

employees the number of severe colds can be materially reduced, the number of persons having no colds may be increased, and the amount of time lost from work may be very significantly decreased. Obviously cod liver oil should not be looked upon as a panacea but the results of this investigation show that lost time due to colds and similar troubles may be materially reduced by

the regular consumption of cod liver oil and thus the annoyance and expense which lost time causes the employer and the employee can be significantly reduced.

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# CAPRIFIED FIG SEED OIL

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The seeds from California caprifig figs, which are separated in the manufacture of fig paste, are now a waste product amounting to between 5 and 10 tons a season. As no reference to fig seed oil from any source could be found in the literature, samples of the seed and of the cold expressed oil were sent to the authors for investigation by E. M. Chace, in charge of the Fruit and Vegetable Chemistry Laboratory of the Bureau of Chemistry and Soils at Los Angeles, California.

The caprifig fig seeds were found to contain 30.44 per cent of oil and 6.30 per cent of moisture. The expressed oil was a brilliant yellow liquid, which remained fluid even when cooled and held for some hours at 10° C. It has a mild but pleasant characteristic dried-fig taste. The chemical and physical characteristics of the oil are given in Table I.

**TABLE I—CHEMICAL AND PHYSICAL CHARACTERISTICS**

Refractive index at 25°	1.4775
Iodine number (Hanus)	169.4
Thiocyanogen value	108.4
Saponification value	190.1
Acid value	0.87
Acetyl value (André-Cook)	6.1
Unsaponifiable matter, %	1.07
Saturated acids (corrected), %	8.46
Unsaturated acids (corrected), %	85.66

The iodine number indicates that the oil belongs to the drying-oil class.

#### Unsaturated Acids

The percentages of oleic, linoleic and linolenic acids in the oil were

calculated in the customary manner, using the iodine number and the thiocyanogen value. The results are given in Table II.

**TABLE II**  
Unsaturated Acids, Acids in Oil,

	Per Cent	Per Cent
Oleic acid	22.17	18.99
Linoleic acid	39.36	33.72
Linolenic acid	38.47	32.95
	100.00	85.66

#### Saturated Acids

The saturated acids, which were separated from the saponified oil by the lead-salt ether method, were esterified with anhydrous ethyl alcohol in the presence of dry hydrogen chloride gas (J. Amer. Chem. Soc. 42, p. 1200, 1920). The esters, amounting to 40.00 grams, were freed from solvent and moisture, and fractionally distilled under a pressure of 3 mm. from a Ladenburg fractionation flask. Four fractions were collected and weighed. The composition of each fraction was determined by the method previously described (J. Amer. Chem. Soc. 46, p. 775, 1924). The results calculated from the analytical data are given in Table III.

**TABLE III**  
Saturated Oils, Acids in Oil,

	Per Cent	Per Cent
Palmitic acid	61.84	5.23
Stearic acid	25.71	2.18
Arachidic acid	12.45	1.05
	100.00	8.46

The acids were recovered from the ester fractions and the small undistilled residue by saponifying

with alcoholic potash and then decomposing the soaps with hydrochloric acid. The acids in each case were collected and completely separated from the potassium chloride and any hydrochloric acid by remelting with hot distilled water in the usual manner. The dried acids obtained from the four ester fractions and the undistilled residue were subjected to fractional crystallization from ethyl alcohol. No myristic acid could be detected, nor was any indicated by the mean molecular weight of the saturated acids in the first ester fraction. Part of the arachidic acid was found in the acids from fraction four and the remainder in the undistilled ester residue. Repeated crystallization of this acid failed to yield a fraction with a melting point above 77°, indicating the absence of lignoceric acid.

The acids which were isolated in each case confirmed the deductions previously made from the mean molecular weights of the saturated acid esters.

The composition of the oil in terms of glycerides is given in Table IV.

**TABLE IV—PERCENTAGES OF FATTY ACIDS IN OIL AS GLYCERIDES**

Glycerides of—	Per Cent
Oleic acid	19.8
Linoleic acid	35.1
Linolenic acid	34.2
Palmitic acid	5.5
Stearic acid	2.3
Arachidic acid	1.1

The oil could be used for either edible or technical purposes.