OSMOTIC STRESS EFFECTS ON THE BIOCHEMICAL COMPOSITION OF THE DIGESTIVE GLAND OF THE SCALLOP *FLEXOPECTEN GLABER*

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Abstract
This study refers to the biochemical composition of the digestive gland of *Flexopecten glaber*. Results show that the hyposmotic and the hyper-osmotic stress induce a decrease in the total content of glycogen and lipids. The osmotic stress induces an increase of the polyunsaturated fatty acids and the (*n*-3) group; mainly the C18:3*n*-3 and C18:4*n*-3. Conversely the EPA (C20:5*n*-3) decreases as a response to any variation of salinity around the optimal salinity rate (35 psu).
Keywords: Bivalves, Physiology, Aquaculture

Introduction
The digestive gland plays an important role in the physiology of the mollusk bivalves. This organ is mainly involved in the storage of lipids and glycogen ([1], [2], [3]). In this study we investigated the effects of salinity variation on the biochemical composition (glycogen, lipids and fatty acids) of the digestive gland of the scallop *F.glaber*.

Material and Methods
Individuals of *F.glaber* were acclimated for 3 weeks under constant temperature (15°C) and different salinity rates (25, 30, 35 and 40 psu). Scallops were fed a monoalgal diet based on *Isochrysis galbana*. The total glycogen was analyzed according to the enzymatic method [4]. Total lipids were extracted according to Folch et al. method [5]. Fatty acid methyl esters were obtained according to [6] and analyzed on a HP 6890 gas chromatograph. Statistical analyses were carried out using the software-program Statistica 6.0. Data were analyzed for significant differences of means, ANOVA, and inspected by Duncan test at the level of 5%.

Results and Discussion
Results showed that total glycogen and lipids contents of the digestive gland decrease significantly mainly at 25 psu (2.66 mg/g and 60 mg/g respectively) and 40 psu (2.22 mg/g and 64mg/g respectively) in comparison with the optimal salinity of 35 psu (3.95 mg/g and 81mg/g respectively). Concerning fatty acids, we noted that the elevation (40 psu) and diminution (25 psu and 30 psu) of salinity induce an increase of the åPUFA (Polyunsaturated fatty acids) as well as the åMUFA (Monounsaturated fatty acids) and a decrease of the åSFA (Saturated fatty acids) compared to the control salinity (35 psu). We also noted an elevation of the å(*n*-3) and å(*n*-6) under hyposmotic and hyperosmotic stress. We recorded that the osmotic stress induces an increase of the C18:3*n*-3 (from 0.7% at 35 psu to 6.25% at 30 psu and 4.66% at 25 psu) and the C18:4*n*-3 (from 2.24% at 35psu to 12.59% at 40 psu and 10.45% at 30 psu). Conversely we noted a significant diminution of the EPA (C20:5*n*-3) from 7.08% at 35psu to 3.42% at 40 psu and 3.48% at 25 psu. Recorded results are linked with the role played by the PUFA (mainly *n*-3) in the regulation of permeability and fluidity of the membrane; specially the EPA which may serve as a substrate for prostaglandin biosynthesis as a stress response [7].

References
1 - Strohmeiers T., Duinker A., and Lie O., 2000. Seasonal variations in chemical composition of female gonad and storage organs in *Pecten maximus* (L.) suggesting that somatic and reproductive growth are separated in time. *J. Shellfish Res*., 19: 741-747.
2 - Le Pennec G., Le Pennec M., and Beninger P.G., 2001. Seasonal digestive gland dynamics of the scallop *Pecten maximus* in the bay of Brest (France). *J. Mar. Biol. Assoc. UK.*, 81: 663–671.
3 - Pazos A.J., Sanchez J.L., Roman G., Pérez-Prallé M.L., and Abad, M., 2003. Seasonal changes in lipid classes and fatty acid composition in the digestive gland of *Pecten maximus*. *Comp. Biochem. Physiol. Part B.*, 134: 367–380.
4 - Dubois M., Gilles K.A., Hamilton J.K., Rebers P.A., and Smith F., 1956. Colorimetric method for determination of sugars and related substances. *Anal. Chem*., 28: 350–356.
5 - Folch J., Less M., and Sloane-Stanley C.H., 1957. A simple method for the isolation and purification of total lipids from animal tissues. *J. Biol. Chem*., 266 : 497–509.
6 - Cecchi G., Basini S., and Castano C., 1985. Méthanolyse rapide des huiles en solvant. *Revue française des corps gras* n4.
7 - Hall J.M., Parrish C.C., and Thompson R.J., 2002. Eicosapentaenoic acid regulates scallop (Placopecten magellanicus) membrane fluidity in response to cold. *Biol. Bull*., 202:201–203.