

On the Chemistry of Japanese Plant, IV.¹
Saturated Fatty Acids in Camphor Seed Fat
(*Laurus camphora*, Neess).

By

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In the course of study of phytosterol in the camphor seed fat, the authors have investigated the composition of the saturated fatty acids of the fat, expecting to isolate a C₁₀-acid.

M. Tsujimoto studying the physical constants and some chemical properties of the fat obtained at Fukuokaken, has stated in his "Japanese Vegetable Oils and Fats" (p. 488, 1912) that it was composed probably of a glyceride of lauric acid.

The seeds used in the present investigation were obtained through the courtesy of Mr. Osumi, and were grown at Fukuokaken.

Each seed is spherical in form, of about 0.5 cm. in diameter, about 0.1 gm. and consists, in weight, of 39 per cent. of dark violet shell, and 61 per cent. of a greenish white meal.

The meal is composed of 60 per cent. of crude fat, 35 per cent. of non-fatty substance, indicating 6.7 per cent. ash.

The crude fat extracted with ether was found to be composed of a light yellow crystalline substance and a white one, and its physical and chemical properties were studied and the results are shown in the following table with those observed by M. Tsujimoto in comparison :

	Authors.	Tsujimoto.
Sp. gr. (25°)	0.9308	0.9267
Ref. I. (25°)	1.451	1.17
Solid. p.	13.70	—
M. p.	21°	22.8°

¹ This paper was read before the regular meeting of the Chemical Society of Japan on July 5th, 1924.

Acid V.	1.82	4.70
Sap. V.	283.8	283.76
Iod. V. (Wijs)	4.56	4.49
Non-sap. m.	1.1%	—

The fatty acids were separated from the non-saponifying matter and other substances after saponifying the fat with alcoholic potash, as usual, and their physical and chemical properties were determined.

	Authors.	Thujimoto.
M. p.	18°	21°
Ref. I. (25°)	1.4362	—
Neut. V.	264.8	292.83
Mean mol. wt.	211.8	191.57
Iod. V. (Wijs)	4.14	5.07

The separation of crude acids into two groups of "the solid saturated acids" and "the unsaturated acids" was effected by the conversion of the acids into their lead salts and then extraction with ether following the suggestion of Gusseroff and Varrentrapp, and the approximate proportions of the two groups of acids occurring in the fat were determined to be 79 per cent of the saturated acid and 21 per cent of the unsaturated.

These acids, approximately separated, were studied as to their physical and chemical constants:

	Saturated acids.	Unsaturated acids.
M. p.	21°	—
Neut. V.	300.3	274.8
Mol. wt.	186.8	204.1
Iod. V.	2.39	20.1

Such a high saponification value and low iodine value of the fat and of the fatty acids separated, suggest the presence of large quantities of fatty acids of lower molecular weight, and consequently the crude fatty acids were subjected to steam distillation and resulted in yielding a volatile acid of melting points ranging from 22° to 25° and of neutralisation value 314.

144 gm. of the saturated fatty acids were transformed into their methyl ester which weighed 166 gm., the esters were fractionated for 5 times under reduced pressure (10–12 mm.) and lastly we obtained the following fractions:

	Fraction (to mm.).	Yield (in grm.).
1.	104-107°	65.4
2.	109-111°	10.0
3.	111-116°	7.6
4.	116-119°	7.7
5.	119-129°	
6.	129-133°	41.0
7.	residue	18.6
	Sum	144.7
	Loss	21.3

The two portions, B. p. 104-107° and 129-133°, composing the main parts of the esters, showed the following physical constants, and were analysed with the following results :

	Fraction I.	Fraction II.
B. p.	104-107°.	129-133°.
d_4^{20}	0.8746	0.8713
n_D^{20}	1.4239	1.4309
C	70.67	72.42
H	11.87	12.32
O (by diff.)	16.46	15.26

The experimental results above mentioned agree quite well with those of the methyl esters of capric and lauric acids described by A. Haller and Youssoufian¹.

These esters were converted by saponification into free acids which were then identified to be capric and lauric acids respectively by determination of their melting points and also by elementary analysis :

	Capric acid ²	Lauric acid ³
M. p.	31.5-32.5°	43-44°
C	69.46	71.57
H	11.82	12.53

Thus, it was confirmed that capric acid occurs abundantly in the camphor seed fat in the form of a glyceride together with lauric acid. In this respect the fat somewhat resembles cocoa-nut oil⁴ and also

¹ C. R., **143**, 805 (1906).

² Beilstein: Handbuch Org. Chem., II, 355 (1920).

³ Ibid., 359 (1920).

⁴ E. E. Walker: J. Chem. Soc., **123**, 2837 (1923).

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“Tohaku oil”¹ (*Lindera obtiroba*, B. L.) produced in Corea. It was strange that caprylic acid which occurs in camphor oil was, however, not met in the seed fat.

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¹ Y. Iwamoto: J.Chem. Ind. (Japan), **24**, 1143 (1921).