

THE COMMERCIAL ASPECTS OF SPINY LOBSTER FARMING

Harold W. Sims, Jr.

Reissued September 1968
Florida Board of Conservation Marine Laboratory

INTRODUCTION

The Florida spiny lobster, *Panulirus argus*, is an important item in Florida fisheries, rating high among fishery products. The fishery is centered in south Florida and the Florida Keys but the commercial range may extend into other areas as more exploratory research is done. The majority of the catch is made using wooden traps and discarded ice cans, but large numbers are taken at certain times of the year in bully nets, shrimp trawls, and by hand. The catch is sold alive. The U. S. catches cannot satisfy the demand for this tasty product and each year millions of pounds are imported from South America, Africa, Australia, and other countries.

Because of the fairly high market price placed on this animal and because of the large number imported, several persons have become interested in the artificial propagation of the spiny lobster and have requested information on the commercial feasibility of lobster farming. It is for that reason this paper is prepared.

THE LIFE HISTORY OF THE SPINY LOBSTER

Before the complications of spiny lobster farming can be fully understood, a knowledge of the life history of the spiny lobster is needed.

The spiny lobster is a member of the class of animals known as the Crustacea, crab-like animals with a shell. They grow by means of shedding the old shell, going through a soft stage while they grow, and then becoming hard again, remaining at that size until the next molt. They differ from the northern lobster, *Homarus americanus*, in that they lack the large claws, are covered with spines, and live in warmer waters. They are sometimes erroneously referred to as "crawfish" or "crayfish" which confuses them with the freshwater species of a different species utilized commercially in some countries. The name "spiny lobster" is the preferred one and should be used when referring to animals of this type.

Mating occurs in late winter and early spring and during copulation the male extrudes a viscous fluid from the gonoducts found at the base of the last pair of walking legs. This fluid, containing the sperm, is attached to the underside of the female at a point between the third pair of walking legs where the female gonoducts are located. Upon extrusion the spermatophoric fluid hardens to form a dark substance known to the fishermen as "tar."

Sometime between April and October the females lay their eggs which become attached to the paddles under the tail. They are fertilized by the

spermatozoa which the female releases by scratching the sperm sac with the tips of her legs. The number of eggs varies with the size of the lobster and a large female may carry well over a million.

Hatching takes place in two to four weeks, depending on the temperature of the water. Larvae are nearly transparent, flat and spider-like in appearance. They are capable of some movement but are for the most part carried at the mercy of the currents. During this stage the young are known as phyllosomes.

During the phyllosoma stage this larva undergoes an undetermined number of molts while drifting with the ocean currents, and in from six to nine months metamorphoses into a tiny postlarva known as a puerulus. By this stage of the million phyllosomes that were hatched probably less than ten per cent remain. The rest have been eaten by fish, other larvae and marine invertebrates, or have died due to unfavorable conditions such as high or low temperature or unfavorable salinity. The puerulus stage is perfectly transparent except for the dark eyes; however, by the time of the first molt it has obtained some pigment and now resembles the adult spiny lobster. The puerulus then leaves its drifting existence and becomes a bottom-dwelling animal. An additional two or more years are now required for the young lobster to reach marketable size.

Growth to the adult takes place by a series of molts which are numerous at first but slow down to one or two a year in later life. It is assumed that the spiny lobster goes on growing as long as it lives and specimens weighing seven to nine pounds are not uncommon.

THE LABORATORY REARING OF SPINY LOBSTER

Several workers in Japan, India, Australia, Africa, and the United States have been successful in rearing, up to a point, the phyllosomes of various species of spiny lobster. To this time no one has been successful in raising the Florida spiny lobster phyllosome to a post-larva. Great care is needed to raise the larvae and conditions such as temperature, salinity, light, oxygen, and proximity to other larvae must be carefully watched. The slightest change in any of the above conditions can cause mass mortality. Postlarvae have been reared in the laboratory but only under carefully maintained conditions. They are usually raised in separate containers since some cannibalism may take place.

Adult lobsters can be maintained in captivity if they are well fed and if too many are not kept in a given area. Growth, however, is probably not as fast as it is in the natural state.

SPINY LOBSTER FARMING

Considering the facts as shown, certain requirements must be met before artificial propagation would be economically practicable. Of the million young released by each female, few reach the postlarval stage and perhaps only one or two reach adulthood. It would then be necessary to overcome the large natural mortality. This apparently entails such extraordinary care and supervision that it becomes economically impossible at our present level of understanding. The cost of rearing a spiny lobster from the egg or even from a postlarva to a commercial size would be far more than the price received for the product.

SUMMARY

It is apparent that the farming of spiny lobsters is not a profitable venture at this time. More research is needed before satisfactory techniques will be worked out.

From the scientific point of view there is a need for the laboratory rearing of spiny lobsters. The larval stages of many of the common species of spiny lobsters are not known. The hatching of spiny lobsters in the laboratory and the rearing of them to the oldest possible stage is greatly needed.

A LIST OF PERTINENT LITERATURE

The following is a list of available publications dealing with the field of rearing spiny lobster. In most cases these can be obtained from the author or publishing agency indicated.

CRAWFORD, D. R.

1922. Spawning habits of the spiny lobster (*Panulirus argus*) with notes on artificial hatching. *Trans. Amer. Fish. Soc.*, 50(2): 312-319.
Write: Local library for interlibrary loan of the original publication.

CRAWFORD, D. R. and W. J. J. DESMIDT

1922. The spiny lobster, *Panulirus argus*, of southern Florida: its natural history and utilization. *Bull. Bur. Fish.*, 38: 281-310.
Write: Local library for interlibrary loan of the original publication.

INOUE, M. and M. NONAKA

1963. Notes on the cultured larvae of the Japanese spiny lobster *Panulirus japonicus* (V. Siebold). *Bull. Jap. Soc. Fish.*, 29(3): 211-218.
Write: Dr. Makoto Nonaka, The Izu Division of the Shizuoka Prefectural, Fisheries Experimental Station, Shrahama. Shimado, Shizuoka-Ken, Japan.

NONAKA, M., Y. OHSHIMA and R. HIRANO

1958. Culture and ecdysis of the spiny lobster at phyllosoma stage. *Aquiculture*, 5(3): 13-15.
Write: Dr. Makoto Nonaka. Same as above.

SAISHO, T.

1962. Notes on the early development of phyllosoma of *Panulirus japonicus*. *Mem. Fac. Fish. Kagoshima Univ.*, 11(1): 18-23.
Write: Dr. Toshio Saisho, Kagoshima University, Kagoshima-Shi, Japan.

SAISHO, T.

1963. Notes on the early development of a Scyllarid lobster, *Parribacus antarcticus* (Lund). *Mem. Fac. Fish. Kagoshima Univ.*, 11(2): 174-178.

SAISHO, T.

1964. The first phyllosoma stage of the spiny lobster, genus *Panulirus*. *Mem. Fac. Fish. Kagoshima Univ.*, 12(2): 127-134.

SAISHO, T. and K. NAKAHARA

1960. On the early development of the phyllosoma of *Ibacus ciliatus* and *Panulirus longipes*. *Mem. Fac. Fish. Kagoshima Univ.*, 9(2): 84-90.
Write: Dr. Toshio Saisho.

SMITH, F. G. W.

1948. The spiny lobster industry of the Caribbean and Florida. *Carib. Res. Coun. Fish Ser. No. 3*: 1-49.

Write: Local library for interlibrary loan.

SMITH, F. G. W.

1958. The spiny lobster industry of Florida. *Fla. Bd. Conserv.*, Ed. Ser. No. 11: 1-36.

Write: Florida Board of Conservation Marine Laboratory, P. O. Drawer F, St. Petersburg, Florida 33731.

WITHAM, R., R. M. INGLE, and E. A. JOYCE, JR.

1968. Physiological and ecological studies of *Panulirus argus* from the St. Lucie estuary. *Fla. Bd. Conserv.*, Tech. Ser. No. 53: 1-31.

Write: Same as above.