

### Studies in Medicinal Plants. Part III. Protoberberine Alkaloids from the Roots of *Cissampelos pareira* Linn.<sup>1</sup>

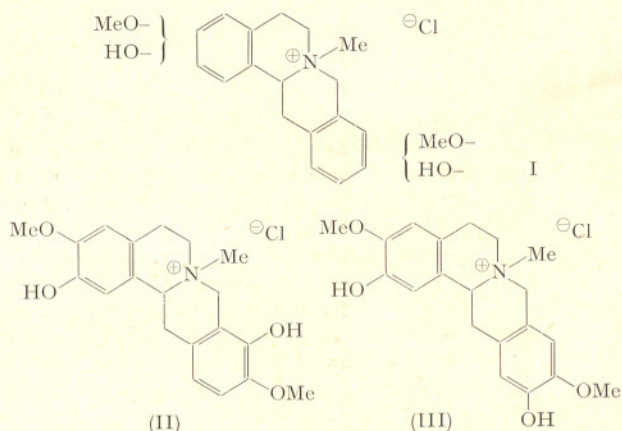
Our interest in the alkaloids from the roots of *Cissampelos pareira* Linn.<sup>2-5</sup> led us to the examination of its water-soluble quaternary bases previously isolated by two of us<sup>5</sup>. In the present communication only the essential data required to establish the constitution of Cissamine – the major quaternary alkaloid present in the roots of the plant – are reported.

Cissamine chloride has m.p. 215–220°,  $[\alpha]_D^{26} - 129^\circ$  ( $c = 1.00$ ; MeOH). Its mass-spectrum revealed that the previous formula<sup>5</sup> was untenable; this has now been revised to  $C_{20}H_{24}NO_4Cl$ . Its UV-absorption at  $\lambda_{max}^{EtOH}$  212, 235 and 285 nm ( $\log \epsilon$  4.51, 4.10 and 3.94 respectively) corresponds to a tetrahydroberberine structure and the phenolic nature was shown by the spectral change in alkali to 218 nm ( $\log \epsilon$  4.52) 253 nm ( $\log \epsilon$  4.15) and 302 nm ( $\log \epsilon$  4.04). The IR-spectrum supported the presence of phenolic hydroxyl group(s) ( $3509^{-1}$  cm).

The NMR-spectrum taken in  $D_2O$  on a Varian A-60 machine showed signals for 4 aromatic protons (3.02 to 3.15  $\tau$ ), 1  $>N^+-Me$  (6.75  $\tau$ ) and 2 aromatic OMe groups (6.18  $\tau$ , 6.24  $\tau$ ). There were 6 protons in the region 6.4–7.0  $\tau$  and 3 at  $\tau$  5.45.

A clue to the structure of cissamine chloride was provided by degradation studies. A double Hofmann degradation of the base chloride yielded a compound, m.p. 152–153° which contained 1  $NMe_2$  and 2 OMe groups. This, in conjunction with the foregoing data indicated that the N in this compound was in an environment as in tetrahydro-palmatine and the partial structure of cissamine chloride could thus be written as (I). This was confirmed by the mass-spectrum of the quaternary base which showed the base peak at  $m/e$  341 corresponding to the fragment M-HX ( $X = Cl$ )<sup>6</sup>. This narrowed the assignment of the structure of cissamine chloride to (II) and (III). The fixation of the positions of the 2 hydroxyls and 2 methoxyls in the 2 aromatic rings in these structures follows mainly biogenetic grounds.

A compound with the structure (II), named cyclanoline had recently been isolated from *Stephania tetrandra* by TOMITA et al.<sup>7</sup>. A comparison of cissamine chloride with cyclanoline chloride (m.p., thin-layer chromatography, optical rotation and IR-spectrum) showed that the 2 compounds were, indeed, identical<sup>8</sup>. Structure II for cissamine chloride is thus confirmed.



**Zusammenfassung.** Cissaminechlorid aus den Wurzeln von *Cissampelos pareira* Linn. ist als Protoberberin-Alkaloid erkannt und mit Cyclanolinechlorid aus *Stephania tetrandra* identifiziert worden.

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- 1 Communication No. 1270 from the Central Drug Research Institute, Lucknow (India).
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- 8 The authors thank professor M. TOMITA for kindly supplying the sample of cyclanoline chloride and Dr. A. K. BHATNAGAR for assistance in the early stages of the work.