ESTERS OF *Ferula angrenii*

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From an ethanolic extract of *Ferula angrenii* Eug. Kor. collected in the fruit-bearing period in the Shaugazsai gorge (upper reaches of the R. Angren, Tashkent oblast) by column chromatography and fractional crystallization we have isolated four crystalline compounds: (I) — $C_{17}H_{22}O_3$ (274^+), mp 159-161°C (hexane—ether), $[\alpha]_D^{24}$ + 37° (c 0.28; ethanol); (II) — $C_{17}H_{22}O_3$ (274^+), mp 133-135°C (hexane—ether) $[\alpha]_D^{24}$ −41° (c 0.8; ethanol); (III) — $C_{22}H_{30}O_4$, mp 188-189°C (ether), $[\alpha]_D^{20}$ −90.2° (c 1.0; chloroform); and (IV) — $C_{23}H_{32}O_5$, mp 140-141°C (ether), $[\alpha]_D^{20}$ − 96.8° (c 1.0; chloroform). They all have sharp physical constants, but in the PMR spectra of (I) and (II) in the region of hemiacyl protons together with the signal of an axial proton at 4.82 ppm (t, $\Sigma_{1/2}$ = 12 Hz, 1 H) there is the signal of an equatorial proton at 5.01 ppm (m, $\Sigma_{1/2}$ = 15 Hz, 1 H), the ratio of their intensities being 1:1. A mixture of (I) with (II) gave a depression of the melting point, but a mixture of (I) with chimgin [1] showed no depression.

On alkaline hydrolysis, compound (I) gave p-hydroxybenzoic acid $C_7H_6O_3$ with mp 208-210°C and a hydroxyterpene $C_{10}H_{18}O$ (154^+), mp 196-197°C, $[\alpha]_D^{24}$ −2.68° (c 1.8; ethanol); (II) gave the same acid and a hydroxyterpene $C_{10}H_{18}O$ (154^+) with mp 198-199°C, $[\alpha]_D^{24}$ −27.4° (c 2.61; chloroform).

Thus, compound (I) is a natural diastereomeric mixture of dextrorotatory chimgin and isochimgin (1:1), and (II) is a natural diastereomeric mixture of levorotatory chimgin and isochimgin (1:1). A comparison of the signs of the rotations and ORD curves of (I) and (II) showed that they were optical antipodes.

A similar natural mixture of chimgin and isochimgin has been isolated previously from *F. dshizakensis* [2], but the lack of physical constants (melting point, $[\alpha]_D$) did not permit us to identify it with our substances.

From their IR and PMR spectra and a mixed melting point with authentic samples, compounds (III) and (IV) were identified as ferolin and chimganidin [3] — esters of angrendiol.

We detected no free angrendiol in our sample [4].

LITERATURE CITED

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