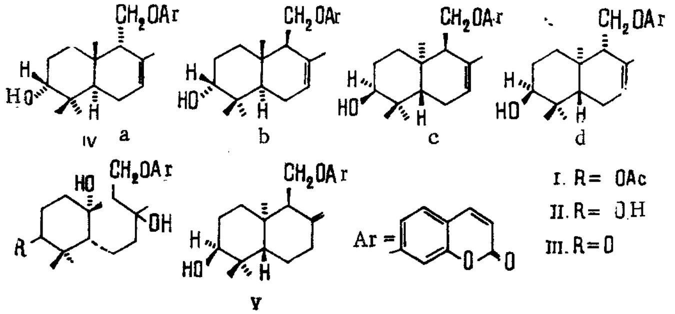

Thus, feropolidin (IV) is the mirror isomer of deacetylanhydrokellerin (c) with the axial $-CH_2OAr$ substituent at $C_1$' and for this we propose the absolute configuration "a." On the basis of the results obtained, it may be concluded that feropolin (I), feropolol (II), and feropolone (III) have the absolute configurations (I-III).

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# CHEMICAL COMPOSITION OF THE STEMS OF *Ferula diversivittata*

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Continuing a study of the chemical composition of *Ferula diversivittata* Rgl. et Schmalh. [1-3] we have investigated the stems of the plant collected in the municipality of Daudan, Ashkhabad Oblast.

The combined substances were extracted from the stems of the plant with hydrolysis alcohol. The concentrated alcoholic extract was diluted with water (1:2) and treated with ether. From the ether-soluble fraction of the resin, chromatography on a column of KSK silica gel with petroleum ether–benzene yielded five individual substances: (I) – $C_9H_6O_3$, mp 228°C; (II) – $C_{19}H_{20}O_4$, mp 98°C; (III) – $C_{19}H_{20}O_4$, mp 55-57°C; (IV) – $C_{25}H_{30}O_7$, mp 179-180°C, $[\alpha]_D$ –36°C (c 0.1; chloroform); (V) – $C_{29}H_{32}O_9$, mp 185-186°C, $[\alpha]_D$ –284° (c 0.5; benzene).

The water-soluble fraction of the extract was treated with butanol. The concentrated butanol extract was deposited on a column of KSK silica gel and was eluted with chloroform–ethanol. This gave substance (VI) $C_{25}H_{34}O_{10}$, mp 154-155°C, $[\alpha]_D$ + 10° (c 1.0; ethanol).

From their physicochemical constants, elementary compositions, IR and NMR spectra, and mixed melting points with authentic samples, the substances were identified, respectively,

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as umbelliferone, diversin, diversinin [1], 4-hydroxypruteninone diangelate, diversolide [3], and diversoside [2].

It must be mentioned that the qualitative compositions of the stems and roots of *Ferula diversivittata* are similar, with the exception of the absence of β-sitosterol from the stems.

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# C-GLYCOSIDES OF *Dianthus deltoides*

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Continuing an investigation of the mixture of flavonoids from the epigeal part of *Dianthus deltoides* L. (maiden pink), we have isolated an individual compound (V) [1].

Substance (V) with the composition $C_{21}H_{20}O_{10}$ has mp 240-242°C, $[\alpha]_D^{20}$ −40.7° (c 0.1; methanol). Its UV spectra, nm: $\lambda_{max}^{C_2H_5OH}$ 335, 270; $\lambda_{max}^{CH_3COONa}$ 395, 270; $\lambda_{max}^{C_2H_5ONa}$ 390, 270 $\lambda_{max}^{ZrOCl_2}$ 395, 275; $\lambda_{max}^{CH_3COONa+H_3BO_3}$ 385, 270.

The reaction of substance (V) with 5% hydrochloric acid (100°C, 3 h) led to its isomerization with the formation of substance (VI) having the composition $C_{21}H_{20}O_{10}$, mp 244-246°C, $[\alpha]_D^{20}$ +37.6°C, (c 0.1; methanol).

Analysis of the UV spectra showed the presence in compound (VI) of free OH groups at $C_5$, $C_7$, and $C_4$. For the exhaustive hydrolysis of substances (V) and (VI) we used a mixture of 30% solutions of sulfuric and acetic acids. After hydrolysis for 20 h, an aglycone and D-glucose and D-arabinose were obtained. From the results of UV spectroscopy, alkaline degradation, and a mixed melting point with an authentic sample, the aglycone of glycosides (V) and (VI) was identified as apigenin. The yields of the aglycone were 52-56%, which characterize the substances as monoglycosides.

To determine the position of the C-carbohydrate substituent we used the spectral properties of the zirconyl complexes [2]. Analysis of the UV spectra of the zirconyl complexes of the C-monoglycosides under investigation showed an additional maximum in the 355-360 nm region (B), and a regularity was also observed in the ratio of the intensities of the main (A) and supplementary (B) maxima.

The ratio of the intensities of the maxima A/B for vitexin and saponaretin (isovitexin) is between 80 and 100%, while for substances (V) and (VI) it was between 20 and 30%. The results obtained permit the assumption that in the C-glycosides investigated the carbohydrate substituent is present in the $C_6$ position. Acetylation with acetic anhydride in the presence of Anhydrone took place incompletely. The hydroxy group at $C_5$ did not undergo acetylation, which is characteristic for C-glycosides [6]. The melting point of the acetyl derivative of substance (V) was 180-182°C, $[\alpha]_D^{20}$ +80° (c 0.1; ethanol); and the corresponding figures for substance (VI) were 160-162°C, $[\alpha]_D^{20}$ +160.2° (c 0.1; ethanol).

Analysis of the differential spectra of the C-monoglycosides showed that in both components the sugar has the pyranose form (on the basis of the presence of three absorption bands in the IR spectrum in the 1100-1010 $cm^{-1}$ region). A band at 840 $cm^{-1}$ is a characteristic indication of the presence of the α configuration of the glycosidic bond [3, 4]. In a study of the kinetics of acid hydrolysis (10% hydrochloric acid, 100°C, 6 h), two isomers were detected with $R_f$ 0.14 and 0.55 in 15% acetic acid and 0.06 and 0.16 in the butan-1-ol—acetic acid—water (4:1:2) system in a ratio of 1:10.

According to the available literature information, isomers having an α-C-glycosidic bond are formed in a ratio of 1:10, and isomers with a β-C-glycosidic bond (of the type of

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