Donax marincovichi and *Donax obesulus* (Bivalvia: Donacidae) two putative species supported by sperm morphology?

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Introduction

Donacides are distributed at sandy beaches all over the world except the Polar Regions, whereas the number of total species is 64. Many species of this family are demonstrating a valuable source for the artesanal fisheries. *D. marincovichi* and *D. obesulus* (Fig.1 and 2) inhabit beaches from Northern Chile to Northern Ecuador in dense populations. The taxonomy of *D. marincovichi* and *D. obesulus* are controversially discussed. Sperm morphology is useful for taxonomic identification, frequently applied for mollusk taxonomy.

Fig. 1: D. marincovichi (23 mm)

Fig. 2: D. obesulus (17 mm)

Fig. 3: Sampling site of *D. marincovichi* Peru (Beach Jahuay, 180km south of Lima) and *D. obesulus* Chile (Beach Chinchorro, Arica)

Material and Methods

Therefore samples of *D. obesulus* were taken from a Northern Chilean beach (Chinchorro, Arica, Fig. 3) and *D. marincovichi* sampled in Central Peru (Jahuay, north of Pisco, Fig. 3). Male gonads were elaborated and analyzed by transmission electron microscopy (TEM).

Results and Discussion

Both putative species demonstrate a primitive sperm type (Fig. 4), structured in acrosome (Fig. 4A, 5 and 6), nucleus (Fig. 4N and 7) and tail, 9+2 axoneme (Fig. 9) . In both cases the total number of mitochondria is four (Fig. 8 and 10). The apex of the acrosome of both species shows a characteristic arrowhead (Fig. 4 and 5), which was not observed from other species of this family yet (Hodgson 1990, Sousa 1994, Herrmann 2006). No differences in sperm morphology were found between both putative species. This supports our genetic study (Carstensen 2006) indicating that we rather deal with one single instead of two distinct *Donax* species.

Fig. 4: Mid-longitudinal section through the spermatozoa of both species. Acrosome (A), nucleus (N), mitochondria (M) and tail (T) (20000x)

Fig. 5: Mid-longitudinal section of acrosome, axial rod (AR), nuclear fossa (NF), electron-dense (ED) and electron-lucent (EL) regions (50000x)

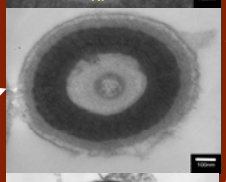

Fig. 6: Transverse section of acrosome (60000x)

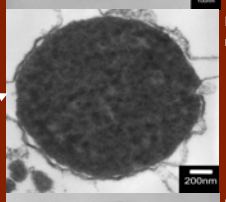

Fig. 7: Transverse section of nucleus (20000x)

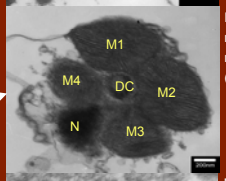

Fig. 8: Transverse section of mitochondria (M), part of the nucleus (N) and distal centriol (DC) (30000x)

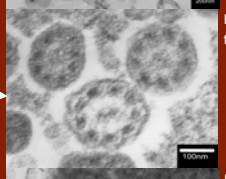

Fig. 9: Transverse section of tail, 9+2 axoneme (80000x)

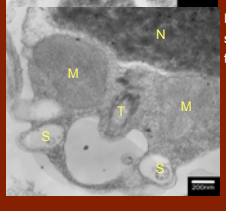

Fig. 10: Longitudinal section of satelites (S), mitochondria (M), tail (T) and nuleus (N) (30000x)

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Acknowledgments

This study was financed and conducted in the frame of the EU-project CENSOR (Climate variability and El Nino Southern Oscillation: Impacts for natural resources and management, contract 511071) and is CENSOR publication 364

References

Carstensen, D., Herrmann, M., Laudien, J., Schiel, S., Arntz, W., Leese, F., Held, C. (2006). Genetic variability of Chilean and Peruvian surf clams (*Donax marincovichi* and *Donax obesulus*), International Congress on Bivalvia, 22-27 July, Barcelona, Spain.

Herrmann, M., Giménez, J., Laudien, J. & Penchaszadeh, P.E. (2006b). Spermatozoan morphology of the Argentinean surf clam *Donax hanleyanus* (Bivalvia: Donacidae). International Congress on Bivalvia, 22-27 July 2006, Universitat Autònoma de Barcelona, Spain.

Hodgson, A.N., Bernard, R.T.F. & van der Horst, G. (1990). Comparative spermatology of three species of *Donax* (Bivalvia) from South Africa. J. Moll. Stud. 56: 257-265.

Sousa, M. & Oliveira, E. (1994). Ultrastructural and cytochemical study of spermatogenesis in *Donax trunculus* (Mollusca, Bivalvia). J. Submicrosc. Cytol. Pathol. 26 (305-311).