

## SHORT COMMUNICATION

### THE ANTHOCYANINS OF BULGARIAN AUBERGINE (*SOLANUM MELOGENA*)

S. S. TANCHEV, P. J. RUSKOV and C. F. TIMBERLAKE

Higher Institute for Food Industry, Plovdiv, Bulgaria, and Research Station, Long Ashton, Bristol

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**Abstract**—The skin of Bulgarian aubergine (*Solanum melongena*) contains delphinidin 3-rutinoside accompanied by a smaller amount of delphinidin 3-rutinoside-5-glucoside.

THE MAIN commercial aubergine (*Solanum melongena*—Solanaceae) cultivar in Bulgaria is known as Number 12. When methanolic-HCl extracts of skins (with or without purification via lead acetate) were streaked on Whatman No. 3 filter paper and chromatographed in butanol-conc. HCl-water (7:2:5, v/v), the anthocyanins separated into a trace component (I) of low  $R_f$ , in amount insufficient for further examination and minor (II) and major (III) components of increasing  $R_f$ s. The latter anthocyanins, after further separation in acid solvents (HOAc-conc. HCl-water; 15:3:82, v/v and 2% HOAc), were identified as follows: (a) spectral examination<sup>1,2</sup> in the visible and u.v. region indicated that component (II) was a 3,5-diglycoside, that component (III) was a 3-glycoside and that neither component was acylated; (b) total acid hydrolysis and chromatographic examination by established methods<sup>3</sup> showed that glucose and rhamnose were present in both components, quantitative assessment of the ratio glucose/rhamnose giving approximately 2:1 for component (II) and 1:1 for component (III), the aglycone being identified as delphinidin in both components; (c)  $H_2O_2$  treatment<sup>4</sup> showed that rutinose occurred in the 3-position of both components; (d) partial acid hydrolysis of component (III) gave only one intermediate anthocyanin (delphinidin 3-monoglucoside), but component (II) yielded two intermediate anthocyanins. Component (II) was therefore identified as delphinidin 5-glucoside-3-rutinoside and component (III) as delphinidin 3-rutinoside. The identity of (III) was confirmed by chromatography in five solvents with an authentic specimen of delphinidin 3-rutinoside obtained from black currants.<sup>5</sup>

The lack of acylation in (II) (and probably also in (I) because of its low  $R_f$ ) indicates that this Bulgarian cultivar differs genetically from some Japanese aubergines which contain delphinidin 3-rutinoside-5-glucoside acylated with *p*-coumaric acid as their major component<sup>6,7</sup> and in which both glycosidation and acylation of delphinidin 3-rutinoside are controlled

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<sup>3</sup> J. B. HARBORNE, *Biochem. J.* **74**, 262 (1960).

<sup>4</sup> B. V. CHANDLER and K. A. HARPER, *Australian J. Chem.* **14**, 586 (1961).

<sup>5</sup> B. V. CHANDLER and K. A. HARPER, *Australian J. Chem.* **15**, 114 (1962).

<sup>6</sup> S. SAKAMURA, S. WATANABE and Y. OBATA, *Agri. Biol. Chem.* **27**, 663 (1963).

<sup>7</sup> S. WATANABE, S. SAKAMURA and Y. OBATA, *Agri. Biol. Chem.* **30**, 420 (1966).

by a single gene<sup>8</sup> or a closely linked pair of genes.<sup>9,10</sup> The anthocyanin pattern differs also from that of some other cultivars<sup>8,9,11</sup> in which only delphinidin 3-rutinoside has been identified and from an unspecified Italian cultivar which contained delphinidin 3-glucoside, delphinidin 3-rutinoside acylated with *p*-coumaric acid and delphinidin 3-rutinoside-5-glucoside of uncertain acylation.<sup>12</sup>

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<sup>9</sup> Y. ABE and K. GOTOH, *Botan. Mag. Tokyo* **72**, 432 (1959).

<sup>10</sup> J. B. HARBORNE, *Comparative Biochemistry of the Flavonoids*, pp. 262, 264, Academic Press, London (1967).

<sup>11</sup> J. B. HARBORNE, personal communication.

<sup>12</sup> U. CASOLI and G. DALL'AGLIO, *Ind. Conserve Parma* **44**, 18 (1969).