# CATECHINS AND PROANTHOCYANIDINES FROM *Alhagi pseudoalhagi*

**D. F. Alimova, Z. A. Kuliev, and A. D. Vdovin** UDC 547.972

Plants of the genus *Alhagi* Tourn ex Adans belong to the family Fabaceae and are widely distributed throughout the world [1, 2].

Eight species of this genus have been described, of which four grow in Uzbekistan: *A. kirghizorum*, *A. sparsifolia*, *A. persarum*, and *A. pseudoalhagi* (camelthorn).

Extracts and aqueous infusions of roots and the aerial part of *Alhagi* are widely used in folk medicine as hemostatic, diuretic, thermoprotectant, sudorific, and anti-ulcer agents [3-5]; as hemostatics and laxatives; and for bloody diarrhea [6, 7], inflammations of the colon and small intestine and gall bladder, gastritic and ulcerous diseases, angina, and uncontrollable coughing. Tanning agents, flavonoids, steroids, coumarins, anthocyanidines, and catechins of organic acids, dyes, and tanning agents were observed previously in roots and the aerial part of plants of the genus *Alhagi* [7, 8]. Vegetative parts of the plant contain about 0.33% essential oil with a unique aroma. Only traces of oil are found in the flowers.

*Alhagi* is recommended as a source of vitamins, ascorbic acid, carotene, vitamin B, vitamin K, and flavan glycosides with P-vitamin activity [9].

We investigated catechins and proanthocyanidines from the aerial part and roots of *A. pseudoalhagi* collected during budding and flowering in Talas District of the Republic of Kyrgyzstan using chromatography over microcrystalline cellulose powder and gel filtration over Sephadex LH-20 and the total aqueous alcohol extract of them. The ethylacetate extract afforded 12 pure compounds, 6 of which were monomers; 4, dimers of proanthocyanidines. The physical chemical and spectral (UV, IR, and PMR) properties of the compounds and chemical transformations (alkaline, acid, and thiolytic decomposition) identified (+)-catechin (**1**), $C_{15}H_{14}O_6$, MW = 290, mp 178-180°C, $[\alpha]_D^{22}$ +21° (acetone:water, 1:1), $R_f$ 0.65 (*n*-BuOH:$CH_3CO_2H$:$H_2O$, 40:12:18) [10]; (-)-epicatechin (**2**), $C_{15}H_{14}O_6$, MW = 290, mp 241-242°C, $[\alpha]_D^{24}$ -69° (acetone:water, 1:1), $R_f$ 0.51 (*n*-BuOH:$CH_3CO_2H$:$H_2O$, 4:1:5) [11]; (-)-epigallocatechin (**3**), $C_{15}H_{14}O_7$, MW = 306, mp 215-216°C, $[\alpha]_D^{20}$ -58.2° ($CH_3OH$), $R_f$ 0.42 ($CHCl_3$:$CH_3OH$:$H_2O$:$CH_3CO_2H$, 9:3:0.5:0.5); (-)-epicatechin-3-*O*-gallate (**4**), $C_{22}H_{18}O_{10}$, MW = 442, mp 253-255°C, $[\alpha]_D^{20}$ -135° ($CH_3OH$:$H_2O$), $R_f$ 0.74 ($CHCl_3$:$CH_3OH$:$H_2O$:$CH_3CO_2H$, 9:3:0.5:0.5); (-)-epigallocatechin-3-*O*-gallate (**5**), $C_{22}H_{18}O_{11}$, MW = 458, mp 210-212°C, $[\alpha]_D^{22}$ -184° (water:acetone, 1:5), $R_f$ 0.64 ($CHCl_3$:$CH_3OH$:$H_2O$:$CH_3CO_2H$, 9:3:0.5:0.5); gallic acid (**6**), $C_7H_6O_5$, MW = 170, mp 220-222°C, $R_f$ 0.69 (*n*-BuOH:$CH_3CO_2H$:$H_2O$, 4:1:5) [11, 12].

Proanthocyanidines **7**-**10** were isolated from this plant species for the first time.

Decomposition of **7** and **8** by a five-fold excess of KOH under $N_2$ formed phloroglucinol and protocatechoic acid. Treatment of **7**-**10** with HCl produced cyanidine.

Decomposition of **8** and **9** by base formed phloroglucinol and protocatechoic acid in addition to gallic acid; acid decomposition, delphinidine. Thus, chemical transformations and UV, IR, and PMR spectra of **7**-**10** enabled us to identify **7** as the dimeric proanthocyanidine (+)-catechin-(4$\alpha$-8)-(+)-catechin; **8**, (-)-epicatechin-(4$\beta$-6)-(-)-epicatechin; **9**, (-)-epigallocatechin-(4$\beta$-8)-(-)-epicatechin; **10**, (-)-epicatechin-(4$\beta$-8)-(+)-catechin.

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S. Yu. Yunusov Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 120 64 75. Translated from Khimiya Prirodnykh Soedinenii, No. 3, pp. 272-273, May-June, 2007. Original article submitted February 12, 2007.

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