

## Influence of Sample Preparation and Anisotropy on Lobster Claw studied by LOM, SEM and TEM

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KEY WORDS: chitin, biomineralization, lobster, calcium carbonate.

### ABSTRACT:

The exoskeleton (cuticle) of all arthropods is composed of chitin organized in fibrils embedded in a matrix of various proteins. In addition, the crustacean exoskeleton contains significant amounts of inorganic salts, mainly calcium carbonate [1].

The architecture of cuticle is helicoidal and most probably this building plan is responsible for its extraordinary mechanical, thermal and physiological properties. In this helicoidal structure, chitin is in the form of crystalline filaments and proteins play the role of the matrix. [2].

The cuticle consists on three layers (see Fig. 1a): epicuticle, thin and waxy that has mainly functional properties such as diffusion and thermal control, exocuticle, hard and durable, that is a protective layer and endocuticle, that has similar structure than the exocuticle but is more flexible. Both exo and endocuticle play a mechanical role. Next to the endocuticle is the epidermis [3].

In this study the microstructure of the lobster claw is analyzed by light optical microscopy (LOM) (using both, normal and transmission light), scanning electron microscopy (SEM) with secondary and backscattered electron detectors and transmission electron microscopy (TEM). Samples were prepared by polishing or by fracturing for LOM and SEM as well as by fixation and decalcination for TEM. It is shown that, depending on the direction of the cut, the structure reveals horizontal layers with a waving pattern (when cross-sectional cuts), see Fig. 1a or a peacock feather-type pattern (when surface-parallel cuts), see Fig. 1b.

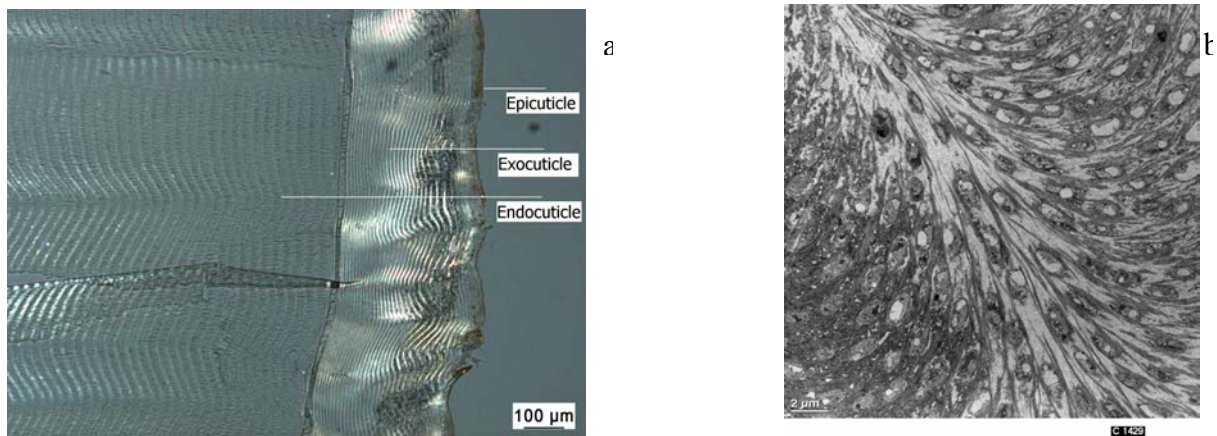


Figure 1 (a). LOM micrograph of a cross-sectional cut of the lobster shell and (b) TEM micrograph of a surface-parallel cut.

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[2] downloaded from <http://bioinformatics.biol.uoa.gr/cuticleDB>.

[3] F. J. Vernberg and W. B. Vernberg. *The biology of the crustacea*. Academic Press, New York, USA, 1983.