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.

This would indicate that all integument of the metamorphosing tadpole is totipotent in this regard and that structures in the immediate vicinity of the tympanic membrane region have a direct influence on membrane formation.

Autoplastic transplantations of the annular tympanic cartilage in various stages of development were made to regions under the skin of the side and under the skin of the back of metamorphosing tadpoles. Typical tympanic membranes were formed in the skin of the back directly over the annular tympanic cartilage transplants. Less perfectly formed membranes developed in the skin of the side directly over the transplants. Histological sections of such membranes showed that typical cellular transformations had taken place, identical to those found in normal membrane formation.

All cases of complete extirpation of the annular tympanic cartilage exhibited a total absence of tympanic membrane formation, all external and histological evidences being absent. This, together with the transplantation results, indicates the necessary presence of the developing annular tympanic cartilage for normal tympanic membrane formation.

Transplantation of the annular tympanic cartilage beneath normal integument at a late stage of development, and at a time when the normal tympanic membrane is well formed, induced slight, if any, transformation of the integument. This would indicate that the influence of the annular tympanic cartilage, on membrane formation, is limited to a definite period of its development. The data indicate also that skin will transform into tympanic membrane only when in close contact with the annular tympanic cartilage. The formation of the normal tympanic membrane illustrates an indirect method of the thyroid hormone in bringing about certain metamorphic transformations in the tadpole.

This conclusion seems justified in view of the fact that the skin fails to undergo modifications typical of tympanic membrane formation in the absence of the annular tympanic cartilage. If the thyroid hormone operated directly through the blood stream, removal of the annular tympanic cartilage would not have inhibited the process. It is only indirectly, therefore, through the development and presence of the annular tympanic cartilage, that the thyroid hormone is able to induce tympanic membrane changes in the skin over the cartilage.