SYNTHESIS AND HYDROLYSIS OF 3-β-D-RIBOFURANOSYLWYE

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Treatment of 5-(methylamino)-1-β-D-ribofuranosylimidazole-4-carboxamide with an excess of CNBr in acetate buffer (pH 5) at room temperature gave 5-cyanomethylamino derivative, mp 183–185° (dec.), in 32% yield. Cyclization of this compound was effected by treating with NaOEt in EtOH at 30°, giving 3-methylguanosine (I) in 61% yield. Bromoacetone was then allowed to react with I in Me_2NCHO in the presence of K_2CO_3 at 30° to give 3-β-D-ribofuranosylwye (II), the most probable structure for wyosine from *Torulopsis utilis* $tRNA^{Phe}$, in 52% yield; mp 235° (dec.); λ_{max} (H_2O) (pH 2) 230 nm (ε 35,600), 277 (11,800); λ_{max} (H_2O) (pH 7) 236 (34,700), 296 (8,000); λ_{max} (H_2O) (pH 13) 236 (35,800), 295 (8,200); δ (Me_2SO-d_6) 2.23 (3H, CMe), 4.09 (3H, s, NMe), 7.37 (1H, 7-H), 8.25 (1H, s, 2-H).

The compound II underwent rapid cleavage of the glycosidic bond in dilute hydrochloric acid and the rate constants at 25° (4.4×10^{-1} min^{-1} in 0.1 *N* aq. HCl and 3.7×10^{-2} min^{-1} at pH 2.1) were comparable to those for I (9.8×10^{-1} min^{-1} in 0.1 *N* aq. HCl and 9.9×10^{-2} min^{-1} at pH 2.1). The rate of the hydrolysis of II at pH 2.9 and 37° ($t_{1/2}$ 41 min) was similar to the reported rate ($t_{1/2}$ *ca.* 70 min) for wybutosine from yeast $tRNA^{Phe}$. Wyosine and wybutosine have been isolated by enzymatic digestion at pH 5.0–8.5 at 37°. At this pH range at 37° II was found to be fairly stable. The compound II decomposed to wye and a yet unidentified compound(s) in 0.1 *N* aq. NaOH at 37°. Finally, both I and II have been kept in solid state at room temperature for several months without any detectable decomposition, in contrast to the description in the literature. The knowledge obtained here should help towards the large scale isolation of pure wyosine and related nucleosides.