8H), 1.96 (*d*, H, $J=2.5$ Hz, C-8H), 2.33 (*m*, H, $J=2$, 7 Hz, C-9H), 2.91 (*m*, H, $J=1.2$, 2.5 Hz, C-7H), 3.01 (*m*, 2H, $J=12$ Hz, C-11H and C-13H), 3.06 (*dd*, H, $J=2.5$, 12 Hz, C-11H), 3.11 (*dd*, H, $J=2$, 12 Hz, C-12H), 3.90 (*qd*, H, $J=1.5$, 7, 15, C-10H), 4.13 (*d*, H, $J=15$ Hz, C-10H), 6.00 (*dd*, H, $J=1.2$, 7 Hz, C-5H), 6.45 (*dd*, H, $J=1.5$, 9 Hz, C-3H), 7.30 (*q*, H, $J=7$, 9 Hz, C-4H). *Dns-cytisine*. 1.79 (*br d*, H, C-8H), 1.83 (*br d*, H, C-8H), 2.45 (*br s*, H, C-9H), 2.79 [s, 6H, $N(Me)_2$ of dns], 2.92 (*br s*, H, C-7H), 2.98 (*d*, 2H, C-11H), 3.50 (*dd*, H, C-11H), 3.66 (*d*, H, C-10H), 3.71 (*d*, H, C-10H), 3.74 (*t*, H, C-13H), 5.65 (*d*, H, C-5H), 6.10 (*d*, H, C-3H), 6.89 (*q*, H, C-4H), 7.06 (*d*, H, $J=8$ Hz), 7.33 (*t*, H, $J=8$, 8.5 Hz), 7.40 (*t*, H, $J=8.5$ Hz), 7.76 (*d*, H, $J=8.5$), 8.09 (*d*, H, $J=8$ Hz), 8.44 (*d*, H, $J=8.5$); protons in 7.06–8.44 region are from the $C_{10}H_6$ of dns; additional J values are shown in Fig. 1. *Didns-3-hydroxy-11-norcytisine*. 1.90 (*d*, H, C-8H), 2.08 (*m*, H, C-8H), 2.85 [*s*, 6H, $N(Me)_2$ of dns], 2.91 [*s*, 6H, $N(Me)_2$ of 2nd dns], 2.97 (*m*, H, C-9H), 3.25 (*d*, H, C-10H), 3.65 (*q*, H, C-10H), 3.85 (*dd*, H, C-12H), 3.89 (*d*, H, C-12H), 4.83 (*d*, H, C-7H), 5.54 (*d*, H, C-5H), 6.87 (*d*, H, C-4H), 7.13 (*d*, H, $J=7.5$ Hz), 7.23 (*d*, H, $J=7.5$ Hz), 7.41 (*t*, H, $J=7.5$ Hz), 7.50 (*t*, H, $J=7.5$ Hz), 7.52 (*t*, H, $J=8$ Hz), 7.65 (*t*, H, $J=8$ Hz), 8.08 (*d*, H, $J=8.5$ Hz), 8.19 (*dd*, H, $J=1$, 7.5 Hz), 8.26 (*dd*, H, $J=17.5$ Hz), 8.52 (*d*, H, $J=7.5$ Hz), 8.55 (*d*, H, $J=7.5$ Hz), 8.63 (*d*, H, $J=8$ Hz); protons in the 7.13–8.63 region are from the $C_{10}H_6$s of 2 dns; additional J values are shown in Fig. 1.

EIMS. *Dns-cytisine*: *m/z*, (rel. int.); 424 $[M+1]^+$ (17), 423 $[M]^+$ (75), 408 $[M-Me]^+$ (18), 191 $[M-dns+2H]^+$ (27), 190 $[M-dns+H]^+$ (8), 189 $[M-dns]^+$ (36), 171 $[C_{12}H_{12}N+H]^+$ (52), 170 $[C_{12}H_{12}N^+$ fm. dns] (37), 169 $[C_{12}H_{11}N]^+$ (29), 155 $[C_{11}H_9N$ fm. dns$]^+$ (14), 154 $[C_{11}H_8N]^+$ (15), 147 [cytisine residue $-C_2H_4N]^+$ (20), 146 [cytisine residue $-C_2H_5N]^+$ (39), 128 $[C_{10}H_6+2H]^+$ (12), 127 $[C_{10}H_6+H]^+$ (14). *Didns-3-hydroxy-11-norcytisine*: *m/z*. (rel. int.); 658 $[M]^+$ (0.3), 426 $[M-dns+2H]^+$ (1.0), 425 $[M-dns+H]^+$ (3.6), 424 $[M-dns]^+$ (1.6), 191 $[M-2dns+H]^+$ (1.4), 171 $[C_{12}H_{12}N+H]^+$ (10.5), 170 $[C_{12}H_{12}N$ fm. dns$]^+$ (9.8), 169 $[C_{12}H_{11}N]^+$ (4.2), 155 $[C_{11}H_9N$ fm. dns$]^+$ (2.2), 154 $[C_{11}H_8N]^+$ (3.1), 128 $[C_{10}H_6+2H]^+$ (1.9), 127 $[C_{10}H_6+H]^+$ (2.5), 126 $[C_{10}H_6$ fm. dns$]^+$ (1.1).

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(+)-*N*-METHYLTILIAMOSINE, AN ALKALOID FROM *TILIACORA RACEMOSA*

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Key Word Index—*Tiliacora racemosa*; Menispermaceae; leaves; new diphenylbisbenzylisoquinoline alkaloid; *N*-methyltiliamosine.

Abstract—The leaves of *Tiliacora racemosa* yielded *N*-methyltiliamosine, a new diphenylbisbenzylisoquinoline alkaloid whose constitution was established from spectral as well as synthetic methods.

INTRODUCTION

The presence of *N*-methyltiliamosine in the leaves of *Tiliacora racemosa* was indicated earlier [1]. Evidence in support of the identification of this alkaloid are now presented in this communication.

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RESULTS AND DISCUSSIONS

The alkaloid, $C_{37}H_{38}N_2O_6$ ($[M]^+$ *m/z* 606), $[\alpha]_D^{25°}$ $+510°$ (*c* 1.5, $CHCl_3$), was isolated in low yield by prep. TLC. The UV [λ_{max}^{EtOH} 240 sh (log ε 4.65), 291 nm (log ε 4.0); $\lambda_{max}^{EtOH-0.1\ N\ NaOH}$ 304 nm (log ε 3.84)], IR [ν_{max}^{KBr} 3375 (hydrogen bonded OH)], 400 MHz ^{1}H NMR (Table 1) and mass [*m/z* 606, 607, 605, 591, 380, 379, 366, 365, 349, 303, 190] spectra were comparable to tiliamosine (**1**) [2]

Table 1. 400 MHz ^{1}H NMR spectroscopic signals of *N*-methyltiliamosine in $CDCl_3$–CD_3OD

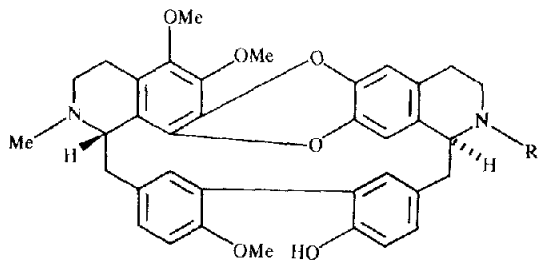
Chemical shift (δ)	Number of protons	Multiplicity	Probable assignments
2.20	3	*s*	MeN-2
2.51	3	*s*	MeN-2′
2.37	1	*dd* (J = 4.5, 17.5 Hz)	H_a-α
2.63	1	*dd* (J = 12, 17.5 Hz)	H_b-α
3.20	1	*dd* (J = 5, 13 Hz)	H-1
2.60	1	*dd* (J = 7, 12 Hz)	H_b-3
2.66	1	*dd* (J = 6, 12 Hz)	H_a-3
3.35	1	*dd* (J = 7.5, 6.5 Hz)	H-1′
3.25	1	*m*	H_b-α′
2.83–2.91	3	*m*	H_a-4′/H_b-3′/H_a-α′
3.0	1	octet	H_a-3′
2.72–2.74	2	*m*	H_a-4/H_b-4
2.47	1	*br dd* (J = 17.6, 4.5 Hz)	H_b-4′
3.72	3	*s*	OMe-5
3.82	3	*s*	OMe-6
3.89	3	*s*	OMe-12
6.54	1	*s*	H-5′
7.99	1	*s*	H-8′
6.88	1	*d* (J_o = 8.3 Hz)	H-13
6.91	1	*d* (J_o = 8.1 Hz)	H-13′
7.17	1	*dd* (J_o = 8.3 Hz, J_m = 2.2 Hz)	H-14′
7.27	1	*dd* (J_o = 8.3 Hz, J_m = 2.2 Hz)	H-14
7.50	1	*d* (J_m = 1.96 Hz)	H-10′
7.59	1	*d* (J_m = 2.2 Hz)	H-10

and could well be the corresponding *N*-2′-methyl derivative (**2**). This structure was supported from 2D, ^{13}C NMR analyses and NOED studies, detailed elsewhere, and finally settled by its identity with the synthetic product obtained from pure tiliamosine on treatment with formaldehyde and sodium borohydride.

EXPERIMENTAL

Mps: uncorr. IR, UV, ^{1}H NMR spectra were recorded in KBr, EtOH, and $CDCl_3$ CD_3OD with TMS int. std, respectively. Non-aq. solvents were routinely dried over Na_2SO_4 before use. Silica gel G (E.M.) plates were used for TLC with Dragendorff's reagent as spray reagent.

Isolation of N-*methyltiliamosine.* Finely ground air-dried leaves (2 kg) of *T. racemosa* Colebr. (kindly identified and specimen preserved by Dr S. R. Das, Plant Survey Officer, Regional Research Institute, CCRAS, Calcutta 700009), collected from the campus of the S.S.K.M. Hospital, Calcutta, in the summer, was first extd in a Soxhlet with petrol (bp 60–80°) for 24 hr and then percolated with EtOH–HOAc (19 : 1) for 21 days. This latter extract on concn under red. pres. mixing with HOAc (5%), washing with different solvents, basification (NH_4OH) and extn ($CHCl_3$) yielded a fraction containing mixt. of alkaloids which was dissolved in $CHCl_3$ and extracted with NaOH (5%) to remove phenolic bases. The $CHCl_3$-soluble part was washed with H_2O and extracted with 2 M HCl, basified (NH_4Cl–NH_4OH, pH 8) and extd into C_6H_6 which on concn and TLC [$CHCl_3$–MeOH (24 : 1)] showed two distinct spots; the lower R_f value compound was removed to obtain pure tiliamosine. The higher R_f value spot on TLC in C_6H_6–MeOH (8 : 1), further resolved into two spots; the top one yield *N*-methyltiliamosine (0.01 g).



1 R = H
2 R = Me

Preparation of N-*methyltiliamosine.* To a soln of tiliamosine (0.015 g) in MeOH (20 ml) was added formalin (37% CH_2O) (3 ml) dropwise with stirring. After stirring for an additional 50 min, the resulting soln was cooled to 0°, $NaBH_4$ (0.06 g) was added slowly and stirring continued for another 50 min at room temp. The soln was then evapd to dryness and the residue dissolved in 1 M HCl (20 ml) and washed with $CHCl_3$ (3 × 20 ml). The acidic layer was sepd, basified (NH_4OH, pH 9) and extracted with $CHCl_3$ (4 × 20 ml). The $CHCl_3$ extracts were dried and the solvent removed. Subsequent prep. TLC afforded a homogenous (TLC) solid (0.007 g). This was found to be identical with natural *N*-methyltiliamosine in all respects.

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