

# APORPHINE ALKALOIDS. II<sup>1</sup>

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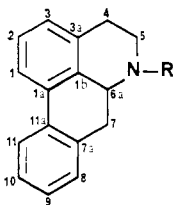
Substantial progress has been made since 1975 in the field of aporphinoids (aporphine alkaloids *sensu lato*). About sixty new alkaloids have been found. Among the 182 compounds known at this time, the structures of some alkaloids were revised, additional physical and spectral data became available for others, especially through <sup>13</sup>C NMR spectroscopy, while a great number of already-described substances were isolated from new sources.

This review supplements our earlier one<sup>1</sup> by including all data published since 1975, along the following plan:

- (1) Additional data on previously reported aporphine alkaloids (structures 1-182):
  - (a) Revised structures
  - (b) Additional physical and spectral data
  - (c) Known natural aporphines reisolated from new sources
- (2) Completely new aporphine alkaloids (structures 183-248)

The organization and the intent of the present review are essentially the same as in the previous one.

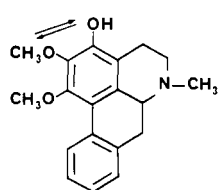
Included in this listing are the aporphines (noraporphines, aporphines, quaternary aporphines, aporphine N-oxides, N-acetylated noraporphines), oxoaporphines, C-7 and/or C-4 substituted aporphines, dehydroaporphines, phenanthrenes, and miscellaneous aporphinoids<sup>2</sup>. For each alkaloid the description includes the structure, the molecular formula and molecular weight, the melting point and specific rotation, and the uv, ir, pmr and mass spectral data, as well as the circular dichroism curve and <sup>13</sup>C nmr data when available. The numbering of the skeleton is according to the accepted ruling.



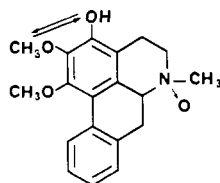
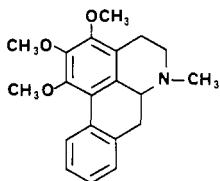
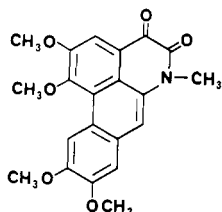
Unless stated otherwise, uv (nm, log  $\epsilon$ ) spectra were obtained in ethanol, ir ( $\text{cm}^{-1}$ ) spectra in nujol, and nmr spectra in deuteriochloroform (60 MHz). Chemical shifts are in  $\delta$  units, and the coupling constants in Hz.

<sup>1</sup>H. GUINAUDEAU, M. LEBOEUF and A. CAVÉ, Aporphine Alkaloids, *Lloydia*, **38**, 275 (1975).

<sup>2</sup>For the new alkaloids: aporphines = structures 183-213; oxoaporphines = structures 214-219; C-7 and/or C-4 substituted aporphines = structures 220-237; dehydroaporphine = structure 238; phenanthrenes = structures 239-241; miscellaneous aporphinoids = structures 242-248.

TABLE 1. Revised structures of previously reported aporphine alkaloids.<sup>1</sup>**13 LIRININE (or liridinine)**C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

(28)

[Lirinine and liridinine are **186** and **13** respectively, or *vice versa* (28)]**14 LIRININE N-OXIDE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048[from the revised structure of lirinine **13** (28)]**15 O-METHYLLIRININE**C<sub>20</sub>H<sub>23</sub>O<sub>3</sub>N: 325.167783[from the revised structure of lirinine **13** (28)]**135 PONTEVEDRINE**C<sub>21</sub>H<sub>19</sub>O<sub>6</sub>N: 381.121227

(21)

Synthesis (20)

TABLE 2. Additional physical and spectral data on previously reported aporphine alkaloids.

**1 CAAVERINE**C<sub>17</sub>H<sub>17</sub>O<sub>2</sub>N: 267.125921

<sup>13</sup>C NMR: (DMSO) 141.6 (C-1), 119.7 (C-1a), 123.5 (C-1b), 146.5 (C-2), 110.3 (C-3), 127.3 (C-3a), 28.4 (C-4), 42.7 (C-5), 53.2 (C-6a), 36.8 (C-7), 135.7 (C-7a), 128.1\* (C-8), 128.1\* (C-9), 126.2\* (C-10), 125.9\* (C-11), 132.4 (C-11a), 55.8 (C-2 OMe) (121)

\*Signals may be reversed.

**2 LIRINIDINE**C<sub>19</sub>H<sub>19</sub>O<sub>2</sub>N: 281.141570

<sup>13</sup>C NMR: (DMSO) 141.6 (C-1), 119.2 (C-1a), 123.5 (C-1b), 146.5 (C-2), 110.3 (C-3), 127.4 (C-3a), 28.4 (C-4), 52.9 (C-5), 62.1 (C-6a), 34.4 (C-7), 135.7 (C-7a), 128.1\* (C-8), 127.5\* (C-9), 126.2\* (C-10), 126.0\* (C-11), 132.4 (C-11a), 43.6 (N-Me), 55.8 (C-2 OMe) (121)

\*Signals may be reversed.

**3 ASIMILOBINE** $C_{17}H_{17}O_2N$ : 267.125921 $^{13}C$  NMR: (DMSO) 143.2 (C-1), 125.1 (C-1a), 129.3 (C-1b), 148.9 (C-2), 115.7 (C-3), 126.8 (C-3a), 28.5 (C-4), 42.6 (C-5), 53.2 (C-6a), 36.9 (C-7), 136.3 (C-7a), 127.7\* (C-8), 127.5\* (C-9), 127.2\* (C-10), 126.5\* (C-11), 132.1 (C-11a), 59.3 (C-1 OMe) (121)

\*Signals may be reversed.

**4 N-METHYLASIMILOBINE** $C_{18}H_{19}O_2N$ : 281.141570 $^{13}C$  NMR: (CDCl<sub>3</sub>) 143.0 (C-1), 125.6 (C-1a), 126.9 (C-1b), 148.1 (C-2), 114.2 (C-3), 129.6 (C-3a), 28.6 (C-4), 53.2 (C-5), 62.2 (C-6a), 34.7 (C-7), 136.0 (C-7a), 127.8\* (C-8), 127.2\* (C-9), 127.2\* (C-10), 127.2\* (C-11), 131.7 (C-11a), 43.7 (N-Me) (78)

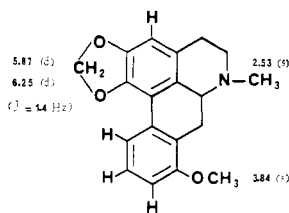
\*Signals may be reversed.

**6 NUCIFERINE** $C_{15}H_{21}O_2N$ : 295.157220 $^{13}C$  NMR: (DMSO) 144.3 (C-1), 125.7 (C-1a), 128.6 (C-1b), 151.4 (C-2), 111.8 (C-3), 127.5\* (C-3a), 28.6 (C-4), 52.5 (C-5), 61.9 (C-6a), 34.3 (C-7), 136.2 (C-7a), 127.9\* (C-8), 127.5\* (C-9), 127.1\* (C-10), 126.6\* (C-11), 131.5 (C-11a), 43.6 (N-Me), 59.6 (C-1 OMe), 55.6 (C-2 OMe) (160)

\*Signals may be reversed.

**12 STEPHANINE** $C_{15}H_{19}O_3N$ : 309.136485IR: (CHCl<sub>3</sub>) 945, 990, 1150, 1390, 1420, 1485, 1502, 1585 (159)

NMR: (159)

Mass: M<sup>-</sup> 309, 308 (base) (159)

4 aromatic H at 6.52 - 7.80

**18 XYLOPINE** $C_{15}H_{17}O_3N$ : 295.120835 $^{13}C$  NMR: (DMSO) 141.8 (C-1), 115.2 (C-1a), 120.5 (C-1b), 147.3 (C-2), 106.6 (C-3), 127.9 (C-3a), 24.8 (C-4), 40.2‡ (C-5), 51.3 (C-6a), 32.2 (C-7), 134.2 (C-7a), 113.6\* (C-8), 158.7 (C-9), 113.0\* (C-10), 124.5 (C-11), 122.3 (C-11a), 100.9 (C-1, 2 OCH<sub>2</sub>O), 55.1 (C-9 OMe) (HCl) (121)

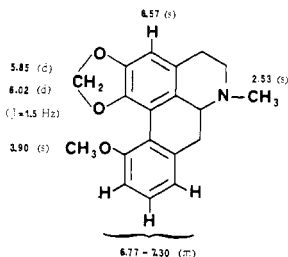
\*Signals may be reversed.

‡Assignments uncertain, overlapped by DMSO.

**21 APOGLAZIOVINE** $C_{15}H_{17}O_3N$ : 297.136485 $^{13}C$  NMR: (DMSO) 141.6 (C-1), 119.4 (C-1a), 122.9 (C-1b), 146.5 (C-2), 110.2 (C-3), 127.5 (C-3a), 28.4 (C-4), 52.8 (C-5), 62.5 (C-6a), 33.6 (C-7), 126.0 (C-7a), 127.9 (C-8), 115.4 (C-9), 155.3 (C-10), 113.2 (C-11), 133.0 (C-11a), 43.5 (N-Me), 55.7 (C-2 OMe) (121)

**26 NUCIFEROLINE**C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

<sup>13</sup>C NMR: (DMSO) 144.3 (C-1), 125.9 (C-1a),  
128.6 (C-1b), 151.3 (C-2), 111.6 (C-3),  
127.7 (C-3a), 28.7 (C-4), 52.5 (C-5),  
62.3 (C-6a), 33.5 (C-7), 126.6 (C-7a),  
128.4 (C-8), 114.5 (C-9), 155.7 (C-10),  
114.0 (C-11), 132.1 (C-11a), 43.5 (N-  
Me), 59.6 (C-1 OMe), 55.5 (C-2 OMe)  
(121)

**36 O-METHYLPUKATEINE**C<sub>19</sub>H<sub>19</sub>O<sub>2</sub>N: 309.136485

IR: (KBr) 755, 825, 940, 990, 1090, 1125, 1200, 1220,  
1230, 1270, 1295, 1370, 1415, 1430, 1450, 1480,  
2790, 2850, 2950, 2970 (115)

NMR: (115)

Mass: M<sup>-</sup> 309 (base), 308, 294, 293, 279, 266, 264, 236,  
208, 165, 152 (115)

**40 ISOBOLDINE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

<sup>13</sup>C NMR: (DMSO) 140.6 (C-1), 119.7 (C-1a),  
123.5 (C-1b), 146.5 (C-2), 109.2 (C-3),  
126.7 (C-3a), 28.4 (C-4), 52.9 (C-5),  
62.4 (C-6a), 33.7 (C-7), 129.1 (C-7a),  
114.9 (C-8), 145.4 (C-9), 145.3 (C-10),  
113.6 (C-11), 123.0 (C-11a), 43.6 (N-  
Me), 55.8 (C-2 OMe), 55.8 (C-10 OMe)  
(121)

**41 LAURIFOLINE**C<sub>23</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup>X<sup>-</sup>: 342.170522

<sup>13</sup>C NMR: (CDCl<sub>3</sub>-CH<sub>3</sub>OH) 142.2 (C-1), 118.2\* (C-  
1a), 118.3\* (C-1b), 148.0 (C-2), 108.0  
(C-3), 119.8 (C-3a), 23.5 (C-4), 61.5  
(C-5), 69.7 (C-6a), 28.6 (C-7), 123.7  
(C-7a), 114.3 (C-8), 145.4 (C-9), 146.2  
(C-10), 112.1 (C-11), 122.5 (C-11a),  
42.6 and 53.4 (N<sup>+</sup>-Me<sub>2</sub>), 55.7 (C-2  
OMe), 55.7 (C-10 OMe) (98)

\*Signals may be reversed.

**42 BRACTEOLINE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

<sup>13</sup>C NMR: (DMSO) 140.8 (C-1), 119.4 (C-1a),  
122.7 (C-1b), 146.2 (C-2), 109.2 (C-3),  
126.9 (C-3a), 28.4 (C-4), 52.8 (C-5),  
62.4 (C-6a), 33.9 (C-7), 126.9 (C-7a),  
116.0 (C-8), 145.7 (C-9), 143.8 (C-10),  
111.3 (C-11), 124.7 (C-11a), 43.6 (N-  
Me), 55.6\* (C-2 OMe), 55.3\* (C-9 OMe)  
(121)

\*Signals may be reversed.

**44 THALIPORPHINE**C<sub>23</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 140.7 (C-1), 119.5 (C-1a),  
127.2 (C-1b), 145.8 (C-2), 108.7 (C-3),  
123.9 (C-3a), 29.0 (C-4), 53.5 (C-5),  
62.7 (C-6a), 34.5 (C-7), 128.9 (C-7a),  
110.9 (C-8), 147.6 (C-9), 147.1 (C-10),  
112.0 (C-11), 124.8 (C-11a), 44.0 (N-  
Me), 55.9 and 56.0 (C-2, C-9, C-10  
OMe) (78) (126)

**48 DOMESTICINE** $C_{19}H_{19}O_4N$ : 325.131399

$^{13}C$  NMR: ( $CDCl_3$ ) 140.7 (C-1), 119.5 (C-1a),  
127.2 (C-1b), 145.8 (C-2), 109.7 (C-3),  
123.6 (C-3a), 28.8 (C-4), 53.3 (C-5),  
62.5 (C-6a), 34.9 (C-7), 130.2 (C-7a),  
108.2 (C-8), 145.8 (C-9), 145.8 (C-10),  
108.7 (C-11), 125.8 (C-11a), 43.9 (N-  
Me), 56.0 (C-2 OMe) (82) (126)

**50 BOLDINE** $C_{19}H_{21}O_4N$ : 327.147048

$^{13}C$  NMR: ( $CDCl_3$ ) 142.0 (C-1), 126.8 (C-1a),  
125.9 (C-1b), 148.1 (C-2), 113.3 (C-3),  
129.9 (C-3a), 28.9 (C-4), 53.4 (C-5),  
62.6 (C-6a), 34.2 (C-7), 130.2 (C-7a),  
114.2 (C-8), 145.1 (C-9), 145.6 (C-10),  
110.1 (C-11), 123.6 (C-11a), 44.0 (N-  
Me), 60.2 (C-1 OMe), 56.1 (C-10 OMe)  
(78) (126)

**52 PREDICENTRINE** $C_{20}H_{23}O_4N$ : 341.162697

$^{13}C$  NMR: ( $CDCl_3$ ) 142.3 (C-1), 126.3 (C-1a),  
125.9 (C-1b), 148.2 (C-2), 113.5 (C-3),  
129.6 (C-3a), 28.7 (C-4), 53.3 (C-5),  
62.5 (C-6a), 34.2 (C-7), 129.2 (C-7a),  
110.7 (C-8), 148.1 (C-9), 147.6 (C-10),  
110.0 (C-11), 124.1 (C-11a), 43.8 (N-  
Me), 60.3 (C-1 OMe), 55.8 and 56.0 (C-9  
and C-10 OMe) (78) (126)

**56 XANTHOPLANINE** $C_{21}H_{25}O_4N^+ X^-$ : 356.186171

$^{13}C$  NMR: ( $CDCl_3-CH_3OH$ ) 145.9 (C-1), 127.6 (C-  
1a), 118.4 (C-1b), 153.6 (C-2), 109.8  
(C-3), 124.4 (C-3a), 24.0 (C-4), 61.5  
(C-5), 69.9 (C-6a), 28.9 (C-7), 123.9  
(C-7a), 114.5 (C-8), 145.9 (C-9), 146.5  
(C-10), 111.4 (C-11), 122.0 (C-11a),  
43.6 and 54.3 (N-Me<sub>2</sub>), 60.1 (C-1 OMe),  
55.8 (C-2 OMe), 55.8 (C-10 OMe) (98)

**58 NORGLAUCINE** $C_{20}H_{23}O_4N$ : 341.162697

$^{13}C$  NMR: (DMSO) 144.3 (C-1), 125.7 (C-1a),  
120.8 (C-1b), 152.8 (C-2), 111.2 (C-3),  
126.4\* (C-3a), 24.8 (C-4), 40.8‡ (C-5),  
51.9 (C-6a), 32.3 (C-7), 126.2\* (C-7a),  
111.6 (C-8), 148.3 (C-9), 147.3 (C-10),  
111.6 (C-11), 123.1 (C-11a), 59.6 (C-1  
OMe), 55.5 $\times$  (C-2 OMe), 55.5 $\times$  (C-9  
OMe), 55.8 $\times$  (C-10 OMe) (HCl) (121)

\* and  $\times$ : Signals may be reversed.

‡Assignments uncertain, overlapped by DMSO.

**59 GLAUCINE** $C_{21}H_{25}O_4N$ : 355.178347

$^{13}C$  NMR: ( $CDCl_3$ ) 143.9 (C-1), 126.5 (C-1a),  
128.6 (C-1b), 151.5 (C-2), 110.1 (C-3),  
127.0 (C-3a), 29.1 (C-4), 53.1 (C-5),  
62.3 (C-6a), 34.4 (C-7), 129.1 (C-7a),  
110.6 (C-8), 147.7 (C-9), 147.1 (C-10),  
111.4 (C-11), 124.2 (C-11a), 43.4 (N-  
Me), 59.8 (C-1 OMe), 55.5, 55.5 and  
55.7 (C-2, C-9 and C-10 OMe) (160)

**60 N-METHYLGLAUCINE**C<sub>22</sub>H<sub>35</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 370.201821

<sup>13</sup>C NMR: (CDCl<sub>3</sub>-CH<sub>3</sub>OH) 145.6 (C-1), 127.7 (C-1a), 118.6 (C-1b), 153.9 (C-2), 110.2 (C-3), 124.1\* (C-3a), 24.3 (C-4), 61.4 (C-5), 70.3 (C-6a), 29.5 (C-7), 124.0\* (C-7a), 111.4 (C-8), 148.8 (C-9), 148.2 (C-10), 111.4 (C-11), 123.0 (C-11a), 44.0 and 54.8 (N<sup>+</sup>Me<sub>2</sub>), 60.5 (C-1 OMe), 55.7 (C-2 OMe), 56.1 (C-9 and C-10 OMe) (98)

\*Signals may be reversed.

**62 NANTENINE**C<sub>20</sub>H<sub>21</sub>O<sub>4</sub>N: 339.147048

<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 144.0 (C-1), 126.4 (C-1a), 128.2\* (C-1b), 151.4 (C-2), 110.3 (C-3), 127.0\* (C-3a), 29.0 (C-4), 52.9 (C-5), 62.1 (C-6a), 34.9 (C-7), 130.4 (C-7a), 107.8 (C-8), 146.0<sup>x</sup> (C-9), 145.9<sup>x</sup> (C-10), 108.4 (C-11), 125.1 (C-11a), 43.6 (N-Me), 59.8 (C-1 OMe), 55.4 (C-2 OMe), 100.4 (C-9, 10 OCH<sub>2</sub>O) (160)

\* and <sup>x</sup>: Signals may be reversed.**67 DICENTRINE**C<sub>20</sub>H<sub>21</sub>O<sub>4</sub>N: 339.147048

<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 141.7 (C-1), 116.6 (C-1a), 126.4 (C-1b), 146.6 (C-2), 106.1 (C-3), 126.6 (C-3a), 29.2 (C-4), 53.6 (C-5), 62.4 (C-6a), 34.3 (C-7), 128.3 (C-7a), 110.5 (C-8), 148.2 (C-9), 147.6 (C-10), 111.2 (C-11), 123.4 (C-11a), 44.0 (N-Me), 55.9 and 56.1 (C-9 and C-10 OMe) (78) (126)

**72 MAGNOFLORINE**C<sub>20</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 342.170522

<sup>13</sup>C NMR: (CDCl<sub>3</sub>-CF<sub>3</sub>COOD) 140.2 (C-1), 118.9 (C-1a), 117.7 (C-1b), 148.8 (C-2), 109.6 (C-3), 120.3\* (C-3a), 23.4 (C-4), 61.5 (C-5), 69.7 (C-6a), 30.3 (C-7), 123.8 (C-7a), 120.8 (C-8), 110.9 (C-9), 147.6 (C-10), 140.2 (C-11), 119.2\* (C-11a), 43.4 and 54.2 (N<sup>+</sup>Me<sub>2</sub>), 55.8 (C-2 OMe), 55.8 (C-10 OMe) (98)

\*Signals may be reversed.

**75 N-METHYLCORYDINE**C<sub>21</sub>H<sub>25</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 356.186175

<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 143.6 (C-1), 119.2\* (C-1a), 119.2\* (C-1b), 150.9 (C-2), 110.6 (C-3), 119.6\* (C-3a), 23.9 (C-4), 61.0 (C-5), 69.8 (C-6a), 30.7 (C-7), 124.7<sup>x</sup> (C-7a), 125.3 (C-8), 111.8 (C-9), 152.5 (C-10), 143.6 (C-11), 124.6<sup>x</sup> (C-11a), 44.0 and 54.8 (N<sup>+</sup>Me<sub>2</sub>), 56.1 (C-2 and C-10 OMe), 62.2 (C-11 OMe) (98)

\* and <sup>x</sup>: Signals may be reversed.**79 N-METHYLLINDCARPINE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048Mass: M<sup>+</sup> 327, 312 (base), 296, 281, 164, 149 (125)

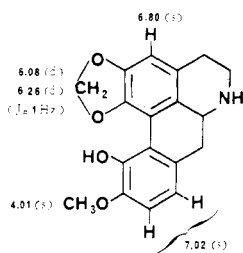
**85 ISOCORYDINE** $C_{27}H_{23}O_4N$ : 341.162697

$^{13}C$  NMR: ( $CDCl_3$ ) 141.7 (C-1), 125.4 (C-1a), 129.8\* (C-1b), 150.8\* (C-2), 110.8 (C-3), 128.8\* (C-3a), 29.1 (C-4), 52.4 (C-5), 62.6 (C-6a), 35.6 (C-7), 129.6\* (C-7a), 118.6 (C-8), 110.7 (C-9), 149.0\* (C-10), 143.6 (C-11), 119.8 (C-11a), 43.6 (N-Me), 61.7 (C-1 OMe), 55.5 and 55.8 (C-2 and C-10 OMe) (160)

\* and ×: Signals may be reversed.

**86 MENISPERINE** $C_{27}H_{26}O_4N^- X^-$ : 356.186171

$^{13}C$  NMR: ( $CDCl_3-CH_3OD$ ) 143.0 (C-1), 126.0 (C-1a), 118.3 (C-1b), 152.9 (C-2), 110.6 (C-3), 125.2 (C-3a), 23.8 (C-4), 60.3 (C-5), 69.1 (C-6a), 30.6 (C-7), 124.3 (C-7a), 119.6 (C-8), 111.5 (C-9), 149.7 (C-10), 143.5 (C-11), 120.2 (C-11a), 42.9 and 53.5 (N-Me), 62.1 (C-1 OMe), 55.8 (C-2 and C-10 OMe) (98)

**91 LAUNOBINE** $C_{15}H_{17}O_4N$ : 311.115749

MP: 231-232°C (94a)

 $\alpha^{24}D + 218^\circ$  (C=0.5,  $CHCl_3$ ) (94a)

UV: (EtOH) 218 (3.98), 263 (3.67), 303 (3.28) (94a)

IR: (KBr) 953, 1054 (94a)

NMR: (94a)

**109 OCOTEINE** $C_{21}H_{25}O_3N$ : 369.157612

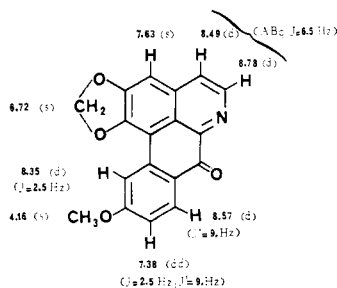
$^{13}C$  NMR: ( $CDCl_3$ ) 143.2 (C-1), 110.4 (C-1a), 127.4 (C-1b), 134.8 (C-2), 139.1 (C-3), 119.1 (C-3a), 23.6 (C-4), 53.2 (C-5), 62.3 (C-6a), 34.1 (C-7), 127.4 (C-7a), 111.1 (C-8), 147.5 (C-9), 147.5 (C-10), 110.0 (C-11), 123.5 (C-11a), 100.4 (C-1, 2  $OCH_2O$ ), 59.3 (C-3 OMe), 56.0 (C-9 OMe), 55.8 (C-10 OMe) (98)

**121 OXOLAURELINE (Lauterine, 10-methoxylirodienine)** $C_{15}H_{11}O_4N$ : 305.068802

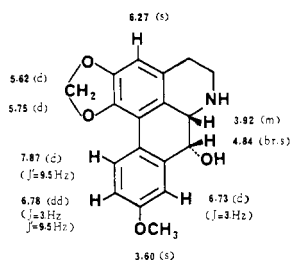
MP: 301-303° (dec.) (65)

UV: ( $CH_3OH$ ) 247 (4.26), 267 (4.19), 309 (3.78), 349 (3.81), 400 (3.81) (65)

IR: (KBr) 1020, 1050, 1260, 1280, 1310, 1360, 1420, 1450, 1490, 1500, 1580, 1600 (65)

NMR: ( $CF_3COOD$ ) (65)Mass:  $M^-$  305 (base), 277, 262, 234, 206, 204, 176 (65)**140 GUATTERINE** $C_{15}H_{16}O_2N$ : 325.131399

$^{13}C$  NMR: ( $CDCl_3$ ) 143.9 (C-1), 110.7 (C-1a), 124.1 (C-1b), 134.9 (C-2), 139.5 (C-3), 119.3 (C-3a), 17.2 (C-4), 49.3 (C-5), 64.2 (C-6a), 69.7 (C-7), 138.7 (C-7a), 123.6 (C-8), 126.9 (C-9), 126.9 (C-10), 125.7 (C-11), 128.7 (C-11a), 39.0 (N-Me) (78)

**141 MICHELANUGINE** $C_{15}H_{17}O_4N$ : 311.115749

MP: 274° (dec.) (HCl) (146)

 $\alpha_D$ : -105° ( $c=0.62$ ,  $C_2H_5OH$ ) (HCl) (146)

UV: 217 (4.49), 237 sh (4.16), 279 (4.29), 322 sh (3.62) (HCl) (146)

IR: (KBr) 935, 960, 1042, 1125, 1250, 1375, 1405, 1500, 3300 (HCl) (146)

NMR: ( $CF_3COOD$ ) (146)

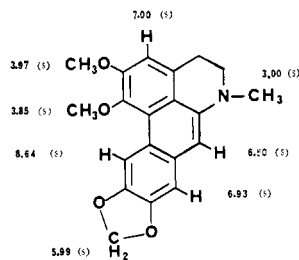
Mass: M-311 (base), 310 (base), 293, 282, 281, 252, 224 (146)

**142 OLIVERIDINE** $C_{15}H_{15}O_4N$ : 325.131399 $^{13}C$  NMR: ( $CDCl_3$ ) 141.6 (C-1), 116.3 (C-1a), 122.5 (C-1b), 146.5 (C-2), 106.3 (C-3), 126.9 (C-3a), 23.2 (C-4), 49.8 (C-5), 64.3 (C-6a), 70.0 (C-7), 141.3 (C-7a), 109.0 (C-8), 159.1 (C-9), 112.5 (C-10), 127.8 (C-11), 121.4 (C-11a), 39.5 (N-Me) (78)**143 OLIVERINE** $C_{20}H_{21}O_4N$ : 339.147048 $^{13}C$  NMR: ( $CDCl_3$ ) 141.4 (C-1), 116.0 (C-1a), 123.5 (C-1b), 146.4 (C-2), 106.5 (C-3), 127.4 (C-3a), 25.3 (C-4), 52.0 (C-5), 63.4 (C-6a), 81.5 (C-7), 139.4 (C-7a), 109.3 (C-8), 159.0 (C-9), 112.2 (C-10), 128.0 (C-11), 122.2 (C-11a), 40.7 (N-Me) (78)**145 DUGUETINE** $C_{20}H_{22}O_5N$ : 355.141962 $^{13}C$  NMR: ( $CDCl_3$ ) 141.1 (C-1), 115.8 (C-1a), 121.0 (C-1b), 147.2 (C-2), 106.7 (C-3), 127.7 (C-3a), 24.6 (C-4), 50.8 (C-5), 64.6 (C-6a), 69.8 (C-7), 133.4 (C-7a), 108.1 (C-8), 148.3 (C-9), 146.1 (C-10), 110.5 (C-11), 123.6 (C-11a), 39.9 (N-Me), 100.5 (C-1, 2  $OCH_2O$ ), 55.3\* (C-9 OMe), 55.6\* (C-10 OMe) (121)

\*Signals may be reversed.

**151 DEHYDROROEMERINE** $C_{15}H_{15}O_2N$ : 277.110272

UV: 254 (4.61), 262 (4.76), 332 (4.12) (177)

Mass: M<sup>+</sup> 277 (base), 262, 246, 232, 218, 138.5 (177)**156 DEHYDRONANTENINE** $C_{20}H_{19}O_4N$ : 337.131399

MP: 197° (46)

UV: 217 (4.22), 244 sh (4.45), 262 (4.66), 299 sh (4.02), 337 (3.93) (86)

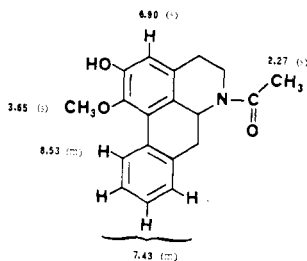
IR: 1000, 1040, 1085, 1225, 1300, 1400, 1460, 1500, 1600, 1625 (46)

NMR: (46)



**157 DEHYDRODICENTRINE**C<sub>20</sub>H<sub>19</sub>O<sub>4</sub>N: 337.131399

IR: (KBr) 857, 1114, 1209, 1308, 1397, 1470, 1515, 1595 (35)

Mass: M<sup>-</sup> 337 (base), 322, 293, 279, 251, 168.5 (35)<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 142.4 (C-1), 117.0<sup>x</sup> (C-1a), 118.4 (C-1b), 144.5 (C-2), 106.2\* (C-3), 127.4 (C-3a), 31.0 (C-4), 50.6 (C-5), 141.0 (C-6a), 100.6 (C-7), 129.3 (C-7a), 106.5\* (C-8), 149.2 (C-9), 145.8 (C-10), 108.4 (C-11), 116.8<sup>x</sup> (C-11a), 40.3 (N-Me), 100.6 (C-1, 2 OCH<sub>2</sub>O), 56.0<sup>†</sup> (C-9 OMe), 55.6<sup>†</sup> (C-10 OMe) (HCl) (121)\*, <sup>x</sup> and <sup>†</sup>: Signals may be reversed.**180 N-ACETYLASIMILOBINE**C<sub>16</sub>H<sub>15</sub>O<sub>3</sub>N: 309.136485

MP: 281-283° (30)

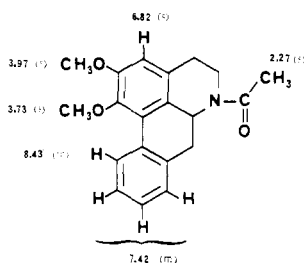
 $\alpha_{D}^{25}$ : -405° (c=0.6, C<sub>2</sub>H<sub>5</sub>N) (68)

IR: 756, 875, 1250, 1415, 1450, 1590, 1620, 3220 (30)

NMR: (6S)

Mass: 310, M<sup>+</sup> 309, 266, 251, 238, 237, 236, 223, 221,

209, 202, 183, 181 (30)

CD: (CH<sub>3</sub>OH)  $\theta_{235} = -232900$ ,  $\theta_{249} = 0$ ,  $\theta_{272} + 45700$ ,  $\theta_{287} = 0$ ,  $\theta_{312} = -7000$  (68)**181 N-ACETYLNORNUCIFERINE**C<sub>20</sub>H<sub>21</sub>O<sub>3</sub>N: 323.152134

MP: 229-231° (30)

 $\alpha_{D}^{25}$ : +406° (c=0.65, CHCl<sub>3</sub>) (68)UV: (CH<sub>3</sub>OH) 211 (4.09), 268 (3.78), 300 sh (3.10) (68)

IR: 1630 (68)

NMR: (6S)

Mass: 324, M<sup>-</sup> 323, 280, 264, 263, 252, 251 (base) (30)CD: (CH<sub>3</sub>OH)  $\theta_{235} = -212200$ ,  $\theta_{249} = 0$ ,  $\theta_{272} + 39400$ ,  $\theta_{287} = 0$ ,  $\theta_{310} = -6900$  (68)

TABLE 3. Known natural aporphines reisolated from new sources.

<b>1</b> CAAVERINE C <sub>17</sub> H <sub>17</sub> O <sub>2</sub> N: 267.125921 SOURCES: Annonaceae: <i>Isolona</i> (23) (60) Lauraceae: <i>Ocotea</i> (19) Magnoliaceae: <i>Liriodendron</i> (177)	<b>4</b> N-METHYLASIMILOBINE C <sub>15</sub> H <sub>15</sub> O <sub>2</sub> N: 281.141570 SOURCES: Nymphaeaceae: <i>Nelumbo</i> (174) Rhamnaceae: <i>Colubrina</i> (53) (54)
<b>2</b> LIRINIDINE C <sub>15</sub> H <sub>15</sub> O <sub>2</sub> N: 281.141570 SOURCES: Annonaceae: <i>Isolona</i> (23) Lauraceae: <i>Ocotea</i> (19)	<b>5</b> NORNUCIFERINE C <sub>15</sub> H <sub>15</sub> O <sub>2</sub> N: 281.141570 SOURCES: Annonaceae: <i>Annona</i> (170), <i>Enantia</i> (79), <i>Isolona</i> (60) (61), <i>Xylopia</i> (113) Magnoliaceae: <i>Liriodendron</i> (28) (30) Nymphaeaceae: <i>Nelumbo</i> (174) Rhamnaceae: <i>Colubrina</i> (53) (54)
<b>3</b> ASIMILOBINE C <sub>17</sub> H <sub>17</sub> O <sub>2</sub> N: 267.125921 SOURCES: Annonaceae: <i>Annona</i> (170), <i>Uvaria</i> (90) Lauraceae: <i>Ocotea</i> (19) Magnoliaceae: <i>Liriodendron</i> (20) (30) (177) Rhamnaceae: <i>Ziziphus</i> (178)	<b>6</b> NUCIFERINE C <sub>15</sub> H <sub>15</sub> O <sub>2</sub> N: 295.157220 SOURCES: Magnoliaceae: <i>Liriodendron</i> (30) Nymphaeaceae: <i>Nelumbo</i> (174) Rhamnaceae: <i>Colubrina</i> (53) (54)

**7 ANONAININE**C<sub>17</sub>H<sub>15</sub>O<sub>2</sub>N: 265.110272

SOURCES: Annonaceae: *Annona* (153)  
 (170), *Cananga* (92), *Enantia*  
 (79), *Isolona* (60) (61),  
*Polyalthia* (58), *Xylophia*  
 (106) (113)  
 Nymphaeaceae: *Nelumbo* (174)  
 Rhamnaceae: *Colubrina* (53)  
 (54)

**8 ROEMERINE**C<sub>18</sub>H<sub>17</sub>O<sub>2</sub>N: 279.125921

SOURCES: Annonaceae: *Annona* (170),  
*Cananga* (92), *Isolona* (60),  
*Xylophia* (106)  
 Nymphaeaceae: *Nelumbo* (174)  
 Papaveraceae: *Papaver* (99)  
 Rhamnaceae: *Colubrina* (53)  
 (54)

**16 ANOLOBINE**C<sub>17</sub>H<sub>13</sub>O<sub>3</sub>N: 281.105186

SOURCES: Annonaceae: *Annona* (170)

**18 XYLOPINE**C<sub>18</sub>H<sub>17</sub>O<sub>3</sub>N: 295.120835

SOURCES: Annonaceae: *Duguetia* (115),  
*Xylophia* (106) (113)

**20 SPARSIFLORINE**C<sub>17</sub>H<sub>17</sub>O<sub>3</sub>N: 283.120835

SOURCES: Euphorbiaceae: *Croton* (18)

**21 APOGLAZIOVINE**C<sub>18</sub>H<sub>19</sub>O<sub>3</sub>N: 297.136485

SOURCES: Lauraceae: *Ocotea* (19) (37)  
 (racemic alkaloid)

**31 ISOTHEBAINE**C<sub>18</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

SOURCES: Papaveraceae: *Papaver* (122)

**33 OBOVANINE**C<sub>17</sub>H<sub>15</sub>O<sub>3</sub>N: 281.105186

SOURCES: Annonaceae: *Duguetia* (115)

**36 O-METHYLPUKATEINE**C<sub>18</sub>H<sub>19</sub>O<sub>3</sub>N: 309.136485

SOURCES: Annonaceae: *Duguetia* (115)

**39 LAURELLIPTINE**C<sub>18</sub>H<sub>19</sub>O<sub>4</sub>N: 313.131399

SOURCES: Rhamnaceae: *Ziziphus* (178)

**40 ISOBOLDINE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Annonaceae: *Annona* (170),  
*Enantia* (79), *Uvaria* (90),  
*Xylophia* (62)  
 Lauraceae: *Ocotea* (19),  
*Sassafras* (32)  
 Papaveraceae: *Corydalis* (75)  
 (76) (77) (112), *Glaucium*  
 (107) (130)  
 Ranunculaceae: *Delphinium*  
 (117)  
 Rhamnaceae: *Ziziphus* (178)

**41 LAURIFOLINE**C<sub>22</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 342.170522

SOURCES: Menispermaceae: *Legnephora*  
 (44)  
 Rutaceae: *Zanthoxylum* (42)  
 (43) (141)

**42 BRACTEOLINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Papaveraceae: *Corydalis* (75)

**44 THALIPORPHINE**C<sub>22</sub>H<sub>25</sub>O<sub>4</sub>N: 341.162697

SOURCES: Annonaceae: *Uvaria* (90)  
 Berberidaceae: *Berberis* (106)  
 Magnoliaceae: *Liriodendron*  
 (30)

**46 FAGARA BASE**C<sub>21</sub>H<sub>26</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 356.186171

SOURCES: Rutaceae: *Zanthoxylum* (6) (7)

**48 DOMESTICINE**C<sub>15</sub>H<sub>15</sub>O<sub>4</sub>N: 325.131399

SOURCES: Papaveraceae: *Corydalis* (75)  
 (76) (112)

**49 LAUROLITSINE**C<sub>18</sub>H<sub>19</sub>O<sub>4</sub>N: 313.131399

SOURCES: Lauraceae: *Sassafras* (32)  
 Rhamnaceae: *Retanilla* (12)

**50 BOLDINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Lauraceae: *Sassafras* (32)  
 Rhamnaceae: *Retanilla* (12)

**52 PREDICENTRINE**C<sub>20</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

SOURCES: Lauraceae: *Ocotea* (157)  
 Magnoliaceae: *Liriodendron*  
 (30) (177)  
 Papaveraceae: *Corydalis* (112),  
*Glaucium* (124)

**54 LAUROTETANINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Annonaceae: *Xylophia* (62)  
 Monimiaceae: *Laurelia* (156)

**55 N-METHYLLAUROTETANINE**C<sub>20</sub>H<sub>25</sub>O<sub>4</sub>N: 341.162697

SOURCES: Annonaceae: *Enantia* (79)  
 Magnoliaceae: *Liriodendron*  
 (30)  
 Ranunculaceae: *Delphinium*  
 (117), *Thalictrum* (128) (169)

**58 NORGLAUCINE**C<sub>20</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

SOURCES: Annonaceae: *Alphonsea* (96)  
 Magnoliaceae: *Liriodendron*  
 (30)  
 Rhamnaceae: *Colubrina* (53)  
 (54)

**59 GLAUCINE**C<sub>21</sub>H<sub>23</sub>O<sub>4</sub>N: 355.178347

SOURCES: Annonaceae: *Alphonsea* (96),  
*Uvaria* (90)  
 Berberidaceae: *Berberis* (84)  
 Lauraceae: *Ocotea* (46)  
 Magnoliaceae: *Liriodendron*  
 (29) (30) (69) (177)  
 Papaveraceae: *Corydalis* (158),  
*Glaucium* (15) (107) (124)  
 (125) (130)  
 Ranunculaceae: *Thalictrum*  
 (151)  
 Rhamnaceae: *Colubrina* (54)

**61 NORNANTENINE**C<sub>18</sub>H<sub>17</sub>O<sub>4</sub>N: 325.131399

SOURCES: Annonaceae: *Xylophia* (62)  
 Monimiaceae: *Laurelia* (156)

**62 NANTENINE**C<sub>20</sub>H<sub>21</sub>O<sub>4</sub>N: 339.147048

SOURCES: Lauraceae: *Ocotea* (46)

**63 N-ACETYLNORNANTENINE**C<sub>21</sub>H<sub>21</sub>O<sub>5</sub>N: 367.141962

SOURCES: Magnoliaceae: *Liriodendron*  
 (67) (69)

**64 ACTINODAPHNINE**C<sub>13</sub>H<sub>17</sub>O<sub>4</sub>N: 311.115749

SOURCES: Lauraceae: *Litsea* (110) (132)

**65 N-METHYLACTINODAPHNINE**C<sub>14</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

SOURCES: Lauraceae: *Ocotea* (157)

**67 DICENTRINE**C<sub>20</sub>H<sub>21</sub>O<sub>4</sub>N: 339.147048

SOURCES: Lauraceae: *Litsea* (110),  
*Ocotea* (157)  
 Menispermaceae: *Cissampelos*  
 (35)  
 Papaveraceae: *Glaucium* (88)  
 (123) (125) (147)

**71 CORYTUBERINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Papaveraceae: *Corydalis* (76)  
 (80) (158), *Dicranostigma*  
 (142), *Eschscholtzia* (133)

**72 MAGNOFLORINE\***C<sub>20</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 342.170522

SOURCES: Annonaceae: *Enantia* (79)  
 Aristolochiaceae: *Aristolochia*  
 (34)  
 Berberidaceae: *Berberis* (17)  
 (84)  
 Menispermaceae: *Cocculus* (38)  
 (39), *Dioscoreophyllum* (2),  
*Legnephora* (44) (45),  
*Trichlisia* (109)

\*Many literature references where magnoflorine has supposedly been identified may be in error because of the similarity in properties between it and *N,N*-dimethylindcarpine (Private communication from Drs. Doskotch and Beal (139).)

Papaveraceae: *Argemone*

(134), *Chelidonium* (137),  
*Dicranostigma* (142),  
*Glaucium* (107), *Meconopsis*  
 (59) (135) (136), *Pterido-*  
*phyllum* (71)

Ranunculaceae: *Coptis* (73),  
*Delphinium* (4), *Isopyrum*  
 (101) (102), *Thalictrum* (49)  
 (95) (109a) (151) (163) (164)  
 (166) (167)

Rhamnaceae: *Colubrina* (53)  
 (54)

Rutaceae: *Phellodendron* (73)  
 (149) (165), *Zanthoxylum*  
 (40) (41) (42) (43) (129) (140)  
 (150)

**73 NORCORYDINE**C<sub>16</sub>H<sub>20</sub>O<sub>4</sub>N: 327.147048

SOURCES: Annonaceae: *Xylophia* (62)  
 (106)

**74 CORYDINE**C<sub>21</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

SOURCES: Annonaceae: *Xylophia* (62)  
 Papaveraceae: *Corydalis* (75)  
 (76) (158), *Dicranostigma*  
 (142), *Eschscholtzia* (133),  
*Glaucium* (107) (119) (130)  
 Ranunculaceae: *Thalictrum*  
 (128)  
 Rutaceae: *Zanthoxylum* (148)

**75 N-METHYLCORYDINE**C<sub>21</sub>H<sub>25</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 356.186175

SOURCES: Annonaceae: *Polyalthia* (58)  
 Rutaceae: *Zanthoxylum* (129)  
 (140)

**79 N-METHYLLINDCARPINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Papaveraceae: *Glaucium* (125)

**80 N,N-DIMETHYLLINDCARPINE**C<sub>20</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 342.170522

SOURCES: Ranunculaceae: *Caltha* (139)

**84 NORISOCORYDINE**C<sub>18</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

SOURCES: Annonaceae: *Xylophia* (62)

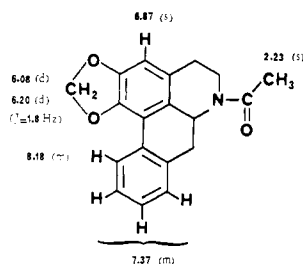
**85 ISOCORYDINE**C<sub>20</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

SOURCES: Annonaceae: *Enantia* (79)  
 Berberidaceae: *Berberis* (83)  
 Lauraceae: *Ocotea* (46)  
 Papaveraceae: *Corydalis* (75)  
 (76) (111), *Dicranostigma*  
 (142), *Glaucium* (107) (125)  
 (130), *Papaver* (26) (99),  
*Pteridophyllum* (71)  
 Ranunculaceae: *Thalictrum*  
 (27)

**86 MENISPERINE**C<sub>21</sub>H<sub>25</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 356.186171

SOURCES: Annonaceae: *Enantia* (79)  
 Papaveraceae: *Dicranostigma*  
 (142)  
 Rutaceae: *Phellodendron* (149)  
 (165)

- 89 NANDIGERINE**  
 $C_{18}H_{17}O_4N$ : 311.115749  
 SOURCES: Hernandiaceae: *Hernandia* (172) (173)
- 91 LAUNOBINE**  
 $C_{18}H_{17}O_4N$ : 311.115749  
 SOURCES: Hernandiaceae: *Illigera* (94a)
- 92 BULBOCAPNINE**  
 $C_{19}H_{19}O_4N$ : 325.131399  
 SOURCES: Papaveraceae: *Corydalis* (97) (112) (158), *Glaucium* (88) (123) (125)
- 94 OVIGERINE**  
 $C_{18}H_{15}O_4N$ : 309.100100  
 SOURCES: Hernandiaceae: *Hernandia* (172) (173)
- 96 PREOCOTEINE**  
 $C_{21}H_{25}O_5N$ : 371.173261  
 SOURCES: Ranunculaceae: *Thalictrum* (95)
- 100 THALICSIMIDINE**  
 $C_{22}H_{27}O_5N$ : 385.188910  
 SOURCES: Ranunculaceae: *Thalictrum* (95) (151)
- 101 N-ACETYL-3-METHOXYNOR-NANTENINE**  
 $C_{22}H_{23}O_6N$ : 397.152526  
 SOURCES: Magnoliaceae: *Liriodendron* (67) (69)
- 102 OCONOVINE**  
 $C_{21}H_{25}O_5N$ : 371.173261  
 SOURCES: Ranunculaceae: *Thalictrum* (27)
- 108 O-METHYLCASSYFILINE**  
 $C_{20}H_{21}O_5N$ : 355.141962  
 SOURCES: Ranunculaceae: *Thalictrum* (51) (95)
- 109 OCOTEINE**  
 $C_{21}H_{25}O_5N$ : 369.157612  
 SOURCES: Ranunculaceae: *Thalictrum* (51) (95)
- 112 OCOPODINE**  
 $C_{21}H_{25}O_5N$ : 369.157612  
 SOURCES: Lauraceae: *Ocotea* (157)
- 114 THALPHENINE**  
 $C_{21}H_{22}O_4N^+ X^-$ : 352.154873  
 SOURCES: Ranunculaceae: *Thalictrum* (162) (163)  
 Rutaceae: *Phellodendron* (165)
- 115 LYSICAMINE**  
 $C_{15}H_{13}O_3N$ : 291.089537  
 SOURCES: Annonaceae: *Enantia* (79), *Polyalthia* (24)  
 Menispermaceae: *Stephania* (5)  
 Rhamnaceae: *Colubrina* (53)
- 116 LIRIODENINE**  
 $C_{17}H_9O_2N$ : 275.058238  
 SOURCES: Annonaceae: *Annona* (153) (170), *Cananga* (92), *Enantia* (79) (104), *Fusea* (16), *Isolona* (61), *Pachypodanthium* (10) (118), *Polyalthia* (55) (58), *Xylopia* (106)  
 Eupomatiaceae: *Eupomatia* (14)  
 Magnoliaceae: *Elmerrillia* (33), *Liriodendron* (29) (30) (49) (177), *Magnolia* (119) (143) (176), *Michelia* (108) (146), *Talauma* (81) (144)  
 Menispermaceae: *Stephania* (5)  
 Monimiaceae: *Laurelia* (152) (156), *Siparuna* (16)  
 Rhamnaceae: *Colubrina* (54)  
 Rutaceae: *Zanthoxylum* (72)
- 118 O-METHYLMOSCHATOLINE**  
 $C_{19}H_{19}O_4N$ : 321.100100  
 SOURCES: Annonaceae: *Cleistopholis* (89), *Duguetia* (52), *Enantia* (79)  
 Menispermaceae: *Abuta* (22), *Trichlisia* (36) (70)
- 119 ATHEROSPERMIDINE**  
 $C_{18}H_{17}O_4N$ : 305.068802  
 SOURCES: Annonaceae: *Enantia* (79)
- 120 LANUGINOSINE**  
 $C_{18}H_{17}O_4N$ : 305.068802  
 SOURCES: Annonaceae: *Enantia* (104), *Polyalthia* (55) (58), *Xylopia* (105) (113)  
 Magnoliaceae: *Liriodendron* (1), *Magnolia* (143), *Michelia* (146), *Talauma* (144)  
 Menispermaceae: *Stephania* (159)
- 121 OXOLAURELINE**  
 $C_{18}H_{17}O_4N$ : 305.068802  
 SOURCES: Annonaceae: *Guatteria* (63) (65)  
 Magnoliaceae: *Magnolia* (176)  
 Monimiaceae: *Laurelia* (152)
- 123 ATHEROLINE**  
 $C_{18}H_{15}O_5N$ : 337.095014  
 SOURCES: MONIMIACEAE: *Laurelia* (156)
- 124 OXOGLAUCINE**  
 $C_{20}H_{17}O_5N$ : 351.110664  
 SOURCES: Magnoliaceae: *Liriodendron* (29) (30)  
 Papaveraceae: *Glaucium* (124) (130)
- 125 OXONANTENINE**  
 $C_{16}H_{13}O_5N$ : 335.079365  
 SOURCES: Monimiaceae: *Laurelia* (156)
- 128 HERNANDONINE**  
 $C_{18}H_9O_5N$ : 319.048066  
 SOURCES: Hernandiaceae: *Hernandia* (172) (173)

**130 THALICMININE**C<sub>20</sub>H<sub>16</sub>O<sub>6</sub>N: 365.089928SOURCES: Ranunculaceae: *Thalictrum*  
(51) (95)**131 CASSAMEDINE**C<sub>18</sub>H<sub>14</sub>O<sub>2</sub>N: 349.058630SOURCES: Monimiaceae: *Siparuna* (16)**132 IMENINE**C<sub>20</sub>H<sub>17</sub>O<sub>3</sub>N: 351.110664SOURCES: Menispermaceae: *Abuta* (22)**134 CORUNNINE**C<sub>20</sub>H<sub>17</sub>O<sub>3</sub>N: 351.110664SOURCES: Magnoliaceae: *Liriodendron*  
(30)  
Papaveraceae: *Glaucium*  
(130)**138 NORUSHINSUNINE**C<sub>17</sub>H<sub>13</sub>O<sub>3</sub>N: 281.105186SOURCES: Annonaceae: *Annona* (153)  
(170)  
Magnoliaceae: *Elmerrillia*  
(33), *Liriodendron* (29) (30)**139 USHINSUNINE**C<sub>18</sub>H<sub>17</sub>O<sub>3</sub>N: 295.120835SOURCES: Annonaceae: *Cananga* (92)**140 GUATTERINE**C<sub>18</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399SOURCES: Annonaceae: *Pachypodanthium*  
(8), *Polyalthia* (24)**142 OLIVERIDINE**C<sub>19</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399SOURCES: Annonaceae: *Enantia* (104),  
*Isolona* (61), *Polyalthia* (24)  
(58)**143 OLIVERINE**C<sub>20</sub>H<sub>21</sub>O<sub>4</sub>N: 339.147048SOURCES: Annonaceae: *Enantia* (104),  
*Isolona* (61), *Polyalthia* (24)  
(58)**146 STEPORPHINE**C<sub>18</sub>H<sub>17</sub>O<sub>3</sub>N: 295.120835SOURCES: Monimiaceae: *Laureliopsis*  
(154)**149 DEHYDRONUCIFERINE**C<sub>19</sub>H<sub>19</sub>O<sub>2</sub>N: 293.141570SOURCES: Rhamnaceae: *Colubrina* (53)  
(54)**151 DEHYDROROEMERINE**C<sub>18</sub>H<sub>15</sub>O<sub>3</sub>N: 277.110272SOURCES: Magnoliaceae: *Liriodendron*  
(177)  
Rhamnaceae: *Colubrina* (54)**154 DEHYDROGLAUCINE**C<sub>21</sub>H<sub>23</sub>O<sub>4</sub>N: 353.162697SOURCES: Magnoliaceae: *Liriodendron*  
(29) (30) (69)**156 DEHYDRONANTENINE**C<sub>20</sub>H<sub>19</sub>O<sub>4</sub>N: 337.131399SOURCES: Berberidaceae: *Nandina* (86)  
Lauraceae: *Ocotea* (46)**157 DEHYDRODICENTRINE**C<sub>20</sub>H<sub>19</sub>O<sub>4</sub>N: 337.131399SOURCES: Menispermaceae: *Cissampelos*  
(35)**164 METHOXYATHEROSPERMININE**C<sub>21</sub>H<sub>23</sub>O<sub>3</sub>N: 339.183433SOURCES: Menispermaceae: *Meiocar-*  
*pidium* (91)**169 THALICTHUBERINE**C<sub>21</sub>H<sub>23</sub>O<sub>4</sub>N: 353.162697SOURCES: Ranunculaceae: *Thalictrum*  
(95)**172 THALIGLUCINONE**C<sub>21</sub>H<sub>19</sub>O<sub>3</sub>N: 365.126313SOURCES: Ranunculaceae: *Thalictrum*  
(49) (93) (162) (163) (164)  
(166) (167)**176 CEPHARADIONE B**C<sub>19</sub>H<sub>15</sub>O<sub>4</sub>N: 321.100100SOURCES: Piperaceae: *Piper* (56) (57)**177 CEPHARADIONE A**C<sub>18</sub>H<sub>15</sub>O<sub>4</sub>N: 305.068802SOURCES: Piperaceae: *Piper* (56) (57)Table 4. Completely new aporphine alkaloids.<sup>3</sup>**183 N-ACETYLANONAINE**C<sub>19</sub>H<sub>17</sub>O<sub>3</sub>N: 307.120836

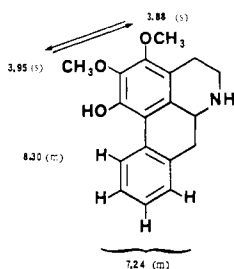
MP: 229–230° (68)

 $\alpha$ D: –356° (c=0.49, CHCl<sub>3</sub>) (68)UV: (CH<sub>3</sub>OH) 217 (4.24), 269 (4.12), 312 (3.49) (68)

IR: (KBr) 925, 1045, 1630 (119)

NMR: (68)

CD: (CH<sub>3</sub>OH)  $\theta_{230}$ –168700,  $\theta_{231}$  0,  $\theta_{273}$ +30600 (68)SOURCES: Magnoliaceae: *Liriodendron* (67) (68),  
*Magnolia* (119)<sup>3</sup>Not previously reported in: H. GUINAUDEAU, M. LEBOEUF and A. CAVÉ, *Lloydia*, **38**, 275 (1975).

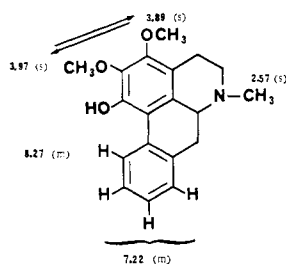
**184 ISOPILINE**C<sub>18</sub>H<sub>19</sub>O<sub>3</sub>N: 297.136485

MP: 153° (60)

αD: -55° (c=1.06, CH<sub>3</sub>OH) (60)

UV: 220 (4.39), 275 (4.15), 292 sh (3.91), 310 (3.78) (60)

NMR: (60)

Mass: M<sup>+</sup> 297, 296 (base), 282, 268, 266, 165, 151 (60)SOURCES: Annonaceae: *Isolona* (60)**185 N-METHYLISOPILINE**C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

MP: 220-222° (60)

αD: -56° (c=0.2, CH<sub>3</sub>OH) (60)

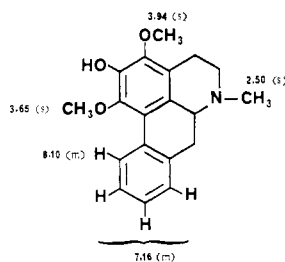
UV: 220, 275, 292 sh, 310 (60)

IR: 2798-2800, 3500 (60)

NMR: (60)

Mass: M<sup>+</sup> 311, 310 (base), 296, 280, 268, 165, 152 (60)

SOURCES: Synthesis (60)

**186 LIRIDININE (or lirinine)\***C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

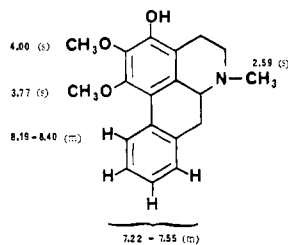
MP: 142-144° (1)

α<sub>20</sub><sup>D</sup>: -38° (c=0.095, CHCl<sub>3</sub>) (1)

UV: 221 (4.41), 281 (4.16) (1)

IR: (KBr) 760, 1290, 1595, 2830, 3200, 3400 (1)

NMR: (1)

SOURCES: Magnoliaceae: *Liriodendron* (1)\*Liridinine and lirinine are **186** and **13** (revised structure), respectively, or *vice versa* (28).**187 3-HYDROXYNUCIFERINE**C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

MP: 150-152° (161)

α<sub>28</sub><sup>D</sup>: -83.7 (c=1, CHCl<sub>3</sub>) (161)

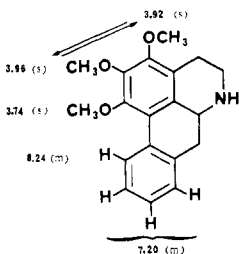
UV: 215 (4.69), 240 sh (4.28), 283 (4.49), 292 sh (4.46) (161)

IR: (KBr) 3200-3400 (161)

NMR: (161)

MASS: M<sup>+</sup> 311 (161)

SOURCES: Synthesis (161)

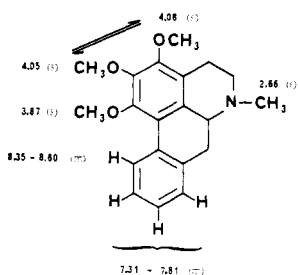
**188 O-METHYLISOPILINE**

(O-METHYLNORLIRININE)

C<sub>19</sub>H<sub>21</sub>O<sub>3</sub>N: 311.152134

NMR: (60)

Mass: M<sup>+</sup> 311, 310 (base), 296, 294, 282, 280, 165, 152 (60)SOURCES: Magnoliaceae: *Liriodendron* (28),  
Synthesis (60)

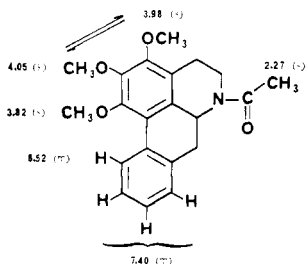
**189 3-METHOXYNUCIFERINE***(O-methyllyrinine\*)* $C_{20}H_{23}O_3N$ : 325.16783

MP: 105-106° (13) (161)

 $\alpha^{25}D$ : -112° ( $c=0.214$ ,  $CHCl_3$ ) (161)

UV: 212 (4.63), 228 sh (4.39), 275 (4.33) (161)

NMR: (161)

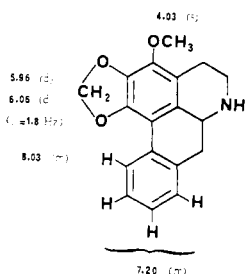
MASS:  $M^+$  325, 324 (base), 310, 294, 282, 165, 152 (60)SOURCES: Magnoliaceae: *Liriodendron* (175),  
Synthesis (13) (60) (161)\**O*-methyllyrinine 15: revised structure (28).**190 TULIFEROLINE** $C_{21}H_{23}O_4N$ : 353.162697

MP: 145-146° (68)

 $\alpha^{25}D$ : -330 ( $c=0.83$ ,  $CHCl_3$ ) (68)UV:  $(CH_3OH)$  224 (4.06), 273 (4.10) (68)

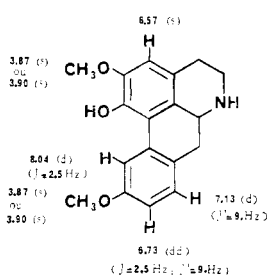
IR: (KBr) 1642 (68)

NMR: (68)

CD:  $(CH_3OH)$   $\theta_{210} +105100$ ,  $\theta_{224} 0$ ,  $\theta_{235} -300900$ ,  $\theta_{251} 0$ ,  
 $\theta_{277} +46800$  (68)SOURCES: Magnoliaceae: *Liriodendron* (67) (68)**191 NORSTEPHALAGINE** $C_{17}H_{17}O_3N$ : 295.120835

UV: 214, 241, 275 (113)

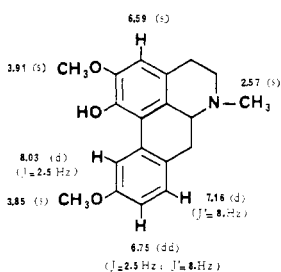
NMR: (113)

SOURCES: Annonaceae: *Xylopia* (113)**192 ZENKERINE** $C_{18}H_{16}O_3N$ : 297.136485

UV: 222, 264, 274, 307 (23)

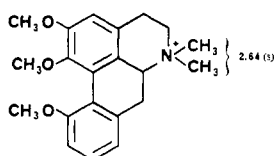
IR:  $(CHCl_3)$  3520 (23)

NMR: (23)

MASS:  $M^+$  297, 282, 280, 267, 266 (base), 252, 250,  
238, 236, 223 (23)SOURCES: Annonaceae: *Isolona* (23) (60)**193 PULCHINE (*N*-methylzenkerine)** $C_{19}H_{21}O_3N$ : 311.152134

NMR: (23)

MASS:  $M^+$  311,  $M^{++}$  155.5, 310, 296, 281, 268, 266,  
264 (23)SOURCES: Lauraceae: *Ocotea* (37), Synthesis (23)



3 methoxy at 3.59

4 aromatic H at 6.50 (1H), 6.64 (1H), 6.86 (2H)

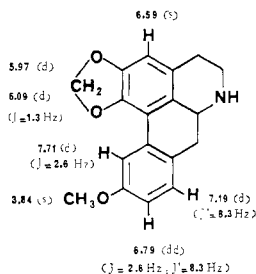
**194 ZANTHOXYPHYLLINE**C<sub>21</sub>H<sub>26</sub>O<sub>3</sub>N<sup>+</sup> X<sup>-</sup>: 340.191257

UV: 230, 278 sh, 310 (148)

IR: (KBr) 725, 735, 772, 805, 840, 1050, 1065, 1120, 1160, 1215, 1235, 1252, 1311, 1379, 1450, 1512, 1598, 1635, 3400 (hydroxide) (148)

NMR: (CF<sub>3</sub>COOD) (hydroxide) (148)\*  
MASS: 339, 283, 268, 255, 212, 167, 165, 152, 58 (base) (148)SOURCES: Rutaceae: *Zanthoxylum* (148)

\*Assignments are doubtful.



5.97 (d)

6.09 (d)

(J = 1.3 Hz)

7.71 (d)

(J = 2.6 Hz)

3.84 (s)

CH<sub>3</sub>O

7.19 (d)

(J = 8.3 Hz)

6.79 (dd)

(J = 2.6 Hz, J = 8.3 Hz)

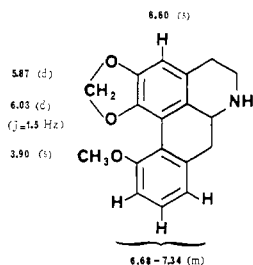
**195 NORLAURELINE**C<sub>15</sub>H<sub>17</sub>O<sub>2</sub>N: 295.120835

MP: 208–209° (N-acetyl) (66)

α<sub>D</sub><sup>25</sup>: -336° (c = 0.25, CH<sub>3</sub>OH) (N-acetyl) (66)UV: (CH<sub>3</sub>OH) 220 (4.44), 266 (4.01), 276 (4.05), 310 (3.86) (N-acetyl) (66)

IR: (KBr) 1490, 1575, 1640 (N-acetyl) (66)

NMR: (N-acetyl) (66)

MASS: M<sup>+</sup> 337, 294, 279, 278, 267, 266, 265 (base), 165 (N-acetyl) (66)SOURCES: Annonaceae: *Guatteria* (64) (66)

5.87 (d)

6.03 (d)

(J = 1.3 Hz)

3.90 (s)

CH<sub>3</sub>O

6.68–7.34 (m)

**196 PUTERINE**C<sub>15</sub>H<sub>17</sub>O<sub>2</sub>N: 295.120835

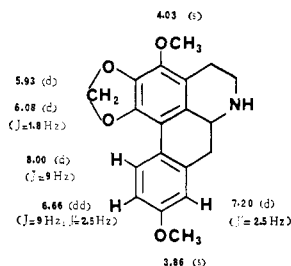
MP: 179–182° (N-acetyl) (66)

α<sub>D</sub>: -231° (c = 0.95, C<sub>2</sub>H<sub>5</sub>OH) (115)

UV: 265 sh (4.11), 274 (4.17), 295 (3.91) (115)

IR: (KBr) 755, 780, 940, 980, 1045, 1085, 1130, 1220, 1265, 1285, 1385, 1415, 1430, 1450, 1475, 1575, 1595, 2830, 2890, 2930, 3360 (115)

NMR: (115)

MASS: M<sup>+</sup> 295, 294 (base), 280, 266, 265, 264, 250, 236, 165, 152, 149 (115)SOURCES: Annonaceae: *Guatteria* (66), *Duguetia* (115)

5.93 (d)

6.08 (d)

(J = 1.8 Hz)

8.00 (d)

(J = 9 Hz)

6.86 (dd)

(J = 9 Hz, J = 2.5 Hz)

3.86 (s)

OCH<sub>3</sub>

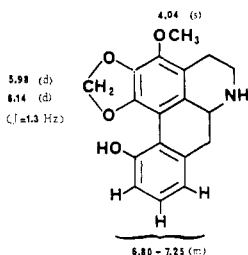
7.20 (d)

(J = 2.5 Hz)

**197 BUXIFOLINE**C<sub>16</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

UV: 240, 278 (113)

NMR: (113)

MASS: M<sup>+</sup> 325, 324, 296, 294, 280, 278, 264, 192, 165, 152 (113)SOURCES: Annonaceae: *Xylopi*a (113)

5.99 (d)

6.14 (d)

(J = 1.3 Hz)

6.80–7.25 (m)

**198 ELMERRILLICINE**C<sub>18</sub>H<sub>17</sub>O<sub>4</sub>N: 311.115749

MP: 201–203° (N-acetyl) (33)

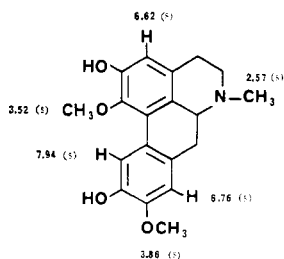
UV: (CH<sub>3</sub>OH) 221 (4.60), 241 sh (4.27), 271 sh (4.14), 277 (4.17), 298 (4.01) (N-acetyl) (33)

NMR: (N-acetyl) (33)

MASS: 353, 322, 321, 310, 309, 294, 282, 281 (base), 279, 266, 252, 251, 165, 152 (N-acetyl) (33)

SOURCES: Magnoliaceae: *Elmerrillia* (33)

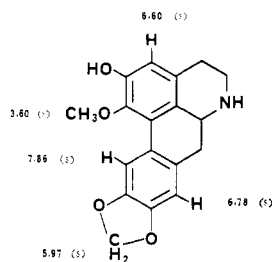


**199 LIRIOTULIPIFERINE**C<sub>19</sub>H<sub>21</sub>O<sub>4</sub>N: 327.147048

MP: 184–186° (30)

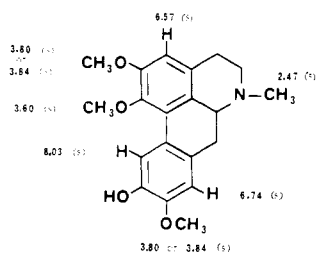
αD: +174° (CCl<sub>4</sub>) (30)UV: (CH<sub>3</sub>OH) 218 (4.54), 274 sh (4.06), 281 (4.12), 303 (4.10), 313 sh (4.03) (30)

NMR: (30)

MASS: M<sup>+</sup> 327 (base), 326, 313, 312, 311, 297, 296, 284, 269 (30)SOURCES: Magnoliaceae: *Liriodendron* (30)**200 NORISODOMESTICINE**C<sub>18</sub>H<sub>17</sub>O<sub>4</sub>N: 311.115749

UV: 220, 283, 310 (62)

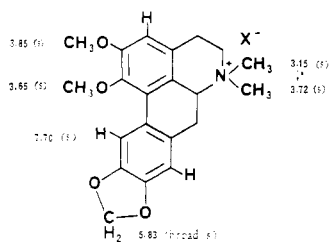
NMR: (62)

SOURCES: Annonaceae: *Xylopia* (62)**201 LIRIOFERINE**C<sub>20</sub>H<sub>23</sub>O<sub>4</sub>N: 341.162697

MP: 173–174° (30)

αD: +128.6° (CHCl<sub>3</sub>) (30)UV: (CH<sub>3</sub>OH) 220 (4.50), 273 sh (4.02), 280 (4.09), 303 (4.07), 312 sh (4.02) (30)

NMR: (30)

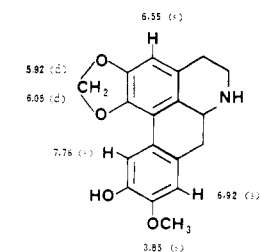
MASS: M<sup>+</sup> 341 (base), 340, 339, 327, 326, 311, 310, 298, 296, 295, 283, 268, 267 (30)<sup>13</sup>C NMR: 144.0 (C-1), 151.4 (C-2), 110.5 (C-3), 111.0 (C-8), 146.1 (C-9), 144.3 (C-10), 115.0 (C-11) (138)SOURCES: Magnoliaceae: *Liriodendron* (30)**202 N-METHYLNANTENINE**C<sub>21</sub>H<sub>24</sub>O<sub>4</sub>N<sup>+</sup> X<sup>-</sup>: 354.170522

MP: 213–214° (127)

αD: +39° (C<sub>2</sub>H<sub>5</sub>OH) (127)

UV: 225 (4.24), 278 sh (3.65), 285 (3.79), 310 (3.94), 320 sh (3.84) (127)

NMR: (127)

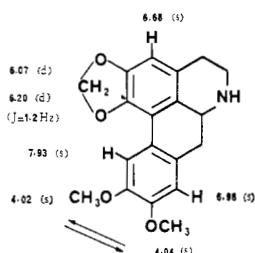
SOURCES: Ranunculaceae: *Thalictrum* (127)**203 LITSEFERINE**C<sub>18</sub>H<sub>17</sub>O<sub>4</sub>N: 311.115749

MP: 258° (132)

UV: 282 (4.10), 310 (4.12) (132)

NMR: (O,N-diacetate) (132)

SOURCES: Lauraceae: *Litsea* (132)

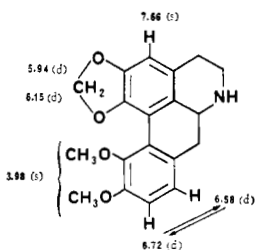
**204 NORDICENTRINE**C<sub>19</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

MP: 254–255° (dec.) (31)

 $\alpha^D_{25}$ : +31° (c=0.65, CH<sub>3</sub>OH) (31)

UV: 216 (4.32), 277 (3.99), 302 (4.04), 309 sh (4.03) (31)

IR: 940, 1050 (31)

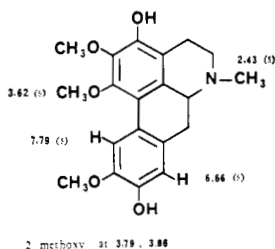
NMR: (CF<sub>3</sub>COOH) (31)SOURCES: Lauraceae: *Lindera* (31)**205 LITSEDINE**C<sub>19</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

MP: 182–183° (110)

UV: 285 (3.93), 308 (4.11) (110)

IR: 2780, 3350 (110)

NMR: (110)\*

MASS: M<sup>+</sup> 325, 296, 165, 152 (110)SOURCES: Lauraceae: *Litsea* (110)\*Assignments are very doubtful; this alkaloid should be nordicentrine **204**.**206 DELPORPHINE**C<sub>20</sub>H<sub>25</sub>O<sub>5</sub>N: 357.157612

MP: 116–117° (117)

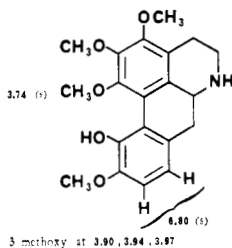
 $\alpha^D_{25}$ : +68° (c=0.25, CH<sub>3</sub>OH) (117)

IR: 1520, 1595, 3420 (117)

NMR: (100 MHz) (117)

MASS: M<sup>+</sup> 357 (base), 356, 342, 340, 326, 314, 283 (117)SOURCES: Ranunculaceae: *Delphinium* (117)

2 methoxy at 3.79, 3.88

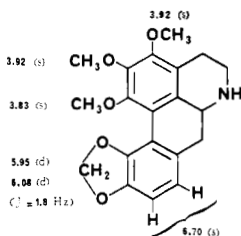
**207 NOROCONOVINE**C<sub>20</sub>H<sub>25</sub>O<sub>5</sub>N: 357.157612

UV: 221, 274, 307 sh (55)

NMR: (55)

MASS: M<sup>+</sup> 357, 356, 342, 340, 328, 327, 326, 312, 311, 310, 297, 296 (55)SOURCES: Annonaceae: *Polyalthia* (55)

3 methoxy at 3.90, 3.94, 3.97

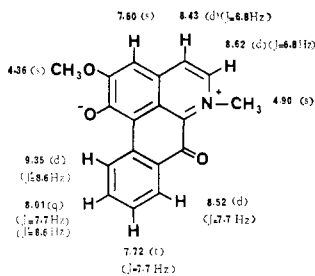
**208 POLYGOSPERMINE**C<sub>20</sub>H<sub>21</sub>O<sub>5</sub>N: 355.141962

UV: 222, 276, 306 sh (55)

NMR: (55)

MASS: M<sup>+</sup> 355, 354, 340, 326, 325, 324, 311, 310 (55)Sources: Annonaceae: *Polyalthia* (55)



**214 O,N-DIMETHYLIRIODENDRONINE** $C_{18}H_{18}O_3N$ : 291.089537

(zwitterionic oxoaporphine)

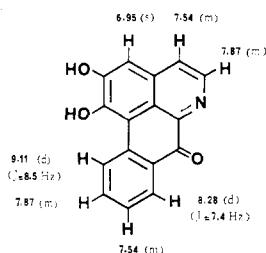
MP: 275–278° (dec.) (120)

UV: (CH<sub>3</sub>OH) 247 sh (4.03), 311 (4.29), 420 (3.46), 585 (3.44), 6.02 (3.44) [(HCl) 251 (4.16), 286 (4.16), 387 (3.56), 473 (3.37)] (120)

IR: (KBr) 765, 796, 855, 1210, 1255, 1300, 1538, 1585, 1628, 2850, 2920, 2950 (120)

NMR: (CF<sub>3</sub>COOD) (120)MASS:  $M^+$  291 (base), 290, 277, 276, 263, 262, 261, 249, 220, 219, 218, 190, 177, 176, 163, 151, 150, 149, 136 (120)

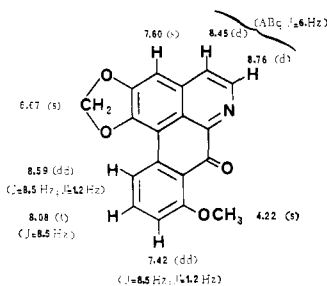
SOURCES: Synthesis (116) (120)

**215 LIRIODENDRONINE** $C_{18}H_{16}O_3N$ : 263.058238

MP: 265–270° (dec.) (120)

UV: (CH<sub>3</sub>OH) 260 (4.08), 297 (3.84), 543 (3.75), 569 sh (3.73); [(HCl) 253 (4.12), 261 sh (4.08), 278 sh (3.88), 477 (3.56), 602 sh (3.06)] (120)

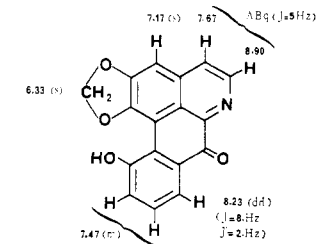
IR: (KBr) 770, 800, 850, 1565, 1650, 3220, 3305 (120)

NMR: (CF<sub>3</sub>COOD) (120)MASS:  $M^+$  263, 236, 235 (base), 234, 207, 206, 179, 178, 177, 164, 163, 152, 151, 150 (120)SOURCES: Magnoliaceae: *Liriiodendron* (120)**216 OXOSTEPHANINE** $C_{18}H_{11}O_4N$ : 305.068802

MP: 270–272° (159)

UV: (CH<sub>3</sub>OH) 248 (4.23), 270 (4.15), 308 (2.90), 356 (3.41); [(HCl) 258 (4.30), 287 (4.14), 324 (3.11)] (159)

IR: 1016, 1045, 1130, 1193, 1232, 1250, 1270, 1283, 1308, 1365, 1406, 1495, 1573, 1592, 1660 (159)

NMR: (CF<sub>3</sub>COOD) (159)MASS:  $M^+$  305 (base), 276 (159)SOURCES: Annonaceae: *Polyalthia* (24)  
Menispermaceae: *Stephania* (159)**217 OXOPUKATEINE**

(11-Hydroxy-1,2-methylenedioxyoxoaporphine)

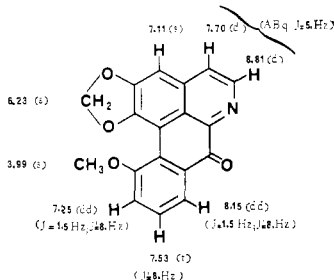
 $C_{17}H_9O_4N$ : 291.053152

MP: 255–257° (52)

UV: 248 (4.14), 260 sh (3.92), 274 (4.04), 311 (3.39) (52)

IR: (KBr) 976, 1050, 1066, 1309, 1460, 1580, 1600, 1660, 3250 (52)

NMR: (52)

MASS:  $M^+$  291, 275, 247, 246, 177, 85, 83, 78 (52)SOURCES: Annonaceae: *Duguetia* (52)**218 OXOPUTERINE** $C_{17}H_{11}O_4N$ : 305.068802

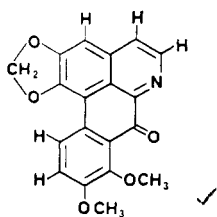
MP: 241–243° (dec.) (65)

UV: (CH<sub>3</sub>OH) 250 (4.52), 278 (4.46), 320 (3.78), 432 (4.06) (65)

IR: (KBr) 1010, 1040, 1210, 1250, 1265, 1290, 1415, 1450, 1500, 1565, 1585, 1660 (65)

NMR: (65)

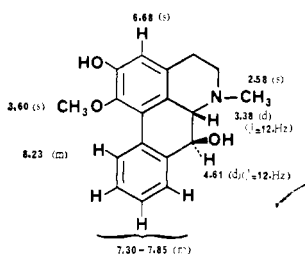
MASS:  $M^+$  305 (base), 290, 262, 234, 206, 204, 176 (65)SOURCES: Annonaceae: *Duguetia* (52) (115), *Guat-teria* (63) (65)



**219** 1,2-METHYLENEDIOXY-8,9-DIMETHOXYOAPORPHINE

$C_{19}H_{13}O_5N$ : 335.079365

SOURCES: Hernandiaceae: *Hernandia* (173)



**220** PACHYCONFINE

$C_{15}H_{19}O_2N$ : 297.136485

MP: 198° (HCl) (8)

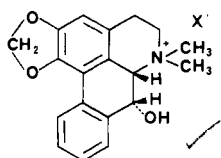
$\alpha_D$ : -150° ( $c=0.7$ ,  $CHCl_3$ ) (8)

UV: 227 (4.29), 274 (4.18), 307 (3.65) (8)

NMR: (8)

MASS:  $M^+$  297, 296, 282, 266, 248, 192 (8)

SOURCES: Annonaceae: *Pachypodanthium* (8)



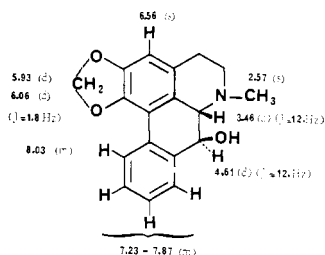
**221** N-METHYLUSHINSUNINE

$C_{19}H_{20}O_3N^+ X^-$ : 310.144309

MP: 235-237° (33)

$\alpha_D$ : -118° ( $c=1$ ,  $CHCl_3$ ) (33)

SOURCES: Magnoliaceae: *Elmerrillia* (33), Synthesis (171)



**222** OLIVEROLINE

$C_{15}H_{17}O_2N$ : 295.120835

MP: 152° (58)

$\alpha_D$ : -64° ( $c=0.5$ ,  $CHCl_2$ ) (58)

UV: 235 (4.03), 275 (4.08), 315 (3.56) (58)

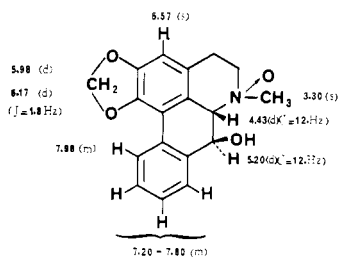
NMR: (58)

MASS:  $M^+$  295, 294, 277, 252, 190, 165, 130, 105, 91 (58)

$^{13}C$  NMR: ( $CDCl_3$ ) 142.4 (C-1), 116.5 (C-1a), 123.4 (C-1b), 146.8 (C-2), 107.4 (C-3), 127.6 (C-3a), 22.8 (C-4), 48.9 (C-5), 64.6 (C-6a), 69.8 (C-7), 138.8 (C-7a), 123.8 (C-8), 127.6\* (C-9), 127.8\* (C-10), 127.0 (C-11), 128.6 (C-11a), 40.6 (N-Me) (78)

SOURCES: Annonaceae: *Pachypodanthium* (8), *Polyalthia* (24) (58)

\*Signals may be reversed.



**223** OLIVEROLINE N-OXIDE

$C_{15}H_{17}O_4N$ : 311.115749

MP: 138° (58)

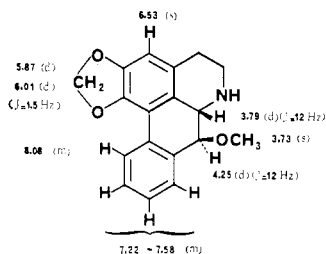
$\alpha_D$ : -154° ( $c=0.4$ ,  $C_2H_5OH$ ) (58)

UV: 237 (4.14), 274 (4.05), 314 (3.53) (58)

NMR: (58)

MASS:  $M^+$  311, 295, 294, 192, 122, 106, 85, 83 (58)

SOURCES: Annonaceae: *Polyalthia* (58)

**224 PACHYPODANTHINE**C<sub>15</sub>H<sub>17</sub>O<sub>3</sub>N: 295.120835

MP: 127° (9)

 $\alpha$ D: +38° (c=0.8, C<sub>2</sub>H<sub>5</sub>OH) (9)

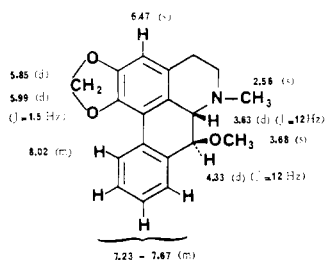
UV: 232 (4.20), 274 (4.25), 318 (3.58) (9)

NMR: (9)

MASS: M<sup>-</sup> 295, 280, 263, 251, 165, 147.5 (9)

<sup>13</sup>C NMR: (CDCl<sub>3</sub>) 141.8 (C-1), 114.8 (C-1a), 124.7 (C-1b), 146.7 (C-2), 107.9 (C-3), 127.2 (C-3a), 29.1 (C-4), 42.7 (C-5), 60.4 (C-6a), 83.2 (C-7), 136.4 (C-7a), 123.1 (C-8), 127.4 (C-9), 127.4 (C-10), 126.7 (C-11), 129.6 (C-11a) (78)

SOURCES: Annonaceae: *Pachypodanthium* (9),  
*Polyalthia* (24) (58)

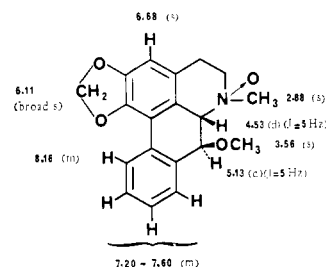
**225 N-METHYLPACHYPODANTHINE**C<sub>16</sub>H<sub>19</sub>O<sub>3</sub>N: 309.136485

MP: 250° (dec.) (HCl) (10)

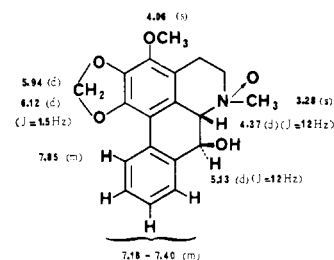
 $\alpha$ D: +24° (c=0.8, C<sub>2</sub>H<sub>5</sub>OH) (10)

UV: 235 (4.02), 273 (4.03), 317 (3.45) (10)

NMR: (10)

MASS: M<sup>-</sup> 309, 295, 294 (base), 277, 251, 236 (10)SOURCES: Annonaceae: *Pachypodanthium* (10)**226 N-METHYLPACHYPODANTHINE N-OXIDE**C<sub>16</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

NMR: (58)

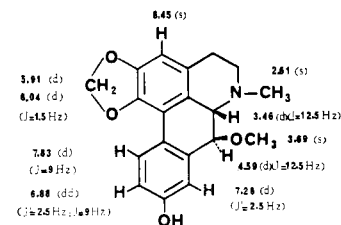
MASS: M<sup>+</sup> 325, 309, 308, 307, 294, 280, 266, 251 (58)SOURCES: Annonaceae: *Polyalthia* (58)**227 GUATTERINE N-OXIDE**C<sub>19</sub>H<sub>19</sub>O<sub>3</sub>N: 341.126313

MP: 196° (8)

 $\alpha$ D: -43° (c=0.8, CHCl<sub>3</sub>) (8)

UV: 244 (4.29), 281 (4.24) (8)

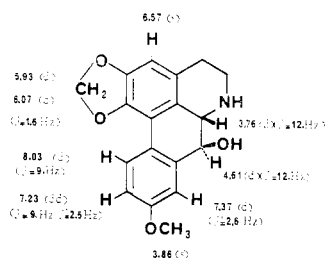
NMR: (8)

MASS: M<sup>+</sup> 341, 325, 324, 307 (base), 305, 290, 275, 260 (8)SOURCES: Annonaceae: *Pachypodanthium* (8)**228 POLYSUAVINE**C<sub>19</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

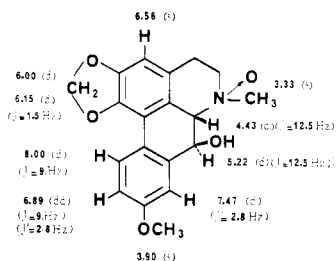
UV: 232, 282 (24)

NMR: (24)

SOURCES: Annonaceae: *Polyalthia* (24)

**229 NOROLIVERIDINE** $C_{15}H_{17}O_4N$ : 311.126139

NMR: (58)

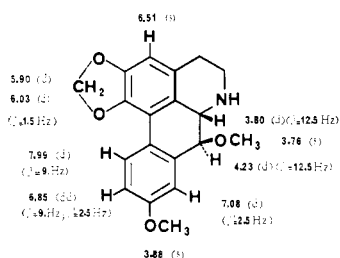
MASS:  $M^-$  311, 310, 293, 281 (base), 280 (base), 263, 262, 252, 251, 176, 149 (58)SOURCES: Annonaceae: *Polyalthia* (58)**230 OLIVERIDINE N-OXIDE** $C_{15}H_{17}O_5N$ : 341.126313

MP: 208-209° (104)

 $\alpha_D$ : -51° (c=0.6,  $C_2H_5OH$ ) (104)

UV: 222 (4.42), 240 sh (4.15), 287 (4.28), 320 sh (3.88) (104)

NMR: (104)

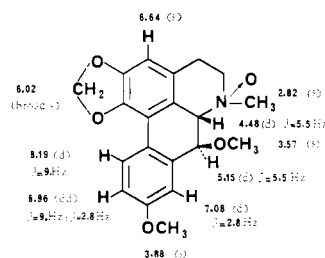
MASS:  $M^-$  341, 325, 324, 308, 307, 305, 282 (base), 281 (104)SOURCES: Annonaceae: *Enantia* (104)**231 NOROLIVERINE** $C_{15}H_{19}O_4N$ : 325.131399

MP: 280-282° (dec.) (HCl) (24)

 $\alpha_D$ : +65° (c=0.5,  $C_2H_5OH$ ) (HCl) (24)

UV: 217 (4.38), 235 (4.06), 282 (4.21), 320 (3.64) (24)

NMR: (24)

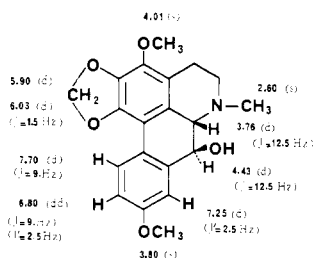
MASS:  $M^-$  325, 324, 311, 310 (base), 281, 280, 162 (24)SOURCES: Annonaceae: *Polyalthia* (24)**232 OLIVERINE N-OXIDE** $C_{20}H_{21}O_5N$ : 355.141962

MP: 134° (104)

 $\alpha_D$ : +111° (c=0.9,  $C_2H_5OH$ ) (104)

UV: 223 (4.38), 238 sh (4.03), 283 (4.18), 317 sh (3.70) (104)

NMR: (104)

MASS:  $M^-$  355, 339, 337, 324, 322, 297, 296 (base), 295, 281, 265, 253 (104)SOURCES: Annonaceae: *Enantia* (104), *Isolona* (61)**233 POLYALTHINE** $C_{20}H_{21}O_5N$ : 355.141962

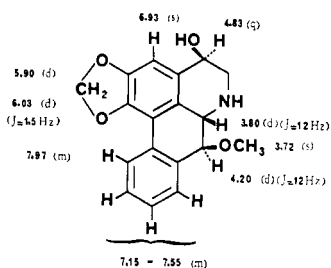
MP: 274° (dec.) (24)

 $\alpha_D$ : +11° (c=0.8,  $CH_3OH$ ) (24)

UV: 246 (4.18), 287 (4.25) (24)

NMR: (24)

MASS:  $M^-$  355, 354, 340, 337 (base), 325, 312 (24)SOURCES: Annonaceae: *Polyalthia* (24)

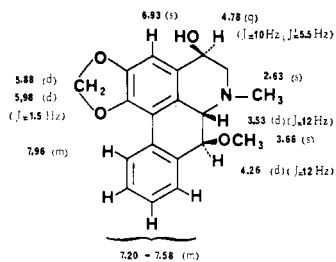
**234 NORPACHYSTAUDINE**C<sub>15</sub>H<sub>17</sub>O<sub>4</sub>N: 311.115749

MP: 214–216° (10)

 $\alpha$ D: +5° (c=0.5, CHCl<sub>3</sub>) (10)

UV: 237 (4.16), 274 (4.18), 315 (3.50) (10)

NMR: (10)

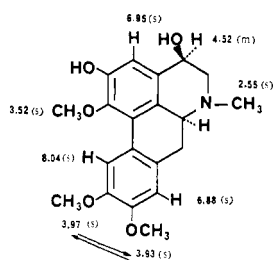
MASS: M<sup>+</sup> 311, 296, 278, 261, 210, 162, 155.5, 128, 91 (10)SOURCES: Annonaceae: *Pachypodanthium* (10)**235 PACHYSTAUDINE**C<sub>19</sub>H<sub>19</sub>O<sub>4</sub>N: 325.131399

MP: 157° (10)

 $\alpha$ D: +34° (c=0.5, CHCl<sub>3</sub>) (10)

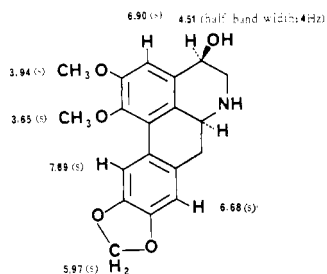
UV: 237 (4.24), 274 (4.20), 314 (3.58) (10)

NMR: (10)

MASS: M<sup>+</sup> 325, 310 (base), 307, 305, 292, 290, 275, 260 (10)SOURCES: Annonaceae: *Pachypodanthium* (10)**236 SRILANKINE**C<sub>20</sub>H<sub>23</sub>O<sub>5</sub>N: 357.157612 $\alpha$ D: +122° (c=0.18, CH<sub>3</sub>OH) (138)

UV: 210 (4.68), 277 (4.35), 301 (4.22) (138)

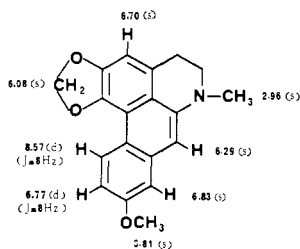
NMR: (138)

MASS: M<sup>+</sup> 357, 342, 327, 314 (base), 312, 254 (138)<sup>13</sup>C NMR: 143.8 (C-1), 125.8 (C-1a), 125.8 (C-1b), 149.0 (C-2), 114.4 (C-3), 131.8 (C-3a), 66.2 (C-4), 60.6 (C-5), 62.8 (C-6a), 33.7 (C-7), 128.7 (C-7a), 110.9 (C-8), 148.7 (C-9), 148.1 (C-10), 111.4 (C-11), 123.9 (C-11a), 43.5 (N-Me), 60.4 (C-1 OMe), 55.9 (C-9 OMe), 56.2 (C-10 OMe) (138)SOURCES: Lauraceae: *Alseodaphne* (138)**237 4-HYDROXYNANTÉNINE**C<sub>19</sub>H<sub>19</sub>O<sub>5</sub>N: 341.126313

MP: 179–181° (N,O-diacetyl) (155)

IR: (KBr) 1640, 1770 (N,O-diacetyl) (155)

NMR: (155)

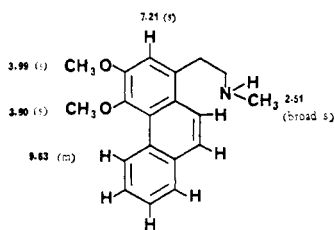
SOURCES: Monimiaceae: *Laurelia* (155), *Laureliopsis* (154)**238 DEHYDROISOLAURELINE**C<sub>19</sub>H<sub>17</sub>O<sub>5</sub>N: 307.120835

MP: 143–145° (177)

UV: 264 (4.75), 334 (4.08) (177)

NMR: (CCl<sub>4</sub>) (100 MHz) (177)SOURCES: Magnoliaceae: *Liriodendron* (177)





5 aromatic H at 7.50 - 7.93

**239 NORATHEROSPERMININE**

$C_{19}H_{21}O_2N$ : 295.157220

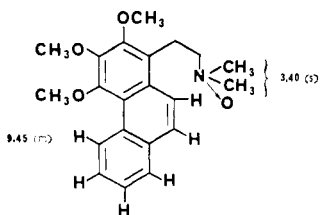
MP: 180° (11)

UV: 235 (4.27), 251 (4.58), 258 (4.62), 279 (3.97), 306 (3.99), 314 (3.97) (11)

NMR: (11)

MASS:  $M^+$  295, 252, 251, 237, 209, 207, 178, 165, 152, 151, 44 (base) (11)

SOURCES: Annonaceae: *Duguetia* (114), Synthesis (11)



3 methoxy at 3.94 (2H), 4.01 (6H)

5 aromatic H at 7.47 - 8.10

**240 METHOXYATHEROSPERMININE**

*N*-OXIDE

$C_{21}H_{25}O_4N$ : 355.178347

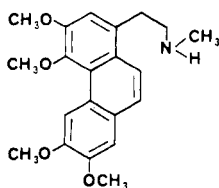
MP: 189° (picrate) (91)

UV: 216 (4.40), 260 (4.80), 284 sh (4.16), 296 (4.05), 308 (4.16) (91)

NMR: (91)

MASS:  $M^+$  355, 339, 294 (base) (91)

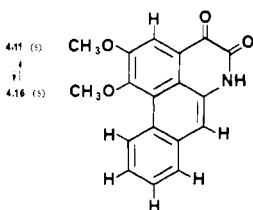
SOURCES: Menispermaceae: *Meiocarpidium* (91)

**241 1-METHYLAMINOETHYL 3,4,6,7-TETRAMETHOXYPHENANTHRENE**

$C_{21}H_{25}O_4N$ : 355.178347

MP: 254-255° (HCl) (100)

SOURCES: Synthesis (100)



6 aromatic H at 7.60 - 9.52

**242 NORCEPHARADIONE B**

$C_{15}H_{15}O_4N$ : 307.084451

MP: 304-307° (dec.) (5)

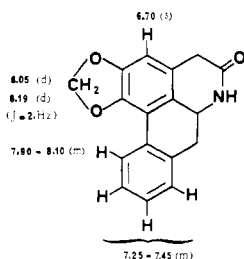
UV: 213 (4.55), 241 (4.60), 303 (4.24), 315 (4.27), 440 (4.22) (5)

IR: (KBr) 1650, 1668 (5)

NMR: (5)

MASS:  $M^+$  307, 279, 264, 236, 221, 193, 165 (5)

SOURCES: Menispermaceae: *Stephania* (5)



7.25 - 7.45 (m)

**243 FUSEINE**

$C_{17}H_{15}O_3N$ : 279.089537

MP: 180° (subl.), 280° (dec.) (16)

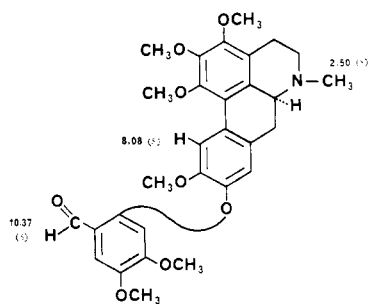
UV: 235 (4.48), 273 (4.55), 317 (3.91) (16)

IR: (KBr) 760, 1680, 3200 (16)

NMR: (DMSO) (16)

MASS:  $M^+$  279 (base), 278, 236, 235, 221, 220 (16)

SOURCES: Annonaceae: *Fusea* (16)



6 methoxy at 3.79, 3.81, 3.91 (6H), 3.93, 3.96  
 7 aromatic H at 6.45, 6.77, 7.40

**244 THALIADINE**

$C_{30}H_{35}O_5N$ : 535.261007

MP: 143–144° (94)

$\alpha_{D}^{26}$ : 0° (c=0.22,  $CHCl_3$ ) (94)

UV: 220 (4.62), 237 sh (4.48), 277 (4.50), 300 (4.30),  
 312 (4.30), 337 sh (4.01) (94)

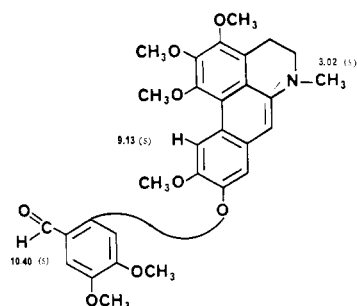
IR: ( $CHCl_3$ ) 1675 (94)

NMR: (94)

MASS:  $M^+$  535 (base) (94)

CD:  $\theta_{240} +214000$ ,  $\theta_{275} -37500$ ,  $\theta_{300} -23600$  (94)

SOURCES: Ranunculaceae: *Thalictrum* (94)



6 methoxy at 3.75, 3.83, 3.94, 3.99, 4.00, 4.07  
 4 aromatic H at 6.48 (2H), 7.07, 7.42

**245 DEHYDROTHALIADINE**

$C_{30}H_{31}O_5N$ : 533.245349

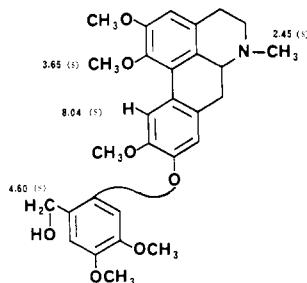
MP: 147–148° (94)

UV: 257 (4.68), 272 (4.67), 330 (4.24) (94)

NMR: (94)

MASS:  $M^-$  533 (base) (94)

SOURCES: Synthesis (94)



3 methoxy at 3.73, 3.85 (9H)  
 4 aromatic H at 6.47, 6.88, 6.53(m 2H)

**246 HERNANDALINOL**

$C_{29}H_{35}O_7N$ : 507.266093

MP: 95–100° (103)

$\alpha_{D}^{26}$ : +35° (c=1.03,  $C_2H_5OH$ ) (103)

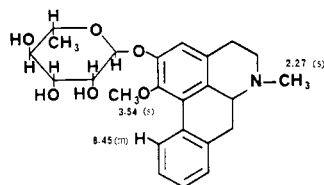
UV: 283 (4.24), 303 (4.16) (103)

IR: 3431 (103)

NMR: (103)

MASS: 508,  $M^+$  507 (base), 506, 492, 476 (103)

SOURCES: Microbial transformation; synthesis (103)



4 aromatic H at 6.70–7.25  
 3 H at 4.83(m), 4.33(m), 5.95 (s)  
 3 H at 1.51 (s) (1:5:1:2)

**247 FLORIPAVIDINE**

$C_{24}H_{29}O_6N$ : 427.199471

MP: 241–242° (74)

$\alpha_D$ :  $-156^\circ$  (C=1.6,  $CH_2OH$ ) (74)

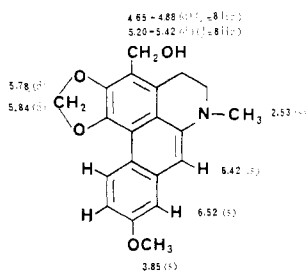
UV: 229 sh (4.37), 273 (4.25), 310 (4.35) (74)

IR: 1000, 1200, 1500, 1595, 3430, 3575 (74)

NMR: (100 MHz) (74)

MASS:  $M^+$  427, 281, 280, 266, 250, 238 (74)

SOURCES: Papaveraceae: *Papaver* (74)

**248 CABUDINE**C<sub>20</sub>H<sub>19</sub>O<sub>4</sub>N; 337.131399

MP: 184-185° (87)

UV: (CH<sub>3</sub>OH) 220, 280, 291, 320 (87)

IR: 931, 1060, 2780, 2885, 3450 (87)

NMR: (87)\*

MASS: M<sup>+</sup> 337, 336 (base), 335, 294 (87)SOURCES: Ranunculaceae: *Thalictrum* (87)

\*Assignments are doubtful.

TABLE 5. Calculated molecular weights of new aporphine alkaloids.

263.058238 C <sub>16</sub> H <sub>9</sub> O <sub>3</sub> N Liriodendronine <b>215</b>	311.152134 C <sub>19</sub> H <sub>21</sub> O <sub>3</sub> N N-Methylisopiline <b>185</b> Liridinine <b>186</b> 3-Hydroxynuciferine <b>187</b> O-Methylisopiline <b>188</b> Pulehine <b>193</b>
279.089537 C <sub>17</sub> H <sub>13</sub> O <sub>3</sub> N Fuseine <b>243</b>	325.131399 C <sub>19</sub> H <sub>19</sub> O <sub>4</sub> N Buxifoline <b>197</b> Nordicentrine <b>204</b> Litsedine <b>205</b> N-Methylpachypodanthine N-oxide <b>226</b> Polysuavine <b>228</b> Noroliverine <b>231</b> Pachystaudine <b>235</b>
291.053152 C <sub>17</sub> H <sub>9</sub> O <sub>4</sub> N Oxopukateine <b>217</b>	325.167783 C <sub>21</sub> H <sub>23</sub> O <sub>3</sub> N 3-Methoxynuciferine <b>189</b>
291.089537 C <sub>18</sub> H <sub>13</sub> O <sub>3</sub> N O,N-Dimethyliriodendronine <b>214</b>	327.147048 C <sub>19</sub> H <sub>21</sub> O <sub>4</sub> N Liriotulipiferine <b>199</b>
295.120835 C <sub>18</sub> H <sub>17</sub> O <sub>3</sub> N Norstephalagine <b>191</b> Norlaureline <b>195</b> Puterine <b>196</b> Oliveroline <b>222</b> Pachypodanthine <b>224</b>	335.079365 C <sub>19</sub> H <sub>19</sub> O <sub>5</sub> N 1,2-Methylenedioxy 8,9-dimethoxy- oxoaporphine <b>219</b>
295.157220 C <sub>19</sub> H <sub>21</sub> O <sub>3</sub> N Noratherosperminine <b>239</b>	337.131399 C <sub>20</sub> H <sub>19</sub> O <sub>4</sub> N N-Demethylthalphenine <b>213</b> Cabudine <b>248</b>
297.136485 C <sub>18</sub> H <sub>19</sub> O <sub>3</sub> N Isopiline <b>184</b> Zenkerine <b>192</b> Pachyconfine <b>220</b>	340.191257 C <sub>21</sub> H <sub>23</sub> O <sub>3</sub> N <sup>-</sup> Zanthoxyphilline <b>194</b>
305.068802 C <sub>18</sub> H <sub>11</sub> O <sub>4</sub> N Oxostephanine <b>216</b> Oxoputerine <b>218</b>	341.126313 C <sub>19</sub> H <sub>19</sub> O <sub>5</sub> N Guatterine N-oxide <b>227</b> Oliveridine N-oxide <b>230</b> 4-Hydroxynantenine <b>237</b>
307.084451 C <sub>18</sub> H <sub>13</sub> O <sub>4</sub> N Norcepharadione B <b>242</b>	341.162697 C <sub>20</sub> H <sub>23</sub> O <sub>4</sub> N Lirioferine <b>201</b>
307.120836 C <sub>19</sub> H <sub>17</sub> O <sub>3</sub> N N-Acetylanonaine <b>183</b> Dehydroisolaureline <b>238</b>	353.162697 C <sub>21</sub> H <sub>23</sub> O <sub>4</sub> N Tuliferoline <b>190</b>
309.136485 C <sub>19</sub> H <sub>19</sub> O <sub>3</sub> N N-Methylpachypodanthine <b>225</b>	354.170522 C <sub>21</sub> H <sub>21</sub> O <sub>4</sub> N <sup>-</sup> N-Methylnantenine <b>202</b>
310.144309 C <sub>19</sub> H <sub>20</sub> O <sub>3</sub> N <sup>+</sup> N-Methylushinsunine <b>221</b>	355.141962 C <sub>20</sub> H <sub>21</sub> O <sub>5</sub> N Polygospermine <b>208</b> Leucoxine <b>210</b> Oliveridine N-oxide <b>232</b> Polyalthine <b>233</b>
311.115749 C <sub>18</sub> H <sub>17</sub> O <sub>4</sub> N Elmerrillicine <b>198</b> Norisodomeesticine <b>200</b> Litseferine <b>203</b> Oliveroline N-oxide <b>223</b> Noroliveridine <b>229</b> Norpachystaudine <b>234</b>	

355.178347 C <sub>21</sub> H <sub>25</sub> O <sub>4</sub> N	399.168175 C <sub>22</sub> H <sub>25</sub> O <sub>6</sub> N
Methoxyatherosperminine <i>N</i> -oxide <b>240</b>	Leucoxylophine <b>212</b>
1-Methylaminoethyl 3,4,6,7-tetra- methoxyphenanthrene <b>241</b>	
357.157612 C <sub>20</sub> H <sub>25</sub> O <sub>5</sub> N	427.199471 C <sub>24</sub> H <sub>29</sub> O <sub>6</sub> N
Delporphine <b>206</b>	Floripavidine <b>247</b>
Noroconovine <b>207</b>	507.266093 C <sub>29</sub> H <sub>35</sub> O <sub>7</sub> N
Srilankine <b>236</b>	Hernandalinol <b>246</b>
369.157612 C <sub>21</sub> H <sub>23</sub> O <sub>5</sub> N	533.245349 C <sub>30</sub> H <sub>31</sub> O <sub>8</sub> N
<i>N</i> -Methylpolygosperrine <b>209</b>	Dehydrothaliadine <b>245</b>
385.152526 C <sub>21</sub> H <sub>23</sub> O <sub>5</sub> N	535.261007 C <sub>30</sub> H <sub>33</sub> O <sub>8</sub> N
Ocoxylophine <b>211</b>	Thaliadine <b>244</b>

TABLE 6. Botanical sources of aporphine alkaloids.<sup>a</sup>

## ANNONACEAE

*Alphonsea*

Glaucine **59**  
Norglaucine **58**

*Annona*

Anolobine **16**  
Anonaine **7**  
Asimilobine **3**  
Isoboldine **40**  
Liriodenine **116**  
Nornuciferine **5**  
Norushinsunine **138**  
Roemerine **8**

*Cananga*

Anonaine **7**  
Liriodenine **116**  
Roemerine **8**  
Ushinsunine **139**

*Cleistopholis*

*O*-Methylmoschatoline **118**

*Duguetia*

*O*-Methylmoschatoline **118**  
*O*-Methylpukateine **36**  
Noratherosperminine **239**  
Obovanine **33**  
Oxopukateine **217**  
Oxoputerine **218**  
Puterine **196**  
Xylophine **18**

*Enantia*

Anonaine **7**  
Atherospermidine **119**  
Isoboldine **40**  
Isocorydine **85**  
Lanuginosine **120**  
Liriodenine **116**  
Lysicamine **115**  
Magnoflorine **72**  
Menisperine **86**  
*N*-Methyl-laurotetanine **55**  
*O*-Methylmoschatoline **118**  
Nornuciferine **5**  
Oliveridine **142**  
Oliveridine *N*-oxide **230**  
Oliverine **143**  
Oliverine *N*-oxide **232**

*Fusea*

Fuseine **243**  
Liriodenine **116**

*Guatteria*

Norlaureline **195**  
Oxolaureline **121**  
Oxoputerine **218**  
Puterine **196**

*Isolona*

Anonaine **7**  
Caaverine **1**  
Isopiline **184**  
Lirinidine **2**  
Liriodenine **116**  
Nornuciferine **5**  
Oliveridine **142**  
Oliverine **143**  
Oliverine *N*-oxide **232**  
Roemerine **8**  
Zenkerine **192**

*Pachypodanthium*

Guatterine **140**  
Guatterine *N*-oxide **227**  
Liriodenine **116**  
*N*-Methylpachypodanthine **225**  
Norpachystaudine **234**  
Oliveroline **222**  
Pachyconfine **220**  
Pachypodanthine **224**  
Pachystaudine **235**

*Polyalthia*

Anonaine **7**  
Guatterine **140**  
Lanuginosine **120**  
Liriodenine **116**  
Lysicamine **115**  
*N*-Methylcorydine **75**  
*N*-Methylpachypodanthine *N*-oxide **226**  
Noroconovine **207**  
Noroliveridine **229**  
Noroliverine **231**  
Oliveridine **142**  
Oliverine **143**  
Oliveroline **222**  
Oliveroline *N*-oxide **223**

<sup>a</sup>Excluding those previously tabulated in *Lloydia*, **38**, 275 (1975).

- Oxostephanine 216  
 Pachypodanthine 224  
 Polyalthine 233  
 Polygosperrine 208  
 Polysuavine 228  
*Uvaria*  
 Asimilobine 3  
 Glaucine 59  
 Isoboldine 40  
 Thaliporphine 44  
*Xylophia*  
 Anonaine 7  
 Buxifoline 197  
 Corydine 74  
 Isoboldine 40  
 Lanuginosine 120  
 Laurotetanine 54  
 Liriodenine 116  
 Norecorydine 73  
 Norisocorydine 84  
 Norisodomecicine 200  
 Nornantenine 61  
 Nornuciferine 5  
 Norstephalagine 191  
 Roemerine 8  
 Xylophine 18
- ARISTOLOCHIACEAE
- Aristolochia*  
 Magnoflorine 72
- BERBERIDACEAE
- Berberis*  
 Glaucine 59  
 Isocorydine 85  
 Magnoflorine 72  
 Thaliporphine 44  
*Nandina*  
 Dehydronantenine 156
- EUPHORBIACEAE
- Croton*  
 Sparsiflorine 20
- EUPOMATIACEAE
- Eupomatia*  
 Liriodenine 116
- HERNANDIACEAE
- Hernandia*  
 Hernandonine 128  
 1,2-Methylenedioxy 8,9-dimethoxy-  
 oxoaporphine 219  
 Nandigerine 89  
 Ovigerine 94  
*Illigera*  
 Launobine 91
- LAURACEAE
- Alseodaphne*  
 Srilankine 236  
*Lindera*  
 Nordicentrine 204  
*Litsea*  
 Actinodaphnine 64  
 Dicentrine 67  
 Litsedine 205  
 Litseferine 203
- Ocotea*  
 Apoglaziovine 21  
 Asimilobine 3  
 Caaverine 1  
 Dehydronantenine 156  
 Dicentrine 67  
 Glaucine 59  
 Isoboldine 40  
 Isocorydine 85  
 Leucocine 210  
 Leucoxylinone 212  
 Liridinine 2  
 N-Methylactinodaphnine 65  
 Nantenine 62  
 Ocopodine 112  
 Ocoxylinone 211  
 Predicentrine 52  
 Pulchine 193
- Sassafras*  
 Boldine 50  
 Isoboldine 40  
 Lauroilsine 49
- MAGNOLIACEAE
- Elmerrillia*  
 Elmerrillicine 198  
 Liriodenine 116  
 N-Methylushinsunine 221  
 Norushinsunine 138  
*Liriodendron*  
 N-Acetylanonaine 183  
 N-Acetylnornantenine 63  
 N-Acetyl 3-methoxynornantenine 101  
 Asimilobine 3  
 Caaverine 1  
 Corunnine 134  
 Dehydroglaucine 154  
 Dehydroisolaureline 238  
 Dehydroroemerine 151  
 Glaucine 59  
 Lanuginosine 120  
 Liridinine 186  
 Liriodendronine 215  
 Liriodenine 116  
 Lirioferine 201  
 Liriotulipiferine 199  
 3-Methoxynuciferine 189  
 O-Methylisopiline 188  
 N-Methyllaurotetanine 55  
 Norglaucine 58  
 Nornuciferine 5  
 Norushinsunine 138  
 Nuciferine 6  
 Oxoglaucine 124  
 Predicentrine 52  
 Thaliporphine 44  
 Tuliferoline 190
- Magnolia*  
 N-Acetylanonaine 183  
 Lanuginosine 120  
 Liriodenine 116  
 Oxolaureline 121
- Michelia*  
 Lanuginosine 120  
 Liriodenine 116
- Talauma*  
 Lanuginosine 120  
 Liriodenine 116

## MENISPERMACEAE

- Abuta*  
 Imenine 132  
 O-Methylmoschatoline 118
- Cissampelos*  
 Dehydrodicentrine 157  
 Dicentrine 67
- Cocculus*  
 Magnoflorine 72
- Dioscoreophyllum*  
 Magnoflorine 72
- Legnephora*  
 Laurifoline 41  
 Magnoflorine 72
- Meiocarpidium*  
 Methoxyatherosperminine 164  
 Methoxyatherosperminine N-oxide 240
- Stephania*  
 Lanuginosine 120  
 Liriodenine 116  
 Lysicamine 115  
 Norcepharadione B 242  
 Oxostephanine 216
- Triclisia*  
 Magnoflorine 72  
 O-Methylmoschatoline 118

## MONIMIACEAE

- Laurelia*  
 Atheroline 123  
 4-Hydroxynantenine 237  
 Laurotetanine 54  
 Liriodenine 116  
 Nornantenine 61  
 Oxolaureline 121  
 Oxonantenine 125
- Laureliopsis*  
 4-Hydroxynantenine 237  
 Steporphine 146
- Siparuna*  
 Cassamedine 131  
 Liriodenine 116

## NYPHEACEAE

- Nelumbo*  
 Anonaine 7  
 N-Methylasimilobine 4  
 Nornuciferine 5  
 Nuciferine 6  
 Roemerine 8

## PAPAVERACEAE

- Argemone*  
 Magnoflorine 72
- Chelidonium*  
 Magnoflorine 72
- Corydalis*<sup>b</sup>  
 Bracteoline 42  
 Bulbocapnine 92  
 Corydine 74  
 Corytuberine 71  
 Domesticine 48  
 Glaucine 59  
 Isoboldine 40  
 Isocorydine 85  
 Predicentrine 52

- Dicranostigma*  
 Corydine 74  
 Corytuberine 71  
 Isocorydine 85  
 Magnoflorine 72  
 Menisperine 86
- Eschscholtzia*  
 Corydine 74  
 Corytuberine 71
- Glaucium*  
 Bulbocapnine 92  
 Corunnine 134  
 Corydine 74  
 Dicentrine 67  
 Glaucine 59  
 Isoboldine 40  
 Isocorydine 85  
 Magnoflorine 72  
 N-Methylindcarpine 79  
 Oxoglaucine 124  
 Predicentrine 52
- Meconopsis*  
 Magnoflorine 72
- Papaver*  
 Floripavidine 247  
 Isocorydine 85  
 Isothebaine 31  
 Roemerine 8
- Pteridophyllum*  
 Isocorydine 85  
 Magnoflorine 72

## PIPERACEAE

- Piper*  
 Cepharadione A 177  
 Cepharadione B 176

## RANUNCULACEAE

- Caltha*  
 N,N-Dimethylindcarpine 80
- Coptis*  
 Magnoflorine 72
- Delphinium*  
 Delporphine 206  
 Isoboldine 40  
 Magnoflorine 72  
 N-Methylaurotetanine 55
- Isopyrum*  
 Magnoflorine 72
- Thalictrum*  
 Cabudine 248  
 Corydine 74  
 N-Demethylthalphenine 213  
 Glaucine 59  
 Isocorydine 85  
 Magnoflorine 72  
 O-Methylcassyfiline 108  
 N-Methylaurotetanine 55  
 N-Methylnantenine 202  
 Oconovine 102  
 Ocoteine 109  
 Preocoteine 96  
 Thaliadine 244  
 Thalicminine 130  
 Thaliglucione 172  
 Thalicimidine 100

<sup>b</sup>Some authors include the genus *Corydalis* in the Fumariaceae.

Thalictuberine 169	Laurolictsine 49
Thalphenine 114	<i>Ziziphus</i>
RHAMNACEAE	Asimilobine 3
<i>Colubrina</i>	Isoboldine 40
Anonaine 7	Laurelliptine 39
Dehydronuciferine 149	RUTACEAE
Dehydroroemerine 151	<i>Phellodendron</i>
Glaucine 59	Magnoflorine 72
Liriodenine 116	Menisperine 86
Lysicamine 115	Thalphenine 114
Magnoflorine 72	<i>Zanthoxylum</i>
<i>N</i> -Methylasimilobine 4	Corydine 74
Norglaucine 58	Fagara base 46
Nornuciferine 5	Laurifoline 41
Nuciferine 6	Liriodenine 116
Roemerine 8	Magnoflorine 72
<i>Retanilla</i>	<i>N</i> -Methylcorydine 75
Boldine 50	Zanthoxyphylline 194

TABLE 7. Names and synonyms of aporphine alkaloids cited in this review.<sup>a</sup>

<i>N</i> -Acetylanonaine 183 <i>n.a.</i>	Dehydrothaliadine 245 <i>n.a.</i>
<i>N</i> -Acetylasimilobine 180 <i>s.d.</i>	Delporphine 206 <i>n.a.</i>
<i>N</i> -Acetyl 3-methoxynornantennine 101 <i>i.a.</i>	<i>N</i> -Demethylthalphenine 213 <i>n.a.</i>
<i>N</i> -Acetylnornantennine 63 <i>i.a.</i>	Dicentrine 67 <i>s.d.; i.a.</i>
<i>N</i> -Acetylnornuciferine 181 <i>s.d.</i>	<i>N,O</i> -Dimethylactinodaphnine 67 <i>s.d.; i.a.</i>
Actinodaphnine 64 <i>i.a.</i>	<i>N,O</i> -Dimethylcassyfileine 109 <i>s.d.; i.a.</i>
Analobine 16 <i>i.a.</i>	<i>N,N</i> -Dimethylindocarpine 80 <i>i.a.</i>
Anolobine 16 <i>i.a.</i>	<i>N,O</i> -Dimethyliriodendronine 214 <i>n.a.</i>
Anonaine 7 <i>i.a.</i>	Domesticine 48 <i>s.d.; i.a.</i>
Apoglaziovine 21 <i>s.d.; i.a.</i>	Domesticine 62 <i>s.d.; i.a.</i>
Aporheine 8 <i>i.a.</i>	Duguetine 145 <i>s.d.</i>
Aporpheine 8 <i>i.a.</i>	Elmerrillicine 198 <i>n.a.</i>
Aporphinium DVT 46 <i>i.a.</i>	Epidicentrine 62 <i>s.d.; i.a.</i>
Artabotrine 85 <i>s.d.; i.a.</i>	Esholine 72 <i>s.d.; i.a.</i>
Asimilobine 3 <i>s.d.; i.a.</i>	Eximine 67 <i>s.d.; i.a.</i>
Atheroline 123 <i>i.a.</i>	Fagara alkaloid 46 <i>i.a.</i>
Atherospermidine 119 <i>i.a.</i>	Fagara base 46 <i>i.a.</i>
Boldine 50 <i>s.d.; i.a.</i>	Floripavidine 247 <i>n.a.</i>
Bracteoline 42 <i>s.d.; i.a.</i>	Fuseine 243 <i>n.a.</i>
Bulbocapnine 92 <i>i.a.</i>	Glaucentrine 74 <i>i.a.</i>
Buxifoline 197 <i>n.a.</i>	Glaucine 59 <i>s.d.; i.a.</i>
Caaverine 1 <i>s.d.; i.a.</i>	Guatterine 140 <i>s.d.; i.a.</i>
Cabudine 248 <i>n.a.</i>	Guatterine <i>N</i> -oxide 227 <i>n.a.</i>
Cassamedine 131 <i>i.a.</i>	Hernandalinol 246 <i>n.a.</i>
Cassytha base 125 <i>i.a.</i>	Hernandia base 89 <i>i.a.</i>
Cassythicine 65 <i>i.a.</i>	Hernandia base II 89 <i>i.a.</i>
Cepharadione A 177 <i>i.a.</i>	Hernandia base IV 94 <i>i.a.</i>
Cepharadione B 176 <i>i.a.</i>	Hernandonine 128 <i>i.a.</i>
Chakranine 86 <i>s.d.; i.a.</i>	Hernangerine 89 <i>i.a.</i>
Corunnine 134 <i>i.a.</i>	Hexahydrothalieminine 108 <i>i.a.</i>
Corydine 74 <i>i.a.</i>	Homomoschatoline 118 <i>i.a.</i>
Corytuberine 71 <i>i.a.</i>	4-Hydroxynantennine 237 <i>n.a.</i>
Dehydrodicentrine 157 <i>s.d.; i.a.</i>	3-Hydroxynuciferine 187 <i>n.a.</i>
Dehydroglaucine 154 <i>i.a.</i>	Imenine 132 <i>i.a.</i>
Dehydroisolaureline 238 <i>n.a.</i>	Isoboldine 40 <i>s.d.; i.a.</i>
Dehydronantennine 156 <i>s.d.; i.a.</i>	Isocorydine 85 <i>s.d.; i.a.</i>
Dehydronuciferine 149 <i>i.a.</i>	Isopiline 184 <i>n.a.</i>
Dehydroroemerine 151 <i>s.d.; i.a.</i>	Isothebaine 31 <i>i.a.</i>

<sup>a</sup>*r.s.* : revised structure*s.d.* : additional physical and spectral data*i.a.* : known natural aporphine isolated again*n.a.* : new aporphine alkaloid

- Lanuginosine **120** *i.a.*  
 Launobine **91** *s.d.; i.a.*  
 Laurelliptine **39** *i.a.*  
 Laurifoline **41** *s.d.; i.a.*  
 Lauroilsine **49** *i.a.*  
 Lauroscolzine **55** *i.a.*  
 Laurotetanine **54** *i.a.*  
 Lauterine **121** *s.d.; i.a.*  
 Leucosine **210** *n.a.*  
 Leucoxyloine **212** *n.a.*  
 Liridine **118** *i.a.*  
 Liridinine **186** *n.a.*  
 Lirinidine **2** *s.d.; i.a.*  
 Lirinine **13** *r.s.*  
 Lirinine *N*-oxide **14** *r.s.*  
 Liriodendron base **124** *i.a.*  
 Liriodendronine **215** *n.a.*  
 Liriodenine **116** *i.a.*  
 Lirioferine **201** *n.a.*  
 Liriotulipiferine **199** *n.a.*  
 Litsedine **205** *n.a.*  
 Litseferine **203** *n.a.*  
 Litsoeine **54** *i.a.*  
 Luteanine **85** *s.d.; i.a.*  
 Lysicamine **115** *i.a.*  
 Magnofflorine **72** *s.d.; i.a.*  
 Menisperine **86** *s.d.; i.a.*  
 Methoxyatherosperminine **164** *i.a.*  
 Methoxyatherosperminine *N*-oxide **240** *n.a.*  
 10-Methoxyliriodenine **121** *s.d.; i.a.*  
 3-Methoxynuciferine **189** *n.a.*  
*N*-Methylactinodaphnine **65** *i.a.*  
*O*-Methylanolobine **18** *s.d.; i.a.*  
*N*-Methylanonaine **8** *i.a.*  
*N*-Methylasimilobine **4** *s.d.; i.a.*  
*O*-Methylatheroline **124** *i.a.*  
*O*-Methylcassyfiline **108** *i.a.*  
*O*-Methylcassythine **108** *i.a.*  
*N*-Methylcorydine **75** *s.d.; i.a.*  
*O*-Methyldomesticine **62** *s.d.; i.a.*  
*N*-Methylglaucine **60** *s.d.*  
*O*-Methylisoboldine **44** *s.d.; i.a.*  
*N*-Methylisocorydine **86** *s.d.; i.a.*  
*N*-Methylisopiline **185** *n.a.*  
*O*-Methylisopiline **188** *n.a.*  
*N*-Methylaunobine **92** *i.a.*  
*N*-Methylaurelliptine **40** *s.d.; i.a.*  
*N*-Methylaurotetanine **55** *i.a.*  
*N*-Methylindcarpine **79** *s.d.; i.a.*  
*O*-Methylirinine **15** *r.s.*  
*O*-Methylmoschatoline **118** *i.a.*  
*N*-Methylnantenine **202** *n.a.*  
*O*-Methylnorlirinine **188** *n.a.*  
*N*-Methylpachypodanthine **225** *n.a.*  
*N*-Methylpachypodanthine *N*-oxide **226** *n.a.*  
*N*-Methylpolygospermine **209** *n.a.*  
*O*-Methylpreocoteine **100** *i.a.*  
*O*-Methylpukateine **36** *s.d.; i.a.*  
*O*-Methylthalicmidine **59** *s.d.; i.a.*  
*N*-Methylushinsunine **221** *n.a.*  
*N*-Methylzenkerine **193** *n.a.*  
 Michelalbine **138** *i.a.*  
 Micheline **139** *i.a.*  
 Micheline B **116** *i.a.*  
 Michelanugine **141** *s.d.*  
 Nandigerine **89** *i.a.*  
 Nantenine **62** *s.d.; i.a.*  
 Noratherosperminine **239** *n.a.*  
 Norboldine **49** *i.a.*  
 Norbulbocapnine **91** *s.d.; i.a.*  
 Norcepharadione B **242** *n.a.*  
 Norcorydine **73** *i.a.*  
 Nordicentrine **204** *n.a.*  
 Norglaucine **58** *s.d.; i.a.*  
 Norisoboldine **39** *i.a.*  
 Norisocorydine **84** *i.a.*  
 Norisodomesticine **200** *n.a.*  
 Norlaureline **195** *n.a.*  
 Normantenine **61** *i.a.*  
 Normuciferine **5** *i.a.*  
 Noroconovine **207** *n.a.*  
 Noroliveridine **229** *n.a.*  
 Noroliverine **231** *n.a.*  
 Norpachystaudine **234** *n.a.*  
 Norstephalagine **191** *n.a.*  
 Norushinsunine **138** *i.a.*  
 Nuciferine **6** *s.d.; i.a.*  
 Nuciferoline **26** *s.d.*  
 Obovanine **33** *i.a.*  
 Oconovine **102** *i.a.*  
 Ocopodine **112** *i.a.*  
 Ocoteine **109** *s.d.; i.a.*  
 Ocoxyloine **211** *n.a.*  
 Oliveridine **142** *s.d.; i.a.*  
 Oliveridine *N*-oxide **230** *n.a.*  
 Oliverine **143** *s.d.; i.a.*  
 Oliverine *N*-oxide **232** *n.a.*  
 Oliveroline **222** *n.a.*  
 Oliveroline *N*-oxide **223** *n.a.*  
 Ovigerine **94** *i.a.*  
 Oxoglaucine **124** *i.a.*  
 Oxolaureline **121** *s.d.; i.a.*  
 Oxonantenine **125** *i.a.*  
 Oxonuciferine **115** *i.a.*  
 Oxopukateine **217** *n.a.*  
 Oxoputerine **218** *n.a.*  
 Oxostephanine **216** *n.a.*  
 Oxoushinsunine **116** *i.a.*  
 Ooxylopine **120** *i.a.*  
 Pachyconfine **220** *n.a.*  
 Pachypodanthine **224** *n.a.*  
 Pachystaudine **235** *n.a.*  
 Phoebe base **79** *s.d.; i.a.*  
 Polyalthine **233** *n.a.*  
 Polygospermine **208** *n.a.*  
 Polysuavine **228** *n.a.*  
 Pontevedrine **135** *r.s.*  
 Predicentrine **52** *s.d.; i.a.*  
 Preocoteine **96** *i.a.*  
 Psilopine **119** *i.a.*  
 Pulchine **193** *n.a.*  
 Purpureine **100** *i.a.*  
 Puterine **196** *n.a.*  
 Roemerine **8** *i.a.*  
 Rogersine **55** *i.a.*  
 Sparsiflorine **20** *i.a.*  
 Spermatheridine **116** *i.a.*  
 Srilankine **236** *n.a.*  
 Stephanine **12** *s.d.*  
 Steporphine **146** *i.a.*  
 Thaliadine **244** *n.a.*  
 Thalicmidine **44** *s.d.; i.a.*  
 Thalicmine **109** *s.d.; i.a.*  
 Thalicminine **130** *i.a.*



Thalicsimidine 100	<i>i.a.</i>	Tuliferoline 190	<i>n.a.</i>
Thalictuberine 169	<i>i.a.</i>	Ushinsunine 139	<i>i.a.</i>
Thalictrine 72	<i>s.d.; i.a.</i>	Xanthoplanine 56	<i>s.d.</i>
Thaliglucinone 172	<i>i.a.</i>	Xylopine 18	<i>s.d.; i.a.</i>
Thaliporphine 44	<i>s.d.; i.a.</i>	Zanthoxyphylline 194	<i>n.a.</i>
Thalphenine 114	<i>i.a.</i>	Zenkerine 192	<i>n.a.</i>

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