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APORPHINE ALKALOIDS OF *LITSEA SEBIFERA*, *L. WIGHTIANA* AND *ACTINODAPHNE OBOVATA**

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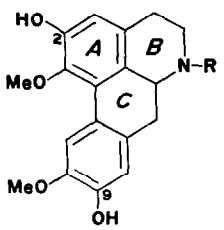
Key Word Index—*Litsea sebifera*; *Litsea wightiana*; *Actinodaphne obovata*; Lauraceae; boldine; norboldine; actinodaphnine; laurotetanine; *N*-methyllaurotetanine.

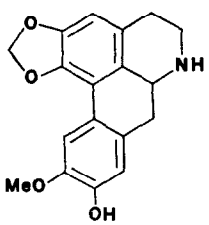
Abstract—Boldine, laurotetanine, *N*-methyllaurotetanine, and actinodaphnine from *Litsea sebifera* pers., boldine and norboldine from *L. wightiana* Hook. f. and laurotetanine, *N*- methyllaurotetanine and actinodaphnine from *Actinodaphne obovata* Bl. have been isolated.

CURRENT interest in aporphine alkaloids has been on their biosynthesis[1,2] and biological activity.[3,4] A good source of different types of these alkaloids is, therefore, important for further biosynthetic and biological studies. *Litsea sebifera* Pers. Lauraceae. *Occurrence.* Western Himalayas. *Source.* Lansdown, U.P., India.

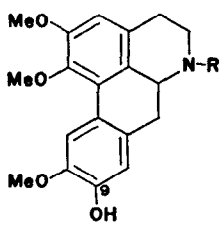
Leaves and stem. The aporphine bases boldine (I), actinodaphnine (III), laurotetanine (IV) and *N*-methyllaurotetanine (V) are found to be present in the leaves and stem of the plant.



(I) R = Me
(II) R = H



(III)



(IV) R = H
(V) R = Me

Litsea wightiana Hook. f. Lauraceae, *Occurrence.* Nilghiri and Travancore hills 6000–8000 ft. *Source.* Ooty, Tamil Nadu, India.

Stem bark: The aporphines boldine and norboldine (II) were isolated from the alkaloidal mixture of the stem bark of the plant.

Actinodaphne obovata Bl. *Occurrence.* Eastern Himalayas and Assam 1000–3000 ft. *Source.* Sibsagar, Assam, India.

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[2] G. BLASCHKE, *Arch. Pharm.* **301,** 432 (1968); *idem. ibid.* **303,** 358 (1970).
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Leaves and stem. The aporphines laurotetanine, *N*-methyllaurotetanine and actinodaphnine are found to occur in the leaves and stem of the plant. The aporphine alkaloids reported above were isolated from the basic fraction of the ethanolic extractive of the plant material. The alkaloidal mixtures are resolved by chromatography on neutral Al_2O_3, SiO_2 and preparative TLC.

TABLE 1. NMR (τ) DATA ON APORPHINES

No.	Alkaloids	6	1	2	9	10	H_3	H_8	H_{11}
1	II	—	6·22	—	—	6·03	3·39	3·02	1·80
2	III*	—	6·64	—	—	6·38	3·48	3·39	2·37
3	I	—	6·39	—	—	6·09	3·40	3·10	2·02
4	IV	—	6·32	6·05	—	6·02	3·38	3·00	2·20
5	V	7·48	6·39	6·15	—	6·11	3·43	3·19	2·00

* Spectrum in TFA. Aliphatic protons attached to ring *B* and *C* gave complex pattern between τ 6·2 and 7·8.

NMR and MS data of the isolated bases are recorded in Tables 1 and 2 respectively. The relative positions of the hydroxyl and methoxyl groups in these bases are established by base catalysed exchange experiments.[5] The norbases are converted into the corresponding *N*-methyl derivatives by treatment with HCHO followed by $NaBH_4$[6] and *O*-methyl derivatives are prepared by treating the bases in a MeOH with ethereal CH_2N_2.

TABLE 2. MASS SPECTRA DATA ON APORPHINES

Alkaloids		M^+	M^{2+}	M−1	M−15	M−17	M−29	M−31	M−43	M−58	M−74
I	($C_{19}H_{21}O_4N$)	327	163·5	326	312	310	—	296	284	269	253
II	($C_{18}H_{19}O_4N$)	313	156·5	312	298	296	384	282	—	255	239
III	($C_{18}H_{17}O_4N$)	311	155·5	310	296	294	—	M−30 281	—	253	237
IV	($C_{19}H_{21}O_4N$)	327	163·5	326	312	310	298	296	—	269	253
V	($C_{20}H_{23}O_4N$)	341	170·5	340	326	324	—	310	298	283	267

EXPERIMENTAL

IR, UV and 60 Mcs NMR spectra were recorded in KBr, EtOH and $CDCl_3$ respectively with TMS as internal standard. Silica gel-G was used for TLC, with $CHCl_3$–MeOH (19:1) and (9:1) and C_6H_6–Et_2NH–EtOAc (7:1:2).

Isolation of bases. Air dried plant materials were extracted with EtOH. The solvent was removed and the residues were extracted with 5% HCl. The acidic solutions were defatted with light petroleum, basified with Na_2CO_3 and the liberated bases extracted with $CHCl_3$, washed (H_2O), dried and the solvent removed to give the alkaloidal mixtures.

Litsea sebifera. The alkaloidal mixture (2·8 g) was chromatographed on neutral Al_2O_3 (100 g). The column was eluted successively with C_6H_6, C_6H_6–$CHCl_3$ (1:1), $CHCl_3$, $CHCl_3$–MeOH (99:1), (49:1), (19:1), (10:1) and followed by TLC.

Boldine. The $CHCl_3$ and $CHCl_3$–MeOH (99:2) eluates yielded boldine (120 mg), m.p. 160–161°; $[\alpha]_D$ 106° ($CHCl_3$). UV λ_{max} 220, 282 and 304 nm. The base in MeOH (3 ml) was treated with CH_2N_2 to give glaucine m.p. 117°; λ_{max} 218, 282 and 304 nm. A mixture of base (80 mg), K-*t*-butoxide (100 mg) and

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D_2O (0·5 ml) were heated in a sealed tube at 100° under N_2 for 100 hr. The resulting mixture was worked up as usual. The NMR spectrum of the deuterated compound was identical with that of boldine except that the signals for aromatic protons at position-3 and 8 had almost disappeared. The identity of the base with boldine was established by comparison with an authentic sample (m.p., m.m.p., IR, UV and TLC).

N-*Methyllaurotetanine*. The $CHCl_3$–MeOH (49:1) eluate afforded the base (100 mg). It was homogenous on TLC but could not be crystallised, λ_{max} 215, 283 and 304 nm, Base, HBr, m.p. 220–222°. The base in MeOH (2 ml) was treated with CH_2N_2 to give glaucine, m.p. 118°. The NMR of the deuterated compound was identical with that of the parent base except the signal at τ 3·19 for an aromatic proton at position-8 which had considerably reduced in intensity (85%). The identity of the base with *N*-methyllaurotetanine was confirmed by comparison with an authentic sample (TLC, IR, NMR and MS).

Laurotetanine. The $CHCl_3$–MeOH (19:1) eluate gave the base (110 mg), as an amorphous powder which was homogenous on TLC, λ_{max} 220, 281 and 305 nm. A mixture of the base (80 mg), MeOH (20 ml) and HCHO (2 ml) was treated with $NaBH_4$. The resulting mixture was worked up to give *N*-methyllaurotetanine (TLC, IR, NMR and MS).

Actinodaphnine. The $CHCl_3$-MeOH (19:1) eluate when further subjected to preparative TLC (SiO_2) gave the base (96 mg) m.p. 204–206°. $[\alpha]_D$ +28° ($CHCl_3$); λ_{max} 221, 285 and 308 nm. The base was treated with HCHO and (HCOOH) to give *N*-methyllaurotetanine (TLC, UV, NMR and MS).

L. wightiana. The alkaloidal mixture was chromatographed on neutral Al_2O_3. Elution with $CHCl_3$–MeOH (99:1) gave boldine (m.p., m.m.p., $[\alpha]_D$, IR, UV, NMR and MS). The $CHCl_3$–MeOH (19:1) eluate gave norboldine (250 mg) as an amorphous base λ_{max} 220, 284 and 308 nm°. Base picrate, m.p. 210°. Treatment of the base (80 mg) with HCHO (2 ml) and HCOOH (3 ml) yielded boldine (m.p. TLC, IR and NMR).

Actinodaphne obovata. The alkaloidal mixture was chromatographed on neutral Al_2O_3. The $CHCl_3$–MeOH (49:1) and (19:1) eluates afforded *N*-methyllaurotetanine (TLC, IR, NMR and MS) and laurotetanine (TLC, UV, IR and NMR) respectively.