

Fine Structure Analysis of Spermatogenesis in *Tegula eiseni*, *T. aureotincta* and *T. regina* from Bahía Tortugas, Baja California Sur, México.

Esperanza Ortiz *, Jorge Belmar *, Hortensia Montellano *, Angélica Silva-Olivares **, Victor Tsutsumi ** Mineko Shibayama **. *Escuela Nacional de Ciencias Biológicas (IPN) Mexico City, Mexico. **Centro de Investigación y de Estudios Avanzados (CINVESTAV-IPN) Mexico City, Mexico. Email: perabiol@yahoo.com

The west coast of the Baja California peninsula is a highly productive biological region due to the influence exerted by the California stream. Numerous species coexist in its rocky ocean bottom. Some of these species, by reason of their dominant character, help define to a greater or lesser extent how the community works. Referring to the benthic community of abalone banks in Bahía Tortugas (Baja California Sur, Mexico), Guzmán del Prío et al. (1991) state the genus *Tegula* is a noteworthy ecological element. Despite the ecological importance of these species within the community, there is no information on certain aspects of the reproductive process of these organisms as well as on the fine structure of their germ cells. The aim of this work was to study the ultrastructure of spermatogenesis in *Tegula eiseni*, *T. aureotincta* and *T. regina* from Bahía Tortugas. We emphasized on the characteristics of the germ cells and specially on the shape of the acrosome, the latter possibly being an additional feature of help in the taxonomic allocation of species of this family or other gastropod families. Adult organisms were collected in two subtidal rocky shelves near Bahía Tortugas. Small portions of the testicle were removed from each specimen and fixed in 2.5% glutaraldehyde in seawater, then postfixed with osmium tetroxide and processed using conventional techniques for electron microscopy. Additionally, some testicle samples were fixed in 10% formalin and prepared by the periodic acid Schiff (PAS) technique. Similar results were obtained in all three species: spermatogonia contained a central spherical nucleus with heterochromatin clumps at the periphery, mitochondria were abundant and perinuclearly arrayed, and scattered glycogen granules in the cytoplasm. In primary spermatocytes, heterochromatin was more highly condensed, the number of mitochondria was smaller relative to that in spermatogonia, and a large quantity of electron-dense granules of varied diameter were scattered throughout the cytoplasm. In secondary spermatocytes, heterochromatin was found in peripheral areas of the nucleus and is ring-shaped, while electron-dense granules remain the same as in primary spermatocytes. Spermatids showed fully condensed chromatin taking up all the nucleus, while the mitochondria increase in size, migrating to the basal pole to form the middle piece of spermatozoa. The nucleus of the latter was elongate and the shape of the acrosome varied according to the species: rounded and hoodlike in *T. eiseni*, elongate with a slight widening at the apex in *T. aureotincta*, and triangular in *T. regina*. On the basis of these fine structure results, we conclude that all three species have the following distinguishing characteristics: (1) the cytoplasm of primary and secondary spermatocytes contains dispersed granules whose chemical composition is analogous to that of neutral mucopolysaccharides indicating this material is possibly involved in spermiogenesis; (2) acrosome morphology is species specific, and (3) mitochondria are five in number.

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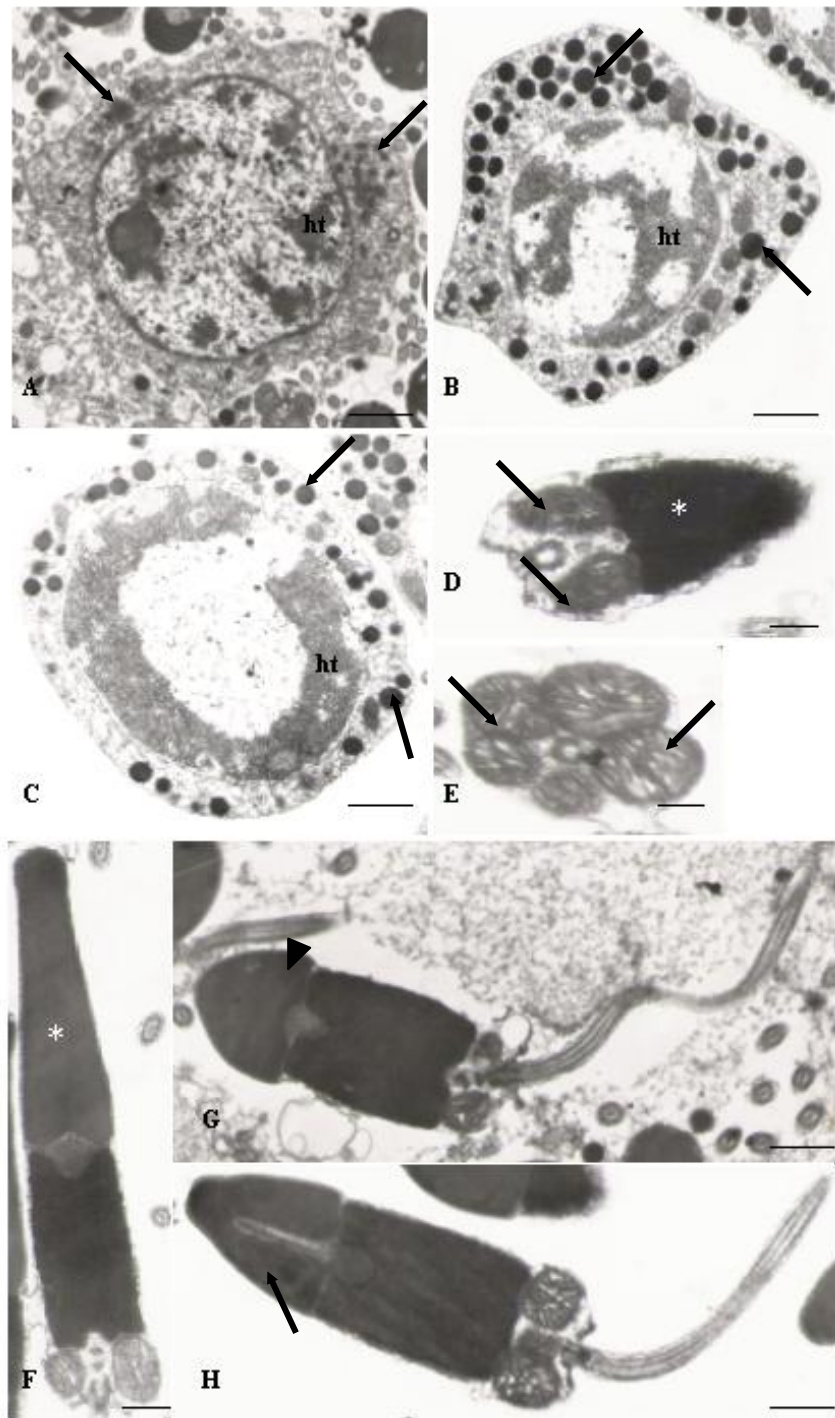


Fig 1. **A.** Spermatogonia. Heterochromatin (ht) clumps arrayed beneath the nuclear membrane. Several mitochondria (arrows) are shown. **B.** Primary spermatocyte. Condensed heterochromatin (ht) and electrodense granules are scattered throughout the cytoplasm (arrows). **C.** Secondary spermatocyte. Heterochromatin is localized peripherally (ring-shaped) (ht). Electrodense granules are present in the same primary spermatocyte (arrows). **D.** Spermatid. Chromatin is completely condensed (*) and mitochondria increased in size (arrows). **E.** Typical five mitochondria (arrows). **F.** *Tegula aureotincta* spermatozoid. Elongate acromose (*). **G.** *T. eiseni* spermatozoid. Acrosome rounded and hoodlike (arrow-head). **H.** *T. regina* with triangular acrosome (arrow). Bars = 0.5 μm