



CHAPTER II

HISTORICAL

Botanical Aspects of The Menispermaceae

The Menispermaceae contains 73 genera and about 350 species, which are almost entirely tropical. There are 30 genera of this family occur in Asia, 22 in America, 30 in Africa and 10 in Australia to the Pacific.

The Menispermaceae is characterized by dioecious woody or sometimes herbaceous climbers, rarely erect shrubs or trees (*Cocculus* spp.); tubers sometimes present (*Stephania* spp.); sometimes producing exudate or rarely latex (*Fibraurea*; *Tinomiscium*). Wood often with concentric rings or arcs of vascular bundles separated radially by interfascicular rays, or vascular bundles in one ring; wood sometimes yellow. Young stem usually drying longitudinally striate, but young shoots often tendrilliform. Stipule absent. Leaf spiral, simple, often palmatinerved at base and sometimes peltate, or pinninerved at base and sometimes peltate, or pinninerved, margin usually entire, sometimes boardly crenate, sometimes deeply 3-5 lobed, petiole often swollen at base, sometimes also at apex, sometimes leaving a raised discoid scar on the stem. Inflorescences axillary or on defoliate branches or cauliflorous, solitary or fasciculate, various in form, often cymes, thyrses or pseudoracemes, branching of cymes rarely umbelliform (*Stephania* spp.), flowers rarely in disciform capitulum (*Stephania* spp.); female usually fewer flowered than male, female rarely with accrescent bracts (*Cissampelos* spp.) Flowers small, usually green, yellow or white, actinomorphic or female sometimes zygomorphic. Sepals usually in 1-2(-4) whorls of 3, or 1 whorl of 4, the outer whorl(s) smallest, imbricate but the innermost whorl sometimes valvate and sometimes connate, sepal rarely spirally arranged (*Hypserpa* spp.); in female sometimes reduced to 1 or 2. Petals mostly 3-6 in 1 or 2 whorls or 0, free or sometimes \pm connate, usually smaller than the sepals, rarely larger

(*Sarcopetalum* spp.), the lateral edges or lobes often inflexed and sometimes clasping the opposite stamen, often glandular within, in female sometimes reduced to 1 or 2. *Stamen* mostly 3 or 6, sometimes 9 or up to about 40, often free and opposite a petal, or variously connate, sometimes forming a peltate synandrium, connective sometimes adaxially or abaxially thickened, rarely terminally prolonged (*Macrococculus* spp.); anthers introrse to extrorse with dehiscence longitudinal to transverse. *Staminodes* sometimes present in female, usually subulate, carpels free, usually 3 or 6, sometimes 1 or to 12, sometimes borne on a short gynophore; style terminal when present; stigma often sessile, reflexed and lobed or divided. *Pistillodes* 0 in male. *Ovules* 2 reducing to 1 in development, attached ventrally. Fruits of 1-6(-10) drupes sometimes borne on an enlarged globose, discoid or columnar carpophore which is rarely shortly branched (*Anamirta*, *Tiliacora*). *Drupes* sometimes narrowed at base into a stipe, style-scar terminal, ventral or close to base; exocarp membranous to coriaceous, mesocarp fleshy; endocarp usually bony rarely papyraceous to crustaceous (*Pycnarrhena* spp.) rugose, tuberculate, spiny, ridged or variously ornamented on at least the dorsal surface, sometimes smooth or surface fibrous, usually with a condyle; i.e. a ventral sometimes hollow intrusion into the seed cavity around which the seed is curved, or a ventral groove, cavity or chamber; the condyle when hollow often 2-chambered and with 2 lateral or ventral apertures or condyle septiform or lamelliform, then sometimes centrally perforate. *Seed* often horseshoe-shaped; endosperm present or absent, sometimes ruminant, embryo usually either elongate and with semiterete or flattened contiguous cotyledons or flat and very thin with divaricate foliaceous cotyledons, sometimes broadly ellipsoidal with thick contiguous cotyledons, rarely cotyledons much folded (*Arcangelisia* spp.); radical very small (Forman, 1986).

There are 22 genera, and 51 species in Thailand; of which 9 species are endemic (Shown by asterisk). All of them are as follows:

1. *Albertisia papuana* Becc.

A. puberula Forman*

2. *Anamirta cocculus* (Linn.) Wight & Arn.

[Mae nam nong (แม่น้ำนอง) (Northern); Thaowan thong (เถาวัลย์ทอง) (South-westerns); Wai din (หวายดิน), Kho khlan (โคคลาน) (Central) ; Thao kha-nom (เถาชะโนม), Lumpri (ลุมพรี) (South-eastern)]

3. *Arcangelisia flava* (Linn.) Merr.

[Khamin khrua (ขมิ้นเครือ) (South-eastern); Khamin ruesi(ขมิ้นฤาษี), Hap(ฮับ) (Peninsular)]

4. *Aspidocarya uvifera* Hook. f. & Thoms.5. *Cissampelos hispida* Forman*

C. pareira Linn. var *hirsuta* Forman

[Khong khamao (ขงเขมา) (Northern); Khrua ma noi (เครือหมาน้อย) (Eastern); Kon pit (กันปัด) (South-western); Krung khamao (กรุงเขมา), Sifan(สีพัน)(Peninsular)]

6. *Cocculus hirsutus* (Linn.) Theob.

C. laurifolius DC.

[Yan nang ton (ย่านนางตัน) (North-eastern, Central); Sa kae dong (สะแกดง) (North-eastern); Suramarit(สุรามฤต)(Eastern)]

C. obiculatus (Linn.) DC.

7. *Cosciniium blumeianum* Miers.

C. fenestratum (Gaertn.) Colebr.

[Khrua hen (เครือเหิน) (North-eastern); Khamin khrua (ขมิ้นเครือ) (South-eastern)]

8. *Cyclea atjehensis* Forman

C. barbata Miers.

[Krung badan (กรุงบาดาล) (south-eastern); Krung khamao (กรุงเขมา) (Peninsular)]

C. laxiflora Miers.

C. polypetala Dunn.

C. varians Craib*

9. *Diploclisia glaucescens* (Bl.) Diels.

[Ma nim dam (มะหนิมดำ), Duk khrua (ดูกเครือ)(Northern); K hruea sai kai (เครือไส้ไก่)(Shan/Northern); Tap tao (ตับเต่า) (Peninsular)]

10. *Fibraurea tinctoria* Lour.

[Khamin ruesi (ขมิ้นฤาษี), Khamin Khrua (ขมิ้นเครือ), Man miat (มันเมียด) (Peninsular); Thaowan thong (เถาวัลย์ทอง) (South-western); Kamphaeng chet chan (กำแพงเจ็ดชั้น)(Central)]

11. *Haematocarpus validus* (Miers.) Bakh. f. ex Forman

12. *Hypserpa nitida* Miers.

[Haen kuem (แฮนกี๋ม)(North-eastern)]

13. *Limacia blumei* (Boerl.) Diels.

L. oblonga Hook. f. & Thoms.

L. scandens Lour.

14. *Pachygone dasycarpa* Kurz

[Nam phrom (น้ำพรหม)(Northern); Ya nang chang (หญ้านางช้าง)(Eastern)]

P. odorifera Miers.

15. *Parabaena sagittata* Miers.

[Phak nang (ผักหน้าง)(Shan/Northern)]

16. *Pericampylus glaucus* (Lank.) Merr.

[Salit hom kha (สลิดหอมคา) (Northern); Yan tap tao (ย่านตับเต่า) (Peninsular)]

17. *Pycnarrhena lucida* (Teijsm. & Binn.) Miq.

[Ya nang ton (ย่านางตัน)(South-western)]

P. poilanei (Gagnep.) Forman

18. *Sinomenium acutum* (Thunb.) Rehder & Wilson

19. *Stephania brevipes* Craib*

[Bua khrua (บัวเครือ)(Northern)]

S. capitata (Bl.) Spreng.

S. crebra Forman*

S. elegans (Roxb.) Miers.

[Se-khi-pho (เสฉีพอ) (Karen/Northern)]

S. glabra (Roxb.) Miers.

[Phanang nang (ผะนังนัง)(Northern)]

S. glandulifera Miers.

S. japonica (Thunb.) Miers.

[Kon pit (กันปัด), Bai kon pit (ใบกันปัด) (Central); Pang pon(ปังปอน) (Northern);

Tap tao (ต๊ับเต่า), Yan pot(ย่านปัด) (Peninsular)]

S. oblata Craib

S. papillosa Craib*

S. pierreii Diels.

[Bua khrua (บัวเครือ) (North-Eastern); Bua bok (บัวบก) (South-western,

Eastern and central); Kot hua bua (โกฏหัวบัว), Sabu lueat (สบู่เลือด) (Central)]

S. reticulata Forman

[Tap tao (ต๊ับเต่า) (Peninsular)]

S. rotunda Lour.

S. suberosa Forman*

[Bua bok (บัวบก) (Central); Boraphet phung chang (บอระเพ็ดพุงช้าง) (South-

western)]

S. subpeltata H.S. Lo.

S. tomentella Forman*

S. venosa (Bl.) Spreng.

[Plao lueat khrua (ปล้ำเลือดเครือ) (Northern); Cho koe tho (ชอเกาะทอ)

(Karen/Northern); Krathom lueat (กระท่อมเลือด) (North-eastern); Kling klang dong

(กิ้งกลางดง) (South-western); Boraphet yang daeng (บอระเพ็ดยางแดง) (Peninsular)]

20. *Tiliacora triandra* (Colebr.) Diels.

[Choi nang (จ้อยนาง) (North); Thao ya nang (เถาย่านาง) (Eastern, Central);

Thaowan khieo (เถาวัลย์เขี้ยว) (South-Eastern)]

21. *Tinomiscium petiolare* Hook. f. & Thoms.

[Pharai hothong (ผำร่ายห่อทอง) (Peninsular)]

22. *Tinospora baenzigeri* Forman

[Chung cha ling (จุงจาลิง), Chingcha chali (ชิงช้าชาลี) (General)]

T. crispa (Linn.) Hook. f. & Thoms.

[Boraphet (บอระเพ็ด) (Central)]

T. siamensis Forman*

T. sinensis (Lour.) Merr.

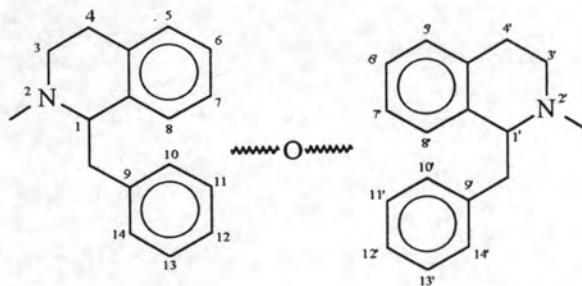
[Ping kaling (ปิงกะลิง) (Northern); Sali thao chali (สลีเถาชาลี) (Central)]

(Forman, 1991)

Bisbenzylisoquinoline Alkaloids in Plants

The bisbenzylisoquinolines are the largest group of isoquinoline alkaloids. They are represented by approximately four hundred compounds which occur primarily in the families Berberidaceae, Menispermaceae, Monimiaceae and Ranunculaceae.

Bisbenzylisoquinoline alkaloids are built up of two benzylisoquinoline units linked by ether bridges.



In addition to this ether linkage, methylenoxy bridging or direct carbon-carbon bonding is also found between the two benzyloquinoline units (Guha and Mukherjee, 1979).

The bisbenzyloquinolines have been classified into 26 types. These types can best be described by numerical system obeying the following rule:

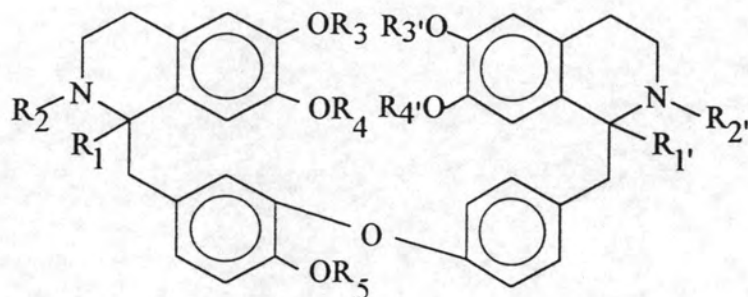
1. The numbering system for a bisbenzyloquinoline half of a dimer is shown above.

2. Each benzyloquinoline half of the dimer is described in terms of its oxygenation pattern, since only oxygenated positions are indicated. The more highly oxygenated constitutes the left-hand side of the dimer. The two sets of numerical values are separated by a hyphen. In the case of head-to-tail coupling, the more highly oxygenated benzyloquinoline is placed on top.

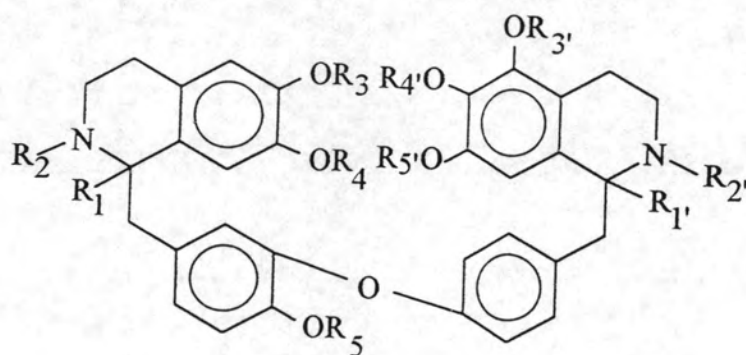
3. The symbols *, +, and ++ indicate the shared oxygens of diaryl ethers, and are placed at the upper right of the appropriate numbers.

4. Numbers between parentheses, appearing after the listing of the oxygenated sites, denote a direct carbon-carbon bond for the presence of a biphenyl linkage. Numbers between squared brackets, appearing after the listing of the oxygenated sites, indicate the terminals of a methylenoxy bridge.

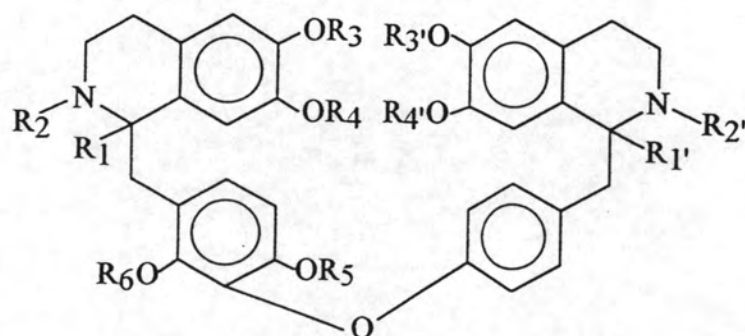
Using the above simple rules, the types of bisbenzyloquinolines can be denoted as shown in table 1.

Table 1 Structure Classification of The Bisbenzylisoquinoline Alkaloids

TYPE I 6,7,11*,12-6,7,12*

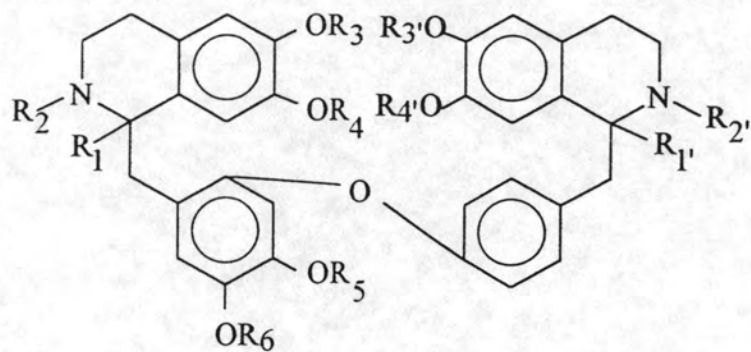


TYPE Ia 6,7,11*,12-5,6,7,12*

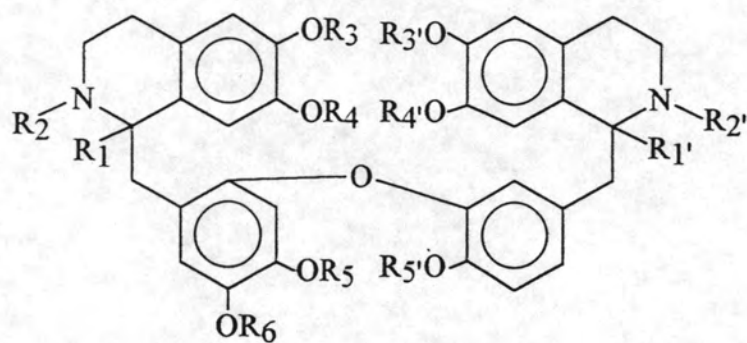


TYPE Ib 6,7,10,11*,12-6,7,12*

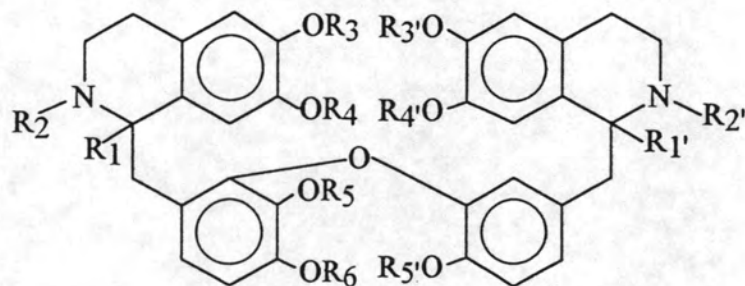
Table 1 (Continued)



TYPE II 6,7,10*,12,13-6,7,12*

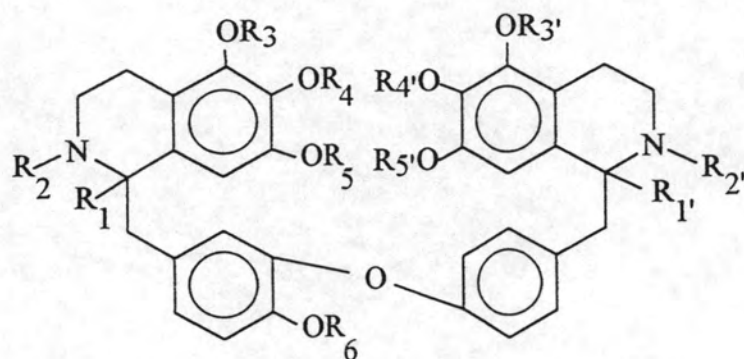


TYPE IIa 6,7,10*,12,13-6,7,11*,12

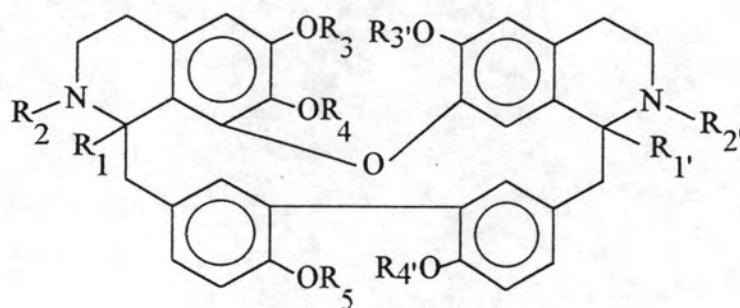


TYPE IIb 6,7,10*,11,12-6,7,11*,12

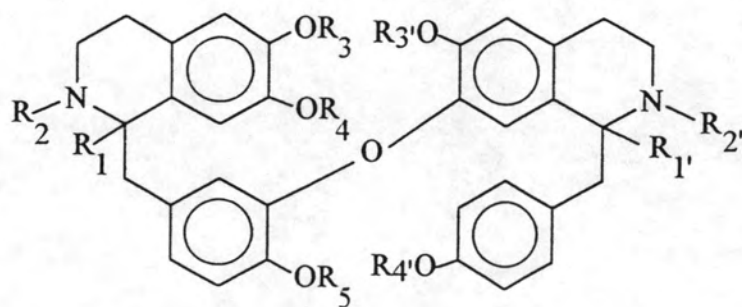
Table 1 (Continued)



TYPE III 5,6,7,11*,12-5,6,7,12*

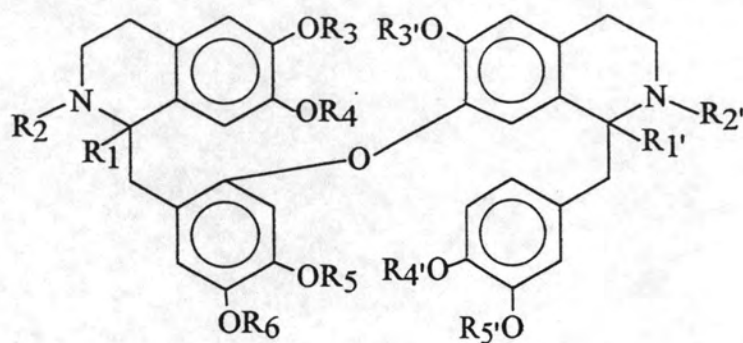


TYPE IV 6,7,8*,12-6,7*,12(11-11)

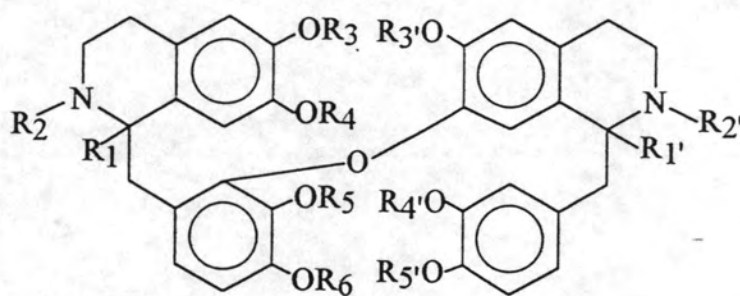


TYPE V 6,7,11*,12-6,7*,12

Table 1 (Continued)



TYPE Va 6,7,10*,12,13-6,7*,11,12



TYPE Vb 6,7,10*,11,12-6,7*,11,12

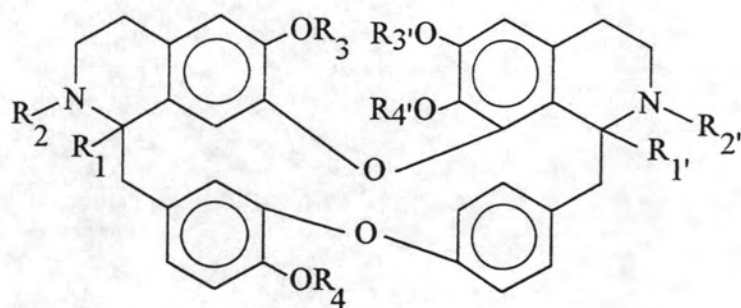
TYPE VI 6,7*,11⁺,12-6,7,8*,12⁺

Table 1 (Continued)

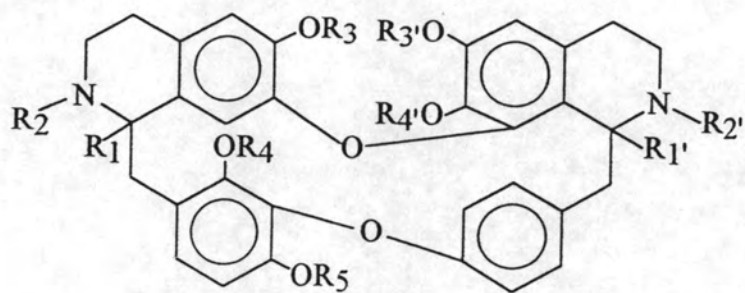
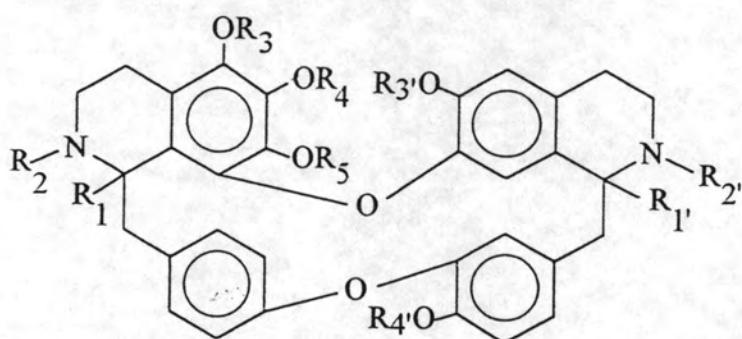
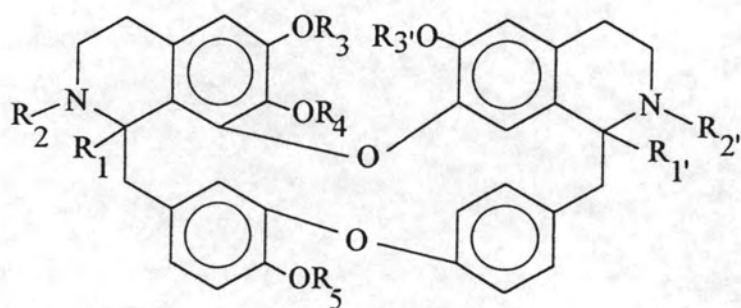
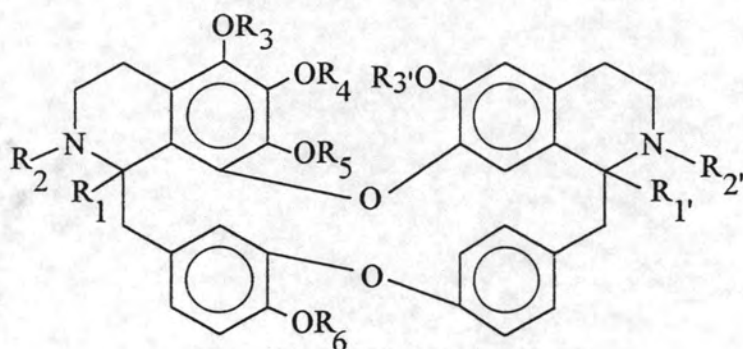
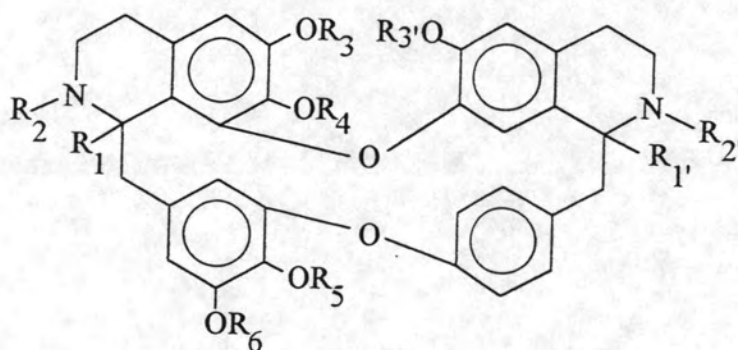
TYPE VIa 6,7*,10,11⁺,12-6,7,8*,12⁺TYPE VII 5,6,7,8*,12⁺-6,7*,11⁺,12TYPE VIII 6,7,8*,11⁺,12-6,7*,12⁺



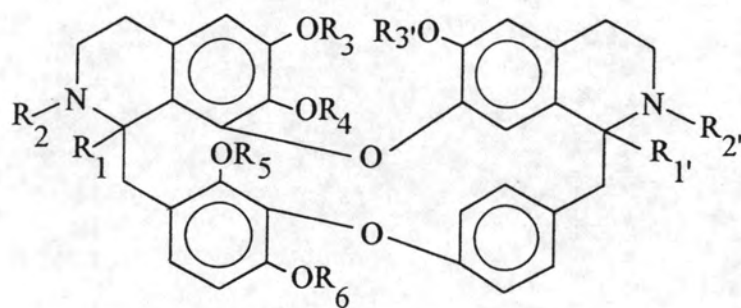
Table 1 (Continued)



TYPE IX 5,6,7,8*,11+,12-6,7*,12+



TYPE X 6,7,8*,11+,12,13-6,7*,12+



TYPE Xa 6,7,8*,10,11+,12-6,7*,12+

Table 1 (Continued)

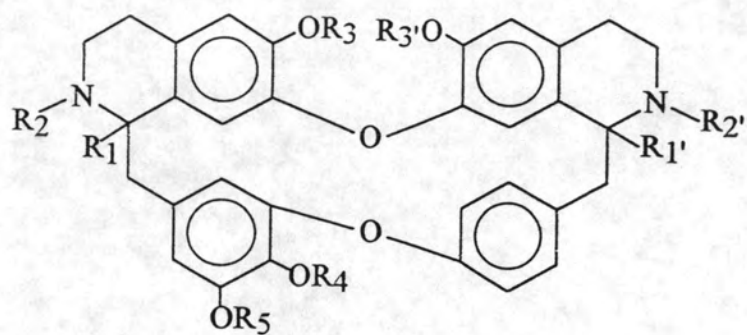
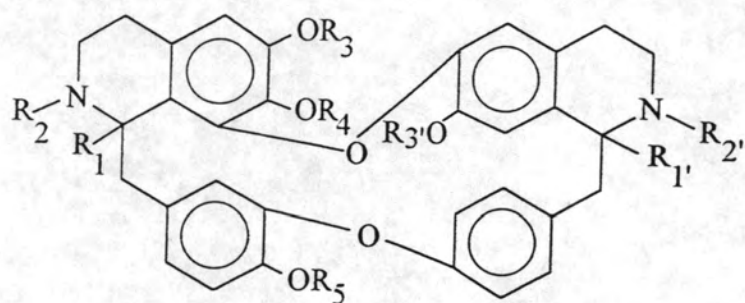
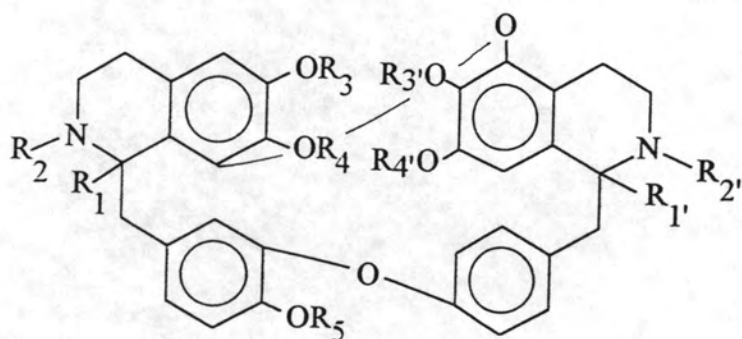
TYPE Xb 6,7*,8,11⁺,12,13-6,7*,12⁺TYPE XI 6,7,8*,11⁺,12-6*,7,12⁺TYPE XII 6,7,8*,11⁺,12-5,6,7,12⁺

Table 1 (Continued)

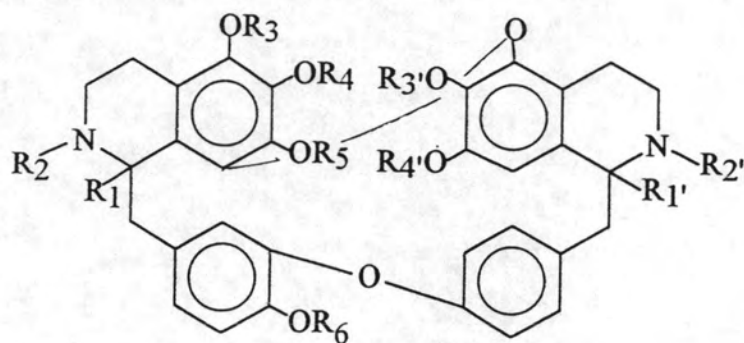
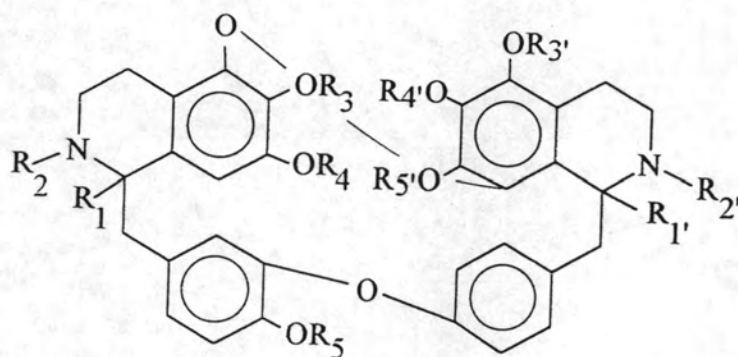
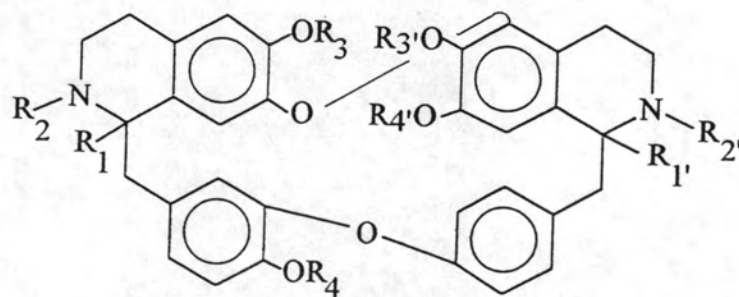
TYPE XIIa 5,6,7,8*,11⁺,12-5*,6,7,12⁺TYPE XIII 5*,6,7,11⁺,12-5,6,7,8*,12⁺TYPE XIV 6,7*,11⁺,12-5*,6,7,12⁺

Table 1 (Continued)

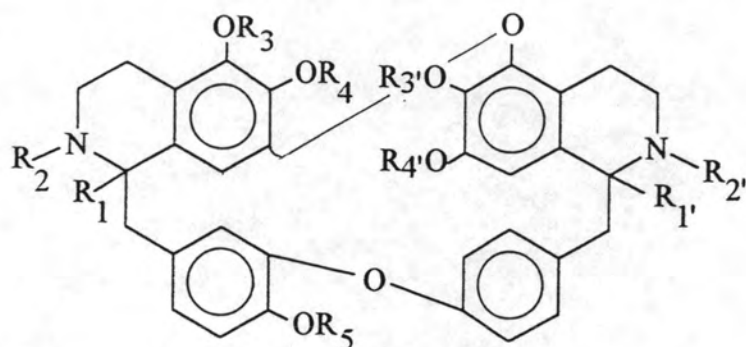
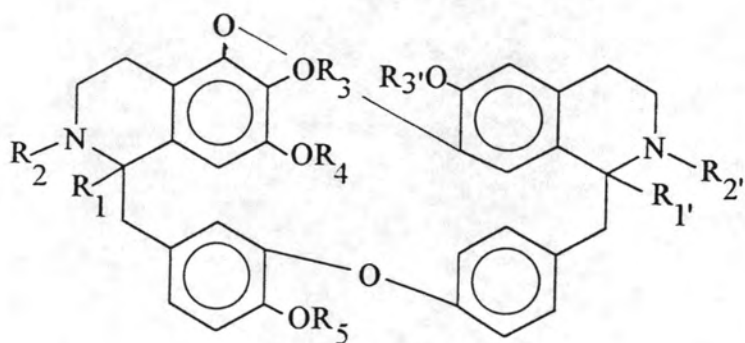
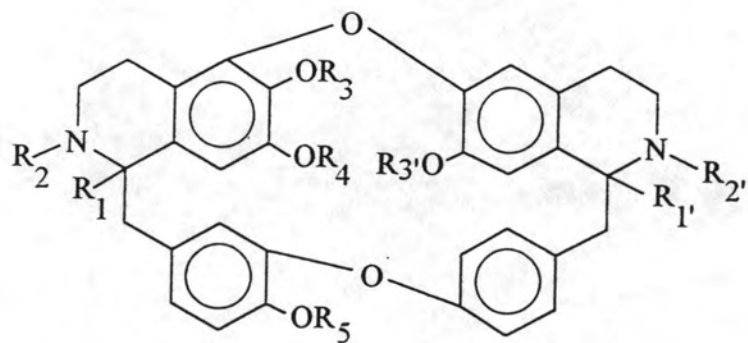
TYPE XIVa 5,6,7*,11⁺,12-5*,6,7,i2⁺TYPE XV 5*,6,7,11⁺,12-6,7*,12⁺TYPE XVI 5*,6,7,11⁺,12-6*,7,12⁺

Table 1 (Continued)

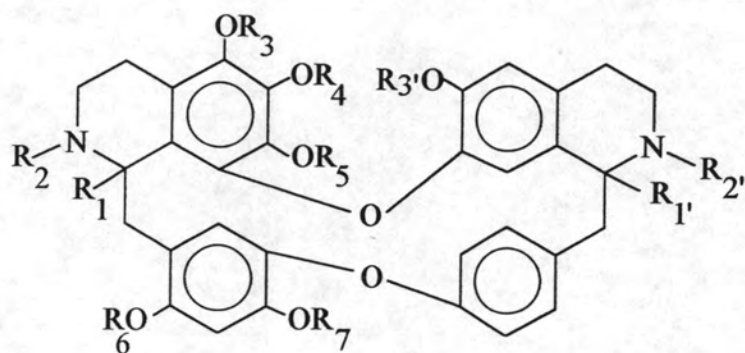
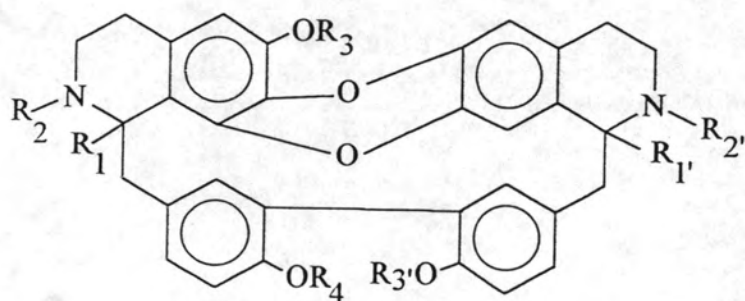
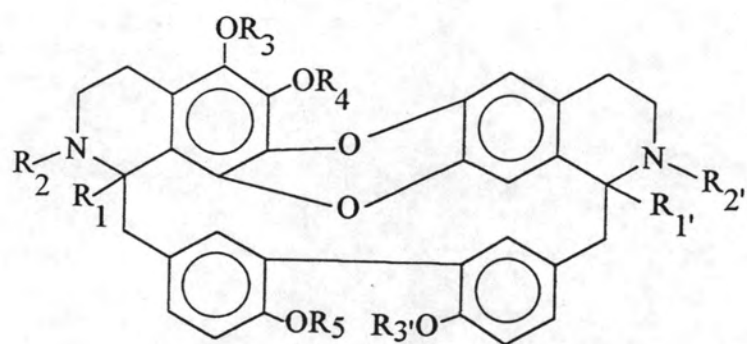
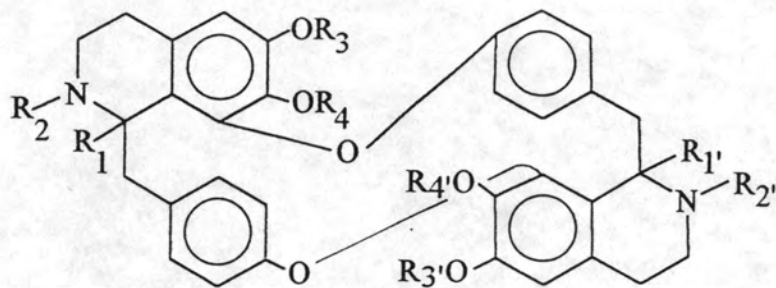
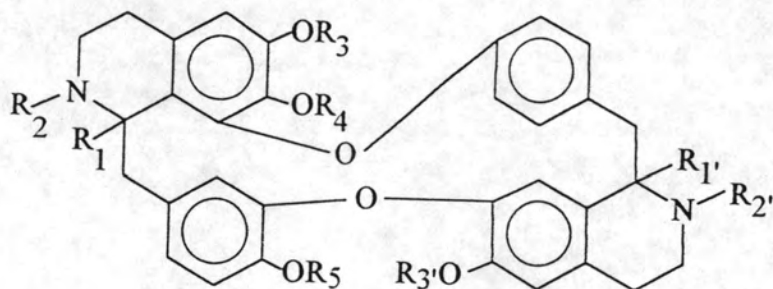
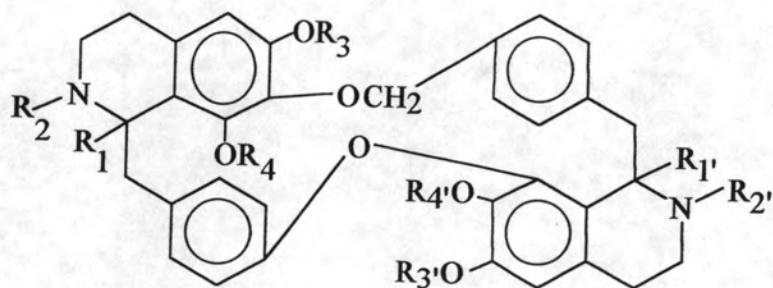
TYPE XVII 5,6,7,8*,10,12,13⁺-6,7*,12⁺TYPE XVIII 6,7*,8⁺,12-6*,7⁺,12(11-11)TYPE XIX 5,6,7*,8⁺,12-6*,7⁺,12(11-11)

Table 1 (Continued)

TYPE XX 6,7,8*,12⁺-6,7,8⁺,12*TYPE XXI 6,7,8*,11⁺,12-6,7⁺,12*

TYPE XXII 6,7,8*,12*-6,7,8*[7-12]

Table 1 (Continued)

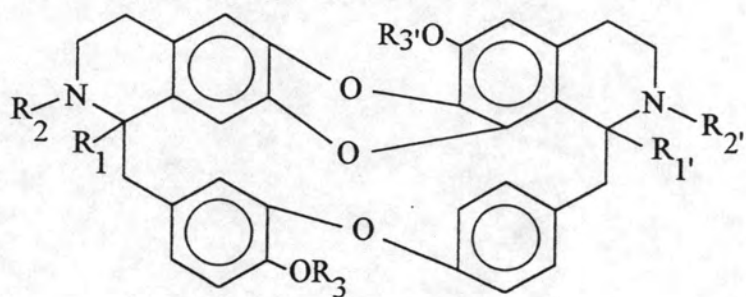
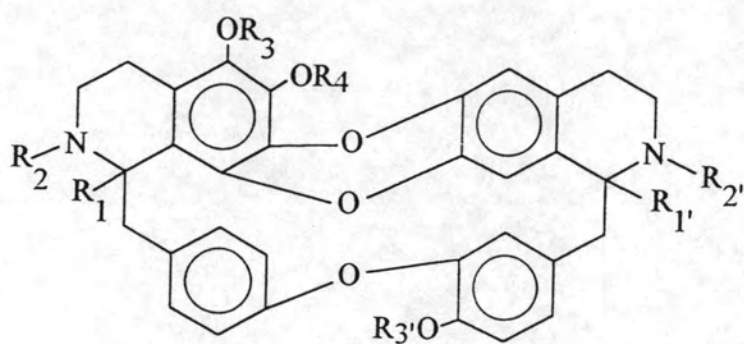
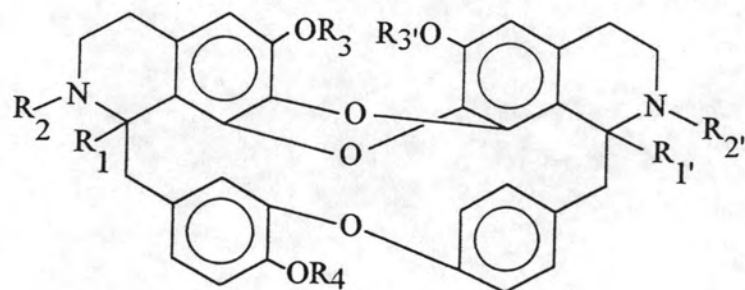
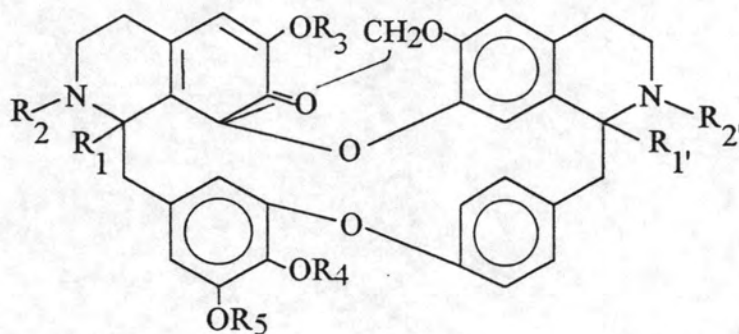
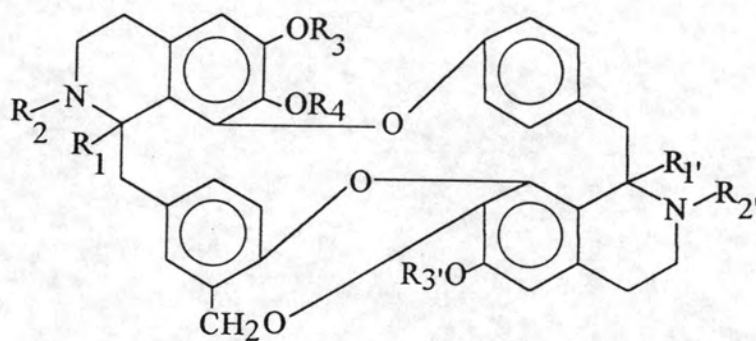
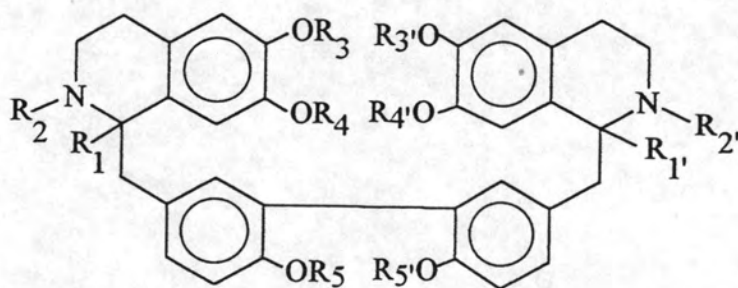
TYPE XXIII 6*,7⁺,11⁺⁺,12-6,7*,8⁺,12⁺⁺TYPE XXIIIa 5,6,7*,8⁺,12⁺⁺-6*,7⁺,11⁺⁺,12TYPE XXIV 6,7*,8⁺,11⁺⁺,12-6,7⁺,8*,12⁺⁺

Table 1 (Continued)

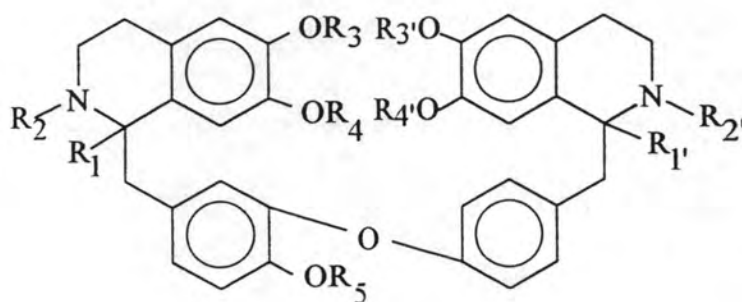
TYPE XXV 6,7,8*,11⁺,12,13-6,7*,12⁺[8-6]TYPE XXVI 6,7,8*,12⁺-6,7,8⁺,12*[11-7]

TYPE XXVII 6,7,12-6,7,12(11-11)

A complete list of the bisbenzylisoquinoline alkaloids follows table 2 and the sources of them in table 3. This included structures showing configurations at the chiral centers. The bisbenzylisoquinoline alkaloids are represented by approximately four hundred compounds. The first comprehensive tabular review of the bisbenzylisoquinoline alkaloids was published by Guha et al. in early 1979 and then followed by Schiff, those were published in 1983, 1987 and 1991. But this present data in the table 2 is concerned with the literature through 1994.

Table 2 Bisbenzylisoquinoline Alkaloids

Type I



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
1	Berbamunine	H	Me	Me	H	H	H	Me	Me	H	<i>R,S</i>
2	Cuspidaline	H	Me	Me	H	Me	H	Me	Me	H	<i>R,R</i>
3	Dauricine	H	Me	Me	M	H	H	Me	Me	Me	<i>R,R</i>
4	Dauricinoline	H	Me	H	Me	H	H	Me	Me	Me	<i>R,R</i>
5	Dauricoline	H	Me	H	Me	H	H	Me	H	Me	<i>R,R</i>
6	Daurinoline	H	Me	Me	Me	H	H	Me	H	Me	<i>R,R</i>
7	Daurisoline	H	Me	Me	H	H	H	Me	Me	Me	<i>R,R</i>
8	Desmethyldauricine, <i>N</i> -	H	H	Me	Me	H	H	Me	Me	Me	<i>R,R</i>
9	Desmethyldauricine, <i>N'</i> -	H	Me	Me	Me	H	H	H	Me	Me	<i>R,R</i>
10	Dimethylgrisabine, <i>O</i> -	H	Me	Me	Me	Me	H	Me	Me	Me	<i>S,R</i>
11	Dimethylindoldha mine, <i>N,N'</i> -	H	Me	Me	H	H	H	Me	Me	H	<i>R,R</i>
12	Espinidine	H	Me	Me	H	Me	H	Me	H	Me	<i>R,S</i>
13	Espinine	H	Me	Me	H	H	H	Me	H	Me	<i>R,S</i>
14	Geraldoamine	H	Me	Me	H	Me	H	Me	Me	Me	<i>R,R</i>
15	Grisabine	H	Me	Me	H	Me	H	Me	Me	H	<i>S,R</i>

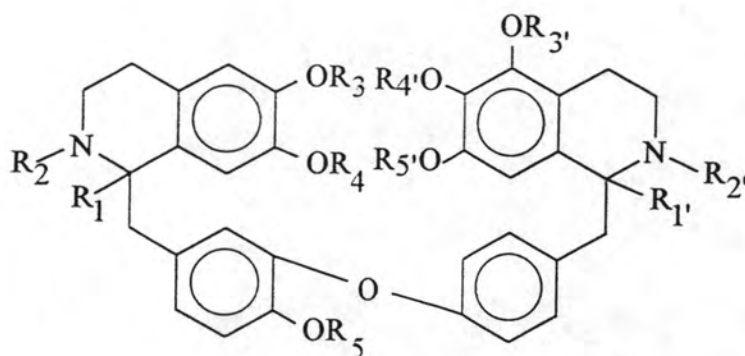
Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
16	Isodaurisoline	H	Me	Me	Me	H	H	Me	Me	H	<i>R,R</i>
17	Lindoldhamine	H	H	Me	H	H	H	H	Me	H	<i>R,R</i>
18	Magnoline	H	Me	Me	H	H	H	Me	Me	H	<i>S,R</i>
19	Methylcuspidaline, 7'- <i>O</i> -	H	Me	Me	H	Me	H	Me	Me	Me	<i>R,R</i>
20	Methylauricine	H	Me	Me	Me	Me	H	Me	Me	Me	<i>R,R</i>
21	Methylauricine, <i>N</i> -2- oxy- <i>O</i> -	H	O, Me	Me	Me	Me	H	Me	Me	Me	<i>R,R</i>
22	Methylauricine, <i>N</i> - 2'-oxy- <i>O</i> -	H	Me	Me	Me	Me	H	O, Me	Me	Me	<i>R,R</i>
23	Methylindoldhamine, 2- <i>N</i> -	H	Me	Me	H	H	H	H	Me	H	<i>R,R</i>
24	Methylindoldhamine, 2'- <i>N</i> -	H	Me	Me	H	H	H	Me	Me	H	<i>R,R</i>
25	Methylindoldhamine, 7- <i>O</i> -	H	H	Me	Me	H	H	H	Me	H	<i>R,R</i>
26	Methylindoldhamine, 7'- <i>O</i> -	H	H	Me	H	H	H	H	Me	Me	<i>R,R</i>
27	Methylthaliбрine, <i>O</i> -	H	Me	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
28	Neothaliбрine	H	Me	Me	H	Me	H	Me	Me	Me	<i>S,S</i>
29	Neothaliбрine,2'- α - <i>N</i> - oxide	H	Me	Me	H	Me	H	O, Me	Me	Me	<i>S,S</i>
30	Nordaurisoline,2'-	H	Me	Me	H	H	H	H	Me	Me	<i>R,R</i>
31	Northaliбрine	H	Me	Me	Me	Me	H	H	Me	H	<i>S,S</i>
32	Northaliб्रोline	H	Me	Me	H	H	H	H	Me	H	<i>S,S</i>
33	Pampulhamine	H	Me	Me	H	H	H	H	Me	Me	<i>R,R</i>
34	Pedroamine	H	Me	Me	H	H	H	H	Me	H	<i>R,R</i>
35	Phaeantharine	-	Me	Me	Me	Me	-	Me	Me	Me	--
36	Popidine	H	Me	H	Me	Me	H	Me	Me	Me	<i>R,R</i>
37	Popisidine	H	Me	Me	Me	Me	H	Me	H	Me	<i>R,R</i>

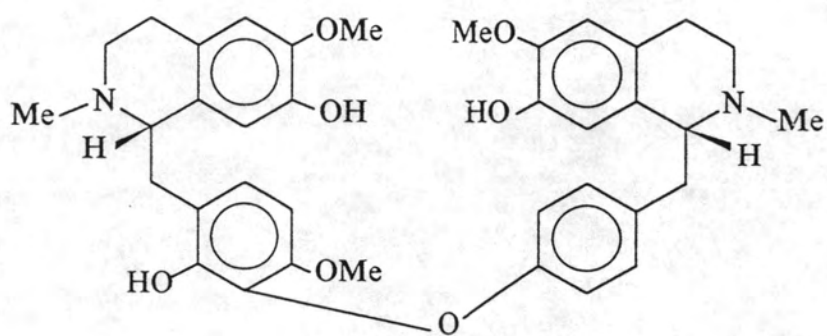
Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
38	Popisine	H	Me	Me	Me	Me	H	Me	Me	H	<i>R,R</i>
39	Popisonine	H	Me	H	Me	Me	H	Me	H	Me	<i>R,R</i>
40	Popisopine	H	Me	H	Me	Me	H	Me	Me	H	<i>R,R</i>
41	Temuconine	H	Me	Me	Me	H	H	Me	Me	H	<i>R,S</i>
42	Temuconine,(-)	H	Me	Me	H	H	H	Me	Me	Me	<i>S,R</i>
43	Thalibrine	H	Me	Me	Me	Me	H	Me	Me	H	<i>S,S</i>
44	Thaligrisine	H	Me	Me	H	Me	H	Me	Me	H	<i>R,S</i>

Type Ia



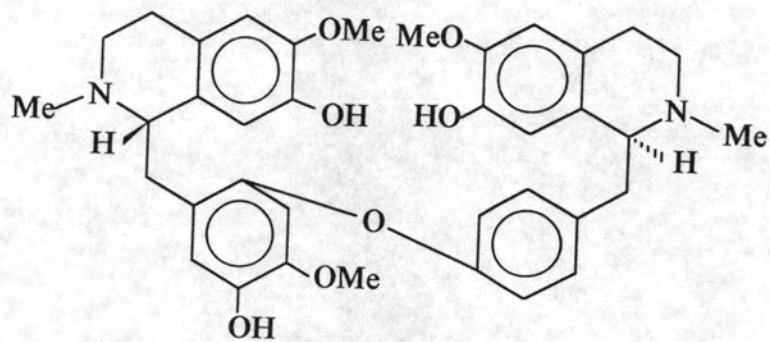
	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	R ₅ '	Cf* 1,1'
45	Thaliracebine	H	Me	Me	Me	Me	H	Me	-CH ₂ -		Me	<i>S,S</i>
46	Thalirugine	H	Me	Me	H	Me	H	Me	H	Me	Me	<i>S,S</i>
47	Thaliruginine	H	Me	Me	Me	Me	H	Me	H	Me	Me	<i>S,S</i>

Table 2 (Continued)**Type Ib**

48 Chilanamine

Table 2 (Continued)

Type II

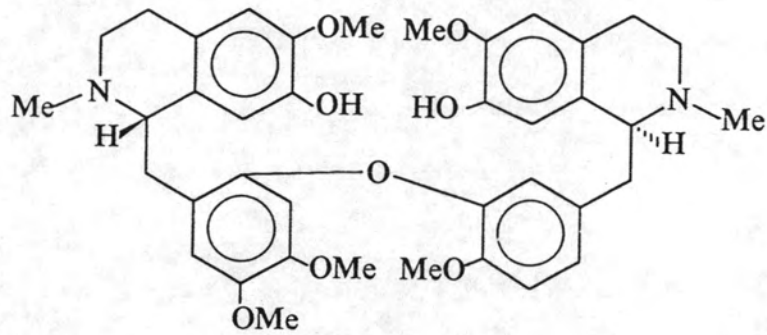


49 Magnolamine

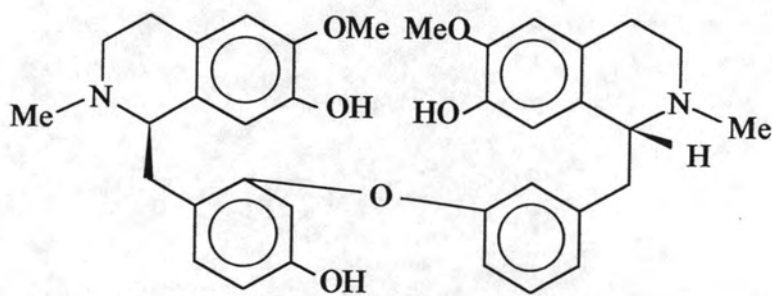


Table 2 (Continued)

Type IIa



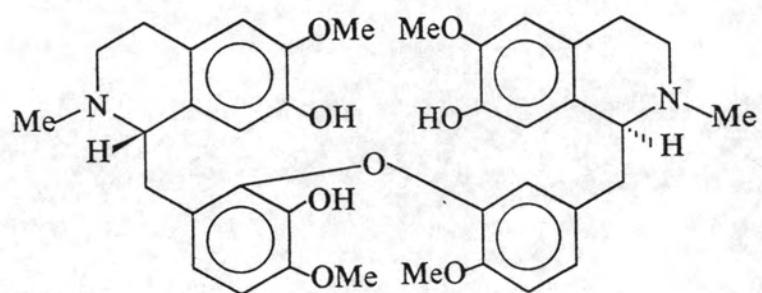
50 Vanuatine



51 Dauricine

Table 2 (Continued)

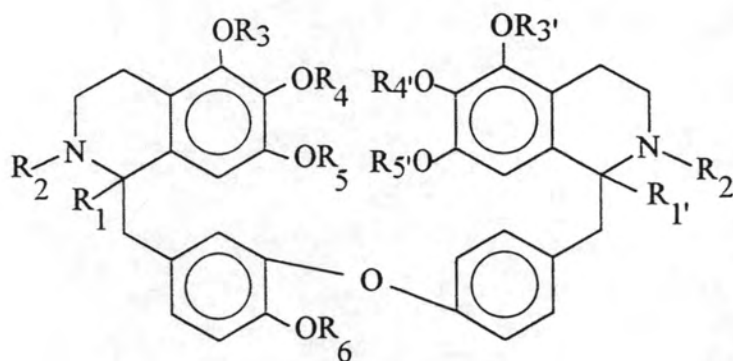
Type IIb



52 Vateamine

Table 2 (Continued)

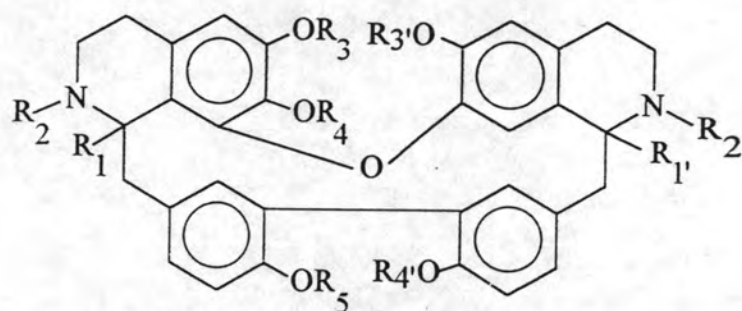
Type III



No	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₁ '	R ₂ '	R ₃ '	R ₄ '	R ₅ '	Cf* 1,1'
53	Desmethylthalistyl line, <i>N</i> -	H	Me	Me	Me	Me	Me	H	Me	---CH ₂ ---		Me	<i>s,s</i>
54	Methothalistryline	H	Me	Me	Me	Me	Me	H	Me	---CH ₂ ---		Me	<i>s,s</i>
55	Thalirabine	H	Me	H	Me	Me	Me	H	Me	---CH ₂ ---		Me	<i>s,s</i>
56	Thalirugidine	H	H	Me	Me	Me	Me	H	Me	H	Me	Me	<i>s,s</i>
57	Thalistine	H	Me	H	Me	Me	Me	H	Me	---CH ₂ ---		Me	<i>s,s</i>
58	Thalistryline	H	Me	Me	Me	Me	Me	H	Me	---CH ₂ ---		Me	<i>s,s</i>

Table 2 (Continued)

Type IV

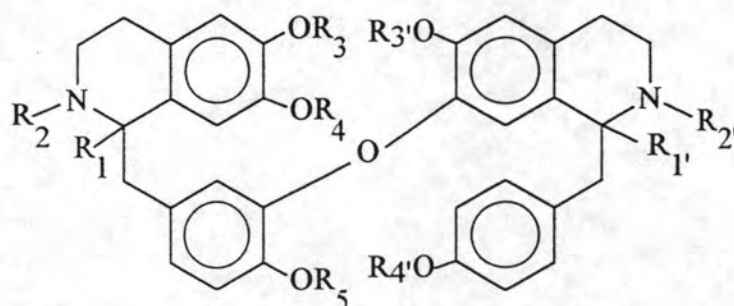


No.	Alkaloids	R_1	R_2	R_3	R_4	R_5	$R_{1'}$	$R_{2'}$	$R_{3'}$	$R_{4'}$	Cf* 1,1'
59	Antioquin	H	Me	Me	H	Me	H	Me	Me	H	<i>S,R</i>
60	Bisnorguattaguanine, 2,2'-	H	H	Me	Me	H	H	H	Me	Me	<i>S,S</i>
61	Cardobine	H	Me	Me	H	Me	H	Me	Me	H	<i>R,S</i>
62	Cordobimine	H	Me	Me	H	Me	-	-	Me	H	<i>R,-</i>
63	Dirosine	H	Me	Me	Me	Me	H	H	Me	H	-
64	Funiferine	H	Me	Me	Me	H	H	Me	Me	Me	-
65	Funiferine dimethiodide	H	Me	Me	Me	H	H	Me	Me	Me	<i>S,R</i>
66	Funiferine <i>N</i> -oxide	H	Me	Me	Me	H	H	Me, O	Me	Me	-
67	Granjine	H	Me	Me	Me	Me	H	Me	Me	Me	<i>R,S</i>
68	Guattamine	H	Me	Me	Me	H	-	-	Me	Me	<i>S,-</i>
69	Guattaminone	H	Me	Me	Me	H	-	-	Me	Me	-
70	Monterine	H	Me	Me	H	Me	H	Me	Me	Me	<i>R,S</i>
71	Norfuniferine,2'-	H	Me	Me	Me	H	H	H	Me	Me	<i>S,R</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
72	Norguattaguanine, 2'-	H	Me	Me	Me	H	H	H	Me	Me	S,S
73	Norrodiasine	H	Me	Me	Me	Me	H	H	Me	H	-
74	Nortiliageine,2'-	H	Me	Me	H	H	H	H	Me	Me	S,R
75	Ocotosine	H	Me	Me	Me	Me	H	-	Me	H	-
76	Oxandrine	H	Me	Me	H	Me	H	Me	Me	H	S,S
77	Oxandrinine	H	Me	Me	H	Me	H	Me	Me	Me	S,S
78	Phlebicine	H	Me	Me	Me	Me	H	Me	H	H	-
79	Pseudoxandrine	H	Me	Me	H	H	H	Me	Me	Me	S,S
80	Pseudoxandrinine	H	Me	Me	Me	H	H	Me	Me	Me	S,S
81	Rodiasine	H	Me	Me	Me	Me	Me	H	Me	H	-
82	Tiliageine	H	Me	Me	H	H	H	Me	Me	Me	-
83	Tilitriandrine	H	Me	Me	H	Me	H	H	Me	H	S,R

Type V

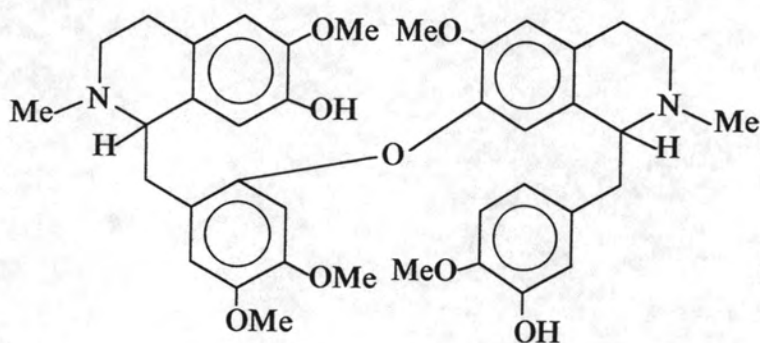


No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
84	Isoliensinine	H	Me	Me	H	H	H	Me	Me	Me	R,R

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	R _{4'}	Cf* 1,1'
85	Liensinine	H	Me	Me	M	H	H	Me	Me	H	<i>R,R</i>
86	Neferine	H	Me	Me	M	H	H	Me	Me	Me	<i>R,R</i>

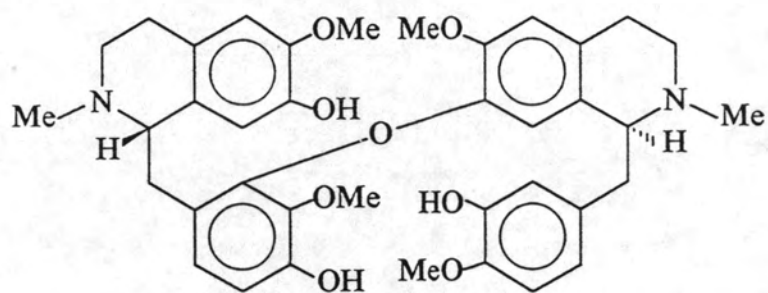
Type Va



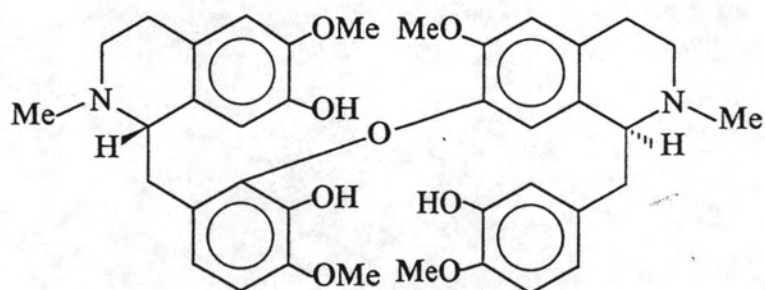
87 Malekulatine

Table 2 (Continued)

Type Vb



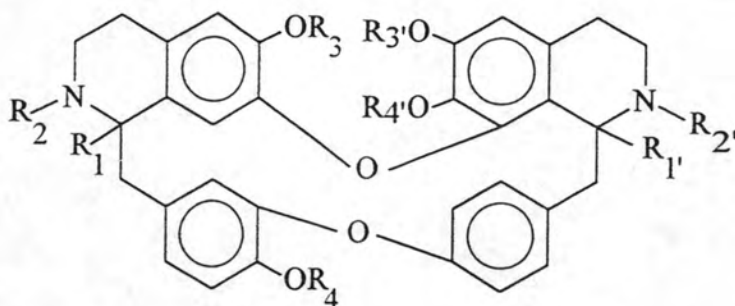
88 Ambrimine



89 Efatine

Table 2 (Continued)

Type VI



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
90	Aromoline	H	Me	Me	H	H	Me	Me	H	<i>R,S</i>
91	Baluchistine	H	Me	Me	H	H	Me	H	Me	<i>R,S</i>
92	Bisnoraromoline, <i>N,N'</i> -	H	H	Me	H	H	H	Me	H	<i>R,S</i>
93	Candicusine	H	Me	Me	H	H	Me	Me	H	<i>R,R</i>
94	Cepharanoline	H	Me	Me	H	H	Me	-CH ₂ -		<i>R,S</i>
95	Cepharanthine	H	Me	Me	Me	H	Me	-CH ₂ -		<i>R,S</i>
96	Cepharanthine-2' β - <i>N</i> - oxide	H	Me	Me	Me	H	O, Me	-CH ₂ -		<i>R,S</i>
97	Coclobine	-	-	Me	Me	H	Me	Me	Me	<i>S,-</i>
98	Colorflamme	H	Me	Me	Me	-	-	Me	Me	-
99	Cycleapeltine	H	Me	Me	Me	H	Me	Me	H	<i>S,S</i>
100	Daphnandrine	H	H	Me	Me	H	Me	Me	H	<i>R,S</i>
101	Daphnoline	H	H	Me	H	H	Me	Me	H	<i>R,S</i>
102	Demerarine	H	H	Me	H	H	Me	Me	Me	<i>S,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
103	Demethylcoclobine, 12 -O-	-	-	Me	H	H	Me	Me	Me	-,S
104	Dihydrostephasubine, 3',4'-	H	Me	Me	Me	-	-	Me	H	R,-
105	Epistephanine	H	Me	Me	Me	-	-	Me	Me	R,R
106	Gyrocarpine	H	Me	Me	Me	H	Me	H	Me	S,R
107	Gyrocarpusine	H	Me	Me	Me	H	Me	H	Me	R,R
108	Gyrolidine	H	Me	Me	Me	H	Me	Me	Me	S,R
109	Homoaromoline	H	Me	Me	Me	H	Me	Me	H	R,S
110	Hypoepistephanine	H	Me	Me	H	-	-	Me	Me	R,-
111	Johnsonine	H	Me	Me	Me	H	Me	H	Me	S,S
112	Limacusine	H	Me	Me	Me	H	Me	Me	H	R,R
113	Macolidine	H	Me	Me	H	H	Me	Me	H	S,R
114	Macoline	H	Me, H	Me	H	H	Me Me	Me	H	S,R
115	Methyllimacusine, O-	H	Me	Me	Me	H	Me	Me	Me	R,R
116	Methylrepandine, O-	H	Me	Me	Me	H	Me	Me	Me	S,S
117	Norcepharanoline, 2-	H	H	Me	H	H	Me	-CH ₂ -		R,S
118	Norcepharanthine, 2-	H	H	Me	Me	H	Me	-CH ₂ -		R,S
119	Norcepharanthine, 2'	H	Me	Me	Me	H	H	-CH ₂ -		R,S
120	Norisocepharanthine, 2'-	H	H	Me	Me	H	Me	-CH ₂ -		R,S
121	Norlimacusine, 1,2- dehydro-2-	-	-	Me	Me	H	Me	Me	H	-,R
122	Norlimacusine, 2-	H	H	M	Me	H	Me	Me	H	R,R
123	Norobaberine, 2'-	H	Me	Me	Me	H	H	Me	Me	R,S
124	Noroxyacanthine, 2'-	H	Me	Me	H	H	H	Me	Me	R,S
125	Norstephasubine	H	Me	Me	Me	-	-	Me	H	-
126	Obaberine	H	Me	Me	Me	H	Me	Me	Me	R,S

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R _{1'}	R _{2'}	R _{3'}	R _{4'}	Cf* 1,1'
127	Oblongamine	H	Me	Me	H	H	Me Me	Me	Me	-
128	Oxoepistephanine	H	Me	Me	Me	-	-	Me	Me	-
129	Oxyacanthine	H	Me	Me	H	H	Me	Me	Me	R,S
130	Pangkoramine	H	H	Me	H	H	H	Me	H	R,R
131	Pangkorimine	H	H	Me	H	-	-	Me	H	R,-
132	Pycnazanthine	H	H	Me	H	-	-	Me	H	R,-
133	Repandine	H	Me	Me	H	H	Me	Me	Me	S,S
134	Sepeerine	H	H	Me	H	H	Me	Me	Me	R,S
135	Stebisimine	-	-	Me	Me	-	-	Me	Me	-
136	Stephasubimine	-	-	Me	Me	-	-	Me	H	-
137	Stephasubine	H	Me	Me	Me	-	-	Me	H	R,-
138	Stephibaberine	H	Me	Me	Me	H	Me	H	Me	R,S
139	Tetrodehydrolima cusine,1',2',3',4'-	H	Me	Me	Me	-	Me	Me	H	-
140	Thalrugosamine	H	Me	Me	Me	H	Me	Me	H	R,S
141	Norcepharoline,2-	H	H	Me	H	H	Me	-CH ₂ -		R,S

Type VII

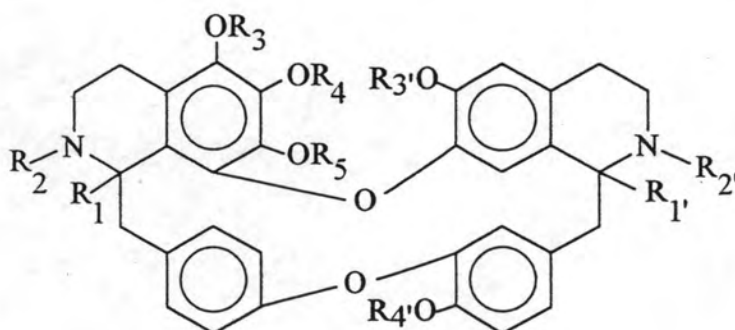
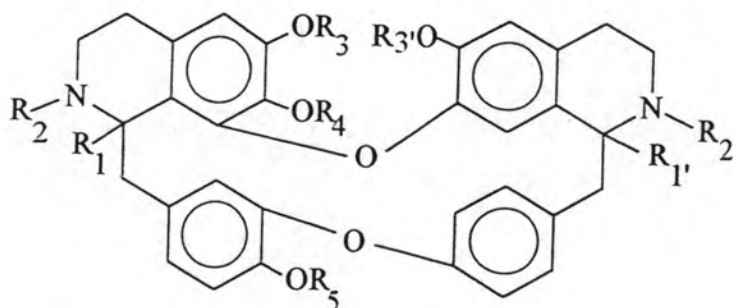


Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	R _{4'}	Cf* 1,1'
143	Thaligosine	H	Me	H	Me	Me	H	Me	Me	Me	<i>S,S</i>
144	Thaligosine-2β- <i>N</i> -oxide	H	Me	H	Me	Me	H	O, Me	Me	Me	<i>S,S</i>
145	Thaligosinine	H	Me	Me	Me	Me	H	Me	Me	H	<i>S,S</i>
146	Thalisopidine	H	Me	H	Me	Me	H	Me	Me	H	<i>S,S</i>
147	Thalisopine	H	Me	H	Me	Me	H	Me	Me	Me	<i>S,S</i>
148	Thalrugosaminine	H	Me	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
149	Thalrugosaminine-2α- <i>N</i> -oxide	H	O, Me	Me	Me	H	Me	Me	Me	Me	<i>S,S</i>

Type VIII

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
150	Atherospermoline	H	Me	Me	H	H	H	Me	Me	<i>S,S</i>
151	Berbacolorflamme	-	Me	Me	H	Me	H	Me	Me	<i>-,R</i>
152	Berbamine	H	Me	Me	Me	H	H	Me, O	Me	<i>R,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
153	Berbamine-2'-β-N-oxide	H	Me	Me	Me	H	H	Me	Me	R,S
154	Bisnorobamegine	H	H	Me	H	H	H	H	Me	R,S
155	Bisnorphaeanthine, 2,2'-	H	H	Me	Me	Me	H	H	Me	R,R
156	Bisnorthalrugosine	H	H	Me	H	Me	H	H	Me	R,S
157	Caryolivine	-	-	Me	H	Me	H	Me	Me	-
158	Cheratamine	-	-	Me	Me	H	H	Me	Me	-
159	Cycleabarbaine,(+)-	H	Me	Me	Me	Me	H	Me	Me	R,R
160	Cycleadrine	H	Me	Me	H	Me	H	Me	Me	-
161	Cycleahomine	H	Me	Me	Me	Me	H	Me	Me	S,S
162	Cycleanorine	H	Me	Me	Me	Me	H	H	Me	S,S
163	Dehatridine	-	-	Me	H	H	H	Me	Me	-
164	Dehatrine	H	Me	Me	Me	Me	-	-	Me	-
165	Demethylpeinamine,7 -O-	H	H	Me	H	H	H	Me	Me	S,R
166	Demethylpeinamine,N -methyl-7-O-	H	Me	Me	H	H	H	Me	Me	S,R
167	Fangchinoline	H	Me	Me	H	Me	H	Me	Me	S,S
168	Fenfangine A	H	O, Me	Me	Me	Me	H	Me	Me	S,S
169	Fenfangine B	H	Me	Me	H	Me	H	O, Me	Me	S,S
170	Fenfangine C	H	Me	Me	H	Me	H	O, Me	Me	S,S
171	Fenfangine D	-	OH ,Me	Me	H	Me	H	Me	Me	-
172	Gyroamericine	H	Me	H	Me	Me	H	Me	Me	R,R
173	Isotetrandrine	H	Me	Me	Me	Me	H	Me	Me	R,S



Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
174	Isotetrandrine, <i>N</i> -oxy-2'-	H	Me	Me	Me	Me	H	O, Me	Me	<i>R,S</i>
175	Isotetrandrine, <i>Nor</i> -2'-	H	Me	Me	Me	Me	-	H	Me	<i>R,S</i>
176	Krukovine	H	Me	Me	H	H	H	Me	Me	<i>R,R</i>
177	Limacine	H	Me	Me	H	Me	H	Me	Me	<i>R,R</i>
178	Limacine-2 β - <i>N</i> -oxide	H	O, Me	Me	H	Me	H	Me	Me	<i>R,R</i>
179	Limacine-2' α - <i>N</i> -oxide	H	Me	Me	H	Me	H	O, Me	Me	<i>R,R</i>
180	Limacine-2' β - <i>N</i> -oxide	H	Me	Me	H	Me	H	O, Me	Me	<i>R,R</i>
181	Methylberbamine, 2- <i>N</i> '-	H	Me	Me	Me	H	H	Me Me	Me	<i>R,S</i>
182	Methylfangchinoline, <i>N</i> -	H	Me	Me	OH	Me	H	Me	Me	<i>S,S</i>
183	Methylisotetrandrine, <i>N</i> -2'-	H	Me	Me	Me	Me	H	Me Me	Me	<i>R,S</i>
184	Monomethyltetrandrinium	H	Me Me	Me	Me	Me	H	Me, H	Me	<i>S,S</i>
185	Norberbamine,2- <i>N</i> -	H	H	Me	Me	H	H	Me	Me	<i>R,S</i>
186	Norisotetrandrine,2-	H	H	Me	Me	Me	H	Me	Me	<i>R,S</i>
187	Norlimacine,(-)-2'-	H	Me	Me	Me	Me	H	H	Me	-
188	Norlimacine,2-	H	H	Me	H	Me	H	Me	Me	<i>R,R</i>
189	Norobamegine,2- <i>N</i> -	H	H	Me	H	H	H	Me	Me	<i>R,S</i>
190	Norpenduline	H	H	Me	Me	H	H	Me	Me	<i>S,S</i>
191	Nortetrandrine,2-	H	H	Me	Me	Me	H	Me	Me	<i>S,S</i>
192	Northalrugosine,2-	H	H	Me	H	Me	H	Me	Me	<i>R,S</i>
193	Obamegine	H	Me	Me	H	H	H	Me	Me	<i>R,S</i>
194	Oxofangchirine	H	Me	Me	Me	Me	-	-	Me	-
195	Peinamine	H	H	Me	Me	H	H	Me	Me	<i>S,R</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
196	Penduline	H	Me	Me	Me	H	H	Me	Me	<i>S,S</i>
197	Phaeantharine	-	Me	Me	Me	Me	-	Me	Me	-
198	Phaeanthine	H	Me	Me	Me	Me	H	Me	Me	<i>R,R</i>
199	Phaeanthine-2' α - <i>N</i> -oxide	H	Me	Me	Me	Me	H	O, Me	Me	<i>R,R</i>
200	Pycnamine	H	Me	Me	Me	H	H	Me	Me	<i>R,R</i>
201	Stepierrine	-	-	Me	H	H	H	Me	Me	-
202	Tetradehydrolimacine ,1,2,3,4-	-	Me	Me	H	Me	H	Me	Me	-
203	Tetrandrine mono- <i>N</i> -2'-oxide	H	Me	Me	Me	Me	H	O, Me	Me	-
204	Tetrandrine,(+)	H	Me	Me	Me	Me	H	Me	Me	<i>S,S</i>
205	Tetrandrine,(\pm)	H	Me	Me	Me	Me	H	Me	Me	-
206	Thalrugosine	H	Me	Me	H	Me	H	Me	Me	<i>R,S</i>
207	Tiliafunimine	-	-	Me	H	Me		Me	Me	-

Type IX

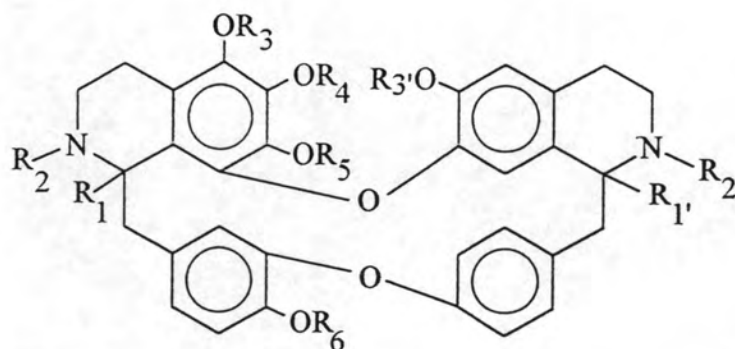
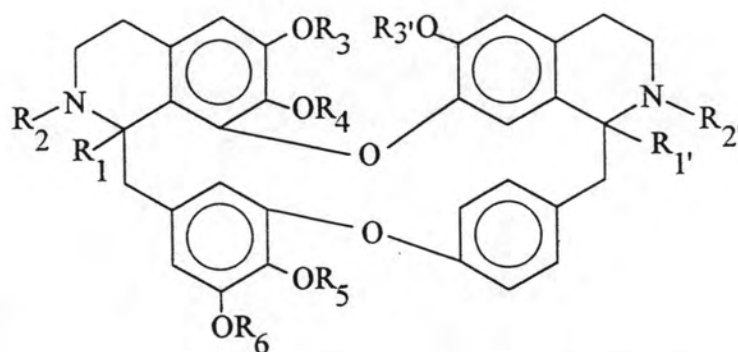


Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
208	Desmethylthalidezine, <i>N</i> -	H	H	H	Me	Me	Me	H	Me	Me	<i>S,S</i>
209	Epinorhernadazine	H	Me	Me	Me	Me	Me	H	H	Me	<i>S,R</i>
210	Hernandezine	H	Me	Me	Me	Me	Me	H	Me	Me	<i>S,S</i>
211	Hernandezine- <i>N</i> - oxide	H	Me	Me	Me	Me	Me	H	O, Me	Me	<i>S,S</i>
212	Isothalidezine	H	Me	H	Me	Me	Me	H	Me	Me	<i>S,R</i>
213	Norhernandezine, <i>N'</i> -	H	Me	Me	Me	Me	Me	H	H	Me	<i>S,S</i>
214	Thalidezine	H	Me	H	Me	Me	Me	H	Me	Me	<i>S,S</i>
215	Thalisamine	H	Me	Me	Me	Me	Me	H	Me	Me	<i>S,S</i>
216	Thalsimidine	H	Me	H	Me	Me	Me	-	-	Me	<i>S,-</i>

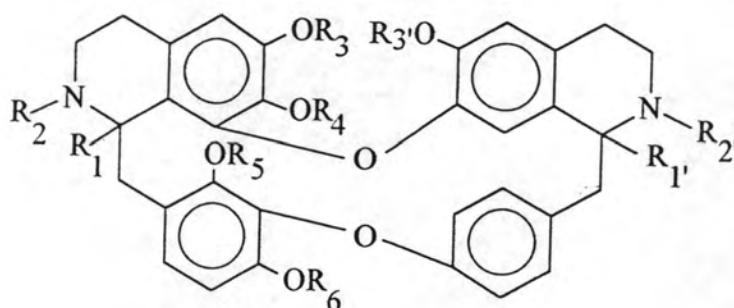
Type X

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
217	Isotenuipine	H	Me	Me	Me	-CH ₂ -		H	Me	Me	<i>R,S</i>
218	Nortenuipine,(+)	H	Me	Me	H	-CH ₂ -		H	Me	Me	<i>S,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
219	Nortenuipine,(-)	H	Me	Me	H		-CH ₂ -	H	Me	Me	R,R
220	Nortenuipine-2β -N- Oxide	H	Me	Me	H		-CH ₂ - 	H	O, Me	Me	R,R
221	Repandinine	H	Me	Me	Me		-CH ₂ -	H	Me	Me	-
222	Tenuipine,(+)	H	Me	Me	Me		-CH ₂ -	H	Me	Me	S,S
223	Tenuipine,(-)	H	Me	Me	Me		-CH ₂ -	H	Me	Me	R,R

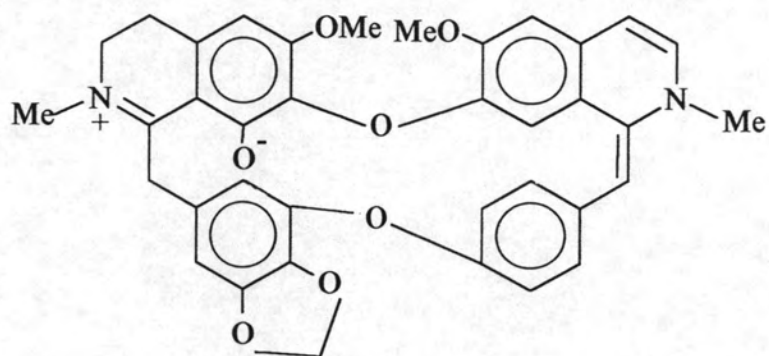
Type Xa



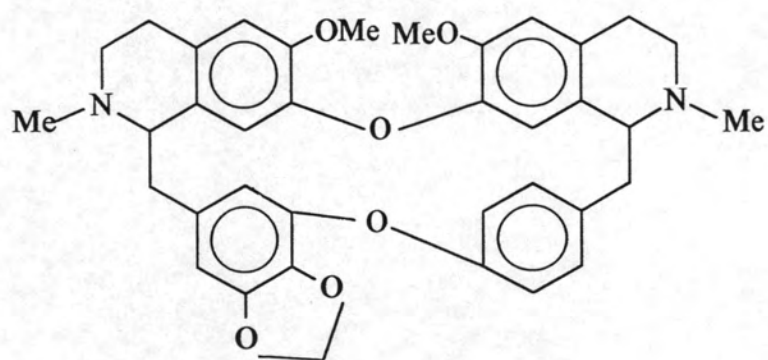
No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
224	Calafatimine	H	Me	Me	Me	Me	Me	-	-	Me	S,-
225	Calafatine	H	Me	Me	Me	Me	Me	H	Me	Me	R,R
226	Calafatine-2' α-N- oxide	H	Me	Me	Me	Me	Me	H	O, Me	Me	S,R
227	Calafatine-2' β-N- oxide	H	Me	Me	Me	Me	Me	H	O, Me	Me	S,R

Table 2 (Continued)

Type Xb



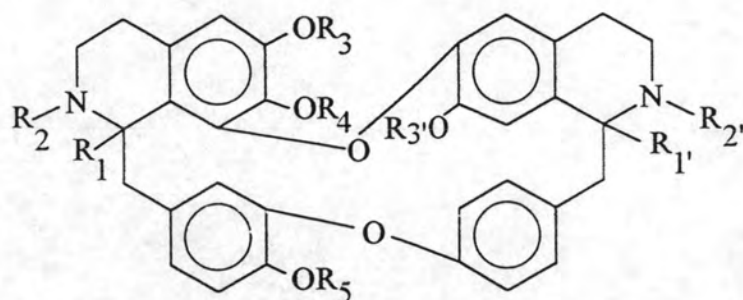
228 Daphnine



229 Hexahydrodaphnine

Table 2 (Continued)

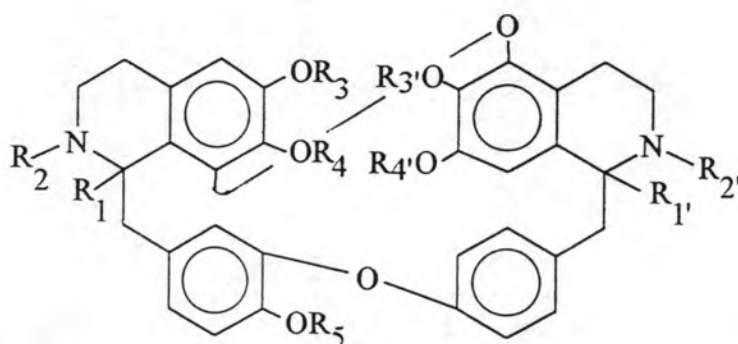
Type XI



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
230	Belarine	H	Me	Me	H	Me	H	Me	Me	<i>R,S</i>
231	Demethylisothalicberine, 7- <i>O</i> -	H	Me	Me	H	H	H	Me	Me	<i>R,S</i>
232	Isothalicberine	H	Me	Me	Me	H	H	Me	Me	<i>R,S</i>
233	Methylisothalicberine, <i>O</i> -	H	Me	Me	Me	Me	H	Me	Me	<i>R,S</i>
234	Methylthalicberine, <i>O</i> -	H	Me	Me	Me	Me	H	Me	Me	<i>S,S</i>
235	Northaliphylline, 2'-	H	Me	Me	H	Me	H	H	Me	<i>S,S</i>
236	Thalicberine	H	Me	Me	Me	H	H	Me	Me	<i>S,S</i>
237	Thaliphylline	H	Me	Me	H	Me	H	Me	Me	<i>S,S</i>
238	Thaliphylline-2'β <i>N</i> -oxide	H	Me	Me	H	Me	H	Me	Me	<i>S,S</i>
239	Thalivarminine	H	Me	Me	H	H	H	O, Me	Me	<i>S,S</i>
240	Thalmethine	H	Me	Me	Me	H	-	-	Me	<i>S,-</i>
241	Thalsivasine	H	Me	Me	H	Me	-	-	Me	<i>S,-</i>

Table 2 (Continued)

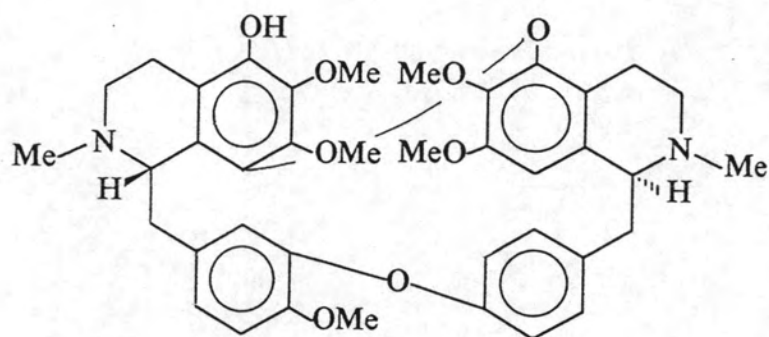
Type XII



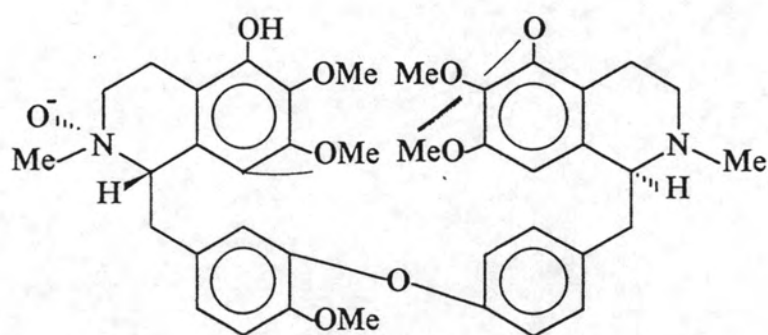
No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
242	Desmethylthalidazine, <i>N</i> -	H	H	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
243	Desmethylthalarugosidine, <i>N</i> -	H	H	Me	H	Me	H	Me	Me	Me	<i>S,S</i>
244	Thalfoetidine	H	Me	Me	Me	H	H	Me	Me	Me	<i>S,S</i>
245	Thalidasine	H	Me	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
246	Thalidasine-2 α - <i>N</i> -oxide	H	O, Me	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
247	Thaligosidine	H	Me	Me	H	H	H	Me	Me	Me	<i>S,S</i>
248	Thalpindione	H	CH O	Me	H	Me	H	Me	Me	Me	<i>S,S</i>
249	Thalrugosidine	H	Me	Me	H	Me	H	Me	Me	Me	<i>S,S</i>
250	Thalrugosinone	H	CH O	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>

Table 2 (Continued)

Type XIIIa



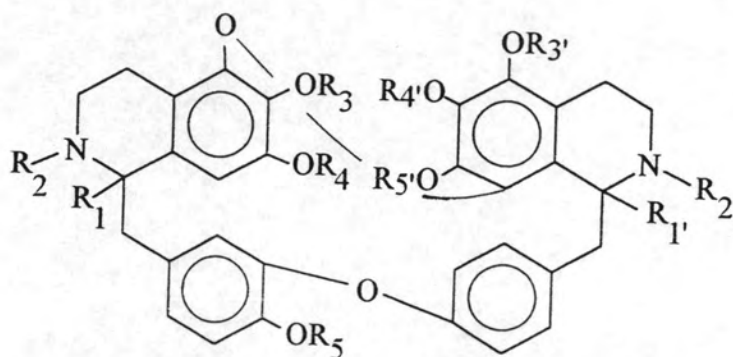
251 Hydroxythalidasine,5-



252 Hydroxythalidasine-2'α-N-oxide

Table 2 (Continued)

Type XIII



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	R ₅ '	Cf*
												1,1'
253	Thalfine	H	Me	Me	Me	Me	-	-	Me	-CH ₂ -		S,-
254	Thalfinine	H	Me	Me	Me	Me	H	Me	Me	-CH ₂ -		S,S
255	Thalmirabine	H	Me	Me	Me	Me	H	Me	H	Me	Me	S,S

Type XIV

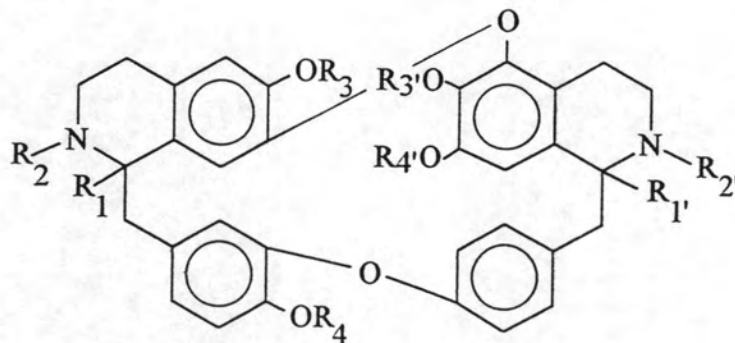
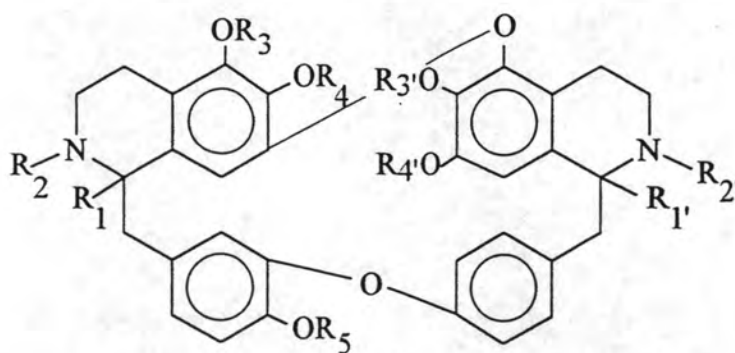


Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R _{1'}	R _{2'}	R _{3'}	R _{4'}	Cf* 1,1'
256	Berbilaurine	H	Me	H	Me	H	Me	H	Me	<i>R,S</i>
257	Desmethyllauberine, 1 2- <i>O</i> -	H	Me	Me	H	H	Me	H	Me	<i>R,S</i>
258	Dryadine	H	Me	H	Me	H	Me	Me	Me	<i>S,R</i>
259	Dryadodaphnine	H	Me	H	H	H	Me	Me	Me	<i>S,R</i>
260	Lauberine	H	Me	Me	Me	H	Me	H	Me	<i>R,S</i>
261	Methylthalmine, <i>O</i> -	H	Me	Me	Me	H	Me	Me	Me	<i>S,S</i>
262	Northalmine, 2-	H	H	Me	Me	H	Me	H	Me	<i>S,S</i>
263	Thalibadensine	H	Me	Me	H	H	Me	H	Me	<i>S,S</i>
264	Thalictine	H	Me	Me	H	H	Me	Me	Me	<i>S,S</i>
265	Thalifortine	H	Me	Me	H	H	Me	Me	Me	<i>S,R</i>
266	Thalmiculatimine	H	Me	Me	H	-	-	Me	Me	<i>S,-</i>
267	Thalmine	H	Me	Me	Me	H	Me	H	Me	<i>S,S</i>

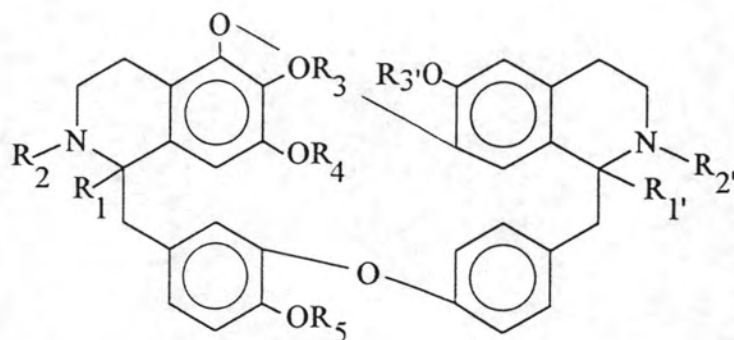
Type XIVa

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	R _{4'}	Cf* 1,1'
268	Cultithalminine	H	Me	H	Me	H	-	-	Me	Me	<i>S,-</i>
269	Hydroxythalmine, 5-	H	Me	H	Me	Me	H	Me	H	Me	<i>S,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
270	Thalmiculimine	H	Me	H	Me	Me	-	-	Me	Me	S,-
271	Thalmiculine	H	Me	H	Me	Me	H	Me	Me	Me	S,S

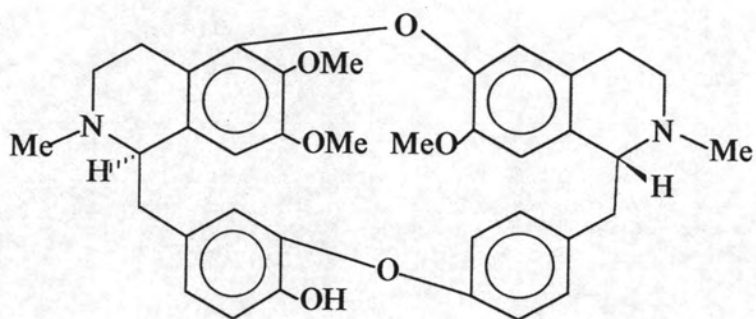
Type XV



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
272	Norpanurensine	H	Me	H	Me	Me	H	H	Me	R,R
273	Panurensine	H	Me	H	Me	Me	H	Me	Me	R,R

Table 2 (Continued)

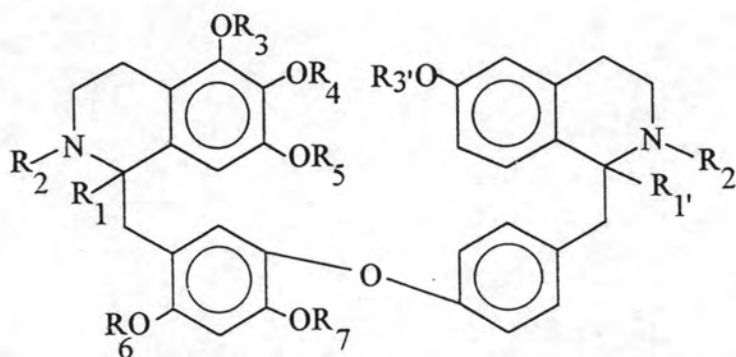
TYPE XVI



274 Nemuarine

Table 2 (Continued)

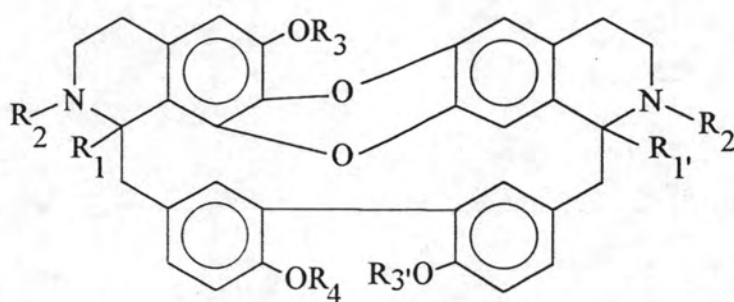
Type XVII



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
275	Dihydrothalictrinine	H	Me	Me	Me	Me	H	Me	-	-	Me	-
276	Epinorthalibrunine	H	Me	Me	Me	Me	H	Me	H	H	Me	S,R
277	Methylthalibrunimine, <i>O</i> -	H	Me	Me	Me	Me	Me	Me	-	-	Me	S,-
278	Northalibrunine, <i>N'</i> -	H	Me	Me	Me	Me	H	Me	H	H	Me	S,S
279	Oxothalibrunimine	H	Me	Me	Me	Me	H	Me	-	-	Me	S,-
280	Thalibrunimine	H	Me	Me	Me	Me	H	Me	-	-	Me	S,-
281	Thalibrunine	H	Me	Me	Me	Me	H	Me	H	Me	Me	S,S
282	Thalictinine	H	Me	Me	Me	Me	H	Me	-	-	Me	S,-

Table 2 (Continued)

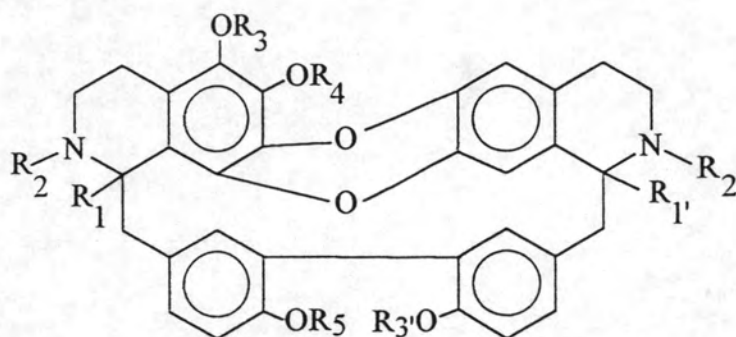
Type XVIII



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R _{1'}	R _{2'}	R _{3'}	C [*] 1,1'
283	Dinklacorine	H	Me	Me	H	H	Me	Me	-
284	Medelline	H	Me	Me	Me	H	Me	H	<i>S,R</i>
285	Nortilliacorine-A	H	Me	Me	Me	H	H	H	-
286	Nortilliacorinine-A	H	H	Me	Me	H	Me	H	<i>S,S</i>
287	Nortilliacorinine-B	H	H	Me	Me	H	Me	H	-
288	Pachyovatamine	H	H	Me	Me	H	H	H	<i>S,S</i>
289	Tiliacorine	H	Me	Me	Me	H	Me	H	<i>R,S</i>
290	Tiliacorimine	H	Me	Me	Me	H	Me	H	<i>S,S</i>
291	Tiliacorinine-2'-N-oxide	H	Me	Me	Me	H	O, Me	H	<i>S,S</i>
292	Tiliarine	H	Me	Me	H	H	H	Me	<i>S,S</i>
293	Yanangcorinine	H	Me	Me	H	H	Me	Me	<i>S,S</i>

Table 2 (Continued)

Type XIX

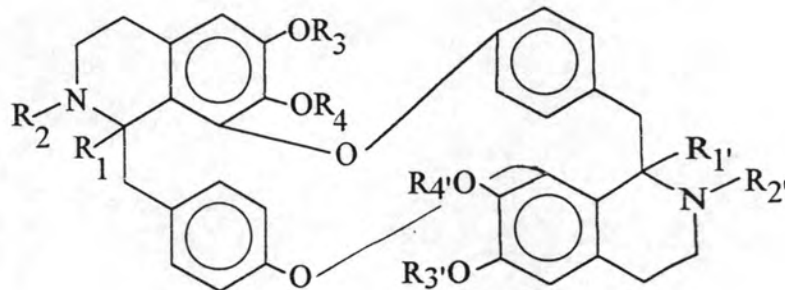


No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	Cf 1,1'
294	Methylpachygonamine, <i>N</i> -	H	Me	H	Me	Me	H	H	H	-
295	Methyltiliamosine, <i>N</i> -	H	Me	Me	Me	Me	H	Me	H	<i>S,S</i>
296	Norisoyanangine	H	Me	H	Me	Me	H	H	H	<i>R,S</i>
297	Noryanangine	H	Me	H	Me	Me	H	H	H	<i>S,S</i>
298	Pachygonamine	H	H	H	Me	Me	H	H	H	-
299	Tiliamosine	H	Me	Me	Me	Me	H	H	H	-
300	Tilianangine	H	Me	H	Me	H	H	Me	Me	<i>S,S</i>
301	Yanangine	H	Me	H	Me	Me	H	Me	H	<i>S,S</i>



Table 2 (Continued)

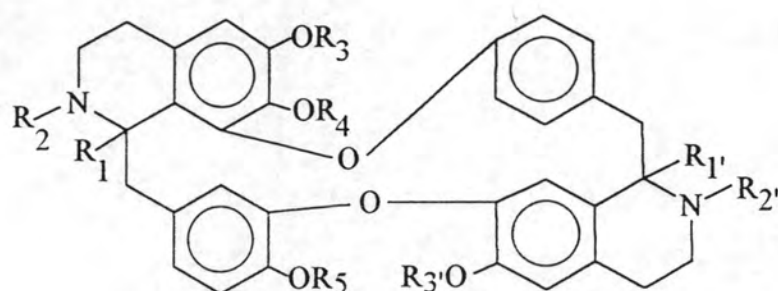
Type XX



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
302	Cycleanine	H	Me	M	Me	H	Me	Me	Me	<i>R,R</i>
303	cycleanine- <i>N</i> -oxide	H	O, Me	Me	Me	H	Me	Me	Me	<i>R,R</i>
304	Demethylcycleanine, tetra- <i>O</i> -	H	Me	H	H	H	Me	H	H	<i>S,S</i>
305	Dessmethylcycleanine, <i>N</i> -	H	Me	Me	Me	H	H	Me	Me	<i>R,R</i>
306	Isochondodendrine	H	Me	Me	H	H	Me	Me	H	<i>R,R</i>
307	Isocycleanine	H	Me	Me	Me	H	Me	Me	Me	<i>R,S'</i>
308	Neoprotocuridine	H	Me	Me	H	H	Me	Me	H	-
309	Norcycleanine,(+)-	H	Me	Me	Me	H	Me	Me	H	<i>S,S</i>
310	Norcycleanine,(-)	H	Me	Me	Me	H	Me	Me	H	<i>R,R</i>
311	Protocuridine	H	Me	H	Me	H	Me	Me	H	-
312	Sciadenine	H	Me	Me	H	H	Me	Me	Me	<i>S,R</i>
313	Sciadoferine	-	-	Me	H	H	-	Me	Me	<i>-,R</i>
314	Sciadoline	-	-	Me	H	H	Me	Me	Me	<i>-,R</i>

Table 2 (Continued)

Type XXI

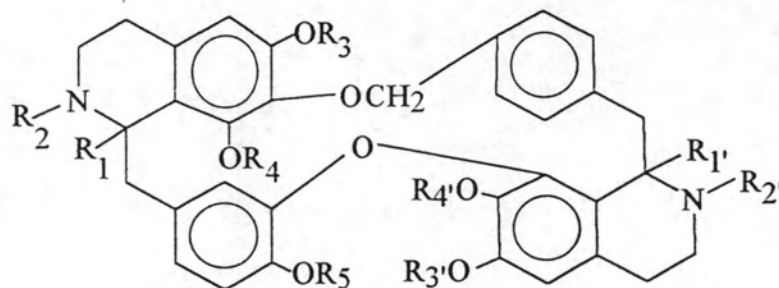


No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
315	Chondocurarine	H	Me, Me	Me	H	H	H	Me, H	Me	<i>R,S</i>
316	Chondrocurine	H	Me	Me	H	H	H	Me	Me	<i>R,S</i>
317	Chondrocurine, Nor- N _b -	H	Me	Me	H	H	H	H	Me	<i>R,S</i>
318	Chondrofoline	H	Me	Me	M	H	H	Me	Me	<i>S,S</i>
319	Curine, (+)	H	Me	Me	H	H	H	Me	Me	<i>S,S</i>
320	Curine, (-)	H	Me	Me	H	H	H	Me	Me	<i>R,R</i>
321	Cycleacurine	H	Me	Me	H	H	H	Me	H	<i>R,R</i>
322	Dimethylcurine, <i>O,O</i> -	H	Me	Me	M	Me	H	Me	Me	<i>R,R</i>
323	Hayatidine	H	Me	Me	H	Me	H	Me	Me	<i>S,R</i>
324	Hayatine	H	Me	Me	H	H	H	Me	Me	-
325	Hayatinine	H	Me	Me	H	Me	H	Me	Me	-
326	Methylcurine, 12'- <i>O</i> -	H	Me	Me	H	Me	H	Me	Me	<i>R,R</i>
327	Methylcurine, 4''- <i>O</i> -	H	Me	Me	H	Me	H	Me	Me	<i>S,S</i>
328	Tubocararine, (+)	H	Me, Me	Me	H	H	H	Me, Me	Me	<i>R,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
329	Tubocurarine,(-)	H	Me, Me	Me	H	H	H	Me, Me	Me	<i>S,R</i>
330	Tubocurine,(-)	H	Me	Me	H	H	H	Me	Me	<i>R,S</i>

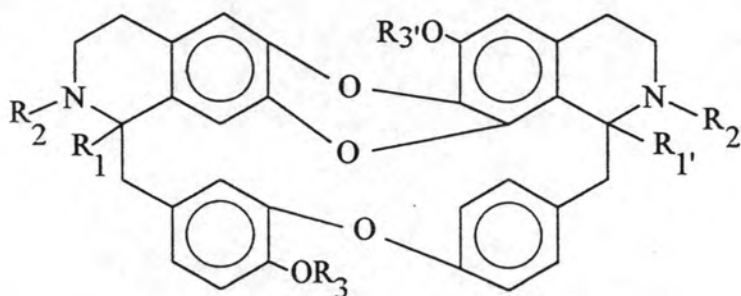
Type XXII



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
331	Cissampareine	-	-	Me	H	H	Me	Me	Me	<i>-,R</i>
332	Cycleaneonine	H	Me	Me	H	H	Me	Me	Me	-
333	Methylwarifteine	-	-	H	Me	H	Me	Me	Me	<i>-,R</i>
334	Warifteine	-	-	H	Me	H	Me	Me	H	<i>-,R</i>

Table 2 (Continued)

Type XXIII

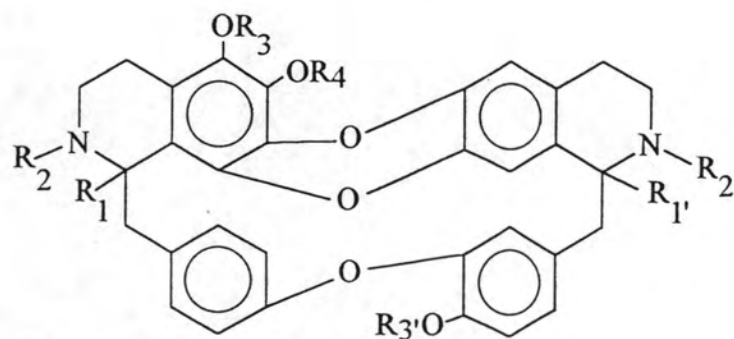


No.	Alkaloids	R ₁	R ₂	R ₃	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
335	Apateline	H	H	H	H	Me	Me	<i>R,S</i>
336	Cocsoline	H	H	H	H	Me	Me	<i>S,S</i>
337	Cocsuline	H	Me	H	H	Me	Me	<i>S,S</i>
338	Cocsuline- <i>N</i> -2-oxide	H	O, Me	H	H	Me	Me	<i>S,S</i>
339	Dehydroapateline, 1,2-	-	-	H	H	Me	Me	-, <i>S</i>
340	Dehydromicranthine, 1, 2-	-	-	H	H	Me	Me	-, <i>R</i>
341	Dehydrotelobine, 1,2-	-	-	Me	H	Me	Me	-, <i>S</i>
342	Demethyltrialobine, 1, 2'-	H	Me	H	H	H	Me	<i>S,S</i>
343	Dimethylmicranthine, <i>N,O</i> -	H	Me	Me	H	Me	Me	<i>R,R</i>
344	Isotrilobine	H	Me	Me	H	Me	Me	<i>S,S</i>
345	Kurramine			H	H	Me	H	-, <i>S</i>
346	Methylapateline, <i>N</i> -	H	Me	H	H	Me	Me	<i>R,S</i>
347	Methylcocsoline, <i>O</i> -	H	H	Me	H	Me	Me	<i>S,S</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
348	Methylmicranthine, <i>O</i>	H	H	Me	H	Me	Me	<i>R,R</i>
349	Methylnorapateline, <i>N</i>	H	Me	H	H	Me	H	<i>R,S</i>
350	Micranthine	H	H	H	H	Me	Me	<i>R,R</i>
351	Norcocculine,2'-	H	Me	H	H	H	Me	<i>S,S</i>
352	Nortelobine,1,2- dehydro	-	-	Me	H	H	Me	<i>-,S</i>
353	Nortrilobine	H	H	Me	H	H	Me	<i>S,S</i>
354	Telobine	H	H	Me	H	Me	Me	<i>R,S</i>
355	Tricordatine	H	Me	H	H	Me	H	<i>S,S</i>
356	Trigilletimine	H	Me	Me	-	-	Me	<i>S,-</i>
357	Trilobine	H	Me	Me	H	H	Me	<i>S,S</i>

Type XXIIIa

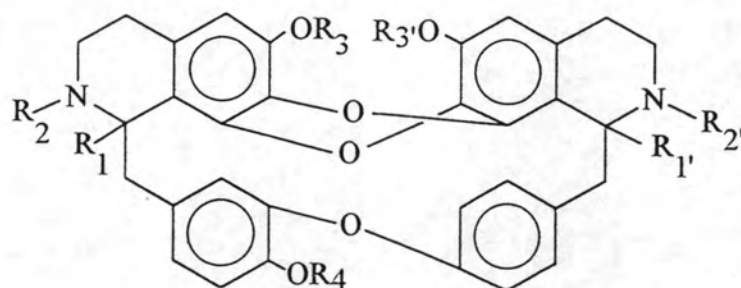


No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
358	Dehydrokohatamine, 1',2'-	H	Me	H	Me	-	-	Me	<i>S,-</i>

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
359	Dehydrokohatine, 1, 2'-	H	Me	H	Me	-	-	H	S,-
360	Hydroxyapateline, 5-	H	Me	H	Me	H	H	H	S,R
361	Hydroxytelobine, 5-	H	Me	H	Me	H	H	Me	S,R
362	Kohatamine	H	Me	H	Me	H	H	Me	S,S
363	Kohatine	H	Me	H	Me	H	H	H	S,S
364	Siddiquamine	H	Me	H	Me	-	-	Me	S,-
365	Siddiquine	H	Me	H	Me	-	-	H	S,-

Type XXIV

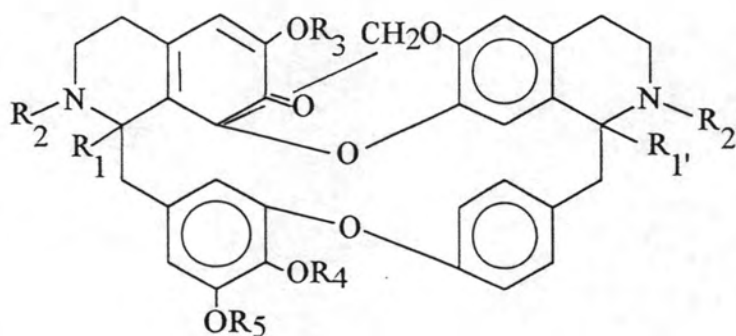


No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
366	Cocsiline	H	Me, H	H	H	H	Me, H	Me	-
367	Cocsilinine	H	H	Me	H	H	H	H	-
368	Cocsulinine	H	Me	Me	H	H	Me	H	S,S
369	Gilletine	H	Me	Me	Me	H	H	H	S,S

Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
370	Isogillettine- <i>N</i> -oxide	H	O, Me	Me	Me	H	H	H	-
371	Menisarine	H	Me	Me	Me	-	-	Me	-
372	Methylcocsulinin, <i>O</i> -	M	Me	Me	H	Me	Me	Me	-
373	Norcocsulinin, <i>N</i> -	H	Me	H	H	H	Me	H	-
374	Pendilinine	H	Me	Me	Me	H	H	Me	-

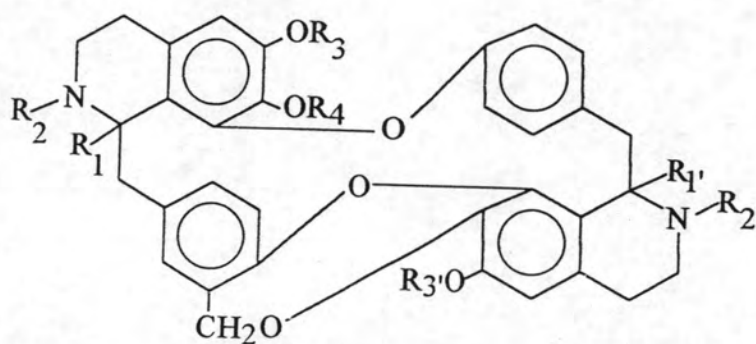
Type XXV



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R ₁ '	R ₂ '	Cf* 1,1'
375	Dielsine	H	H	Me	H	Me	H	Me	-
376	Pseudorepanduline	H	Me	Me	M	H	H	Me	-
377	Repanduline	H	Me	Me	-CH ₂ -		H	Me	-

Table 2 (Continued)

Type XXVI



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
378	Insulanoline	H	Me	Me	H	H	Me	Me	R,R
379	Insularine	H	Me	Me	Me	H	Me	Me	R,R
380	Insularine-2β-N-oxide	H	O, Me	Me	Me	H	Me	Me	R,R
381	Insularine-2β'-N-oxide	H	Me	Me	Me	H	O, Me	Me	R,R

Type XXVII

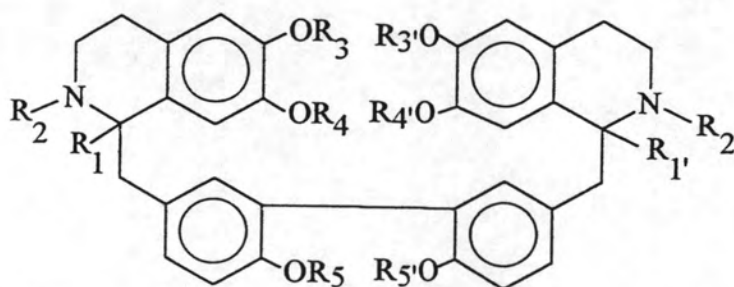


Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	R _{4'}	R _{5'}	Cf* 1,1'
382	Norpisopowiaridine, 2'-	H	Me	H	Me	Me	H	H	H	Me	H	R,R
383	Pisopowamine	H	Me	Me	Me	H	H	H	Me	Me	H	R,R
384	Pisopowetine	H	Me	Me	Me	H	H	Me	Me	Me	H	R,R
385	Pisopowiaridine	H	Me	H	Me	Me	H	Me	H	Me	H	R,R
386	Pisopowiarine	H	Me	H	Me	Me	H	Me	H	Me	Me	R,R
387	Pisopowidine	H	Me	H	Me	Me	H	Me	Me	Me	Me	R,R
388	Pisopowine	H	Me	Me	Me	Me	H	Me	Me	Me	Me	R,R

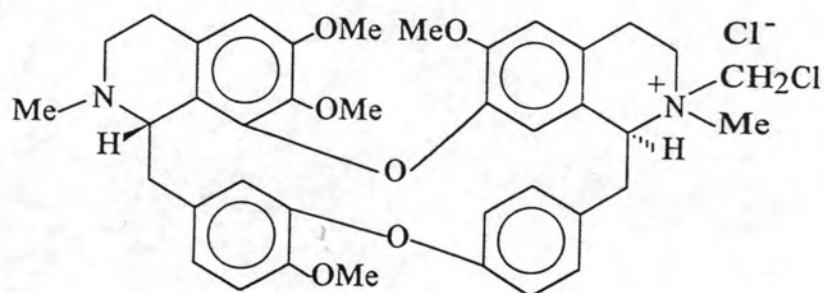
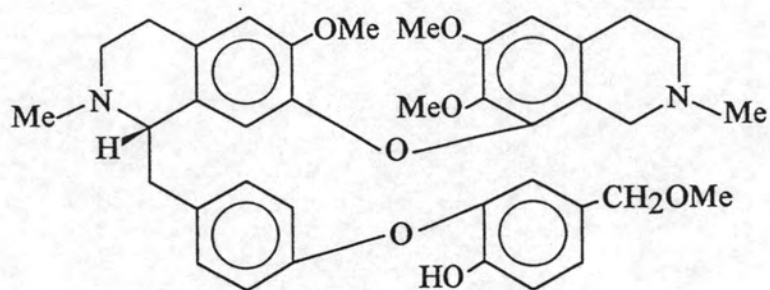
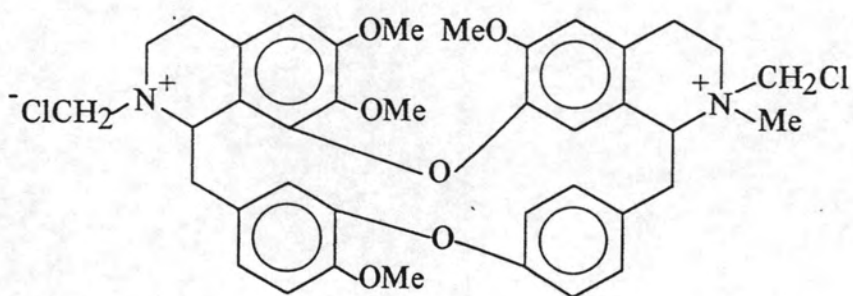
Artifact

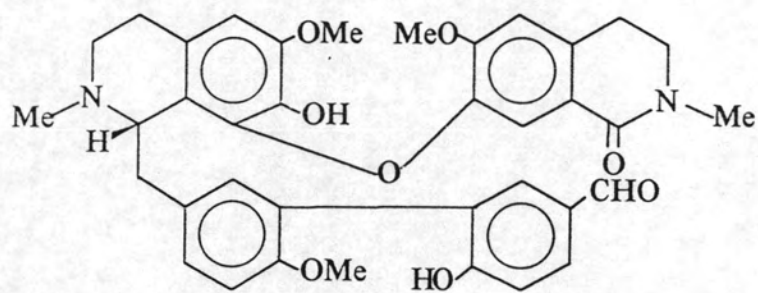
Table 2 (Continued)



390 Chenabiol methylether



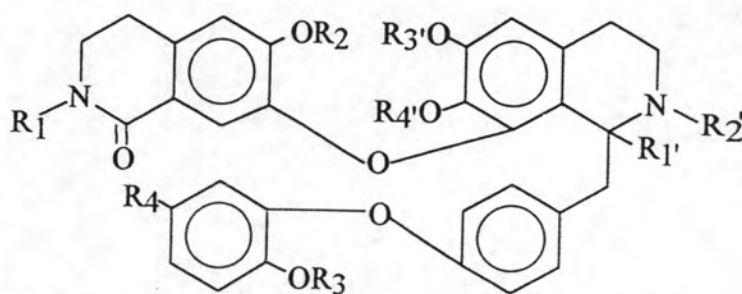
391 Dihydromethyltetrandrine, 2,2'-N,N-

Secobisbenzylisoquinoline Alkaloids**Type IV**

392 Secantioquine

Table 2 (Continued)

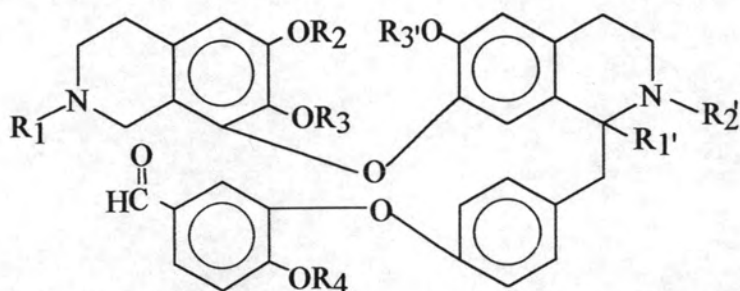
Type VI



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	R ₄ '	Cf* 1,1'
393	Auroramine	Me	Me	Me	CH O	H	Me	Me	Me	-,R
394	Baluchistanamine	Me	Me	H	CH O	H	Me	Me	Me	-,S
395	Dihydrosecocepharant hine	Me	Me	Me	CH OH	H	Me	-CH ₂ -		-,S
396	Maroumine	Me	Me	Me	CH O	H	Me	H	Me	-,R
397	Seco-obaberine	Me	Me	Me	CH O	H	Me	M	Me	-,S
398	Secocepharanthine	Me	Me	Me	CH O	H	Me	-CH ₂ -		-,S

Table 2 (Continued)

Type VIII



No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
399	Chenabine	Me	Me	Me	H	H	Me	Me	-,S
400	Jhelumine	Me	Me	H	H	H	Me	Me	-,S

Type Xa

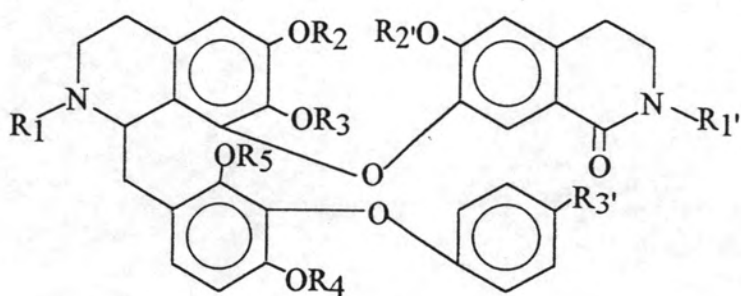
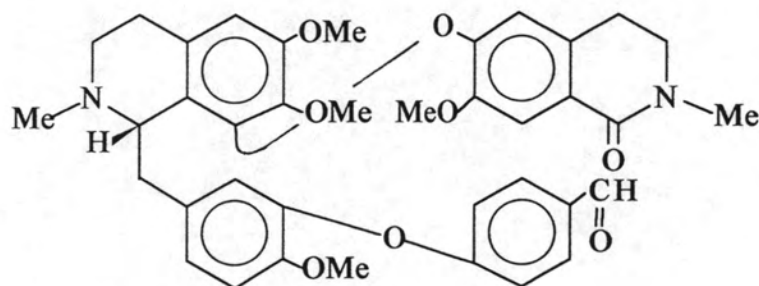


Table 2 (Continued)

No.	Alkaloids	R ₁	R ₂	R ₃	R ₄	R ₅	R _{1'}	R _{2'}	R _{3'}	Cf* 1,1'
403	Curacautine	Me	Me	Me	Me	Me	Me	Me	CH O	S,-
404	Talcamine	H	Me	Me	Me	Me	Me	Me	CO OC H ₃	S,-

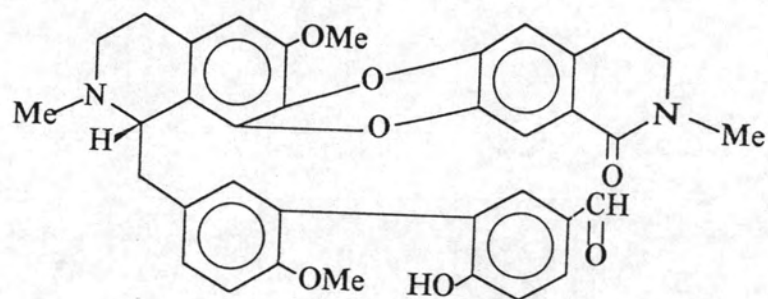
Type XI



405 Revolutinone

Table 2 (Continued)

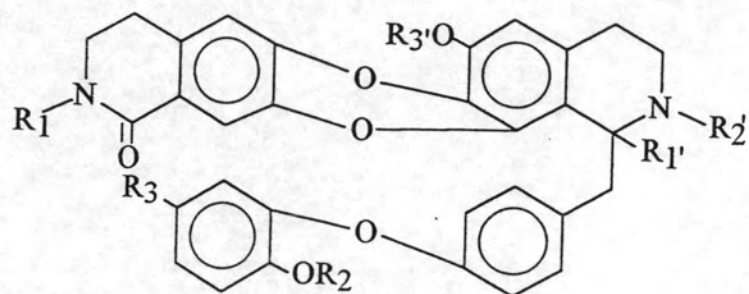
Type XVIII



406 Secolucidine

Table 2 (Continued)

Type XXIII

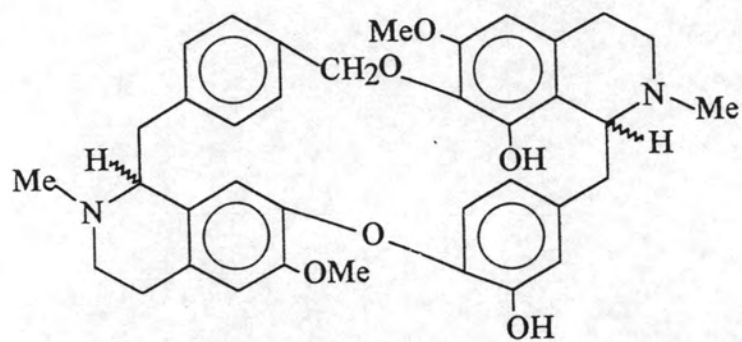


No.	Alkaloids	R ₁	R ₂	R ₃	R ₁ '	R ₂ '	R ₃ '	Cf* 1,1'
407	Gilgitine	Me	H	CO OC H ₃	H	Me	Me	-,S
408	Methyldeoxopunjabine, <i>O</i>	Me	Me	Me	H	Me	Me	-,S
409	Methylpunjabine, <i>O</i>	Me	Me	CH O	H	Me	Me	-,S
410	Punjabine	Me	H	CH O	H	Me	Me	-,S

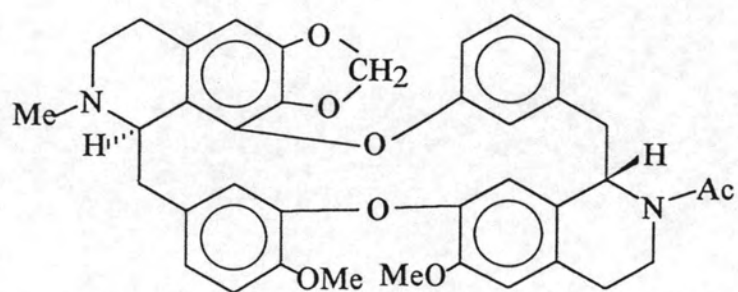
* Cf=Configuration

Table 2 (Continued)

Miscellaneous



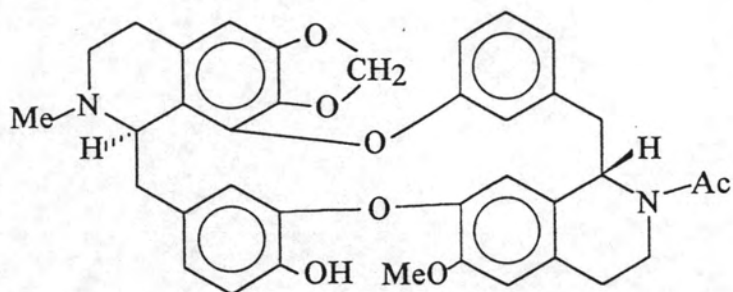
411 Cissampentin



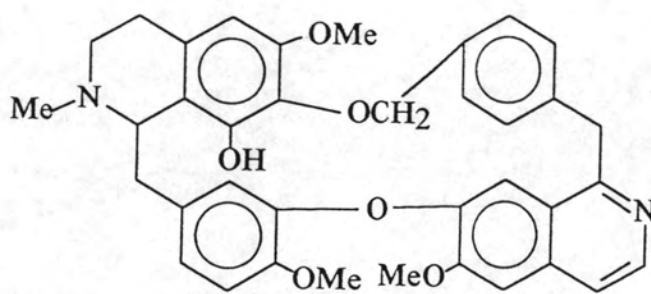
412 Curicycleatjehine

Table 2 (Continued)

Miscellaneous



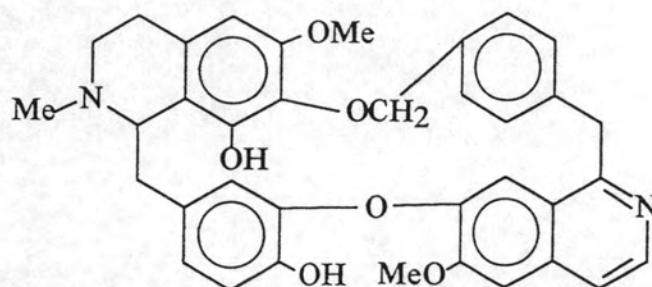
413 Curicycleatjine



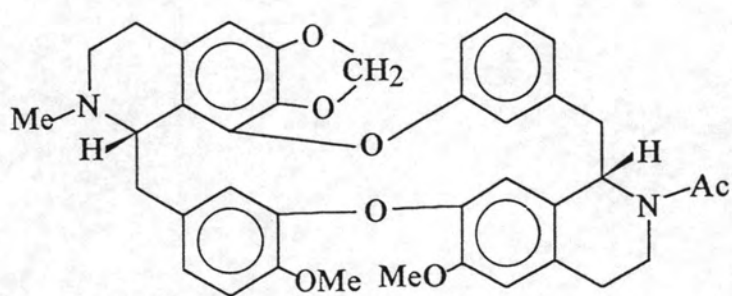
414 Cycleatjeheneine

Table 2 (Continued)

Miscellaneous



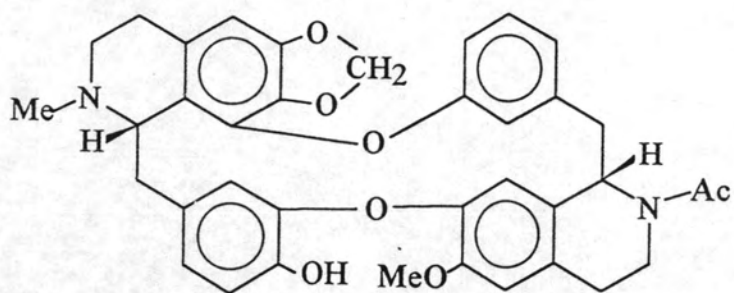
415 Cycleatjenine



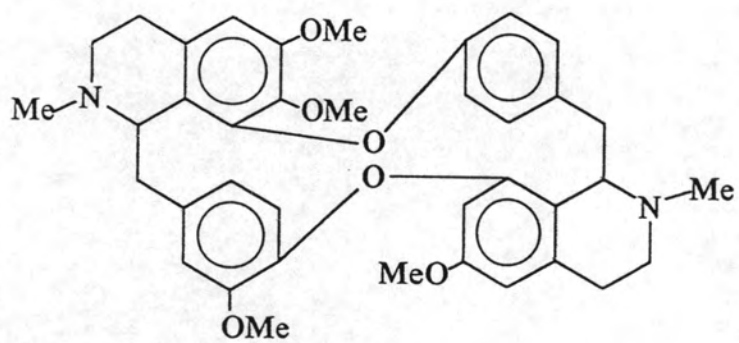
416 Isocuricycleatjenine

Table 2 (Continued)

Miscellaneous



417 Isocuricycleatjine

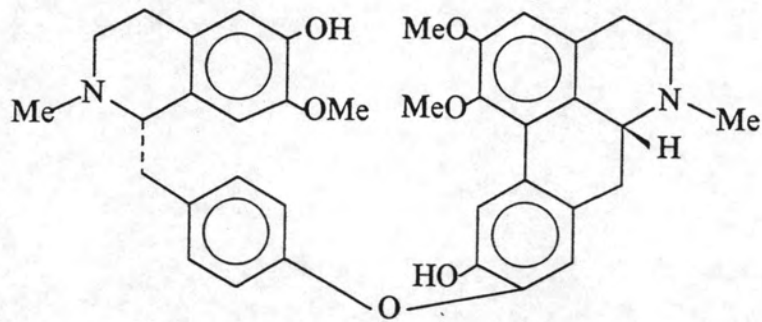


418 Sutchenensine

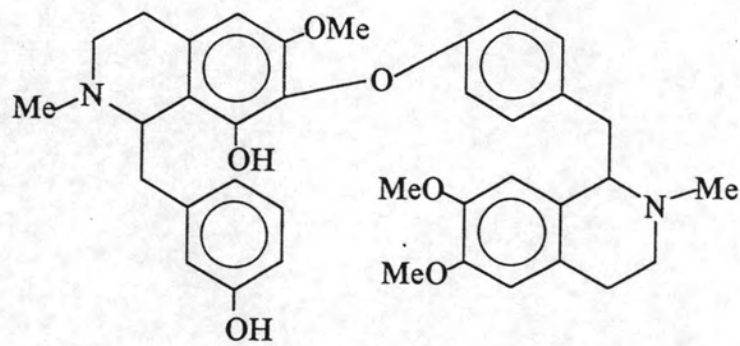


Table 2 (Continued)

Miscellaneous



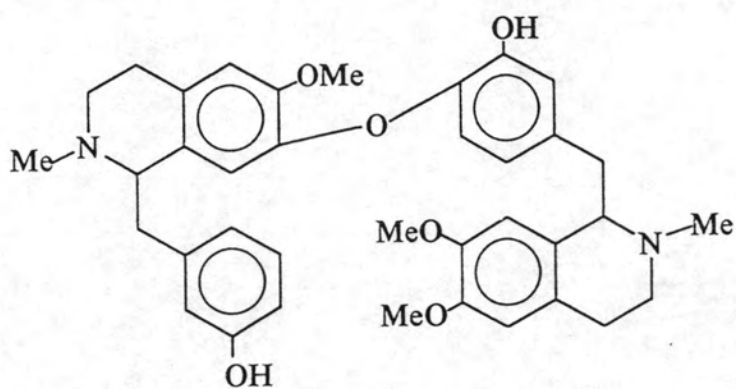
419 Waziristanine



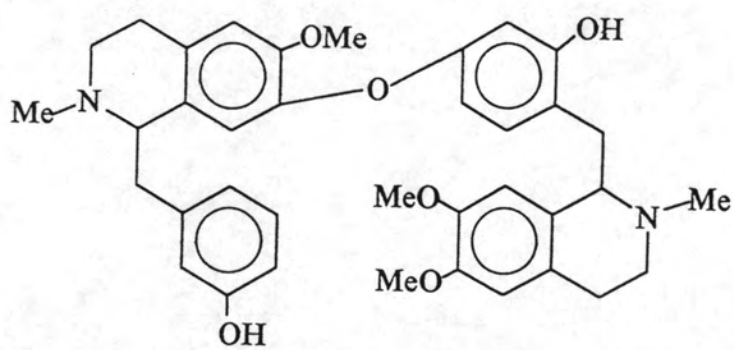
420 -

Table 2 (Continued)

Miscellaneous



421 -



422 -

Table 3 Botanical sources of Bisbenzylisoquinoline alkaloids

Name of plants	Part	Alkaloids (No.)	Type
<i>Abuta candicans</i> Rich ex DC	St	(+)-Curine (319)	XXI
		(+)-Isochondodendrine (306)	XX
<i>A. grisebachii</i>	St	Grisabine (15)	I
		Magnoline (18)	I
		Demethylpeinamine, 7-O- (165)	VIII
		Macolidine (113)	VI
		Macoline (114)	VI
		Demethylpeinamine, N-methyl, 7-O- (166)	VIII
		Peinamine (195)	VIII
<i>A. pahni</i>	St	Daurisoline (7)	I
		Dimethylindoldhamine, N, N'- (11)	I
		Lindoldhamine (17)	I
		Methylindoldhamine, 2-N- (23)	I
		Methylindoldhamine, 2'-N- (24)	I
		Nordaurisoline, 2'- (30)	I
<i>A. panurensis</i>	St	Norpanurensine (275)	XV
		Panurensine (273)	XV
<i>A. splendida</i>	St	Aromoline (90)	VI
		Homoaromoline (109)	VI
		Krukovine (176)	VIII
<i>Albertisia laurifolia</i>	Rh	Apateline (335)	XXIII
		Aromoline (90)	VI
		Cocsoline (336)	XXIII
		Cocsuline (337)	XXIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>A. papuana</i>	St	Daphnoline (101)	VI
		Methylapateline, <i>N</i> - (346)	XXIII
		Apateline (335)	XXIII
		Aromoline (90)	VI
		Bisnoraromoline, <i>N,N'</i> - (92)	VI
		Bisnorphaeanthine,2,2'- (155)	VIII
		Cocsoline (336)	XXIII
		Cocsuline (337)	XXIII
		Daphnandrine (100)	VI
		Daphnoline (101)	VI
		Dehydrotelobine (341)	XXIII
		Homoaromoline (109)	VI
		Isotrilobine (344)	XXIII
		Lindoldhamine (17)	I
		Methylcocsoline, <i>O</i> - (347)	XXIII
		Norcocsuline,2'- (351)	XXIII
		Obaberine (126)	VI
		Oxyancanthine (129)	VI
		Pangkoramine (130)	VI
		Pangkorimine (131)	VI
<i>Andrachne cordifolia</i>	Rt	Cocsuline (337)	XXIII
		Penduline (196)	VIII
<i>Anisocycla cymosa</i>	Rt	Cocsoline (336)	XXIII
		Dehydroapateline,1,2- (339)	XXIII
		Dehydrotelobine,1,2- (341)	XXIII
<i>Anisocyclea gradidieri</i>	St	Trilobine (357)	XXIII
		Demethyltrialobine,12'- <i>O</i> - (342)	XXIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>Anomospermum grandifolium</i>		Epistephanine (105)	VI
		Stebisimine (135)	VI
		Trilobine (357)	XXIII
<i>Acanalasia flava</i>	St	Tubocurarine,(+)- (328)	XXI
	Rt,	Homoaromoline (109)	VI
<i>Aristolochia debilis</i>	St	Limacine (177)	VIII
	Rt	Tetrandrine (205)	VIII
<i>A. elegans</i>	Lf	Methylcuspidaline,7'-O-	I
		(19)	
<i>A. gigantea</i>		Temuconine,(-)- (42)	I
	Lf	Geraldoamine (14)	I
		Pampulhamine (33)	I
		Pedroamine (34)	I
<i>A. indica</i>	Rt	Curine,(-) (320)	XXI
<i>Atherosperma moschatum</i>	Lf	Atherospermoline (150)	VIII
	Bk	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>Berberis amurensis</i>	St	Berbamine (152)	VIII
		Berbamunine (1)	I
<i>B. aquifolium</i>	Rt	Berbamine (152)	VIII
		Oxyacanthine (129)	VI
<i>B. aristata</i>	Rt	Berbamine (152)	VIII
		Oxyacanthine (129)	VI
	RB	Aromoline (90)	VI
		Berbamine (152)	VIII
<i>B. asiatica</i>		Oxyacanthine (129)	VI
	Rt,	Berbamine (152)	VIII
	Bk		
	St		
<i>B. baluchistanica</i>		Baluchistine (91)	VI
<i>B. boliviana</i>	Rt	Aromoline (90)	VI

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>Berberis brandisiana</i>	St	Berbamine (152)	VIII
		Homoaromoline (109)	VI
		Isotetrandrine (173)	VIII
		Obaberine (126)	VI
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
		Thalrugosine (206)	VIII
		Aromoline (90)	VI
		Berbamine (152)	VIII
	Tp	Berbamunine (1)	I
		Isotetrandrine (173)	VIII
		Obaberine (126)	VI
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
		Berbamine (152)	VIII
		Berbamine-2' β -N-oxide (153)	VIII
		Isotetrandrine (173)	VIII
		Penduline (196)	VIII
		Berbidine	-
Chenabiol methylether (390)	Artf		
<i>B. bumeliaefolia</i>	Rt	Aromoline (90)	VI
		Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Oxyacanthine (129)	VI
<i>B. buxifolia</i>	Rt,	Calafatine (225)	Xa
	StB	Calafatimine (224)	Xa
	-	Chillanamine (48)	Ib
	-	Osormine (142)	VIa

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>B. chilensis</i>	Wp	Calafatine-2 α - <i>N</i> -oxide (226)	Xa
		Calafatine-2 β - <i>N</i> -oxide (227)	Xa
	Lf, St	Demethylisothalicberine, 7- <i>O</i> - (231)	XI
		Isothalicberine (232)	XI
		Methylisothalicberine, <i>O</i> - (233)	XI
	Lf	Methylthalicberine, <i>O</i> - (234)	XI
		Desmethyllauberine, 12- <i>O</i> - (257)	XIV
<i>B. chitria</i>	Wp	Espinine (13)	I
<i>B. cretica</i>	Wp	Oxyacanthine (129)	VI
		Aromoline (90)	VI
		Berbamine (152)	VIII
		Berbamunine (1)	I
		Isotetrandrine (173)	VIII
		Obaberine (126)	VI
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
		Thalrugosine (206)	VIII
		<i>B. empetrifolia</i>	Rt
<i>B. integerrima</i>	Lf	Berbamunine (1)	I
		Oxyacanthine (129)	VI
<i>B. julianae</i>	Rt	Berbamine (152)	VIII
		Oxyacanthine (129)	VI
<i>B. kawakamii</i>	Rt	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>B. koreana</i>	Tp	Aromoline (90)	VI

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type	
		Berbamine (152)	VIII	
		Obamegine (193)	VIII	
<i>B. laubertii</i>	Rt	Oxyacanthine (129)	VI	
		Berbamine (152)	VIII	
<i>B. laurina</i>	Rt	Oxyacanthine (129)	VI	
		Aromoline (90)	VI	
		Belarine (230)	XI	
		Berbilaurine (256)	XIV	
		Demethylisothalicberine, 7-O-(231)	XI	
		Homoaramoline (109)	VI	
		Lauberine (260)	XIV	
		Thalrugosine (206)	VIII	
		Rb	Belarine (230)	XI
			Espinidine (12)	I
			Espinine (13)	I
Rt	Lauberine (260)	XIV		
	Methylisothalicberine, O-(233)	XI		
<i>B. lycium</i>	Rt	Obaberine (126)	VI	
		Berbamine (152)	VIII	
		Oxyacanthine (129)	VI	
<i>B. mingetsensis</i>	Rt	Berbamine (152)	VIII	
		Isotetrandrine (173)	VIII	
<i>B. Morrisonensis</i>	Rt,	Berbamine (152)	VIII	
	St	Isotetrandrine (173)	VIII	
<i>B. oblonga</i>	Rt	Berbamunine (1)	I	
		Methylberbamine, 2'-N-(181)	VIII	
		Oblongamine (127)	VI	
		Oxyacanthine (129)	VI	

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>B. orthobotrys</i>	Sh	Berbamine (152)	VIII
		Methylisotetrandrine, <i>N</i> -2' (183)	VIII
		Oxyacanthine (129)	VI
<i>B. paucidentata</i>	Rt	Aromoline (90)	VI
		Berbamine (152)	VIII
		Oxyacanthine (129)	VI
<i>B. petiolaris</i>	Rt, St	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Obaberine (126)	VI
<i>B. poiretii</i>	RB	Oxyacanthine (129)	VI
		Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>B. polymorpha</i>	St	Thalrugosine (206)	VIII
<i>B. pseudambalata</i>	Tp	Obaberine (126)	VI
		Oxyacanthine (129)	VI
<i>B. regeliana</i>	Fr	Berbamine (152)	VIII
<i>B. stolonifera</i>	Cul	Aromoline (90)	VI
		Berbamine (152)	VIII
		Berbamunine (1)	I
		Dimethylindoldhamine, <i>N</i> , <i>N</i> '- (11)	I
		Isotetrandrine (173)	VIII
<i>B. swaseyi</i>	Rt	Berbamine (152)	VIII
<i>B. thunbergii</i>	Wp	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Oxyacanthine (129)	VI
		Berbamine (152)	VIII
<i>B. tinctoria</i>	Rt	Isotetrandrine (173)	VIII
		Berbamine (152)	VIII
		Berbamine (152)	VIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type		
<i>B. tschonoskyana</i>	St	Obaberine (126)	VI		
		Obamegine (193)	VIII		
		Oxyacanthine (129)	VI		
<i>B. valdiviana</i>	Wp	Temuconine (42)	I		
<i>B. vulgaris</i>	Rt	Berbamine (152)	VIII		
		Oxyacanthine (129)	VI		
	RB,	Berbamine (152)	VIII		
	StB	Oxyacanthine (129)	VI		
	-	Berbamunine (1)	I		
<i>B. waziristanica</i>	RB	Waziristanine (421)	Mic		
<i>B. wilsoniae</i>	Tp	Berbamine (152)	VIII		
		Isotetrandrine (173)	VIII		
<i>B. zebiliana</i>	-	Berbamine (152)	VIII		
<i>Buxus sempervirens</i>	Lf	Curine,(+)- (319)	XXI		
<i>Caryomene olivascens</i>	St	Caryolivine (157)	VIII		
		Norlimacusine, 1, 2- dehydro-2-(121)	VI		
		Dimethylindoldhamine, N, N'- (11)	I		
		Norlimacine, 2- (188)	VIII		
		Norlimacusine, 2- (122)	VI		
		<i>Chondodendron limaciifolium</i>	Wd	Isochondodendrine (306)	XX
				Norcycleanine,(+)- (309)	XX
<i>C. microphyllum</i>	Rt	Curine,(+)- (319)	XXI		
		Isochondodendrine (306)	XX		
<i>C. platiphyllum</i>	Lf	Chondrofoline (318)	XXI		
		Curine,(-)- (320)	XXI		
		Isochondodendrine (306)	XX		
	Rt	Isochondodendrine (306)	XX		
		Curine,(-)- (320)	XXI		
	St	Curine,(-)- (320)	XXI		

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>C. tomentosum</i>	St,	Chondocurarine (315)	XXI
	Bk	Chondrocurine (316)	XXI
		Curine,(-)- (320)	XXI
		Cycleanine (302)	XX
		Isochondodendrine (306)	XX
		Tubocurarine,(+)- (328)	XXI
		Norcycleanine,(+)- (309)	XX
	St	Tubocurarine,(-)- (329)	XXI
<i>C. toxicoferum</i>	St	Curine,(-)- (320)	XXI
		Isochondodendrine (306)	XX
<i>Cissampelos fasciculata</i>	Ap	Cissampentin (413)	Mic
<i>C. insularis</i>	Rt	Cycleanine (302)	XX
		Insularine (379)	XXVI
<i>C. mucronata</i>	Rt	Isochondodendrine (306)	XX
<i>C. ovalifolia</i>		Methylwarifteine (333)	XXII
		Warifteine (334)	XXII
<i>C. pareira</i>	Wp	Cissampareine (331)	XXII
	Rt	Insularine (379)	XXVI
		Isochondodendrine (306)	XX
		Methylcurine,4"-O- (327)	XXI
		Curine,(-)- (320)	XXI
	Rt&		
	Lf	Cycleanine (302)	XX
		Hayatidine (323)	XXI
		Hayatine (324)	XXI
		Hayatinine (325)	XXI
<i>Cleistopholis staudii</i>	StB	Chondrefoline (318)	XXI
		Curine,(-)- (320)	XXI
		Cycleanine (302)	XX
		Isochondodendrine (306)	XX
<i>Cocculus hirsutus</i>	Lf	Isotrilobine (344)	XXIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>C. laurifolius</i>	St& Rt	Trilobine (357)	XXIII
		Isotrilobine (344)	XXIII
	Bk& Tr	Trilobine (357)	XXIII
		Cocculine-N-2-oxide (338)	XXIII
		Isotrilobine (344)	XXIII
<i>C. leaebe</i>	Rt	Trilobine (357)	XXIII
		Coccoline (336)	XXIII
		Cocculine (337)	XXIII
		Penduline (196)	VIII
		Oxyacanthine (129)	VI
<i>C. pendulus</i>	Lf	Menisarine (371)	XXIV
	St& Lf	Coccoline (336)	XXIII
		Cocculine (337)	XXIII
	Lf	Cocculinine (368)	XXIV
		Pendine	-
		Penduline (196)	VIII
		Pendulinine	-
		Nortrilobine (353)	XXIII
		Pendilinine (374)	XXIV
		Dehydrokohatamine, 1', 2'- (358)	XXIIIa
		Dehydrokohatine, 1', 2'- (358)	XXIIIa
		Nortelobine, 1, 2-dehydro- (352)	XXIII
		Hydroxyapateline, 5- (360)	XXIIIa
		Hydroxytelobine, 5- (361)	XXIIIa
		Kohatamine (362)	XXIIIa

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>C. sarmentosus</i>	St	Kohatine (363)	XXIIIa
		Siddiquamine (364)	XXIIIa
		Siddiquine (365)	XXIIIa
		Cheratamine (158)	VIII
		Cocsoline (336)	XXIII
		Cocsuline (337)	XXIII
		Daphnoline (101)	VI
		Dehydroapateline, 1,2- (339)	XXIII
		Isotrilobine (344)	XXIII
		Kohatine (363)	XXIIIa
	-	Kurramine (345)	XXIII
		Methylapateline, N- (349)	XXIII
		Norberbamine, 2-N- (185)	VIII
		Norpenduline (190)	VIII
		Penduline (196)	VIII
		Tetrandrine (205)	VIII
		Tricordatine (355)	XXIII
		Cocsilinine (367)	XXIV
		Norcocsulinine, N- (373)	XXIV
		Cocsiline (366)	XXIV
Cocsulinine (368)	XXIV		
<i>C. trilobus DC.</i>	Rt	Isotrilobine (344)	XXIII
		Menisarine (371)	XXIV
		Tetrandrine (205)	VIII
		Trilobine (357)	XXIII
<i>C. trilobus Thumb.</i>	Wp	Coclobine (97)	VI
		Isotrilobine (344)	XXIII
		Daphnoline (101)	VI
		Trilobine (357)	XXIII
<i>C. trilobus Thumb.</i>	-	Isotrilobine (344)	XXIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
		Trilobine (357)	XXIII
<i>Colubrina asiatica</i>	Bk	Methylauricine, <i>O</i> - (20)	I
<i>C. faralaotra</i>	Lf,	Cycleapeltine (99)	VI
	StB,	Limacine (177)	VIII
	RB		
<i>Crementosperma sp.</i>	StB	Cordobimine (62)	IV
		Cordobine (61)	IV
		Granjine (67)	IV
		Monterine (70)	IV
<i>C. polyphlebum</i>	Bk	Phlebicine (78)	IV
<i>Curarea candicans</i>	Rt	Candicusine (93)	VI
		Krukovine (176)	VIII
		Limacine (177)	VIII
		Limacine-2' α - <i>N</i> -oxide (179)	VIII
		Limacine-2 β - <i>N</i> -oxide (178)	VIII
		Limacine-2' β - <i>N</i> -oxide (180)	VIII
		Limacusine (112)	VI
<i>Cyclea atjehensis</i>		Cycleatjehene (416)	Misc.
		Cycleatjehine (417)	Misc.
		Curicycleatjehine (414)	Misc.
		Curicycleatjine (415)	Misc.
		Isocuricycleatjehine (418)	Misc.
		Isocuricycleatjine (419)	Misc.
<i>C. barbata</i>	Rt	Curine (319)	XXI
		Homoaromoline (109)	VI
		Isochondodendrine (306)	XX
		Tetrandrine (205)	VIII
		Norlimacine, (-)-2'- (187)	VIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>C. burmanni</i>	Rh	Cycleabarbaine,(+)- (159)	VIII
		Homoaromoline (109)	VI
		Isotetrandrine (173)	VIII
		Berbamine (152)	VIII
		Chondrocurine (316)	XXI
		Fangchinoline,(+)- (167)	VIII
		Isochondrodendrine,(+)- (306)	XX
		Limacine (177)	VIII
		Monomethyltetrandrinium (184)	VIII
		Tetrandrine,(+)- (205)	VIII
		Thalrugosine (206)	VIII
<i>C. hainanensis</i>	Rt	Tetrandrine (205)	VIII
	-	Phaeanthine (198)	VIII
<i>C. hypoglauca</i>	Lf	Curine (319)	XXI
		Hayatine (324)	XXI
		Isochondodendrine,(+)- (306)	XX
		Methylcurine,(+)-4''-O- (327)	XXI
<i>C. insularis</i>	Rt	Cycleanine (302)	XX
		Dimethylcurine,O,O- (322)	XXI
		Insulanoline (378)	XXVI
		Insularine (379)	XXVI
<i>C. madagascariensis</i>	Rh	Cycleanine (302)	XX
		Insulanoline (378)	XXVI
		Insularine (379)	XXVI
		Isochondodendrine (306)	XX
		Norcycleanine,(+)- (309)	XX
<i>C. madagascariensis</i>	Rt	Chondocurine (315)	XXI

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>C. peltata</i>	Rt	Curine,(-)- (320)	XXI
		Isochondodendrine (306)	XX
		Cycleacurine (321)	XXI
		Cycleadrine (160)	VIII
		Cycleahomine (161)	VIII
		Cycleanorine (162)	VIII
		Cycleapeltine (99)	VI
		Fangchinoline (167)	VIII
		Isochondodendrine (306)	XX
		Tetrandrine,(+)- (205)	VIII
<i>C. racemosa</i>	Rt	Cycleaneonine (332)	XXII
<i>C. sutchuenensis</i>	Rt	Insularine-2 β - <i>N</i> -oxide (380)	XXVI
		Insularine-2' β - <i>N</i> -oxide (381)	XXVI
		Isocycleanine (307)	XX
		Sutchuenensine (420)	Mic
<i>C. tonkinensis</i>	-	Cycleanine (302)	XX
<i>Daphnandra apateline</i>	Bk	Apateline (335)	XXIII
		Dehydroapateline,1,2-(339)	XXIII
		Dehydrotelobine,1,2-(341)	XXIII
		Telobine (354)	XXIII
		Aromoline (90)	VI
<i>D. aromatica</i>	Bk	Daphnoline (101)	VI
		Methylrepandine, <i>O</i> -(116)	VI
<i>D. dielsii</i>	Bk	Repandinine (221)	X
		Tenuipine,(-)- (223)	X
		Repanduline (377)	XXV
		Pseudorepanduline (376)	XXV

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type		
<i>D. johnsonii</i>	-	Dielsine (375)	XXV		
		Methylapateline, <i>N</i> - (346)	XXIII		
		Nortenuipine (218)	X		
		Nortenuipine-2 β - <i>N</i> -oxide (220)	X		
		Repandine (133)	VI		
		Repanduline (377)	XXV		
		Daphnine (228)	Xb		
		Hexahydrodaphnine (229)	Xb		
		Johnsonine (111)	VI		
		<i>D. micrantha</i>	Bk, Lf, St	Methylapateline, <i>N</i> - (346)	XXIII
				Methylnorapateline, <i>N</i> - (349)	XXIII
				Methylrepandine, <i>O</i> - (116)	VI
				Nortenuipine,(+)- (218)	X
Repandine (133)	VI				
Repandinine (221)	X				
<i>D. repandula</i>	Bk	Daphnandrine (100)	VI		
		Dimethylmicranthine, <i>N,O</i> - (343)	XXIII		
		Methylmicranthine, <i>O</i> - (348)	XXIII		
		Micranthine (350)	XXIII		
		Daphnoline (101)	VI		
<i>D. repandula</i>	Bk	Methylrepandine, <i>O</i> - (116)	VI		
		Repandine (133)	VI		
		Repandinine (221)	X		
		Repanduline (377)	XXV		

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
	Bk,	Daphnine (228)	Xb
	Lf		
<i>Daphnandra sp.</i>	Bk	Isotenuipine (217)	X
<i>Daphnandra sp. Dt-7</i>	Bk	Fangchinoline (167)	VIII
		Dimethylmicranthine, <i>N,O</i> - (343)	XXIII
		Methylmicranthine, <i>O</i> - (348)	XXIII
		Nortenuipine, (+)- (218)	X
		Telobine (354)	XXIII
<i>Daphnandra sp. unnamed</i>	Tw	Dehydromicranthine, 1,2- (340)	XXIII
		Dimethylmicranthine, <i>N,O</i> - (343)	XXIII
		Methylmicranthine, <i>O</i> - (348)	XXIII
		Micranthine (350)	XXIII
		Pseudorepanduline (376)	XXV
		Tenuipine, (+) (222)	X
<i>D. tenuipes</i>	Lf	Nortenuipine, (-)- (219)	X
	Bk	Aromoline (90)	VI
		Nortenuipine, (+)- (218)	X
		Repandinine (221)	X
		Repanduline (377)	XXV
		Tenuipine, (-)- (223)	X
		Tenuipine, (+)- (222)	X
<i>Dehassia triandra</i>	Lf	Dehatridine (163)	VIII
	Wd	Dehatrine (164)	VIII
		Obaberine (126)	VI
<i>Doryphora aromatica</i>	Bk	Aromoline (90)	VI

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
		Daphnandrine (100)	VI
		Daphnoline (101)	VI
		Dehydroapateline, 1,2-(339)	XXIII
		Homoaromoline (109)	VI
<i>Dryadodaphne novoguineensis</i>	Bk	Isotetrandrine (173)	VIII
		Dryadine (258)	XIV
		Dryadodaphnine (259)	XIV
<i>Epinetrum cordifolium</i>	Rt	Cycleanine (302)	XX
		Isochondodendrine (306)	XX
		Norcycleanine (309)	XX
<i>E. manganotti</i>	Rt&Lf	Cycleanine (302)	XX
		Isochondodendrine (306)	XX
		Norcycleanine (309)	XX
<i>E. villosum</i>	Lf,Rt, St	Cycleanine (302)	XX
		Isochondodendrine (306)	XX
		Norcycleanine (309)	XX
<i>G. guianensis</i>	StB	Apateline (335)	XXIII
		Aromoline (90)	VI
		Bisnorguattaguanine, 2,2'-(60)	IV
		Coclobine (97)	VI
		Daphnandrine (100)	VI
		Daphnoline (101)	VI
		Dehydroapateline, 1,2-(339)	XXIII
		Dehydrotelobine, 1,2-(341)	XXIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type	
<i>G. megalophylla</i>		Demethylcoclobine, 12- <i>O</i> - (103)	VI	
		Funiferine (64)	IV	
		Guattamine (68)	IV	
		Guattaminone (69)	IV	
		Norfuniferine, 2'- (71)	IV	
		Norguattaguanine, 2'- (72)	IV	
		Nortiliageine, 2'- (74)	IV	
		Telobine (354)	XXIII	
		Tiliageine (82)	IV	
		<i>Gyrocarpus americanus</i>	StB	Dimethylcurine, <i>O, O</i> - (322)
Isochondodendrine (306)	XX			
Methylcurine, 12'- <i>O</i> - (326)	XXI			
<i>Gyrocarpus americanus</i>	Bk&Lf	Phaeanthine (198)	VIII	
		Pycnamine (200)	VIII	
	Lf	Auroramine (393)	SecoVI	
		Gyrocarpine (106)	VI	
		Limacine (177)	VIII	
		Maroumine (396)	SecoVI	
		Phaeanthine (198)	VIII	
		StB	Grisabine (15)	I
	Gyroamericine (172)		VIII	
	Gyrocarpine (106)		VI	
	Gyrocarpusine (107)		VI	
	Gyrolidine (108)		VI	
	Isotetrandrine (173)		VIII	
	Limacine (177)		VIII	
	<i>Heracleum wallichii</i>	Rt	Methyllimacusine, <i>O</i> - (115)	VI
			Phaeanthine (198)	VIII
			Cycleanine (302)	XX
			Isochondodendrine (306)	XX



Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>Hernandia peltata</i>	Bk	Malekulatine (87)	Va
		Vanuatine (50)	IIa
		Vateamine (52)	IIb
<i>Isolona hexaloba</i>	RB	Efatine (89)	Vb
		Cycleanine (302)	XX
		Isochondodendrine (306)	XX
<i>I. pilosa</i>	TB	Norcycleanine (309)	XX
		Curine (319)	XXI
		Isochondodendrine (306)	XX
<i>Isopyrum thalictroides</i>	StB	Curine,(-)- (320)	XXI
		Isochondodendrine (306)	XX
		Isochondodendrine (306)	XX
<i>Laurelia sempervirens</i>	Rt	Isochondodendrine (306)	XX
		Methylrepandine, O- (116)	VI
		Tetrandrine (205)	VIII
		Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>Limacia cuspidata</i>	Lf	Isotetrandrine (173)	VIII
		Obaberine (126)	VI
		Oxyacanthine (129)	VI
		Thalrugosine (206)	VIII
<i>L. oblonga</i>	Wp	Cuspidaline (2)	I
		Limacine (177)	VIII
		Limacusine (112)	VI
<i>Limaciopsis longensis</i>	Fr,Lf, Rt,St	Cuspidaline (2)	I
		Limacine (177)	VIII
		Limacusine (112)	VI
<i>Limaciopsis longensis</i>	Fr,Lf, Rt,St	Berbamine (152)	VIII
		Cycleanine (302)	XX
		Isotetrandrine (173)	VIII
		Isotetrandrine, Nor-2'- (175)	VIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
		Isotetrandrine, <i>N</i> -oxy-2'- (174)	VIII
		Thalrugosamine (140)	VI
		Thalrugosine (206)	VIII
<i>Lindera oldhamii</i>	Lf	Lindoldhamine (17)	I
<i>Magnolia compressa</i>	Bk	Oxyacanthine (129)	VI
<i>M. fuscata</i>	Lf	Magnolamine	II
		Magnoline (18)	I
<i>Mahonia acanthifolia</i>	Rt	Oxyacanthine (129)	VI
<i>M. aquifolium</i>	-	Berbamine (152)	VIII
	Bk, Lf	Aquifoline (204)	VIII
		Aromoline (90)	VI
		Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
	Rt	Baluchistine (91)	VI
<i>M. borealis</i>	Rt	Oxyacanthine (129)	VI
<i>M. fortunei</i>	Tr	Berbamine (152)	VIII
		Oxyacanthine (129)	VI
<i>M. griffithii</i>	Bk	Berbamine (152)	VIII
		Oxyacanthine (129)	VI
<i>M. japonica</i>	Tr&Rt	Berbamine (152)	VIII
	Tr&Rt	Isotetrandrine (173)	VIII
	&Lf		
<i>M. leschenaultii</i>	Rt	Oxyacanthine (129)	VI
<i>M. lomariifolia</i>	Rt	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>M. manipurensis</i>	Rt	Oxyacanthine (129)	VI
<i>M. morrisonensis</i>	Rt	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
<i>M. philippinensis</i>	Tr&Rt	Berbamine (152)	VIII

Table 3 (Continued)

Name of plants	Part	Alkaloids (No.)	Type
<i>M. repens</i>	Rt,St	Isotetrandrine (173)	VIII
		Obaberine (126)	VI
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
<i>M. siamensis</i>	StB	Thalrugosine (206)	VIII
		Isotetrandrine (173)	VIII
<i>M. sikkimensis</i>	StB	Oxyacanthine (129)	VI
<i>M. simonsii</i>	Rt	Oxyacanthine (129)	VI
<i>Menispermum canadense</i>	St,Rt	Dauricine (3)	I
	Rh	Daurinoline (6)	I
		Desmethyldauricine, <i>N</i> - (8)	I
<i>M. dauricum</i>	Rh	Dauricine (3)	I
		Dauricinoline (4)	I
		Dauricoline (5)	I
		Daurinoline (6)	I
		Daurisoline (7)	I
		Dauriciline (51)	IIa
		Desmethyldauricine, <i>N</i> - (8)	I
<i>Michelia fuscata</i>	Lf	Magnolamine (49)	II
		Magnoline (18)	I
<i>Nectandra rodiei</i>	B k &	Rodiasine (81)	IV
	Sd		
		Sepeerine (134)	VI
	Bk	Demerarine (102)	VI
		Dirosine (63)	IV
		Norrodiasine (73)	IV
	Sd	Tetrandrine, 2-Nor-(±)- (191)	VIII
		Ocotosine (75)	IV
	Rt	Curine,(+)- (319)	XXI
	<i>Nelumbo mucifera</i>	Em	Isoliensinine (84)
Liensinine (85)			V

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
<i>Nemuaron vieillardii</i>	Sd	Isoliensinine (84)	V	
		Neferine (86)	V	
	Bk	Neumarine (274)	XVI	
<i>Pachygone loyaltiensis</i>	&Lf			
	St	Apateline (335)	XXIII	
		Bisnoraromoline, <i>N,N'</i> - (92)	VI	
		Daphnandrine (100)	VI	
		Daphnoline (101)	VI	
		Dehydroapateline, 1,2- (339)	XXIII	
		Dehydrotelobine, 1,2- (341)	XXIII	
		Isotrilobine (344)	XXIII	
		Methylcocsoline, <i>O</i> - (347)	XXIII	
	<i>P. ovata</i>	Lf	Trilobine (357)	XXIII
Lf,		Methylpachygonamine, <i>N</i> -	XIX	
St		(294)		
		Pachygonamine (298)	XIX	
		Pachyovatamine (288)	XVIII	
		Tiliamosine (299)	XIX	
Rt		Nortrilobine (353)	XXIII	
		Trilobine (357)	XXIII	
<i>P. pubescens</i>		Rt&	Isotrilobine (344)	XXIII
		Tp		
<i>Paracyclea ochiaiana</i>	St,	Curine, (-) (320)	XXI	
	Rt&			
	Rh			
		Cycleanine (302)	XX	
	Insularine (379)	XXVI		
	Isochondodendrine (306)	XX		

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type		
<i>Peruvian curare</i>	-	Chondrocurine (315)	XXI		
		Curine (320)	XXI		
		Chondrocurine, Nor- <i>N</i> ψ (317)	XXI		
<i>Phaenanthus ebraceteolatus</i>	Lf,	Phaeantharine (35)	I		
	Bk				
		Phaeantharine (197)	VIII		
		Phaeanthine (198)	VIII		
<i>Pleogyne cunninghamii</i>	Rt	Curine, (-)- (320)	XXI		
		Isochondodendrine (306)	XX		
<i>Polyalthia nitidissima</i>	StB	Daurisoline (7)	I		
		Dimethylindoldhamine, <i>N</i> , <i>N'</i> - (11)	I		
		Isodaurisoline (16)	I		
		Lindoldhamine (17)	I		
		Methylindoldhamine, 7- <i>O</i> - (25)	I		
		Methylindoldhamine, 7'- <i>O</i> - (26)	I		
		<i>Popowia pisocarpa</i>	Bk,	Dauricine (3)	I
			Lf	Dauricoline (5)	I
				Methylauricine, <i>N</i> -2-oxy- <i>O</i> - (21)	I
				Methylauricine, <i>N</i> -2'-oxy- <i>O</i> - (22)	I
	Norisopowiaridine, 2'- (382)		XXVII		
	Pisopowamine (383)		XXVII		
	Pisopowetine (384)		XXVII		
	Pisopowiaridine (385)		XXVII		
	Pisopowiarine (386)	XXVII			
	Pisopowidine (387)	XXVII			

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>Pseudoxandra aff. lucida</i>		Pisopowine (388)	XXVII
		Popidine (36)	I
		Popisidine (37)	I
		Popisine (38)	I
		Popisonine (39)	I
		Popisopine (40)	I
	StB	Antioquine (59)	IV
		Obaberine (126)	VI
	Bk	Medelline (284)	XVIII
		Oxandrine (76)	IV
Oxandrinine (77)		IV	
Pseudoxandrine (79)		IV	
<i>P. sclerocarpa</i>	StB	Pseudoxandrinine (80)	IV
		Berbamunine (1)	I
		Homoaromoline (109)	VI
		Secolucidine (406)	Seco XVIII
		Thaligrisine (44)	I
		Antioquine (59)	IV
<i>Pycnarrhena australiana</i>	Wp	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Norberbamine,2- <i>N</i> - (185)	VIII
		Norobamegine,2- <i>N</i> - (189)	VIII
<i>P. longifolia</i>	St,Rt	Berbacolorflamme (151)	VIII
		Colorflamme (98)	VI
		Aromoline (90)	VI
		Daphnoline (101)	VI
		Homoaromoline (109)	VI
		Krukovine (176)	VIII
		Limacine (177)	VIII
		Obaberine (126)	VI

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>P. manillensis</i>	Rt	Tetrahydrolimacine, 1,2,3,4- (202)	VIII
		Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
		Phaeanthine (198)	VIII
	Rt,	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
	St	Phaeanthine (198)	VIII
		Phaeanthine-2' α -N-oxide (199)	VIII
		Pycmanilline (402)	Seco VIII
		Pycnamine (200)	VIII
Berbamine (152)		VIII	
Limacine (177)		VIII	
<i>P. novoguineensis</i>	St	Phaeanthine (198)	VIII
		Pycnamine (200)	VIII
		Thalrugosine (206)	VIII
		Bisnorobamegine (154)	VIII
		Bisnorthalrugosine (156)	VIII
<i>P. ozantha</i>	St	Daphnoline (101)	VI
		Norberbamine, 2- (185)	VIII
		Norobamegine (189)	VIII
		Northalrugosine, 2- (192)	VIII
		Pycnazanthine (132)	VI
		Bisnoraromoline, N,N'- (92)	VI
		Norobamegine, 2-N- (189)	VIII
		Bk	Grisabine (15)
	Norlimacusine, 2- (122)		VI
	<i>Sciadotenia eichleriana</i>	St,	Isochondodendrine (306)
<i>S. toxifera</i>	Wd		

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>Stephania cepharantha</i>	St	Sciadenine (312)	XX
		Sciadoferine (313)	XX
		Sciadoline (314)	XX
		Sciadenine (312)	XX
		Sciadoline (314)	XX
	Sd	Berbamine (152)	VIII
		Isotetrandrine (173)	VIII
	Rt	Aromoline (90)	VI
		Berbamine (152)	VIII
		Cycleanine (302)	XX
Homoaromoline (109)		VI	
<i>S. capitata</i>	-	Isotetrandrine (173)	VIII
		Cycleanine (302)	XX
		Epistephanine (105)	VI
<i>S. cepharantha</i>	Rt	Berbamine (152)	VIII
		Cepharanoline (94)	VI
		Cepharanthine (95)	VI
		Cycleanine (302)	XX
		Isotetrandrine (173)	VIII
<i>S. epigaea</i>	-	Curine,(-) (320)	XXI
		Cepharanthine (95)	VI
		Cycleanine (302)	XX
<i>S. erecta</i>	Tb	Cepharanthine (95)	VI
		Homoaromoline (109)	VI
<i>S. glabra</i>	Rh	Cycleanine (302)	XX
		Desmethylcycleanine, <i>N</i> - (305)	XX
<i>S. hernandifolia</i>	Rt	Fangchinoline (167)	VIII
		Isochondodendrine (306)	XX
		Isotrilobine (344)	XXIII
		Tetrandrine (205)	VIII

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>S. japonica</i>		Oxoepistephanine (128)	VI
	Wp	Epistephanine (105)	VI
	St	Dihydrostephasubine,3',4'- (104)	VI
		Epistephanine (105)	VI
		Stephasubine (137)	VI
	St,Rh	Thalrugosine (206)	VIII
	St,Rt &Lf	Epistephanine (105)	VI
	Rt	Hypoepistephanine (110)	VI
		Obamegine (193)	VIII
		Insularine (379)	XXVI
<i>S. pierrii</i>	St& Lf	Stebisimine (135)	VI
	Lf	Stebisimine (135)	VI
	Tb	Aromoline (90)	VI
		Berberamine (1)	I
		Cepharanthine (95)	XX
		Cycleanine (302)	VI
		Daphnandrine (100)	VI
		Dehydroapateline,1,2- (339)	XXIII
		Desmethylcycleanine,N- (305)	XX
		Homoaromoline (109)	VI
		Isotetrandrone (173)	VIII
		Norberbamine,2- (185)	VIII
		Norcepharanoline,2- (117)	VI
		Norcepharanthine,2'- (118)	VI
		Norisocepharanthine,2'- (120)	VI
	Norisotetrandrone,2- (186)	VIII	

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
		Norisotetrandrine,2'- (175)	VIII
		Norobaberine,2'- (123)	VI
		Obaberine (126)	VI
		Stephibaberine (138)	VI
		Stepierrine (201)	VIII
		Thalrugosamine (140)	VI
		Norcepharoline,2- (141)	VI
<i>S. rotunda</i>	Tp	Cycleanine (302)	XX
<i>S. sasakii</i>	Rt	Berbamine (152)	VIII
		Cepharanthine (95)	VI
		Obaberine (126)	VI
<i>S. sinica</i>	Rt	Thalrugosine (206)	VIII
		Cepharanthine (95)	VI
<i>S. suberosa</i>	Rt	Cepharanthine (95)	VI
		Cepharanthine-2' β -N-oxide (96)	VI
<i>S. tetrandra</i>	Rt	Norcepharanthine,2- (118)	VI
		Norstephasubine (125)	VI
		Stephasubimine (136)	VI
		Stephasubine (137)	VI
		Cycleanine (302)	XX
		Fangchinoline (167)	VIII
		Fenfangjine A (168)	VIII
		Fenfangjine B (169)	VIII
		Fenfangjine C (170)	VIII
		Fenfangjine D (171)	VIII
		Isotetrandrine (173)	VIII
		Oxofangchirine (194)	VIII
		Tetrandrine (205)	VIII
Berbamine (152)	VIII		
Fangchinoline (167)	VIII		

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
<i>S. venosa</i> <i>Synclisia scabrida</i>	Tb	Fangchinoline (167)	VIII	
		Tetrandrine (205)	VIII	
	-	Methylfangchinoline, <i>N</i> - (182)	VIII	
	Rh	Homoaromoline (109)	VI	
	St	Cocsoline (336)	XXIII	
		Cocsuline (337)	XXIII	
		Cycleanine (302)	XX	
		Cycleanine- <i>N</i> -oxide (303)	XX	
		Norcycleanine, (+)- (309)	XX	
		Rt,	Cocsoline (336)	XXIII
<i>Thalictrum alpinum</i>	St	Cocsuline (337)	XXIII	
		Cycleanine (302)	XX	
	Rt	Desmethylthalrugosidine, <i>N</i> - (243)	XII	
		Neothalibrine (28)	I	
		Thalidasine (245)	XII	
		Thalpindione (248)	XII	
		Thalrugosaminine (148)	VII	
		Thalrugosidine (249)	XII	
	<i>T. baicalense</i>	Rt	Desmethylthalistyline, <i>N</i> - (53)	III
			Thalirabine (55)	III
<i>T. buschianum</i>	-	Thalmine (267)	XIV	
<i>T. collinum</i>	Wp	Methylthalicberine, <i>O</i> - (234)	XI	
		Thalmine (267)	XIV	
	Rt	Methylthalicberine, <i>O</i> - (234)	XI	
<i>T. cultratum</i>	Wp	Aromoline (90)	VI	
		Cultithalminine (268)	XIVa	
		Desmethylthalidasine, <i>N</i> - (242)	XII	

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
		Hydroxythalidasine,5- (251)	XIIa
		Hydroxythalidasine-2' α - <i>N</i> -oxide,5- (252)	XIIa
		Hydroxythalamine,5- (269)	XIVa
		Methylthalicberine, <i>O</i> - (234)	XI
		Methylthalamine, <i>O</i> - (261)	XIV
		Neothalibrine (28)	I
		Neothalibrine-2' α - <i>N</i> -oxide (29)	I
		Noroxyacanthine,2'- (124)	VI
		Northaliphylline,2'- (235)	XI
		Northalmine,2- (262)	XIV
		Obaberine (126)	VI
		Oxyacanthine (129)	VI
		Thalictine (264)	XIV
		Thalidasine (245)	XII
		Thalidasine-2 α - <i>N</i> -oxide (246)	XII
		Thaligosine (143)	VII
		Thaligosine-2 β - <i>N</i> -oxide (144)	VII
		Thaliphylline (237)	XI
		Thaliphylline-2' β - <i>N</i> -oxide (238)	XI
		Thalirugine (46)	Ia
		Thalisopine (147)	VII
		Thalmiculatimine (266)	XIV
		Thalmiculimine (270)	XIVa
		Thalmiculine (271)	XIVa
		Thalmine (267)	XIV

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
		Thalrugosaminine (148)	VII	
		Thalrugosaminine-2 α -N-oxide (149)	VII	
		Thalrugosidine (249)	XII	
		Thalrugosinone (250)	XII	
		Thalsivasine (241)	XI	
<i>T. dasycarpum</i>	Rt	Thalidasine (245)	XII	
<i>T. delavayi</i>	Rt	Hernandezine (210)	IX	
		Isothalidezine (212)	IX	
		Thalidezine (214)	IX	
<i>T. faberi</i>	-	Thalmirabine (255)	XIII	
		Desmethylthalidasine, N-(242)	XII	
		Thalfinine (254)	XIII	
		Thalidasine (245)	XII	
		Thaliracebine (45)	Ia	
		Rt	Methylthalibrine, O- (27)	I
		Methylthalicberine, O- (234)	XI	
		Thalisopine (147)	VII	
		Thalrugosidine (249)	XII	
<i>T. fendleri</i>	Wp	Hernandezine (210)	IX	
<i>T. foetidum</i>	Ap	Thalidezine (214)	IX	
		Berbamine (152)	VIII	
		Isotetrandrine (173)	VIII	
		Thalfoetidine (244)	XII	
		Rt	Thalfine (253)	XIII
	-	Thalfinine (254)	XIII	
		Thalidasine (245)	XII	
		Thalrugosamine (140)	VI	

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>T. foliolosum</i>	Rt	Thalrugosine (206)	VIII
		Thalirugidine (56)	III
		Thalisopine (147)	VII
	Wp	Thalrugosaminine (148)	VII
		Thalrugosidine (249)	XII
		Thalidasine (245)	XII
<i>T. fortunei</i>	-	Thalrugosidine (249)	XII
		Aromoline (90)	VI
<i>T. havum</i>	-	Thalifortine (265)	XIV
		Hernandezine (210)	IX
		Thalfoetidine (244)	XII
<i>T. hernandezii</i>	Rt	Thalidasine (245)	XII
		Methylthalicberine, <i>O</i> - (234)	XI
		Hernandezine (210)	IX
<i>T. isopyroides</i>	Rt	Thalifortine (265)	XIV
		Thalisopidine (146)	VII
		Thalisopine (147)	VII
<i>T. javanicum</i>	Rt	Thaligosinine (145)	VII
		Thalisopine (147)	VII
		Thalrugosaminine (148)	VII
<i>T. kuhistanicum</i>	Wp	Methylthalicberine, <i>O</i> - (234)	XI
		Thalmine (267)	XIV
<i>T. lankesteri</i>	Tp	Hernandezine (210)	IX
<i>T. longipedunculatum</i>	Tp	Methylthalicberine, <i>O</i> - (234)	XI
		Thalfoetidine (244)	XII
		Thalicberine (236)	XI
		Thalidasine (245)	XII
<i>T. longistylum</i>	Rt	Desmethylthalistyline, <i>N</i> - (53)	III
		Methothalistryline (54)	III
		Thalibrine (43)	I
		Thalistryline (58)	III

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>T. lucidum</i>	Rt	Aromoline (90)	VI
		Homoaromoline (109)	VI
		Methylthalicberine, <i>O</i> - (234)	XI
		Obaberine (126)	VI
		Obamegine (193)	VIII
		Oxyacanthine (129)	VI
		Thalicberine (236)	XI
		Thalidasine (245)	XII
		Thalrugosine (206)	VIII
<i>T. minus</i>	Ap	Thalmethine (240)	XI
	Rt& Wp	Methylthalicberine, <i>O</i> - (234)	XI
	Rt	Obaberine (126)	VI
		Thalfine (253)	XIII
		Thalfinine (254)	XIII
		Thalicberine (236)	XI
		Thalidasine (245)	XII
		Thalidezine (214)	IX
		Thalirabine (55)	III
		Thaliracebine (45)	Ia
	Wp	Thalrugosaminine (148)	VII
		Thalmine (267)	XIV
	Rt	Thalmethine (240)	XI
		Thalmine (267)	XIV
	Tp	Methylthalicberine, <i>O</i> - (234)	XI
		Thalabadensine (263)	XIV
		Thalicberine (236)	XI
		Thalmethine (240)	XI
		Thalmine (267)	XIV
	St	Methylthalicberine, <i>O</i> - (234)	XI
Thalmethine (240)		XI	

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
<i>T. minus var. hypoleucum</i>	R	Methylthalibrine, O- (27)	I	
		Thalistine (57)	III	
		Thalmirabine (255)	XIII	
		Thalrugosine (206)	VIII	
	Tp	Oxyacanthine (129)	VI	
		Thalmethine (240)	XI	
	-	Methylthalicberine, O- (234)	XI	
	<i>T. minus var. microphyllum</i>	Wp	Methylthalicberine, O- (234)	XI
			Obaberine (126)	VI
			Thalisopine (147)	VII
			Thalrugosine (206)	VIII
		Rh,	Aromoline (90)	VI
		Rt	Homoaromoline (109)	VI
Methylthalicberine, O- (234)			XI	
Obamegine (193)			VIII	
Thalicberine (236)			XI	
Thaligrisine (44)			I	
Thaliphylline (237)	XI			
<i>T. minus var minus</i>	Lf	Thalirugine (46)	Ia	
		Thalisopine (147)	VII	
		Methylthalicberine, O- (234)	XI	
		Thalicberine (236)	XI	
		Thaliphylline (237)	XI	
		Thalivarmine (239)	XI	
	Thalmethine (240)	XI		
Rt,	Thalsivasine (241)	XI		
Rh	Northalibroline (32)	I		
<i>T. pedunculatum</i>	-	Berbamine (152)	VIII	

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type
<i>T. podocarpum</i>	Rt	Desmethylthali dezine, <i>N</i> - (208)	IX
		Desmethylthalistyline, <i>N</i> - (53)	III
		Hernandezine (210)	IX
		Isothalidezine (212)	IX
		Methothalistyline (54)	III
		Thalidezine (214)	IX
		Thalistyline (58)	III
<i>T. polygamum</i>	-	Thalrugosine (206)	VIII
<i>T. revolutum</i>	Fr	Methylthalicberine, <i>O</i> - (234)	XI
	Rt	Methylthalicberine, <i>O</i> - (234)	XI
		Thalidasine (245)	XII
		Thalrugosaminine (148)	VII
<i>T. rochebrunianum</i>	Rt	Dihydrothalictrinine (275)	XVII
		Epinorhernandezine (209)	IX
		Epinorthalibrunine (276)	XVII
		Methylthalibrunimine, <i>O</i> - (277)	XVII
		Norhernandezine, <i>N</i> '- (213)	IX
		Northalibrunine, <i>N</i> '- (278)	XVII
		Oxothalibrunimine (279)	XVII
		Thalibrunimine (280)	XVII
		Thalibrunine (281)	XVII
		Thalictinine (282)	XVII
		Hernandezine (210)	IX
		Northalibrine (31)	I
		Thalibrine (43)	I
		<i>T. rugosum</i>	Rt
Thalidasine (245)	XII		
Thalidezine (214)	IX		

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
		Thaligosidine (247)	XII	
		Thaligosine (143)	VII	
		Thaligosinine (145)	VII	
		Thalirugidine (56)	III	
		Thalirugine (46)	Ia	
		Thaliruginine (47)	Ia	
		Thalrugosamine (140)	VI	
		Thalrugosaminine (148)	VII	
		Thalrugosidine (249)	XII	
		Thalrugosine (206)	VIII	
		Rt	Aromoline (90)	VI
			Neothalibrine (28)	I
			Obaberine (126)	VI
			Thalrugosinone (250)	XII
<i>T. sachalinense</i>	Rh	Thalrugosine (206)	VIII	
<i>T. simplex</i>	Ap	Hernandezine (210)	IX	
		Thalidezine (214)	IX	
		Thalisamine (215)	IX	
		Thalsimidine (216)	IX	
<i>T. squarrosom</i>	Rt	Thalidasine (245)	XII	
<i>T. sultanabadense</i>	Tp	Hernandezine (210)	IX	
		Hernandezine- <i>N</i> -oxide (211)	IX	
		Thalbadensine (263)	XIV	
		Thalidezine (214)	IX	
	Ap	Hernandezine (210)	IX	
		Thalbadensine (263)	XIV	
	Tp	Methylthamine, <i>O</i> - (261)	XIV	
		Thalictine (264)	XIV	
	Rt&	Hernandezine (210)	IX	
	Tp			

Table 3 (Continued)

Name of Plants	Part	Alkaloids (No.)	Type	
<i>T. thunbergii</i>	Rt& Tp	Thalabadensine (263)	XIV	
		Thalictine (264)	XIV	
		Hernandezine (210)	IX	
	Rt	Thalabadensine (263)	XIV	
		Thalictine (264)	XIV	
		Aromoline (90)	VI	
		Homoaromoline (109)	VI	
	St& Lf	Methylthalicberine, O- (234)	XI	
	<i>Tiliacora dinklagei</i>	Rt	Thalicberine (236)	XI
			Thalictine (264)	XIV
Dinklacorine (283)			XVIII	
Funiferine (64)			IV	
Nortiliacorinine (286)			XVIII	
Tiliacorinine (290)			XVIII	
Tiliageine (82)			IV	
<i>T. funifera</i>	Rt	Funiferine dimethiodide (65)	IV	
		Funiferine-N-oxide (66)	IV	
		Nortiliacorine A (286)	XVIII	
		Tiliacorine (289)	XVIII	
	Lf	Isotetrandrine (173)	VIII	
		Thalrugosine (206)	VIII	
		Tiliafunimine (207)	VIII	
<i>T. racemosa</i>	Lf	Tiliamosine (299)	XIX	
	Rt& Lf	Nortiliacorinine A (286)	XVIII	
	Rt	Nortiliacorinine B (287)	XVIII	
		Tiliacorine (289)	XVIII	
		Tiliacorinine (290)	XVIII	
		Tiliarine (292)	XXVII	

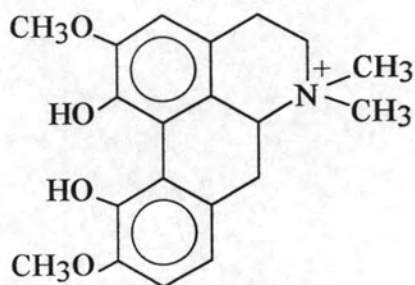
			I
	Wp	Nortiliacorinine (286)	XVIII
	Rt	Methyltiliamosine, <i>N</i> - (295)	XIX
		Nortiliacorinine (286)	XVIII
		Tiliarine (292)	XVIII
<i>T. triandra</i>	Lf,St	Dinklacorine (283)	XVIII
		Nortiliacorinine A (286)	XVIII
		Nortiliacorine A (285)	XVIII
		Norisoyanangine (296)	XIX
		Tiliacorine (289)	XVIII
		Tiliacorinine (290)	XVIII
		Tiliacorinine-2'- <i>N</i> -oxide (291)	XVIII
		Tiliageine (82)	IV
		Tilianangine (300)	XIX
		Tilitriandrine (83)	IV
		Yanangcorinine (293)	XVIII
		Yanangine (301)	XIX
	Rt	Nortiliacorinine (286)	XVIII
		Tiliacorine (289)	XVIII
		Tiliacorinine (290)	XVIII
		Tiliacorinine-2'- <i>N</i> -oxide (291)	XVIII
<i>Triclisia dictyophylla</i>	Wp	Cocsuline (337)	XXIII
		Trigilletimine (356)	XXIII
<i>T. gilletti</i>	Lf	Gilletine (369)	XXIV
		Isogilletine- <i>N</i> -oxide (370)	XXIV
		Obamegine (193)	VIII
		Stebisimine (135)	VI
	St &	Cocsuline (337)	XXIII
	Rt	Isotetrandrine (173)	VIII
		Trigilletimine (356)	XXIII

Table 3 (Continued)

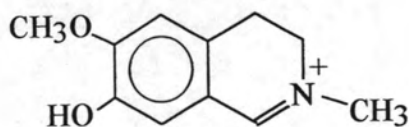
Name of Plants	Part	Alkaloids (No.)	Type
<i>T. patens</i>	Lf	Stebisimine (135)	VI
	Rt&	Cocculine (337)	XXIII
	St	Pycnamine (200)	VIII
		Trigilletimine (356)	XXIII
	Rt&	Phaeanthine (198)	VIII
	St&		
<i>T. subcordata</i>	Lf	Aromoline (90)	VI
	Rt	Fangchinoline (167)	VIII
		Tetrandrine (205)	VIII
		Tricordatine (355)	XXIII
<i>Uvaria ovata</i>	Lf	Chondrofoline (318)	XXI
<i>Xanthoriza simplicissima</i>	Rh&	Obamegine (193)	VIII
	Rt	Oxyacanthine (129)	VI

* Ap=Aerial parts, Bk=Bark, Cul=Culture, Em=Embryo, Fr=Fruits, Lf=Leaves, RB=Root Bark, Rh=Rhizomes, Rt=Roots, Sh=Shoots, St=Stems, StB=Stembark, TB=Trunk Bark, Tb=Tubers Tp=Tops, Tr=Trunk, Tw=Terminal twigs, Wd=Wood, Wp=Whole Plant

Phytochemical investigation had been previously conducted on some *Pycnarrhena* species. Although the identified alkaloids proved to be mainly bisbenzylisoquinolines, but some of alkaloids are monomer of benzylisoquinoline or simple isoquinoline such as Magnoflorine(423), Pycnarrhine(424), respectively.



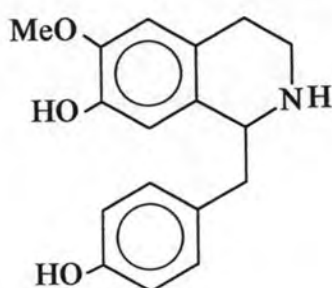
423 Magnoflorine



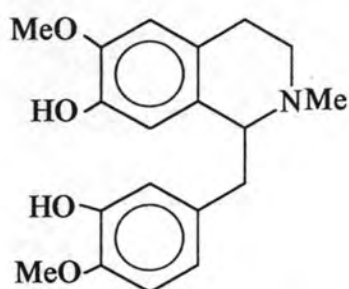
424 Pycnarrhine

Biosynthesis of Bisbenzylisoquinoline Alkaloids

The isoquinoline skeleton is incorporated into well over 1000 alkaloids and most of these compounds may be broken down into two broad categories depending upon whether they are derived biogenetically from the tetrahydroisoquinoline (\pm)-coclaurine(425) or (+)-reticuline(426). (\pm)-Coclaurine-derived alkaloids tend to dimerize to provide more than 250 different bisbenzylisoquinoline. The *in vivo* chemistry of (+)-reticuline(426), which possesses an additional oxygen in the bottom ring, differs in some important respects from that of (\pm)-coclaurine(425).

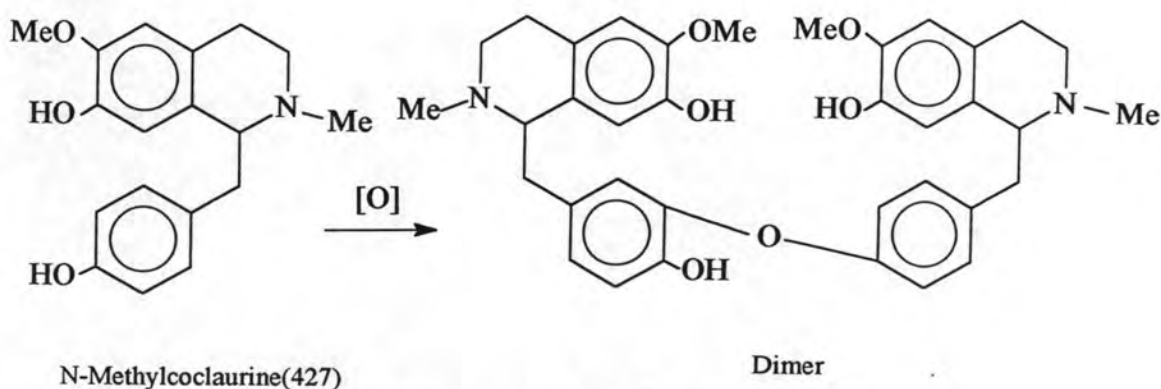


(\pm)-Coclaurine(425)



(+)-Reticuline(426)

In fact only nine bisbenzylisoquinolines are known that incorporate a reticuline moiety bonded to a coclaurine unit while a few of them were originated from bonding between two reticulines (Bruneton et al., 1983), but several of these alkaloids were shown to be derived by coupling of coclaurine or *N*-methylcoclaurine units (427) (Scheme 1).

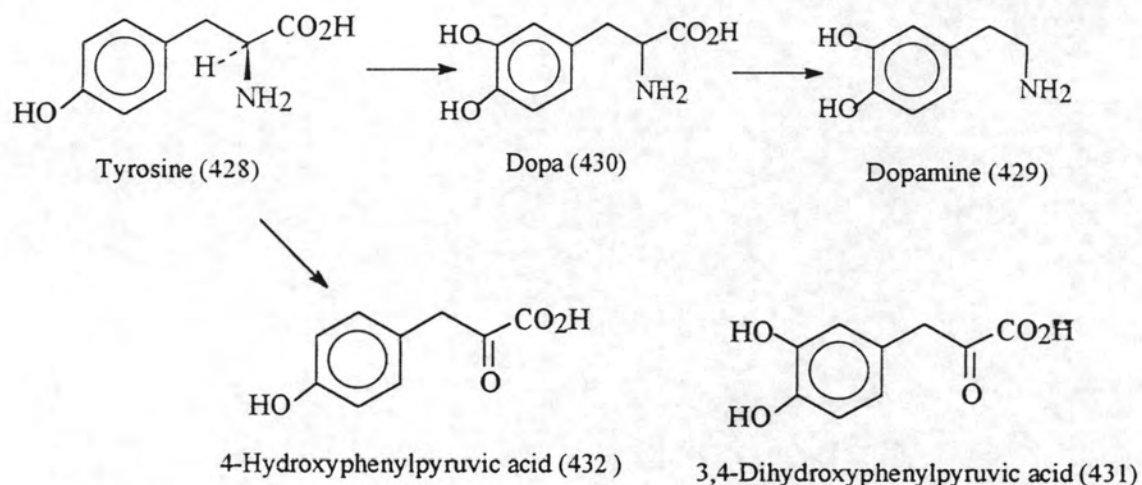


N-Methylcoclaurine(427)

Dimer

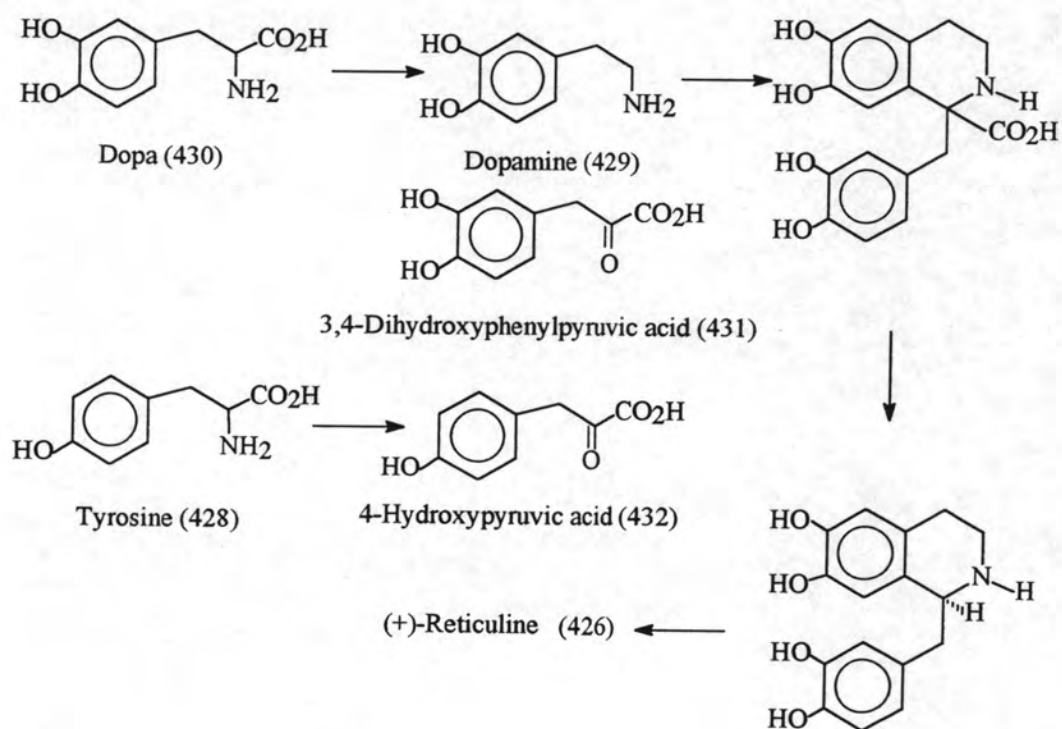
Scheme 1 The Formation of Bisbenzylisoquinoline alkaloid

The fundamental units are those for the formation of the benzyloquinoline alkaloids with the addition of a single carbon atom which becomes c-8 of the skeleton. Thus two molecules of tyrosine(428) are involved, one proceeding to dopamine(429) via dopa(430), and the second to 3,4-dihydroxyphenyl pyruvic acid(431). (Scheme 2)



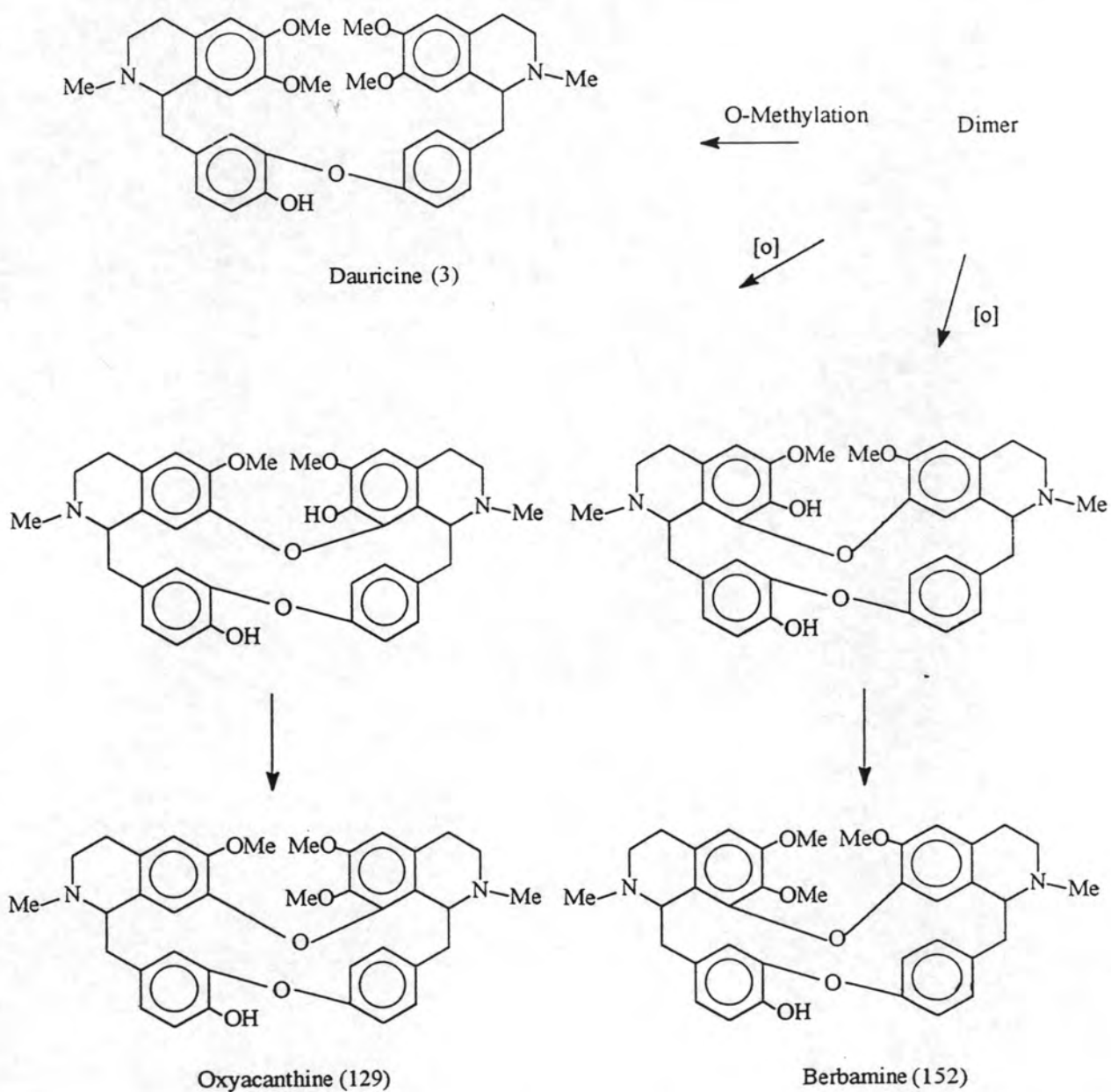
Scheme 2 The Biosynthesis of 3,4-Dihydroxyphenylpyruvic acid (431)

From feeding experiments, $[1-^{14}\text{C}]$ dopa was incorporated into norlaudanosoline 1-carboxylic acid via dopamine. It is considered that 4-hydroxyphenylpyruvic acid(432), produced by oxidative deamination of tyrosine(428), is subsequently hydroxylated to afford 3,4-dihydroxyphenylpyruvic acid(431) and then was incorporated into norlaudanosoline 1-carboxylic acid to form (+)-reticuline(426) as follow (Scheme 3).



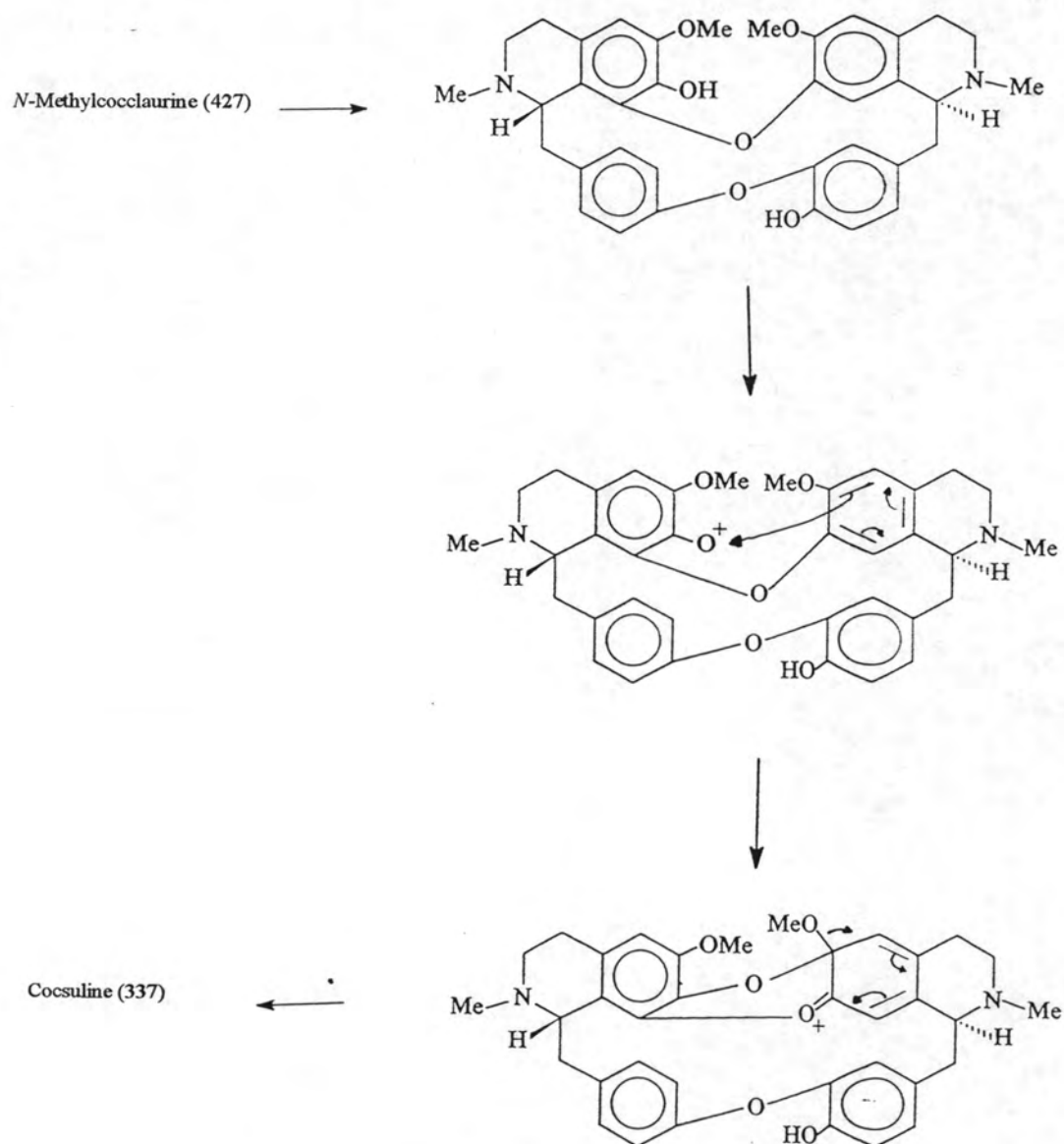
Scheme 3 The Biosynthesis of (+)-Reticuline (426)

In nature, bisbenzylisoquinolines are formed through the phenolic oxidative coupling of simple benzylisoquinoline such as *N*-methylcoclaurine(427), (+)-reticuline (426), as mentioned above. A logical, but so far hypothetical sequence that could lead to dauricine(3), oxyacanthine(129), and berbamine(152) would be as described in scheme 4.



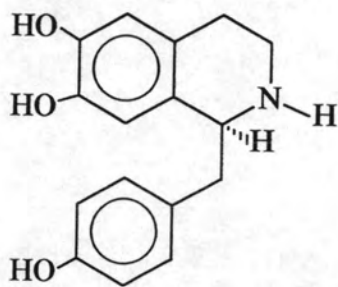
Scheme 4 The Biosynthesis of Oxyacanthine (129) and Berbamine (152)

As mentioned above, those are overall biosynthesis pathway of bisbenzylisoquinoline. After that, the detail of some experiments on *Cocculus laurifolius* D.C. with a combination of ^{14}C - and ^3H -labeled *N*-methylococclaurine and related compounds substantiated the biosynthetic scheme shown for cocsuline(337).

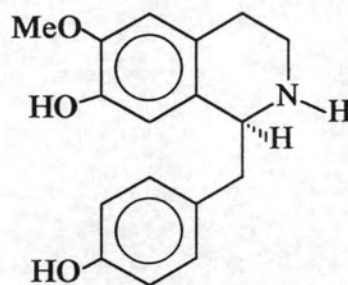


Scheme 5 The Biosynthesis of Cocsuline(337)

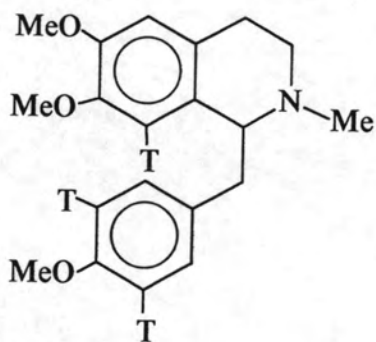
Tyrosine(429) was shown to be an efficient precursor of cocsuline(337) , and the intermediacy of (*s*)-norcoclaurine(433), (*s*)-coclaurine(434) and (*s*)-*N*-methylcoclaurine was demonstrated by the following observations.



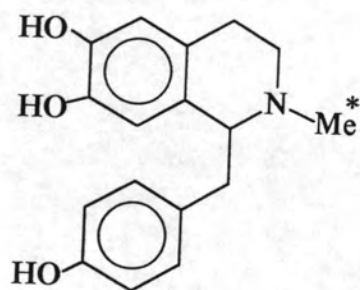
(*S*)-Norcoclaurine(433)



(*S*)-Coclaurine(434)



Tritium-Labelled (*R,S*)-*O*-Methylarmepavine(435)



¹⁴C-Labelled (*R,S*)-*N*-Methylnorcoclaurine(436)

Tritium-labeled (*R,S*)-*O*-methylnorpavine(435) was not incorporated, nor was ^{14}C -labeled (*R,S*)-*N*-methylcoclaurine(436). Feeding the racemic resulted in appearance of only half of the total radioactivity in the isolated cocculine(337), showing that only one enantiomer is utilized, and feeding of the enantiomers of *N*-methylcoclaurine(427), labeled with either $1\text{-}^3\text{H}$ or $N\text{-}^{14}\text{C}$, proved that it is the (*s*) form. (Brossi, 1987) It would be expected that the enzyme system involved in the relevant biotransformation would be stereospecific, and that only one of two optical isomers would normally act as a direct substrate.

A similar approach was used to establish the biosynthetic pathway in *Cocculus laurifolius* of cocculinine(368) and tetrandrine(205). (*S*)-*N*-methylcoclaurine proved to be the precursor for both halves of the alkaloid.

In another study of isotetrandrine(173) biosynthesis, feeding experiments were done on *Cocculus laurifolius* D.C. It was shown that *Cocculus laurifolius* elaborates isotetrandrine(173) from (*R,S*)-*N*-methylcoclaurine and double labelling experiment with (\pm)-*N*-[^{14}C]methyl[$1\text{-}^3\text{H}$]coclaurine demonstrated that hydrogen atom at the asymmetric centre in *N*-methylcoclaurine(427) is retained in the bioconversion into isotetrandrine(173). So that it could rule out some hypothesis that the enantiomer are interconvertible via the dehydromethyl-coclaurinium ion (Bhakuni, Singh and Jain, 1980).

The biosynthesis of the diastereomeric biphenyl-linked alkaloids tiliacorine (189) and tiliacorinine(290) in *Tiliacora racemosa* Colebr. was studied by isotopic labeling. Labeled racemic norcoclaurine(433), coclaurine(425) and *N*-methylcoclaurine(427) were readily incorporated in to both alkaloids. The configurations of the asymmetric centers of tiliacorine(189) and tiliacorinine(290) were shown by separately feeding only one labeled enantiomer of *N*-methylcoclaurine(427). (*S*)- and (*R*)-*N*-methylcoclaurine were incorporated equally into tiliacorine(189), but

the labeled (*S*) form was converted 70 times more readily than the other enantiomer into tiliacorinine(290).

Stephania glabra (Roxb.) was shown to produce cycleanine(302) and *N*-desmethylcycleanine(305) via dimerization of both (*R*)-*N*-methylcoclaurine and (*R*)-coclaurine. The plant was proven to utilize *L*-tyrosine to biosynthesize the intermediate *N*-methylcoclaurine (Brossi, 1987).

The biosynthesis of the various bisbenzylisoquinoline alkaloid types is a fascinating area which has been little discussed. In addition, compounds having three diphenyl ether linkages pose even more stimulating academic problems.

Pharmacology of Bisbenzylisoquinoline Alkaloids

Bisbenzylisoquinoline alkaloids have several types of biological activities. There are two bisbenzylisoquinolines of pharmacologic significance, tubocurarine chloride and tetrandrine, and there has already been discussion concerning the antitumor activity of tetrandrine (Cordell, 1981).

(+)-Tubocurarine, one of the alkaloids of tube curare from Brazil and Peru, is often present in the arrow poisons used by South American Indians. It is usually isolated as the crystalline dichloride salt. When injected into the bloodstream, it quickly blocks neuromuscular action so that respiration ceases and death results. Muscle paralysis is actually achieved by blocking the action of acetylcholine on the end-plate region of the muscle fiber. A single paralyzing dose in man (3-9 mg) lasts almost a half hour. (+)-Tubocurarine chloride is used in abdominal surgery in very small doses as a complement to anesthetics since it causes paralysis of the abdominal muscles without stopping the natural movement of the intestines. It actually blocks the transmission of nerve impulses at the myoneural junction to skeletal muscle. The drug is ineffective when taken orally, probably because it does not penetrate the intestinal walls. This fact also explains why animals that have been killed with an injection of tube curare can be eaten with impunity(Shamma, 1972).

also explains why animals that have been killed with an injection of tube curare can be eaten with impunity(Shamma, 1972).

(+)-Tetrandrine has been of recent interest because it possesses significant activity against the Walker carcinosarcoma system, and the *d*-isomer was found to be almost as active as the racemate. It has been the subject of extensive preclinical toxicological studies. In addition to anticancer activity, (+)-tetrandrine has potent hypotensive and vasodilatory effects in several animal species. Other effects observed after intravenous administration include antipyresis, anti-inflammation, and histamine liberation from mast cells. Nephrotoxicity and hepatotoxicity in monkeys and dogs have also been observed(Cordell, 1981).

The pharmacological action and effect reported in the studies of bisbenzylisoquinoline alkaloids are listed in table 4.

Table 4 Pharmacological Activity of Bisbenzylisoquinoline Alkaloids

Alkaloids	Pharmacological Activity	References
Antioquine (59)	Antiprotozoal	Schiff, 1991
	Muscle relaxant	Schiff, 1991
Aromoline (90)	Antimalarial	Schiff, 1991
Berbamine (152)	Antiprotozoal	Schiff, 1991
	Hypotensive	Brossi, 1987; Schiff, 1991
	Hair tonic, Prevention of alopecia	
	Inhibit natural killer cell cytotoxicity	
	Inhibit platelet aggregation	Schiff, 1987
	Immunostimulant	
	Antileukopenic	
	Antisilicotic	
Berbamunine (1)	Spasmolytic	Brossi, 1987
Cepharanoline (94)	Membrane-modifying activity	Schiff, 1991
Cepharanthine (95)	Anti-inflammatory	Schiff, 1991
	Anticoagulant	
	Antidopaminergic effect	
	Immunomodulatory effects	
	Lipid peroxidation inhibitory effect	
	Membrane modulator	
	Antineoplastic activity	Brossi, 1987
	Antihistamine	
	Inhibit platelet aggregation	
	Antitumor	
	Antimicrobial	
	Antileukopenic	
Cocsuline (337)	Antiprotozoal	Schiff, 1991
Cocsulinine (368)	Active on human carcinoma	Brossi, 1987
Curine (319)	Muscle relaxant	Brossi, 1987
	Antitumor	Schiff, 1987



Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
	Antimalarial	
Cycleaneonine (332)	Inhibit carcinoma cell	Schiff, 1991
Cycleanine (302)	CNS depressant	Brossi, 1987
	Sedative	
	Uterolytic	
	Antiprotozoal	Schiff, 1991
	Hair tonic	
	Inhibit platelet aggregation	Schiff, 1987
	Analgesic	
	Antisilicotic	
	Anti-inflammatory	
Daphnandrine (100)	Antiprotozoal	Schiff, 1991
Daphnoline (101)	Antiprotozoal	Schiff, 1991
Dauricine (3)	Bactericidal	Brossi, 1987
	Virucidal	
	Inhibit platelet aggregation	Brossi, 1987; Schiff, 1987, 1991
	Hypotensive	Brossi, 1987; Schiff, 1987
	Local anesthetic	
	Antiarrhythmic	Brossi, 1987; Schiff, 1991
	Muscle relaxant	
	Anti-inflammatory	Schiff, 1991
	Antidopaminergic effects	
	CNS depressant	Schiff, 1987
Dauricinoline (4)	Muscle relaxant	Schiff, 1983
Dauricoline (5)	Muscle relaxant	Schiff, 1983
Daurinoline (6)	Muscle relaxant	Schiff, 1983
Daurisoline (7)	Muscle relaxant	Schiff, 1983

Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
Demethylisothalicberine, 7-O- (231)	Block pacemaker	Schiff, 1991
Desmethylthalidasine, N- (242)	Anticancer activity	Brossi, 1987
Desmethylthalidezine, N- (208)	Hypotensive	Brossi, 1987
Desmethylthalistyline, N- (53)	Antibacterial	Brossi, 1987
Epistephanine (105)	Hypotensive Block sympathetic nerve	Brossi, 1987, Schiff, 1983
Fangchinoline (167)	Inhibit platelet aggregation Analgesic Antitumor Antisilicotic Antimicrobial	Brossi, 1987 Schiff, 1987
Fenfangjine A (168)	Antihypertensive	Schiff, 1991
Fenfangjine B (169)	Antihypertensive	Schiff, 1991
Fenfangjine C (170)	Antihypertensive	Schiff, 1991
Fenfangjine D (171)	Antihypertensive	Schiff, 1991
Gilletine (369)	Antimalarial activity	Schiff, 1991
Hayatine (324)	Antitumor Antisilicotic	Schiff, 1987
Hernandezine (210)	Antiarrhythmic Anti-inflammatory Hypotensive Weak anticancer activity Antimicrobial	Brossi, 1987 Schiff, 1983
Homoaromoline (109)	Antibacterial	Brossi, 1987

Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
	Inhibit platelet aggregation	Brossi, 1987; Schiff, 1987, 1991
Isochondodendrine (306)	Antiprotozoal	Schiff, 1991
	Analgesic	Brossi, 1987; Schiff, 1983, 1987
Isoiensinine (84)	Membrane-modifying activity	Schiff, 1991
Isotetrandrine (173)	Analgesic	Schiff, 1987
	Antitumor	
	Antisilicotic	
	Antimicrobial	
	Hair tonic, Prevention of alopecia	Schiff, 1991
	Antimalarial	
	Anti-inflammatory	Brossi, 1987
Isotrilobine (344)	Membrane stabilizer	Brossi, 1987
	Radioprotective	
	Anti-inflammatory	
Krukovine (176)	Antiprotozoal	Schiff, 1991
Limacine (177)	Antiprotozoal	Schiff, 1991
Limacusine (112)	Antimalarial	Schiff, 1991
Macoline (114)	Curarizing activity	Brossi, 1987
Magnoline (18)	Inhibited feeding of bark beetle	Brossi, 1987
Methothalistryline (54)	Hypotensive	
	Antimicrobial	
Methylrepandine, <i>O</i> - (116)	Potential tuberculostat	Brossi, 1987
Methylthalibrine, <i>O</i> -	Antimicrobial	Brossi, 1987; Schiff, 1983
Methylthalicberine, <i>O</i> - (234)	Hypotensive	Brossi, 1987; Schiff, 1983

Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
	Antiarrhythmic	Brossi, 1987
Neferine (86)	Hypotensive	Schiff, 1991
Norcyclemine (309)	Weak spasmolytic	Brossi, 1987
	Hypotensive	
Nortiliacorinine A (286)	Antifungal	Schiff, 1991
Obaberine (126)	Antiprotozoal	Schiff, 1991
Obamegine (193)	Antimalarial	Schiff, 1991
	Hypotensive	Brossi, 1987; Schiff, 1987
Oxyacanthine (129)	Hypotensive	Brossi, 1987
Penduline (196)	Hypotensive	Brossi, 1987
Phaeantharine (197)	Antibacterial	Brossi, 1987; Schiff, 1987, 1991
Phaeanthine (198)	Muscle relaxant	Brossi, 1987
	Antiprotozoal	Schiff, 1991
Pycnamine (200)	Antimalarial	Schiff, 1991
Repandine (133)	Potential tuberculostat	Brossi, 1987
Tetrandrine (205)	Antiarrhythmic	Brossi, 1987
	Antitumor	Brossi, 1987; Schiff, 1983, 1991
	Antihypertensive	Brossi, 1987; Schiff, 1987, 1991
	Anti-inflammatory	Brossi, 1987
	Antimalarial	Schiff, 1991
	Antianginal	Schiff, 1991
	Immunosuppressive	Schiff, 1991
	Inhibit platelet aggregation	Schiff, 1991
	Hair tonic, Prevention of alopecia	Schiff, 1991
	Analgesic	Schiff, 1987

Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
Tetrandrine- <i>N</i> -oxide (203)	Hypotensive	Schiff, 1991
Thalfine (253)	Antibacterial	Brossi, 1987; Schiff, 1983
Thalfinine (254)	Antibacterial	Brossi, 1987; Schiff, 1983
Thalicerine (236)	Hypotensive Active against HeLa and Ehrlich ascites cells	Brossi, 1987
Thalidasine (245)	Hypotensive	Brossi, 1987; Schiff, 1983
Thalidezine (214)	Antitumor Antimicrobial Hypotensive	Brossi, 1987 Schiff, 1983
Thalirabine (55)	Antibacterial	Brossi, 1987
Thaliracebine (45)	Hypotensive Antibacterial	Brossi, 1987
Thaligosine (143)	Antiarrhythmic	Brossi, 1987; Schiff, 1983
Thalistine (57)	Antibacterial	Brossi, 1987
Thalistryline (58)	Hypotensive	Brossi, 1987; Schiff, 1983
Thalmine (267)	Antimicrobial Antiarrhythmic	Brossi, 1987
Thalmirabine (255)	Antimicrobial	Brossi, 1987; Schiff, 1983
Thalrugosaminine (148)	Antimicrobial Hypotensive	Brossi, 1987; Schiff, 1983

Table 4 (Continued)

Alkaloids	Pharmacological Activity	References
Thalrugosine (206)	Hypotensive	Brossi, 1987; Schiff, 1987
	Antibacterial	
Tiliacorinine (290)	Antifungal	Schiff, 1991
Trigilletimine (356)	Antimalarial	Schiff, 1991
Trilobine (357)	Anti-inflammatory	Brossi, 1987; Schiff, 1991
Tubercularine,(+)-(328)	Muscle relaxant	Schiff, 1983
	Dopaminergic antagonist	Brossi, 1987
	Local anesthetic	Schiff, 1987
Warifteine (334)	Anesthetic	Brossi, 1987
	Muscle relaxant	