Ontogenetic eye development and related behavioural changes in larvae and juveniles of barramundi Lates calcarifer (Bloch)

Abstract

Larvae and juveniles of barramundi Lates calcarifer (Bloch) were examined for the development of the retina, occurrence of the retinomotor response and retinal tapetum and change in eye size with age in days. The barramundi hatched with unpigmented non-functional eyes in which retinal cells had not yet differentiated into the various elements. Soon it was followed by rapid changes in the histology of the retina. Two-day-old larvae had a well-pigmented retina with area temporalis which would allow acute vision and prey attack in the nasal direction. At 10 days, rod cells and the retinal tapetum first appeared in the retina and the retinomotor response first occurred; these would allow feeding in dim light. The retinal tapetum moved in unison with the cones and the pigment epithelium during the retinomotor response. At 26 days, the horizontal cells were divided into two layers and the twin cones appeared. These changes in the eyes occurred concurrently or in anticipation of behavioural changes, such as the onset of the first feeding at 2 days, the shift of habitat from coastal waters to swamps at the notochord flexion stage at 7-15 days, the abrupt change in feeding behaviour from roving zooplanktivore to lurking predator at 25-30 days and a later shift of habitat from turbid swamps to open coastal or lake areas at the early juvenile stage.