Economically important marine larvae: Aquaculture production and larval rearing

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Abstract

The production of animals through aquaculture practices has narrowed down the dependence on fisheries-derived products. Aquaculture production yields are increasing but the majority of farmed aquatic animals are still represented by freshwater fish such as carp and tilapia. On the other hand, the production of marine organisms is dominated by several species of fish, crustaceans and molluscs; which have been successfully breed in captivity through their whole life cycles. These advances have been in part supported by applied research that has led to development of well-established rearing practices. The continued growth of the aquaculture industry requires high numbers of good quality postlarvae and juveniles produced in commercial hatcheries. Very often, the larval rearing of marine species represents the main bottleneck of the whole aquaculture production process and this is highlighted by the present situation with the production of marine fish. Although hundreds of species of marine fish are viable for farming, the current production accounts to only 3% of the global production of farmed aquatic animals. This figure is in part explained by the current lack of knowledge on the digestive physiology and nutrient requirements for most marine fish larvae. While mollusc larvae entirely depend on phytoplankton, most economically important species of marine crustaceans and fish are strongly dependent on zooplankton during the larval stage. The intrinsic difficulties in producing large amounts of specific live feeds to support the larval rearing of many marine species represents one of the main problems that marine farmers have to cope with. Therefore, intensive research on the ontogeny and physiology of the larval digestive tract is continuously conducted in order to have a better understanding of the larval digestive

processes. New findings on the biology and physiology of marine larvae rapidly impacts technical production aspects such as the shape and size of the rearing vessels, the establishment of optimal larval rearing conditions and the larval feeding protocols used to supply live and inert feeds. New research findings assist nutritionists to formulate diets that can successfully replace live preys needed during the critical larval rearing stages. The present chapter reviews a number of aspects derived from the extremely high amount of marine larvae that the aquaculture industry currently requires, focusing on the research and methods that have allowed producing increasing numbers of larvae, in particular through studies on the digestive physiology of marine larvae. The demand for live feed to rear marine larvae is also addressed; situation that conveys several economic implications that will persist until effective replacement of larval live feed with inert diets is achieved. Special reference is done on methods applied to evaluate larval quality, larval diets and feeding protocols, to finally conclude with a look to future trends in scientific and technologic developments to rear marine larvae.

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Larvae: Morphology, Biology and Life Cycle

Editors: Kia Pourali and Vafa Niroomand Raad

Book Description:
Larvae are the distinct juvenile form many animals undergo before metamorphosis into adults. Animals with indirect development such as insects, amphibians, or cnidarians typically have a larval phase of their life cycle. In this book, the authors present current research in the study of the morphology, biology and life cycle of larvae. Topics include the morphological changes of marine fish larvae and their nutrition needs; spawning and nursery areas of neotropical fish species; larvae and embryonization principles of ontogeny in arthropods; larvicidal lectins and trypsin inhibitors isolated from different plant tissues; aquaculture production and larval rearing; expression of recombinant proteins in insect larvae; and adaptive plasticity and evolution in larvae with particular reference to the chironomid midge. (Imprint: Nova)

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