THE FIRST ISOLATION OF AN ACRIDONE ALKALOID FROM *PONCIRUS TRIFOLIATA*[1]

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Poncirus trifoliata (L.) Raf. (Rutaceae) is the original plant of the traditional Chinese medicine "Gou Ju," which has been used for treating pain, stomach ache, hysteroptosis, stagnant blood, and as a detoxicant of wine poisoning (1). The presence of an essential oil, coumarins, and flavonoids in this plant has been reported (2-9). However, no alkaloidal component has been detected in this plant. In the course of our studies on the isolation of the acridone alkaloids in the Rutaceae, we have reinvestigated the constituents of this plant and identified the acridone alkaloid, 5-hydroxynoracronycine, in the root bark. This is the first example of the isolation of an acridone alkaloid from the genus *Poncirus*. Coumarins, poncitrin (dentatin), nordentatin, and marmesin, were also identified.

Compounds	Identified by	References
5-hydroxynoracronycine	mp, ir(KBr), ^{1}H nmr, co-tlc	(10)
poncitrin (dentatin)	mp, ir(KBr), ^{1}H nmr, co-tlc	(3)
nordentatin	mp, ir(KBr), ^{1}H nmr, co-tlc	(11)
marmesin	mp, [α]D, ir(KBr), ^{1}H nmr	(6,7)

EXPERIMENTAL

PLANT MATERIALS.—*P. trifoliata* was collected in Hsinchu Hsien, Taiwan, in October 1984. The plant was identified by Professor C.S. Kuoh of Cheng Kung University, and voucher specimens were deposited in the herbarium of Tsing Hua University, Taiwan.

EXTRACTION AND ISOLATION.—The fresh root bark of *P. trifoliata* (100 g) was extracted with Me_2CO four times at room temperature. The extract was filtered and concentrated under reduced pressure to a brown syrup which was then partitioned between $CHCl_3$ and H_2O. The $CHCl_3$ layer was dried over Na_2SO_4 and concentrated under reduced pressure. The components of the crude extract were separated by column chromatography over silica gel. Poncitrin (230 mg), nordentatin (105 mg), and 5-hydroxynoracronycine (5 mg) were eluted with *n*-hexane-EtOAc (4:1), successively. Marmesin (8 mg) was eluted by *n*-hexane-EtOAc (3:2).

Full details of the physical and spectral (ir, uv, ^{1}H nmr, ms) data are available on request.

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FLAVONOID GLYCOSIDES FROM *BETULA PUBESCENS* AND *BETULA PENDULA*

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An hplc method for the separation of flavonoid glycosides from *Betula* species was recently developed (1). Using diode-array technology seven flavonoid glycosides were identified based on their characteristic uv spectra. Reference substances were used to identify rutin, hyperin, and quercitrin, which were previously reported in *Betula* species (2,3). By up-scaling of this hplc method to low pressure liquid chromatography (lplc), six flavonoid glycosides could be isolated. In addition to hyperin and quercitrin, myricetin-3-galactoside was obtained, which was known to be present in various *Betula* species (4). Now quercetin-3-glucuronide, quercetin-3-arabinofuranoside, and quercetin-3-arabinopyranoside are reported for the first time as being present in *Betula pubescens* Ehrhart and *Betula pendula* Roth (Betulaceae).

EXPERIMENTAL

PLANT MATERIAL.—Leaves of *B. pubescens* and *B. pendula* were collected in Birmensdorf, 5 km from Zurich, Switzerland. Voucher specimens are deposited in the Swiss Federal Institute of Forestry Research, Birmensdorf, Switzerland.

EXTRACTION AND ISOLATION.—Air-dried, finely powdered leaves (500 g) from both species were separately and exhaustively extracted with 80% MeOH at 40°. The extracts were concentrated in vacuo, and after adding 1 liter of H_2O, the extracts were filtered. Chlorophyll was removed by extraction with light petrol; then the flavonoid glycosides were exhaustively extracted with EtOAc, and extracts of 5.8 g from *B. pubescens* and of 6.2 g from *B. pendula* were obtained. Most of the hyperin was removed by crystallization from both extracts. The remaining residue was chromatographed on a Sephadex-LH-20 column using a step-gradient process with 30-100% MeOH to afford six fractions. These fractions were chromatographed on C-18 reversed phase material with lplc. The mobile phase, optimized with the "PRISMA"-model for hplc (5), was applied to lplc by scaling up.

From fraction 1, quercetin-3-glucuronide was isolated in addition to hyperin with a mobile phase of 15.0% THF, 1.2% acetonitrile, 1.5% MeOH, and 82.3% H_2O. With the same mobile phase, myricetin-3-galactoside was isolated from fraction 2. From fraction 4 quercetin-3-arabinopyranoside and quercitrin were obtained with a mobile phase of 1.4% THF, 16.3% acetonitrile, 2.5% MeOH, and 79.8% H_2O. This latter mobile phase was also used for the isolation of quercetin-3-arabinofuranoside as well as quercitrin and quercetin-3-arabinopyranoside from fraction 5.

IDENTIFICATION.—All flavonoid glycosides were identified by hptlc, hplc, and spectral data (uv, nmr, ms) and are in agreement with those in the literature.

Full details on isolation and identification of the compounds are available on request.

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