

NOTES ON THE ARTIFICIAL CULTIVATION  
OF FRESH WATER SHRIMP<sup>1</sup>

Robert M. Ingle<sup>2</sup> and Bonnie Eldred<sup>3</sup>

INTRODUCTION

In order to be practical, the cultivation of an organism should have two features. The animal concerned must have a desirability for human use and should breed and grow under artificial conditions with relative ease.

At least two species of fresh water shrimp of the western hemisphere meet both of these tests. This prompted a study of the basic biology and ecology of Macrobrachium acanthurus and M. carcinus the general results of which are presented here.

It is worth noting that plans have been prepared for a fresh water shrimp hatchery in Mexico (Mercado, 1959), and progress is being made in actual cultivation in Peru (Hernandez, 1959).

FINDINGS

Part 1. Macrobrachium acanthurus

1. Fresh water shrimp (M. acanthurus) are hardy and can be kept for relatively long periods of time in small aerated aquaria, provided the usual cleanliness precautions are taken. They are omnivorous scavengers and will attack a wide variety of animal and plant materials with vigor. These shrimp are cannibalistic and will attack the newly moulted individuals, especially if sufficient food is not provided. Rocks or some type of covering should be placed in the tanks for the protection of the soft shelled specimens.

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<sup>1</sup>Contribution No. 39, Marine Laboratory, Florida State Board of Conservation, St. Petersburg, Florida.

<sup>2</sup>Director of Research, Florida State Board of Conservation, Tallahassee, Florida.

<sup>3</sup>Biologist, Florida State Board of Conservation Marine Laboratory, Bayboro Harbor, Harbor, Maritime Base, St. Petersburg, Florida.

2. The animals spend a surprising amount of time out of water, voluntarily. This is especially true if the water is not flowing. In the case of tanks and ponds, this often results in the shrimp climbing or jumping out of their aqueous habitat, particularly at night. Many times they fail to find their way back and die. In several experiments, it proved necessary to take special protective measures against this contingency.

3. While no accurate growth rate data are available, weight increment is believed to be rapid. Moulting, under artificial conditions, takes place about every two weeks in young, rapidly growing animals.

4. Spawning is apparently protracted. Females, carrying eggs, were noted throughout the spring, summer and early fall.

5. Under natural conditions, there is apparently adequate and specific food for post-embryonic and juvenile stages. Several rather hastily executed experiments aimed at rearing hatchlings in small aquaria and other containers failed. Percy Viosca, (personal communication) working in Louisiana, attempted to raise hatchlings without success. It is not known which of the two species of Macrobrachium indigenous to Louisiana Viosca studied (M. acanthurus or M. ohione).

Earl Register, (personal communication) in St. Augustine, Florida, attempted to raise hatchlings of M. acanthurus but was unable to get any survival after about a week to ten days.

Prida Karnasut (personal communication) working with Macrobrachium sp. in Thailand successfully hatched well developed brown colored eggs of ovigerous females in aquaria. The survival time of the hatchlings was never over 24 hours, which could be related to improper food or amount of salt content in the water (see Item 8). Yellow colored eggs of ovigerous females were never hatched in aquaria by this worker.

On several occasions, we noted that females prematurely shed the eggs they were carrying after living in aquaria for several days. This could possibly be related to salt content of the water in which they were kept. (see Item 8, below).

6. Fresh water shrimp have been cultivated, inadvertently, near St. Augustine, Florida. This cultivation was apparently derived from a naturally occurring population. Sulphurous artesian waters originating about 3 miles north of the City and flowing seaward, pass through a meandering, highly convoluted channel. This complicated path has been made even more devious by broadening the stream bed to small-lake size at several locations. Since the entire course is nearly sea level (tide water is about two miles from the spring source) the flow is extremely sluggish. At the spring's origin, an exhibition has been established featuring animals in outside cages and enclosures. All of the refuse, urinary products, excrement, unused and defiled food are daily washed from the pens into the artesian stream. The water is accordingly turbid and in the summer, due to its exposure to the sun, quite tepid.

Immediately downstream from the exhibition, an enclosure is provided for hogs. Garbage, collected from the nearby City of St. Augustine is deposited along the shore of the stream as food for the swine.

Throughout the short course of this stream, fresh water shrimp abound. They can be caught by cast net and trap in an abundance that would support a commercial production. When traps are used, eels enter the traps with the shrimp, upon which they apparently feed. Eels are also abundant which would indicate a high shrimp productivity; for, in spite of this source of predation, the shrimp are still abundant.

7. Although M. acanthurus collected in St. Augustine appears to be tolerant of relatively high temperature, it is sensitive to cold. As temperatures approach 50° F.

the shrimp appear sluggish and become debilitated. Discolorations of the shell appear which resemble those caused by sporozoan parasites of penaeid shrimp. Any temperatures below 50° F. result in death in from one to three days.

8. A general survey of surface run off and artesian water of those parts of Florida (southern tip and east coast) which support fresh water shrimps suggests that a small amount of salts are desirable. Shrimp are found to be abundant in those waters that, although potable and considered fresh, actually contain small amounts of salt. This factor needs more study and evaluation before definite conclusions can be drawn.

9. Fresh water shrimp were never found naturally in waters which were not moving, i.e., in lakes and ponds. They apparently were able to grow and multiply in such waters, however, once they were introduced. The extent of their need for flowing water, be it ever so slow, deserves future investigation.

#### Part II. Macrobrachium carcinus

1. One attempt at raising the fresh water shrimp, M. carcinus, under artificial conditions has proved very encouraging. This species requires little care and is tolerant of tap water with low chloride content.

2. One male specimen lived for over a year in a 15 gallon aerated aquarium filled with tap water. A lack of oxygen, during an electrical power failure, evidently caused the death of the male.

3. The food provided to this male specimen consisted of various tropical fish foods. Liver protein and vitamin B supplements were added to the diet.

4. Two different measurements, in millimeters, were used at each moult to estimate the growth rate: (1) A measurement was made of the carapace from the orbital angle to the posterior edge of the carapace. (2) Measurements were made of the left chela including the dactyl. Only five moulted exoskeletons were found in

the tank, however, other exuviations undoubtedly took place during the year but were not observed. Both M. acanthurus and M. carcinus specimens have been seen eating the cast off shells. When the male was placed in the tank on June 5, 1958, the carapace measured 22mm and the chela was 19mm in length. At the last moult which occurred on June 12, 1959, just previous to the death of this specimen, the carapace measured 40mm and the left chela was 60mm in length.

#### CONCLUSIONS

1. Biologically, fresh water shrimp offer several advantages for artificial cultivation.
2. Economically, the species is an attractive one for artificial cultivation. At the time this report was being prepared, tails were being sold at \$1.45 per pound in Tampa, Florida. One restaurant in the same city now offers six small tails as an entre at a price of \$1.50 for the complete meal.

#### REFERENCES

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