Reports

Marine Fungus Infecting Eggs and Embryos of Urosalpinx cinerea

This paper reports a fungus infestation of ova within the egg cases of the marine gastropod *Urosalpinx cinerea* (Say), the common oyster drill (*1*). This observation is important since it offers a possible biological control measure for this snail, which is one of the most destructive predators of young oysters. *Urosalpinx cinerea* is currently being studied by the U.S. Fish and Wildlife Service and other groups in an effort to develop methods for controlling its predation. This fungus is one of the few natural controlling factors known for this gastropod.

Fungus infestation in drill egg cases was first observed in cases taken from our outdoor tidal tanks, in which oyster drills are kept for laboratory study. Figure 1 shows an egg case, with its outer membrane removed, containing four dense masses which were once healthy ova and now are infected with fungus growth.

This fungus was isolated from the infested cases and was cultured by H. S. Vishniac (*2*), who thinks that it is a new form resembling *Sirolpidium zoophthorum*. She believes that this fungus belongs to the order Lagenidaiales and resembles the Sirolpidiaceae but lacks the septa which characterize this family, as defined by Sparrow (*3*). Because the fungus also resembles *Plectospira dubia* (Atkins), a marine fungus capable of infecting crustacean eggs, a pure culture of our fungus was sent to D. Atkins (*4*). She was successful in infecting the eggs of the oyster crab, *Pinnotheres,* with our isolate but is of the opinion that it is not the same as *P. dubia.*

Preliminary experiments conducted with a culture isolate demonstrated that this fungus will infect ova within the egg cases of *U. cinerea* in sterilized sea water, at 20°C, with a salinity of 21 parts per thousand. Moreover, ova do not have to be moribund for the infestation to develop. In one experiment, a flask containing 200 ml of sterile sea water and 20 washed egg cases containing ova and early gastrulae was inoculated with 3 ml of the cultured isolate. One hundred-percent infection occurred within 24 days, although the controls had developed from ova to protoconchs with no infestation.

In a similar experiment, 12 egg cases, of which four contained ova, four, veliger larvae, and four, protoconchs, were used. At the end of 28 days the four egg cases which initially contained protoconchs had released them; the veliger larvae developed to protoconchs; but the egg cases that contained ova were infected and did not develop. Normal development, with no infections, occurred in the control.

In early experiments, in which infected egg cases were used as an inoculum, only egg cases that contained ova through veliger stages were infected, not the older egg cases that contained protoconchs. Hence, infection appears to be confined to the ova and early developing stages and, in this respect, resembles the infecting behavior of *P. dubia* on crustacean eggs, inasmuch as *P. dubia* is likewise less pathogenic for the prezoeal and zoeal stages than it is in the early stages of the egg development (*5*).

Biotic control of the drill by using a trematode parasite which causes castration in snails has been suggested by Cole (*6*). The only other known biotic factor which might be considered as a means of control is a tube-dwelling amphipod, which was found to form mud tubes in drill egg cases and presumably destroys the ova of the drills on the West Coast (*6*). Hence, the fungus infestation here described presents another biotic factor which may be considered for control of *U. cinerea.* However, the practicability of control by the use of a fungus is doubtful, since any control measures in the field would demand the creation of environmental conditions conducive to infestation and dissemination. On the other hand, if this fungus can be carried and spread by the drills themselves, it may offer a specific, natural infecting agent capable of reducing efficiently the population density of the oyster drill.

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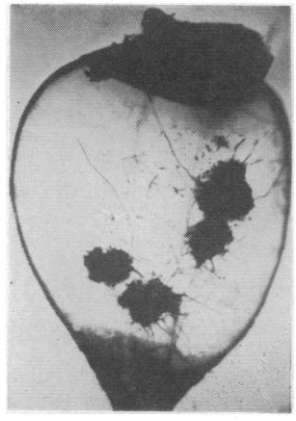

Fig. 1. An egg case of *Urosalpinx cinerea* with its outer membrane removed to show four dense masses of fungus-infested ova (× 10).

References and Notes

1. I wish to thank V. L. Loosanoff, for his assistance in pursuing this problem, and C. A. Nomejko, for preparing the photomicrograph. I also wish to thank H. S. Vishniac, for preparing the fungus isolate, and D. Atkins, for allowing me to refer to her correspondence with Vishniac.
2. H. S. Vishniac, department of microbiology, Yale University, New Haven, Conn.
3. F. K. Sparrow (Univ. of Michigan Press, Ann Arbor, 1943), p. 785.
4. D. Atkins, Plymouth Marine Laboratory, Plymouth, England.
5. D. Atkins, *J. Marine Biol. Assoc. United Kingdom* 33, 721 (1954).
6. M. R. Carriker, *Special Science Rept. Fisheries* No. 148 (1955).

4 April 1957

Regulation of Liver Cholesterol Synthesis by Lymph Cholesterol

Very little is known about the homeostatic mechanism(s) regulating the blood and tissue cholesterol levels in the animal body. It has been reported that the endogenous synthesis of cholesterol is, in part, regulated by the intake of dietary sterol. In the dog and rat who have previously been fed cholesterol in their diet, there is a depression of liver cholesterol synthesis, both *in vivo* and *in vitro* (*1*). In addition, fasting has been shown to reduce markedly the rate of cholesterol synthesis in the rat (*2*).

Of particular interest to the atherosclerosis problem is the endogenous synthesis of cholesterol and its reabsorption. It has been suggested, on the basis of recent findings (*3*), that reduction of endogenous synthesis and also of reabsorption of endogenous cholesterol may lower the cholesterol level in the blood and tissues. In connection with studies on tissue cholesterol and cholesterol ester synthesis being carried out in our laboratories, an interesting observation was made on the effect of removal of

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