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Letter to the Editor

Gas chromatographic separation of diastereomeric isoprenoids

Sir,

We recently reported the application of the gas chromatographic (GC) separation of stereoisomeric isoprenoids to the monitoring of oil pollution in marine biota¹.

In this article we clearly mentioned that "the double peak shape of pristane and phytane is well known" (p. 401). Among the previous and the most recent works in this field we pointed out the paper by Patience *et al.*². These authors, extending the earlier work of the Organic Geochemistry group of the Bristol School of Chemistry, established the effect of oil maturation on the stereochemistry of 2,6,10,14-tetramethylpentadecane (pristane). It would have been worthwhile to point out that, as early as 1971, the Bristol group clearly demonstrated the resolution of pristane from an ancient sediment into two components by means of open tubular gas-liquid chromatography³. The stereochemistry of the two components was determined by means of direct GC analysis of a sample containing only the *meso*-form (6*R*),(10*S*) of the naturally occurring pristane⁴.

However, such a separation, which was remarkable in the early 1970's, required an open tubular stainless-steel column of 100 m long coated with a polar stationary phase such as butanediol succinate or diethylene glycol succinate polyesters. Since the beginning of the 1970's capillary GC has undergone a dramatic improvement both in the speed of analysis and in the separation power. This undoubtedly has resulted from the recent emphasis on analysing very complex mixtures from biological and environmental sources, as we experienced during the 10 last years.

By using contemporary glass capillary GC we illustrated that the resolution of isoprenoids is not such a challenging task as it was in 1970. As shown in Fig. 1, such a separation can be carried out with a resolution factor of about 1, allowing a correct determination of the GC peak height ratios. The analysis time required is about 1 h for optimized conditions of flow-rate and temperature programme. This separation was carried out on OV-1, a thermostable apolar liquid phase. Knowing that the analysis time increases as the cube of the resolution factor⁵, it can be calculated from the data of Maxwell and co-workers³ that in order to achieve the same resolution factor of 1 the analysis time would be 14 h under their GC conditions. This example emphasizes the advantages of modern glass capillary GC.

On the other hand, the concept of using diastereomer separations to distinguish between pristane of fossil fuel and biogenic origins, even if previously suggested by Quirk *et al.*⁶, until now has not been extensively used, unlike the hopanes test introduced by Dastillung and Albrecht⁷. We think this is probably due to the GC conditions used by the Bristol group. Indeed, such conditions based upon the use of a

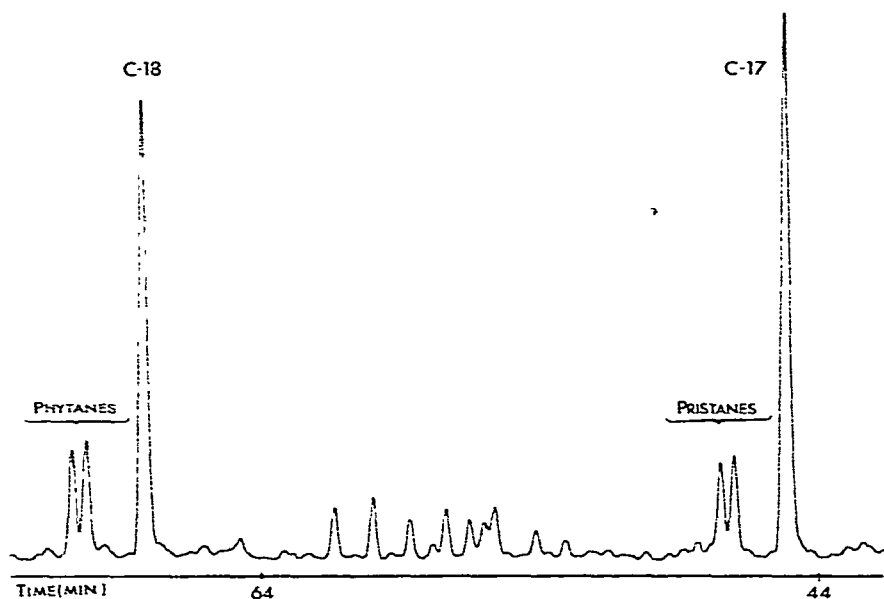


Fig. 1. Section of a gas chromatogram of an aliphatic hydrocarbon fraction extracted from oysters collected from Abers sites polluted by Amoco-Cadiz oil spill. GC conditions: OV-1, 50 m \times 0.3 mm I.D., film thickness 0.075 μ m on BaCO₃-treated glass. Splitless injection at 40°C then 60°C followed by a temperature programme of 1°C/min.

100-m stainless-steel column of DEGS, are not very common in chromatography laboratories.

Thus, our paper may be considered as a contribution in transferring knowledge of geochemists to the environmental field.

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