(0.113%), (4-hydroxy-3-methoxyphenyl)propane (0.187%), vanillin (0.257%), (4-hydroxy-3-methoxyphenyl)propan-1-ol (0.184%), 3-(4-hydroxy-3-methoxyphenyl)propan-1-ol (0.008%), (4-hydroxy-3,5-dimethoxyphenyl)propane (0.407%), (4-hydroxy-3,5-dimethoxyphenyl)propan-1-ol (0.109%), and 3-(4-hydroxy-3,5-dimethoxyphenyl) propan-1-ol (0.0366%).

Thus, the results of nitrobenzene oxidation and decomposition of the lignin of the double hollyhock by metallic sodium and liquid ammonia confirm the presence of p-coumaryl, guaiacyl, and syringyl structures of the lignin units.

LITERATURE CITED

1. M. Pepper and M. Siddequellah, Can. J. Chem., 39, 1454 (1961).
2. Flora of Uzbekistan [in Russian], Vol. 4, Tashkent, (1959), p. 169.
3. A. Björkman, Nature, 174, 1057 (1954).
4. A. A. Geronikaki and Kh. A. Abduazimov, Khim. Prirodn. Soedin., 242 (1976).
5. A. D. Alekseev, V. M. Reznikov, and A. G. Matusevich, Khimiya Drevesiny, No. 9, 57 (1971).
6. N. N. Shorygina, T. Ya. Kefeli, A. F. Semechkina, Dokl. Akad. Nauk SSSR, 5, 689 (1949).
7. A. A. Geronikaki and Kh. A. Abduazimov, Khim. Prirodn. Soedin., 410 (1976).

ANTIMICROBIAL SUBSTANCES FROM Salvia officinalis

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On fractionating an acetone extract of the dried leaves of Salvia officinalis L. (garden sage) we detected two substances exhibiting considerable activity against Staphylococcus aureus. The two substances were isolated by chromatography on a column of silica gel of the "aqueous silicic acid" type with gradient elution by mixtures of diethyl ether and petroleum ether with increasing concentrations of diethyl ether (from 0 to 33%) and were finally purified by TLC on the same adsorbent in the ether–hexane (1 : 1) system, where they had R_f 0.48 and 0.63.

The substance with the higher chromatographic mobility, having $\lambda_{max}^{C_2H_5OH}$ 212, 233 and 284 nm (ε 21500, 9650 and 1690), ν_{max}^{KBr} 3500–2400, 1680 cm^{-1} was identified with a known component of sage, salvin (I) [1] on the basis of its conversion into a diacetate with mp 217-219°C (from methanol) (see [2]). This substance, which has also been described under the name of carnazolic acid [2] was readily esterified by diazomethane with the formation of monomethyl ester in which the two phenolic groups can be methylated under the action of methyl iodide and sodium hydride in dimethyl sulfoxide, as a result of which the trimethyl derivative (III) was obtained with $\nu_{max}^{CCl_4}$ 1730 cm^{-1}; δ^{CCl_4} 0.78 ppm (3H singlet), 0.97 ppm (3H singlet), 1.18 and 1.21 ppm (6H, 2 doublets J = 7 Hz), 2.67-2.93 ppm (2H, multiplet), 3.18 ppm (1H, septet, J = 7Hz), 3.58 ppm (6H, singlet), 3.64 ppm (3H, singlet), and 6.58 ppm (1H, singlet).

The second substance, present in the sage in larger amount (about 15% of the dry weight of the extract) consisted of an oil with $\lambda_{max}^{C_2H_5OH}$ 276 and 284 nm (ε 1570 and 1750); $\nu_{max}^{CCl_4}$, 3620, 3600–2400, 1740, 1690 cm^{-1}, δ^{CCl_4} 0.85 ppm (3H, singlet), 0.96 ppm (3H, singlet), 1.17 and 1.19 ppm (6H, 2 doublets, J = 7 Hz), 3.14 ppm (1H, septet, J = 7 Hz), 3.68 ppm (3H, singlet), and 6.38 ppm (1H, singlet); M^+ 346 (after treatment with D_2O, M^+ 348). For this compound we have established the structure (II) on the basis of the following facts. (See scheme on following page.)

On brief heating at 200°C it underwent oxidative decarboxylation with the formation of substance (IV) the NMR and IR spectra of which showed the absence of olefinic protons and carbonyl groups, while its UV spec-

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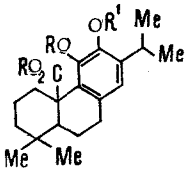
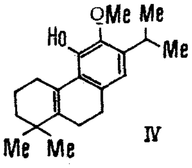


(I). R=R¹=H
(II). R=H; R¹=Me
(III). R=R¹=Me



IV

trum was characteristic for a styrene chromophor: λ_{max}^{hexane} 220, 262, and 296 nm (ε 15,300, 6900 and 1000). When compound (II) was esterified with diazomethane followed by O-alkylation with methyl iodide in the presence of sodium hydride in dimethyl sulfoxide, trimethylsalvin (III) was obtained; consequently the compound under consideration is a monomethyl ether of salvin. The question of which of the two phenolic hydroxyls remains free in this monomethyl ether was answered by means of the reaction with a p-nitrobenzenediazonium salt. This gave an azo-coupling product the absorption maximum which, in the UV spectrum, underwent a considerable bathochromic shift (to 570 nm) when the solution was made alkaline, which is characteristic for p-hydroxynitroazo compounds. It follows from this that the free phenolic hydroxyl is present in the para position to the single aromatic proton and the compound under investigation has the structure (II).

LITERATURE CITED

1. C. R. Narayanan and H. Linde, Tetrahedron Lett., 3647 (1965).
2. C. H. Brieskorn and H. J. Dömling, Arch. Pharm., 302, 641 (1969).