Another fragment was separated preparatively in the hexane–chloroform (2:1) system, which gave a zone with R_f 0.67 enriched with polyisoprenoids having M^+ 618 ($C_{43}H_{70}O_2$), 686 ($C_{48}H_{78}O_2$), and 754 ($C_{53}H_{86}O_2$). The compositions of these ions differed from those of the $(M - H_2O)^+$ ions of the glycinoprenols. In the region of low mass numbers of the corresponding spectrum there were the peaks of ions with m/z 277 ($C_{18}H_{29}O_2$) and 261 ($C_{18}H_{29}O$) of a linoleic acid residue and acyl group. In the MD spectrum of the ion with m/z 618 the peaks of parental ions with m/z 686 and 754 were observed, which confirmed the polyisoprenoid nature of the substances. They were most probably esters of linolenic acid with penta-, hexa-, and heptaprenols. Mass-spectrometric characteritics were obtained as described in [2].

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TERPENOID COUMARINS OF Ferula lipskyi AND F. vicaria

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Continuing a systematic study of the chemical composition of plants of the genus Ferula growing on the territory of Central Asia, we have studied the components of the roots of another two species of the genus that have not been studied previously – F. lipskyi Korov. and F. vicaria Korov., collected in the foothills of the Turkestan and Alai ranges, in the basins of the rivers Isfara and Sokh (Leninabad province of Tadzhikstan and Oshsk province of Kirghizia).

An ethanolic extract of the comminuted roots was diluted with water 1:2, and the substances were extracted with diethyl ether. The extractive substances obtained were deposited on a column of silica gel and compounds were eluted by petroleum ether–ethyl acetate (7:1) and mixtures of the same solvents with increasing concentrations of the latter.

From the total extractive substances of the roots of F. lipskyi collected in the valley of the River Sokh five substances of coumarin nature were isolated: (I) with the composition $C_{24}H_{30}O_4$, m.p. 176-177° $[\alpha]_D$ – 54° (c 1.0; chloroform); II – $C_{24}H_{30}O_4$, m.p. 154-155° $[\alpha]_D$ – 55° (c 1.0; chloroform); III – $C_{24}H_{30}O_4$, m.p. 137-138°, $[\alpha]_D$ – 82.0° (c 1.0; chloroform; IV – $C_{26}H_{36}O_6$, m.p. 152-153°, $[\alpha]_D$ + 29° (c 1.0; chloroform); V – $C_{24}H_{32}O_5$, m.p. 212-214°, $[\alpha]_D$ – 51° (c 1.0; chloroform).

Substances (I-V) were identified by a comparison of physicochemical constants, IR spectra, and mixed melting points with authentic samples as gummosin [1, 2], farnesiferol A [3], conferol [4], samarkandin acetate [5], and feshurin [6], respectively.

F. lipskyi is the first representative of the section Anatriches Korov, for which the presence of terpenoid coumarins has been shown. The marked differences between the chemical composition of this species and those of F. equisetacea K.-Pol. and F. fedschenkoana K.-Pol. from the same section raises doubt about the taxonomic integrity and naturalness of the Anatriches section.

From the roots of another species of giant fennel (F. vicaria) gathered in the Urtabuz mountains, by separating the total substances of a column of silica gel we isolate and identified six terpenoid coumarins – feropolol $C_{24}H_{34}O_6$, m.p., 96-98°, $[\alpha]_D$ + 38° (c 1.0; ethanol); feropolone $C_{24}H_{32}O_6$, m.p. 225-226°, $[\alpha]_D$ – 7° (c 1.0: chloroform); feropolidin $C_{24}H_{30}O_4$,

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m.p. 154-155°, $[\alpha]_D$ + 1.55° (c 1.0; chloroform) [7, 8]; mogoltadone $C_{24}H_{28}O_4$, m.p. 132-133°, $[\alpha]_D$ − 41.0° (c 1.0; chloroform) [9]; gummosin $C_{24}H_{30}O_4$, m.p. 176-177° $[\alpha]_D$ − 54° (c 1.0; chloroform) [1, 2], and foliferin $C_{24}H_{34}O_6$, m.p. 240-241°, $[\alpha]_D$ + 128° (c 1.0; ethanol). All these substances were identified by a comparison of IR spectra and by mixed melting points with authentic samples.

F. vicaria was provisionally (because of the absence of information on the structure of the fruit) assigned by E. P. Korovin [11] to the group Lobulatae Korov., section Macrorrhiza Korov. The results of the present sudy permit doubt of the correctness of this treatment of the taxonomic position of the species, since the presence of different esters of terpenoid alcohols is characteristic for the other species of the group that have been studied – F. soongarica Pall. ex. Schult. and F. akitschkensis.

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TERPENOID COUMARINS OF Ferula cummosa

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F. gummosa Boiss. is one of the species of the genus Ferula that is used in Eastern medicine (especially in India) for the treatment of various diseases [1, 2]. Various components have been isolated from this species and from the medicinal resin galbanum isolated from it (terpenoids, polyacetylenic compounds, macrocyclic lactones, and also fatty and essential oils) [2]. Among the active components of this species are coumarins – galbanic acid [3, 4], gummosin [5], and umbelliferone [5, 6].

The present investigation has shown that the coumarin composition of F. gummosa is not exhausted by these three substances. At the same time, it brings additional clarity into the disputed question of the chemical composition of F. kopetdaghensis.

We have investigated the coumarins of the roots of F. gummosa collected in Turkmenia (Kopet-Dagh, Mount Dushak). The total extrative substances were obtained by the ethanol extraction of the comminuted roots, and these were separated into three fractions: neutral (A), acidic (B), and glycosidic (C).

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