Mosquito Eggs XXVI

Further Descriptions of Sabethine Eggs

by

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Genus *Tripteroides* Giles

Tr. (Tripteroides) bambusa (Yamada)

The following description is based on eggs, and some very fine electron-scan photographs, kindly sent me by Mr. Ichiro Miyagi. These are from a colony based on material collected in Nagasaki Prefecture, Japan. Miyagi[337] gives a description of the oviposition behaviour but no description of the eggs. Oviposition was observed to take place mainly on the wing while hovering over a dark coloured container partly filled with water. This was preferred to wet filter paper. Some females projected the eggs while resting on the walls of the container and a very few laid them while resting on the surface of the water. It is interesting to compare this behaviour with that of *Sabethes chloropterus*[80] which also oviposits on the wing but in which the detailed behaviour is modified to permit projection of the eggs into tree holes with very small apertures. In the present species the principal oviposition sites are cut bamboo stumps[338]. As noted in my previous paper on sabethine eggs[97] the oviposition behaviour is also strikingly reminiscent of *Toxorhynchites*.

Oviposition was found to take place 5-7 days after feeding on an anaesthetized mouse and hatching 4-5 days later. Individual females produced an average 150 eggs. Some resistance to desiccation was observed at reduced temperatures and this is being further investigated. Miyagi informs me, in litt., that the eggs can withstand desiccation for 2-3 months in winter but the majority are dead after 3 weeks desiccation in summer.

Viewed from above the eggs appear symmetrically diamond shaped but when viewed obliquely or from the side they are seen to have one surface more strongly curved than the other (Fig. 1a'). None of the eggs are embryonated and I am unable to say which is the upper and which the lower surface. The outer chorion is thin, very fragile and strongly adherent. The inner chorion is dark brown, almost black by reflected light, and strongly sclerotized. When detached fragments are viewed by transmitted light it is seen that the surface is covered, in whole or in part, with a delicate hexagonal reticulum. The outer chorion is covered with transparent raised papillae so that, when viewed by transmitted light, the egg as a whole appears to have quite a broad refringent border (Fig. 1a').

The individual papillae are of two orders of size, the larger forming a hexagonal reticulum in the meshes of which groups of smaller papillae are enclosed (Fig. 1a"). The apex of the egg is provided with a small but conspicuous micropylar cup (Figs. 1a' and 1a''') and this in combination with the chorionic papillae gives the egg a distinctly aedine appearance. The resemblance is, however, quite superficial, particularly as regards the papillae. When detached and seen in lateral view they appear mushroom-shaped with slender stem and expanded "cap" (Fig. 1a"). I have seen no papillae of this kind at all in *Aedes* and, indeed, the only chorionic papillae known to me which in any way resemble them are found in *Anopheles nili*[31,183]. The apical cup also seems to me less like that of *Aedes* and more like a greatly reduced corolla such as is found in *Culex, Culiseta* and some anophelines.

Yamada[339] has a figure of the egg and gives a brief description kindly translated for me by Mr. Jun Akiyama. He stresses the air-retaining function of the chorionic papillae. In my preserved eggs the "caps" of the papillae are much shrunken compared to those seen in the electronscan photographs, indicating that they are hollow and thin walled. It does not seem that they themselves contain air though they may well contribute to the formation of a plastron as in some culicine and anopheline mosquitoes[1,2] and, among sabethines, *Wyeomyia smithii*[75,97] where, however, this function is served by quite a different type of ornamentation. That this is so is indicated by the fact that Miyagi[337] found the eggs to accumulate, under the influence of surface tension, in large numbers at the edges of the oviposition vessel. Under natural conditions this would clearly involve a risk of stranding.

Moriya et al. [340] give a brief description of the egg with an outline drawing and an electronscan photograph which is interesting to compare with Miyagi's. However, none of the electronscan photographs show the true shape of the papillae which must be detached before this can be appreciated. Each papilla exhibits a number of thickenings at the base of the "stem" having the general appearance of rootlets and when each is detached it brings with it a small piece of unmodified outer chorion (Fig. 1a'').

Tr. (Rachionotomyia) caledonicus (Edwards)

Iyengar[341] gives a brief description and figure of the egg. He describes it as ashen-grey and about 470-520 μ long by 155-170 μ wide. The micropyle (equivalent, presumably to my 'apical cup' which surrounds the micropyle proper) is described as well developed, flat and circular. The outer chorion has small sub-globular raised markings arranged usually in about 18 longitudinal rows. Dehiscence is apical, separation of the cap occurring at about one-fifth of the distance from apex to posterior end (Fig. 1b). The eggs were collected in New Caledonia where *T. caledonicus* is said to breed exclusively in *Nepenthes* pitchers.

Tr. (Rachionotomyia) melanesiensis Belkin

Iyengar[341] describes the eggs of this species as charcoal-grey to black and 480-500 μ long by 230-240 μ wide at the widest point. The "micropyle" (= ? apical cup) is described as inconspicuous. The outer chorion has irregular polygonal raised patches separated by narrow, shallow depressions. Dehiscence is said to take place at about one-third of the distance from the anterior end of the egg (Fig. 1c). The eggs came from adults ovipositing in artificial containers.

Iyengar notes that elongate, ovoid eggs such as those of *Tr. caledonicus* are also found in two other nepenthicolous species in the Philippines[83,97]. In contrast to this, fusiform or domed eggs, such as those of *Tr. melanesiensis*, are characteristic of species breeding in other situations (*Tr. atripes* in tree holes and water tanks[76,97], *Tr. tasmaniensis* in tree holes, artificial containers and rock pools[76,97] and the related *Marigoeldia argyropa* breeding in tree holes, artificial containers and an occasional residual pool[85,97,342]). It will be seen that *Tr. bambusa* falls into the latter category with respect both to its egg shape and its breeding places. Bancroft[343] describes the eggs of *Tr. (Rachio.) punctolateralis* as laid "in a long narrow raft, jet black in colour and very like that of *Culex tigripes*". This species breeds in water butts, tanks and rot holes in fallen logs[344]. It is the only sabethine in which true raft formation has so far been recorded.

Tr. (Rachisoura) bisquamatus Lee

This is the only *Rachisoura* for which the eggs have so far been described. Van den Assem[345] describes them as relatively large, spherical bodies with one pole distinctly more pointed than the other. They are laid separately, may either float or sink and take about 24 hours to hatch. Eggs were found only in pitchers which had recently opened. Attempts to secure oviposition in plastic vials hung between the pitcher plant leaves and filled with fluid from the pitchers failed. It is interesting that, from the description, these eggs would appear to resemble those of the non-pitcher-breeding, rather than the pitcher breeding, *Rachionotomyia*.

Genus *Trichoprosopon* Theobald

Tr. (Trichoprosopon) digitatum (Rondani)

Eggs of this species were described and figured by Goeldi[10] (as *Megarhinus separatus)*, Pawan[77] (as *Psorophora posticata)*, Pawan[78] (as *Joblotia digitata)* and Aitken et al.[79] Their descriptions were summarised in my previous paper[97]. All these authors have photographs which are excellent for general features but inadequate to reveal detailed ornamentation. Thanks to Dr. Zavortink, who kindly sent me two batches of eggs, I am now able to describe the ornamentation in detail. The following description is based on a partly hatched egg mass from a cut bamboo at Loz Rioz, Valencia, Ecuador and some hatched eggs from a *Heliconia* bract at Rancho Grande, Aragua, Venezuela. I have also included the egg mass from Trinidad, collected by Dickson in 1913 at Cocorite, which was mentioned in my previous paper and which I have now remounted.

The individual eggs (Fig. 2a) have the anterior end bent sharply downwards in a ventral direction (as shown by the position of the larval mouthbrushes in eggs on point of hatch). Adjacent eggs are attached to one another by a conspicuous patch of "glue" located in one of three narrow embrasures in the posterior outer chorionic "cap". The edges of these embrasures are fringed with numerous fine filaments, not mentioned by previous authors, and the "glue" also appears to be secreted in filaments (Fig. 2a). The posterior "cap" is ornamented with very large papillae, on a background of micro-papillae which are subspherical, with at most a short, broad stem, at and around the posterior pole but more anteriorly become greatly elongated. Goeldi figures these elongated papillae as cylindrical and described them as perforated at the tip. In lateral view, however, they are seen to be flattened and I was unable to detect any perforation. It might be desirable to check this with fresh material in view of the possible hydrostatic function suggested by Goeldi.

The macro-papillate posterior "cap" terminates in a well marked boundary at about two-thirds of the distance from the posterior pole. Beyond this the anterior one-third is not, as I had previously supposed, devoid of outer chorion. Instead it is covered with delicate chorion provided exclusively with micro-papillae which are smaller and more feebly developed than their counterparts on the posterior "cap". The boundary of the "cap" is marked by a line of modified papillae from which it becomes partly detached on hatching so that the anterior chorion remains attached to it around part of the circumference only. The general effect is well shown in Pawan's photographs of detached caps (and see Fig. 2a'). For some distance anterior to the boundary the micropapillae are grouped in a reticular pattern (fig. 2a'') but at about four-fifths of the distance from the posterior pole this appearance is lost and a second, much less conspicuous boundary occurs. Anterior to this the papillae become even smaller and more feebly developed and by the time the anterior pole is reached they are either absent or undetectable.

The micropylar apparatus is confined to a small sclerotized disc with a well marked central perforation. There is no micropylar cup or corolla.

Tr. (Isotomyia) espini (Martini)

Dr. Zavortink kindly sent me three eggs of this species, one hatched, the other two unhatched. They were obtained from a female taken biting in an open, marshy area at 17.00 hrs at Zelaya, about two miles south of Bluefields, Nicaragua, by D. Schroeder on 26.xi. 1971. When received they were lightly glued to a piece of paper on which they were presumably deposited in the laboratory. The breeding places of this species are said to be the leaf axils of Araceae and it is interesting that they conform in shape to those of the nepenthicolous *Tripteroides* rather than to Iyengar's second category. In shape they are very long and narrow, recalling the eggs of, e.g., *Aedes woodi* breeding in reeds[346]. When viewed in the horizontal plane they appear bilaterally symmetrical but seem from the side one surface is more strongly curved than the other (Fig. 2b). Much of the surface is covered with very large, minutely sculptured papillae arranged in more or less regular longitudinal rows and alternating, within the rows, with one or more smaller

papillae. Towards the more strongly curved surface the large papillae disappear and only the smaller ones persist while these, in turn, eventually give way to longitudinal lines of minute papillae in detached groups. The anterior end of the egg bears a thin-walled micropylar cup similar to, though differing somewhat in shape from, that seen in *Tripteroides bambusa*. The posterior tip is embraced by a single greatly enlarged papilla more than twice the size of any occurring elsewhere, an unusual feature which I have not seen in any other non-anopheline egg.

Tr. (Trichoprosopon) sp. n.

A hatched egg mass of this species was kindly sent me by Dr. Zavortink who will be describing and naming it. It is closely related to *Tr. digitatum*. The eggs were collected from a plantanillo axil at the Rockefeller Foundation Virus Field Station, Rio Raposo. Valle, Colombia by V. H. Lee on 16.iii. 1965. They are very similar to those of *Tr. digitatum* but differ strikingly in having the anterior one-fifth, or thereabouts, covered, apart from the extreme tip, with a minute but conspicuous thick-walled reticulum with inconspicuous, barely raised papillae in the meshes (Fig. 2c). This is apparently responsible for the fact that in hatched eggs the tip does not open out completely. In *Tr. digitatum*, on the other hand it unfurls completely or almost completely depending on whether or not the longitudinal split passes through the micropyle (Fig. 2d).

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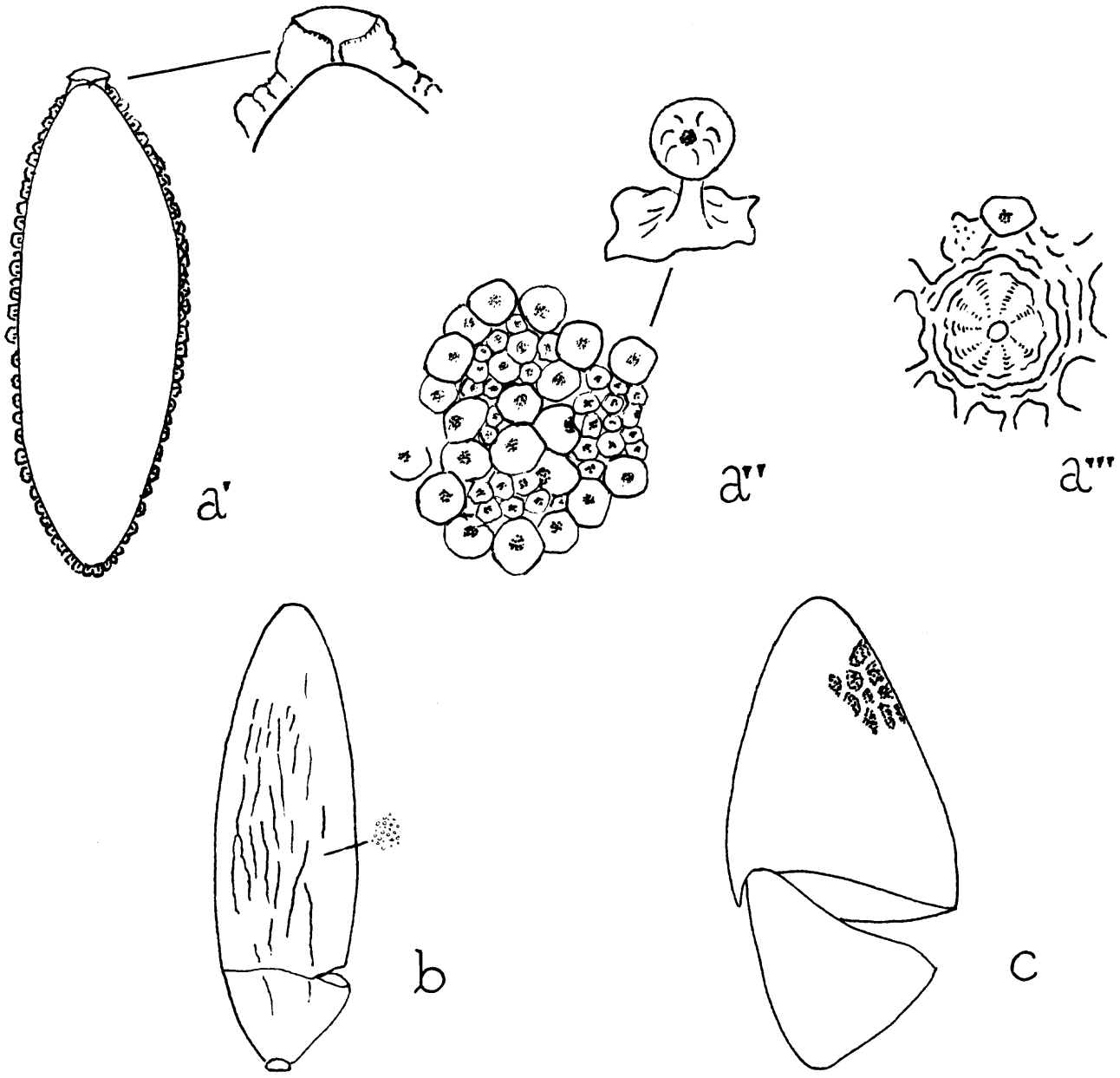

Fig. 1. Eggs of *Tripteroides* spp. a. *Tr. (Tr.) bambusa*, b. *Tr. (Rachionotomyia) caledonicus*, c. *Tr. (R.) melanesiensis*. a'', in part, and a''' from electronscan photographs. For explanation see text.

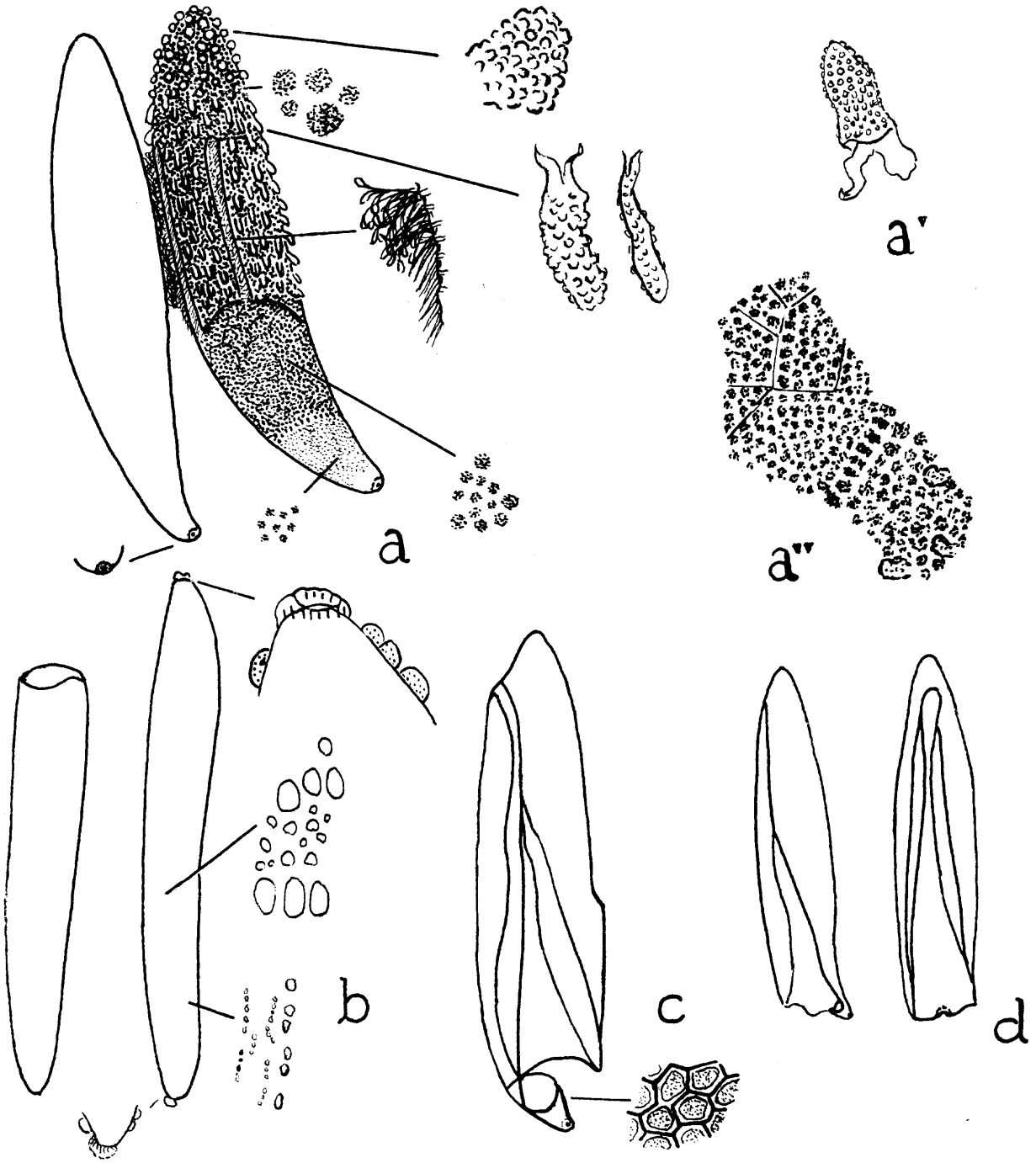

Fig. 2. Eggs of *Trichoprosopon* spp. a. *Tr. digitatum*, a'. Detached chorion (after Pawan), a''. Boundary between chorionic "cap" and anterior chorion, b. *Tr. espini*, c. *Tr. sp. n.*, d. Hatched eggs of *Tr. digitatum* for comparison.