# The Isolation and Structure of Papilamine, a New Alkaloid from *Buxus papilosa*

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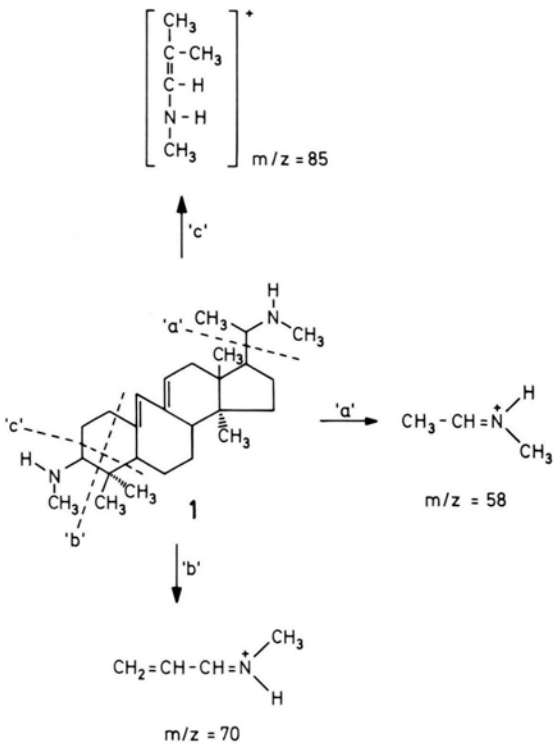
A new alkaloid, papilamine, has been isolated from the leaves of *Buxus papilosa* to which the structure **1** has been assigned on the basis of chemical and spectroscopic studies.

*Buxus papilosa* (Buxaceae) is a shrub which occurs abundantly in the northern regions of Pakistan. Extracts of *Buxus* species have been used since ancient times for the treatment of a wide variety of diseases including malaria and venereal disease. *Buxus papilosa* has found use in the indigenous system of medicine as a febrifuge, for relief of rheumatism and for the treatment of a number of other ailments. A number of alkaloids have previously been reported from this plant by others [1–5] and by us [6–11].

The crude alkaloids obtained from the alcoholic extracts of the air-dried leaves of the plant were chromatographed on a neutral alumina column. The column was successively eluted with petroleum ether (60–80), petroleum ether-chloroform, chloroform, and finally with methanol. A number of alkaloidal fractions were isolated, the "papilamine" containing fraction being obtained from elution of the column with 95% $CHCl_3$ –5% MeOH. The pure alkaloid was obtained as a white crystalline solid, m.p. 240 °C (dec), $[\alpha]_D = +23.3°$.

The infra-red spectrum showed bands at 3400 $cm^{-1}$ (N–H str.), 2940 $cm^{-1}$ (C–H str.), and 1585 $cm^{-1}$ (C=C str.). The UV spectrum showed absorption maxima at 210, 237, 245 and 254 nm, characteristic of the presence of a 9(10→19) *abeo*-diene system. An identical UV spectrum is encountered in buxamine E and buxaminol E [4]. The proton NMR spectrum ($CDCl_3$) showed four singlets, corresponding to the 4 tertiary methyl groups at $\delta$ 0.72, $\delta$ 0.97, $\delta$ 1.25 and $\delta$ 1.38. The secondary (C-21) methyl group resonated as a doublet at $\delta$ 0.97 ($J = 6.5$ Hz), while the two N-methyl groups resonated at $\delta$ 2.43 and $\delta$ 2.59 ($\delta$ 2.67 and $\delta$ 2.76 in $CD_3OD$). A singlet at $\delta$ 5.16 was assigned to the isolated olefinic proton at C-19 while a multiplet centred at $\delta$ 5.90 was assigned to the C-11 olefinic proton.

The mass spectrum of the compound afforded the molecular ion at $m/z = 384.3504$ which corresponded to the formula $C_{26}H_{44}N_2$ (calcd 384.3504). A prominent loss of 43 mass units from the molecular ion to afford a fragment ion at 341.2959 corresponding to the formula $C_{23}H_{37}N_2$ (calcd 341.2957) supported the loss of gem C-dimethyl group from ring A. The substance afforded a base peak at $m/z = 58.0065$ corresponding to the composition $C_3H_8N^+$ which suggested the loss of $CH_3CH{=}\overset{+}{N}(H){-}CH_3$ commonly encountered in alkaloids bearing a $CH(CH_3){-}NHCH_3$ grouping on ring D [3]. A peak at $m/z$ 85.0890 agreed with the composition $C_5H_{11}N$ (calcd 85.0891) assigned to it which corresponded to the cleavage of ring A with the side chain. Another peak at 69.9982 was consistent with the composition $C_4H_8N$ probably

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formed by a loss of methyl group from the peak at $m/z = 85$.

The olefinic carbon atoms could be clearly distinguished in the C-13 NMR spectrum at $\delta$ 118.28, $\delta$ 120.53, $\delta$ 140.21 and $\delta$ 141.29 which were assigned to C-11, C-19, C-10 and C-9 carbon atoms respectively. The two tertiary carbon atoms bearing the N-substituents, C-3 and C-20, were found to resonate at $\delta$ 50.46 and $\delta$ 60.37 respectively. The assignments to various carbon atoms are shown in Table I.

Acetylation of "papilamine" with acetic anhydride and pyridine afforded a diacetyl derivative which afforded a molecular ion at $m/z = 468.3702$ in agreement with the formula $C_{30}H_{48}N_2O_2$. Hydrogenation of "papilamine" over $PtO_2$ in methanol afforded two different reduction products both of which afforded molecular ions at $m/z = 386$ formed by the preferential reduction of one of the two double bonds.

In the light of the above studies, structure **1** is proposed for papilamine.

Table I*.

| Carbon | Chemical shift (ppm) | Carbon | Chemical shift (ppm) |
|---|---|---|---|
| 1 | 34.59 | 14 | 48.46 |
| 2 | 30.00 | 15 | 33.17 |
| 3 | 60.46 | 16 | 26.76 |
| 4 | 38.10 | 17 | 51.71 |
| 5 | 49.72 | 18 | 15.93 |
| 6 | 25.78 | 19 | 120.56 |
| 7 | 26.95 | 20 | 60.37 |
| 8 | 49.89 | 21 | 15.51 |
| 9 | 141.29 | 28 | 17.67 |
| 10 | 140.197 | 29 | 26.85 |
| 11 | 118.32 | 30 | 15.56 |
| 12 | 33.26 | $N_a-CH_3$ | 40.08 |
| 13 | 45.76 | $N_b-CH_3$ | 34.108 |

* The assignments could not be confirmed by off-resonance and heteronuclear spin decoupling experiments on account of paucity of material, its low solubility and tendency to decompose on standing in solution.

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