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(+)-Peucedanol Methyl Ether from *Hippomarathrum cristatum*, Umbelliferae

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(+)-Peucedanol methyl ether was isolated from *Hippomarathrum cristatum* (Turkish *Umbelliferous* plant), and the circular dichroism curves of it in MeOH and $CHCl_3$ were determined.

Keywords——coumarin; isolation; *Hippomarathrum*; Umbelliferae; CD curve

It is well known that *Umbelliferous* plants are good sources of natural coumarins. However, only two species of *Hippomarathrum* plants, *H. caspium*[2] and *H. macrocarpum*,[3] were studied on the chemical constituents by Russian groups. We, now, examined on chloroform extracts of a Turkish *Hippomarathrum* plant, *H. cristatum*, and isolated colourless fine needles, mp 139—140°, $[\alpha]_{589}$ +65.1° (MeOH), which were identified with an authentic sample of (+)-peucedanol methyl ether[4] [(+)-ulopterol[5]] (**1**). Recently, Lemmich *et al.* skilfully established the absolute configuration of this material as an R.[6]

On the other hand, during the studies on the absolute configuration of the *Rutaceous* coumarins, we occasionally found that the sign of the Cotton effect in the circular dichroism (CD) curve of the chiral dihydropyranocoumarin depends upon the property of the solvent used. Since this change could not be explained only by the conformational change of the ring having a chiral center and peucedanol methyl ether has a straight chain formed by ring-opening of a dihydropyrano- or a dihydro-furanocoumarin, we observed the CD curve of (+)-peucedanol methyl ether in methanol and in chloroform. This

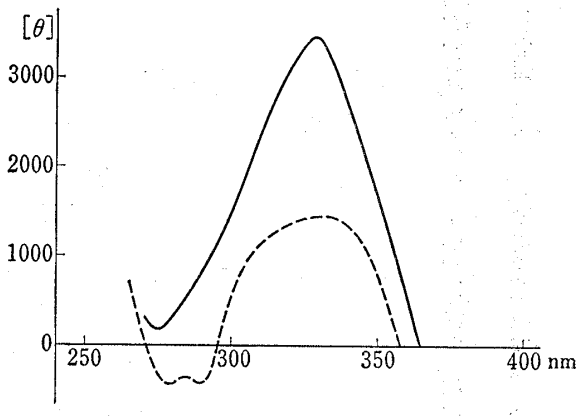
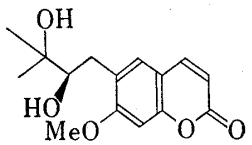


Fig. 1. CD Curve of **1**

——: MeOH.
----: $CHCl_3$.



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1) Location: *a) Beyazit, Istanbul, Turkey; b) 1-33, Yayoi-cho, Chiba, 260, Japan.*
2) A.Z. Abyshev, *Khim. Prir. Soedin*, **9**, 550 (1973) [*Chem. Abstr.*, **80**, 105846*k* (1974)].
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4) *a)* D.L. Dreyer, M.V. Pickering, and P. Cohan, *Phytochemistry*, **11**, 705 (1972); *b)* H. Ishii, K. Hosoya, T. Ishikawa, E. Ueda, and J. Haginiwa, *Yakugaku Zasshi*, **94**, 322 (1974); *c)* P.P. Joshi, Y.N. Shukla, D.S. Bhakuni, and M.M. Dhar, *Indian J. Chem.*, **13**, 772 (1975).
5) A.Z. Abyshev and A.M. Kutnevich, *Khim. Prir. Soedin*, **4**, 378 (1968) [*Chem. Abstr.*, **70**, 84948*w* (1969)]; A.Z. Abyshev, A.M. Kutnevich, N.P. Kostyuchenks, O.S. Arisimova, A.I. Ermakov, and Yu.N. Sheinker, *Khim. Prir. Soedin*, **6**, 300 (1970) [*Chem. Abstr.*, **73**, 76997*h* (1970)].
6) J. Lemmich and S. Havelund, *Phytochemistry*, **17**, 139 (1978).

result could not be simply explained but promoted our research on the solvent dependency of the chiral coumarin. The precise discussion on this matter will be published elsewhere in the near future.

Experimental[7]

Isolation of R-(+)-Peucedanol Methyl Ether (1)——The dried and powdered whole plant (1.5 kg) collected at Marmara Island (Turkey) in May 1971 was extracted with $CHCl_3$. After evaporation, the residue was chromatographed on SiO_2. The fraction eluted with $CHCl_3$ yielded a crude product (1.2 g) which was purified using preparative TLC ($CHCl_3$: EtOH=9: 1 (v/v), Rf=0.32) followed by recrystallization from EtOH to give colourless fine needles, mp 139—140° (lit.[4b] 136—138°). High resolution mass spectrum: 278.1163 (M^+, 29.5%) ($C_{15}H_{18}O_5$ requires: 278.1155), 220.0732 (M^+-58, 45.6%) ($C_{12}H_{12}O_4$ requires: 220.0733). IR ν_{max}^{KBr} cm^{-1}: 3600—3100 (OH), 1733 (CO). NMR ($CDCl_3$) δ: 1.29 and 1.38 (each 3H, s, C-Me), 2.06 and 2.24 (each 1H, br. s, OH, disappeared on addition of D_2O), 2.53 (1H, d.d, J=10.5 and 14.0 Hz, -CH-C$\underline{H}_A$H$_B$-Ar), 3.03 (1H, d.d, J=14.0 and 2.0 Hz, -CH-CH$_A$$\underline{H}_B$-Ar), 3.63 (1H, d.d, J=10.5 and 2.0 Hz, O-C$\underline{H}$-CH$_2$-), 3.91 (3H, s, OMe), 6.22 and 7.62 (each 1H, d, J=10.0 Hz, C_3 and C_4-H), 6.80 and 7.30 (each 1H, s, arom. H). $[\alpha]_{589}^{22.5°}$ +65.1 (c=4.99×10^{-2}, MeOH).

7) All melting points were taken on micro melting point hot stage (Yanagimoto) and uncorrected. IR, NMR, and high resolution mass spectrum were obtained with Hitachi EPI-G3, JEOL JMN-MH-100, and JEOL JMS-01SG-2 spectrometer, respectively.

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Synthesis of Two Peptides corresponding to α-Endorphin and γ-Endorphin by the Methanesulfonic Acid Deprotecting Procedure[1]

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Methanesulfonic acid was employed as a deprotecting reagent for the syntheses of the hexadecapeptide and the heptadecapeptide corresponding to α-endorphin and γ-endorphin. Their analgesic potencies were 0.021 and 0.013 relative to that of morphin respectively.

Keywords——methanesulfonic acid deprotection; α-endorphin; γ-endorphin; β-human endorphin; analgesic effect

In 1976, Ling *et al.*[3] reported the structural elucidation and the solid phase synthesis of two morphinomimetic peptides, α-endorphin (I) and γ-endorphin (II), isolated from a crude extract of porcine hypothalamus-neurohypophysis.

We wish to report alternative syntheses of the hexadecapeptide and heptadecapeptide corresponding to these two peptides, which were performed in a conventional manner, using

1) Amino acids and peptides are of the L-configuration. Following abbreviations were used: Z=benzyloxycarbonyl, Z(OMe)=*p*-methoxybenzyloxycarbonyl, Bzl=benzyl, DCC=dicyclohexylcarbodiimide, HOBT=1-hydroxybenzotriazole, DMF=dimethylformamide, DMSO=dimethylsulfoxide, THF=tetrahydrofuran, TFA=trifluoroacetic acid.

2) Location: *a) Minamifunabori-cho, Edogawa-ku, Tokyo, 132, Japan*; *b) Sakyo-ku, Kyoto, 606, Japan.*

3) N. Ling, R. Burgus and R. Guillemin, *Proc. Natl. Acad. Sci. U.S.A.*, 73, 3942 (1976); N. Ling, *Biochem. Biophys. Res. Commun.*, 74, 248 (1977).