ISOLATION OF KOPSINILAMINE FROM *Vinca erecta*

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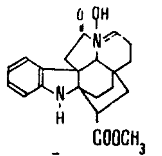
Continuing an investigation of the combined alkaloids after the separation of kopsinine nitrate [1], we have isolated a yellow crystalline base (I) with mp 243-244°C (acetone) $[\alpha]^{28}_{D}$ −65.5° (c 0.76; acetone), which we have called kopsinilamine. Its UV spectrum [$\lambda_{max}^{C_2H_5OH}$ 246, 296 nm (log ε 3.75, 3.34)] is characteristic of the indoline alkaloids. The IR spectrum is very similar to that of kopsinilam; it has absorption bands at (cm^{-1}) 760 (disubstituted benzene ring), 1720, 1220 (nonconjugated ester carbonyl), 1680 (lactam carbonyl), and 3220 (NH group) but differs from the IR spectrum of kopsinilam by a broad band at 3400-3480 cm^{-1} apparently due to a hydroxy group. The NMR spectrum of the base ($CDCl_3$) showed signals from a $COOCH_3$ group (δ 3.69 ppm, singlet) and from four aromatic protons (δ 6.5-7.0 ppm).

Taking these facts into account and also the co-occurrence of kopsinilamine with kopsinine and kopsinilam, it was assumed that the base was a quaternary derivative of kopsinilam [2]. This was also shown by the higher solubility of the base in water than of kopsinine and kopsinilam.

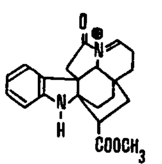
To confirm its quaternary nature, kopsinilamine was reduced with zinc in 5% hydrochloric acid solution and in the presence of a platinum catalyst in ethanol. The hydrogenation products yielded one and the same crystalline substance, which was identified as kopsinilam. When kopsinilamine was treated with hydrochloric acid, the chloride-hydrochloride of (I) was formed with mp 239-240°C (decomp.). Its IR spectrum lacked the band characteristic for a hydroxy group.

These results indicate that the base is a quaternary ammonium form of kopsinilam with the structure (I).

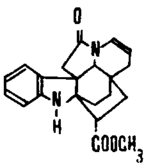


I

The structural formula proposed for kopsinilamine agrees with its mass spectrum, which shows the peaks of ions with m/e 351 (28%), 350 (100%), and 214 (55%). The peak with m/e 351 possibly arises from the molecular ion by the splitting out of the hydroxy group, and the strongest peak with m/e 350 by the splitting out of a molecule of water.



(M-OH)



(M-H_2O)

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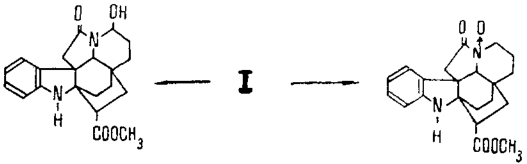
However, the NMR spectrum of the base (I) does not show the signal of an olefinic proton. This is apparently due to the fact that kopsinilamine, as a quaternary ammonium base [3], may pass into its pseudo form – 8-hydroxykopsinilam (II).



II III

Furthermore, kopsinilamine may exist in equilibrium with the N-oxide form – kopsinilam N-oxide (III), as was first shown in a study of cocculidine [4].

Thus, kopsinilamine is obviously one of the intermediate compounds in the formation of the N-oxide and hydroxy derivatives of alkaloids of this series [5, 6].

EXPERIMENTAL

Isolation of Kopsinilamine (I). The material obtained from the mother liquor after the isolation of kopsinine (58 g) was dissolved in 200 ml of benzene and chromatographed on a column of alumina (520 g).

Fractions 4-8 of the benzene eluates yielded a yellow crystalline base (1.5 g) with mp 243-244°C (acetone), $[\alpha]_D^{28}$ −65.6° (c 0.76; acetone).

Chloride-Hydrochloride of (I). A solution of 20 mg of the base in 10 ml of acidified chloroform was evaporated, and the residue was dried under vacuum. Small colorless crystals deposited with mp 239-240°C (decomp.). IR spectrum, cm^{-1}: 1720, 1690, 1220, 780.

Reduction of Kopsinilamine. A. A solution of 100 mg of (I) in 10 ml of 10% hydrochloric acid solution was treated with 0.5 g of zinc granules.

After 4 h, the initially yellow solution had become colorless. The mixture was made alkaline with ammonia and extracted with chloroform. This gave 81 mg of a base identical with kopsinilam according to IR and UV spectra and a mixed melting point.

B. The reduction of 100 mg of the base was performed in solution in 100 ml of ethanol in an atmosphere of hydrogen in the presence of a platinum catalyst (50 mg). The yellow color gradually disappeared over 8 h. The reaction mixture yielded a base identical with kopsinilam.

CONCLUSIONS

1. The new alkaloid kopsinilamine has been isolated from the epigeal part of V. erecta.

2. A study of chemical properties and spectra has shown that kopsinilamine is a quaternary ammonium derivative of kopsinilam.

LITERATURE CITED

1. V. M. Malikov and S. Yu. Yunusov, Khim. Prirodn. Soedin., 3, 142 (1967); 7, 640 (1971).
2. C. Kump and H. Schmid, Helv. Chim. Acta, 45, 1090 (1962).
3. Weygand-Hilgetag, Organisch-chemische Experimentierkunst, J. A. Barth, Leipzig (1964).
4. S. Yu. Yunusov, Tr. Instituta Khimii Akad. Nauk UzSSR, 1952, 3.
5. D. W. Thomas, H. Achenbach, and K. Biemann, J. Amer. Chem. Soc., 88, 14, 3423 (1966).
6. H. Horst and H. A. Linde, Helv. Chim. Acta, 48, 1822 (1965).