BIOLOGICALLY ACTIVE COMPOUNDS FROM *Climacoptera*

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We investigated the aerial part of wooly climacoptera (*Climacoptera lanata*) and aral climacoptera (*C. aralensis*) (Chenopodiaceae) [1] collected during flowering in the Aral region. They were analyzed qualitatively and quantitatively. Flavonoids, saponins, steroids, phenolic acids, and traces of coumarins were detected.

Ground air-dried raw material was extracted exhaustively with methanol. The combined methanol extract was evaporated in vacuum. The condensed solution was diluted with water and treated successively with hexane, $CHCl_3$, ethylacetate, and *n*-butanol.

Column chromatography over silica gel with elution by $CHCl_3$:hexane (9:1) isolated **1** from the $CHCl_3$ fraction; **2** and **3**, from the ethylacetate fraction ($CHCl_3$:CH_3OH in various ratios). Gel chromatography over Sephadex LH-20 isolated **4** from the butanol fraction. The compounds were identified as below based on physicochemical data and comparison with the literature.

1, $C_{29}H_{28}O$, FAB/MS *m/z* 412. PMR spectrum (500 MHz, $CDCl_3$, δ, ppm, J/Hz): six methyl signals at 0.68 (s, H-18), 0.76 (d, J = 6.4, H-27), 0.78 (t, J = 7.0, H-29), 0.81 (d, J = 6.3, H-26), 0.88 (d, J = 6.2, H-21), 1.00 (s, H-19) and three olefinic signals at 4.96 (dd, J = 15.2, 8.2, H-23), 5.09 (dd, J = 15.2, 8.4, H-22), and 5.32 (br.s, H-6).

^{13}C NMR (75 MHz, $CDCl_3$, δ, ppm): 39.2 (C-1), 29.3 (C-2), 79.6 (C-3), 40.4 (C-4), 141.1 (C-5), 122.4 (C-6), 32.4 (C-7), 32.5 (C-8), 51.9 (C-9), 37.3 (C-10), 21.6 (C-11), 40.3 (C-12), 42.8 (C-13), 57.5 (C-14), 25.8 (C-15), 26.8 (C-16), 56.7 (C-17), 12.2 (C-18), 19.3 (C-19), 36.7 (C-20), 19.1 (C-21), 138.8 (C-22), 129.9 (C-23), 46.6 (C-24), 29.8 (C-25), 20.0 (C-26), 19.6 (C-27), 23.6 (C-28), 12.4 (C-29). **1** was characterized as stigmasterol using PMR and ^{13}C NMR spectral data [2].

2, $C_{28}H_{32}O_{16}$, mp 169-171°C, $[\alpha]_D^{20}$ -38.7° (*c* 0.3, MeOH), FAB/MS 641 (22%) $[M - 1]^+$, 316 (15) $[M - gluram]^+$; UV spectrum (EtOH, λ_{max}, nm): 356, 302(sh), 255; (+NaAc) 396, 299(sh), 270; (+$AlCl_3$) 402, 300(sh), 268; (+$AlCl_3$ + HCl) 396, 300(sh), 268; (+NaAc + H_3BO_3) 360, 265(sh), 255; (+$NaOC_2H_5$) 415, 318(sh), 275.

IR spectrum (mineral oil, ν, cm^{-1}): 3520-3100 (OH), 2980 (OCH_3), 1660, 1650 (C=O), 1570, 1520, 1500 (C=C).

PMR spectrum (400 MHz, CD_3OD, δ, ppm, J/Hz): 6.18 (d, J = 1.8, H-6), 6.39 (d, J = 1.8, H-8), 6.8 (d, J = 8.2, H-5′), 7.60 (dd, J = 8.2, 1.8, H-6′), 7.93 (d, J = 1.8, H-2′), 4.5 (s, H-1‴), 5.23 (d, J = 7.3, H-1″), 1.1 (s, 3H, rhamnose CH_3). **2** was characterized as isorhamnetin 3-O-β-D-glucopyranosyl-(6→1)-O-α-L-rhamnopyranoside (narcissin) [3].

3, $C_{22}H_{22}O_{12}$, mp 232-235°C, $[\alpha]_D^{20}$ -71.5° (*c* 0.5, ethanol), UV spectrum (EtOH, λ_{max}, nm): 361, 298(sh), 259; (+NaAc) 370, 270; (+$AlCl_3$) 420, 280; (+$AlCl_3$ + HCl) 380, 280; (+NaAc + H_3BO_3) 380, 290; (+$NaOC_2H_5$) 410, 280.

IR spectrum (mineral oil, ν, cm^{-1}): 3400-3200 (OH), 1670, 1620, 1615 (C=O), 1520, 1470 (C=C).

PMR spectrum (400 MHz, CD_3OD, δ, ppm, J/Hz): 5.4 (d, J = 7, H-1″), 6.12 (d, J = 2, H-6), 6.43 (d, J = 2, H-8), 6.85 (d, J = 8.5, H-5′), 7.2 (d, J = 2.5, H-3′), 7.53 (d, J = 2.5, H-2′), 7.85 (dd, J = 8.5, 2, H-6′). **3** was characterized as quercetin 3-O-β-D-galactopyranoside (hyperin) [4].

4, $C_{52}H_{82}O_{22}$, $[\alpha]_D^{20}$ -7.8°. Mass spectrum *m/z* 1057 [M - H], 925 [M - H - 132], 895 [M - H - 162 - 132], 881 [M - H - 176 - 162 - 132], 455 [M - H - 2×132 - 162 - 176].

PMR spectrum (500 MHz, CD_3OD, δ, ppm, J/Hz): 0.78-1.14 (s, 7CH_3), 2.86 (dd, J = 2.6, 13.1, H-18), 3.13 (dd, J = 4.6, 10.6, H-28), 5.24 (br.s, H-12), signals of four anomeric sugar protons 5.38, 4.83, 4.61, and 4.47 (d, J = 6.5-8).

^{13}C NMR spectrum (75 MHz, CD_3OD, δ, ppm): 39.9 (C-1), 27.1 (C-2), 91.6 (C-3), 40.4 (C-4), 57.2 (C-5), 19.3 (C-6), 34.0 (C-7), 40.4 (C-8), 48.1 (C-9), 37.9 (C-10), 24.6 (C-11), 123.8 (C-12), 144.8 (C-13), 42.9 (C-14), 28.9 (C-15), 24.04 (C-16), 48.1 (C-17), 42.6 (C-18), 47.3 (C-19), 31.6 (C-20), 35.0 (C-21), 33.1 (C-22), 28.2 (C-23), 17.0 (C-24), 16.1 (C-25), 16.6 (C-26),

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26.3 (C-27), 178.1 (C-28), 33.4 (C-29), 23.9 (C-30), 105.5 (C-1′), 79.7 (C-2′), 87.2 (C-3′), 72.2 (C-4′), 78.0 (C-5′), 168.1 (C-6′), 104.4 (C-1″), 76.4 (C-2″), 78.0 (C-3″), 71.2 (C-4″), 67.4 (C-5″), 104.9 (C-1‴), 75.2 (C-2‴), 78.3 (C-3‴), 71.0 (C-4‴), 66.9 (C-5‴), 95.7 (C-1⁗), 73.9 (C-2⁗), 78.2 (C-3⁗), 71.0 (C-4⁗), 78.0 (C-5⁗), 62.5 (C-6⁗).

Thus, **4** was characterized based on spectral data (mass spectrum, PMR, ^{13}C NMR, HMBC spectra) as oleanolic acid 3-O-{[β-D-xylopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyranosido}-28-O-β-D-glucopyranoside [5-8].

The compounds indicated above were isolated from *C. lanata* and *C. aralensis* for the first time.

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