

A NEW SENSITIVE METHOD FOR DETERMINING ABSOLUTE CONFIGURATION OF α -AMINO ACIDS: CD SPECTRA OF N-2,4-DINITROPHENYL- α -AMINO ACYLANILIDES

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Recently we reported a method useful for determining absolute configuration of aromatic α -amino acids in micromolar quantities. The method is based on the finding that DNP(=2,4-dinitrophenyl) derivatives of aromatic amino acids show characteristic CD spectra above 300 nm and the sign of the Cotton effect of the band near 400 nm is well correlated to their absolute configuration.¹⁾ The relation, named DNP-aromatic rule, states that $[\theta]_{400}$ is negative(positive) for compounds of L-(D-)configuration. In this communication an extension of the DNP-aromatic rule to anilides of aliphatic DNP- α -amino acids is described.

Anilides of DNP-L-alanine (I) can be regarded as analogs of DNP-D-phenylalanine (II) because replacement of β -CH₂- and -CO₂H groups of II with -CONH- and -CH₃ groups, respectively, affords I. As expected from DNP-aromatic rule, CD spectra of I exhibited remarkable resemblance to that of II with strong positive $[\theta]_{400}$ -values (Fig. 1), although DNP derivatives of aliphatic α -amino

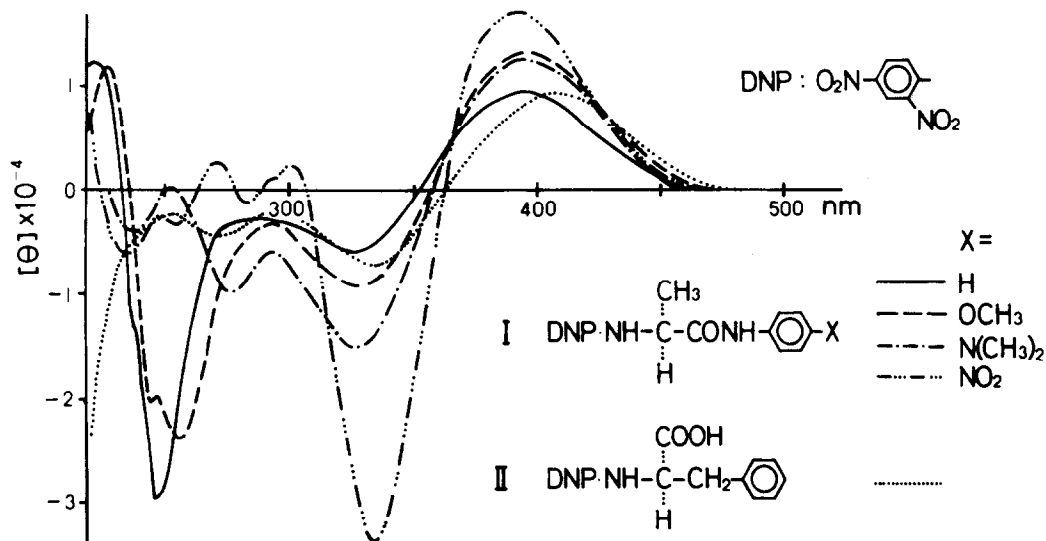


Fig. 1. CD spectra of DNP-L-alanylanilides (I) and DNP-D-phenylalanine (II) in MeOH.

acids show very weak Cotton effect ($-2000 < [\theta]_{400} < +2000$). The results prompted us to survey some proper derivatives of other aliphatic α -amino acids. *p*-Methoxyanilides (III) of various aliphatic DNP- α -amino acids were prepared and their CD spectra were measured. As shown in Fig. 2, all of the compounds of type III exhibited CD spectra of high similarity with strong positive maximum near 400 nm. The high similarity is not surprising because of the reasons; (i) the CD spectra are caused by perturbation of the DNP-chromophore with the aromatic one,²⁾ and (ii) their spatial arrangements which control the interaction of the two chromophore are determined by absolute configuration at the α -carbon atom only in this case.

The relation here found presents a new and sensitive method for determining absolute configuration of α -amino acids irrespective of the nature of the side chain unless it contains an aromatic group. The large ellipticity and ease of preparation of these derivatives³⁾ secure application of this method to the compounds of limited quantities. *p*-Anisidine was selected because of its reactivity, ease of manipulation and high ellipticity.

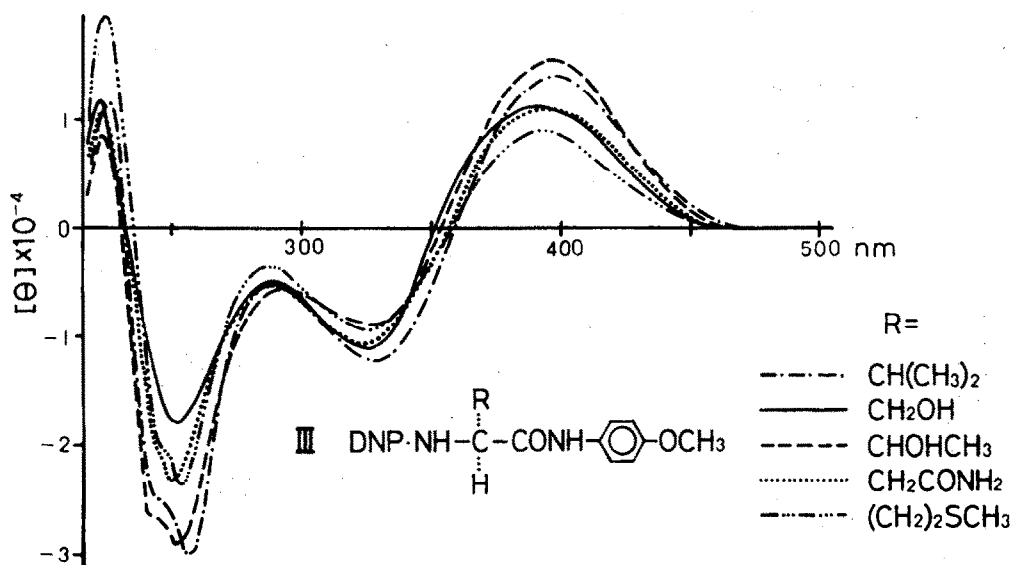


Fig. 2. CD spectra of DNP-L- α -amino acyl-*p*-methoxyanilides (III) in MeOH.

REFERENCES

- 1) M. Kawai, U. Nagai, and M. Katsumi, *Tetrahedron Letters*, 2845-2848 (1975).
- 2) M. Kawai and U. Nagai, to be submitted.
- 3) DNP- α -amino acylanilides were obtained in good yields by coupling DNP- α -amino acids with anilines by dicyclohexylcarbodiimide, except with *p*-nitroaniline, which gave poor yield of the product.