments of detached outer chorion (original), d. *C. victoriensis* (after Dobrotworsky[306]), e. The same (after Dobrotworsky[76]).

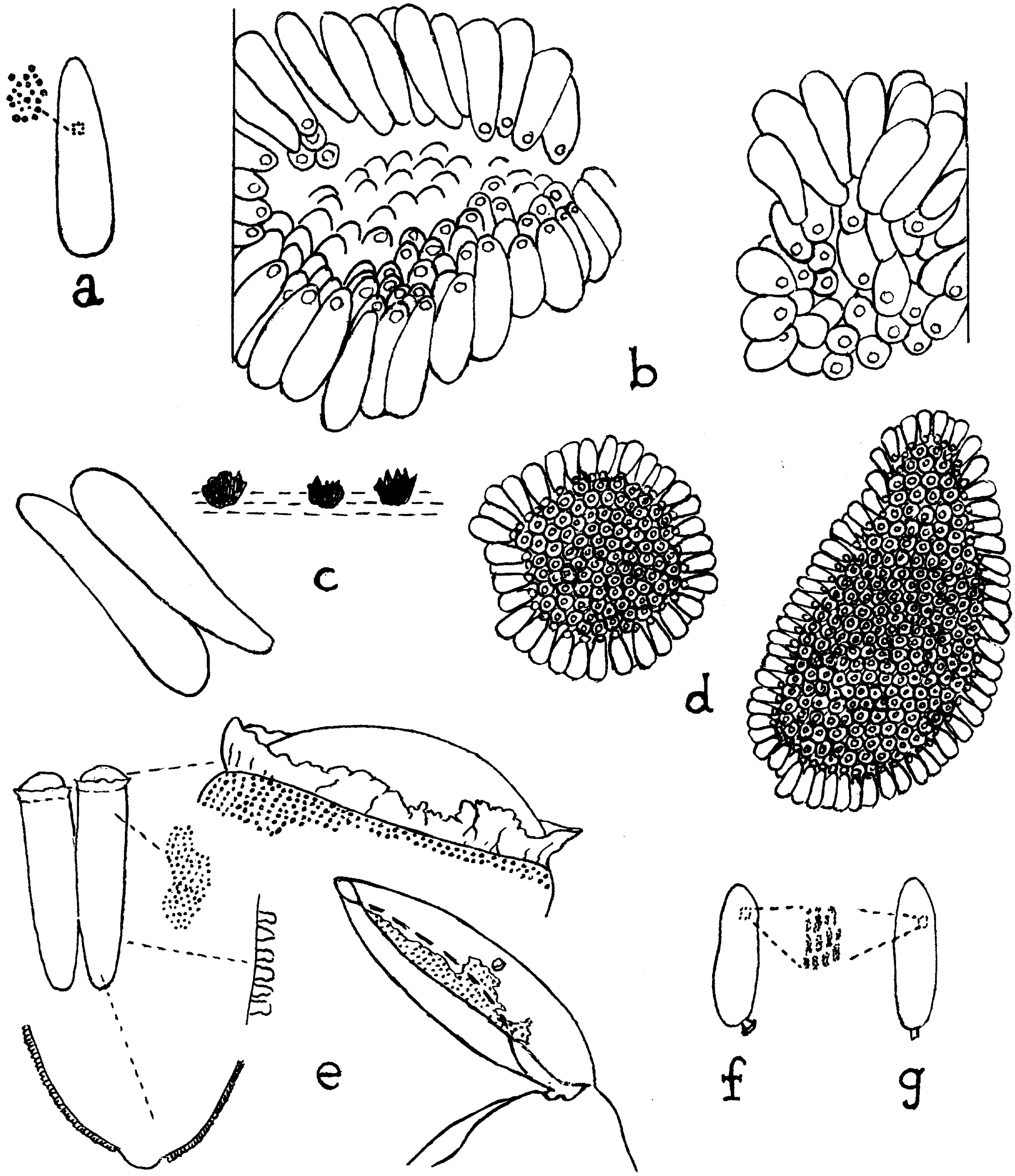

Fig. 4. a. Egg of C. *antipodea* (after Dobrotworsky[313]), b,c. Eggs and rafts of C. *melanura* (after Chamberlain *et al.*), b. Rafts in plane view, c. Individual eggs, and rafts in lateral view, d,e, C. *longiareolata* (original), d. Rafts, e. Unhatched eggs and cap of hatched egg, f. C. *frenchii*, g. C. *hilli* (both after Dobrotworsky[306]).