

had been covered with blebs, becomes smooth, pseudopodia are formed, and the cleavage furrow gradually disappears. Pressure applied for the same length of time before the completion of nuclear division does not prevent either nuclear or cytoplasmic division. Once the furrowing process is suppressed no cytoplasmic division occurs before the next full cell division about 20–28 hr. later.

The observation that the prevention of cytoplasmic division by pressure applied for a minimum time of 7–10 min. is sufficient to postpone it for one full cellular cycle suggests that the completion of chromosome duplication has itself a reversing influence upon the factors involved in cytoplasmic division. The minimum time which this influence requires to become effective is provided in the experiment by the artificial retardation of the furrowing process. If the initiation of both nuclear and cytoplasmic division were controlled by the ratio between utilization and production of chemically bound energy<sup>2-4</sup>, the increased rate of energy-utilizing macromolecular synthesis after mitosis<sup>5-7</sup> could be the mechanism for this reversal.

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### Albinism in an American Population of the Shore Crab, *Carcinus maenas* (L.)

THE common shore or green crab, *Carcinus maenas* (L.), is a widely distributed predator in inshore areas on both sides of the Atlantic. The ecological importance of the green crab, its status as a predator on commercial shellfish, and its extensive use in laboratory studies warrant a preliminary report on a recently noted abnormality found in a population of this species near Woods Hole, Massachusetts.

Two female *Carcinus maenas* with abnormal coloration were discovered by me in the summer of 1958 at Menemsha Creek, Martha's Vineyard Island, Massachusetts. In one specimen the right cheliped was entirely lacking pigment, appearing chalky white. The second specimen was similarly affected in all segments of a walking leg. The crabs, which had mated prior to capture, were isolated in running sea water at the Massachusetts State Lobster Hatchery and Research Station, and in November of 1958 they both became ovigerous. The white-clawed individual lost all her eggs during confinement; but the last of these were well developed by the time they became unattached. The second crab retained a part of the egg mass to the hatching stage. During March 20–30, 1959, slightly more than 700 eggs hatched from this female, 15 of them yielding larvæ totally lacking pigment except for the eyes. This group, slightly less than 2 per cent, were completely transparent and very readily separable from their siblings. Had they survived they probably

would have become totally white adults. Relatively small amounts of white such as present on the parent crab would have been indistinguishable in the larval stages, and thus it is possible that some of the 'normal' larvæ also would have exhibited some albinism had they attained the adult form.

An attempt was made to rear all the larvæ but *Artemia* nauplii provided as food were apparently too large for the larvæ to utilize and other foods were not available at the time. Within 23 days of initial hatching all larvæ had died from starvation or other adverse cultural conditions, but there was no apparent tendency for albino larvæ to succumb more quickly than the others.

Discovery of several additional albino adults in the tidal creeks near the Lobster Hatchery some 10 miles from Menemsha indicated that the anomaly was not restricted to a single locality. Indeed, John Ropes of the Narragansett Marine Laboratory has since found partially albino green crabs in Rhode Island waters and even in Plum Island Sound, Massachusetts, north of Cape Cod.

To determine the frequency of occurrence of this abnormality in a natural population a trapping survey was undertaken during the summer months of 1959, near the Lobster Hatchery. The traps used were of 1-in. chicken wire mesh, and very young crabs were not retained. The results, therefore, are based only on adults and large juveniles. Prior to May 26, 1959, a total of 5 albino crabs had been captured in Martha's Vineyard waters. Between May 26 and July 31, 1959, a total of 1,595 green crabs was trapped of which 45, or 2.9 per cent, were partial albinos. The degree of albinism exhibited varied considerably. Thirty-one specimens had only one dactyl affected, whereas some specimens had several entire appendages white. In two specimens a white maxilliped was found, and several individuals had white sternal plates. At least two specimens were irregularly mottled on the carapace and other portions of the body. Specimens which moulted in captivity showed the same degree of albinism after moulting as before. There was no indication that the abnormal coloration was the result of injury or regeneration.

The incidence of 3 per cent reported here for an adult population may be lower than the frequency for the population as a whole, for trapped animals often had one or more appendages missing which would tend to reduce apparent incidence. If selective predation tends to eliminate those individuals showing large white areas, the adult incidence is probably less than in a juvenile population.

The wide variation in degree of albinism suggests more than one gene may be responsible for inheritance and/or exhibition of the character, but controlled laboratory matings will be necessary to study the inheritance of this condition in more detail.

At the time the data were collected I was employed by the U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Milford, Connecticut. I wish to thank Dr. V. L. Loosanoff, director of the Milford Laboratory, for permission to undertake this study.

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