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Effect of Biogenic Amines on Yeast Carboxylase.

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It has been found by Werle, *et al.*¹⁾ that histamine was absorbed by fermenting yeast, but less by non-fermenting yeast. An attempt was made in the present experiment to demonstrate the effect of histamine together with other biogenic amines on yeast carboxylase, which plays an important rôle in fermentation.

The authors are grateful to Mr. K. Matsui of Dainippon Vitamin Pharmaceutical Co. for the gift of brewer's yeast.

Experimental

CO₂ output was measured manometrically by Warburg flask at 30°. Sodium pyruvate ($3 \times 10^{-2}M$, pH 6.0) was used as a substrate and the flask was filled with N₂ as a gas phase. Purified preparation of carboxylase was obtained by the method of Green²⁾ from brewer's yeast. Several biogenic amines other than histamine (Takara Pharmaceutical Co.) listed in Table I were synthesized in this laboratory.

TABLE I. Effect of Biogenic Amines on Yeast Carboxylase
(in final concentration $10^{-2}M$)

Amine	%	Amine	%
Histamine	200 (stimulation)	Arcaine ($10^{-3}M$)	105 (no effect)
Ethylenediamine	250 (//)	Methylguanidine	104 (//)
Ethanolamine	101 (no effect)	Methylamine	90 (slight inhibition)
Tyramine	100 (//)	Trimethylamine	82 (//)
Putrescine	100 (//)	Choline	102 (no effect)
Cadaverine	96 (//)	Phosphocholine	114 (slight stimulation)
Agmatine	80 (slight inhibition)	Phosphoethanolamine	103 (no effect)

Results

As shown in Table I, only histamine and ethylenediamine of these amines tested were found to stimulate the activity of the yeast carboxylase. The other amines so far tested did not show any apparent effect. Fig. 1 shows the relationship between the concentration of amines [pS: $-\log$ (concn. of amine)] and the activity of carboxylase. The optimum stimulating concentration was shown to be $10^{-3} \sim 10^{-2}M$ for histamine and $10^{-2} \sim 10^{-1}M$ for ethylenediamine. Apparent inhibition of carboxylase by histamine was demonstrated at a concentration of $10^{-1}M$.

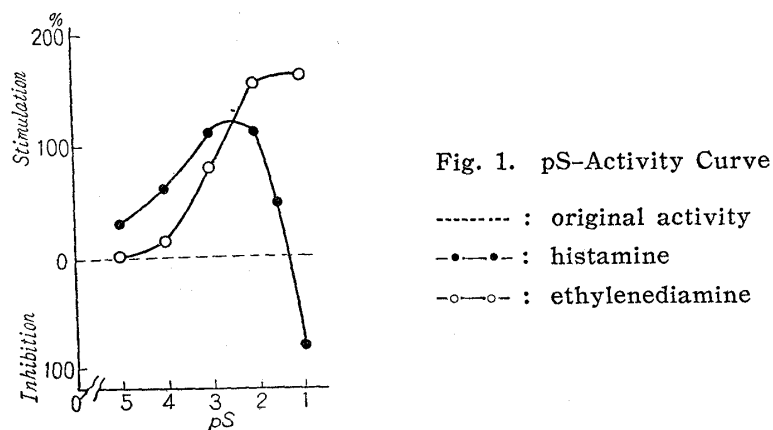


Fig. 1. pS-Activity Curve

----- : original activity
 -●-●- : histamine
 -○-○- : ethylenediamine

The fact that histamine evidently stimulates the yeast carboxylase is worth mentioning in relation to the earlier finding of Werle, *et al.* that only a fermenting yeast absorbed histamine.

(Received August 5, 1957)

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1) E. Werle, W. Boden: *Biochem. Z.*, **304**, 371(1940).

2) D.E. Green, D. Herbert, V. Subrahmanyam: *J. Biol. Chem.*, **138**, 327(1941).