ALKALOIDS OF THE ROOTS OF Sophora griffithii

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We have previously [1-3] investigated the alkaloids of the epigeal part of Sophora griffithii Stocks collected in the fruit-bearing period and have found pachycarpine, cytisine, N-methylcytisine, and argentine.

In the present paper we give the results of a study of the alkaloids of the roots of this sophora collected on May 20, 1968 in the water-meadows of R. Naryn close to Tash-Kumyr, Kirghiz SSR, in the fruit-bearing period. The plants (2.8 kg) were extracted by the usual chloroform method. After the elimination of the solvent, 15.1 g of combined alkaloids (0.54%) was obtained.

The combined alkaloids were dissolved in 7% sulfuric acid and the solution was washed several times with chloroform. Then the acid aqueous solution was made alkaline with 10% caustic soda and was extracted with benzene and then with chloroform. The solvents were distilled off, and the benzene extract gave 6.89 g and the chloroform extract 6.64 g of residue. Cytisine was isolated from the latter and identified.

When the material from the benzene extract was subjected to thin-layer chromatography (TLC) on alumina in system 1 [benzene–ether–ethanol (10 : 6 : 2)], four spots were found with R_f 0.17, 0.25, 0.44, and 0.59, and on chromatography similarly in system 2 [chloroform–ethanol (10 : 1)] the four alkaloids had R_f 0.40, 0.44, 0.49, and 0.58.

By comparative chromatography (system 1) it was established that the spot with R_f 0.17 corresponded to cytisine, that with R_f 0.44 to N-methylcytisine, and that with R_f 0.59 to matrine.

To isolate individual alkaloids, the material from the benzene fraction was chromatographed on a column of alumina (activity grade II). The alkaloids were eluted with benzene–ether–ethanol (10 : 6 : 2). This gave 12 fractions, which were analyzed by the TLC method. Fractions 1-4 contained mixtures of alkaloids. When fractions 5-10 were concentrated, a crystalline material precipitated (2.32 g). After recrystallization from petroleum ether, it melted at 137°C. The IR spectrum of the base obtained was identical with that of N-methylcytisine.

Fractions 11-12, after the solvent had been distilled off, yielded cytisine (0.35 g).

Fractions 1-4 were combined, the solvent was distilled off, and the residue was rechromatographed on a column. The alkaloids were eluted with a mixture of chloroform and ethanol (10 : 1). The first fractions of the eluate, after the elimination of the solvent, yielded crystals (0.21 g) identical in melting point and IR spectrum with matrine.

It was impossible to obtain the alkaloid with R_f 0.25 (system 1) in the individual state.

Thus, cytisine, N-methylcytisine, and matrine have been isolated from the roots of Sophora griffithii.

LITERATURE CITED

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