At first sight the form of the male paleæ and the arrangement of the paleal pegs would appear to be non-adaptive; any one arrangement of paleal pegs being as effective as any other for gripping the female. But the front legs are used for other functions, particularly feeding, and a study of the functional morphology of the front legs shows that the form of the male paleæ and the arrangement of the pegs is of great functional significance, as well as being a valuable taxonomic feature at the species-level.

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Atypical Spermiogenesis in *Thermobia domestica*, a Thysanuran Insect

IN a recent communication, Bawa[1] has again put forward the hypothesis of a typical sperm in *Thermobia domestica*. However, I have shown[2], with some electron photographs of *Petrobius maritimus*, that the centriole and the acrosome are in their normal positions. The acrosome is a scoop-shaped body at the anterior end of the nucleus which forms a projecting tube. What Bawa has called the acrosome is probably another body, the centriole adjunct[3], which encloses a centriole and gives rise to the flagellum. In Thysanura, no division of the centriole occurs, and as such it is a fixed body on the posterior aspect of the nucleus. These observations are further strengthened by the detailed cytochemical reactions obtained by me, the results of which will be published elsewhere.

As regards the 'adnuclear fold' or the 'lateral fold', it is very clear from the electron photographs that the fold is not a continuation of the flagellum as it does not possess the typical fibrillar structure. On the contrary it is an intra-nuclear body of unknown significance. This body is an easily followed structure in X-irradiated *Petrobius*[4]. It also differs with the flagellum in chemical constitution.

Finally, I again stress that the sperm of thysanuran is a typical flagellate sperm and does not show any deviation from the normal patterns.

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MATHUR (preceding communication and ref. 1), in his communications, has again stressed that the thysanuran sperm is a typical flagellate one, having the acrosome and the centriole located at the proximal and distal end of the nucleus. I disagree with him and have the following comments to make in this context.

Mathur's[1] report is incomplete inasmuch as he does not mention (1) the name of the insect, (2) the stage of spermiogenesis electronmicrograph 1 represents and (3) the magnification of the two electron micrographs. I may add that I am unable to interpret his electronmicrograph 2. Furthermore, if I am interpreting correctly, Mathur's electronmicrograph 1 is a spermatid of a thysanuran. After scrutinizing scores of electronmicrographs of *Thermobia* spermatids[2], it is safe to point out that Mathur's acrosome *A* is actually the nucleus which shows nuclear pores at places, and his nucleus *N* is unmistakably a typical mitochondrial nebenkern revealing badly damaged cristæ. Mathur, however, does not mention anything about the mitochondria. It has been reported[2] that a typical mitochondrial nebenkern is formed in *Thermobia* and other thysanurans, and it remains an integral part of the mature spermatozoan. The structures F_1, F_2 and F_3 in Mathur's[1] electronmicrograph 1 do not reveal any structural detail to be identified as parts of the flagellum cut at different places. He also fails to make reference to bodies labelled as *M* in electronmicrograph 1. It is not clear whether bodies *F*, *M* identified by him in the upper right corner of electronmicrograph 1 are inclusions in the same cell referred to in the micrograph or are located in an adjacent cell. Structures *CA*, *M*, F_1, F_2 and F_3 probably are the microbodies or lipid elements, as such inclusions are invariably observed in the spermatids of *Thermobia*. So far as I can understand, the only structure identified correctly by Mathur[1] in electronmicrograph 1 is the Golgi material, *G*.

In *Pterobius* spermatid, Gatenby and Mathur[3] using light microscopy were unable to establish the correct nature of the 'adnuclear' or 'lateral fold'. This structure, according to Mathur, is the 'intranuclear' body of unknown significance. However, this 'intranuclear body' is seen to consist of the tail flagellum and the two mitochondrial nebenkern ribbons[1,4,5]. Electron microscopy[2] of *Thermobia* clearly indicates the composite nature of this intranuclear body. In favourably cut ultra-thin sections of *Thermobia* spermatids, one can discern tail filament complex and the mitochondrial cristæ in the nebenkern ribbons. It is important to mention also that the nucleus, mitochondrial nebenkern and the tail filament complex are seen to be disposed adjacent to each other. Such a unique spatial arrangement is especially clear in the cross-sections. Finally, there is evidence[2] that the acrosome occupies the basal end of the sperm head and that it is derived from the Golgi dictyosomes. The centriole is not embedded in the 'centriole adjunct' and it moves around the nucleus until it lies toward the apical end of the nucleus. Thus there is no reason to confuse the 'centriole adjunct' of Gatenby *et al.*[6] with the acrosome of *Thermobia domestica* spermatozoan.

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