Short Paper

Vitellogenin-like Substance in the Skin Mucus of Tilapia *Oreochromis mossambicus*

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It is well known that vitellogenin is a female-specific serum protein which is synthesized in liver under the influence of estrogen, released into the circulation, and then incorporated into developing oocytes as yolk proteins.¹⁾ Investigations of skin mucus proteins detected a vitellogenin-like substance in the skin mucus of tilapia, *Oreochromis mossambicus*.

Sexually matured tilapia used in this study were reared in a 1 ton concrete tank at the Sesoko Station, Tropical Biosphere Research Center, University of the Ryukyus.

Fig. 1. Immunoelectrophoresis of female serum (FS) and skin mucus (FSM) with rabbit antisera against tilapia female serum (a-FS) and yolk proteins (ab. a-E).

Fig. 2. Double immunodiffusion of egg extract (E), female serum (FS), female skin mucus (FSM), and male skin mucus (MSM) with rabbit antiserum against yolk proteins (ab. a-E).

Blood samples were collected from the caudal vasculature, centrifuged at 3000 rpm for 15 min, and the sera obtained were separated. Skin mucus was collected by scraping the body surface with a slide glass. It was then homogenized with the same volume (w/v) of 0.01 M phosphate-buffered saline (PBS), pH 7.4, and centrifuged at 12,000 rpm for 5 min. Egg extract (ten times with PBS) was also prepared from the ovulated eggs. These were analyzed by immunoelectrophoresis and double immunodiffusion test. The antisera against mature female serum (a-FS) and egg extract (a-E) were induced in rabbits. A-E was absorbed with one-fourth volume of normal male serum in order to remove components common to both sexes (ab. a-E).

Figure 1 shows typical immunoelectrophoretic patterns of the serum and the skin mucus of female tilapia against a-FS and ab. a-E. The serum formed many precipitin lines against a-FS, while at least three lines against ab. a-E. The skin mucus also formed several precipitin lines against both antisera. The differences in the patterns between the serum and the skin mucus against a-FS suggest that selective secretions of serum proteins occur from the circulation to the skin mucus. Figure 2 represents double immunodiffusion patterns of the egg extract, the female serum, the female and male skin mucus against ab. a-E. The egg extract, the female serum and the female skin mucus formed precipitin lines which reacted with this antiserum, completely fusing with one another. Conversely, no reaction was observed between the male skin mucus and this antiserum.

In the skin mucus of teleost fishes, the existence of immunoglobulin,^{2,3)} C-reactive protein (CRP),⁴⁾ hemagglutinin (lectin),⁵⁾ and lysozyme^{6,7)} have been described. They are believed to play an important role in the host defense mechanism against pathogens. The present study found that the skin mucus of tilapia contains certain proteins immunologically similar to the serum, and that one of them has the same antigenicity to vitellogenin. The vitellogenin-like substance has been detected also in the skin mucus of striped bass *Morone saxatilis*.⁸⁾ At the present time, the biological importance of the vitellogenin-like substance is unknown. However, the present findings suggest that if a similar protein also exists in the skin mucus of other teleosts, it, like serum/plasma^{9,10)} or whole blood,¹¹⁾ may be used as a substance to distinguish sex.

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