PART IX. THE OIL FROM THE SEEDS OF CERBERA ODOLLAM (Gaertn.).

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Cerbera odollam (Gaertn.) is a handsome tree which grows fairly commonly in the salt swamps of the coasts of India, Burma and Ceylon. Like those of *Thevetia Neriifolia* the seeds of *C. odollam* are extremely poisonous and are frequently used in Southern India for criminal purposes. In addition to a poisonous principle, the seeds contain an oil which does not appear to have been previously examined (cf. *Pharm. Indica*, **2**, 411). This oil has now been subjected to a detailed examination and has been found to be a non-drying oil containing the glycerides of palmitic, stearic, myristic, lignoceric, oleic and linolic acids.

EXPERIMENTAL.

The seeds used in this investigation were obtained from Madras and were fully ripe. On extraction with light petroleum (b.p. 60–80°) the dried kernels yielded 43·1 per cent. of a pale yellow oil having the constants given in Table I.

TABLE I.

$d_{15^\circ}^{15^\circ}$	0·9144
$n_D^{60^\circ}$	1·4578
Acid value	0·35
Saponification value	191·1
Unsaponifiable matter	0·8 per cent.
Acetyl value	0·0
Iodine value	73·8
Polenske value	Inappreciable.
Reichert-Polenske value	,,
Hehner value	94·8

After saponification with an alcoholic solution of sodium hydroxide the unsaponifiable matter was removed from the soap by ether and the liquid and solid acids separated by the Twitchell process, the general properties of the acids being given in Tables II and III.

TABLE II.

Total Fatty Acids.

$n_D^{60^\circ}$	1·4478
Iodine value	75·8
Titre test	33·8°
M. W.	277·9

TABLE III.

	Saturated Acids (41·2 per cent.)	Unsaturated Acids (58·8 per cent.)
$n_D^{60°}$	1·4368	1·4589
Iodine value	3·8	111·8
M. W.	272·2	280·8

The Unsaturated Acids.—The unsaturated acids were identified by the preparation of the additive bromo-compounds by the method of Jamieson and Baughman (*Journ. Am. Chem. Soc.*, 1920, **42**, 2398). The results are tabulated in Table IV and indicate the presence of a mixture of linolic acid (27·8 per cent.) and oleic acid (72·2 per cent. by difference), a result which agrees well with the observed iodine value (Found : 112. Calc. 115).

TABLE IV.

Quantity brominated	5·884 g.	6·304 g.
Yield of di- and tetrabromo-acids ...	10·027 g.	10·742 g.
Yield of hexabromo-acid	0·0	0·0
Br in mixed bromo-acids	42·1 per cent.	42·0 per cent.
M. P. of tetrabromo-acid	112–113°	112–113°

The Saturated Acids.—The mixture of saturated acids was converted into the methyl esters and these were fractionated under diminished pressure, the results being summarised in Table V.

It has been assumed from the molecular weight of the ester and the melting point of the acid that fraction 1, in addition to palmitic acid, contains some myristic acid. It was not found possible to separate this acid in a pure state since crystallisation yielded only palmitic acid. The presence of myristic acid must therefore be considered as doubtful. From fractions 2–7 it was possible to separate by the usual methods both palmitic and stearic acids.

The ester which remained in the distilling flask after the fractionation gave on hydrolysis an acid m.p. 65–66°, M.W. 330·3. After repeated recrystallisation the m.p. was raised to 78°, M.W. 366·4 and it is probable that this acid is lignoceric acid which has m.p. 80°, M.W. 368.

TABLE V.

No. of Fraction	I B. P. (7 mm.)	II Yield per cent.	III M.W. of ester	IV Titre of ester	V M.P. of acid	VI Titre of acid	VII	VIII	IX	X
							Percentage of methyl stearate calculated from			
							III	IV	V	VI
1	172–174°	7·8	266·7	26·7°	60·5–61·5°	...*	...	...	...	...
2	174°	11·0	271	25·4°	62–62·5°	61·6°	3·6	3·0	0·0	3·0
3	177–179°	36·7	272·5	24°	61–61·5°	59·1°	9·0	8·0	0·5	11·0
4	180–183°	22·3	276·2	23·5–24°	57–57·5°	55·6°	22·2	18·0	20·0	25·0
5	183–186°	5·9	283·4	26·5–27°	55·5–56°	56·3°	47·9	45·0	40·0	45·0
6	187–190°	4·8	289·2	28·5°	60·5–61°	59·5°	67·3	60·0	65·0	63·0
7	195–200°	7·6	298·4	36·2°	67·5–68·5°	...	99·9	97·0	95·0	...
8	Residue	3·9	343·4	...	64·5–65°	...†	44·8	...	...	...

* Mixture of myristic acid (11 per cent.) and palmitic acid (88·2 per cent.)
† Mixture of stearic and lignoceric acids.

The examination of the saturated acids thus shows them to have the following composition :—myristic acid? (0·9 per cent.), palmitic acid (72·9 per cent.), stearic acid (24·1 per cent.) and lignoceric acid (2·1 per cent. by difference).

Unsaponifiable matter.—The unsaponifiable matter (0·8 per cent. was purified by the digitonin method and the crude sterol (32·2 per cent.) was converted into the acetyl derivative which after crystallisation from alcohol melted at 125°. It consisted apparently mainly of acetyl sitosterol (m.p. 129°), but was not obtained in sufficient quantity for further curification.

SUMMARY.

The seeds of *Cerbera odollam* contain 43·1 per cent. of a non-drying oil. The oil contains the glycerides of linolic acid (16·4 per cent.), oleic acid (4·2 per cent.), myristic acid? (0·4 per cent.), palmitic acid (30 per cent.), stearic acid (9·9 per cent.) and lignoceric acid (0·9 per cent.).

The unsaponifiable matter forms 0·8 per cent. of the oil and contains 32·2 per cent. of a sterol, probably sitosterol.