

Original Article

Histological structure of the skin in five fish species of *Periophthalmus waltoni* (Gobiidae), *Silurus triostegus* (Siluridae), *Heteropneustes fossilis* (Heteropneustidae), *Mastacembelus mastacembelus* (Mastacembelidae) and *Coptodon zilli* (Cichlidae)

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Abstract: The five fish species viz. *Periophthalmus waltoni*, *Silurus triostegus*, *Heteropneustes fossilis*, *Mastacembelus mastacembelus*, and *Coptodon zilli* were collected in the Shatt Al-Arab River from February to June 2019. The samples were transferred to the laboratory to measure their total lengths and weights. To examine the skin histology and structure in these fishes, a skin sample was taken from the dorsal part close to the lateral line. The results showed that the skin of fish contains two layers: the first is the epidermis, which includes the epithelium. The thickness of the tissue in fish varied from 3 to 20 layers. In this layer, there are mucous cells that were spared and varied in their abundance from one species to another. The dermis includes two layers of stratum spongiosum and stratum compactum. These two layers consist of pigment cells that spread directly under the epidermis in a dark brown color. In *C. zilli* and *H. fossilis*, a third layer was found under stratum compactum as hypodermis; the highest thickness of the dermis was recorded in *C. zilli*.

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Introduction

There are many functions in fish skin e.g. it can be used for secretion, sense, maintenance of osmotic pressure, and a defense against microorganisms (Elliott, 2000; Dauod et al., 2009). The skin shows differences between fish species e.g. in having scales (Singh and Mittal, 1990). The skin is a secretory organ in which the cellular components can produce a wide range of biological factors (Damasceno et al., 2012). The function of goblet cells is to conceal mucus which helps the body keep its surfaces moist and protected (Gona, 1979; Yang et al., 2019). Club cells produce alarm substances that initiate their reaction. Pigments were produced from melanocytes to give the fish special coloration (Takeuchi, 1967). The skin is also considered a tool for coetaneous sense organs to detect food and predators. Amongst all these, there are lateral line systems and taste buds, which have electro-receptive organs and neuromasts (Jakubowski, 1974).

The fish skin includes 3 main strata: epidermis,

dermis, and hypodermis. The cells that are involved in the epidermis have many different cell types, i.e., cuboidal or columnar cells in the base while in the middle there were polyhedral or superficial (flat) cells (Park, 2002a; Faílde et al., 2014). In some fishes, the epidermis is extensively comprised of five layers (Bullock and Roberts, 1974). Club and some mucous cells were found in Palembang puffer fish and catfish exactly in the intermediate layer (Hertwig et al., 1992; Park et al., 2003).

Iraqi water is rich in terms of biodiversity, especially the Shatt Al-Arab River draining to the Persian Gulf (Mohamed and Mutla, 2008). This study aimed to investigate the skin histological structure of five fish species viz. *Periophthalmus waltoni* (Gobiidae), *Silurus triostegus* (Siluridae), *Heteropneustes fossilis* (Heteropneustidae), *Mastacembelus mastacembelus* (Mastacembelidae), and *Coptodon zilli* (Cichlidae) collected from the Shatt Al-Arab River.

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