SESQUITERPENE LACTONES OF Eupatorium cannabinum

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Sesquiterpene lactones of the germacrane type (eupatoriopicrin, eupatolide, eucannabinolide, eupasimplicin B, chromolenide, hiyodorilactone E, and unidentified compounds 1–4) and of the guaiane type (eupachifolin C) [1–4] have previously been isolated from hemp agrimony (hemp eupatorium) Eupatorium cannabinum L, family Asteraceae.

In a study of the herbage of hemp agrimony gathered in L'vov province in the flowering phase, by chromatography on Silufol plates in the solvent system benzene–ethyl acetate–acetone (100:5:0:5) we have detected substances close to the sesquiterpene lactones of elecampane inula, Inula helenium [5].

To isolate the substances that had been detected, the comminuted raw material was extracted with a tenfold amount of chloroform, and then the solvent was evaporated off and the sesquiterpene lactones of the residue were separated by partition chromatography on silica gel using petroleum ether with increasing amounts of ethyl acetate up to 10% as eluent. As a result, compounds of sesquiterpene nature were obtained which were designated as substances (I) ($C_{15}H_{20}O_2$, 78–79°C, $[\alpha]_D^{20}$ +219.3° (c 1.24; ethanol)) and (II) ($C_{15}H_{20}O_2$, mp 111-113°C $[\alpha]_D^{20}$ +188.3° (c 1.02; ethanol)).

The compounds isolated had absorption bands characteristic for sesquiterpene lactones: 1750-1760 cm^{-1} (γ-lactone), 1662–1671, and 1645–1647 cm^{-1} (double bonds).

Substances (I) and (II) were reduced by $NaBH_4$, which showed the presence of a methylene group at C_{11} of the lactone ring, and gave dihydroalantolactone ($C_{15}H_{22}O_2$, mp 133–135°C) and dihydroisoalantolactone ($C_{15}H_{22}O_2$, mp 172–173°C) [5], respectively.

As a result of a comparison of the physicochemical properties of the substances isolated, the products of their reduction, IR spectra, R_f values on TLC in the above-mentioned system, and relative retention times in GLC (5% of PEGS on Chromaton N-AW-DMCS, 185°C, and 5% of Apiezon on Chromaton N-AW-DMCS, 220°C) with the same characteristics of authentic samples, they were identified as alantolactone (I) and isoalantolactone (II). This is the first time that substances (I) and (II) have been detected in the epigeal organs of the plant, as well.

Thus, sesquiterpene lactones of the eudesmane type – alantolactone and isoalantolactone have been isolated from Eupatorium cannabinium L. for the first time.

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