CHROM. 5999

Gas–liquid chromatography of cannabinoids in micro quantities of cannabis by solid injection

In the gas chromatographic analysis of cannabis, extracts of the sample prepared by means of an organic solvent are usually employed. Extracts of plant material made with organic solvents always contain a mixture of compounds, many of which are not volatile. Gas chromatography of such extracts very soon leads to contamination of the gas chromatographic column. It would be preferable, therefore, to be able to analyze micro quantities of the sample directly without any extraction. Only the volatile components present would then evaporate, whereas non-volatile compounds would remain in the plant material, doing no harm to the column. We have developed a micro technique for gas chromatographic analysis of cannabinoids in cannabis by means of solid injection of fresh or dried plant material. The amount necessary for one analysis is less than 1 mg dried cannabis. The method is well suited to the detection of small amounts of cannabinoids in cannabis and cigarettes impregnated with cannabis extracts.

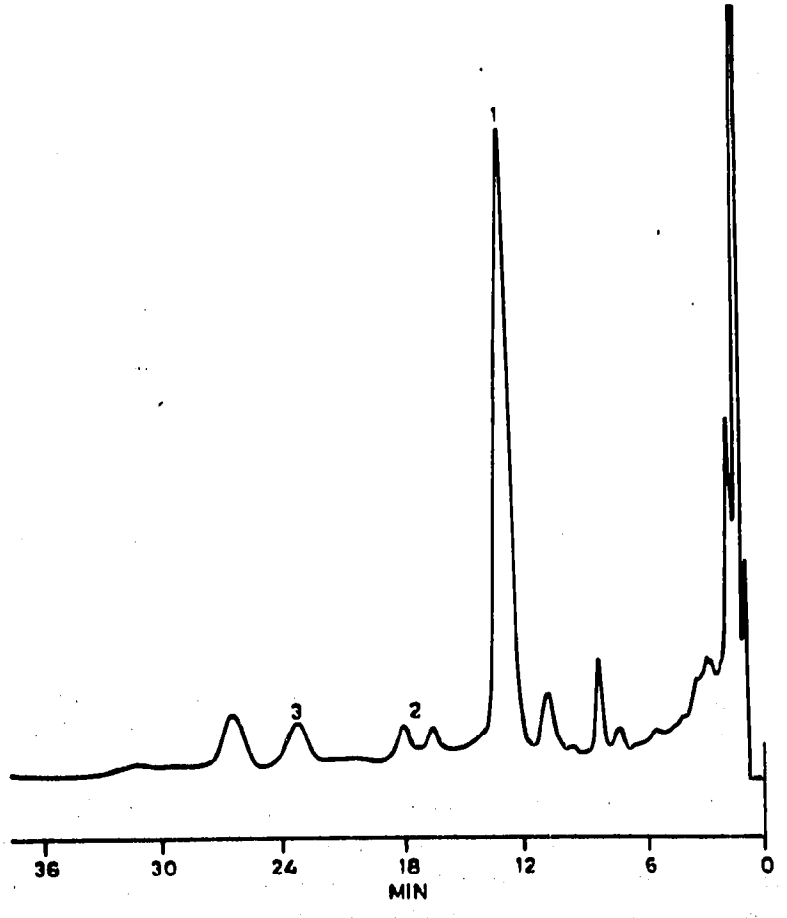

Fig. 1. Chromatogram of cannabis grown in Turkey, solid injection. 1, cannabidiol; 2, 1,2-tetrahydrocannabinol; 3, cannabinol.

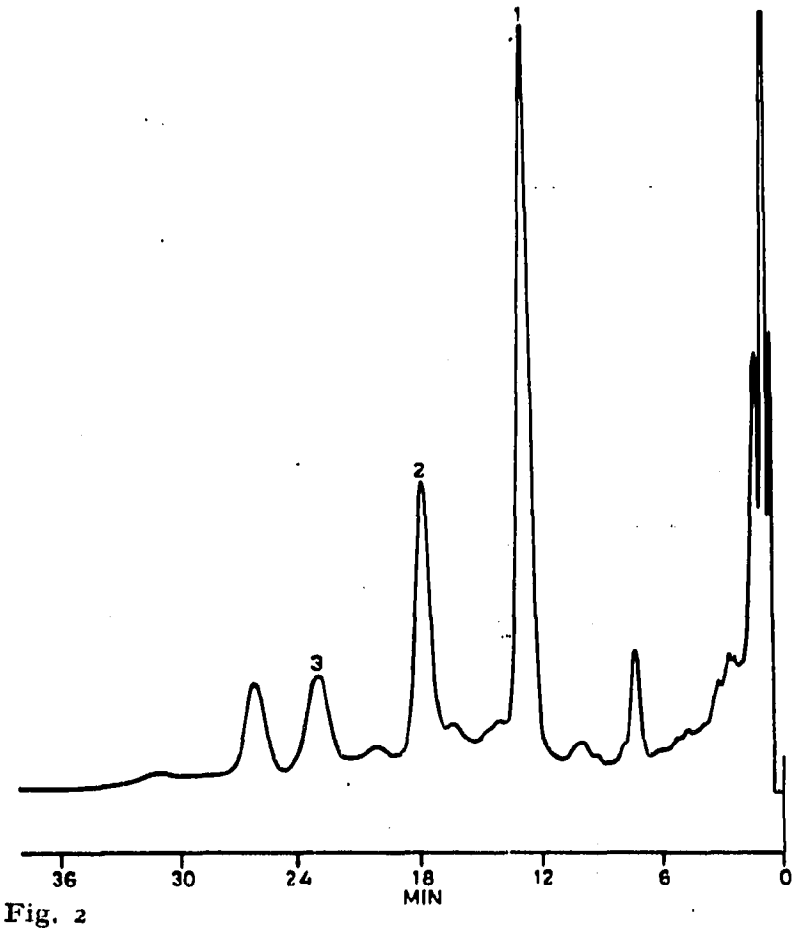

Fig. 2

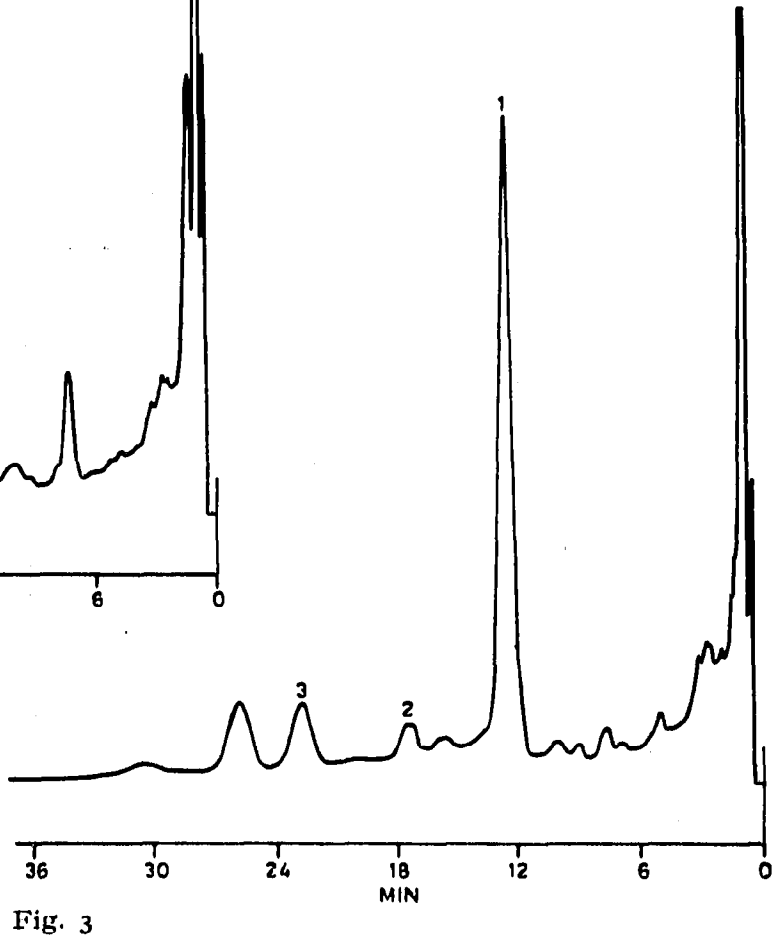

Fig. 3

Fig. 2. Chromatogram of cannabis grown in The Netherlands, solid injection. Peak numbers as in Fig. 1.

Fig. 3. Chromatogram of cannabis grown in Norway, of Swiss origin, solid injection. Peak numbers as in Fig. 1.

Experimental

Apparatus. The gas chromatograph used was a Becker Model 409 (Becker-Delft, The Netherlands) with an FID detector. The column used was glass coil, 2 m long, I.D. 2 mm.

Operating conditions. Gas chromatography was carried out under the following conditions: Stationary phase, OV-17, 3% on Chromosorb W, AW, 60–80 mesh; carrier gas, nitrogen, 30 ml/min; temperature, oven, 235°, injector, 300°, detector, 300°.

Sample size. Approximately 1 mg of dried plant material was used.

The device for solid injection of the plant material used in this investigation

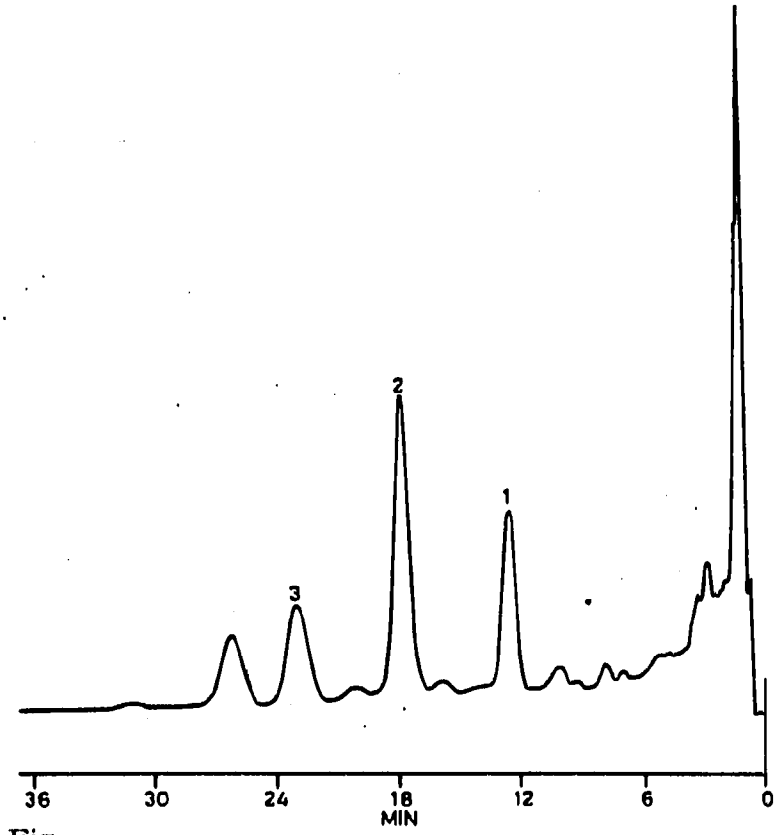

Fig. 4

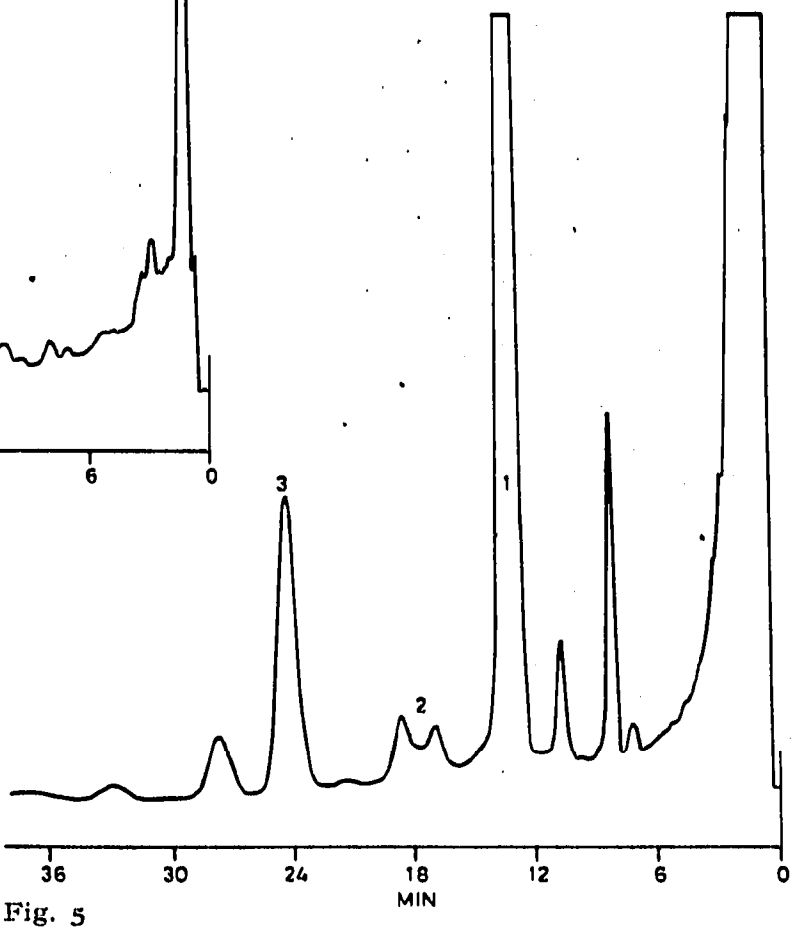

Fig. 5

Fig. 4. Chromatogram of cannabis grown in Norway, of South African origin, solid injection. Peak numbers as in Fig. 1.

Fig. 5. Chromatogram of cannabis grown in Turkey. Extract prepared with petroleum ether for GLC. Peak numbers as in Fig. 1.

is the same as that described previously[1,2]. The sample to be analyzed is placed in a small metal holder connected to a stainless steel rod going through a metal tube with gas-tight teflon O-rings. The device is connected to the flash heater of the gas chromatograph. The holder with the plant material is moved into the flash heater and is withdrawn after 30 sec. This is sufficient to make the cannabinoids evaporate and be carried onto the column by the carrier gas.

Figs. 1–4 show typical chromatograms of cannabis grown in Turkey, The Netherlands and Norway. The Norwegian samples were cultivated from seeds of

South African and Swiss origin. On all chromatograms the peaks of the main cannabinoids, cannabidiol, cannabinol and tetrahydrocannabinol, are present. In Fig. 5 the chromatogram of a petroleum ether extract of the Turkish sample is shown compared with the solid injection technique (Fig. 1). For the direct technique only the utmost tip of a leaf (less than 1 mg) is necessary for one analysis, whereas a greater amount of material has to be used in preparing the extract.

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Department of Pharmacognosy,
State University of Leiden,
Leiden (The Netherlands)

K. E. RASMUSSEN
S. RASMUSSEN
A. BAERHEIM SVENDSEN

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