THE FLAVONOIDS OF HEDYSARUM GMELINI

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Khimiya Prirodnykh Soedinenii, Vol. 3, No. 2, pp. 138–139, 1967

It is known that Hedysarum gmelini Ldb. (Gmelin's sweetvetch [1]) and other species of this genus contain flavonoids [2]. However, we have found no information in the literature available to us on their isolation and chemical properties.

Paper chromatography of alcoholic extracts in a series of one-dimensional and two-dimensional systems showed not less than eight substances of a flavonoid nature.

Flavonoid	Formula	Mp, °C	$[\alpha]_D^{18}$ in ethanol, deg	Color in UV light	
				before treatment with $Al_2(SO_4)_3$ solution	after treatment with $Al_2(SO_4)_3$ solution
Substance (I)	$C_{21}H_{20}O_{11}$	174–176	−183.4	dark brown	yellow-green
Substance (II)	$C_{20}H_{18}O_{11}$	209–211	−159		
Aglycone of substances (I) and (II)	$C_{15}H_{10}O_7$	307–313	0	yellow	

The total flavonoids obtained from Hedysarum gmelini were separated on a column of kapron polyamide sorbent [3]. As a result, two flavonoids provisionally called substances (I) and (II) were isolated; their main properties are given in the table.

To elucidate the structure of the substances under investigation, they were subjected to acid hydrolysis. From their hydrolysates a single aglycone was isolated (table) which was identified by its physicochemical properties, its R_f values, its UV spectrum, and mixed melting points, as quercetin. Paper chromatography of the hydrolysates showed that substance (I) contained an L-rhamnose sugar residue and substance (II) an L-arabinose residue.

The position of attachment of the sugar residues to the aglycone was determined by means of complex-forming reactions with zirconyl nitrate and citric acid [4], from the capacity of the various flavonoids for fluorescing in UV light [5], and from the results of spectroscopic analysis in the UV region [6, 7]. The results obtained show that the L-rhamnose and L-arabinose are attached to the aglycone at position 3. To elucidate the configuration of the glycosidic bond and the size of the oxide ring of the sugars in the glycosides under consideration, we compared their optical rotations with those of various phenyl L-rhamnosides and L-arabinosides. It was found that the glycosides (I) and (II) have an α-glycosidic bond and are furanosides. Consequently, substance (I) has been identified as quercetin 3-α-L-rhamnofuranoside [18] and substance (II) as quercetin 3-α-L-arabinofuranoside (avicularin) [9].

The results of comparing the properties of substances (I) and (II) with those of quercetin 3-α-L-rhamnofuranoside and avicularin confirmed their complete identity.

The sample of quercetin 3-α-L-rhamnofuranoside was given to us by V. N. Spiridonov.

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