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PHENOLIC ANTIOXIDANTS OF THE BARK OF *Fraxinus mandshurica*

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Manchurian ash is widely distributed in the Far East and is used as commercial timber. Nevertheless the bark has found no use, although it is known that in the folk medicine of the Nanians, the Udegeys, and the Ulocheys it is used as an antitubercular, antihelminthic, and wound-healing agent [1]. In China, the dried bark of *F. mandshurica* is sometimes used as a substitute for the Chinese drug "quinpi", while the bark of *F. mandshurica* var. *japonica* is not used in Japan [2]. A series of coumarins has previously been extracted from the bark of *F. mandshurica* var. *japonica* [2]. It has also been reported that an extract from the leaves and bark of *F. excelsior*, which is a component of the drug PHYTODOLOR, exhibits antioxidant activity [5].

During a search for natural antioxidants, we detected a fairly high antioxidant activity of an alcoholic extract of the bark of Manchurian ash. By the column chromatography on silica gel of a hexane-soluble fraction of an alcoholic extract we have isolated the phenolic diterpene ferruginol (1) (0.1%), corresponding in its physical and spectral characteristics to those given in the literature [3]. Its presence as a component of the essential oil of the ash has not been reported previously.

Chromatography of the residue from the alcoholic extract led to the isolation of the two main coumarins of the alcoholic extract — fraxetin (2) (0.2%) and fraxin (fraxetin 8-O-*D*-glucoside) (3) (1.9%). The melting points and UV, IR, NMR, and mass spectra of (2) and (3), corresponded to those described in the literature [2]. It must be mentioned that compound (3) was not detected in an extract of *F. mandshurica* var. *japonica* [2].

An investigation of the antioxidant activities of the compounds isolated on a model of the initiated oxidation of methyl oleate [4] showed that, with respect to its efficiency in interrupting free-radical oxidation of the substrate, compound (2) approximated to Ionol but was inferior to α-tocopherol, while the efficiency of compound (1) was considerably lower than those of α-tocopherol, Ionol, and (2). Compound 3 showed no activity on this model (Fig. 1).

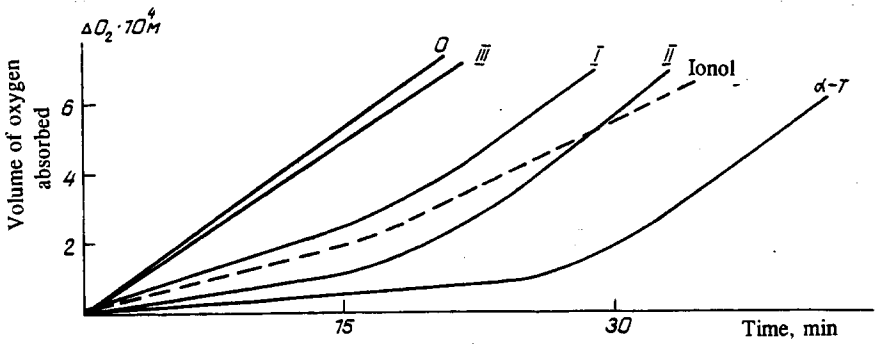

Fig. 1. Initiated oxidation of methyl oleate in the presence of oxidation inhibitors in concentrations of 10^{-4} M. $W_i = 10^{-7}$ mole/liter·s, 60°C. 0 — without an inhibitor.

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