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PROCEDURES FOR ERADICATION OF HYDROZOAN PESTS IN CLOSED-SYSTEM MYSID CULTURE

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ABSTRACT An unidentified species of hydrozoan in the family Eirenidae was inadvertently transported to the Laboratory with a stock of *Mysidopsis bahia*. The hydrozoan competed for food, ate the young mysids, and subsequently reproduced extensively. Hermit crabs provided minimal control. A detailed transfer procedure for the mysids eliminated the hydrozoans from cultures; hydrozoans were eradicated from tanks after removal of mysids by using 1:1200 formalin, hot water, and Clorox.

In early 1978, a culture stock of *Mysidopsis bahia* Molenock was obtained from the Environmental Protection Agency (EPA) Environmental Research Laboratory at Gulf Breeze, Florida, in order to initiate inhouse stocks for toxicity tests. The mysids were placed into six 10-gallon all-glass aquaria with undergravel filters, a crushed oyster shell substrate, and a salinity of 20-22 ppt (Instant Ocean). They were fed *Artemia salina* Leach larvae twice daily.

No problems in rearing occurred for about 2 months. However, during that time a slight brownish growth on the oyster shell in the tanks had become a dense mat, *Artemia* quickly disappeared, and the mysid populations were decreasing. Examination of the growth revealed hydrozoans containing *Artemia* and young mysids, both polyps and medusae were present.

Some problems with hydrozoans had occurred previously where our stocks were obtained, and hermit crabs were deployed to all tanks to consume the hydrozoans. Specimens of *Pagurus* sp. and *Clibanarius vittatus* (Bosc) were introduced into all our tanks, eight to ten of the former and two to four of the latter per tank. The crabs ate the hydrozoans from the bottom outside edges of all tanks, but not in the center or on the vertical glass sides. The mysid populations continued to decrease; the hydrozoans both competed for *Artemia* as food and preyed on young mysids.

In early May 1978, samples of the hydrozoan were sent to Dr. D. R. Calder. Calder (personal communication) replied that "the specimens belong to the family Eirenidae, which now also encompass the old family Eutimididae, . . . The hydroids of this family are very poorly known, as are the juvenile medusa stages. In fact it is likely that this hydroid is undescribed."

From 26 May to 1 June 1978 formalin (Sandifer et al. 1974) was used in the tanks (two tanks treated every other day), according to our procedures, to control the hydrozoan pest. During the following 5 months there was no recurrence of the pest, and it was considered to be successfully eradicated.

PROCEDURES

Procedures developed during this study are presented in a step-by-step order for ease in following.

Mysid Handling

1. Set up one or more 10-gallon all-glass aquaria (isolation tanks) with an air stone, no oyster shell, a filter, and the same salinity as the mysid tanks.
2. Filter overnight, then switch to air stone. Introduce four to six hermit crabs whose shells have been scrubbed to remove hydrozoans.
3. Use a small-mesh dip net to collect mysids out of hydrozoan-infested tanks and put them into clean tank with air stone and hermit crabs (to eat transferred hydrozoans). Feed mysids brine shrimp. Leave mysids in tank at least 2 days.
4. Follow procedures for eradication (see Hydrozoan Eradication section).
5. Net mysids (20 to 30 at a time so pan is not crowded with mysids and debris) out of isolation tank and put into white procelain sorting pan.
6. Sort out all hydrozoans observed in pan and discard.
7. Then, using a small net (1 cm sq, small mesh) or eye dropper, isolate and transfer each mysid individually to a small finger bowl. Remove any hydrozoans observed in bowl.
8. Put mysids in finger bowl back into cleaned original tanks; feed brine shrimp.
9. Do not put hermit crabs back into cleaned tanks as they may have hydrozoans attached to their shells.

Hydrozoan Eradication

1. After mysids are removed, add 30 ml formalin per 10-gallon tank (concentration = about 1:1200, due to volume of shell and filter parts). Let stand at least 2 hours.
2. Siphon off water and discard.
3. Remove shell and scald thoroughly with hot water in a bucket, or discard shell.
4. Rinse and scrub tank thoroughly with fresh water.
5. Fill tank with fresh water and add 2-4 tablespoons of Clorox; put all filter parts into tank. Let stand at least 1 hour.

6. Rinse and scrub tank and filter parts with fresh water. Flush tank and filter parts, and shell in bucket, with flowing fresh water for at least 2 to 3 hours.
7. Set up cleaned tank with sea water and filter overnight.

Nine days after the above procedures two of six tanks of mysids were lost, presumably due to residual formalin still in the oyster shell substrate or on the glass tank walls or filters. The remaining four tanks were disassembled, thoroughly scrubbed (four–five times), and rinsed with fresh water for 5 to 6 hours each; the shell was discarded. Tanks were set up with new shell; no further related die-offs have occurred. Thus, we recommend that the substrate be discarded and the tanks and all filter parts be thoroughly scrubbed and rinsed prior to re-introduction of mysids.

Over three times the concentration of formalin suggested by Sandifer et al. (1974) was used due to the lack of response by the brine shrimp in the tanks to the formalin. They added 250 ppm (1:4000); we added formalin in 10 ml doses three times (about 1:1200) before a majority of the

brine shrimp were affected (swimming ceased).

Polychaetes that reside in the shells were added to mysid tanks along with hermit crabs. Although the effects of polychaetes on mysid cultures are presently unknown, polychaetes did not appear to cause any harm in the tanks.

Procedures similar to those presented here may be used in eradicating hydrozoan pests in closed-system culture of other invertebrates.

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REFERENCE CITED

- Sandifer, P. A., T. I. J. Smith & D. R. Calder. 1974. Hydrozoans as pests in closed-system culture of larval decapod crustaceans. *Aquaculture* 4:55–59.