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Respiratory Regulation of the Crayfish (Cambarus immunis).

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Some 600 modified Winkler oxygen consumption tests were made to determine (1) the normal variation in oxygen consumption of crayfish under constant oxygen tensions, CO_2 content and H-ion concentration, (2) the effect of H-ion concentration on oxygen consumption, and (3) the oxygen consumption under successively lowered oxygen tensions.

Crayfish were found to exhibit considerable variation in their normal oxygen consumption from hour to hour, the consumption being frequently doubled or halved. Both sexes, in weights ranging from 1.5 to 28.0 gm., exhibit this respiratory fluctuation.

Oxygen consumption determinations for 6 consecutive hours, during which crayfish were tested in water ranging in pH from 6.8 to 5.2, gave no evidence within these limits of a possible effect of H-ion concentration on respiration. The variation in oxygen consumption from hour to hour was of the same magnitude previously determined for normal variation in oxygen consumption under a constant pH.

Respiratory regulation under different oxygen tensions was determined by measuring the oxygen consumption, for successive hours, of crayfish which were steadily lowering the oxygen tension of the water by means of their own respiration. Crayfish were tested individually and in groups of 10. The range of oxygen tensions investigated was from 115% to 8% saturation, partial pres-

sure, at 25° C. Grouping the data according to the weights of the individuals revealed that large animals averaging 17.1 gm. were able to regulate oxygen consumption in a normal manner, down to about 40% saturation. Medium-sized animals, averaging 9.0 gm. regulate down to about 30% saturation, while smaller individuals averaging 4.3 gm. are able to regulate down to about 20% saturation.

Asphyxiation occurs in definite stages and is initiated between the tensions of 15 and 10% saturation. Shortly before or during asphyxiation, the crayfish frequently liberates oxygen, which phenomenon is generally followed by increased respiration. Upon death, oxygen is liberated by the body.

Respiratory regulation in the crayfish is very good down to between 40 and 20% saturation, depending on the age of the individual. Below the lower limit of regulation, respiration is spasmodic and is followed shortly by asphyxiation. Within the limits tested, CO_2 content and H-ion concentration of the water have no marked effect on oxygen consumption. Finally, the crayfish normally exhibits considerable hour by hour variation in oxygen consumption.

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Influence of Annular Tympanic Cartilage on Development of Tympanic Membrane (Rana pipiens).

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The formation of the tympanic membrane constitutes one of the last adult structures to be developed during the metamorphosis of the frog tadpole. The present communication, based on over 300 autoplastic transplantations, is designed to point out the factors responsible for its formation.

Histological sections of tympanic membranes in various stages of development show clearly that a definite series of events takes place in the integument during which the *stratum spongiosum* and *stratum compactum* layers disappear and the latter is replaced with a network of fibrous elements typical of the adult tympanic membrane.

Preliminary transplantations of skin grafts from the back and side of the tadpole to the tympanic membrane region, resulted in the formation of typical membranes in the grafts during metamorphosis.