12.20. Found:[3] C, 63.93, 64.07; H, 4.22, 4.30; S, 12.20, 12.17.

Oxidation of the sulfide with 30% hydrogen peroxide (Superoxol) in acetic acid–acetic anhydride gave *p*-chlorophenyl phenacyl sulfone, m. p. 133–134° (previously prepared by a different method, m. p. 132–133°).[4]

(3) Microanalyses by Dr. Carl Tiedcke, New York, N. Y.

(4) Tröger and Beck, *J. prakt. Chem.*, [2] **87**, 296 (1913).

DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING
UNIVERSITY OF PENNSYLVANIA ISAIAH VON
PHILADELPHIA 4, PENNSYLVANIA MARVIN CARMACK

RECEIVED APRIL 25, 1946

COMMUNICATIONS TO THE EDITOR

GROWTH INHIBITION OF LACTIC ACID BACTERIA BY N-(α,γ-DIHYDROXY-β,β-DIMETHYLVALERYL)-β-ALANINE AND ITS REVERSAL BY PANTOTHENIC ACID[1]

Sir:

It has been observed that pantothenic acid molecules with modified non-nitrogenous moieties exhibited diminished or inappreciable growth activity.[1a-3] Salicylol-β-alanine and mandelyl-β-alanine have been reported to be effective displacers of pantothenic acid.[4] A few analogs possessed inhibitory properties but their effects were not reversed by pantothenic acid.[3] In the present studies, the growth of lactic acid bacteria was inhibited markedly by N-(α,γ-dihydroxy-β,β-dimethylvaleryl)-β-alanine and the inhibition was reversed, competitively, by pantothenic acid over a wide range of concentrations.

α,α-Dimethyl-β-hydroxybutyraldehyde (b. p. 74–77° (15 mm.)), prepared as described by Lilienfeld and Tauss,[5] was converted to α-hydroxy-β,β-dimethyl-γ-valerolactone (b. p. 93–94.5° (1 mm.)) by the method of Stiller, *et al.*[6] The lactone crystallized from diethyl ether–petroleum ether as white hygroscopic needles. *Anal.* Calcd. for $C_7H_{12}O_3$: C, 58.31; H, 8.39. Found: C, 57.69; H, 8.47. The sodium salt of *dl* - N - (α,γ - dihydroxy - β,β - dimethylvaleryl)-β-alanine was prepared by fusing a mixture of the lactone and the sodium salt of β-alanine at 110–120°.

Acid production (ml. of 0.0385 *N* base to titrate final 3-ml. volumes) is shown in the Table I.

Mixtures of the lactone and β-alanine had little effect in concentrations as high as 10,000 γ per tube. It is of interest that stimulations occurred at low levels of the analog in the presence of pantothenic acid. Phenyl pantothenone has been reported to be stimulatory at sub-inhibitory levels.[7]

TABLE I

Ca *d*-pantothenate per tube, γ	Analog[a] per tube, γ	*Lactobacillus arabinosus* 17–5, ml.	*Lactobacillus casei* ε, ml.	*Lactobacillus fermenti*, 36 ml.	*Leuconostoc mesenteroides* P–60, ml.
0.0	0.0	4.05	1.80	1.55	2.33
.02	.0	9.95	4.78	2.10	4.50
.06	.0	13.90	10.45	3.70	6.90
.20	.0	14.85	14.18	6.00	9.00
.60	.0	14.90	15.57	8.30	10.65
.02	2.0	9.82	4.15	2.50	5.00
.02	6.0	9.45	2.05	2.55	5.15
.02	10.0	9.05	1.73	2.35	5.00
.02	20.0	8.05		2.28	4.00
.02	40	6.25		1.55	2.75
.02	80	4.05			2.30
.20	60	15.40	4.70	6.30	9.07
.20	100	14.75	2.15	5.70	8.35
.20	200	12.35	1.78	4.05	7.65
.20	400	8.90		1.62	6.50
.20	1000	4.05			2.30
Antibacterial index[3]		4000–5000	500–1000	2000	4000–5000

[a] The analog was 83% condenseda ccording to Van Slyke amino nitrogen determination.

Preliminary experiments with streptococci indicated a high *in vitro* susceptibility to the inhibitor. Further studies on the activity and toxicity of this and other analogs are in progress.

The Dissertation (U. of Texas, 1943) of A. H. Nease has come to our attention. It was reported that N(α,γ-dihydroxy)-β,β-dimethylvaleryl)-β-alanine, prepared under the direction of Dr. H. R. Henze, had no growth activity for *L. casei*.

THE CHEMICAL LABORATORY
UNIVERSITY OF CALIFORNIA WILLIAM DRELL
LOS ANGELES, CALIFORNIA MAX S. DUNN

RECEIVED AUGUST 5, 1946

(1) Aided by grants from the National Institute of Health of the U. S. Public Health Service and the U. of California.

(1a) Williams, *Adv. in Enzym.*, **3**, 253 (1943).

(2) Nease, Dissertation, U. of Texas (1943); quoted by Snell and Shive, *J. Biol. Chem.*, **158**, 551 (1945).

(3) McIlwain, *Biochem. J.*, **36**, 417 (1942).

(4) Martin, Lewis and Urist, Abstracts of Papers, 109th Meeting, *Am. Chem. Soc.*, 21B (1946).

(5) Lilienfeld and Tauss, *Monatsh.*, **19**, 77 (1898).

(6) Stiller, Harris, Finkelstein, Keresztesy and Folkers, THIS JOURNAL, **62**, 1785 (1940).

(7) Woolley and Collyer, *J. Biol. Chem.*, **159**, 263 (1945).

THE RAMAN SPECTRUM OF CYCLOÖCTATETRAENE

Sir:

A material obtained from Germany through the courtesy of the Office of Research and Inventions, U. S. Navy, and Division 16, NDRC, purporting to be 1,3,5,7-cycloöctatetraene, has been found to boil at 142° (uncor.) in agreement with the litera-