

TRITERPENE GLYCOSIDES OF *Astragalus* AND THEIR GENINS.

LXV. CYCLOARTANE AND LANOSTANE

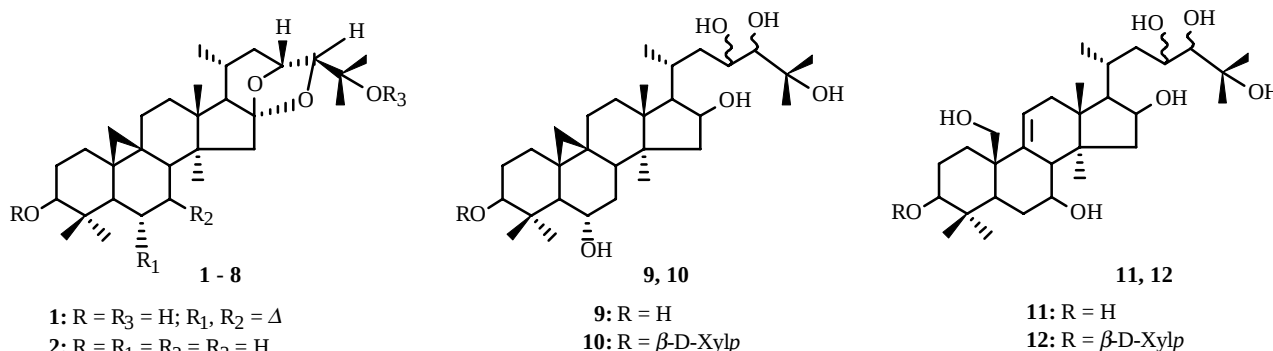
TRITERPENOIDS OF *Astragalus orbiculatus*

R. P. Mamedova, M. A. Agzamova, and M. I. Isaev

UDC 547.918:547.926

The content of triterpenoid glycosides has been studied in detail for more than 40 species of *Astragalus* growing in various parts of the world. Among these, the chemical structure of cycloartane methylsteroids of *Astragalus orbiculatus* Ledeb. is distinctive.

In continuation of the study of isoprenoid plants of the *Astragalus* (Leguminosae) genus [1], we detected in the aerial organs eight derivatives of 16 β ,23;16 α ,24-diepoxy-cycloartane (**1-8**). Compounds of similar chemical structure are characteristic of plants of the *Cimicifuga* (Ranunculaceae) genus that possess sedative, hypotensive, and hepatoprotective activities [2, 3]. However, they have as yet been found in only one species of *Astragalus*, *A. orbiculatus*.



A detailed examination of the MeOH extract of *A. orbiculatus* isolated the previously described by us cycloobigenin A (**1**), C₃₀H₄₆O₄, mp 207-209°C (CHCl₃:MeOH, 20:1), [α]_D¹⁸ -101.3±2° (c 0.75, MeOH) [4]; dihydrocycloobigenin A (**2**), C₃₀H₄₈O₄, mp 237-238°C (MeOH) [5]; cycloobigenin (**3**), C₃₀H₄₈O₅, mp 217-219°C (MeOH), [α]_D²⁰ +28.3±2° (c 1.19, EtOH) [6]; cycloobigenin B (**4**), C₃₀H₄₈O₆, mp 201-203°C (C₆H₆:MeOH, 10:1), [α]_D²⁹ +20.7±2° (c 0.77, MeOH) [7]; cycloobicoside A (**5**), C₃₅H₅₆O₉, mp 267-269°C (EtOH), [α]_D¹⁹ +8.3±2° (c 1.2, MeOH) [8]; cycloobicoside B (**6**), C₃₅H₅₆O₁₀, mp 242-244°C (MeOH), [α]_D²⁴ +20.6±2° (c 0.87, MeOH) [9]; and cycloobicoside G (**8**), C₄₁H₆₆O₁₄, mp 247-249°C (MeOH), [α]_D²⁴ 0±3° (c 0.69, MeOH) [10] and established the structures of the new compounds **7** and **9-12**.

Cycloobicoside C (7), C₄₁H₆₆O₁₃, mp 265-266°C (MeOH), is a 3-O-β-D-xylopyranoside, 25-O-β-D-glucopyranoside-(23R,24S)-16β,23;16α,24-diepoxy-cycloartan-3β,25-diol.

Cycloobigenin C (9), C₃₀H₅₂O₆, mp 256-258°C (MeOH), is 23ξ,24ξ-cycloartan-3β,6α,16β,23,24,25-hexaol.

Cycloobicoside D (10), C₃₅H₆₀O₁₀, mp 285-287°C (MeOH), of structure cycloobigenin C 3-O-β-D-xylopyranoside.

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 Prirodnikh Soedinenii*, No. 4, pp. 296-297, July-August, 2002. Original article submitted July 2, 2002.

Orbigenin (11), $C_{30}H_{52}O_7$, mp 298-301°C (MeOH), is 23 ξ ,24 ξ -lanost-9(11)-en-3 β ,7 β ,16 β ,19,23,24,25-heptaol.

Orbicoside (12), $C_{35}H_{60}O_{11}$, mp 281-283°C (MeOH), is orbigenin 3-O- β -D-xylopyranoside.

The compounds were identified using chemical transformations and modern NMR techniques in one and two dimensions (1H , ^{13}C , J-MOD, DEPT, 1H — 1H COSY, HMQC, HMBC), IR spectroscopy, and electron-impact mass spectrometry.

The stereochemistry of asymmetric centers C-23 and C-24 of the genins of **9** and **11** and, therefore, the corresponding glycosides **10** and **12** is under investigation. Triterpenoids of the lanostane series were found for the first time in plants of the *Astragalus* genus.

Results from structure studies of the new compounds were presented at the IVth International Symposium on the Chemistry of Natural Compounds (Isparta, Turkey, June 6-8, 2001).

REFERENCES

1. R. P. Mamedova, M. A. Agzamova, and M. I. Isaev, *Khim. Prir. Soedin.*, 457 (2001).
2. M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 431 (1985).
3. M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 156 (1989).
4. M. A. Agzamova and M. I. Isaev, *Khim. Prir. Soedin.*, 848 (1997).
5. M. A. Agzamova and M. I. Isaev, *Khim. Prir. Soedin.*, 519 (1998).
6. M. A. Agzamova, M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 455 (1986).
7. M. A. Agzamova, M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 809 (1989).
8. M. A. Agzamova, M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 719 (1986).
9. M. A. Agzamova, M. I. Isaev, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 699 (1990).
10. M. A. Agzamova, M. I. Isaev, M. B. Gorovits, and N. K. Abubakirov, *Khim. Prir. Soedin.*, 837 (1987).