In ethyl acetate extracts from an aqueous methanolic extract of the defatted flour of the seeds by comparison with authentic samples, we identified daidzein and genistein, and also chlorogenic, neochlorogenic, ferulic, and p-coumaric acids.

This is the first time that substances (I-IV) and (IX) have been isolated from soybean herbage.

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POLYPHENOLS OF THE BARK OF *Betula pendula*

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UDC 547.589+978

We have investigated the bark of beech trees growing in the territory of Krasnoyarsk Krai (Predivinsk LPKh [forestry farm]). The resinous substances were removed from the bark sawdust by repeated extraction with benzene.

The polyphenols were extracted with 80% ethanol, the extracts were concentrated in vacuum, and the aqueous residue was treated successively with diethyl ether and ethyl acetate. The polyphenol preparations from the ethyl acetate solutions were isolated by precipitating them from concentrated solutions with dry chloroform. The residue after treatment with ether and ethyl acetate was freeze-dried, and the acetone-soluble fraction was precipitated with petroleum ether.

To analyze each fraction we used paper chromatography in the solvent systems butan-1-ol—acetic acid—water (40:12:28) and 2% acetic acid [1].

In an analysis of the ethereal fraction (8.9% of the total combined polyphenols) we detected four substances of catechin nature, which we designated as K-1, K-2, K-3, and K-4, and 15 phenolic acids.

Phenolic acids were identified by GLC in the form of their silyl derivatives. They were separated on a Tsvet-110 chromatograph with a flame-ionization detector. Stainless steel column (3000 × 3 mm); stationary phase SE-30 (5% of the mass of Chromaton N-AW-DMCS); programming of the temperature from 120 to 300°C at the rate of 3 degrees/min; rate of flow of carrier gas, helium, 50 ml/min, of hydrogen 45 ml/min, and of air 200 ml/min. The qualitative compositions of the phenolic acids were determined by the method of adding pure substances and from literature characteristics [2].

Among the acids we detected benzoic, p-hydroxybenzoic, o- and m-methoxybenzoic, m-hydroxybenzoic, cinnamic, salicylic, o-vanillic, veratric, vanillic, 2,5- and 3,4-dihydroxybenzoic, syringic, and 2,3,4- and 3,4,5-trihydroxybenzoic.

The ethyl acetate fraction amounted to 32.1% of the total combined polyphenols and contained 12 substances of phenolic nature. Qualitative reactions with differentiating reagents [3] and chromatographic analysis permitted two of them to be assigned to the catechins and three to the leucoanthocyanidins.

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The base of the acetone fraction (49.3%) consisted of polymeric forms of the catechins and leucoanthocyanidins. A flavan, K-5, was also detected in this fraction.

From the ethereal fraction of the polyphenols of beech bark, by chromatography on type KSK silica gel, we isolated three flavans (K-1, K-2, and K-3) and four phenolic acids.

Flavan K-1 was a white crystalline substance with mp 173-174°C, $\lambda_{max}^{C_2H_5OH}$ 280 nm, $[\alpha]_D^{20}$ +17.0° [acetone–water (1:1)]. It contained 11.6% of ortho-hydroxy groups. From its physicochemical constants and the products of its transformations, the substance was characterized as (+)-catechin.

Flavan K-2 was identical with an authentic sample of (±)-gallocatechin in its melting point and spectral characteristics.

On the basis of a study of the products of acid hydrolysis and alkaline cleavage, and other properties, flavan K-3 was assigned to the dimeric flavans.

The phenolic acids isolated were identified from the results of a study of their physicochemical properties as protocatechuic, vanillic, syringic, and p-hydroxybenzoic acids.

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PYRETHRIN — A NEW GUAIANOLIDE FROM *Pyrethrum parthenifolium*. II.

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Continuing a study [1, 2] of the sesquiterpene lactones of *Pyrethrum parthenifolium* Willd., we have isolated a substance with mp 161-162°C (flavonoid), and a lactone with the composition $C_{15}H_{20}O_4$, mp 198-200°C. By direct comparison, this lactone has been identified as isoridentin [3].

To confirm the structure of pyrethin [1], we performed its de-epoxidation [4]. On eliminating the epoxy group from pyrethin we obtained a substance with mp 118-119°C identical in its physicochemical constants with 8-deoxycumambrin B [5]. Consequently, pyrethin is 10α-hydroxy-3,4-epoxyguai-11(13)-en-6,12-olide.

We investigated this plant from a different growth site (environs of Saivan, Turkmen SSR). By column chromatography, together with the known lactones (chrysartemin B, artecalin, and isoridentin), we isolated a new lactone with the composition $C_{18}H_{22}O_5$, mp 168°C, $[\alpha]_D^{20}$ +107° (c 0.06; CH_3OH), which we have called pyrethrin (I). The IR spectrum of (I) has absorption bands at (cm^{-1}) 1775 (γ-lactone carbonyl), 1740 (carbonyl group of a saturated ester), and 1670 and 1645 (double bond). In the mass spectrum are the peaks of ion with m/z 318 (M^+), 262 $(M - CH_2CH_2CO-)^+$, 244 $(M - CH_3CH_2COOH)^+$. In the PMR spectrum of (I) (deuteropyridine; 0 — HMDS) in the strong-field region the following signals are observed: triplet (^3J about 10 Hz) at 1.02 ppm (3 H) from the methyl group of propionic acid and a singlet at 1.53 ppm (3 H) from a methyl group at an epoxide ring. In the 3.18 ppm region there is a broadened singlet (1 H) from an epoxide proton. The signal of a lactone proton appears at 4.10 ppm in the form of a quartet (^3J = 10, 9 Hz), which unambiguously shows the position of the lactone ring at C_6-C_7 and the trans linkage of it with the guaiane skeleton.

The presence of a guaiane nucleus in this compound was confirmed by the formation of chamazulene, identified by TLC with a marker. Two one-proton broadened singlets are located at 4.71 and 4.90 ppm and have been assigned to the protons of an exomethylene group in a sev-

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