FLAVONOIDS OF PLANTS FROM THE GENUS *Tamarix*

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In continuation of studies of plants of the genus *Tamarix* [1], we investigated the aerial part of *T. elongata* Ledeb, a species endemic to Central Asia, and *T. laxa* Willd. The plants were gathered in Aral′sk (dried bottom of the Aral Sea, INTAS program) and Almaty districts during the growth phase.

Phytochemical analytical methods for *T. elongata* and *T. laxa* determined oxidized forms of flavonoids (1.42 and 0.92%, respectively), hydrolyzed tanning agents (8.10 and 8.40), phenolic (1.76 and 3.36) and amino acids (0.54 and 1.98), and carbohydrates (0.15 and 0.14).

Fractional extraction, adsorption-distribution, and gel chromatography isolated pure **1**-**8**, where **1**-**5** were from both species whereas **6**-**8** were from *T. elongata*.

Chemical (acid hydrolysis, alkaline destruction, anthocyanidine sample) and spectral methods (UV, mass, PMR spectroscopies) and comparison with the literature and authentic samples isolated from *T. hispida* and *T. ramosissima* [1] identified **1**-**4** as quercetin (**1**), isorhamnetin (**2**), tamarixetin (**3**), and potassium tamarixetin 3-O-sulfate (**4**).

Chrysoeriol (**5**), rhamnazin (**6**), and tamarixetin 3-O-α-L-arabinoside (**7**) were isolated from plants of the genus *Tamarix* for the first time. Furthermore, *T. elongata* afforded tamarixetin 3-O-β-D-glucoside (**8**), which was previously observed in *T. nilotica* [2].

The glycosidic nature of **7** and **8** was determined from acid hydrolysis, as a result of which the aglycon tamarixetin (**3**) was isolated. L-Arabinose and D-glucose were identified in the hydrolysates. The attachment site of the carbohydrates was established using UV spectroscopy with complexants and ionizing reagents.

Chrysoeriol (5) (5,7,4′-trihydroxy-3′-methoxyflavone), mp 330-332°C (70% ethanol); UV spectrum (MeOH, λ_{max}, nm): 254, 354; +CH_3COONa: 260, 380; +CH_3COONa + H_3BO_3: 260, 353; +NaOMe: 275, 405; +$AlCl_3$: 280, 402; +$AlCl_3$/HCl: 270, 385.

PMR spectrum (200 MHz, DMSO-d_6, δ, ppm, J/Hz): 3.70 (3H, s, OCH_3), 6.20 (1H, d, J = 2.0, H-6), 6.40 (1H, d, J = 2.0, H-8), 6.70 (1H, s, H-3), 6.90 (1H, d, J = 8.0, H-5′), 7.47 (2H, dd, J = 8.0 and J = 2.0, H-2′, H-6′). Mass spectrum (EI, 70 eV, *m*/*z*): 300, $C_{16}H_{12}O_6$ [3].

Rhamnazin (6) (3,5,4′-trihydroxy-7,3′-dimethoxyflavone), mp 222-224°C (70% ethanol); UV spectrum (MeOH, λ_{max}, nm): 254, 368; +CH_3COONa: 255, 369; +CH_3COONa + H_3BO_3: 255, 367; +NaOMe: 266, 388; +$AlCl_3$: 267, 426; +$AlCl_3$/HCl: 267, 426.

PMR spectrum (400 MHz, CD_3OD, δ, ppm, J/Hz): 3.92 (6H, s, OCH_3), 6.17 (1H, d, J = 2.0, H-6), 6.38 (1H, d, J = 2.0, H-8), 7.05 (1H, d, J = 8.5, H-5′), 7.72 (1H, dd, J = 8.4 and J = 2.0, H-6′), 7.74 (1H, d, J = 2.0, H-2′). Mass spectrum (EI, 70 eV, *m*/*z*): 330; $C_{17}H_{14}O_7$ [4].

Tamarixetin-3-O-α-L-arabinoside (7), $C_{21}H_{20}O_{11}$, mp 200-202°C (70% ethanol); UV spectrum (MeOH, λ_{max}, nm): 254, 348; +CH_3COONa: 270, 356; +CH_3COONa + H_3BO_3: 255, 353; +NaOMe: 273, 379; +$AlCl_3$: 274, 397; +$AlCl_3$/HCl: 276, 396.

PMR spectrum (500 MHz, CD_3OD, δ, ppm, J/Hz): 3.92 (3H, s, OCH_3), 3.67-4.21 (arabinose protons), 4.56 (1H, d, J = 2.0, H-1″), 6.19 (1H, d, J = 2.0, H-6), 6.40 (1H, d, J = 2.0, H-8), 7.02 (1H, d, J = 8.6, H-5′), 7.63 (1H, d, J = 2.0, H-2′), 7.77 (1H, dd, J = 8.0 and J = 2.0, H-6′). Mass spectrum of aglycon (EI, 70 eV, *m*/*z*): 316; $C_{16}H_{17}O_7$ [5].

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Tamarixetin-3-O-β-D-glucoside (8), $C_{22}H_{22}O_{12}$, mp 218-220°C (70% ethanol); UV spectrum (MeOH, λ_{max}, nm): 267, 348; +CH_3COONa: 269, 354; +CH_3COONa + H_3BO_3: 267, 351; +NaOMe: 272, 388; +$AlCl_3$: 269, 397; +$AlCl_3$/HCl: 275, 396.

PMR spectrum (400 MHz, C_5D_5N, δ, ppm, J/Hz): 3.59 (3H, s, OCH_3), 3.49-3.85 (glucose protons), 4.07 (1H, d, J = 6.70, H-1″), 6.54 (1H, d, J = 2.0, H-6), 6.60 (1H, d, J = 2.0, H-8), 6.99 (1H, d, J = 8.6, H-5′), 8.39 (1H, d, J = 2.0, H-2′), 8.48 (1H, dd, J = 8.0 and J = 2.0, H-6′). Mass spectrum of aglycon (EI, 70 eV, *m*/*z*): 316; $C_{16}H_{12}O_7$.

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