

SUBSTANCES FROM THE PLANTS OF THE SUBFAMILY *Wurmbaeoideae*  
AND THEIR DERIVATIVES. LXXVII.\*

BECHUANINE — AN ENANTIOMER OF FLORAMULTINE

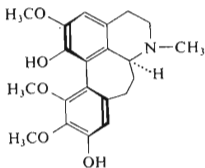
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It has been established that the previously isolated alkaloid bechuanine is an enantiomer of the homoaporphine alkaloid (*R*)-floramultine.

In 1964, one of us<sup>1</sup> reported the isolation of the alkaloid bechuanine from the Indian plants *Iphigenia bechuanica* BAK., *I. indica* A. GRAY, and *I. pallida* BAK. A revision<sup>2</sup> of the so far isolated alkaloids from the plants of the subfamily *Wurmbaeoideae* showed that the empirical formula and the melting point of the alkaloid bechuanine are identical with those of floramultine which was isolated<sup>3</sup> from *Kreysigia multiflora* REICH. This plant also contains<sup>4,5</sup> alkaloids of the colchicine type. The optical rotatory value of (*R*)-floramultine is, however, opposite to that of bechuanine. For comparison, floramultine was studied by UV, IR, and CD spectroscopy and subjected to thin-layer chromatography on silica gel and paper chromatography. The data obtained were compared with those of bechuanine. Under comparable conditions, the alkaloids bechuanine and floramultine are melting at 230–235°C (decomp.). The infrared spectra (in KBr) of these two substances\*\* and the  $R_F$ -values (thin-layer chromatography and paper chromatography with different solvent systems<sup>6</sup>) are identical. From these facts, it is concluded that bechuanine (*I*) is an enan-



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\*\* For the UV and IR curves (in nujol) of floramultine see<sup>7</sup>, for the IR curve of bechuanine (in chloroform) see<sup>1</sup>.

tiomer of (*R*)-floramultine whose structure<sup>5</sup> and absolute configuration<sup>8</sup> have already been elucidated. Consequently, the denomination bechuanine should be discarded from relevant literature.

From the three studied plants of the genus *Iphigenia*, colchicine derivatives having an (*S*)-configuration could be isolated. The isolated enantiomer of floramultine has an (*S*)-configuration. Since the derivatives of (*S*)-colchicine arise from (*R*)-autumnaline, it appears that the plants produce two isomers of autumnaline. The isomer *R* is used for the synthesis of the above mentioned colchicine and the isomer *S* for the synthesis of minor alkaloids such as (*S*)-floramultine (bechuanine) (*I*).

## EXPERIMENTAL

The melting points have been determined on the Kofler block and are uncorrected. The ultraviolet spectra were measured on a Unicam SP.700 in 95% ethanol, the infrared spectra in KBr discs on an Infracscan H-900, and the optical rotatory values on a Hilger & Watts polarimeter. The CD curves were recorded in ethanol on a Roussel-Jouan dichrograph (Model 185) at 20°C in cells of 0.01 to 1.00 cm thickness (concentration c. 1 mg/5 ml).

(*S*)-Floramultine (bechuanine):  $C_{21}H_{25}NO_5$ , m.p. 232–235°C (decomp.) (ethyl acetate, acetone);  $[\alpha]_D^{22} +76^\circ \pm 3^\circ$  (c 0.788 in chloroform); UV:  $\lambda_{max}$  218, 260 and 291 nm (log  $\epsilon$  4.60, 4.11 and 3.71),  $\lambda_{min}$  249 and 283 nm (log  $\epsilon$  4.02 and 3.72); CD:  $\lambda_{max}$  294 sh, 257 and 210 nm ( $\Delta\epsilon$  -0.46, -16.50 and +27).

(*R*)-Floramultine:  $C_{21}H_{25}NO_5$ , m.p. 230°C (decomp.)<sup>3</sup>;  $[\alpha]_D^{18} -97^\circ$  (in ethanol)<sup>5</sup>, -77°C (c 1.19 in chloroform)<sup>3,5</sup>; UV:  $\lambda_{max}$  218, 260 and 291 nm (log  $\epsilon$  4.60, 4.10, and 3.71),  $\lambda_{min}$  247 and 283 nm (log  $\epsilon$  3.97 and 3.70); CD:  $\lambda_{max}$  294 sh, 257 and 210 nm ( $\Delta\epsilon$  +0.48, +15.88 and -25).

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