Thus, in the oleoresin of Schrenk's spruce we have identified and determined quantitatively 18 monoterpene compounds making up 35.3% of the weight of the neutral fraction.

Of sesquiterpene compounds we found in this oleoresin only (+)-cis-α-bisabolene, which we have detected previously in the oleoresin of *Pinus pumila* Pall. Rgl. [3]. It must be mentioned that sesquiterpenes of the bisabolane series are not characteristic for spruce oleoresins and have been detected in other species only in trace amounts [3]. At the same time, they are dominant among the sesquiterpenoids of the oleoresin of Semenov's fir [1]. It is possible that the formation of terpenoids of this group in conifers of the family Pinaceae is a feature of this region.

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OXYGEN-CONTAINING MONO- AND SESQUITERPENOIDS OF THE OLEORESIN OF *Abies sibirica*

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Gas-chromatographic investigations of the mono- and sesquiterpenoids of the oleoresin of *Abies sibirica* Ledeb. (Siberian fir) [1] and also of the resin acid [2] and of the neutral diterpenoids [3] have been reported previously.

The oleoresins of the Siberian fir collected in Novosibirsk province in 1980 contained 43.4% of neutral compounds, which, by chromatography followed by fractional vacuum distillation, were separated into monoterpenes (22.2%), sesquiterpene hydrocarbons (4.6%), oxygen-containing monoterpenes (5.8%), and sesquiterpene compounds (0.7%). The compositions of the fractions of mono-and sesquiterpene hydrocarbons differed insignificantly from those given previously [1].

In the fraction of oxygen-containing monoterpenoids, the predominating component was borneol, a large proportion of which was separated by crystallization. By adsorption chromatography on silica gel impregnated with 20% silver nitrate we isolated, in addition to borneol $[\alpha]_D^{20}$ − 34°, thymol methyl ether, bornyl acetate, α-terpenyl acetate, a mixture of geranyl acetate and citronellyl acetate (3:1, PMR), terpineol-4, citronellol, α-terpineol geraniol, and sabinene hydrate, which were identified by their spectral characteristics.

We may note that the bulk of the barneol was formed on alkaline saponification of the oleoresin (1% NaOH, 24 h) from bornyl acetate. Thus, GLC analysis (XE-60, 50 m, 80-180°C/3°C per minute) of the fraction of neutral oxygen-containing compounds obtained on the rapid saponification of a small sample of the oleoresin (1% NaOH, 5 min) showed a high amout of bornyl acetate — 93% of the monoterpenoids — while the amount of borneol was only 0.8%. Apart from these compounds, 3.8% of thymol methyl ether, 1.3% of geranyl acetate, acetate, and 0.5% of citronellyl acetate were determined in the fraction. The amount of other monoterpenoids isolated by adsorption chromatography did not exceed 0.1%.

In the same fraction we found the following composition of the sesquiterpenoids (%): α-bisabolol, 67.0; nerolidol, 14.1; caryophylla-4(12),8(13)-dien-5α-ol, 9.0; β-eudesmol, 5.8; caryophellene α-oxide; humulene oxide, and β-cedrol, each ~0.3%). All these components were isolated by adsorption chromatography and were identified from their PMR spectra. α-Bisabalol ($[\alpha]_D^{20}$ + 62°) — the main component of the sesquiterpenoids — was, according to

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PMR, present in the oleoresin in the form of a mixture of the 6S,7R- and 6S,7S-isomers in a ratio of 4:1 [4].

Thus, supplementing previous work [1-3], in the oleoresin of the Siberian fir we have identified and determined quantitatively 11 monoterpenoids and seven sesquiterpenoids.

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AN INVESTIGATION OF THE CHEMICAL COMPOSITION OF A SUSPENSION CULTURE OF GINSENG CELLS

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The production of biologically active substances by cultivating plant tissues and cells is attracting attention in view of the possibility of its use on the industrial scale. Furuya et al. were the first to describe the use of a callus culture of gingseng root with the aim of obtaining panaxosides [1, 2]. In a hydrolysate of a crude fraction of saponins from callus tissue, Furuya et al. established the presence of oleanolic acid, panaxadiol, and panaxatriol, and in extracts of the biomass they found panaxosides, β-sitosterol β-D-glucoside, and a mixture of sterols in which β-sitosterol predominated. The basic set of panaxosides of a callus culture corresponded to the set from the roots of *Panex gingseng* C. A. Mey.

In the USSR, an industrial production of gingseng biomass based on the surface method of growing a culture a culture of the plant tissue has been created [3]. One of the tasks for the future is the development of a technology for obtaining biologically active preparations from a suspension of gingseng cells.

In the present communication we given the first results of an investigation of extracts of suspension strains of gingseng from the museum collection of the Omutnisk chemical factory. The dried biomass of a cell culture of the strain BIO-2 (41.7 g) was fully extracted with methanol (3 × 100 ml).

The extract was evaporated in vacuum. The residue (8.57 g) was dissolved in 50 ml of water, the resulting solution was extracted with water-saturated n-butanol (3 × 25 ml), and the solvent was evaporated off. This gave 1.0 g of crude glycoside fraction (CGF). The results of its analysis by TLC in the chloroform–butan-1-ol–methanol–water (10:5:5.5:1.8) system showed the presence of four spots with a specific terpenoid coloration in the interval of R_f values characteristic for panaxosides, and a spot of the same coloration corresponding in its R_f value to an authentic sample of β-sitosterol β-D-glucoside. Detection was performed with 10% H_2SO_4 in ethanol followed by heating at 120-200°C.

A study of the aglycons of the presumed panaxosides obtained after the performance of acid hydrolysis (methanol–water–H_2SO_4 (50:50:2), at 95-100°C), revealed the presence of two main spots at the levels of authentic samples of β-sitosterol and of oleanolic acid. After the methylation of the dry hydrolysate residue with a solution of diazomethane in ether, the

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