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Absolute Values and Temperature Coefficients of Arbacia Egg Respiration.*

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Though all workers have agreed that the respiration of Arbacia eggs increases about 5 times on fertilization, there is disagreement as to the absolute values. Since some theoretical importance attaches to these magnitudes, it seemed desirable to resolve the discrepancies. The most recent determinations by Tang[1] and Tang and Gerard[2] and by Whitaker[3] all utilized the Warburg manometric technique, yet apparently differed by a factor of nearly 2. Expressed as cubic millimeters of oxygen used per 10 cu. mm. of eggs per hour (at 21°C.), the former observers obtained for resting eggs, 0.8; the latter, 0.4-0.5. Differences in technique included: securing the eggs and preparing the suspension; shaking in the manometers; determination of egg volume; and experimental temperature. All these points have been checked by direct comparison of the 2 techniques at each step. The figure obtained in the present series is 0.9.

The results show that whether eggs are obtained by picking out ovaries or allowing the eggs to shed from the gonopores of the half shell is immaterial. Likewise, mild hand centrifuging or filtering through cheese cloth has no effect. Further, both the shaking rates used permitted an adequate oxygen supply without injury to the eggs.

A major difference appeared, however, in the techniques for evaluating egg volume. The egg volume determined by centrifuging a given amount of suspension to constant egg mass was regularly about 80% greater than that calculated from the egg diameter (determined with ocular micrometer) and cell count (with haemocytometer). That the centrifuge method is in error, due to imperfect packing, egg jelly, etc., was further shown by examining an egg mass in the Harvey centrifuge-microscope. During strong centrifuging individual eggs remained widely separated, often by a full egg diameter. Applying this correction to Whitaker's figures, they are in essential agreement with ours and Tang's.

* Aided in part by a grant from the Rockefeller Foundation to the University of Chicago.

[1] Tang, P. S., *Biol. Bull.*, 1931, **60**, 242.

[2] Tang, P. S., and Gerard, R. W., *J. Cell. Comp. Physiol.*, 1932, **1**, 503.

[3] Whitaker, D. M., *J. Gen. Physiol.*, 1933, **16**, 475, 497.

Of especial interest was the influence of temperature on egg respiration. The temperature coefficient for fertilized eggs was slightly under 2, between 11° and 30°C., essentially as reported by Loeb and Wasteneys.[4] The unfertilized eggs, however, show a high coefficient, over 4; so that a 5-fold increase in respiratory rate is true only for intermediate temperatures. At 10° the increase is 10 times and at 31-32°, by slight extrapolation (it is not practical to use these temperatures because of injury), there is no change at all on fertilization. These striking differences in resting and fertilized respiration indicate some fundamental change in the chemistry of the egg. The general reaction: substrate is oxidized, still goes on. Whether the change indicates a shift of master reaction from one member of the concatenated reactions of oxidation to another, or whether it indicates that fertilization introduces an excess of catalyst so that some physical process now becomes the limiting factor in determining oxidation rate, cannot be decided from these experiments.

We wish to acknowledge the kindness of Dr. A. J. Goldforb in permitting us to compare our results with his unpublished ones, which agree on a number of the above points.

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Ovarian Response of Hypophysectomized Rats to Urinary Follicle-Stimulating Principle.*

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Zondek[1] and Kurzrok,[2] by injections in normal immature female rodents, have demonstrated that certain urines (after ovariectomy and the menopause) may induce predominantly a follicular growth. Leonard[3] has shown that the principle in this urine can be differentiated from that in P.U. by the rabbit ovulation test. The dif-

[4] Loeb, J., and Wasteneys, H., *Biochem. Z.*, 1911, **36**, 345.

* Aided by a grant from the Committee for Research in Problems of Sex, the National Research Council.

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[1] Zondek, B., *Klin. Wochenschr.*, 1930, **9**, 393.

[2] Kurzrok, R., 1933, in press.

[3] Leonard, S. L., *Am. J. Physiol.*, 1931, **98**, 406.