c. Assayed by analysis of carboxylic esters; calculated by assuming that the lipid was a diacyl compound.

d. The phosphorus of the sample remained completely "stable" in mild acid hydrolysis.

e. The lysolecithins formed by the mild acid hydrolysis were free of alkoxy-glycerylphosphoryl cholines as shown by their requimolar content of carboxylic ester and phosphorus.

f. The "ether-ester lecithin" obtained from the mild acid hydrolysate gave nearly quantitative yield of "monochain derivatives" of glycerylphosphoryl choline by prolonged mild alkaline hydrolysis.

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Gas Chromatographic Determination of some Volatile Compounds in Urine

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For several years this laboratory has used a chemical as well as an enzymatic method for the determination of alcohol in blood and urine [1]. In some cases large discrepancies were found between the results obtained by the two methods.

The number of cases where these large discrepancies are found as well as the number of cases with smaller but significant differences seem to increase and these findings induced a closer investigation of the cause of the disagreement.

To this purpose a Perkin-Elmer gas fractometer with a flame detector was used. As column filling we used 10 g of Carbowax 1500 (polyethyleneglycol, 10 % by weight on Teflon) in the first part of the column followed by 5 g of Ucon polyglycol LB-550-x (polypropyleneglycol, 20 % by weight on Chromosorb).

This packing ensured complete separation of the volatile compounds which could be expected to be present in the urine samples, without interference of the relatively large amounts of water present. At the same time the water was not, as is the case with polyethyleneglycol alone, unnecessarily retarded which is obviously important as the next sample can not be introduced until all water has left the column.

The temperature was 100°C throughout the procedure and the nitrogen pressure was 1 atm. The urine was injected directly and 2 μl was used. Under these conditions a new sample could be injected every tenth min. At the maximum sensitivity 0.01 % of ethanol in a 2 μl sample gave a deflection of 8 to 10 cm on the recorder.

As could be expected, the chromatographic analysis revealed besides ethanol the presence of methanol, acetone and acetaldehyde which in some but not all cases could account for the differences seen in Table 1. In no cases a higher aliphatic alcohol than ethanol has been found. A typical recording is shown in Fig. 1. Acetone was commonly encountered in diabetic in-

Table 1. Some typical examples of the difference between the two methods. (‰ = g per liter).

Blood		Urine		Gas Chromatography of the Urine			
Widmark ‰	ADH ‰	Widmark ‰	ADH ‰	Ethanol ‰	Methanol ‰	Acetone ‰	Acetal-dehyde ‰
2.73	1.88	3.69	2.47	2.40	0.78	0.02	—
3.45	3.01	4.64	4.25	4.29	0.39	0.02	(0.006 ?)
1.19	0.57	2.39	1.10	0.98	0.66	0.11	—
2.63	2.08	3.23	2.54	2.55	0.39	0.04	0.002
3.34	3.02	3.89	3.93	3.74	—	0.20	—
3.29	2.65	3.61	2.63	2.73	0.69	0.04	—
2.00	1.38	3.29	2.35	2.46	0.45	0.01	unknown
1.00	0.70	1.65	1.12	1.07	0.06	0.17	—

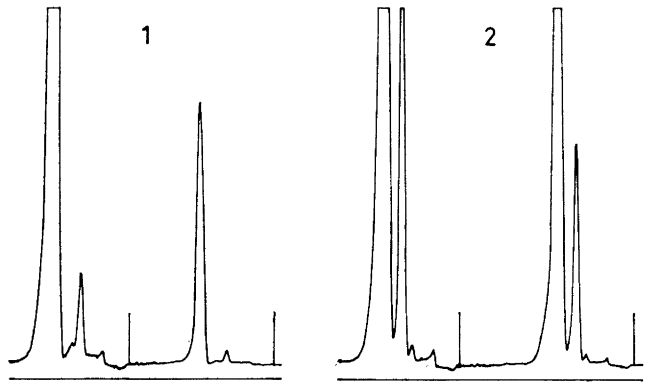

Fig. 1. Recordings of two duplicate analyses with two different sensitivities. The peaks are from left to right, ethanol, methanol, acetone and acetaldehyde. The sensitivities were 32 and 4 in experiment 1, 8 and 4 in experiment 2.

dividuals and the concentration lies mostly around 0.01 ‰. Methanol, acetaldehyde and probably acetone can derive from the drinking of denatured alcohol or home-distilled spirits. In all cases the enzymatic determinations of ethanol agreed closely with the gas chromatographic analysis.

A detailed report with application of the method to blood will be published later.

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