ON THE ESSENTIAL OIL FROM THE BARK OF *EUCALYPTUS MACARTHURI.*

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It has been generally known to distillers, who have extracted the essential oil from the leaves of this Eucalyptus, that the bark is particularly odoriferous. The leaf oil is very rich in geranyl-acetate and appears never to contain less than 60 per cent. of that constituent, while a considerable amount of free geraniol is present also.

The first analysis of the oil of this species will be found in the Journal of this Society, November 1900. Since that time numerous analyses have been made with the oil distilled at various times of the year, and these have all been in agreement with the one first published.

Quite recently a considerable demand has arisen in Australia for perfumery oils from indigenous trees, and consequently a good deal of oil has been distilled from the leaves of *E. Macarthuri*, the product being one of the best geraniol bearing oils obtainable from Australian plants.

It was found that an essential oil could also be distilled commercially from the bark of this species, and it was thus considered desirable that the composition and quality of this bark oil should be determined prior to it being placed on the market.

The Technological Museum is indebted to Mr. J. Quigg of Wingello in this State, who kindly forwarded the freshly stripped bark for the purpose of distillation. It had been obtained from fair sized trees, and ranged in thickness up to $1\frac{1}{2}$ inches. The odour of geranyl-acetate was distinctly

marked on the freshly cut edges, and when coarsely ground for distillation had a very pleasant odour.

The yield of oil by steam distillation from this ground bark was somewhat disappointing, as it did not exceed that obtainable from the mature leaves; but the statement has been made that at certain times of the year, the yield of oil is much greater than that obtainable from the leaves at the same period.

The analyses of the oil from the bark show it to be identical in composition with that obtainable from the leaves, so that no separation need be made for commercial purposes. With trees of fair size it should be profitable to steam distil the bark for its oil, that is, if it be considered necessary to cut down the trees in the process of manufacture. The production of "suckers" from the stumps of the felled trees is somewhat rapid, so that a fresh supply of leaves would soon be available, and an excellent oil is obtainable from this young foliaceous growth.

Experimental.

The bark, which was stripped in November 1915, was chopped into small pieces and coarsely ground in a mill. It was then steam distilled. The yield of oil was equal to 0·12 per cent.

The crude oil was of a light amber colour and had a very marked odour of geranyl-acetate, and in this, as well as in other respects, was in agreement with the leaf oil. The crude oil had the following characters:—

Specific gravity at 15° C. = 0·9214
Optical Rotation a_D = + 1·2°
Refractive index at 20° C. = 1·4718
Soluble in 1·2 volumes 70 per cent. alcohol.

The optical activity of the oil is due to the presence of a small quantity of dextrorotatory pinene. The stearoptene

—eudesmol—, which is a constant constituent in the leaf oil, has not been noticed in the bark oil.

A determination of the ester by cold saponification in alcoholic potash with two hours' contact, gave the following result:—1·107 gram oil required 0·1876 gram KOH, giving as saponification number 169·5, equal to 59·3 per cent. geranyl-acetate.

A portion of the oil was acetylated by boiling with acetic anhydride and sodium acetate in the usual way.

1·028 gram of the acetylated oil by cold saponification required 0·2044 gram KOH, giving as saponification number 198·8, equal to 69·6 per cent. of ester. The saponification number was thus increased by 29·3, corresponding to 10·25 per cent. ester derived from the free geraniol in the oil.

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A sample of crude oil was distilled in October 1915, at Wingello, by Mr. J. Quigg from the bark of this species, and forwarded to the Technological Museum. This oil was light amber in colour and had a good odour. It contained a larger amount of ester than did the oil distilled at the Museum, and had the following characters:—

Specific gravity at 15° C. = 0·9099
Optical rotation a_D = + 1·4°
Refractive index at 20° = 1·4648
Soluble in 1·2 volumes 70 per cent. alcohol.

The saponification number for the ester by cold saponification with two hours' contact was 195, equal to 68·2 per cent. geranyl-acetate.

The saponification number of the acetylated oil by cold saponification was 224, equal to 78·4 per cent. of ester, an increase in the saponification number of 29, representing 10·2 per cent. of ester formed with the free geraniol in the oil.

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A commercial sample of the bark oil of this species, distilled by Mr. Quigg at Wingello, in March 1913, and presented to the Museum by De Meric Ltd., George Street, Sydney, had the following characters:—

Specific gravity at 15° C. = 0·9218
Optical rotation a_D = + 1·2°
Refractive index at 20° = 1·4711
Soluble in 1·2 volumes 70 per cent. alcohol.

The saponification number by cold saponification with two hours' contact was 169, equal to 59·2 per cent. geranyl-acetate. The results obtained with this sample are almost identical with those given by the oil distilled at the Museum two years later.

The results are tabulated for comparison:—

Samples.	Sp. gr. at 15°C.	Rot. a_D	Ref.ind. at 20°C.	Sap. No. Ester.	Sap. No. acetylated oil.	Solubility 70% alcohol
Museum, 11/1915	0·9214	+1·2°	1·4718	169·5	198·8	1·2vols.
Quigg's 10/1915	0·9099	+1·4°	1·4648	195	224	1·2 „
Quigg's 3/1913	0·9218	+1·2°	1·4711	169	...	1·2 „

This Eucalyptus is one of the very few species of the genus from which an essential oil can be distilled from the bark, and, so far as at present known, it is the only one which, in this respect, may be considered of value from a commercial point of view.