To confirm its identity, we obtained hederagonic acid by the direct oxidation of hederagenin with chromium trioxide [5]. The PMR and IR spectra of the natural and synthetic products coincided completely.

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Argemone ALKALOIDS

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UDC 574.973

According to Ownbey [1, 2], the genus *Argemone* from the family *Papaveraceae* numbers about 30 species. They are all characteristic, in the main, for the flora of North, Central, and South America. Interest in *Argemone* species is due to the specific nature of the various groups of isoquinoline alkaloids contained in them [3].

The alkaloid compositions of *A. ochroleuca* and *A. albiflora* have been studied previously abroad. Both wild-growing plants and plants cultivated in various botanical gardens of Europe have been investigated. A total of 10 alkaloids were isolated from *O. ochroleuca* [4, 5] and 11 from *O. albiflora* [6-8].

In the USSR, *Argemone* species have begun to be studied comparatively recently, since some of them have been successfully introduced [4-7]. Two species of *Argemone* – *A. ochroleuca* Sweet and *A. albiflora* Hornem. were grown for the first time in our country in the Botanical Garden of the Pyatigorsk Pharmaceutical Institute in 1984 from seeds obtained in exchange from the Botanical Garden of the University of Craiova, Romania, and the Halle Botanical Garden (GDR).

To study the alkaloids we used cultivated plants of both species collected in the flowering-fruit-bearing period. Ethanolic extraction of the *A. ochroleuca* raw material gave 0.13% of combined alkaloids, which were separated into nonphenolic and phenolic fractions (tertiary bases) and iodides of quaternary bases. From the nonphenolic fraction were isolated protopine, allocryptopine, chelerythrine, sanguinarine, and berberine; from the phenolic fraction, cheilanthifoline, scoulerine, and reticuline, and from the quaternary-base fraction, berberine iodide. The main alkaloids among those from *A. ochroleuca* were protopine (21%), allocryptopine (16%), and berberine (13%). This is the first time that scoulerine and reticuline have been isolated from *A. ochroleuca*.

The ethanolic extraction of the raw material of *A. albiflora* yielded 0.09% of combined alkaloids, which were also separated into nonphenolic and phenolic fractions (tertiary bases) and iodides of quaternary bases. Protopine, allocryptopine, and berberine were isolated from the nonphenolic fraction, scoulerine and reticuline from the phenolic fraction, and berberine iodide from the fraction of quaternary bases. The main alkaloids of *A. albiflora* berberine were (36%) and allocryptopine (8%). This is the first time that reticuline has been isolated from *A. albiflora*.

All the alkaloids isolated were identified by spectral characteristics and by direct comparison with authentic samples.

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O-METHYLCYCLOVIROBUXINE-D — A NEW ALKALOID FROM *Buxus sempervirens*

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As a result of the further study of the alkaloids of *Buxus sempervirens* L. cultivated in the environs of the town of Kobuleti, Adzhar ASSR [1] we have isolated a new alkaloid, which we have called O-cyclomethylvirobuxine-D, with the composition $C_{27}H_{48}N_2O$ (I), mp 231-233°C (ethanol), $[\alpha]_D + 83.52°$ (s 0.903; chloroform).

The IR spectrum of (I) showed absorption bands at 3045 and 1452 cm^{-1} (methylene of a cyclopropane ring) [2] and 2860 and 1275 cm^{-1} (methoxy group). Its NMR spectrum showed signals in the form of two three-proton singlets and a six-proton singlet at 0.69, 1.01 and 0.90 ppm, respectively, from four $C-CH_3$ groups, a six-proton singlet at 2.34 ppm from two $N-CH_3$ groups, a singlet at 3.45 ppm from a methoxy group, and a doublet at 1.04 ppm (J = 6 Hz) from a $C-CH_3$ group. The mass spectrum of alkaloid (I) had the main peaks of ions with m/z 56, 57, 58, (100%), 314, 371, 386, 402, and 416 (M^+).

The m/z value of 58 for the maximum ion peak in the mass spectra confirmed the presence of a methylamine group in the C_{20} position of a pregnane nucleus [3, 4].

When (I) was acetylated with acetic anhydride in pyridine, N,N'-diacetyl-O-methylcyclovirobuxine-D was formed with the composition $C_{31}H_{52}N_2O_3$ (II), mp 242-244°C (acetone—petroleum ether (1:6)), $[\alpha]_D -25.51°$ (s 0.708; chloroform). The IR spectrum of (II) showed an absorption band at 1632 cm^{-1} (N-acetyl group) and its mass spectrum had the main peaks of ions with m/z 57, 58, 100 (100%), 314, 368, 380, 386, 456, 499, and 500 (M^+). This confirmed the formation of a N,N'-diacetyl derivative when (I) was acetylated.

The Hess methylation of (I) gave a N,N'-dimethyl derivative with the composition $C_{29}H_{52} \cdot N_2O$ (III), mp 253-255°C (ethanol) $[\alpha]_D + 65.18°$ (s 0.522; chloroform) the IR spectrum of which lacked the absorption band for an NH group. The mass spectrum showed the main peaks of ions with m/z 70, 71, 72 (100%), 84, 342, 358, 370, 399, 414, and 444 (M^+), indicating the complete methylation of the amino groups in (I) [3, 5].

According to a mixed melting point, and also the features of its IR and mass spectra, the N,N'-dimethyl derivative (III) was identical with N,N',O-trimethylcyclovirobuxine-D [6, 7], which was obtained by Kuhn's method.

Consequently, O-methylcyclovirobuxine-D (I) has the structure and configuration of 16α-methoxy-4,4',14α-trimethyl-3β,20α-di(methylamino)-9β,19-cyclo-5α-pregnane.

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