Mud crab

I. Problem/Question

There is currently an increasing commercial viability of mud crabs especially in subtropical countries. However, due to seasonal factors affecting the spawning of these species, there a need to develop methods for “ year-around larval production” (Zeng, 2007, p. 1478-1479) arises. There are no current techniques that would enable this process. Therefore, this study investigated on the feasibility of out-of-season mud crab spawning induction. It also determined whether in vitro incubation of eggs is possible. An evaluation of the temperature effects on the rates of embryonic development of mud crabs was also conducted. This is in order to provide predicted dates of hatching for berried mud crab females (Zeng, 2007, p. 1478-1479).

II. Experimental procedures/Method

The researchers kept female individuals of S. paramamosain in 1000L tanks. These holding tanks contained seawater, filtered with sand, with constant salinity of 29-32 g/L but with uncontrolled temperature between 10-30 °C. In order to determine the “ proximate maturation index (PMI)” (Zeng, 2007, p. 1479), crab ovarian development was regularly checked every fortnight using a calliper to measure the width of the strip of light in the carapace when shone with bright light from underneath (Zeng, 2007, p. 1479).

The induction experiment was started with the random selection of mature subjects with <2mm PMI. The researchers removed their eyestalks and were moved to indoor aquaria, each provided with sand trays as egg attachment substrate, with controlled environmental temperature and photoperiod. The

aquaria were regularly siphoned for sanitary maintenance. The researchers proceeded with testing their first objective, “ in vitro egg incubation and effects of temperature on egg development” (Zeng, 2007, p. 1480).

Setups with 200 eggs were used for the evaluation of temperature effects on development of the embryo. These were incubated respectively at 10, 15, 25, 27, 30, and 35 °C ± 0. 5°C, with each treatment having triplicates. After acclimatization, embryonic development of the eggs in each treatment was monitored. The eggs were examined under the microscope in a regular time interval during the first 36 hours of the incubation. Then the larvae were attempted to be cultured in vitro, testing whether they are able to “ reach the first juvenile crab stage” (Zeng, 2007, p. 1480).

III. Experimental Results

Between the months of November and April, 90% of female mature crabs with ablated eyestalks successfully spawned. The remaining 10% was due to the mortality of the individual. Newly extruded crab eggs were observed to “ assume an oval shape” while some others were dented on a side, with undistinguishable outer and inner membranes. But eggs later transform into a spherical shape with distinct membranes (Zeng, 2007, p. 1481).

Eggs at 35 °C resulted were characteristically asymmetric and unsynchronized, relative to the ones in 25-35°C treatments. Such abnormal cellular division were also manifested by eggs in temperature treatments between 10 and 35 °C. The embryonic development of eggs incubated at 15 °C was observed to have arrested at the gastrula stage on the 32nd day, followed by the termination of the experiment.

Eggs incubated in vitro successfully hatched in temperatures between 20 and 30 °C. The incubation period was reduced by 14 days with incubation temperature increase from 20 to 25 °C. The researchers divided the embryonic development of the mud crab into 10 stages. They characterized the different morphological attributes of the various stages, revealing different temperature effects on embryonic developmental rates of each stage (Zeng, 2007, p. 1481).

IV. Conclusions/Summary

The researchers were able to spawn the female mud crabs during the non-season period. They were successful in rearing crabs to their juvenile stage with dry weights comparably the same with naturally hatched eggs. They found that temperature has varying effects on embryonic developmental stages. This information enabled them to make accurate predictions of hatching of female mud crab eggs (Zeng, 2007, p. 1481-1482).

V. Discussions

Spawning mud crabs during off season months was made possible through eyestalk ablation and increased water temperature. This is indeed a very important finding as it allowed scientists to provide farmers an improved method in acquiring their preferred harvest of mud crabs. The success of spawning induction is based on the development of gonads during colder seasons and their ability to spawn at higher temperature seasons. Just by elevating the temperature levels, mud crab females already perceive this as a stimulus for them to carry out spawning (Zeng, 2007, p. 1483).

Since this industry has promising commercial potentials, it is essential to develop cost efficient methods that would accommodate high yields. In this

study, the cost of maintaining numerous berried crabs would be reduced through in vitro incubation of crab eggs. These can basically be placed in either aeration-generated water or in static water. As researchers were able to determine the hatching temperature for mud crabs, farmers are now enabled to determine when the hatching schedule would be.

This would allow them to obtain juvenile crabs at any time that they please regardless of the season. The abnormality observed in the cellular division of mud crab embryo in certain temperatures are proposed to be adaptive mechanisms to enable mud crab larvae to have a scheduled hatching during warmer seasons when they can have enough access tofoodsuch as plankton (Zeng, 2007, p. 1484).