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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By separating the neutral fraction on a column of silica gel with elution of the substances by hexane–ethyl acetate (9:1) and mixtures of the same solvents with increasing concentrations of the latter we obtained four individual compounds: (I) with the composition $C_{24}H_{30}O_4$, m.p. 124-125°, $[\alpha]_D$ + 26.5° (c 1.0; chloroform); II) with the composition $C_{24}H_{30}O_4$, m.p. 110-111°C, $[\alpha]_D$ + 14.0° (c 1.0; chloroform); (III) with the composition $C_{24}H_{30}O_4$, m.p. 189-190°; $[\alpha]_D$ + 63°C (c 1.0; chloroform) and (IV) with the composition $C_{24}H_{32}O_5$, m.p. 145-146° $[\alpha]_D$ -15.6°C (c .0; chloroform).

Substances (I-IV) were identified by a comparison of physicochemical constants and IR spectra as kopetdaghin, farnesiferol B, kamolone, and kopeolin, respectively.

Two substances were isolated from fraction B – umbelliferone, $C_9H_6O_3$, mp 231-232°C, and galbanic acid, $C_{24}H_{30}O_5$, mp 94-95°C, $[\alpha]_D$ –24° (c 1.0; chloroform). A butanolic extract of fraction C on long standing, deposited crystals of kopeoside, $C_{30}H_{42}O_{10}$, mp 176-177°C, $[\alpha]_D$ – 22.0° (Ic 1.0; ethanol).

Thus, seven substances of coumarin nature have been isolated from the roots of F. gummosa and have been identified: kopetdaghin, farnesiferol B, kamolone, kopeolin, umbelliferone, galbanic acid, and kopeoside. All these compounds, and also feloside, feligoside, and kopetin have been isolated previously from another Kopet-Dagh species of Ferula, namely F. kopetdaghensis [7-11], and this has proved to be in direct contradiction to the taxonomic position of this species, which is extremely close to F. ovina (Boiss.) Boiss. [12]. We subsequently studied another, authentically documented, sample of F. kopetdaghensis and from it we isolated esters of terpene alconols – ferolin, chimganidin, chimgin, and chimganin [13]. In this way it was shown that F. kopetdaghensis has a terpenoid composition that is typical for the Ovinae group of the Xeronarthex Korov section.

These facts give grounds for assuming that the sample collected in the Kopet-Dagh and studied previously under the name of "F. kopetdaghensis" [7-11] was probably F. gummosa.

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