

Inability of Pimelic Acid to Replace Biotin as a Growth Factor for *Lactobacillus casei*.

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Pimelic acid was first encountered in biological material when Mueller¹ isolated it from urine and demonstrated that it possessed growth factor properties for the diphtheria bacillus. Pimelic acid has since been shown to stimulate the growth of *Colpidium campylum*.² In a study of the growth factor requirements of the diphtheria organism, du Vigneaud *et al.*³ found that pimelic acid could be replaced by biotin. From a consideration of the biotin structure they were led to postulate that in the absence of biotin the diphtheria organism is able to utilize pimelic acid in lieu of biotin for purposes of growth.

Since at present microbiological methods of assay must be resorted to for the determination of biotin, the question of the specificity of the response to biotin by other microorganisms arose. In this investigation the extent to which pimelic acid may replace biotin for growth and acid production by *Lactobacillus casei* has been studied. The requirement for biotin by this organism forms the basis for the assay procedures of Shull, Hutchings, and Peterson⁴ and of Landy and Dicken.⁵ Yeast has already been shown to be incapable of utilizing pimelic acid as a growth factor in place of biotin.³

In determining the ability of pimelic acid to replace biotin for *L. casei* the assay technique and procedure of Landy and Dicken⁵ has been employed. Folic acid was supplied

in the form of a concentrate through the courtesy of Dr. E. L. R. Stokstad. The pimelic acid used (mp 102-103°C) was obtained from Eastman Kodak. Pimelic acid was tested both in the presence and absence of added urea since it was considered possible that biotin might arise from a condensation of pimelic acid, cystine, and urea. The medium of Landy and Dicken contains 1 mg of cystine per culture tube. Table I

TABLE I.
Inability of Pimelic Acid to Replace Biotin as a Growth Factor for *Lactobacillus casei*.

Test material per culture tube	Experiment		
	No. 1	No. 2	No. 3*
	ml	Production of 0.1 N acid ml	ml
None	2.60	3.08	3.00
.0005 γ biotin	9.30	8.00	7.55
.0010 " "	11.60	10.30	10.10
.0025 " "	14.60	12.60	12.55
.0005 γ pimelic acid	3.00	—	—
.001 " "	2.85	—	—
.01 " "	2.65	—	—
.05 " "	—	3.00	3.00
.10 " "	3.30	3.07	2.98
.20 " "	—	3.00	3.00
.50 " "	—	3.00	3.08
1.00 " "	—	3.00	3.00
2.00 " "	—	2.50	3.06
3.00 " "	—	2.95	3.00
5.00 " "	—	3.00	2.98

*Tubes in this series contained 1 mg per tube added urea in addition to the regular constituents of the test medium.

presents the results of several experiments in which the activities of pimelic acid and biotin have been compared.

Summary. Pimelic acid was found to be ineffective in lieu of biotin as a growth factor for *L. casei*.

¹ Mueller, J. H., *J. Bact.*, 1937, **34**, 163.

² Hall, R. P., *Arch. Protistenk.*, 1939, **92**, 315.

³ du Vigneaud, V., Dittmer, K., Hague, E., and Long, B., *Science*, 1942, **96**, 186.

⁴ Shull, G. M., Hutchings, B. L., and Peterson, W. H., *J. Biol. Chem.*, 1942, **142**, 913.

⁵ Landy, M., and Dicken, D. M., *J. Lab. and Clin. Med.*, 1942, **27**, 1086.