

**ULTRASTRUCTURAL CHARACTERIZATION OF EUPYRENE AND APYRENE  
SPERMATOZOA OF Alabama argillacea HÜBNER, 1818 (LEPIDOPTERA,  
NOCTUIDAE), FROM THE TESTIS TO THE GENITAL DUCTS OF MALE  
AND FEMALE MOTHS .**

MARÍLIA MEDEIROS (Depto. de Biologia - UFSC)

and HEIDI DOLDER (Depto. de Biologia Celular - UNICAMP)

Abstract. Eupyrene (typical) and apyrene (atypical) spermatozoa of A. argillacea, a cotton plant plague, were studied by negative staining and ultrathin sections at Transmission Electron Microscopy. Their ultrastructural morphology was described comparatively in the testis after releasing from the testis to genital ducts of the male and female moths.

Key words: Lepidoptera - spermatozoa - eupyrene - apyrene

"CARACTERIZAÇÃO ULTRA-ESTRUTURAL DE ESPERMATOZÓIDES EUPIRENES E APIRENES DE Alabama argillacea HÜBNER, 1818 (LEPIDOPTERA, NOCTUIDAE), AO NÍVEL DO TESTÍCULO E DAS VIAS GENITAIS DOS IMAGOS MACHO E FÊMEA ATÉ A ESPERMATECA".

Sumário. Espermatozóides eupirenes (típicos) e apirenes (atípicos) da mariposa A. argillacea, uma praga de algodoeiro, foram estudados através de coloração negativa e cortes ultra-finos em Microscopia Eletrônica de Transmissão (MET). Sua ultraestrutura foi descrita comparativamente, ao nível do testículo do imago e dos ductos genitais de mariposas macho e fêmea.

Unitermos: Lepidoptera - espermatozóides - eupirenes - apirenes

Male and female moths of Alabama argillacea were dissected out for studying the reproductive systems morphology. The spermatozoa were negative stained and fixed by different methods to transmission electron microscopy. The basic aims of our study were the ultrastructural description of the two normal morphological types of spermatozoa - eupyrene and apyrene - in the testes and the differentiation of the both types of sperm during the passage through the male and female ducts. In the testis, the eupyrene and apyrene spermatozoa are closely associated and aligned in bundles into distinct cysts (LEVIATAN & FRIEDLÄNDER, 1979; PHILLIPS, 1971). The spermatocyst have, in general,  $256 \pm 1$  spermatozoa (PHILLIPS, 1970, 1971 VIREKI, 1973), but some apyrene cysts have a double or triple number of sperm. The intratesticular atypical spermatozoa are smaller than the typical ones. Their anucleated anterior regions seem like truncated cones (FRIED-

LÄNDER & WAHRMAN, 1971) with a most anterior electron dense cap involving one or two concentric microtubules rows. The flagellum of anucleated sperm shows an insect typical axoneme 9+9+2 (BACCETTI, 1972; PHILLIPS, 1970) which central and accessory microtubules have a slighter electron dense lumen. The two small mitochondrial derivatives along the tail have similar size and structure and finish together before the tail endpiece. A typical unit membrane is observed around the axoneme.

The eupyrene testicular spermatozoa are surrounded by a radial mantle of lacinate appendages along almost all their length. There is another type of appendage that runs along the nucleated sperm denominated reticular appendage or satellite body. The head region of the eupyrene sperm has a long, slender and very electron dense nucleus, a tubular structure with electron dense wall lying near to the nucleus and an atypical basal body below the tubular structure and adjacent to the nucleus basal region. None acrosome structure was observed. The eupyrene flagellum has an axoneme 9+9+2 like that one from apyrene sperm. The two axoneme central tubules have more electron dense lumina than the ones of the atypical sperm and the electron dense cores of the nine accessory microtubules stain strongly with ruthenium red, probably indicating the presence of glycoproteins and/or glycosaminoglycans (ANDERSON, 1968). There are two mitochondrial derivatives along the axoneme with different sizes and lengths which show periodic arranged and modified cristae in their cortical region. One of mitochondrial derivatives is larger and extends further posteriorly than the other. In the tail endpiece, without mitochondrial derivatives, the axoneme is completely disorganized. The plasma membrane has a typical trilaminar organization.

After releasing from the testis to the genital ducts, the eupyrene spermatozoa of the same cyst remain associated in bundles (FRIEDLÄNDER & WAHRMAN, 1971; RIEMANN, 1970; RIEMANN & THORSON, 1971). The apyrene sperm are randomly arranged between the eupyrene bundles. The lacinate appendages are lacking, but the reticular one is still observed along a new complex sheath around the nucleated sperm. The anucleated spermatozoa are surrounded by a less elaborated sheath with different number of concentric rings of material recovered by small filamentous extensions.

In the bursa copulatrix and receptaculum seminis of inseminated females, the anucleated spermatozoa are similar to those ones observed in the male genital tract (FRIEDLÄNDER & GITAY, 1972; PHILLIPS, 1971; RIEMANN & THORSON, 1971). The nucleated sperm are now disassociated and the reticular appendage is completely lacking on the dense region in the outer sheath, which has undergone a rotation from its previous position in regard to the internal components of the typical sperm. The atypical spermatozoa remain in the spermatheca where they degenerate, without leaving their own sheaths. The typical ones hatch from their sheaths and fertilize the eggs. The role of apyrene spermatozoa seems to be related with the transport of the eupyrene sperm in the male genital ducts and from copulatory pouch to the female spermatheca.

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