Songklanakarin J. Sci. Technol.
47 (4), 249–255, Jul. – Aug. 2025

http://www.sjst.psu.ac.th

Original Article

Histological localization of the mucus-secreting cell, sacciform cell, and pigment cell in the integument system of the grunting toadfish, *Allenbatrachus grunniens* (Linnaeus, 1758)

Sinlapachai Senarat[1*], Jes Kettratad[2], Wannee Jiraungkoorskul[3], Gen Kaneko[4], Tappadit Mitparian[5], Atsuo Iida[6], and Kitipong Angsujinda[7]

[1] *Division of Biological Science, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla, 90110 Thailand*

[2] *Department of Marine Science, Faculty of Science, Chulalongkorn University, Pathum Wan, Bangkok, 10330 Thailand*

[3] *Faculty of Public Health, Bangkokthonburi University, Thawi Watthana, Bangkok, 10170 Thailand*

[4] *School of Arts and Sciences, University of Houston-Victoria, Victoria, Texas, 77901 United States of America*

[5] *Inland Aquaculture Research and Development Division, Department of Fisheries, Chatuchak, Bangkok, 10900 Thailand*

[6] *Department of Animal Sciences, Graduate School of Bioagricultural Sciences, Nagoya University, Nagoya, 4648603 Japan*

[7] *Aquatic Resources Research Institute, Chulalongkorn University, Pathum Wan, Bangkok, 10330 Thailand*

Received: 7 July 2023; Revised: 6 March 2025; Accepted: 13 May 2025

Abstract

With limited observations, one of the major remaining questions in toadfish biology is how the integument structure helps them cope with a harsh estuarine environment. In this study, we attempted to observe the structure and histological characteristics of the integument system (classified into seven areas) in the grunting toadfish, *Allenbatrachus grunniens*, an economically important estuarine fish. All samples were collected from the estuarine of Pranburi River, Thailand. The skin of *A. grunniens* consists of two layers (epidermis and dermis). The epidermis contains several types of cells, including the mucus-secreting cell, sacciform cell, pigment cell, and Malpighian cell. Based on the morphometric data analysis, the thickest epidermis was observed near the frontal part (area 1), while the thinnest was seen in the middle part between pelvic fins (area 5). The high density of mucus-secreting cells was demonstrated by the periodic acid-Schiff method in area 6 (posterior part of the pectoral fin), area 1 (upper jaw), and area 7 (caudal fin), whilst area 2 (frontal part) and area 4 (lower jaw) displayed a low density of mucus-secreting cells. Interestingly, toadfish samples from the high salinity environment showed significantly higher numbers of mucus-secreting cells than those from the low salinity environment in the integument system areas 3, 4, 5, and 7 ($P < 0.05$), which is the first report from this toadfish. This change might be responsible to an adaptation to changes in salinity, representing an important ability to cope with the estuarine environment.

Keywords: dermis, histology, integument, mucus-secreting cell, skin, Thailand, toadfish

*Corresponding author
Email address: sinlapachai.s@psu.ac.th