

of the AAA molecule is therefore *gauche-trans* (*gt*). The torsion angle of C(7')-C(6')-C(5')-C(4') is -175.4° and is similar to that of P-O(5')-C(5')-C(4') of numerous 5'-mononucleotides.⁶

Thus, in having the *anti* conformation about the glycosidic linkage, AAA is similar to both the monoclinic⁷ and orthorhombic⁸ forms of AMP. The other two characteristics, the *exo*-C(3') puckering of the sugar bond and the *gt* conformation about the C(4')-C(5') bond, are different from those of AMP: *endo*-C(3') and *gauche-gauche* (*gg*) for the monoclinic form and *endo*-C(2') and *gg* for the orthorhombic form. This observed conformation of the AAA molecule is caused by the bulky methylene group replacing the O(5') atom of the nucleoside.

The hydrogen bonding is shown in Figure 2. The carboxy-group is linked to the N(6) and N(7) atoms of the neighbouring adenine ring by the two hydrogen bonds. This interaction would be significant in specific binding with acidic amino-acids, because it is a model for the way in which an adenine, base-paired *via* the N(6) and N(1) atoms to uracil in the double stranded RNA, might form a hydrogen bond with a carboxy-group of glutamic or aspartic acid. This kind of hydrogen bond is also observed in the structure of *N*-(9- β -D-ribofuranosylpurin-6-yl)glycyl-L-alanine.⁹

(Received, 18th August 1980; Com. 903.)

¹ J. J. Baker, P. Mellish, C. Riddle, A. R. Somerville, and J. R. Tittensor, *J. Med. Chem.*, 1974, **17**, 764; A. S. Jones, M. MacCross, and R. T. Walker, *Biochim. Biophys. Acta*, 1973, **365**, 365; A. Hampton, P. Howgate, P. J. Harper, F. Perini, F. Kappler, and R. K. Preston, *Biochemistry*, 1973, **12**, 3328; A. Hampton, T. Sasaki, and B. Paul, *J. Am. Chem. Soc.*, 1973, **95**, 4404; W. Meyer, E. Böhnke, and H. Follman, *Angew. Chem., Int. Ed. Engl.*, 1976, **15**, 499.

² H. Follman, *Angew. Chem., Int. Ed. Engl.*, 1974, **13**, 77.

³ T. E. Walker, H. Follman, and H. P. C. Hogenkamp, *Carbohydr. Res.*, 1973, **27**, 225.

⁴ G. Germain, P. Main, and M. M. Woolfson, *Acta Crystallogr., Sect. A*, 1971, **27**, 368.

⁵ C. Altona and M. Sundaralingam, *J. Am. Chem. Soc.*, 1972, **94**, 8205.

⁶ W. Saenger, *Angew. Chem., Int. Ed. Engl.*, 1973, **12**, 591.

⁷ J. Kraut and L. H. Jensen, *Acta Crystallogr.*, 1963, **16**, 79.

⁸ S. Neidle, W. Kühlbrandt, and A. Achari, *Acta Crystallogr., Sect. B*, 1976, **32**, 1850.

⁹ P. Narayanan, H. M. Berman, and R. Rousseau, *J. Am. Chem. Soc.*, 1976, **98**, 8472.