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A NEW XANTHONE COMPOUND FROM *Centaurium erythraea*

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UDC 547.972

Previously, hexasubstituted xanthones with the 1,3,5,6,7,8- type of substitution such as 1,3,5,6,7,8-hexamethoxyxanthone and 1-hydroxy-3,5,6,7,8-pentamethoxyxanthone have been isolated from the roots of *Canscora decussata* Schult. [1, 2]. We have isolated another new compound with this arrangement of constituents.

The epigeal part of *Centaurium erythraea* Rafn. was extracted with 96% ethanol. The ethanolic extracts were evaporated in vacuum and were treated with hot water, and the aqueous extract exhaustively re-extracted with chloroform. From the chloroform extract by chromatography on silica gel in the petroleum ether–chloroform (7:3) system a yellow crystalline substance of xanthone nature was isolated with the formula $C_{16}H_{14}O_8$, M^+ 334, mp 213–215°C (from FeOH).

The UV spectrum of the substance showed three absorption maxima (nm): λ_{max}^{MeOH} 235, 254, 335; + NaOAc 254, 270, 388; + NaOAc/H_3BO_3 254, 270, 378; + $AlCl_3$ 235, 273, 355 sh. 372; + $AlCl_3$/HCl 235, 273, 335 sh, 372; + NaOME 242, 256, 372.

The PMR spectrum ($CDCl_3$) showed the signals of two protons at 6.8 and 6.51 ppm (d, J = 3.5 Hz, 1 H) due to H-2 and H-4, respectively. There were no other signals of aromatic protons. Consequently, ring B is completely substituted. There were the signals of three methoxy groups: 4.01, 3.91, and 3.82 ppm (s, 3 H each).

Thus, it follows from the results of UV, mass, and PMR spectroscopy that the compound is a hexasubstituted xanthone containing three –OH and three $-OCH_3$ groups. Two of the OH groups are present in the α-positions to a carbonyl, as is confirmed by the PMR spectrum [DMSO, 11.78 and 11.62 ppm (s, 1 H, OH groups in positions 1 and 8)], and by the spectrum of the acetyl derivatives [$CDCl_3$, signal at 2.5 ppm (s, 6 H)], and also the UV spectrum [bathochromic shift with $AlCl_3$]. The third hydroxy group is present in position 3 or 6 of the xanthone – bathochromic shift with NaOAc [3].

To establish the positions of the OH groups, we employed a chemical shift reagent, making use of the fact that an OCH_3 group in a benzene ring in the ortho position to which there are no substituents does not form a complex with the chemical shift reagent. On the other hand, if there is an ortho substituent the methoxy group departs from conjugation with the benzene ring and forms a complex with the chemical shift reagent [4]. As the experiment showed, the signal of the protons of the methoxy group did not change its position with an increase in the concentration of the paramagnetic shift reagent $Eu(fod)_3$. Such behavior may be expected for a $-OCH_3$ group present in position 3.

On the basis of the facts given above, it may be concluded that the substance has the structure of 1,6,8-trihydroxy-3,5,7-trimethoxyxanthone and is a new xanthone compound

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Tyumen' State Medical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 2, p. 258, March-April, 1982. Original article submitted November 13, 1981.

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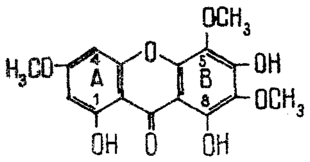

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PHENOLIC COMPOUNDS OF *Phaseolus vulgaris*

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UDC 547.592:635.652

Continuing an investigation of the phenolic compounds of the epigeal part of *Phaseolus vulgaris* L. (kidney bean) [1], we have studied the chloroform and ethyl acetate fractions obtained as the result of the treatment with chloroform and ethyl acetate of an evaporated 80% ethanolic extract.

When the material from the chloroform extract was separated on silica gel (with methylene chloride as eluent), substance (I) was isolated. The chromatography of the material from the ethyl acetate extract on Filtrak FN-1 paper in 2% acetic acid showed the presence of four substances which were assigned to the phenocarboxylic acids on the basis of qualitative reactions. The material of the ethyl acetate extract was separated on a column of polyamide. On elution with water with rechromatography of the fraction in 2% acetic acid, substances (II)-(V) were isolated.

Substance (I), with the composition $C_{10}H_8O_4$, mp 204-205°C, R_f 0.34, has a blue fluorescence in UV light with λ_{max} (in ethanol) 256, 298, 340 nm. By comparison with an authentic sample, (I) was identified as scopoletin [3].

Substance (II), with the composition $C_{16}H_{18}O_9$, mp 200-204°C, R_f 0.76, has a blue fluorescence in UV light with λ_{max} (in ethanol) 325, 240 nm, and was identified as chlorogenic acid [2].

Substance (III) with the composition $C_{16}H_{18}O_9$, amorphous, R_f 0.69, showed a blue fluorescence in UV light with λ_{max} (in ethanol), 328, 245 nm. Compound (III) was shown to be identical with an authentic sample of neochlorogenic acid [2].

Substance (IV), with the composition $C_{10}H_{10}O_4$, mp 168-169°C, R_f 0.32, gave a bright blue fluorescence in UV light with λ_{max} (in ethanol) 323 nm. Compound (IV) was identified by comparison with an authentic sample as ferulic acid.

Substance (V), with the composition $C_9H_8O_4$, mp 196°C, R_f 0.29, had a blue fluorescence in UV light with λ_{max} (in ethanol) 325, 299, 235 nm. Compound (V) was identified as caffeic acid [2].

The epigeal part of *Phaseolus vulgaris* L. contained chlorogenic and neochlorogenic acids in the largest amounts.

This is the first time that scopoletin and phenolic acids have been isolated from the epigeal part of the kidney bean plant.

Khar'kov Pharmaceutical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 258-259, March-April, 1982. Original article submitted January 15, 1982.