readily isomerized to the stable 2α-methyl isomer (IVa) on the treatment with boiling methanolic potassium hydroxide.

Similarly 2α-(IVc) and 2β-methyl-19-nortestosterone (IVd) were also synthesized. It is noteworthy that O.R.D. curves of IVb and IVd showed abnormal weak negative Cotton effect (Fig. 1) in contrast to that of 2,2-dimethyltestosterone[6] similar to IVa. The abnormality suggests that the environment of C=C-C=O chromophore constituted a transoid conformation in 19-nortestosterone may be distorted by the 2β-axial methyl group to some extent.

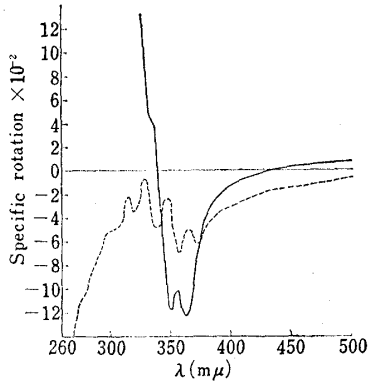

Fig. 1. Optical Rotatory Dispersion Curves (in dioxane)

—— 2α,17α-dimethyl-19-nortestosterone (IVa)

--- 2β,17α-dimethyl-19-nortestosterone (IVb)

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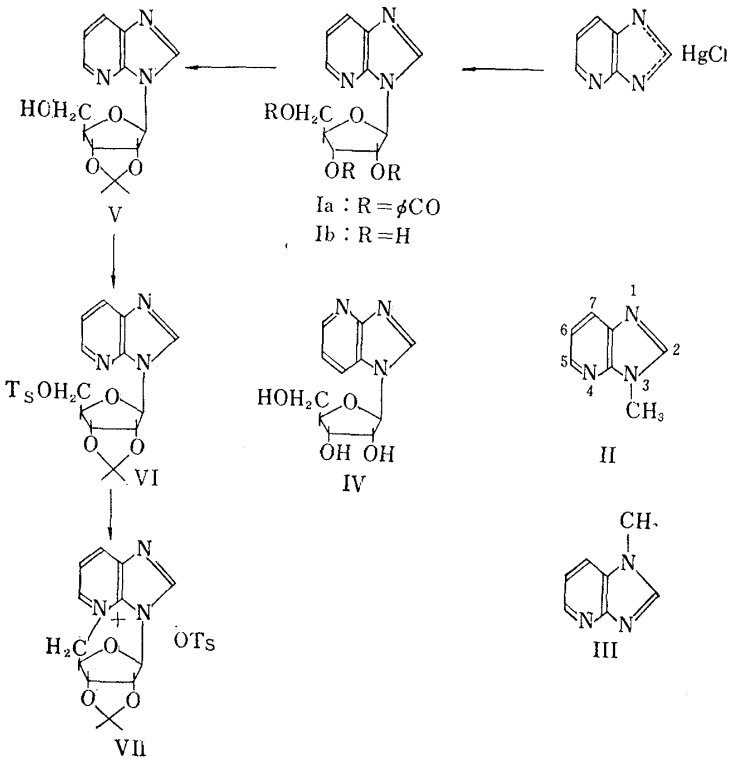
Synthetic Studies of Potential Antimetabolites. VII.*1 Evidences that the supposed 1-β-D-Ribofuranosyl-1*H*-imidazo[4,5-*b*]pyridine is actually 3-β-D-Ribofuranosyl-3*H*-imidazo[4,5-*b*]pyridine (1-Deazapurine Ribofuranoside)

The condensation of the chloromercuric salt of 1*H*-imidazo[4,5-*b*]pyridine (13.9 g.), *Anal.* Calcd. for $C_6H_4N_3HgCl$: N, 11.84. Found: N, 12.01, with 2,3,5-tri-O-benzoyl-β-D-ribofuranosyl chloride prepared by a standard method[1] from 1-O-acetyl-2,3,5-tri-O-benzoyl-D-ribofuranose (20 g.) in boiling xylene (1 L.) gave rise to a crude benzoyl-blocked nucleoside which after chromatographic separation with acid washed alumina (2.5×55 cm.) using benzene-ethyl acetate (1:4, v/v; 1.5L.) as eluting system afforded only

*1 Part VI. Yoshihisa Mizuno, Morio Ikehara, K.A. Watanabe: This Bulletin, to be published in **11**, No. 3, (1963).

1) J. Davoll, B. Lythgoe, A. Todd: J. Chem. Soc., **1948**, 967.

single nucleoside, m.p. 154~155° (from ethanol), $[\alpha]_D^{20}$ −42° (c=2.48, chloroform) and whose ultraviolet absorption maximum was 283 mμ (ethanol), *Anal.* Calcd. for $C_{32}H_{25}O_7N_3$: C, 68.20; H, 4.47; N, 7.46. Found : C, 68.10; H, 4.51; N, 7.42. Yield of the nucleoside was 15.2 g. (68% on the basis of 1-O-acetyl-2,3,5-tri-O-benzoyl-β-D-ribofuranose). No detectable amount of other isomers could be isolated. Debenzoylated nucleoside (Ib), m.p. 220~222° (recrystallized from water), *Anal.* Calcd. for $C_{11}H_{13}O_4N_3$: C, 52.58; H, 5.22; N, 16.73. Found : C, 52.54; H, 5.45; N, 16.91. Indian chemists[2] who also investigated the ribosylation of 1*H*-imidazo[4,5-*b*]pyridine found that only a single nucleoside was formed among two possible isomers (Ib and IV) and assigned the 1-β-D-ribofuranosyl-1*H*-imidazo-[4,5-*b*]pyridine structure to their product from ultraviolet spectral comparison only with 1-methyl-1*H*-imidazo[4,5-*b*]pyridine (III), neglecting a comparison with 3-methyl-3*H*-imidazo[4,5-*b*]pyridine (II). However, our spectroscopic examination of a pair of isomers: 1-methyl-1*H*-imidazo[4,5-*b*]pyridine[2] (III), m.p. 95~97° (recrystallized from benzene), Rf: 0.53 (BuOH-H_2O) and 3-methyl-3*H*-imidazo[4,5-*b*]pyridine (II), m.p. 76~78° (sublimed *in vacuo*), Rf : 0.73 (BuOH-H_2O), *Anal.* Calcd. for $C_7H_7N_3$: C, 63.14; H, 5.30; N, 31.56. Found : C, 62.85; H, 5.30; N, 31.26, prepared from 2-methylamino-3-aminopyridine[3] by ring closure with formic acid, have shown that in case of the base possessing no substituent in position 7, spectroscopic comparison with both of possible isomers and besides in both acidic and basic media is essential for unambigous assignment of the structure (Fig. 1 and 2), casting doubt on the reliability of their evidence for its structure. In alkaline media, ultraviolet absorption spectrum of the nucleoside Ib has the close resemblance both to that of 3-methyl-3*H*-imidazo[4,5-*b*]pyridine (II) and to the spectrum of 1-methyl-1*H*-imidazo[4,5-*b*]pyridine (III) (Fig. 1). However closer inspection of the absorption spectra (Fig. 2) disclosed that the nucleoside (Ib) was more similar to 3-methyl-3*H*-imidazo[4,5-*b*]pyridine (II). That is, our investigation rather supported the possibility that the nucleoside (Ib) has an alternative structure. The structure was unequivocally



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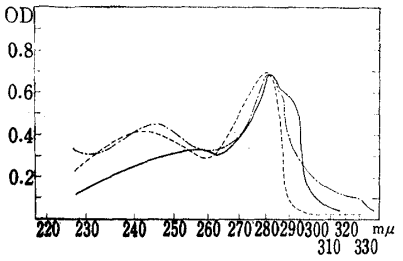

Fig. 1. Ultraviolet Absorption Spectra in 0.1*N* Sodium Hydroxide Solution
- - - - 3-Methyl-3*H*-imidazo[4,5-*b*]-pyridine (II)
-·-·- 1-Methyl-3*H*-imidazo[4,5-*b*]-pyridine (III)
——— Nucleoside (Ib)

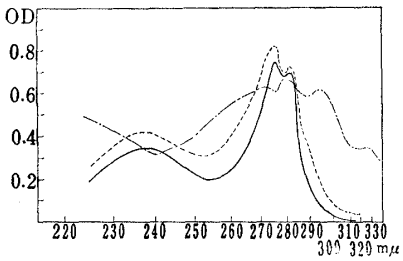

Fig. 2. Ultraviolet Absorption Spectra in 0.1*N* Hydrochloric Acid
- - - - 3-Methyl-3*H* imidazo[4,5-*b*]-pyridine (II)
-·-·- 1-Methyl-1*H* imidazo[4,5-*b*]-pyridine (III)
——— Nucleoside (Ib)

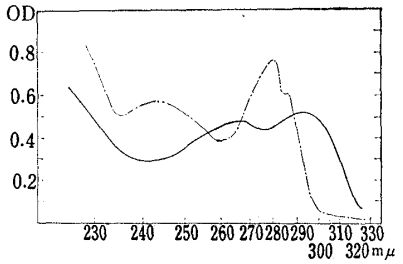

Fig. 3. Ultraviolet Absorption Spectra in Ethanol
-·-·- 3-[2′,3′-Isopropylidene-5′-tosyloxy-β-D-ribofuranosyl]-3*H*-imidazo[4,5-*b*]pyridine (VI)
——— Quaternized derivative of (VI)

established on the basis of the following series of reactions: the nucleoside was converted to 2′,3′-isopropylidene-5′-tosylate (VI), fine needles, m.p. 154~154.5° (recrystallized from acetone and hexane), UV: $\lambda_{max}^{H_2O}$ 283 mμ (ε 7950); Rf: 0.88 (BuOH-H_2O), *Anal.* Calcd. for $C_{21}H_{23}N_3O_6S$: C, 56.63; H, 5.21; N, 9.41. Found: C, 56.72; H, 5.24; N, 9.19, via 2′,3′-isopropylidene derivative (V). Treatment of the tosylate (VI) with boiling acetone gave rise to water soluble product VII, prisms, m.p. 228~231° (decomp.); UV: $\lambda_{max}^{H_2O}$ 293 mμ (ε 6460) (Fig. 3); Rf: 0.65 (BuOH-H_2O), *Anal.* Calcd. for $C_{21}H_{23}N_3O_6S$: N, 9.41. Found: N, 9.38, which gave a positive tosylate ion test in paper chromatogram.[4] These fact clearly showed that intramolecular quaternization took at N_4. And this type of intramolecular quaternization is feasible only with 5′-tosylate of 3-β-D-ribofuranosyl-3*H*-imidazo[4,5-*b*]pyridine, absolutely excluding the possibility that the nucleoside in question might be 1-β-D-ribofuranoside (IV).

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