# SYNTHESIS OF COMPOUNDS RELATED TO FLUORESCENT Y NUCLEOSIDES FROM PHENYLALANINE TRANSFER RIBONUCLEIC ACIDS

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In order to explain the unusual lability of the nucleosidic linkages of Y nucleosides from $tRNA^{Phe}$s, we planned to synthesize Y nucleosides (I) and related compounds. We wish to report here the synthesis of 3-methylwye, 3-methylguanosine, and 3-methylinosine.

Treatment of 1-methyl-5-(methylamino)imidazole-4-carboxamide with cyanogen bromide in acetate buffer (pH 5) gave 5-(cyanomethylamino)-1-methylimidazole-4-carboxamide in 31% yield. This compound cyclized to 3,9-dimethylguanine in 87% yield on treatment with sodium hydride in N,N-dimethylformamide. In a similar manner, 3-ethyl- and 3-benzyl-9-methylguanine, 9-ethyl-3-methylguanine, and 3,9-diethylguanine were synthesized. Reaction of 3,9-dimethylguanine with bromoacetone in dimethylsulfoxide in the presence of sodium hydride gave 3-methylwye [mp 292–294° (dec.)], a model compound of wyosine (Ia) from Torulopsis utilis $tRNA^{Phe}$. UV spectrum of this compound resembles that reported for Ia, supporting that Ia is 3-substituted wye.

Methylation of 2′,3′,5′-tri-O-benzoyl-N,N-dimethyladenosine with $CH_3I$ in N,N-dimethylacetamide gave 2′,3′,5′-tri-O-benzoyl-N,N,3-trimethyladenosine iodide (II) in good yield. Heating II in a mixture of 2 N NaOH and EtOH (2:1, v/v) afforded 5-(methylamino)-1-β-D-ribofuranosylimidazole-4-carboxamide (III: mp 182–184°) in 72% yield. The 2′,3′,5′-tri-O-acetate of III was treated in the same manner as described above for the synthesis of 3,9-dimethylguanine, and 3-methylguanosine [IV: dihydrate; mp ca. 180° (dec.)], a synthetic precursor of I, was obtained after deacetylation of the product with $NH_3$–MeOH. The glycosyl bond of IV proved unusually weak: IV changed completely into 3-methylguanine in 10 min at pH 1 and 20°. For comparison, 3-methylinosine (V: monohydrate; mp 172–173°) was also synthesized by cyclization of III with a mixture of triethyl orthoformate and acetic anhydride (8:3, v/v) followed by treatment with $NH_3$–MeOH. The hydrolysis rate of the glycosyl bond of V at pH 1 was comparable to that of IV. These results suggest that the facile hydrolysis of the nucleosidic linkage of I reflects the structure of I.