A CHEMICAL STUDY OF Scabiosa bipinnata

V. A. Kuril'chenko, G. N. Zemtsova,
and V. Ya. Bandyukova

UDC 547.972.547.587.52

The results of our investigations have shown that Scabiosa bipinnata C. Koch, family Dipsacaceae contains saponins, alkaloids, and various polyphenolic compounds.

The saponins were isolated from the defatted roots by extraction with methanol, concentration, and repeated precipitation with acetone. Aqueous solutions of the saponins formed a stable foam, hemolyzed blood, were colored dark red by conc. sulfuric acid, and gave a positive Briskorn reaction [1]. Chromatographic analysis showed the presence in the plant of two saponins, polyphenolic products, and a large amount of free carbohydrates. The saponin fraction was freed from phenolic substances by treatment with butan-1-ol, precipitation with acetone, and subsequent elution with methanol from a column of alumina. The fractions were analyzed by means of the dark violet coloration with Kahlenberg's reagent [2]. They were freed from free carbohydrates by gel-filtration through Sephadex G-25. Chromatographic analysis of the saponin fraction showed the presence in it of two substances, with R_f 0.29 and 0.48 (BAW system). From the products of acid hydrolysis (with Kiliani's mixture) we isolated an aglycone which, after recrystallization from methanol, melted at 305-308° C and showed no depression of the melting point in admixture with an authentic sample of oleanolic acid. Its IR spectra had absorption bands at (cm^{-1}): 3430, 3170, 2860 (vibration of –OH), 1695 (=C=O), 1620, and 1595 ($-\rangle CH, -CH_3$) [3]. After the separation of the aglycone, D-glucose, D-xylose, and L-rhamnose were found in the hydrolysate.

From the concentrated ethanolic extracts of the epigeal part of the plant, chloroform precipitation yielded three flavonoid glycosides: quercetin 3-O-β-L-arabofuranoside 7-O-β-D-glucopyranoside [4], quercetin 7-O-β-D-glucopyranoside, and luteolin 7-O-β-D-glucopyranoside.

From the concentrated ethanolic extract, exhaustive extraction with acidified diethyl ether yielded two phenolic acids. A determination of their physical constants and their acetylation products confirmed information obtained previously of the presence in this plant of caffeic and chlorogenic acids [5].

A chloroform extract of the roots and herbage yielded crystals with the composition $C_{30}H_{48}O_3$, mp 307° C (from methanol). From its IR spectrum, methylation and acetylation products, and comparison with an authentic sample, the substance was identified as oleanolic acid.

LITERATURE CITED

1. C. H. Briskorn and M. Briner, Arch. Pharm., 287/9, 8, 429 (1954).
2. K. Hiller, M. Keipert, and B. Linzer, Pharmazie, Ber., 12, 713 (1966).
3. G. Snatztke, F. Lampert, and R. Tschesche, Tetrahedron, 18, 1417 (1962).
4. G. N. Zemtsova, V. A. Bandyukova, and A. L. Shinkarenko, Khim. Farmats. Zh., 2, No. 12, 29 (1968).
5. V. A. Bandyukova, G. N. Zemtsova, N. V. Sergeeva, and V. I. Frolova, Khim. Prirodn. Soedin., 6, 388 (1970).

Pyatigorsk Pharmaceutical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 534-535, July-August, 1971. Original article submitted February 23, 1971.