An Occurrence of Aluminium Succinate in *Cardwellia sublimis* F. Muell.

ALUMINIUM succinate has been found as a massive deposit in a cavity in the heartwood of *Cardwellia sublimis* F. Muell. (Proteaceæ), commonly known as northern silky oak or bull oak. This is a commercial timber tree restricted to the rain forests of tropical Queensland. The deposit occurred in a so-called 'wind shake' in a log from Jarra Creek near Tully, North Queensland. Inquiries from foresters and saw-millers indicate that such occurrences are rare. The log was about 10 ft. in girth, and the deposit apparently extended from the base to at least 25 ft. up the stem of the tree. A similar occurrence of aluminium succinate has been previously recorded[1] in *Orites excelsa* R. Br. (Proteaceæ), popularly known as silky oak or prickly ash, a timber tree of the sub-tropical rain forests of New South Wales. Basic aluminium succinate was also identified as a white deposit in the galleries of a longhorn beetle in timber of *Qualea* sp. (Vochysiaceæ) from South America[2].

The present deposit was a loosely aggregated greyish-white powder, which lost 41·2 per cent by weight when dried at 100° C. The alumina content of the dried material was 40·9 per cent, and of the ash 99·9 per cent. The formula for basic aluminium succinate calculated by Smith (*loc. cit.*), which would agree with this result, is $Al_2(C_4H_4O_4)_3Al_2O_3$, but Campbell *et al.* (*loc. cit.*) doubt its validity. Qualitative analysis, confirmed by Dr. F. N. Lahey of the Chemistry Department, University of Queensland, failed to reveal the presence of metals other than aluminium, or organic acids other than succinic acid. The succinic acid, purified by sublimation, was identified by melting point and mixed melting point with an authentic sample. Purification of the original sample by crystallization was impracticable, owing to its complete insolubility in a wide range of solvents; consequently the exact composition was not determined.

Samples of bark and wood from another log of *Cardwellia sublimis* from Tully contained approximately 1·09 and 0·86 per cent alumina and 2·8 and 9·7 per cent ash respectively on a dry-weight basis. The ash of bark and wood contained approximately 40·0 and 82·6 per cent alumina respectively.

The physiological significance of the accumulation of aluminium in large quantities by certain plants is obscure. Chenery[3] has suggested that this accumulation may have some value in taxonomy; and a survey was made of aluminium-accumulating species in the Queensland–New Guinea flora, using the aluminon test[3]. The occurrence of aluminium (>1,000 p.p.m.) in these plants exhibits a remarkable degree of specificity. Its taxonomic and ecological implications for the local flora will be discussed elsewhere.

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Alkaloids of *Datura innoxia*

THE brief reference in *Nature* of December 13, p. 1002, to a paper by James and Thewlis[1] on the separation and identification of solanaceous alkaloids in normal and grafted plants of *Atropa belladonna* and *Datura innoxia* prompts us to place on record certain results we have obtained in a similar study. So far as we are aware, the alkaloids of *D. innoxia* have not hitherto been fully characterized[2]. James and Thewlis state that they found hyoscine and hyoscyamine to be present and, from evidence of the hyoscine : hyoscyamine ratios in the two plants and in their reciprocal grafts, have deduced that alkaloid synthesis occurs mainly in the roots.

Three samples of *D. innoxia* Miller (see Timmerman[3]), one from the 1950 crop and the others from the 1952 crop, were analysed by the method described previously[4,5], and the presence of hyoscine (0·24, 0·30 and 0·37 per cent) was confirmed. The fraction at first considered to be hyoscyamine (0·035, 0·062 and 0·073 per cent) afforded a picrate of melting point considerably below that of hyoscyamine picrate. This material, on fractional crystallization from water, gave two picrates, one of melting point 162–164° C., undepressed on admixture with authentic hyoscyamine picrate, and the other, melting point 175–176° C., undepressed on admixture with authentic meteloidine picrate. It is therefore apparent that, in addition to hyoscine and hyoscyamine, *D. innoxia* contains meteloidine. There is indirect support for this conclusion in certain discrepancies between the acidimetric and colorimetric values for hyoscyamine[1]; meteloidine does not give a colour in the Vitali–Morin test. In *ad hoc* experiments, it has been confirmed that hyoscyamine and meteloidine are not separated by the chromatographic method employed both by us and by James and Thewlis,

From an extension[5] of our earlier experiments[6] on grafts within the same genus, the simplest conclusions with respect to *D. innoxia* are that the main site of alkaloidal syntheses are the roots for hyoscine and the aerial parts for hyoscyamine; the site of synthesis of meteloidine has not been located.

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Resistance of Hop Stems to Invasion by *Verticillium albo-atrum*

MOST fungi causing vascular wilts of plants enter through the roots and then invade systemically the xylem tissue of the root and stem. Their effects are usually judged by the severity of leaf symptoms, and on this criterion is based an assessment both of host resistance and of fungal pathogenicity. The extent and intensity of fungal growth in the xylem (particularly of the stem) parallels the severity of leaf symptoms, and is also used as an indication of host resistance and fungal pathogenicity[1–4].

If a host species or variety has high resistance to a particular strain of wilt pathogen, fungal in-