

1000x magnifications the microscopy anatomy of five layer that form the mantle from outside (shell adjacent) until inside (cavity of mantle) were described as follow:

- i) A squamous epithelium layer;
- ii) A collagen fibers layer;
- iii) A middle layer of connective tissue;
- iv) Layer of muscular tissue; and
- v) Transitional epithelium.

As particular characteristic, it was observed that collagen form the cytoplasm of all the five layers that structure the mantle.

KEY WORDS: *Strombus gigas*, histology of the mantle

Microscopic Anatomy of Tegument of the Foot the Queen Conch *Strombus gigas* (Mesogastropoda: Strombidae) Linnaeus, 1758

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ABSTRACT

The histology of healthy tissues has to be known in detail if the damage caused by diseases, pollution and maladies is to be identified. *Strombus gigas* Linnaeus, 1758 (Prosobranchia, Mesogastropoda, Strombacea, Strombidae) is a species under severe stress, caused by the reduction of its populations and pollution of coastal waters where it inhabits. Epithelia are important structures of gastropod anatomy, aiding in locomotion, physical and chemical interaction with the environment, respiration among others. In this investigations three males and three females were sampled from Alacranes reef, 22°22'96"N 89°41'03"W, North of Yucatan Peninsula, Mexico. They had a shell length of 228 mm (\pm 20) and a lip thickness of 16 mm (\pm 1.8 mm). Each individual were remove from the shell and a 1 cm³ section of the mantle were fixed in Davidson's A. F. A. solution for four days, rinsed in alcohol at 70 %, dehydrated in alcohol at 70 %, 96%, 100%, clarified in Benzene, and

inclusion in "Paraplast" synthetic paraffin (Avila 2001). Six microns sections were made with rotary microtome and were mounted on glass slides with Meyer's albumin. For staining was used Harris Hematoxiline B Yellow Eosine (HHE₂), regressive method (Howard and Smith 1983).

Were described the different epithelia found on the side and sole of the foot. Side epithelia present two different characteristics: 1) Glandular cylindric ciliated epithelia that forms tubular folds and 2) Cylindrical pseudo-stratified epithelia forming irregular sinuosities. The epithelia of the sole presents two different type of cells: 1). The cells contiguous to the foot side are cylindrical, and 2) the sole presents pseudo-stratified cylindrical ciliated epithelia, forming twinned low rigs. The glandular structure of the foot side has a lubricating function, evidenced by secretion granules and mucus, while the rigs on the sole aid on a caterpillar sort of locomotion, characteristics that are present through the Gastropod class, but have a different degree of development in the diverse families and modes of life.

KEY WORDS *Strombus gigas*, anatomy, histology, foot, tegument

Anatomía Microscópica del Tegumento del Pie del Caracol Pala *Strombus gigas* (Mesogastropoda: Strombidae) Linnaeus, 1758

La histología de los tejidos sanos sería conocida en detalle si los daños causados por enfermedades y polución son identificados. *Strombus gigas* Linnaeus, 1758 (Prosobranchia, Mesogastropoda, Strombacea, Strombidae) es una especie bajo muchos stress, causado por la reducción de su población y por la polución de las aguas donde hábitat. El epitelio es una importante estructura de la anatomía de los gasterópodos, que ayuda en la locomoción, en la interacción física y química con el ambiente, en la respiración ,entre otras. En esta investigación tres machos y tres hembras fueron muestreados del Arrecife Alacranes, Yucatán, Estados Unidos Mexicanos, con una longitud de la concha de 228 mm (\pm 20) y un grosor del labio de 16 mm (\pm 1,8). Cada animal fue removido de su concha y muestras de 1 cm³ de la parte anterior del pie fueron fijadas en Solución Davidson A.F.A. por cuatro días, lavados en alcohol al 70 %, deshidratadas a través de una serie de alcoholes del 70 %, 96 % y 100%, clarificadas con Benceno y embebidas en Parafina Paraplast (Avila, 2001). Secciones de 6 μ m de espesor fueron hechas con un micrótopo rotatorio y fueron montadas sobre placas con albúmina de Meyer. La tinción se realizo con Hematoxilina de Harris - Eosina Amarillenta AHHE₂@ (Howard and Smith, 1983).

Fueron descritas las diferencias epiteliales encontradas en el lado del pie y la suela del pie. El epitelio del *lado del pie* presenta dos orientaciones diferentes: (1) Epitelio cilíndrico glandular ciliado (glándula pedal) formando pliegues tubulares y (2) epitelio cilíndrico seudo-estratificado ciliado contiguo a la suela del pie formando sinuosidades pareadas con aristas angulares. La *suela del pie* presenta dos epitelios

diferentes: (1) un epitelio cilíndrico con disposición lineal en la parte contigua al lado del pie, y (2) un epitelio cilíndrico pseudo-estratificado con disposición lobulada y pareada en la parte de la suela del pie que se apoya en el lecho marino. Con esta investigación se demuestra que hay una especialización al nivel de tejidos entre el lado y la suela del pie de *S. gigas*. Se sugiere que esta diferencia anatomía es debida a la forma de movimiento y al tipo de hábitat.

PALABRAS CLAVES: *Strombus gigas*, histología del pie, tegument

Mexican Marine Parks as a Fishery Management Tool for the Queen Conch *Strombus gigas*

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ABSTRACT

Strombus gigas is a species of primary economic importance to all Caribbean countries. Its importance comes from the high exploitation levels ought to local demand for inner consumption, tourist market and international trade. Given its limited distribution range and accessibility, in low energy grass and algal beds, its populations have been depleted in many areas and seriously diminished in others, where exploitation is still taking place. This is the primary reason why it has been placed as a commercially threatened species under CITES (Appendix II). Different measures have been taken to regulate exploitation, which include minimum size, based on shell length, weight and lip thickness, catch quotas, temporal and permanent fishing bans, and marine parks as a measure to preserve reproductive stocks. The level of protection in the different parks of Mexico ranges from a total fishing ban with high reinforcement, to controlled exploitation with little to no reinforcement. The impact of the marine parks on the populations of *S. gigas* is as variable as the number of parks. The density of populations within the parks is critical for the recovery of the populations to its original levels. Evidence shows that the anticipated larval export outside the parks for the restoration of populations seems not to be significant. Marine parks are of practical use for the conservation of reproductive stocks and as a source of juveniles and adults for the rehabilitation of areas under commercial exploitation.

KEY WORDS: Queen conch, *Strombus gigas*, marine parks