sehr gehindert und die einzige mögliche Stellung ist nur 6.

(IV) wurde dann durch die Wolff-Kischner'sche Reduktion nach Huang-Minlon in das 6-Propylderivat (VI) übergeführt. Das rohe kristallinische säurige Reduktionsprodukt, aus dessen UV-Spektrum (λ_{max}^{EtOH} : 271, 280 mμ) das Verschwinden der Carbonylgruppe gesichert wurde, wurde sofort der Selen-Dehydrierung unterworfen. Das Dehydrierungsprodukt wurde dann über das Trinitrobenzolat (Nadeln, Schmp. 159~160°. Ber. für $C_{19}H_{20}\cdot C_6H_3O_6N_3$: C, 65.07; H, 5.02. Gef. : C, 65.35; H, 5.30) gereinigt und man konnte 1,7-Dimethyl-6-propylphenanthren (I) in ziemlich guter Ausbeute erhalten. Das letztere bildet Blätter vom Schmp. 89~90°(U. V. λ_{max}^{EtOH} mμ(log ε) : 259(4.81), 281(4.16), 290(4.09), 302.5(4.21), 319(2.64), 334(2.70), 351(2.51); I. R. : 11.40, 12.46, 13.25 μ.). Sowohl der freie Kohlenwasserstoff wie sein Trinitrobenzolat wurde durch direkten Vergleich mit dem entsprechenden Präparat von (A) identifiziert. Die IR-Spektren beider Kohlenwasserstoffe stimmten auch miteinander völlig überein.

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Studies on Cycloheximide and its New Stereoisomeric Antibiotic

Two anti-yeast and anti-phytopathogenic fungal antibiotics were isolated from the fermentation broth of a Streptomyces (Strain No. TW 305-a) which differed morphologically from *Strept. griseus* WAKSMAN ET HENRICI and other cycloheximide-producing strains. They were named naramycin A and B, respectively. Naramycin A (I) was identified as cycloheximide (Actidione) discovered by Leach, *et al.*[1] Naramycin B (II) came as colorless, dextrorotatory ($[\alpha]_D^9$ +48.8° (c=1, H_2O)) plates of m.p. 109~110° (from H_2O), and its analytical data showed that (II) had a formula $C_{15}H_{23}O_4N$ (*Anal.* Calcd. for $C_{15}H_{23}O_4N$: C, 64.03; H, 8.24; N, 4.90; mol. wt., 281.34. Found : C, 64.30; H, 7.80; N, 4.90; mol. wt. (Micro-Rast), 281.8). U.V. : λ_{max}^{MeOH} 292.5 mμ (log ε, 1.49) and shoulder at

TABLE I. Physical Properties of Naramycins and their Acylates

Compound	Series	m.p. (°C)	$[\alpha]_D$ (in MeOH)	$[M]_D$
Naramycin	A[c]	116.5~117	− 0.73 (c=10)[a]	− 2.1
	B	109 ~110	+50.2 (c= 2)[a]	+141.0
Acetate	A[d]	147 ~147.5	+24.56 (c= 2)[a]	+ 80.0
	B	150.5~152	+62.15 (c= 2)[a]	+201.0
Benzoate	A	162.5~163	+10.0 (c= 1)[b]	+ 38.5
	B	159.5~160.5	+54.6 (c= 1)[b]	+210.0
3,4-Dichlorobenzoate	A	175 ~176	+13.4 (c= 1)[b]	+ 61.0
	B	146.5~147.5	+53.2 (c= 1)[b]	+242.0

a) Measured at 12.5°. *b*) Measured at 11°.

[c]) Authentic Actidione (Upjohn Co.), m.p. 116.5~117°. No depression in m.p. on admixture with Naramycin A. Reported m.p. 115.5~117°,[2] 119.5~121°.[3] $[\alpha]_D^{25}$ −3.0°(c=10, MeOH),[2] +6.8°(c=2, H_2O)[2] $[\alpha]_D^{29}$ −3.38°(c=9.47, EtOH)[3]

[d]) Reported., m.p. 148~149°,[2] 150~152°,[3] $[\alpha]_D^{25}$ +22°(c=2.3, MeOH).[2]

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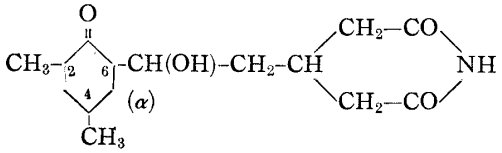
1) B.E. Leach, J.H. Ford, A.J. Whiffen : J. Am. Chem. Soc., **69**, 474(1947).

232 mμ. (II) had 32% activity of (I) against *Saccharomyces sake*. (II) was more heat-stable than (I) which gave anhydrocycloheximide mentioned below. Transformation from (I) to (II) did not succeed. Physical properties of the derivatives of both antibiotics are summarized in Table I.

(II) gave *cis-d*-dimethylcyclohexanone (b.p. 175~176°, $[\alpha]_D^{16}$ +10.84°(c=5, MeOH), semicarbazone, m.p. 213~214°(decomp.)(corr.)), by alkaline hydrolysis, and gave anhydrocycloheximide (m.p. 132.5~133°, $[\alpha]_D^{11}$ −12.6°(c=0.66, MeOH)) by dehydration with P_2O_5 or catalytic amounts of BF_3-ether complex, and gave dehydrocycloheximide (m.p. 177~178°) by CrO_3 oxidation. These products agreed well with those derived from (I).[2,3]

These experimental data showed that (II) was one of the stereoisomers of (I) due to any of the four asymmetric carbon atoms in the formula.



Plane Structure of Cycloheximide (I and II)

Judging from the recent report of Eisenbraun, *et al.*[4] about the absolute configuration of (I), it is sure that the C_4-methyl group present in (II) is also related to D-glyceraldehyde.

The infrared spectrum of (II) in Nujol (ν_{OH} 3226 (broad), ν_{CO} 1689 cm^{-1}) shows that (II) exsists in solid state as a polyassociated form, but the infrared spectrum in CCl_4 (ν_{OH} 3534, ν_{CO} 1711 cm^{-1}) suggests that there exists an intramolecular hydrogen bonding between the carbonyl and hydroxyl groups in the molecule. This is also observed in the infrared spectrum of (I) (ν_{OH} 3540~3534, ν_{CO} 1711 (CCl_4)cm^{-1}). Huitric and Kumler[5] discussed the two diastereoisomers of 2-(α-hydroxy-*p*-halobenzyl)cyclohexanone and they concluded the stereoisomerism to be due to the asymmetric carbon atom attached to the hydroxyl group. In that report they assumed that these substances must have an equatorially substituted groups, because their infrared spectrum in CCl_4 (ν_{OH} 3597~3584 cm^{-1} for high m.p. substance and ν_{OH} 3597~3509 cm^{-1} for low m.p. substance) showed that there exsists an intramolecular hydrogen-bonded hydroxyl group, for, in the case axially oriented, there should not be an intramolecular hydrogen bonding. Comparing the infrared spectra of (I) and (II) with those given by Huitric, it is suggested that a long substituent containing glutarimide moiety orients equatorially to cyclohexanone ring in both antibiotics. However, spatial correlations between carbonyl and hydroxyl groups in the molecule should not be discussed hastily from these infrared data alone.

Adapting the rule of shift to the fact that there are fairly regular differences towards the same direction (positive) between $[\alpha]_D$ values of acylated (I's) and (I) as compared with acylated (II's) and (II), the configuration of α-carbon may be the same, when no conformational changes did happen in other asymmetric centers during the esterification procedures carried out with acyl chloride in pyridine solution with ice-cooling.

The writers are now studying to find out the conformational relationship of the remaining two methyl groups and spatial correlation of carbonyl and hydroxyl groups. Details will be reported later.

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2) J.H. Ford, B.E. Leach : J. Am. Chem. Soc., **70**, 1223(1948).
3) E.C. Kornfeld, R.G. Jones, T.V. Parke : *Ibid.*, **71**, 150(1949).
4) E.J. Eisenbraun, J. Osiecki, C. Djerassi : *Ibid.*, **80**, 1261(1958).
5) A.C. Huitric, W.D. Kumler : *Ibid.*, **78**, 1147(1956).

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Corrigenda for Chemical & Pharmaceutical Bulletin, Vol. 6, No. 1.

Page	Line	Error	Correction
83	Fig. 1. Unit on ordinate	$\times 10$	$\times 10^{-3}$
86	Footnote 16)	I. Lichtenstein : Biochem. Z., **203**, 20(1940).	I. Lichtenstein : Biochem. Z., **303**, 20(1940).
108	10↓, 1↑	Meyer reagent	Mayer reagent

Corrigenda for Pharmaceutical Bulletin, Vol. 5, Nos. 1~6.

241		Structure (Ⅷ) in text and chart are deleted	
243	13↓	8-Carboxyhypoxanthine (Ⅷ)	4,6,7-Trihydroxypteridine
291	23↓	lang umgerührt. Die rötlich	Insert the following between 'umgerührt.' and 'Die' : Hierauf wurde eine Lösung von 300 mg (Ⅲ) in 20 ccm abs. Äther zugesetzt und 3 Std. lang umgerührt.
293	6↓	(Ⅴ) ist zwar	(Ⅰ) ist zwar
526	Experimental 13↓, 18↓	3-Acetyl-5	3-Acetoxy-5
530	〃 6↓	〃	〃
533	Text 14↑	3-alkyl(or acyl)-	3-alkyl(or acyloxy)-
535	6↓	with carbamyl instead of	with carbamoyl instead of
	12↓	carbamyl group	carbamoyl group
	22↓	by carbamylation at	by carbamoylation at