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# THE ALKALOIDS OF THE FRUITS OF *ALSTONIA VENENATA* R.Br.

## ECHITOVENIDINE and (+)-MINOVINCININE

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In continuation of our studies on the alkaloids[2] of the bark of *Alstonia venenata* R. Br. we would now like to report the results of further investigation on this plant. From the fruits we have isolated two new indole alkaloids and their structure is the subject of this communication.

One of these, named echitovenidine, m. p. 162-163°, $[\alpha]_D$ - 580° ($CHCl_3$) exhibited the ultraviolet spectrum : $\lambda_{max}^{EtOH}$ 219 (26,300) ; 302 (13,560) and 327 mμ (18,900) indicating the presence of chromophore I as in vincadifformine[3] (IIa) and echitovenine[2] (IIb).

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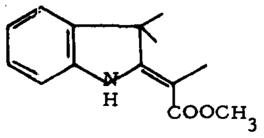
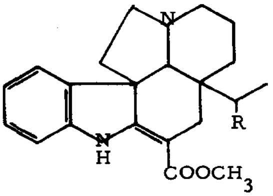
[2] B. Das, K. Biemann, (Mrs.) A. Chatterjee, A. B. Ray and P. L. Majumder, *Tetrahedron Letters*, 2239 (1965).

[3] M. Plat, J. Le Men, M.-M. Janot, H. Budzikiewicz, J. M. Wilson, L. J. Durham and C. Djerassi, *Bull. Soc. Chim. France*, 2237 (1962).



(I)



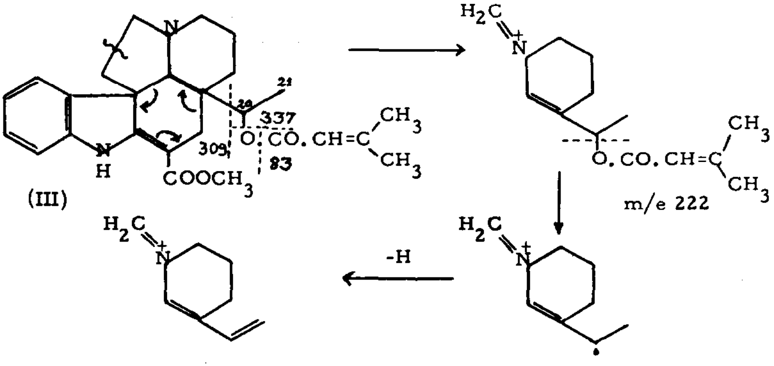
(II)

(a) R = H

(b) R = $CH_3COO$

(c) R = OH

The infrared spectrum showed bands at 3390, 1705, 1683, 1665, 1620, 1245 $cm^{-1}$ and the mass spectrum indicated a molecular weight of 436 in agreement with an empirical formula $C_{26}H_{32}N_2O_4$. The most abundant ion fragment in the mass spectrum of echitovenidine was found at m/e 222. This, considered along with the peaks at m/e 122, 123, 309 [M-127(99+28)] and 337 (M-99) indicated a vincadifformine like structure for echitovenidine with a substituent of composition $C_5H_7O_2$ (99 mass units) at $C_{20}$ or $C_{21}$ as shown in (III). The presence of a peak at m/e 83 ($C_5H_7O$) [99-16] suggested that this substituent represents an ester group (also evident from the I.R. spectrum).

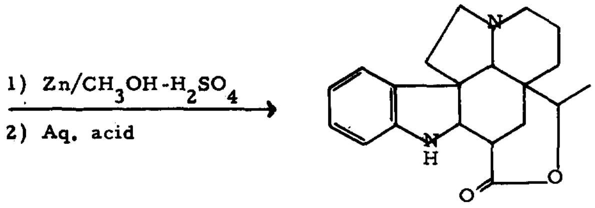


Echitovenidine, when subjected to reduction with zinc and 10% methanolic sulfuric acid followed by heating with aqueous acid gave a product (IIIa) (mol. wt. 324) the mass spectrum (peaks at m/e 253, 194, 123, 122) of which was identical with that of the product obtained from echitovenine (IIb)[2] on similar treatment. Thus the substituent $C_5H_7O_2$ must be attached, probably to $C_{20}$, through an ester linkage. The exact nature of this substituent was deduced from the NMR spectrum of echitovenidine which exhibited signals clearly indicating the presence of the following groups : (i) $CH_3CH\text{-}O\text{-}$ : doublet around $\delta = 0.95$ (3H), and quartet around $\delta = 4.85$ (1H) ; (ii) $(CH_3)_2C{=}CH\text{-}$: $\delta = 1.74$ (3H), $\delta = 2.05$ (3H) and $\delta = 5.14$ (1H) ; (iii) one $\text{-}OCH_3$ : at $\delta = 3.76$ (3H) ; (iv) indole NH : at $\delta = 9.62$ p.p.m. (1H) and the expected signals for the aromatic protons. Further confirmation of the nature of the substituent at $C_{20}$ was obtained by the isolation of ββ-dimethyl-acrylic acid (identified by mixed melting point determination with an authentic sample) upon hydrolysis of echitovenidine with aqueous acid.

The above results therefore lead to structure (III) for echitovenidine.

The second alkaloid, isolated as an amorphous solid from the fruits of <u>A. venenata</u>, exhibited a positive optical rotation, $[\alpha]_D + 338°$ ($CHCl_3$), + 441° (EtOH) and the u.v. spectrum, $\lambda_{max}^{EtOH}$ 227 (12,000), 299 (11,100) and 329 mμ (16,900) was typical of chromophore I. The mass spectrum gave the molecular ion peak at m/e 354 (mol. formula $C_{21}H_{26}N_2O_3$) and the base peak was observed at m/e 140. Reduction with zinc and methanolic sulfuric acid followed by aqueous acid treatment (as in echitovenidine) gave a product (M=324) the mass spectrum of which was identical with that of (III a) and was discussed previously[2].

(III)



(III a)

These results would indicate structure (II c) for this alkaloid. This was suggested for minovincinine[3] from which it differs however by the direction of its optical rotation. Thus, this new alkaloid should be an optical antipode of minovincinine and is therefore named (+)-minovincinine.

Treatment of (+)-minovincinine with acetic anhydride-pyridine gave an O-acetyl derivative, m. p. 170-172°, $[\alpha]_D$+ 690° (CHCl$_3$).

Identity of the latter with echitovenine (II b) was established by comparison of their u. v., i. r. and mass spectra, $R_f$ values on TLC plate as well as by mixed melting point determination.

The high negative optical rotation of echitovenine is surprising in view of the positive rotation of similar magnitude of both (+)-minovincinine and echitovenine[2] as it implies the co-occurrence in the same plant of alkaloids possessing the same skeleton but opposite signs of rotation.