Cairo University
Faculty of veterinary medicine
Department of Cytology and Histology

Histological, Some Histochemical and Ultrastructural Studies on the Gills of Marine and Fresh Water Fish *(Oreochromis niloticus and Sparus aurata)*

A thesis submitted by

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For the degree of the Ph.D
(Cytology & Histology)

Under the Supervision of

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SUPERVISION SHEET

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ABSTRACT

The present study aimed to investigate the histological, histochemical and ultrastructural features of the gills of both *Oreochromis niloticus* as a model of fresh water fish and *Sparus aurata* as a marine water fish. Forty healthy 20 adult samples of tilapia nilotica *(Oreochromis niloticus)* fish and 20 adult samples of gilthead sea bream *(Sparus aurata).* The gill filaments in both species were supported for almost their entire length by sheet of collagen bundles, generally the gill filaments were covered by stratified epithelium while, the secondary lamellae were covered by a simple epithelium also within the filament epithelium characteristic types of cells could be distinguished.The mucous cells of both species were scattered throughout the gill filament epithelium and mostly localized apically between the pavement cells. The mucous cells of the *Sparus aurata* had fine granular light acidophilic cytoplasm. While, those of *Oreochromis niloticus* lacked the acidophilic cytoplasm. Histochemically, the granules of mucous cells of *Oreochromis niloticus* showed strong positive reactivities with PAS as well as, alcian blue pH 1 and pH 2.5. Whereas, these granules in *Sparus aurata* were PAS positive but, showed a very faint or even negative reactivity with alcian blue. While, chloride cells reacted negatively with PAS, alcian blue pH1 and pH 2.5 and alcian blue pH 2.5–PAS combination techniques. In the semi-thin sections, these chloride cells were easily distinguished with toluidine blue. Ultrastructurally, the cytoplasmic granules of the mucous cells of *Oreochromis niloticus* were either scattered throughout the cytoplasm or localized in the basal part of the cell .Meanwhile, the mucous granules of *Sparus aurata* were always distributed all over the entire cytoplasm, at the ultrastructural level, the chloride cells of *Sparus aurata* were much bigger in size and had more mitochondria than in *Oreochromis niloticus*. Ultrastructural feature of chloride cells is the intracytoplasmic tubules and vesicles. These tubules were often more apparent in *Oreochromis niloticus* than in the *Sparus aurata*. Also the mitochondria of both species had closely packed cristae and their mitochondrial matrix varied greatly in their electro-density especially in *Oreochromis niloticus.*

Key words: Ultrastructure of Gill filament, Mucous cells, Histological and histochemical changes in The gills, Chloride cells of the gills of fresh water and marine.

Dedicated to

To the spirit of my father
To my mother
To my wife (Alaa)
To my son and daughter
(Aseel and Hassan)
To my brothers and sisters

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