STEROID SAPOGENINS OF Digitalis ferruginea

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In a study of the steroid sapogenins of Digitalis ferruginea L. growing in Georgia, the materials were first defatted. In the leaves and flowers, the saponins were hydrolyzed directly in the raw material [1]. The sapogenins were extracted from the hydrolyzed state by means of petroleum ether. They were isolated from the seeds with methanol and were then hydrolyzed in the presence of xylene.

The combined sapogenins of the leaves were found to contain two substances. On adsorption chromatography of this mixture on alumina, the petroleum ether and benzene eluates gave a monohydroxy sapogenin which appeared on paper and thin-layer chromatograms at the level of tigogenin; mp 202-203°C, $[\alpha]_D^{20}$ −69.29° (c 1.00; chloroform). A mixture showed no depression of the melting point. The acetate of the substance, with the composition $C_{29}H_{26}O_4$ and mp 203-205°C, was obtained. The IR spectrum of this acetate was identical with that of the acetate of tigogenin [2]. The yield of tigogenin from the leaves was 0.25%. The subsequent washing of the column with chloroform–methanol yielded a dihydroxy sapogenin, the mobility of which on chromatograms corresponded to gitogenin; mp 269-270°C, $[\alpha]_D^{20}$ 72.70° (c 1.00; chloroform). No depression of the melting point of a mixture was observed. The IR spectra of the acetate of this substance and of gitogenin acetate were identical [2]. The yield of gitogenin from the leaves was 0.13%.

A petroleum ether extract of the hydrolysate of the leaves also yielded 0.11% of gitogenin. The mother solution remaining after the isolation of gitogenin was shown to contain a small amount of tigogenin.

When the combined technical sapogenins of the seeds were separated on alumina, two individual substances were obtained. One of them was identical with tigogenin. The yield of tigogenin from the seeds was 0.16%. The second, a substance with the composition $C_{27}H_{44}O_5$, a trihydroxysapogenin, had a R_f value corresponding to that of digitogenin; mp 283°C, IR spectrum of the triacetate completely identical with that of the acetate of digitogenin [2]. The yield of digitogenin from the seeds was 0.76%. A small amount of gitogenin was also found in the combined technical sapogenins of the seeds.

Thus, the main sapogenin of the seeds is digitogenin. This is the first time that digitogenin and gitogenin have been isolated from Digitalis ferruginea.

LITERATURE CITED

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