The Effects of Low Temperature on *Lymnaea truncatula*

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Summary. A group of 20 young and another of 20 adult *Lymnaea truncatula* were abundantly supplied with food and kept continuously under cold conditions (5°C) in the laboratory for 3 months and the effects of low temperature on their behaviour, growth and reproduction were studied.

The results indicate that at low temperature the activity of *L. truncatula* was markedly reduced but complete hibernation did not occur. The snails seem to be unaffected by the low temperature itself since none (both young and adult) died during the 3 months that they were kept at 5°C.

Reduced feeding, even in the presence of abundant food, during the cold conditions caused an almost total inhibition of growth. Of even more significance was the suppression of reproduction which was connected with the metabolic rate of adult snails kept at low temperature.

Young snails seem to profit by exposure to low temperature. On the return to normal laboratory temperature (16-22°C) the young snails became very active, fed voraciously, grew rapidly, tended to live longer and produced more offspring than the controls. Relatively, fewer eggs were deposited in this case.

The results indicate that under natural field conditions in England, where temperature fluctuations during the usually mild winter months are common, the greater burden of increasing the population in overwintered snails must rest on the younger members of the community.

Introduction

Various species of lymnaeid snails are known to be resistant to low temperatures. Thus Mehl (1932), Roberts (1950) and Kendall (1953) working on *L. truncatula*, the intermediate host of *Fasciola hepatica* state that the snails do not suffer from the long cold winters as well as low laboratory temperatures. Boray (1969) found *L. tomentosa* to be also resistant to low field and laboratory temperatures.

No detailed investigations, however, have been made on the effects of low temperature on *L. truncatula*. The following experiments have been designed to study the effects of low laboratory temperature on the behaviour, growth and reproduction of both young and adult snails.

Materials and Methods

Some *L. truncatula* eggs which had been deposited on the same day were incubated. The freshly hatched snails were reared in an algal culture (Hodasi, 1972) until they were 2 weeks of age. Twenty young snails representing “Experimental group 1” were randomly selected from the brood, measured (mean shell length of 2.1 mm) and transferred to a dish with freshly cultured algae. To simulate cold or winter conditions, the covered dish containing the snails was kept in a thermostatically regulated refrigerator at 5°C for 3 months. At 2-week intervals
Fig. 1. *L. truncatula*: Growth of two groups after 3 months exposure to low temperature (5° C) and of an unexposed control group plotted on a logarithmic scale. Experimental group 1 snails were exposed when 2 weeks old and Experimental group 2 when 5 weeks old.

the snails were quickly measured and the algal cultures changed, the change and return to the cold condition not exceeding 10 minutes.

From the two-week old brood of snails a second batch of 20 designated “Experimental group 2” was selected and reared under normal laboratory conditions (16-22° C) until they attained full sexual maturity. When 5 weeks of age (average shell length of 5.9 mm) the group was subjected to 3 months low temperature and was similarly treated as before.

Results

Effects of Low Temperature on *L. truncatula*

Young snails (Experimental group 1) did not feed for the first four days after introduction into the refrigerator, but thereafter small quantities of algae were taken. No change was noticed in the length of the snails at the end of 2 weeks exposure to low temperature. At the end of 6 weeks the mean length had slightly increased to 2.2 mm and there was a corresponding increase in the amount of food consumed. There was no change in growth and amount of food taken at the end of 2 months. By the end of the 3 months exposure there was a small increase in growth, the mean shell length of the 20 snails was 2.5 mm. Very little food was consumed during the fortnightly changes of algal culture. Reduced activity was observed in all the snails but there was no true hibernation.

Adult snails (Experimental group 2) showed no increase in length when they were kept for 2 weeks in the refrigerator. Two snails attempted to hibernate completely by attaching themselves to the glass cover of the culture dish. There was no oviposition. After a month there was a slight increase in length from 5.9 to 6.1 mm. During this period 5 egg masses containing a total of 12 eggs were...