no starch, as was shown by the negative reaction with iodine. The product of the acid hydrolysis of the PSCs from the herbage was found by PC and GLC [3] to contain galacturonic acid, Rha, Ara, Xyl, Man, Glc, Gal, and an unidentified sugar in a ratio of 7.3:8.9:3.6:8.9:19.4:49.4:1, respectively. In the PSCs from the meal, GalUA and the same sugars were detected in a ratio of 16.3:28.0:4.3:3.8:12.5:35.5:1. Gal and Glc predominated in the PSCs from the herbage and Gal and Ara in the PSCs from the meal.

Then, with the aim of purification and separation, the PSCs from the meal (2 g in 25 ml of H_2O) were chromatographed on DEAE-cellulose ($-CO_3^{2-}$) with elution successively by water, 1 M $(NH_4)_2CO_3$, and 0.2 N NaOH. The aqueous eluates were evaporated to a syrup and precipitated with ethanol. The yield of the neutral fraction was 12%. In a hydrolysate, Rha, Ara, Xyl, Man, Glc, and Gal were detected in a ratio of 1:11.6:2.4:1.7:10:19.6. The alkaline eluates were dialyzed against water and precipitated with ethanol. The yield of acidic polysaccharide obtained by elution with 1 M $(NH_4)_2CO_3$ was 23%, and in a hydrolysate GalUA and Rha, Ara, Xyl, Man, Glc, Gal, and an unidentified sugar were detected in a ratio of 11:10:2.4:2:2.4:13.2:1.

The polysaccharides eluted by 0.2 N sodium hydroxide (43%) consisted of Gal and GalUA, traces of Ara, Xyl, and Man also being detected.

Thus, the herbage and meal of Achillea asiatica contain PSCs. They differ with respect to the amounts of individual sugars. The PSCs include neutral and acidic polysaccharides.

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PHYSIOLOGICAL ACTIVITY OF DITERPENOIDS FROM THE SOFT CORAL Sarcophyton trocheliophorum

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UDC 547.996:593.96

We have established that hexane extracts of the soft coral Sarcophyton trocheliophorum, which is widely distributed in the tropical zone of the world ocean and specimens of which were collected in the Seychelles Islands during the expedition of the Scientific Research Vessel Professor Bogorov, contain new cembrene alcohols – 13-hydroxyneocembrene [(1R,3E,7E,11E,13S)cembra-3,7,11,15-tetraen-13-ol] (IV), 0.25% yield calculated on the weight of lyophilized raw material: 11,12-epoxy-13-hydroxyneocembrene [(1R,3E,7E,13S)-11,12-epoxycembra-3,7,15-trien-13-ol] (II), 0.4% yield calculated on the weight of the lyophilizate; and the known diterpene-hydrocarbon neocembrene (I), 0.001%. The structures of the diterpenoids investigated were shown on the basis of an analysis of physicochemical characteristics (see scheme on following page).

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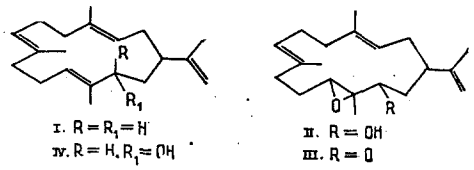
Translated from Khimiya Prirodnykh Soedinenii, No. pp. 137-139, January-February, 1988. Original article submitted April 1, 1988; revision submitted September 3, 1988.

0009-3130/89/2501-0122 $12.50



The cytostatic activities of compounds (I-IV) were determined by a radiometric method in a micro modification according to [1] from the level of inclusion of [^{3}H]thymidine, [^{14}C]uridine, and [^{3}H]leucine in the acid-insoluble fraction of Ehrlich cells. As can be seen from Table 1, compounds (IV) and (II) caused 50% inhibition of the incorporation of [^{3}H]thymidine in concentrations of 19.5 and 28.0 μg/ml, respectively. The effective concentrations of these substances half inhibiting the incorporation of [^{14}C]uridine and [^{3}H]leucine, were 1.5 times higher, which shows their predominant suppression of the biosynthesis of DNA. Compounds (I) and (III) exhibited no cytostatic activity in concentrations of up to 50 μg/ml.

The activities of compounds (I-IV) in relation to tumor cells was partially neutralized by the addition to the incubation medium of both lecithin and lecithin-cholesterol liposomes. The degree of permeability of the liposomes was recorded from the release of [1-^{14}C]-glucose, as described previously [2]. A study of the influence of the diterpenoids on the permeability of the lecithin-cholesterol liposomes showed the existence of a correlation between the action of the substances under investigation on lipid membranes and their activity in relation to tumor cells. Diterpene (IV) was the most effective inductor of the release of labeled glucose from the liposomes. The membrane activity of the other compounds decreased in the sequence (II) > (IV) > (I) (see Fig. 1). In addition, we established that

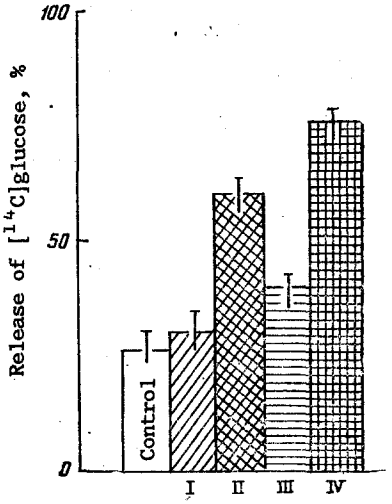


Fig. 1. Action of the diterpenoids on the permeability of liposomes for [^{14}C] glucose.

TABLE 1. Effective Concentrations of the Diterpenoids Causing 50% Inhibition of the Incorporation of Labeled Precursors

Substance	ED_{50}, μg/ml		
	[^{3}H]thymidine	[^{14}C]-uridine	[^{3}H]leucine
I	—	—	—
II	28,0	48.5	49,0
III	—	—	—
IV	19.5	30.5	31.0

the inhibiting action of the cembranoids investigated on tumor cells was not specific since in approximately the same doses they caused the hemolysis of erythrocytes and inhibited the vital activity of mouse lymphocytes and macrophages.

These results permitted an explanation of the role of the individual functional groups of the compounds under investigation in the manifestation of biological activity by them. The presence of a hydroxy group, as in compound (IV), is one of the factors responsible for the efficacy of the action of these substances. The replacement of the 11,12-double bond by an epoxy ring lowers cytostatic activity, while compound (III) in which the hydroxy group has been replaced by a keto group, showed no appreciable activity in the concentrations investigated.

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STEROID GLYCOSIDES OF GARDEN ONION SEEDS. STRUCTURE OF CEPOSIDE D

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UDC 547.918+547.917

In the present communication we give information on the isolation of ceposide D (I) and proof of its structure. As the result of the repeated chromatography of a methanolic extract of the seeds of the garden onion Allium cepa L. (variety Dnestrovskii growing in Moldavia) on a column of silica gel, we obtained an individual fraction (I). The yields of glycoside (I) was 0.1% on the weight of the air-dry raw material. Ceposide D gave a positive reaction with the Sannié reagent [1] and a negative reaction with the Ehrlich reagent [2] which showed its spirostanol nature. The IR spectrum of (I) contained the 900-920 cm^{-1} absorption bands that are characteristic for a spiroketal chain of the (25R)-series. After acid hydrolysis, diosgenin was identified as the aglycon by its physicochemical constants [3].

In a hydrolysate, D-glucose, D-galactose, L-rhamnose, and L-arabinose were identified by GLC in the form of their aldononitrile acetate derivatives [4] in a ratio of 2:1:1:1. The sequence of bonds and the sizes of the oxide rings were determined by the Hakomori methylation of (I) [5] followed by methanolysis of the permethylate obtained. The following were identified by GLC: Me 2,3,4,6-tetra-O-Me-D-Glc_p, Me 4,6-di-O-Me-D-Gal_p, Me 2,3-di-O-Me-L-Rha_p, and Me 3,4-di-O-Me-L-Ara_p. Periodate oxidation confirmed the results of methylation: only galactose was detected by paper chromatography in the hydrolysate.

The sequence of attachment of the monosaccharides was established after an investigation of the progenins obtained from the partial hydrolysis of (I). In the monoside (II) arabinose was identified, in the bioside (III) L-arabinose and L-rhamnose in a ratio of 1:1, in the trioside (IV) L-arabinose, L-rhamnose, and D-galactose (1:1:1), and in the tetraoside (V) L-arabinose, L-rhamnose, D-glucose, and D-galactose (1:1:1:1). After the methylation and methanolysis of (III) Me 2,3,4-tri-O-Me-L-Rha_p and Me 3,4-di-O-Me-L-Ara_p were identified; for (IV), Me 2,3,4,6-tetra-O-Me-D-Gal_p, Me 2,3-di-O-Me-L-Rha_p, and Me 3,4-di-O-Me-L-Ara_p; and for (V), Me 2,3,4,6-tetra-O-Me-D-Glc_p, Me 2,3-di-O-Me-L-Rha_p, Me 3,4-di-O-Me-L-Ara_p, and Me 2,4,6-tri-O-Me-D-Gal_p. The configurations of the glycosidic centers were determined according to Klyne's rule [6].

On the basis of the results presented, the following structure is proposed for ceposide D and its progenins:

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Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 139-140, January-February, 1988. Original article submitted January 21, 1988; revision submitted August 23, 1988.

0009-3130/89/2501-0124 $12.50