QUANTITATIVE DETERMINATION OF DIGITOXIN AND GITOXIN IN THE LEAVES OF Digitalis purpurea

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Methods for the quantitative determination of cardiac glycosides have been discussed in many publications [1-11], but hitherto it has been difficult to select a reliable and sufficiently accurate method of determining these compounds. Consequently, we set outselves the task of developing a method for the quantitative determination of digitoxin and gitoxin in plant material that could be used for routine analyses.

The glycosides were extracted from the air-dried leaves of the common foxglove with 40% methanol by shaking in a shaking machine for 2 h with the preliminary purification of the material by diethyl ether in a Soxhlet apparatus, and they were then transferred into a mixture of chloroform and isopropanol (3:1). The extracts were evaporated to dryness, and the residues were then dissolved in chloroform–methanol (1:1).

The glycosides were separated by thin-layer chromatography. The sorbents used were alumina, starch, and talc. The best separation of the combined glycosides was achieved on talc. The plates for chromatography were prepared as described by Garbuzova and Libizov [2].

For the successful solution of the problem of separating a mixture of substances by chromatography the choice of the liquid phase is of primary importance. In the determination of the glycosides of the common foxglove in a thin layer of talc we used the following solvent systems: 1) benzene–ethanol–chloroform–formamide (30:10:59:1); 2) benzene–ethanol–chloroform –formamide (10:10:79:1); 3) benzene–chloroform–formamide (25:25:3); 4) methyl ethyl ketone–xylene (1:1); 5) chloroform–dioxane–butan-1-ol–formamide (70:20:5:10). In the separation of the combined glycosides, the chloroform–dioxane–butan-1-ol–formamide (70:20:5:10) system proved to be the best.

After chromatographic separation, the digitoxin and gitoxin were eluted with 5 ml of xanthydrol reagent and subjected to spectrophotometry at 532 nm. The amounts of the glycosides were found from calibration curves in the range from 10 to 100 γ. On treating the results obtained by the methods of mathematical statistics, it was found that the relative error in the determination of digitoxin was ±1% and in that of gitoxin ± 2.28%.

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