

Temperature Coefficients for Development in Cladocerans.

L. A. BROWN. (Introduced by W. W. Swingle.)

From the Zoological Laboratory, Harvard University.

In an earlier paper¹ it was shown that the temperature characteristics for the duration of an adult instar in several species of cladocerans were of the same order of magnitude as those found for development in other arthropods, but that certain specific differences were still markedly manifest. The temperature characteristics for the different temperature ranges and also the position of the critical temperatures or "breaks" in the *log rate* against *reciprocal absolute temperature* graphs were accorded a natural interpretation in terms of the geographical distribution and seasonal rhythms of the species studied. The present paper presents data on the temperature coefficients for the complete parthenogenetic generation cycle of several common species of cladocerans.

The literature on the biological application of van't Hoff's rule has been summarized by Kanitz² and Przibram.³ Most of the papers dealing with this subject have been concerned with the relative magnitudes of the temperature coefficients and a subsequent classifying of vital activities into those controlled by physical forces and those controlled by purely chemical reactions. The comparison of several species of cladocerans reared in the laboratory for many generations under similar environmental conditions should reveal specific differences, should such be present, and might be taken to suggest a means for the physiological comparison of related forms. In addition to the ease of propagation in the laboratory, cladocerans are well adapted for such a study as their parthogenetic reproduction insures material that is genetically uniform, and their development by instars provides stages which are morphologically well defined.

Six species of cladocerans were used and one of these, *Daphnia pulex*, included two varieties, the typical form and a thelytokous form⁴ which is probably hexaploid in constitution.⁵ The following table gives the time in hours from the beginning of the first young instar until the end of the first adult instar, when the females produce their first brood of young, for each of several temperatures and the Q_{10} for the temperature intervals 13° to 20°, 20° to 30°, and 25° to 35° C.

On comparing the Q_{10} of the different species for the temperature interval 20 to 30°, decided differences are apparent. Two of

TABLE I.

°C.	Moina macrocopa		Pseudosid- da biden- tata		Simoceph- alus, all species		Daphnia pulex (type)		Daphnia longispina		Daphnia magna		Daphnia pulex (984)	
	time in hours	Q ₁₀	time in hours	Q ₁₀	time in hours	Q ₁₀	time in hours	Q ₁₀	time in hours	Q ₁₀	time in hours	Q ₁₀	time in hours	Q ₁₀
13	296.8		517.6		381.0		309.7		284.5					
		3.96		2.90		2.36		2.64		1.82				
20	114.2		246.0		208.5		156.8		187.0		203.1		170.3	
25	66.9	2.39	134.3	2.03	129.1	1.81	100.8	1.70	138.0	1.48	146.0	1.31	120.4	1.19
30	49.5	1.76	121.2	1.63	115.0	1.15	92.1		126.0		155.0		143.2	
35	38.0		82.4		112.5		Will not live and reproduce.							

the species show a value of the temperature coefficient which is above 2.00; two with a value near 1.75; one with a value near 1.50; and two with a value near 1.25. The reality of these differences indicated by the temperature coefficient for development is emphasized by comparing the lethal temperatures of the adults of these same species. The lethal temperatures, determined arbitrarily by suddenly immersing the animals in water of the desired temperature for one minute, are: *M. macrocopa* 48°, *P. bidentata* 48°, *Simocephalus* species 43°, *D. pulex* typical 44°, *D. longispina* 42°, *D. magna* 41°, and *D. pulex* "984" 41°. The species are seen to fall approximately into the same groups as determined by the temperature coefficient for development of the younger animals.

¹ Brown, L. A., *J. Gen. Physiol.*, 1926-27, x, 111.

² Kanitz, A., *Temperatur und Lebensvorgänge*, 1915, Berlin.

³ Przibram, H., *Temperatur und Temperatoren*, 1923, Leipzig und Wein.

⁴ Banta, A. M., *Z. Indukt. Abstammungs u. Vererbungslehre*, 1925, xl, 28.

⁵ Schrader, F., *Z. Indukt. Abstammungs u. Vererbungslehre*, 1925, xl, 1.

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The Effect of CO₂ Administration Upon Parathyroid Tetany.

W. W. SWINGLE, W. F. WENNER AND P. STANLEY.

From the Zoological Laboratory, State University of Iowa.

It has been known for some years that certain mineral acids such as HCl, and acid producing salts such as CaCl₂ and NH₄Cl are effective agents in the treatment of infantile tetany, and have also been successfully employed in cases of experimental tetany.