

SCANNING ELECTRON MICROSCOPY OF THE EGGS OF TWO SPECIES OF *ANOPHELES (KERTESZIA)* (DIPTERA: CULICIDAE)

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The eggs of Anopheles cruzii and An. bellator are described and illustrated using scanning electron micrographs. Hatching was observed, and larval exit documented. No morphological differences were found between the eggs of the two species.

Key words: *Anopheles cruzii* – *Anopheles bellator* – *Kerteszia* – Culicidae – egg morphology

There are few descriptions of eggs of species *Anopheles* subgenus *Kerteszia*. Early data are restricted to eggs of *An. cruzii* Dyar and Knab and *An. neivai* Howard, Dyar and Knab based on light microscopy and small drawings (Forattini, 1962; Baerg & Boreham, 1974). Obviously this information has technical limitations.

An. cruzii and *An. bellator* Dyar and Knab are distributed throughout the rain forest ecosystem of southeastern Brazil, where they are considered as vectors, of human malaria. Since the egg stage has not been described in detail for any species of *Kerteszia*, the descriptions here presented are based on examination with the scanning electron microscope.

MATERIAL AND METHODS

Eggs of six individual adult females were obtained in the laboratory. Mosquitoes were collected on human bait in Cananeia County, southeastern São Paulo State, Brazil. Locality data was reported previously (Forattini et al., 1993). Embryonated eggs were chemically fixed, dried, then coated with carbon and gold. After preparation, the eggs of these species retained their natural form under vacuum long enough to yield good microphotographs of the outer layer of the chorion. Examination was performed in a Jeol JSM P-15 scanning electron microscope.

Measurements were made from a sample of 36 eggs randomly chosen from the pool that included the egg batches of each species. Width measurement includes the floats. Terminology follows Harbach & Knight (1980).

RESULTS

The eggs of the two species are boat-shaped in general appearance. In lateral view, the entire egg has a contour straight and slightly concave on the ventral surface and convex on the dorsal one. The size of the eggs of the two species are quite similar, as shown in Table. The float is lateral in position, well developed, long and lines almost all the frill, which is incorporated in to it without apparent interruption. The frill arises as a folded longitudinal extension of the outer chorion that is distinct only at the ends of the egg, so the deck of the ventral surface appears completely enclosed by the floats and the frill. (Figs 1, 2). The hatching larva exits through a crack that is produced and detaches the anterior region (Fig. 3). It was possible to observe the egg burster on the dorsal surface of the larval head (Fig. 4).

The dorsal and lateral surfaces of the egg have chorionic cells mainly hexagonal or pentagonal in shape, with boundaries formed by folds of the outer chorion enclosing small clustered tubercles of different sizes (Figs 5, 6, 7). It is noted that the pattern of cells on the lateral surface is rather different than that found at the ends. The hexagonal shape prevails on the former, while the pentagonal contour is more frequent at the anterior and posterior

TABLE

Dimensions off eggs of *Anopheles cruzii* (n = 36) and *An. bellator* (n = 36)

	Length (µm)		Width (µm) ^a		L/W Ratio	
	$\bar{X} \pm SD$	Range	$\bar{X} \pm SD$	Range	$\bar{X} \pm SD$	Range
<i>An. cruzii</i>	350 ± 9	328 - 376	111 ± 5	102 - 119	3.17 ± .10	2.85 - 3.44
<i>An. bellator</i>	350 ± 10	326 - 367	116 ± 5	106 - 125	3.02 ± .13	2.81 - 3.34

a: including float.

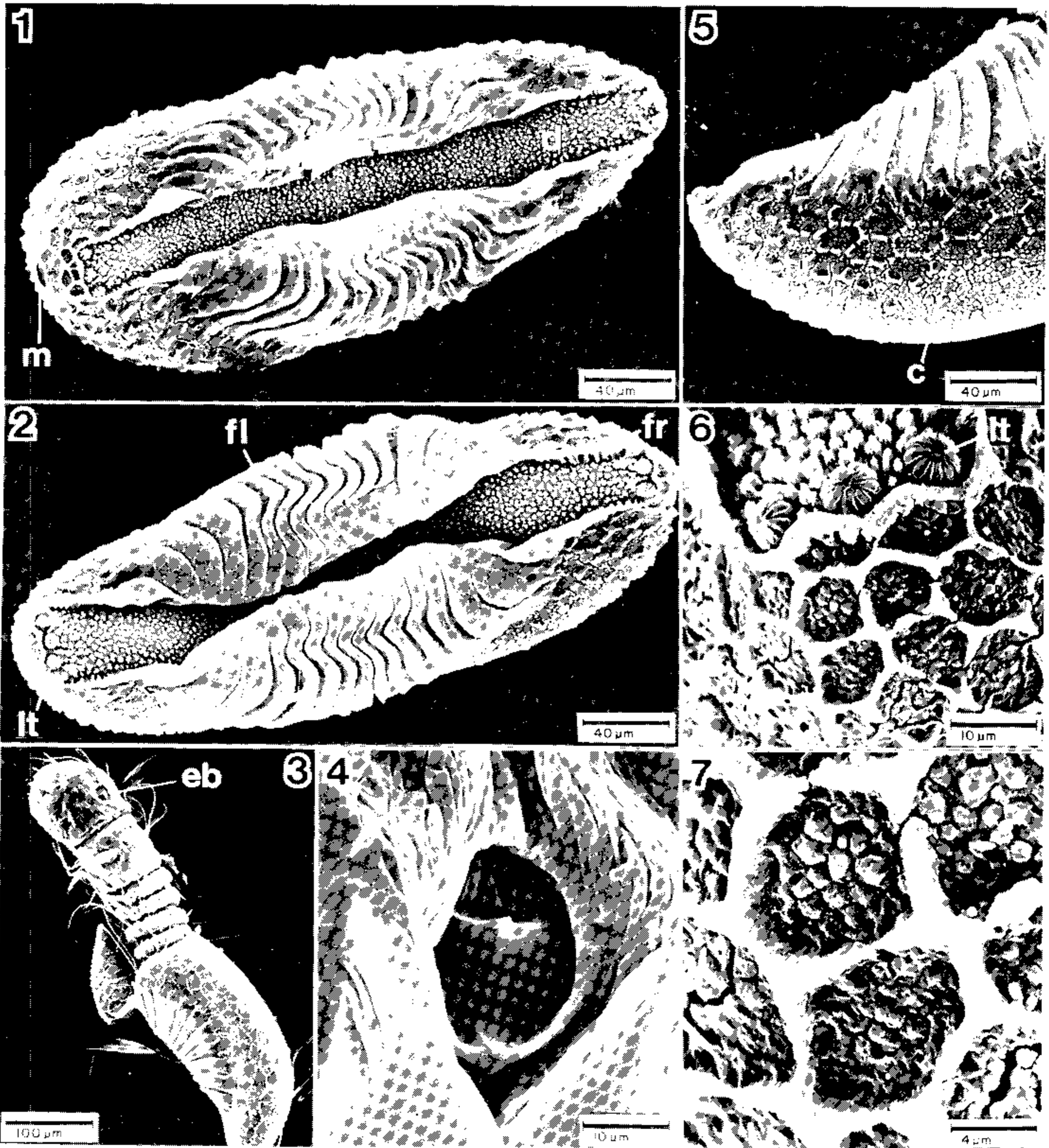


Fig. 1: egg of *Anopheles bellator*. Fig. 2: egg of *An. cruzii*. Fig. 3: hatching larva of *An. cruzii*. Fig. 4: morphological aspect of egg burster of *An. bellator*. Figs 5, 6, 7: surface chorionic cells of *An. cruzii* (c - chorionic cell; d - deck; eb - egg burster; fl - float; fr - frill; lt - lobed tubercle; m - micropyle).

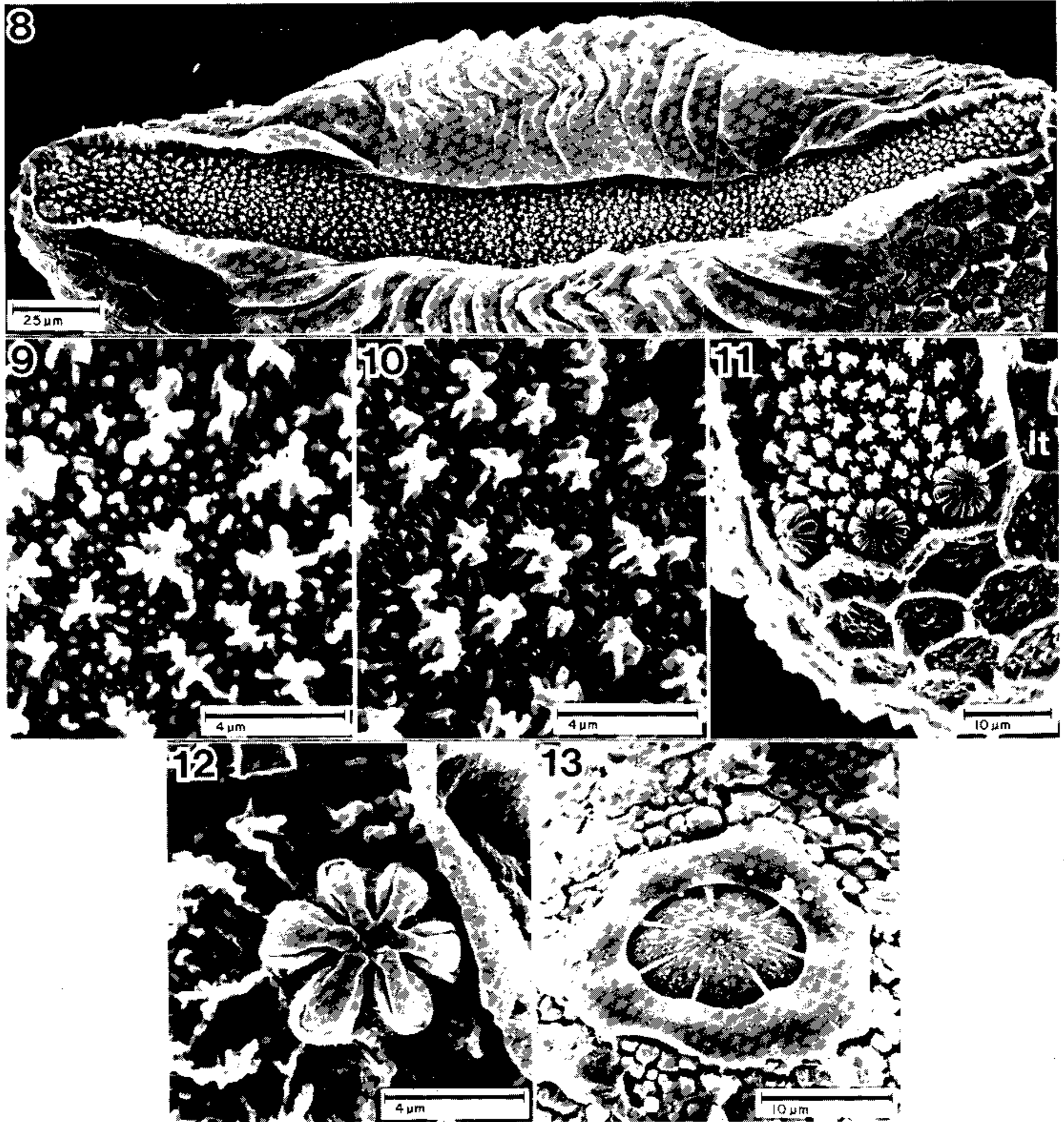


Fig. 8: feature of the deck of *Anopheles bellator*. Figs 9, 10: branched deck tubercles of *An. cruzii* and *An. bellator*, respectively. Fig. 11: posterior end of *An. cruzii* egg showing lobed tubercles; Fig. 12: lobed tubercle of *An. bellator* egg. Fig. 13: micropyle of *An. bellator* egg. (lt - lobed tubercle).

extremities. The float is large, about two-thirds the length of the egg, with about 14-15 ribs that reach almost half way to the dorsal surface.

The deck is continuous, with the outer chorion forming a system of fine tubercles. These tubercles are uniform, appearing similar on the anterior, posterior and middle deck areas (Fig. 8). Each tubercle is irregular in outline and branched, with smaller intercalate pointlike

tubercles (Figs 9, 10). A row of 2-5 lobed tubercles occurs at each end of the deck. The lobes are large, finger-like, disposed like spokes of a cart-wheel, and 5-10 in number (Figs 11, 12).

The micropyle is surrounded by a disc that forms a slight mound and an outlying smooth collar. The collar has radial ridges that extend about half way to the micropyle on the micropylar disk (Fig. 13).

DISCUSSION

Based on the material examined, no differences were found between the eggs of *An. cruzii* and *An. bellator*. There was some variation in the number of branches of the lobed tubercles, which were fewer in *An. bellator* than in *An. cruzii* (Figs 11, 12), but it will be necessary to study a greater number of specimens to know if this is a constant difference.

Egg hatching is similar to that described for *An. albimanus* Wiedemann by Rodriguez et al. (1992). The larva gains freedom through a crack that develops in the anterior area of the egg. The resulting cap detaches.

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