Isolation of Alpinigenine from *Papaver bracteatum*

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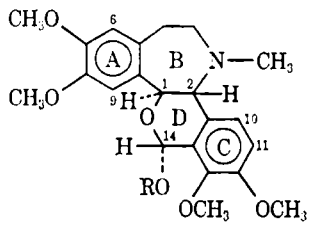
Abstract □ Dried latex of *Papaver bracteatum* was shown to contain 2.3% of alpinigenine. The structure was assigned on the basis of physical properties and spectroscopic analysis.

Keyphrases □ Alpinigenine—isolation from *Papaver bracteatum*, structure determination □ *Papaver bracteatum*—isolation of alpinigenine and its structure determination

In a continuing research program with chemotaxonomic studies of the papaver genus in Iran (1), the latex of *Papaver bracteatum*[1] was subjected to chromatographic analysis. In addition to the major alkaloid thebaine (1), another fraction was eluted, which, upon purification, was found to be alpinigenine as reported by Maturova *et al.* (2). NMR data ($J_{1,2}$ = 9 Hz.) were consistent with a *trans*-configuration of the B–D ring junction. For the elucidation of the stereochemistry at C_{14}, the alkaloid was treated with a methanolic solution of hydrochloric acid and two fractions were isolated by TLC. The slow moving fraction (R_f 0.68) was unchanged alpinigenine. The fast moving fraction (R_f 0.81) was shown to be epialpinine, previously reported by Maturova *et al.* (3) and Shamma *et al.* (4). These data prove that the alpinigenine separated in this work was not changed at C_{14} under equilibrating conditions and had the most stable configuration at C_{14} (Structure I). Similar results were indicated by Mann *et al.* (5).



I

alpinigenine: R = H
epialpinine: R = CH_3

EXPERIMENTAL[2]

Isolation of Alpinigenine—Dried latex (10 g.), obtained by incision of immature capsules of the plant, was treated with dilute ammonia to obtain a soft paste and extracted by trituration with chloroform (150 ml.). The extract was filtered and evaporated under reduced pressure, and the residue was treated with oxalic acid solution (4%, 50 ml.), filtered, and washed with water (20 ml.). The combined aqueous solutions were made alkaline with ammonia and extracted with chloroform (4 × 25 ml.). The organic layer was dried (sodium sulfate), filtered, and evaporated. The residue was subjected to TLC (silica gel), using acetone–chloroform–triethylamine–methanol (4:3:2:1) as eluting solvent. The fast moving fraction (R_f 0.9), after crystallization from methanol, gave 0.23 g. of alpinigenine, m.p. 185–186° [lit. (3) m.p. 193–195°]; UV_{max} 230 (log ε 4.2) and 284 (log ε 3.8) nm.; NMR: δ 7.35 (q, 2H, H_{10} and H_{11}), 6.95 and 6.67 (2s, 2H, H_6 and H_9), 6.4 (s, 1H, H_{14}), 5.8 (d, 1H, H_1, $J_{1,2}$ = 9 Hz.), 4.08 (d, 1H, H_2, $J_{1,2}$ = 9 Hz.), 3.95 and 3.86 (2s, 12H, OCH_3), 3.7–3 (m, 4H, aliphatic), and 2.34 (s, 3H, NCH_3) p.p.m.; mass spectrum: *m/e* 401 (M^+), 222 (base peak), 208, and 179 (large abundance of ions). The slow moving fraction (R_f 0.83) gave, on crystallization from aqueous ethanol, thebaine (2.8 g.), m.p. 198° [lit. (1) m.p. 198°].

Stereochemistry of Alpinigenine at C_{14}—The isolated alpinigenine (100 mg.) was dissolved in methanol (20 ml.), and a saturated methanolic solution of hydrochloric acid (2 ml.) was added. After standing for 2 hr. at room temperature, the solvent was evaporated and the residue was made alkaline with ammonia and extracted with chloroform. The organic layer was evaporated and the residue was subjected to TLC (silica gel), using ether (saturated with water)–acetone–diethylamine (85:8:7). The fast moving fraction (R_f 0.81, m.p. 56–58°) could not be crystallized. Its IR spectrum in chloroform solution, as well as other spectral data, was identical with those reported for epialpinine. The slow moving fraction (R_f 0.68) was unchanged alpinigenine.

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[1] The plant was identified by A. Zargari, Professor of Botany, Tehran University. A herbarium sample of the plant material has been deposited in the Missouri Botanical Garden, St. Louis, Mo.

[2] Melting points were taken on a Kofler hot-stage microscope and are uncorrected. UV spectra were recorded on a Unicam SP 800 instrument. IR spectra were obtained with a Leitz model III spectrograph. NMR spectra were determined in deuteriochloroform with a Varian A60A instrument. Mass spectra were determined with a Varian Mat 111 instrument.