

Aquaculture Potential of Seahorses and Pipefishes

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Characteristics

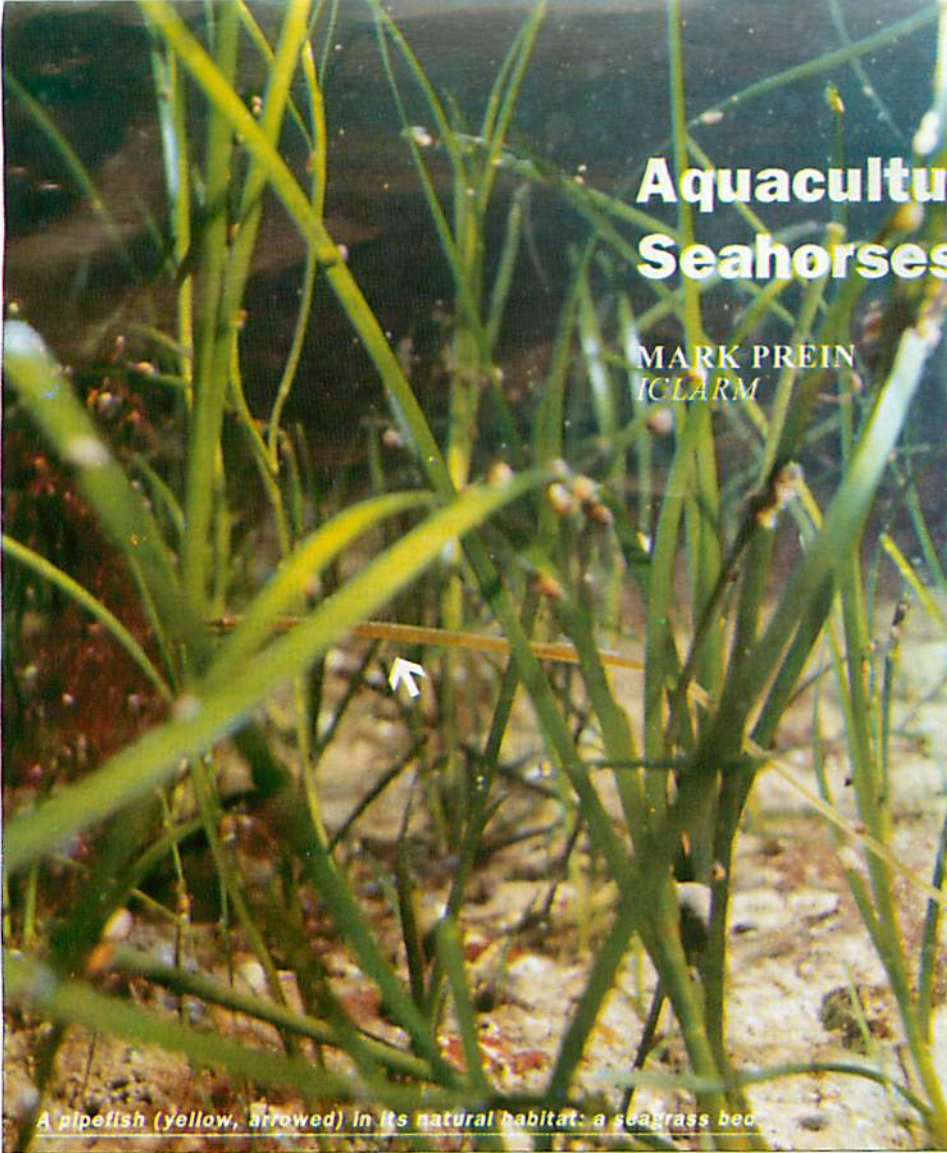
Pipefishes and seahorses are elongate and fragile fish covered with bony plates. They are inconspicuous, bottom-dwelling, basically marine species and inhabit eelgrass beds, clumps of algae, and shallow sheltered coral reefs. Some species are euryhaline and others are purely freshwater species. Adult seahorses range from around 2 cm in "dwarf" species to around 30 cm in large species. Sizes of adult pipefish range from 8 cm to over 60 cm. Most attain only a few grams in body weight. Their life spans range from one to 3-4 years, depending on species. Growth is rapid, as some species can reach reproductive size within three months of hatching.

Food and Feeding

Syngnathids are fairly inactive ambush-feeders, attacking prey from a short distance, using a specialized suction mechanism in their long slender snouts. Some pipefish species are more active hunters patrolling the eelgrass canopy. Through their small cross-section they are difficult to recognize when they approach their prey. Seahorses and some pipefish species require objects to hold onto with their prehensile tail, as these do not possess caudal fins. They can be kept together in dense groups, provided an adequate food supply.

Syngnathids are carnivores with excellent vision, feeding on a variety of benthic and pelagic organisms, mostly tiny zooplanktonic crustaceans and epibenthic isopods and worms. This planktivorous habit is the most difficult aspect of syngnathid culture. Successful growers use large *Artemia*, mosquito larvae, *Daphnia*, *Cyclops*, live mysids and fish larvae (e.g., young

All photos by the author

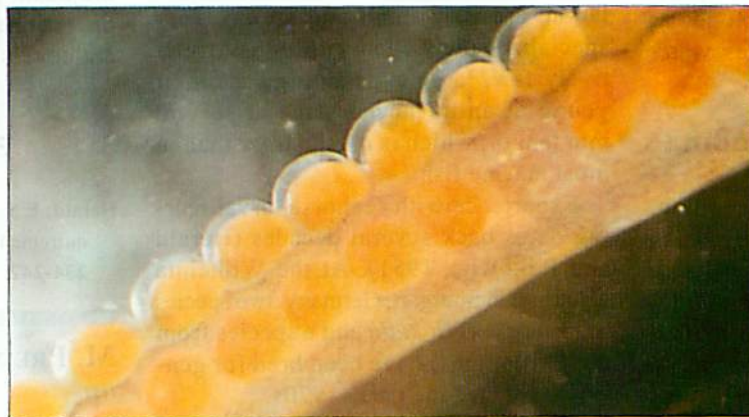


A pipefish (yellow, arrowed) in its natural habitat: a seagrass bed

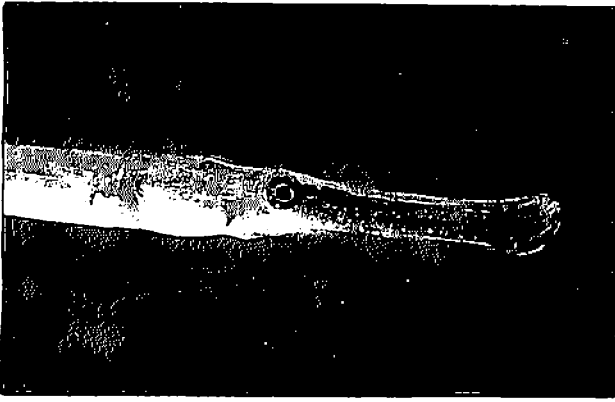
For decades, syngnathids, particularly seahorses, have been kept in aquaria to study their peculiar morphology and behavior. It is mainly through the attention and care of aquarists that considerable knowledge exists about the culture of these extraordinary fish, which today are threatened by habitat destruction and overexploitation (see Amanda Vincent's article, p. 18).

Some species have been cultured for generations in public and private aquaria (e.g., *Hippocampus kuda*). Given their high commercial value, the insatiable and unterrable market demand, and the hopeless state of protection in their natural habitat, these fish could be cultured as nonfood aquatic products. Their self-sustained culture in captivity may ob-

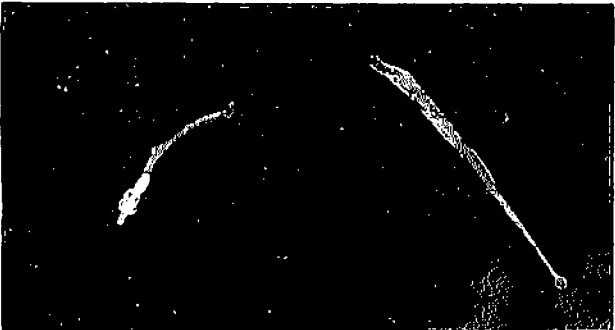
viate further depletion of wild stocks, as in many species of freshwater ornamental fish. Given the appropriate technology, small-scale and commercial operators may have the potential to supply the species and quantities demanded by the market, as has been the case with shrimps, prawns, tilapia and catfish.



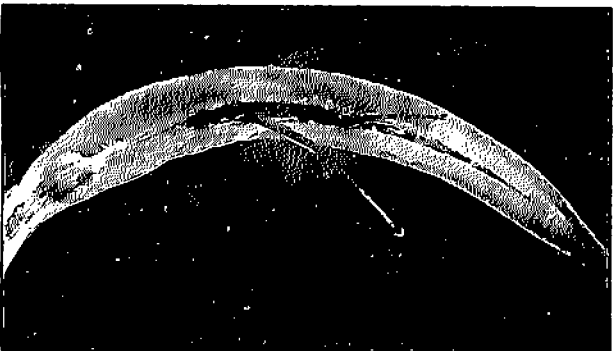
A male worm pipefish (*Nerophis ophidion*) with eggs attached to its ventral scales.



Head and characteristic snout of a pipefish (*Syngnathus typhle*).



Freshly released larva of *S. typhle* (size ~ 11 mm). Note the resorbed yolk sac and advanced developmental stage.



Pregnant male pipefish (*S. typhle*) releasing larvae from within its skin folds.

guppies). Some species can be accustomed to accepting nonliving food, as long as it floats, which requires water movement or aeration.

Reproduction and Breeding

Syngnathids perform male-brooding, in which the female transfers the eggs to the male, where they are then fertilized. Elaborate courtship, mating and interactive behavior makes this group of fish one of the most fascinating species to observe. These characteristics must also be considered for their culture (e.g., sex ratios, broodstock management).

Syngnathids have distinct breeding seasons lasting several months (e.g. in Thailand from October to February). Most species spawn repeatedly during a season.

Most species produce between 100 and 200 eggs, some over 600. Males with closed brood pouches require high amounts of oxygen, as these supply the embryos in their pouch with oxygen through a placenta-like tissue, and also handle removal of metabolic products. Male "pregnancy" lasts from 10 days to 6 weeks.

In some species, hatched larvae must reach the water surface within the first few days to gulp air to fill their swimbladder. They require small food such as *Artemia* nauplii in large amounts. *Artemia* egg shells and unhatched eggs must be removed as these cause gut blockage and death. It has been reported that two-week-old larvae consume up to 3,600 larvae during a 10-hour daytime feeding period. Defecation is proportionally frequent, requiring frequent exchange of water.

Aspects of Syngnathid Culture

The culture of most marine fish is difficult because eggs and larvae are very small and require very specialized diets. Syngnathids have relatively few, large eggs and release their young at an advanced stage at several mm length, which is much larger than in most marine fish.

Experience with seahorse larval rearing dates back several decades (Herald and Rakowicz 1951). At the Wilhelma aquarium in Stuttgart, Germany, two species of seahorses (*H. kuda* and a species from the Philippines) have been bred for generations since the early 1970s.

For the culture of syngnathids, competitors for food and predators of adults

and larvae should be excluded. Adequate hiding and holding opportunities should be provided, and strong currents avoided. For breeding purposes, an adequate supply of clean seawater, oxygenation facilities and larval food are necessary. Low-cost technical solutions such as those used in backyard prawn and shrimp hatcheries seem applicable.

Two years ago in Thailand, US\$260 was paid for 1 kg of dried seahorses, which is approximately four adults per US\$. Depending on scale and efficiency, syngnathid culture may be more lucrative than that of shrimps.

The retail price for seahorses in the aquarium trade is about US\$20 per fish, but there is limited demand because seahorses are less suitable for community fish tanks (high competition), and not many people keep invertebrate tanks. The curio trade absorbs smaller fish whereas larger ones are preferred for medicinal purposes.

In Thailand, scientists at Burapha University have conducted research on seahorse breeding and larval rearing for the last seven years, achieving survival rates of 40 to 50 per cent. This year, laboratory-bred seahorses will be released into specially designed ponds for rearing. The aim is to release them into their natural habitats to replenish heavily depleted stocks.

The existing knowledge outlined here indicates that there is potential for the culture of high-valued species such as syngnathids. Existing technological solutions could be adapted to their specific requirements through further research. First large-scale trials are underway, but the usual problems of upscaling culture operations from laboratory to commercial levels should not be underestimated.



Further Reading

Herald, E.S. and M. Rakowicz. 1951. Stable requirements for raising seahorses. *Aqua*. J. 22: 234-242.

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