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BRIEF COMMUNICATIONS

CERTAIN KAZAKHSTAN *Galium* SPECIES. I.

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Demands of the pharmaceutical industry for local medical raw material stimulated chemical investigations of Kazakhstan *Galium* species. The present communication presents results from a determination of the qualitative composition and quantitative content of polyphenol components of five *Galium* species.

Foreign scientists began the chemical investigation of *Galium* in the 20th century to evaluate the possibility of applying them in practice. At present, the chemical compositions of more than 50 *Galium* species have been studied in the CIS, mainly those growing in the Ukraine and beyond the Caucuses. In Kazakhstan, 25 *Galium* species are found. However, with the exception of two reports [2, 3], where three species of Kazakhstan *Galium* are noted, data on their chemical compositions are lacking.

Biologically active groups of compounds are described for *Galium*: steroids, coumarins, iridoids, saponins, vitamins, formic and ascorbic acids, alkaloids, neoflavonoids, flavonic [4-9], anthracene, and naphthalene derivatives [1], coumarins [8], and chlorogenic and coumaroylquinic acids [10]. Paper and thin-layer chromatographies using specific reagents in the presence of standards have established the qualitative composition of carbohydrates, amino acids, phenols, phenolic acids, flavonoids, anthraquinones, and tanning agents in the Kazakhstan species *G. krylovii*, *G. tianschanicum*, *G. turkestanicum*, *G. mugodsharicum*, and *G. verum*.

Partition chromatography on silica gel, hydrated silicic acid, and LH-20 was used to select the conditions for separating fractions into the components. Quantitative analyses of the principal groups of natural compounds in roots of the studied *Galium* species that were collected during dormancy are presented in Table 1 [3]. The aerial parts of these species were studied over three years in different vegetative states. It was shown that the maximum content of anthracenes, flavonoids, and tanning agents occurs at the start of growth.

The literature teaches that the presence of a dominating number of compounds with substituents on only one ring is characteristic of the biosynthesis of anthraquinones in these plants and the Rubiaceae family in general. One to four substituents can be present [2, 3, 11-14]. However, derivatives with substituents on two rings have recently been reported [10, 13, 15].

Alizarin, rubiadin, lucidin, purpurin, chlorogenic, cofeic, gallic, tartaric, citric, and malic acids, apigenin, kaempferol, quercetin, rutin, quercetin 3-O-β-D-glucoside, kaempferol 3-O-β-rutinoside, scopoletin, and umbelliferone have been identified in five species of Kazakhstan *Galium*.

The Kazakhstan species characteristically have a high content of anthracenes, flavonoids, and tanning agents. They lack anthragallol derivatives and methoxy flavonoids. They have a low content of glycosylated flavonoids and anthraquinones. The amino-acid composition of Kazakhstan *Galium* species has not previously been studied.

The maximum content of anthracenes occurs at the start of growth (May) and during flowering (July). The content decreases by 1.5-2% at the end of growth (September). Alizarin constitutes 76.5% of the total anthracenes. These data are needed to select the time for preparing the raw material.

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TABLE 1. Quantitative Analysis of Main Groups of Biologically Active Compounds in Certain Species of Kazakhstan *Galium*

Galium species	Content, % (average of three samples)					
	carbohydr.	phenols and phenolic acids	amino acids	flavonoids	anthracenes	tanning agents
G. krylovii	4.34	4.00	3.17	1.98	2.96	9.08
G. tianschanicum	3.90	3.36	4.06	3.34	3.41	12.06
G. turkestanicum	4.11	3.22	2.99	3.42	2.94	11.24
G. mugodsharicum	4.62	2.71	4.61	2.88	2.26	10.13
G. verum	5.11	4.16	5.17	2.29	1.52	9.72

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