ACANTHOCEPHALAN OCCURRENCE IN CULTURED RED CRAWFISH

by
Kenneth E. Lantz
Louisiana Wild Life and Fisheries Commission
Opelousas, Louisiana

ABSTRACT

A heavy infestation of a new species of Acanthocephala is recorded in red crawfish, *Procambarus clarki*, harvested from two Louisiana ponds. Occurrence of 44 to 46 percent in harvested crawfish was noticeable enough to warrant public rejection of the affected crawfish as food. Management recommendations are given to reduce occurrence of the parasite.

INTRODUCTION

Intensive culturing of crawfish in Louisiana began in the early 1960's following the poor commercial yields of 1959 and 1960 from the Atchafalaya River Basin, the principal natural producing area in the state. Viosca (1959) presents a series of "Hints to Prospective Crawfish Farmers" as an effort to encourage the culture of the two principal commercial species in Louisiana, red swamp crawfish (*Procambarus clarki*) and white river crawfish (*Procambarus blandingi* acutus). LaCaze (1970) updated and expanded knowledge gained in crawfish culture. Crawfish are currently being farmed in three types of ponds: rice field ponds, wooded ponds, and open ponds. Avault (1972) presents culture methods utilized in the three types of farms.

The general pattern in crawfish culture is to completely de-water the pond in early summer to induce the mated adults to burrow. The crawfish remain dormant beneath the pond surface while emergent and terrestial plants establish dense stands on the exposed soil. These plants will later serve as feed and cover for the future crawfish crop. Re-flooding of the exposed pond begins in mid-fall, thus inducing the female crawfish to come forth and lay their eggs. As the eggs are laid they are fertilized by the sperm retained by the female from spring mating. After fertilization the eggs are attached to the swimmerets of the female's tail by a sticky substance called glair. The eggs usually hatch in two to three weeks.

The young forage on plants, small organisms, periphyton, and detritus. Under optimum conditions, the young crawfish may attain the minimum market size of three inches in 60 days. The average time is usually about 90 days. If minimum market size is not attained before water temperatures fall below 50 degrees Fahrenheit, October hatched crawfish may not attain market size until late March or early April.

Presently there are 40,300 acres of crawfish farms in Louisiana producing an annual yield of almost 12,000,000 pounds of live crawfish. The average yield in pond culture is about 300 pounds per acre. The annual value of the cultured crawfish crop in Louisiana is approximately $3,000,000. This compared to 15,404,000 pounds of naturally produced crawfish valued at $3,542,920 from the Atchafalaya River Basin of Louisiana during the period of July 1, 1971 - June 30, 1972 (Soileau *et al.*, 1973).

MATERIALS AND METHODS

Crawfish examined during this study were collected by commercial fishermen from two large wooded ponds in St. James Parish, Louisiana. The crawfish were collected with baited funnel traps constructed of ¾ inch mesh poultry wire, the common harvesting gear in culture ponds. A total of 385 red crawfish were examined to determine the extent of parasite infestation in the two ponds.

RESULTS AND DISCUSSION

Besides its many natural enemies such as fish, birds and mammals, crawfish must on occasion contend with parasites and disease. In Europe the commercial supply of the crawfish *Astacus astacus* was rapidly depleted by the fungus disease *Aphanomyces astaci* (Unestam, 1972). The crawfish *Orconetes limonsus* and *Pacifastacus leniusculus* have been shipped from the United States to Sweden, Poland, Germany and France in hopes to restore commercially harvestable populations. Crawfish and crawfish eggs in the United States are sometimes affected by *Saprolegnia parasitica* (Avault, 1972), however the condition is generally not considered serious.

In February of 1973 buyers of crawfish in New Orleans, Louisiana began to report red crawfish purchases that exhibited 40 to 50 percent occurrence of a parasite in the abdominal muscle or "tail". The parasite was described as appearing as a pinkish grain of rice near the junction of the abdominal muscle and the cephalothorax. Questioning of the seafood markets selling the affected crawfish indicated the source of the produce was from two wooded crawfish ponds in St. James Parish, Louisiana. Samples taken from the two ponds on March 1, 1973 revealed between 44 and 46 percent occurrence of an acanthocephalan parasite (Table 1). There were usually from 1 to 11 encysted organisms attached to the external lining of the gut of the crawfish, usually in the anterior area of the abdominal muscle and posterior to the heptatopancreas (Figure 1). One crawfish hosted 79 parasites.

This was the second reported occurrence of acanthocephalan parasitism in cultured red crawfish in Louisiana. Cecil LaCaze and Semmes Lynch of Louisiana (personal communication in March, 1973) observed the same organism in red crawfish from the Pecan Island area of southwestern Louisiana in 1966 and 1967. The parasite was found in red crawfish during the early establishment of culture ponds in the freshwater marshes of that area. After three years of intensive culture in the marshes, the organism became almost non-existent in the crawfish population.

The St. James Parish specimens were shipped to Dr. Gerald C. Schmidt of the University of Northern Colorado at Greeley. Schmidt identified the acanthocephalan as juvenile *Southwellina dimorpha* sp. n., a new species he had recently described as being found as immatures in red crawfish in Louisiana and Florida and adults in the white ibis, *Eudocimus alba*, in Florida (Schmidt, 1973). *Southwellina dimorpha* differs from other acanthocephalan species in its sexual dimorphism. The females have large hooks and one field of trunk spines while the male have smaller hooks and two fields of trunk spines.

Detrimental effects of *Southwellina dimorpha* to red crawfish are probably negative as the crustacean serves only as an intermediate host for the encysted immature parasite. The presence of high numbers of the parasites in marketed crawfish is important though as the public recognizes and rejects crawfish tails exhibiting high levels of parasitism.

One culture technique that may break the parasite life cycle in crawfish ponds is complete de-watering of the pond soils each summer for a minimum of two months. Indications are this is what caused the rapid reduction in occurrence in

parasitism in the Pecan Island area after 1967. Presently, the two St. James ponds are not adequately dried each summer.

Future efforts will be made to isolate the adults of *Southwellina dimorpha* in the birds, fish and mammals associated with the St. James ponds to better understand the life cycle of this parasite.

Table 1. Occurrence of *Southwellina dimorpha* in Cultured Red Crawfish*.

	Alee Pond	Waguespack Pond
Sample size	310 crawfish	75 crawfish
No. crawfish affected	144	33
% of Sample affected	46.4	44.0
No. parasites per crawfish	1 to 8**	1 to 11

*Collections made by commercial fishermen during normal fishing activities on March 1, 1973.
**One crawfish hosted 79 parasites.

Figure 1. Encysted *Southwellina dimorpha* attached to intestine of red crawfish.

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CHANGES IN POND BOTTOM SOILS DURING THE FIRST TEN YEARS OF USE[1]

J. R. Snow
Fishery Biologis (Mgt.)
Marion National Fish Hatchery
Marion, Alabama 36756

ABSTRACT

A study to determine changes in pond bottom soil composition has been in progress on the Marion, Alabama National Fish Fatchery for more than ten years. This report gives the findings of analyses for calcium, phosphorus, potassium, pH, nitrogen and organic carbon. Samples were taken periodically from the same locations with the last ones taken ten years after the initial flooding.

During the period, pH changed from acid to neutral levels generally. Phosphorus increased in some ponds and decreased in others. One pond which unfertilized supported a luxuriant growth of *Najas sp.* and *Chara sp.* even though no available phosphorus was measured in the soil sample.

Organic nitrogen and carbon increased appreciably with nitrogen increasing at a greater rate. The carbon/nitrogen (C/N) ratio became narrower in 11 of 12 ponds.

INTRODUCTION

Many fish culturists rearing fish in ponds have noted the diverse response adjacent pond units make to similar management methods. The experienced pond culturist expects diversity in yields, size range, survival percentage, vegetation composition and abundance, and other indices. Reasons for the diversity are not always understood and lack of time may preclude obtaining enough information to determine the cause of differences during a given production cycle. Influences including water quality, bottom soil compositon, autotrophic and heterotrophic organisms present and interaction between these influences combine to affect the production process.

[1]Prepared for presentation at a meeting of the Southern Division of the American Fisheries Society, held in conjunction with the 27th Annual Meeting of the Southeastern Association of Game and Fish Commissioners, hot Springs, Arkansas, October 21-24, 1973.