

be that budding is confined to the spleen, and that resulting erythroplastids are rapidly destroyed in the Anura, but persist in *Batrachoseps* and to a lesser degree in other urodeles.

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¹ Emmel, V. E., *Amer. J. Anat.*, **33**, 347 (1924).

² Duran-Jorda, F., *Acta med. Scand.*, **40**, 183 (1951).

³ Jordan, H. E., and Spiedel, C. C., *Amer. J. Anat.*, **32**, 155 (1923).

⁴ Dawson, A. B., *Amer. J. Anat.*, **42**, 139 (1928).

Hatching the Contents of Cysts of *Heterodera rostochiensis* with Alternating Temperature Conditions

It is well known that the larvæ of the potato root eelworm, *H. rostochiensis*, are stimulated to emerge from the eggs contained in the cysts by a secretion from the roots of growing potato plants. This root diffusate can be collected and used in the laboratory. Anhydrotetroneic acid is also an effective stimulant.

It has been found that an alternation of a high with a low temperature during the hatching of *H. rostochiensis*, with either root diffusate or anhydrotetroneic acid, leads to a significant increase in the number of larvæ emerging from a batch of cysts.

Experiments have been conducted in which weekly counts have been made to observe the effect of hatching the cyst contents when: (a) a temperature of 25° C. is constantly maintained; (b) the temperature is lowered from 25° to 15° C. for 5 hr. twice a week; (c) the temperature is lowered from 25° to 15° C. for 5 hr. five times a week.

The results shown below were obtained from several experiments with potato root diffusate.

NUMBER OF LARVÆ EMERGING FROM BATCHES OF ONE HUNDRED CYSTS (MEAN OF FOUR REPLICATES) AFTER TWELVE WEEKS TREATMENT

Exp. No.		Constant temperature	Alternating temperature Twice a week	Five times a week
1	Non-vintage cysts*	5,739	11,157	13,201
2	Non-vintage cysts	6,222	8,355	11,118
3	Vintage cysts	11,370	17,530	26,819
4	Vintage cysts	13,126	18,421	26,324

* Vintage cysts are cysts of a known age.

A hatching treatment which includes an alternation of temperature probably offers conditions more nearly approximating to those in the soil than one in which the temperature is kept constant, and may help to obtain a complete hatch of larvæ from eelworm cysts.

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Rate of Activity as a Function of Intertidal Height within Populations of some Littoral Molluscs

THE physiological reality and profound ecological significance of the phenomenon of regulation of rate functions towards a constant, in response to maintained temperature differences, within the species in poikilotherms, has been widely recognized in recent times. Much attention has been directed in this

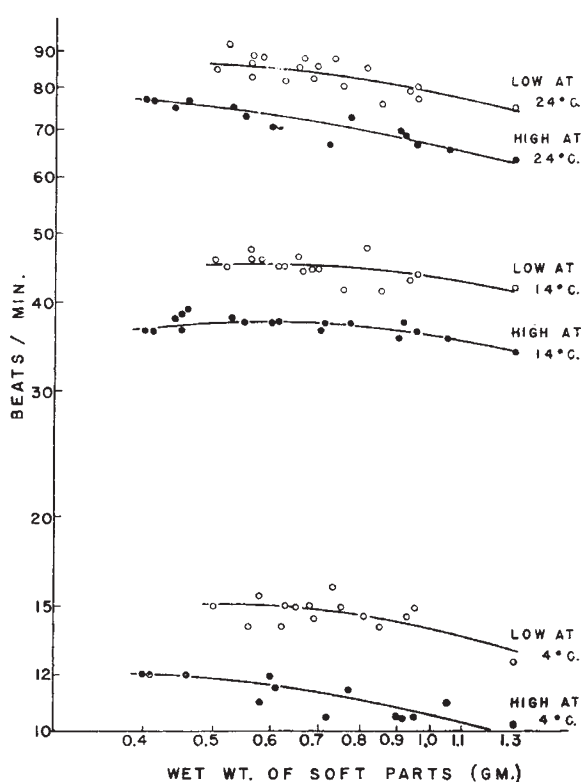


Fig. 1. Relation between frequency of heart-beat and wet weight of soft parts, at various temperatures, in *Acmaea limatula* from Palos Verdes, Calif. Open circles represent low-tide pool individuals from a permanently submerged level; filled circles represent mid-tide individuals from a level (3-4 ft. above zero datum, U.S. Coast and Geodetic Survey Tide Tables), submerged 40-50 per cent of the time. Points are averages of three readings for ten beats each.

connexion to a study of populations spatially separated by a wide range of latitude¹⁻³ or temporally separated by the annual cycle of seasons^{4,5}. Indications of the existence of similar intraspecific differences between high and low members of populations of intertidal invertebrates are reported in the present communication.

The lower in the normal intertidal range of distribution limpets of the species *Acmaea scabra* and *A. limatula* are collected, the higher the rate of heart-beat at any given temperature. This is shown, with weight controlled, in Fig. 1. The heart has been exposed by a trephine hole in the shell, after which the rate of beat settles down shortly to a rather uniform value for many days. Counts were made three days after collecting and trephining; the animals were kept in the meantime in standing, aerated sea water at 14° ± 0.5° C., changed daily. Two hours was allowed for equilibration at each temperature. The regime of temperatures and of handling in collecting, operating and counting, while not critical, has been carefully standardized for the data on *A. limatula*. A few counts were discarded because of excessive locomotor activity or irregularity of heart-beat.

Mussels (*Mytilus californianus*) show the same relationships (Fig. 2) when rate of propulsion of water is measured by photoelectric estimation of clearing rate of dilute colloidal graphite suspensions^{6,7}. Each point on the graph represents the average of three measurements for each individual in a group