GROWTH INCREMENTS AND OXYGEN STABLE ISOTOPE AS ENVIRONMENTAL RECORDER FROM THE STUDY OF THE CHILEAN BIVALVE *EURHOMALEA RUFA*

Marc Gosselin[1], Hugues Boucher[1], Claire E. Lazareth[1], and Luc Ortlieb[1]

[1] LOCEAN- IPSL UMR 7159 (UPMC/CNRS/IRD/MNHN), Centre de recherche IRD Ile de France, 32 avenue Henri Varagnat, Bondy, F 93143. Marc.Gosselin@ird.fr, mar.gosselin@gmail.com.

Abstract

Eurhomalea rufa is a Veneridae living in meso or infra-littoral sandy bottoms along the South-eastern Pacific coasts, at a depth of less than 10 cm below the sediment surface. Little is known about the biology of this burrowing species, in particular about its growth pattern. However *E. rufa*, which the shell can exceed the 10 cm of length, could provide a potential good pluriannual recorder of environmental parameters. Thus a sclerochronological and geochemical study has been conducted on the shell of this species to access both its growth increment parameters and its ability to record the surrounding environment.

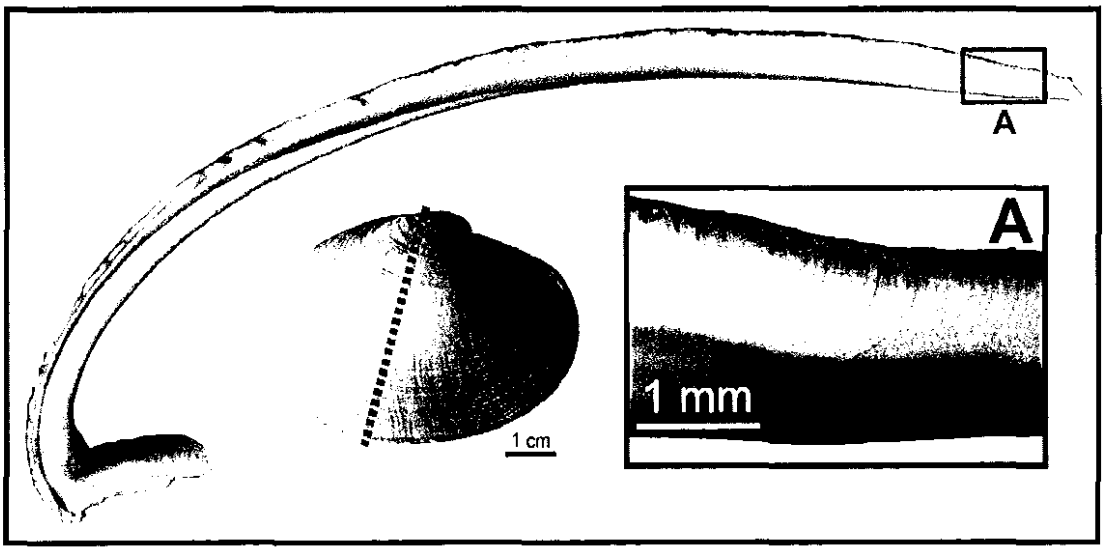

Figure 1 : The shell of the Veneridae *Eurhomalea rufa*. The thin section is symbolized by the black dotted line on the right valve. The growth increments are illustrated in A.

A living specimen of *E. rufa* has been sampled at the end of December 2005 at Hornitos, a fine sandy beach located to the north of the Mejillones peninsula (Antofagasta, Northern Chile) (Figure 1). The observation of thin sections under optical microscope allowed us to propound that the daily growth rhythm is linked to the tidal range periodicity which is semi-diurnal with diurnal inequalities at the studied location. From this temporal framework, we inferred an age of about 30 months for our specimen of 64 mm. Focusing on a period of 15 months, between September 2004 and December 2005, we obtained the variations of the increment growth thickness (daily mean of 42+/-22 µm) as well as the corresponding oxygen isotope variations at a biweekly resolution. Those shell parameters have then been compared to hourly sea surface temperature (SST) data (Cendhoc, Antofagasta). The daily SST is significantly correlated with the growth of the shell ($R^2 = 0.63$; $P < 0.001$) and $\delta^{18}O$ isotopic data ($R^2 = 0.25$; $P < 0.05$). These results allowed calibration equation to be developed in order to elaborate reconstructed SST. The calibration work revealed that the SST changes are best depicted by the increment thickness variations (Figure 2).

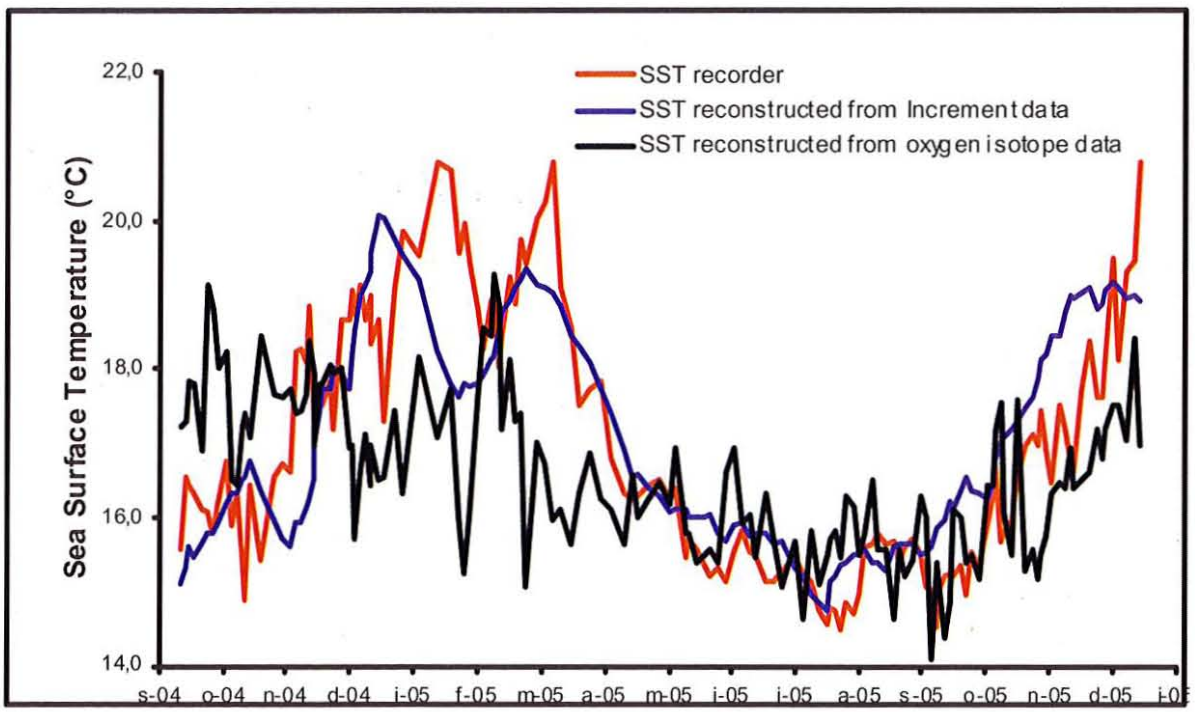

Figure 2 : Sea Surface temperature (SST) variations between September 2004 and December 2005. The red line represents the hourly SST recorded by Cendhoc sensors, while the SST reconstructed from daily growth increment thickness data and from biweekly oxygen isotopic data are shown as blue and black lines, respectively.

In conclusion, *Eurhomalea rufa* could be used as direct recorder of temperature by the study of its growth increment thickness which opens promising perspectives for paleothermometry reconstructions.

KONINKLIJKE VLAAMSE ACADEMIE VAN BELGIE
VOOR WETENSCHAPPEN EN KUNSTEN

BIVALVE BIOMINERALISATION ARCHIVAL POTENTIAL AND PROXY INCORPORATION

4-5 May 2009

Luc André, Frank Dehairs, Rémy Mas, Frédéric Planchon,
Emma Versteegh (eds.)

CONTACTFORUM