Ultrastructural changes in gill lamellar epithelium of Wels catfish *Silurus glanis* adapted to brackish water

I. Mladineo[1], I. Bočina[2], I. Metaxa[3]

1. Laboratory of Aquaculture, Institute of Oceanography & Fisheries, PO Box 500, 21 000 Split, Croatia.
2. Department of Biology, Faculty of Science, Teslina 12, 21 000 Split, Croatia.
3. Faculty of Food Science and Engineering, Aquaculture and Fishery Department, Dunarea de Jos University of Galati, Romany.

mladineo@izor.hr
Keywords: epithelium, gill, ultrastructure, Wels catfish

Gill epithelium of fish is a dynamic ion transporting mechanism that consists of mitochondria rich cells (MRC); pavement cells (PC); and mucous cells (MC). In freshwater, MRC are the ones implicated in active uptake of Cl^- induced by Na^+/K^+-ATPase pump located in the basolateral part of cell plasma membrane. Wels catfish *Silurus glanis* was held in closed experimental recirculation systems; two groups were maintained for 51 day at constant temperature of 26°C at two different salinities - freshwater (0.3 ‰) and brackish water (11 ‰), respectively. At the end of the experiment, gills were sampled for routine histology, TEM, SEM and immunocytochemistry, in order to describe ultrastructural changes as well as to localize ATP-ase α-subunit activity induced by the environmental change. *S. glanis* gill structure shows typical presence of MRC located in interlamellar epithelium both in freshwater and brackish environment, similar to the distribution observed in other freshwater-adapted species. In brackish water however, dark MR cells go through degeneration and necrosis process, while small and compact immature cells with dark cytoplasm resembling β MR cells, are frequently observed tightly enveloped by α MR cells. Evaluating overall appearance and functionality of *S. glanis* gill epithelium, we conclude that even though it shares many characteristics with other euryhaline fish, it also shows peculiar process of differentiation and maturation of β MR cells enclosed by the cytoplasm of pale MR cells.

1. G. Deviller et al., Aquaculture **235** (2004) p331.
2. M.N. Fernandes et al., J Fish Biol **52** (1998) p844.
3. M.N. Fernandes, S.A. Perna Acta Zool (Stockholm) **83** (2002) p321.
4. F. Galvez et al., Am J Physiol Regulatory Integrative Comp Physiol **282** (2002) p658.
5. T. Kaneko et al., Fish Sci **68** (2002) p1.
6. F. Katoh, T. Kaneko J Exp Biol **206 (**2003) p4113.
7. M. Pisam et al., Am J Anat **179** (1987) p40.

DOI: 10.3217/978-3-85125-062-6-339,

The study was conducted in the framework of European Community and IFREMER, Palavas Les Flots, France, through Access to South European Finfish Aquaculture Facilities (ASEFAF) program for the improvement of the Human Research Potential and the Socio-Economic Knowledge Base.

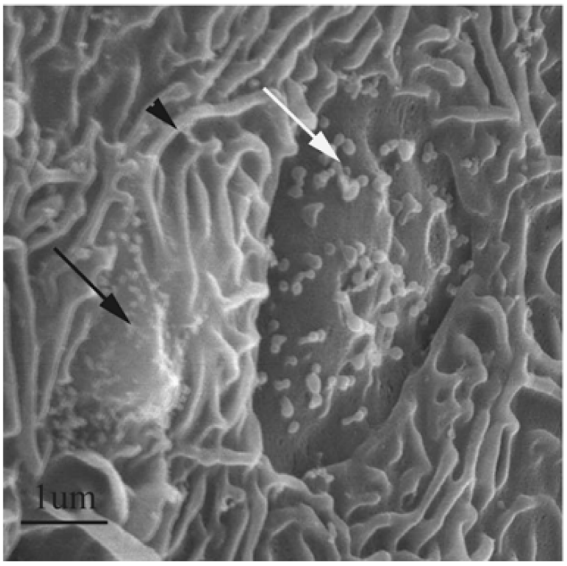

Figure 1. Two types of MRC; with small and abundant microvilli (black arrow), and with large and less abundant microvilli (white arrow); microridges on the surface of the pavement cells (arrowhead).

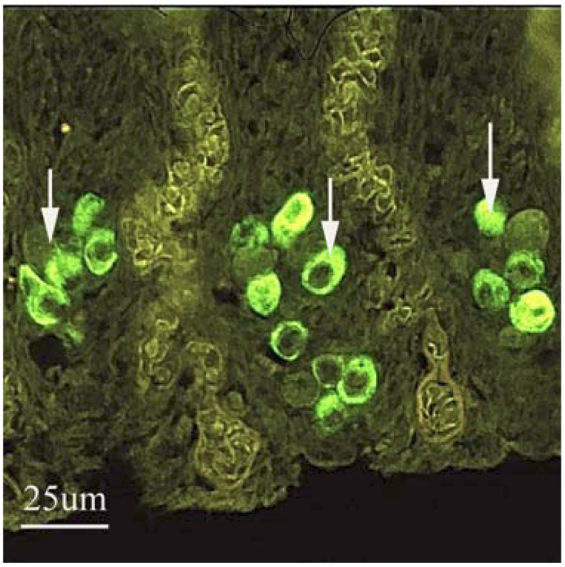

Figure 2. Immunocytochemical localization of the mitochondria rich cells (arrows) on the branchial epithelium of *Silurus glanis*.

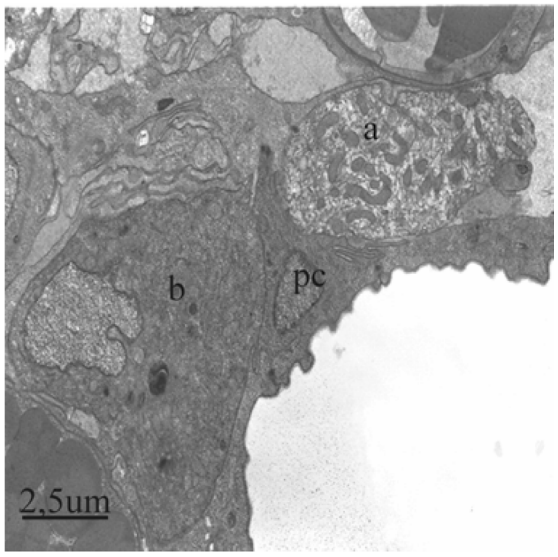

Figure 3. Two mitochondria rich cells (a and b) with different density of cytoplasm, and pavement cell (pc) inserted between them.

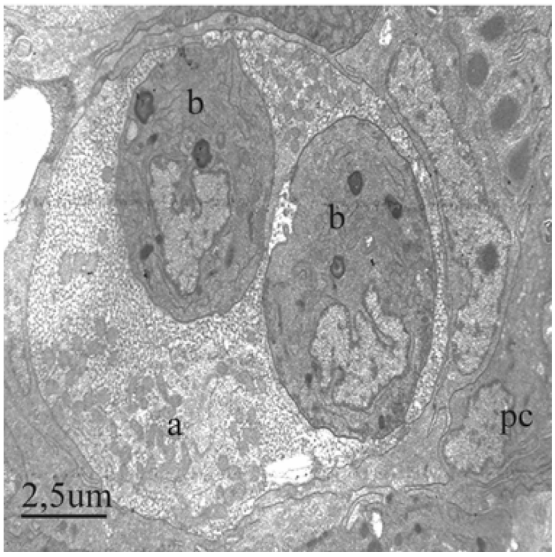

Figure 4. Two β type cells (b) inside the α type (a) mitochondria rich cell surrounded by pavement cell (pc).

M.A. Pabst, G. Zellnig (Eds.): MC2009, Vol. 2: Life Sciences,
DOI: 10.3217/978-3-85125-062-6-339, © Verlag der TU Graz 2009