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STERCULIACEAE

ANTHOCYANINS OF SOME MALAYSIAN *STERCULIA* SPECIES

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Abstract—A new anthocyanin, pelargonidin-3-arabinoside, is found in the follicles of *Sterculia parviflora*. Galactosides and arabinosides occur together in this species, but two other members of the genus contain only glucosides.

RESULTS AND DISCUSSION

Sterculia parviflora Roxb. is a small tree of the lowland tropical rain forest, sometimes cultivated for the ornamental value of the large apocarpous fruit (very similar to those of *S. macrophylla* illustrated by Corner).[1] The intense orange-red colour of the follicles suggested the presence of a pelargonidin pigment, while an anthocyanin record from the Sterculiaceae—that of cyanidin-3-galactoside and cyanidin-3-arabinoside in *Theobroma cacao*[2]—raised the possibility of the hitherto unknown pelargonidin-3-arabinoside being present in this plant.

Investigation of the coloured tissue showed that four anthocyanins were present in approximately equal amounts. Cyanidin-3-galactoside and cyanidin-3-arabinoside were identified by direct comparison with authentic samples, and pelargonidin-3-galactoside by R_f values and identification of the hydrolysis products. The identity of the remaining anthocyanin was strongly indicated by its occurrence with the above three compounds and by R_f values (Table 1) which were in general accord with those expected for pelargonidin-3-arabinoside. On hydrolysis of the purified pigment the only products obtained were pelargonidin and arabinose, each identified by comparison with authentic samples. The slightly lower mobility, relative to pelargonidin-3-glucoside, of this anthocyanin in 1% HCl is perhaps unexpected but does parallel the behaviour of the cyanidin compounds.

These results prompted investigation of other accessible *Sterculia* species. *Sterculia kunstleri* King, although morphologically very similar to *S. parviflora*, had follicles pigmented

TABLE 1. R_f VALUES (×100) OF PELARGONIDIN-3-ARABINOSIDE AND PELARGONIDIN-3-GLUCOSIDE

	1% HCl	HOAc–HCl	BAW	BuHCl
Pelargonidin-3-arabinoside*	14	40	48	40
Pelargonidin-3-glucoside*	16	38	38	34
Pelargonidin-3-glucoside†	14	35	44	38

* Values obtained at local ambient temperature, *ca.* 28°.

† Values usually cited in the literature, e.g. Ref. 3. Solvent mixtures: 1% HCl, water–conc. HCl (97:3); HOAc–HCl, acetic acid–conc. HCl–water (15:3:82); BAW, *n*-butanol–acetic acid–water (4:1:5, top layer); BuHCl, *n*-butanol–2N HCl (1:1, top layer).

[1] E. J. H. CORNER, *The Life of Plants*, Plate 24, The New English Library, London (1964).

[2] W. G. C. FORSYTH and V. C. QUESNEL, *Biochem. J.* **65**, 177 (1957).

by pelargonidin-3-glucoside. No other anthocyanins were present. *Sterculia foetida* L. had cyanidin-3-glucoside as the sole anthocyanin of flowers and also young leaves.

Harborne has noted the co-occurrence of arabinosides and galactosides in anthocyanins of *Theobroma cacao*, *Rhododendron* spp., and various grasses, and suggested that this is possibly due to the close stereochemical relationship of L-arabinose and D-galactose.[3] Results reported here support the correlation in distribution of the above two glycosidic types and also suggest that production of galactoside/arabinosides is a taxonomic character, alternative to the production of glucosides, at the specific level.

EXPERIMENTAL

Anthocyanins were extracted from plant material with 1% HCl–methanol and separated by chromatography on Whatman 3MM paper using two or more of the solvent mixtures indicated in Table 1. The final purification employed paper pre-washed with 10% acetic acid. Spectral and chromatographic identifications of known anthocyanins, aglycones and sugars were carried out by the usual methods.[3,4] At local ambient temperature the 3-glucoside and 3-galactoside of pelargonidin were resolved by prolonged development with BAW while those of cyanidin required about 60 hr in BuHCl.

Authentic samples of cyanidin-3-galactoside and cyanidin-3-arabinoside were isolated from apple peel and young leaves of *Theobroma cacao* respectively, while all anthocyanidins and sugars required were obtained from commercial sources.

Sterculia kunstleri was collected in Ulu Gombak Virgin Jungle Reserve and a specimen lodged with the Forest Research Institute, Kepong, Selangor, Malaysia (herbarium No. FRI 16156). Collections of *S. parviflora* and *S. foetida* were from labelled trees on the campus of the University of Malaya.

[3] J. B. HARBORNE, *Comparative Biochemistry of the Flavonoids*, p. 23, Academic Press, London (1967).
[4] R. J. BLOCK, E. L. DURRUM and G. ZWEIG, *A Manual of Paper Chromatography and Paper Electrophoresis*, Ch. 6, Academic Press, New York (1958).