# Embryonic and larval development of green panchax (*Aplocheilus blockii*): insights into the reproductive strategy of native killifish with biocontrol potential

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**The green panchax, *Aplocheilus blockii*, is valued for aesthetic appeal as an ornamental fish and for their biocontrol competencies. Developing suitable captive propagation methods helps reduce the risk of mosquito-borne disease and the undue use of harmful chemicals. They exhibit sexual dimorphism, with males having vivid colours and females having curved anal fins rather than the long, pointed fins seen in males. The green panchax is a batch spawner, producing 3686 ± 303 eggs per year, and it had a consecutive pattern of 75 ± 4.9 days of continued breeding followed by 31.7 ± 3 days of discontinued breeding and abstained from breeding for 44.1 ± 3.9 days. The eggs were round, demersal, and adhesive with an average diameter of 1.3 ± 0.05 mm. This killifish has a fertilisation and hatching percentage of 86.3 ± 9.7% and 72.2 ± 26.8% respectively with an incubation period of 8.3 ± 0.4 days at 28 ± 3°C. The newly hatched larvae have a total length of 4.5 ± 0.1 mm with an ovoid yolk sac. Larvae exhibited cannibalism during their developmental phase and attained metamorphosis by the 48th day post-hatch. The first sexual maturity was attained at 2.9 ± 0.1 cm and 3.1 ± 0.1 cm, at an average age of 60.4 ± 3.2 days and 66.6 ± 3 days respectively for females and males. The present study provides comprehensive documentation of the developmental process of *A. blockii*, accompanied by a detailed description of embryonic and larval development. The study highlights the importance of morphological characteristics for precise identification of *A. blockii*, even in the absence of distinctive features during early developmental stages.**

**Keywords:** *Aplocheilus blockii*, biocontrol, embryology, killifish, maturity.

THE green panchax, *Aplocheilus blockii*, belongs to the family Aplocheilidae, attains about two inches, inhabits the surface of stationary and sheltered waters with overgrown vegetation[1], and comes under the least concern category in conservation[2,3]. This fish is an active surface feeder and euryhaline, inhabiting the freshwater and brackish water areas of Southeast Asia, Pakistan, Sri Lanka, and the East coast of India[4–6]. Many killifish exhibit capacities to undergo diapause stages I, II, and III, characterised by reversible developmental arrest triggered by adverse environmental conditions, as well as internal dynamics like hormonal changes[7].

The World Health Organisation (WHO) listed *A. blockii* as a potential larvivorous fish for mosquito control due to its effectiveness in consuming mosquito larvae[5]. Green panchax can control mosquitoes with a particular emphasis on *Aedes albopictus* and *Anopheles stephensi*[6,8,9], which are carriers of various diseases such as malaria, chikungunya, dengue, and dirofilariasis. In Goa, India, researchers observed a significant reduction in the population of *A. stephensi* larvae after the introduction of *A. blockii*[10]. These findings suggest that *A. blockii* has the potential to be a valuable tool for mosquito control programs in areas where *A. stephensi* and *A. albopictus* are the major vectors of disease. *Aplocheilus* species were quite hardy and fit for polluted water drains and other stagnant water bodies with organic pollutants and carnivorous fish[9,11] makes them effective for canal ranching as a part of mosquito control in urban and rural areas where pollution is a concern.

Green panchax is considered an ornamental fish for its mesmerising body pattern, elegant movement, and adaptability. They are dark olive with a metallic sheen and green and pink dots over the body, and they have translucent blue enamel on the ventral side[1]. The males are brightly coloured and have longer dorsal and anal fins than females. Since green panchax's ornamental value and biocontrol efficiency are well established, it is useful to know its breeding patterns and production capabilities.

The present study can be used for future research on the early development of green panchax. Clarifying important developmental processes like organogenesis and embryonic morphology provides a foundation for cross-species comparative research. Recognising species at the larval stage is challenging for taxonomists due to the lack of distinct features and similarities among larvae of different species. However, by examining subtle morphological differences, taxonomists can accurately identify species like *A. blockii* even at early developmental stages. The study also enhances our understanding of the breeding

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