manifestation is a factor in predisposing animals to dinitrophenol intoxication. This and other possible explanations of the sex difference reported herein are now being investigated in this laboratory.

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Comparison of Capacity of Some Nitrated Phenols to Stimulate Respiration of Yeast.*

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We have shown that the action of several of the nitrated phenols on the respiration of yeast may be excitatory or inhibitory, depending on the dosage, and that the undissociated form is the active agent in such stimulation or inhibition.[1, 2, 3] A method for comparing the activities of nitrated phenols as metabolic stimulants has been developed and applied to 3 of the dinitrophenols and to the mononitrophenols.[3] We present herewith the results of experiments designed to compare the activities of 5 nitrated phenols which have been used extensively as metabolic stimulants. These are 2-4 dinitrophenol,[4] 4-6 dinitro-o-cresol,[5] 2-4 dinitro-α-naphthol,[6] 2-4 dinitro-cyclo-pentyl phenol[6] and 2-4 dinitro-cyclo-hexyl phenol.[6] The last 2 compounds were provided through the kindness of Dr. M. L. Tainter, who obtained them from Hoffman, LaRoche and Company. In every case aqueous solutions of the sodium salts were employed.

The pure yeast culture and the experimental methods have been described elsewhere.[2, 3] In every case the yeast, after preliminary washing, was suspended in 1% glucose made up in 0.1M phos-

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TABLE I.
Effect of Optimal Concentrations of 5 Nitrated Phenols on Respiratory Rate of Yeast.

Compound	Optimal concentration at pH 6.8			Aver. respiratory rate†	Respiratory rate Control = 100
	Total		Free acid		
	Mg. %	Molar	Molar		
None	—	—	—	35.3	100
2-4 dinitrophenol	40*	1.79×10^{-3}	2.96×10^{-6}	51.7	146.4
4-6 dinitro-o-cresol	10	5.05×10^{-4}	7.96×10^{-6}	52.5	148.8
2-4 dinitro-α-naphthol	10	4.27×10^{-4}	—	38.4	109.8
2-4 dinitro-cyclo-hexyl-phenol	1.75	6.58×10^{-5}	—	52.5	148.8
2-4 dinitro-cyclo-pentyl-phenol	1.25*	4.56×10^{-5}	—	51.9	147.0

*Weighed as the sodium salt.
†Aver. respiratory rate is given in cu. mm. of oxygen at N.P.T. per 10^8 cells per hour.

phate buffer, pH 6.8, and the respiratory rate was measured in the conventional form of Warburg manometer in a water bath at 25 ± 0.02°C. Each series of comparisons involving the 5 compounds was performed on yeast from a single Orla-Jensen plate, incubated for 96 hours at 25°C.

The concentrations of the nitrated phenols which evoked maximal stimulation of yeast respiration in glucose-phosphate (optimal concentrations) were determined in a series of 6 to 12 preliminary experiments on each compound. These concentrations are given in Table I, together with average values for the control and experimental respiratory rates in 2 series of comparisons.

It is shown in Table I that optimal concentrations of all the agents tested, except dinitro-α-naphthol, evoke substantially the same degree of metabolic stimulation. This finding suggests that, for our yeast culture and under the conditions of these experiments, there is an upper limit or "respiratory ceiling," beyond which the nitrated phenols cannot raise the respiratory rate. It is interesting that these are the nitrated phenols which other observers have reported to be among the most active metabolic stimulants.[4, 5, 6]

A more detailed comparison is possible for the compounds of known dissociation constant *viz.* dinitrophenol and dinitrocresol. Both, in optimal dosage, evoke the same degree of metabolic stimulation, but the optimal dosages are quite different, as shown in the table. It is to be noted that while the total optimal concentration of dinitrocresol is lower than that of dinitrophenol, the reverse relation obtains when the free acid concentrations are compared, and there is no doubt that for yeast this second comparison is the more fundamental.[1, 2, 3]