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Oxygen Consumption Without Carbon Dioxide Production in Acidified Tissues.

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In the course of measurements of the respiration of several vertebrate tissues by the tonometric method described by Amberson¹ we detected a very persistent oxygen consumption, not associated with carbon dioxide production, which appears after acidification. This effect was first observed in the eggs of *Fundulus heteroclitus*. It has since been detected in frog muscle. In the lateral line nerve of the dogfish a persistent oxygen consumption after acidification has also been observed, but in this tissue carbon dioxide continues to be produced in small quantities, amounting to about 30% of the oxygen which is consumed.

This effect is not at once evident after acidification, but can be demonstrated in about one hour in the *Fundulus* eggs and embryos. The immediate effect of the addition of acid to this material is a burst of respiratory activity, together with the liberation of combined carbon dioxide. This phase is over in about half an hour. If the dissolved carbon dioxide be now removed by aeration, it can be shown that in succeeding periods of time, up to five days, oxygen disappears without any associated carbon dioxide production. The magnitude of this persistent oxygen consumption appears to be related to the stage of development, being greater in embryos of 8 to 12 days than in fresh eggs. In embryos of this age the oxygen consumption continues at a level of from 5 to 10 cu. mm. per gm. of fresh weight per hour, or approximately 7 to 14% of the previous respiratory rate. The rate of oxygen consumption is usually greater on the second day after acidification. This oxygen consumption persists even after neutralization of the acid. It is not affected by 0.03M potassium cyanide and is thermostable, continuing in eggs which have been boiled as much as one hour.

Acidification of the gastrocnemius muscle of the frog results in the liberation of carbon dioxide from the carbonates present and a depression of the rate of respiration which falls to about 5 to 10% of the resting value at the end of 2 hours. (Fig. 1.) The rate of carbon dioxide production slowly decreases and disappears between 2 and 24 hours after acidification. Muscles differ considerably in

¹ Amberson, W. R., *Biol. Bull.*, 1928, **55**, 79.

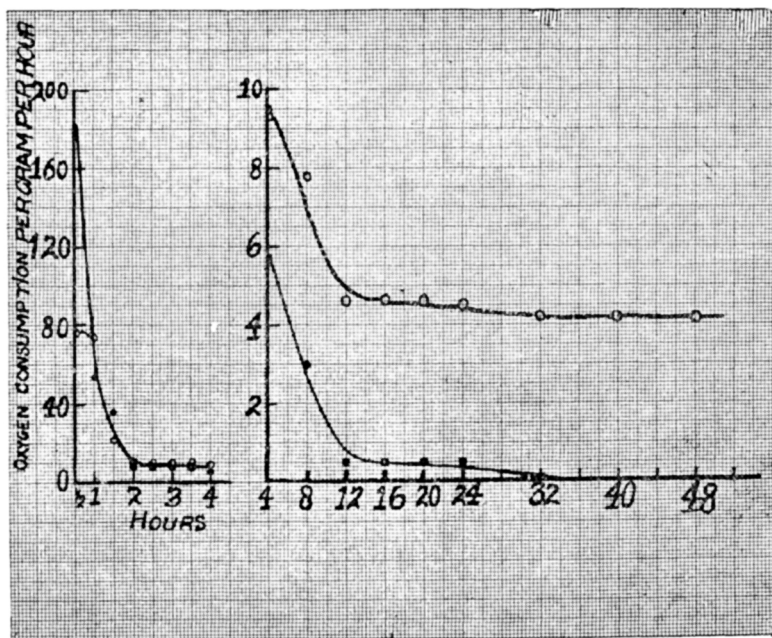


FIG. 1.

The effect of acidification upon gaseous exchanges of frog gastrocnemius muscle.

Ordinate—cu. mm. oxygen consumption per gm. of fresh weight per hour.

Abscissa—time in hours after acidification.

○ oxygen consumption.

● carbon dioxide production.

the time at which carbon dioxide production ceases, but in all the terminal rate of oxygen consumption is surprisingly constant at 4 to 6 cu. mm. per gm. of fresh weight per hour for at least 76 hours. Boiling for one hour does not alter the character of the effect.

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Effect of Freezing on Microorganisms in Various Menstra.

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We showed¹ that prolonged action of freezing temperatures destroyed many yeasts and bacteria although with some species absolute sterility of the suspensions was not attained even after freezing at -15°C for 160 weeks. These investigations have been continued

¹ Tanner, F. W., and Williamson, B. W., *PROC. SOC. EXP. BIOL. AND MED.*, 1928, **25**, 377.