

and carbon tetrachloride produce a fatty degeneration of the liver, while phosphorus attacks the Kupfer cells more.

The observation that benzol intoxication does not interfere with the rise in serum calcium induced by parathyroid extract, indicates that the mechanism of action of phosphorus and hydrazine is not through an injurious action on the bone cells.

Summary. 1. In acute intoxication experiments with the liver poisons, phosphorus, hydrazine and carbon tetrachloride it was found that phosphorus intoxication almost eliminates the serum calcium rise normally produced by injection of parathyroid extract, hydrazine causes a less marked rise and carbon tetrachloride has no appreciable retarding effect. 2. Since the bone-marrow poison, benzol, causes no alteration in the blood calcium curve following injection of parathyroid extract, the action of phosphorus and hydrazine appears not to be through an injurious action on the bone cells.

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Effect of Ultracentrifuging on Oxygen Consumption of the Eggs of *Ascaris suum*, Goeze.

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That the maintenance of structural integrity is of prime importance for the normal functioning of a large part of the oxidative processes of the cell has been demonstrated by a number of workers.¹⁻⁵ Bodine and Boell^{6, 7} have shown that the normal activity of much of the so-called cyanide sensitive respiratory mechanism (indophenol oxidase system) is interfered with as the result of the structural disorganization of the cell. Recently Beams and King⁸

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1 Warburg, O., and Meyerhof, O., *Pflüg. Arch.*, 1912, **148**, 295.

2 Warburg, O., *Pflüg. Arch.*, 1914, **158**, 189.

3 Runnström, J., *Protoplasma*, 1930, **10**, 106.

4 Quastel, J. H., and Wheatley, A. H. M., *Bioch. J.*, 1932, **26**, 726.

5 Quastel, J. H., *Bioch. J.*, 1932, **26**, 1685.

6 Bodine, J. H., and Boell, E. J., *J. Cell. and Comp. Physiol.*, 1936, **7**, 455.

7 Bodine, J. H., and Boell, E. J., *J. Cell. and Comp. Physiol.*, 1936 (in press).

8 Beams, H. W., and King, R. L., 1936 (in press).

found that cleavage in the eggs of *Ascaris suum* was not affected even though the eggs were subjected to forces of 150,000 to 400,000 times gravity (obtained through the use of the Beams⁹ ultracentrifuge). Although such eggs were completely stratified into a centrifugal cap of heavy yolk material, a middle band of clear protoplasm, and a light layer of lipoidal material, cleavage rate in centrifuged eggs was not noticeably different from that in normal eggs.

The purpose of the experiments reported herein was to determine the effect of ultracentrifuging on the oxygen consumption of the eggs of *Ascaris suum*.

The eggs used were obtained fresh from adult worms, expressed into saline, washed repeatedly to remove surplus albumin, and stored at 5°C. until needed. In the centrifuge experiments a concentrated suspension of eggs was rotated for 30 minutes at a force of 150,000 times gravity. Oxygen consumption was measured by means of sensitive microdifferential manometers ($K_{O_2} = 0.160$). In an experiment one drop of a concentrated suspension of ova (containing ca. 5,000 eggs) was supported by a convenient hanger in the manometer vessel. Ten percent KOH was used to absorb CO_2 . In the experiments involving the use of cyanide a freshly prepared KCN solution was neutralized with HCl to pH 7.0 and diluted to 0.001 molar immediately before use. Eggs were washed 3 times with cyanide and were then supported in the manometer in cyanide. KOH-KCN mixtures for absorbing CO_2 , as recommended by Krebs¹⁰ and van Heyningen,¹¹ were used. For each sample of eggs tested, the respiratory rate of normal eggs was determined in duplicate; the effect of centrifuging or cyanide, in duplicate or triplicate. O_2 uptake was measured at $30^\circ \pm 0.02^\circ C.$ over a 4 to 6-hour interval. At the end of the experimental period the eggs were flooded over a squared slide and counted. The respiratory rate (Q_{O_2}) was calculated in terms of mm.³ O_2 per hour per 10^6 eggs.

The results of a typical experiment are presented in detail in Table I; a summary of all experiments is contained in Table II.

Table I shows that the Q_{O_2} for centrifuged eggs was much greater during the third and fourth hours than during the preceding 2, an indication that at least partial recovery from the effects of centrifuging had taken place. Twenty-four hours later such eggs showed complete reorganization of cellular components and many were in the 2-cell stage.

⁹ Beams, J. W. and Pickels, E. J., *Rev. Sci. Inst.*, 1935, **6**, 299.

¹⁰ Krebs, H. A., *Bioch. J.*, 1935, **29**, 1620.

¹¹ Heyningen, W. E. van, *Bioch. J.*, 1935, **29**, 2036.

TABLE I.

Time, Hours	Q_{O_2} (mm ³ per hour per 10 ⁶ eggs)			
	Control	10 ⁻³ M KCN	Centrifuged	Centrifuged + 10 ⁻³ M KCN
1	97.6	35.7	25.5	28.0
2	97.6	25.9	22.3	28.0
3	102.9	13.0	37.3	16.0
4	113.4	13.0	67.0	19.2

TABLE II.

Experimental condition	Ave. Q_{O_2}	% respiration. Control = 100	Remarks
Control	102.3	100	Cleavage after 24 hrs.
10 ⁻³ M KCN	11.3	11	Cleavage 48 hrs. after removal of cyanide.
Centrifuged	22.3	21.8	Cleavage after 24 hrs.
Centrif. + 10 ⁻³ M KCN	12.8	12.5	Cleavage 48 hrs. after removal of cyanide.

Although cyanide markedly depressed the respiration of normal eggs it had no effect on the O_2 uptake of centrifuged eggs. Thus centrifuging seems to exert its effect primarily on the cyanide sensitive respiratory mechanisms.

The action of cyanide is rapid, maximal inhibition being apparent within 2 hours after application. With unneutralized cyanide Zawadowski¹² has claimed that cyanide produces maximal inhibition only after 5 to 9 hours in the eggs of *A. megalocephala*. It is noteworthy that the increase in respiration with time does not occur in centrifuged eggs in the presence of cyanide although physical reorganization apparently is not interfered with.

The results indicate that respiration in *Ascaris* eggs is depressed as a result of the disorganizing effect of ultracentrifuging and that apparently the respiratory processes and those relating to cleavage are not intimately associated.

¹² Zawadowski, M. N., *Biol. Gen.*, 1926, **2**, 442.