Changes in the biochemical composition of the spawns of *Maja brachydactyla* (Decapoda: Majidae) from rearing and field studies.

Patricia Verísimo[1], Guiomar Rotllant[2,3], Inmaculada Álvarez-Fernández[1] & Luis Fernández[1].

[1]Departamento de Bioloxía Animal, Bioloxía Vexetal e Ecoloxía, Universidade da Coruña, Campus da Zapateira s/n, E-15071 A Coruña, Spain
[2]Departement de Recursos Marins Renovables, Institut de Ciències del Mar, CSIC, Passeig Marítim de la Barceloneta, 37-45. E-08003 Barcelona, Spain
[3]Centre d'Aqüicultura, IRTA, Carretera del Poblenou, s/n. Sant Carlesde la Ràpita, E-43540 Tarragona, Spain

INTRODUCTION: In the Galician coasts (NW Spain), females of *Maja brachydactyla* spawn 2 or 3 times along their annual reproductive cycle (González-Gurriarán *et al*, 1993). During the embryonic development, gonads maturate and the females incorporate from the diet the components for building the yolk of the oocites for the next spawn. Previous studies on field samples confirmed the existence of variations in the biochemical composition among the different embryonic development stages and between first and second spawn. In this study we compare the biochemical composition of the spawns of females from their natural habitat and from an experimental culture.

METHODOLOGY:

Field sampling: Experimental traps were used to sample different sites along the Ria de A Coruña (Fig.1a) during the months of March and May 2003 coinciding with the period of first and second spawning in *M. brachydactyla* . Thirty ovigerous females (13 on March and 17 on May) were captured and spawns were frozen for further biochemical analysis in laboratory.

Figure 1. Location of sampling areas; Ria de A Coruña (a) and Corcubion Bay (b) in the Galician coasts (NW, Spain)

Figure 2.Experimental culture tanks.

Experimental culture: Nine non-ovigerous females of spider crab from commercial fishing in the Corcubion Bay (Fig.1b) in November 2002 were maintained in culture tanks (Fig 2), under controlled temperature (16±1°C) and salinity (36±1psu) conditions. During this period females were fed exclusively *Mytillus sp*. Egg samples for biochemical analysis were taken during the embryonic development of first and second spawns.

Classification of embryonic development stages (Fig. 3):

Stage A: Recently extruded, orange coloured eggs. Yolk occupying the whole egg volume.
Stage B: Brown-coloured eggs. Visible lateral eye pigment spot and first pigmented cells. Yolk occupying approximately 50% of egg volume.
Stage C: Eggs with abundant dark pigmentation. Presence of cromatophores and well developed eyes. Totally developed embryo occupying the whole egg volume.

Figure 3. Picture of the hole spawn (left) and individual eggs (right) for each development stage.

Biochemical analyses: Freeze-dried egg samples from different spawns were used to determine their content of lipids (Bligh & Dyer, 1959), proteins (Lowry, 1951), carbohydrates (Dubois, 1956) and ashes (incineration at 450°C 4 hours).

RESULTS: The results obtained show a similar pattern in the evolution of the biochemical composition during the embryonic development both for the field and laboratory reared animals (Fig. 4). Among the organic fractions, lipids show the most remarkable changes during the development due to their utilization as the main source of energy for the embryogenesis (Rosa, 2003). A tendency to increase protein content between stages B and C, from the eggs belonging to the females caught in the field was observed although any differences were not significant.

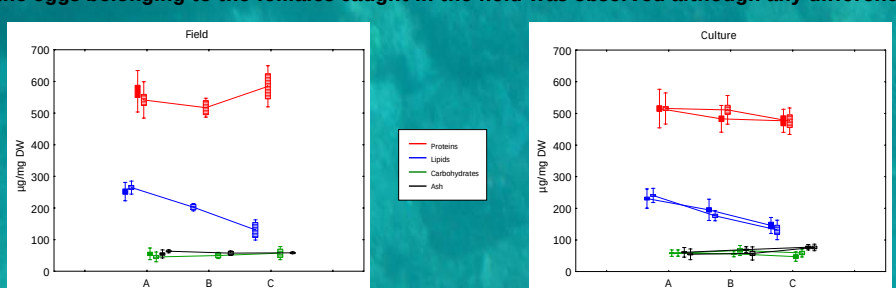

Figure 4. Biochemical composition (µg/mg dry weight) of *M. brachydactyla* eggs along the embryonic development in (left) field and (right) culture. Coloured and striped boxes represent first and second spawn respectively. Box: Mean ± SE; Whisker: Mean ±0.95·SD

Variations in composition between the first and second spawn in both studies were obtained (Fig. 5). Significant differences (ANOVA, $p<0.05$) in the content of lipid and ashes were observed in the culture experience, with lowest values in the first spawn for lipids and in the second spawn for ashes. In the field study, only ashes showed significant changes (ANOVA, $p<0.05$). Variations in protein and carbohydrate contents were not significant in any of the studies. Changes in lipid content between spawns may be influenced by the temperature during egg development (Sibert *et al.*, 2004)

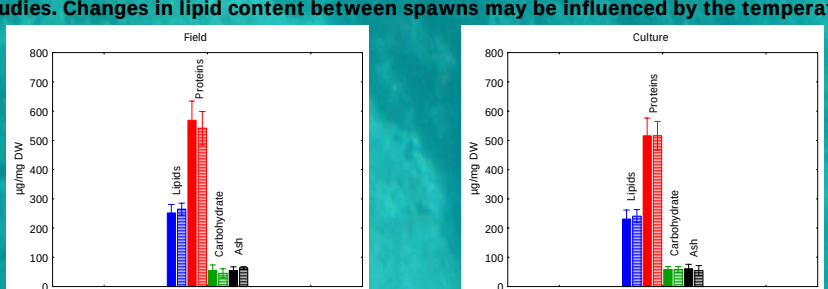

Figure 5. Egg biochemical composition in stage A (µg/mg dry weight) of *M. brachydactyla* in first and second spawn from field and culture. Coloured and striped bars represent first and second spawn respectively.
Box: Mean ± SE; Whisker: Mean ±0.95·SD

Comparing field and culture studies, significant differences in lipids and proteins were observed in the first spawn (ANOVA, $p<0.05$) and in lipids and carbohydrates in the second spawn (ANOVA, $p<0.01$)(Fig.4). Spawns from the natural habitat present highest values in lipid and protein contents, which may be due to the influence of the diet of the spider crab during the gonad maturation as a determinant factor of the biochemical composition of the eggs. Carbohydrates the oposite pattern, with highest values corresponding to the culture experience.

LITERATURE CITED:

González-Gurriarán, E, Fernández, L.,Freire, J., Muiño, R. & J. Parapar. (1993). Reproduction of the spider crab Maja squinado (Brachyura: Majidae) in the southern galician coast (NW Spain). ICES C.M. 1993/K:19
Rosa, R., S. Morais, R. Calado, L. Narciso and M.L. Nunes (2003). Biochemical changes during the embryonic development of Norway lobster, *Nephrops norvegicus*. Aquaculture 221: 507-522.
Sibert, V., P. Ouellet and J-C. Brethes (2004). Changes in yolk total proteins and lipid components and embryonic growth rates during lobster (*Homarus amaricanus*) egg development under a simulated seasonal temperature cycle. Marine Biology 144: 1075-1086.

Paper available at WWW.udc.es/dep/bave/jfreire/home.htm; http://nomada.blogs.com and verisimo@udc.es