sponding distance in benzoic acid, 1.48 Å. The Fourier map in Fig. 1 shows that the electron density in the carbon positions decreases with the distance from the origin, *i. e.* the centre of symmetry of the molecule. The temperature factors, B, increase in the same order. This is in accordance with what is found in other planar centrosymmetric molecules as naphthalene [4] and anthracene [5] and is due to the rigid-body vibrations of the molecules [6]. — The molecular packing is similar to the arrangement found in 1,2,5,6-dibenzanthracene [7].

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The Fatty Acid Composition of Shea Butter and Olive Kernel Oil

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Shea butter. Shea butter (or karite butter) comes from the seeds of *Butyrospermum Parkii* of the family *Sapotaceae*. After the second world war shea nuts have been imported into Europe on a relatively small scale, but in Denmark the oil is used in appreciable quantities for certain types of margarines. It would therefore be of interest to know the composition of the fatty acids of this oil and especially the content of essential fatty acids.

For the present investigation shea nuts from West Africa were used. The fat in the nuts was isolated and analyzed, *i. a.* by alkali isomerization [1] and — in the form of methyl esters — by quantitative gas-liquid chromatography [2]. The chromatograph used was supplied by Griffin & George and had a 0.9 m column (25 % silicone grease on 40—60 mesh Firebrick). The temperature of the column was 215°C, the outlet pressure 1 atm, the katharometer current 100 mA, and the carrier gas used was helium (1.0 l/h). Using a speed of the recorder paper of 6 inches/h, the quantity M (in μl) of the individual components of the methyl ester mixture could be determined from the area A (in cm²) lying under the corresponding peaks in the chromatogram by applying the following formula (which has been derived by calibrating the apparatus by means of pure fatty acid methyl esters):

$$M_i = \log_{10}^{-1} (0.889 \times \log_{10} (A_i) - 0.058)$$

The calculated fatty acid composition (in weight per cent of the fatty acid mixture) and other results obtained from the analyses of the shea butter appear from Table 1; the content of oleic acid is found by determining the iodine value, while the stearic acid percentage is obtained as a difference. The results are in good agreement with those published in earlier works [3,4].

Olive kernel oil. Olive oil is obtained from the fruits of *Olea europea* which belongs to the family *Oleaceae*. The olive kernel contains about 1 % of the total amount of oil in the olive. Olive oil usually contains the kernel oil, as the olive stones are generally crushed during the milling procedure to which the olives are subjected in the factories. As adequate information concerning the linoleic acid content of olive kernel oil was not available from the literature, an investigation of this oil has been carried out.

The fatty acid composition *etc.* was determined in oil isolated from the kernels of olives obtained from Morocco. The investigation was made in the same manner as in the case of shea butter, and the results are summarized in the last column of Table 1. The oil examined showed a higher degree of unsaturation than a Portuguese olive kernel oil examined previously [5]. The composition ascertained is in fairly good agreement with that given for an olive kernel oil from the U.S.A. [6]

Table 1. Fats of shea nuts and olive kernels.

	Butyrospermum Parkii	*Olea europea* (kernels)
Oil, % in nuts and kernels	46	41
Unsaponifiable matter, %	7.3	2.8
Free fatty acids, as % of oleic acid	3.4	3.9
Fatty acid composition, weight % of total fatty acids		
Palmitic acid	5.1	11.3
Stearic acid	43.5	1.2
Oleic acid	45.3	68.9
Linoleic acid	5.8	18.1
Linolenic acid	0.3	0.5

Experimental. Shea butter. The shea nuts were crushed in a hydraulic press and extracted with light petroleum (b.p. 50—70°C) in a large Soxhlet apparatus; after extraction for a couple of hours, the residue was ground and again extracted until all oil contained in the nuts had been isolated. The oil was saponified by means of ethanolic potassium hydroxide, and the unsaponifiable matter was extracted from an ethanolic/aqueous (50 % v/v) soap solution with several portions of ethyl ether. The fatty acids were isolated from the soap solution by dropwise addition of a 50 % solution of sulphuric acid and were converted into methyl esters by means of diazomethane.

Olive kernel oil. Air-dried olive stones from which the fruit coat had been removed almost completely were cracked carefully, and the individual kernels were removed by means of a pair of tweezers to avoid admixture of fruit coat oil. From 470 g of olive stones 40.0 g of kernels were obtained, and after crushing in an agate mortar and treatment with solvent naphtha in a Soxhlet apparatus these yielded 16.4 g of straw-coloured, crude olive kernel oil. A part of this oil was saponified, and the fatty acids obtained were converted into methyl esters by refluxing with excess of methanol and a little sulphuric acid to act as catalyst.

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