Chapter IV

Discussion

I. Discussion of the Alkaloid Structures

There is no previous report on the chemical constituents of the stem bark of *Neolitsea aureo-sericea* Kosterm. (Lauraceae). In this present work, the isolation of four isoquinoline alkaloids of aporphine, pavine, and tetrahydrobenzylisoquinoline types which were identified as isoboldine, bisnorargemonine, norcinnamolaurine and reticuline respectively. The structures of these compounds were elucidated by the ultraviolet, infrared, nuclear magnetic resonance, mass spectroscopy and comparison with the reported data in the literatures.

Isoboldine was isolated as a major alkaloid, m.p. 121-122° $[\alpha]_D^{25°C}$ +53.65 (c = 0.0233 g/ml, chloroform). The mass spectra established the formula as $C_{19}H_{21}NO_4$.

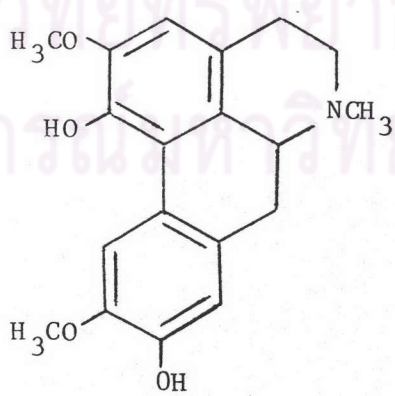


Figure 2 The structure of NA-1 as isoboldine

Ultraviolet and mass spectra show that it is aporphine alkaloid. The infrared spectrum (IR, KBr disc) showed hydroxyl group at 3180 cm^{-1} and aromatic ring at 1600 and 1510 cm^{-1}. The nuclear magnetic resonance spectrum (NMR, 60 MHz) showed the presence of N-methyl at δ 2.52, two methoxyls at δ 3.90 and aromatic protons at δ 6.52, 6.80, and 8.02 (C-3, C-8, C-11). The mass spectrum showed the base peak at m/e 326, molecular peak 327. The main fragmentation pathway for NA-1, the aporphine is outlined as follows.

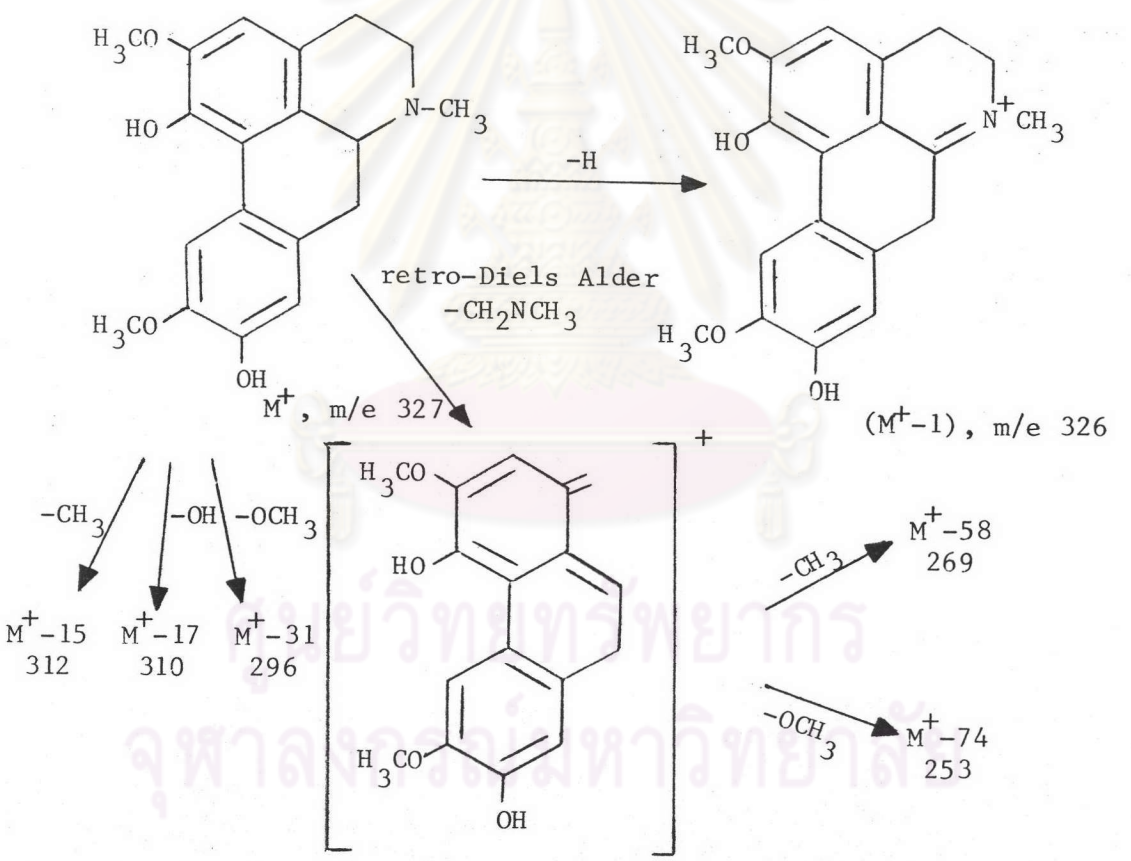


Figure 3 Fragmentation of NA-1

Bisnorargemonine (NA-2) was isolated as a minor alkaloid, m.p. 238-239°C (amorphous powder), $[\alpha]_D^{25°C}$ -214.29 (c = 0.0049 g/ml, methanol). The mass spectra established the formula as $C_{19}H_{21}NO_4$.

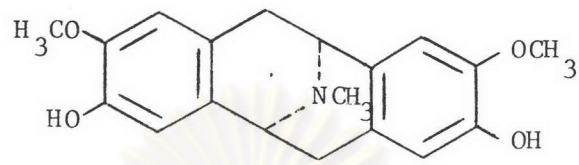
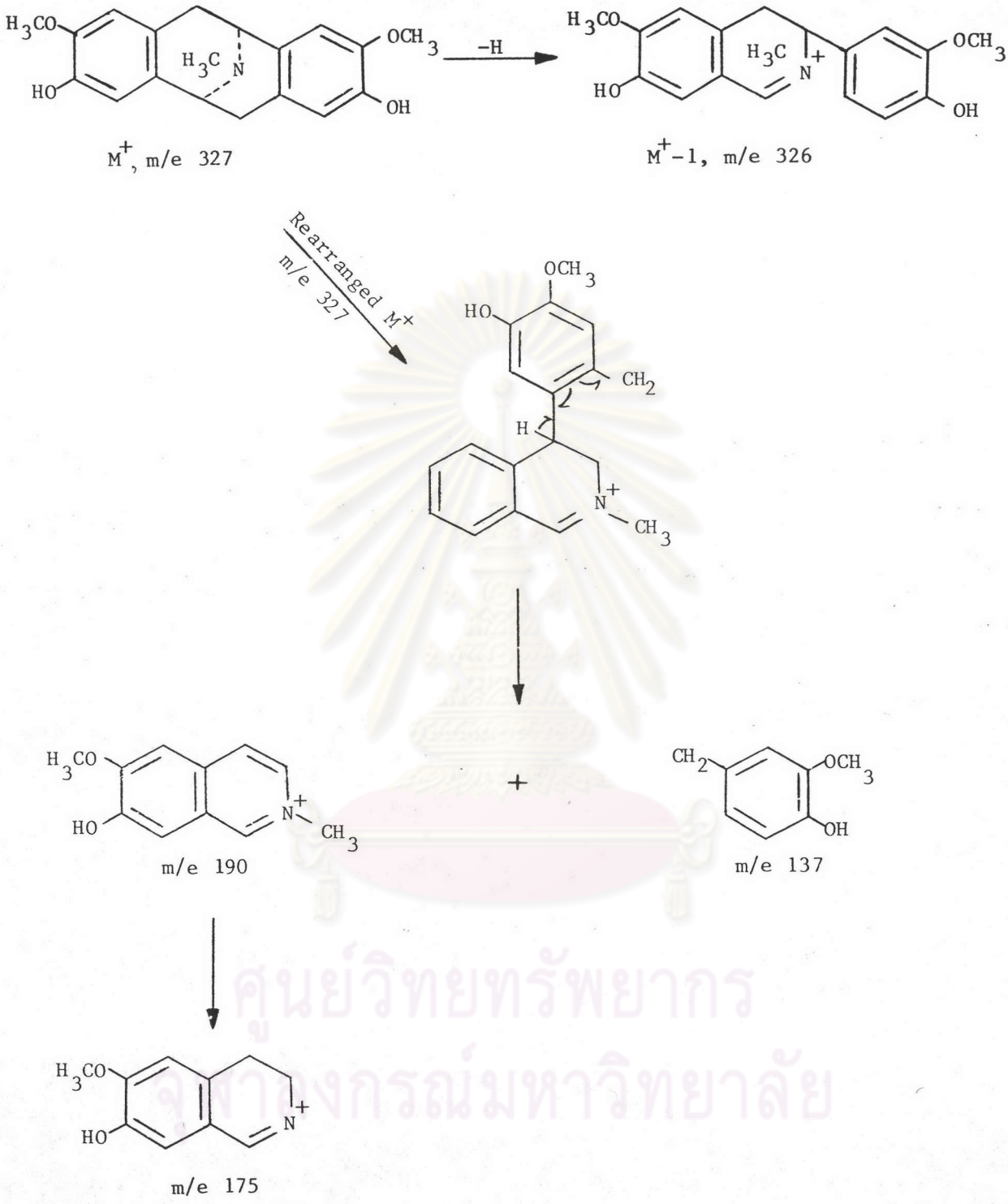


Figure 4 The structure of NA-2 as bisnorargemonine

Ultraviolet and mass spectra show that it is pavine alkaloid. The infrared spectrum (IR, KBr disc) showed hydroxyl group at 3500 cm^{-1} and aromatic ring at 1600, 1510, 760-780 cm^{-1} (ortho substituted). The nuclear magnetic resonance spectrum (NMR, 200 MHz) showed the presence of N-methyl protons at δ 2.32, two methoxyls at δ 3.63 and 3.69, four aromatic protons at δ 6.50, 6.43, 6.65, and 6.30 (C-1, C-4, C-7, and C-10). The mass spectrum showed the based peak at m/e 190, molecular peak 327. The fragmentation of NA-2 proceeds essentially by only one pathway, resulting information of the N-methylisoquinolium ion at m/e 190. Loss of the N-methyl radical from this ion gives the isoquinolium ion at m/e 175.



M+, m/e 327

M+-1, m/e 326

Figure 5 Fragmentation of NA-2

Norcinnamolaurine (NA-3) was isolated as a minor alkaloid, m.p. 196-197°C, $[\alpha]_D^{25°C}$ +90.92 (c = 0.0055 g/ml, ethanol). The mass spectra established the formula as $C_{17}H_{17}NO_3$.

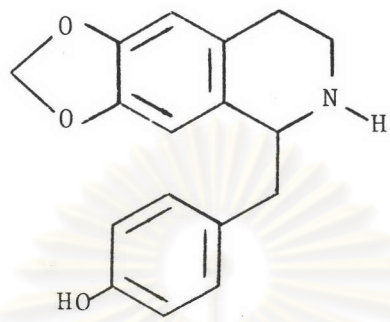


Figure 6 The structure of NA-3 as norcinnamolaurine

Ultraviolet and mass spectra show that it is tetrahydro-benzylisoquinoline alkaloid. The infrared spectrum (IR, KBr disc) showed amine at 3410 cm^{-1} and aromatic ring at 1600, 1460 cm^{-1}. The nuclear magnetic resonance spectrum (NMR, 200 MHz) showed the presence of a methylene dioxy group at δ 5.9, two aromatic protons at δ 6.79 and 6.59 (C-5, C-8 of ring A), and four peaks of aromatic protons at δ 6.67, 7.04 (C-2', C-3', C-5', C-6' of ring B). The mass spectrum showed the base peak at m/e 176, molecular peak at m/e 283. The main fragmentation pathway for NA-3 is outlined as follows.

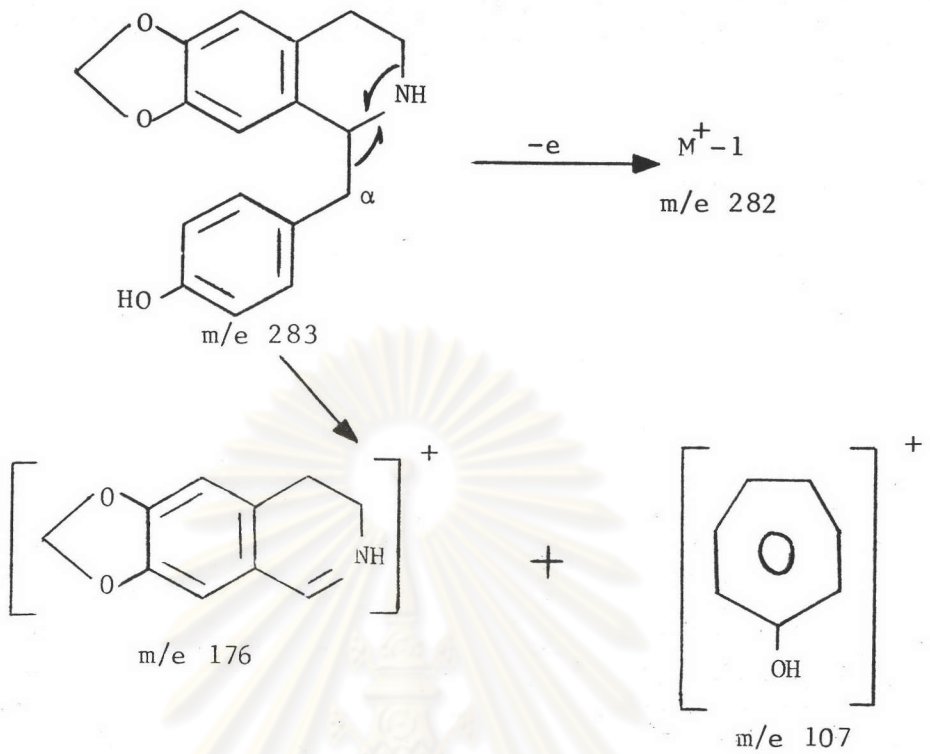


Figure 7 Fragmentation of NA-3

(+)-Reticuline (NA-4) was isolated as a minor alkaloid, $[\alpha]_D^{25^oC}$ +55.00 (c = 0.0001 g/ml, ethanol). The mass spectra established the formula as $C_{19}H_{23}NO_4$.

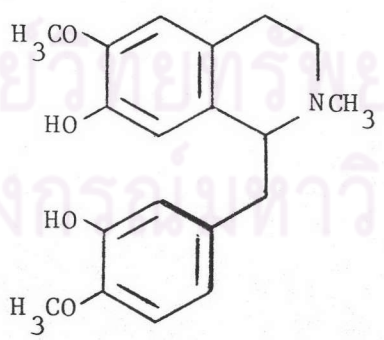


Figure 8 The structure of NA-4 as (+)-reticuline

Ultraviolet and mass spectra show that it is tetrahydrobenzylisoquinoline alkaloid. The infrared spectrum (IR, KBr disc) showed hydroxyl group at 3410 cm^{-1}, and aromatic ring at 1600, 1520 cm^{-1}. The nuclear magnetic resonance spectrum (NMR, 200 MHz) showed the presence of N-methyl proton at δ 2.49, two methoxy protons at δ 3.85, aromatic protons at δ 6.54, 6.35 (C-5, C-8 of ring A) and aromatic protons at δ 6.59, 6.74, 6.75 (C-2', C-3' and C-6' of ring B). The mass spectrum showed the base peak at m/e 192, molecular ion peak at m/e 329. The fragmentation is the same pathway as NA-3.

II. Discussion of Chemotaxonomy

According to this investigation, isoboldine, bisnorargemonine, norcinnamolaurine and reticuline have been isolated from *Neolitsea aureo-sericea* Kosterm. bark. The occurrence in the same plant of isoboldine, reticuline, and bisnorargemonine is interesting because this result correspond well with biosynthesis pathway which all of them are derived biosynthetically from the same benzylisoquinoline precursor, reticuline (Scheme 5 and 6, page 80-81).

Concerning the chemotaxonomic point of view, in subtribe Litseineae, the morphological difference among genus *Litsea* and *Neolitsea* are very slight. The occurrence of bisnorargemonine in this plant appears to be the first report of pavine alkaloid from genus *Neolitsea*. It was found only in *Cryptocarya longifolia* Kosterm. (Ralph *et al.*, 1981) and also, norcinnamolaurine of tetrahydrobenzylisoquinoline type is the first report in *Neolitsea*.

It was previously found in *Cinnamomum* sp., *Lindera glauca* (Sieb & Zucc.) Blume, *Mezilaurus synandra* (Mez.) Kosterm. and *Sassafras albidum* (Nutt.) Nees (Gellert and Summon, 1969; Kozuka *et al.*, 1984; Silva *et al.*, 1983; Chowdhury *et al.*, 1976). While, both of bisnorargemonine and norcinnamolaurine have never been found in genus *Litsea*. So, this recent work supports the classification of genera *Litsea* and *Neolitsea* in subtribe Litseineae and the chemotaxonomic significance agree with the morphological classification.