

## THE CHEMISTRY OF WESTERN AUSTRALIAN PLANTS\*

### III. URSOLIC ACID FROM *ANTHOTROCHE* SPECIES†

By W. BOTTOMLEY‡ and D. E. WHITE\*\*

Investigation of *Anthotroche* species (family Solanaceae), occurrence of which is confined to South Australia and Western Australia, was undertaken to discover whether they, like the majority of solanaceous plants, contained alkaloids. No alkaloids have been found in the two species examined but one of these, *A. blackii* F. Muell., which occurs in two limited areas near Mullewa in the wheat belt of Western Australia and near the South Australian border, contains a large amount of a triterpene acid and the other, *A. pannosa* Endl., which occurs throughout the low rainfall areas of Western Australia, contains a smaller amount of the same acid. This has been identified as ursolic acid, by comparison of the acid, its acetyl derivative, and its methyl ester with authentic ursolic acid and the corresponding derivatives prepared from authentic material.

Ursolic acid is widely distributed in the plant kingdom and in Australian plants it has been recorded from the Solanaceae in three *Duboisia* species by Trautner and Neufeld(1) and from the Goodeniaceae in *Goodenia ovata* Sm. by Lahey and Strasser(2).

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‡ Present address: Division of Plant Industry, C.S.I.R.O., Canberra, A.C.T.

\*\* Organic Chemistry Department, University of Western Australia, Nedlands, W.A.

### Experimental

All melting points are corrected.

(i) *Extraction*.—Dried, ground leaves and stems of *Anthotroche blackii* collected from the vicinity of Wilroy, W.A., (75 g.) were percolated with cold methanol until the extract was no longer coloured. The extract was then concentrated to a small bulk, water added, and the remainder of the methanol distilled. The precipitated solid was filtered and washed with dilute hydrochloric acid.

The filtrate was carefully made alkaline with sodium hydroxide, extracted with chloroform, and the chloroform solution extracted with dilute hydrochloric acid. This acid extract did not give a precipitate with the usual alkaloid reagents, silicotungstic acid, potassium mercuri-iodide (Mayer's reagent), or iodine in potassium iodide (Wagner's reagent).

The precipitated solid was treated with 5% potassium hydroxide in 50% aqueous alcohol, filtered, and the filtrate acidified with 15% aqueous alcoholic hydrochloric acid. The precipitate (7.1 g.; 9.5%) was repeatedly crystallized from alcohol and formed colourless needles, m.p. 286–287 °C., alone or mixed with authentic ursolic acid purchased from L. Light & Co. Ltd., and purified by repeated crystallization from alcohol.

Found: C, 78.3; H, 10.6%; mol. wt. 439 (Rast) (after drying at 110 °C. *in vacuo*).

Calculated for  $C_{30}H_{48}O_3$ : C, 78.9; H, 10.6%; mol. wt. 456.7.

A sample of *A. pannosa*, collected near Meckering, W.A., (500 g.) and extracted similarly, failed to show alkaloid reactions but yielded ursolic acid (2.5 g.; 0.5%), m.p. 289–291 °C., undepressed by admixture with authentic material.

(ii) *Acetylursolic Acid*.—Ursolic acid (1 g.) was acetylated with acetic anhydride (8 ml.) and anhydrous sodium acetate (2 g.) and the product washed with sodium carbonate, and precipitated from solution in aqueous alcoholic potassium hydroxide with aqueous alcoholic hydrochloric acid. It formed colourless needles from alcohol, m.p. 295–296 °C. alone or mixed with authentic acetylursolic acid.

Found: C, 77.2; H, 10.3%.

Calculated for  $C_{32}H_{50}O_4$ : C, 77.1; H, 10.1%.

(iii) *Methyl Ursolate*.—Ursolic acid (1 g.) was esterified with methyl sulphate (3.0 ml.) and excess aqueous alcoholic potassium hydroxide at 45 °C. The product (0.9 g.) formed long colourless prisms from 75% alcohol. After drying *in vacuo* at 100 °C. it melted at 170–171 °C. alone or on admixture with authentic methyl ursolate.

Found: C, 79.2; H, 10.6%.

Calculated for  $C_{31}H_{50}O_3$ : C, 79.1; H, 10.7%.

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### References

- (1) TRAUTNER, E. M., and NEUFELD, O. E.—*Aust. Chem. Inst. J. and Proc.* **14**: 17 (1947).
- (2) LAHEY, F. N., and STRASSER, P. H. A.—*Aust. Chem. Inst. J. and Proc.* **14**: 432 (1947).