

INCIDENCE OF MOLTING AND SPAWNING
IN THE SAME SEASON IN FEMALE
LOBSTERS, *HOMARUS AMERICANUS*

The reproductive cycle in female lobsters, *Homarus americanus*, normally covers 2 yr. Molting and mating occur first, primarily during the summer months. Laying of eggs (spawning) takes place about a year later. Hatching of eggs, followed by molting and mating again, takes place another year later (Aiken and Waddy 1980). However, departures from the normal cycle occur. One such departure is molting and egg laying in the same year (Aiken and Waddy 1980; Ennis 1980). Ennis (1980) noted that new-shelled ovigerous females obtained in fall sampling at various Newfoundland localities ranged towards the lower end of the size range of all ovigerous specimens and suggested that those females that molt and spawn in the same year are spawning for the first time. Aiken and Waddy (1980) similarly suggested that this phenomenon probably occurs primarily in the Adult-I year (i.e., first spawning).

In this paper I present data on the incidence of this phenomenon in a Newfoundland lobster population and illustrate its relationship to size of lobster.

Materials and Methods

Annually, since 1975, research fishing for lobsters has been carried out in autumn, following the summer molting/spawning period, in the area of Arnold's Cove, Placentia Bay, on the southeast coast of Newfoundland. The main purpose of this fishing is to tag legal lobsters to obtain estimates of standing stock during the following spring fishing season. All lobsters caught are measured, sexed, and examined for shell condition to determine whether molting has occurred recently and for the presence of external eggs. Since hatching of eggs laid the previous year occurs during July-August in this area, all ovigerous specimens present in the autumn carry recently laid eggs.

To determine the relationship between percent molting and laying eggs in the same season, it was necessary to convert the observed postmolt carapace length (CL) of new-shelled ovigerous specimens to premolt carapace length. This was done using a premolt-postmolt carapace length relationship for Arnold's Cove lobsters (Ennis 1978). The data for all years were pooled. The total number of ovigerous specimens examined

and the number which had molted prior to laying eggs at each 1 mm CL interval (pre-molt carapace length for new-shelled specimens) were subjected to probit analysis.

Results and Discussion

All ovigerous lobsters ≤ 70 mm CL (pre-molt) molted prior to laying eggs. Beyond 70 mm, the percentage of animals that molt and lay eggs in the same season declined very rapidly to zero at 82 mm CL (Fig. 1).

The lobsters in which Aiken and Waddy (1976, 1980) noted the occurrence of molting and egg laying in the same individual during the same molting/spawning season came from the southern Gulf of St. Lawrence. They suggested that the high summer water temperatures that prevail in the area may be the cause of the phenomenon. However, its occurrence in several Newfoundland localities (Ennis 1980) indicates that the phenomenon may be quite widespread.

At Arnold's Cove the percentage of non-ovigerous females that molt and lay eggs in the same season declines to zero over the size range (70-82 mm CL) where functional maturity increases to 50% (Ennis 1984). This is consistent with the suggestion that this phenomenon occurs in animals laying eggs for the first time. If this is so, the incidence of this phenomenon in a population is likely to be related to the minimum legal

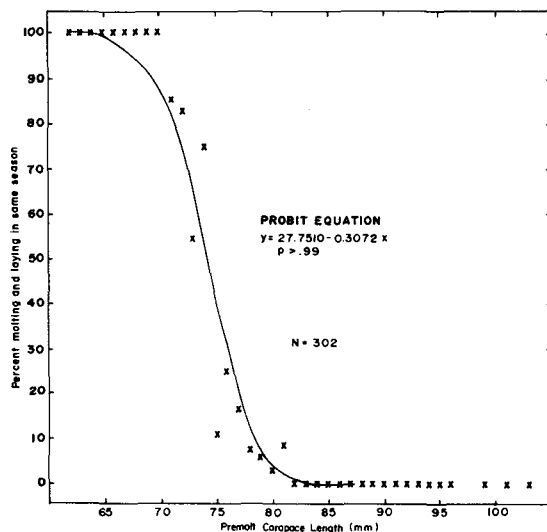


FIGURE 1.—Percentage of non-ovigerous female lobsters that molt and lay eggs in the same season in relation to size at Arnold's Cove, Newfoundland.

size (in relation to size at maturity) and exploitation rates in the fishery. In a fishery with a small minimum legal size and high exploitation rates, most of the ovigerous females in the population would be small animals laying for the first time.

The incidence of new-shelled ovigerous females in autumn sampling at Arnold's Cove has ranged from 0 to 38.5% of the total ovigerous specimens examined (Table 1). This year-to-year variability, which has also been observed elsewhere in Newfoundland (Ennis 1980), could be accounted for by variation in relative abundance of prerecruit animals caused by annual fluctuation in recruitment and exploitation rate.

TABLE 1.—Percentage of ovigerous lobsters with new shells in autumn sampling at Arnold's Cove, Newfoundland, 1975-82.

Year	No. ovigerous examined	% ovigerous with new shell	Carapace length (mm)	
			Range of ovigerous	Range of new-shelled ovigerous ¹
1975	75	10.7	72-103	73-83
1975 ²	16	12.5	65-92	65-71
1976	31	6.5	73-92	83-90
1976 ²	26	19.2	68-91	68-77
1977	78	38.5	71-101	76-88
1978	12	16.7	71-95	82-83
1979	31	25.8	72-99	72-90
1980	18	0.0	73-99	—
1981	31	6.5	71-101	71-81
1982	27	3.7	75-94	75

¹These are postmolt carapace lengths.

²Diver-caught samples obtained during the same period as the trap-caught samples.

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PARASITES OF OLIVE ROCKFISH, *SEBASTES SERRANOIDES*, (SCORPAENIDAE) OFF CENTRAL CALIFORNIA

The olive rockfish, *Sebastes serranoides*, inhabits reefs from Del Norte County, Calif., to San Benito Island, Baja California, Mexico. Olive rockfish are large (to 64 cm TL), active predators, usually found in the water column, but occasionally hovering over or resting upon rocky substrates. Juveniles are primarily midwater feeders, preying upon zooplankton and small fishes, though some demersal feeding (e.g., isopods, caprellid and gammarid amphipods, etc.) has been noted (Hobson and Chess 1976; Love and Ebeling 1978; Love and Westphal 1981). Adults feed almost entirely on nektonic forms of squid and fish and on substrate-dwelling octopus (Love and Westphal 1981).

Little is known about the parasite fauna of olive rockfish, as previous reports are either descriptions of newly discovered species (Cressey 1969; Moser and Love 1975; Love and Moser 1976; Moser et al. 1976) or surveys of particular parasites throughout a fish community (Turner et al. 1969; Hobson 1971; Dailey et al. 1981). As part of a life-history study, we investigated the parasite population of central California olive rockfish.

Methods

Specimens were collected monthly from April 1975 to February 1976 at a group of shallow-water pinnacles, about 11 km west of Avila Beach, San Luis Obispo Co., Calif., (Fig. 1). These pinnacles, at depths of 20-30 m, are situated 100-300 m offshore from Diablo Cove and North Cove and rise to within 5-10 m of the surface.

Six hundred olive rockfish, ranging from 8.6 to 49.2 cm TL, were collected by hook and line or spear, placed in plastic bags, and frozen for later dissection. After thawing, each specimen was