

ALKALOIDS OF THE LAURACEAE

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Summary

Alkaloids of the plant family Lauraceae are classified according to structure into fifteen groups, and arranged in tabular form. The genera and species in which they occur are also tabulated, and another table summarises the number of occurrences of each alkaloid group by genus. Incompletely characterised bases not included in these tables are listed separately. Occurrences of the main structural types are compared for the Lauraceae and certain other plant families in a further table. The possible mode of biogenesis of some less familiar bases is discussed, and references are given to the biosynthesis of well-known structural types.

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1. Introduction

The family Lauraceae is most abundantly represented in the tropics of both hemispheres, with about 18 American and nearly as many Asian genera. Few of these are common to both regions, although the large genus *Cryptocarya* is widely spread, and *Sassafras* occurs in both Eastern Asia and in the Atlantic region of North America as far as Canada. On the whole, the family is sparsely distributed in tropical Africa, with the exception of Madagascar, which has one genus with about 18 species. There are several genera in Australasia^{1,159,160}. A detailed study of the taxonomy of the Lauraceae has been made by Kostermans⁹⁶, and the chemotaxonomy⁶³ and chemosystematics¹⁶¹ of the family have also been reviewed.

The great majority of alkaloids found in the Lauraceae are of the aporphine type. Table 1 shows the principal plant families which contain aporphine alkaloids. The Lauraceae includes examples of many of the other types of alkaloid structures found in nature which are considered to arise biogenetically from phenylalanine or tyrosine, and plant families containing the main types are also shown in Table 1; of these, the dibenzopyrrocolines have so far been found only in the Lauraceae. It can be seen from Table 1 that in general families such as the Monimiaceae and Hernandiaceae, which belong to the same natural order as the Lauraceae, show similarities in alkaloid distribution, but this similarity also extends to families such as the Anonaceae, Magnoliaceae, Ranunculaceae, Menispermaceae and Berberidaceae which are placed in related orders in Hutchinson's "Families of Flowering Plants"¹⁵⁸, although the last three are in herbaceous orders in contrast to the others, which are composed of woody types of plants.

Figures (I-XV) illustrate the general structural types of alkaloids found to date in the Lauraceae; they include a comparatively small number of alkaloids belonging to types which appear to be derived from amino acids

other than tyrosine or phenylalanine. A number of reviews have been published discussing the chemistry of the more important alkaloid groups found in the Lauraceae, including aporphines⁵, proaporphines⁶, bisbenzyl-isoquinolines⁷, and morphines⁸, as well as general texts covering the various types of isoquinoline alkaloids^{16,23}.

The occurrence of alkaloids found in the various species of the Lauraceae is shown in Table 2, which includes 105 alkaloids of 15 structural types occurring in 103 species from 19 genera. The data are summarised in Table 3, in which the number of occurrences of alkaloids of the principal structural types is shown for each genus. The information contained in the tables has been drawn from reviews^{2,3,4} and from Chemical Abstracts for the period 1967-1976.

2. Biosynthesis

Comparatively few of the individual alkaloids found in the Lauraceae have been the subject of biosynthetic study, and such studies as have been made have for the most part been carried out using plants of other families in which the biosynthetic pathways may not be identical. However, the lauraceous alkaloids can be classified according to structure into a number of groups for which the general lines at any rate of the biosynthetic pathways have been largely established. The great majority of the bases may be considered to arise from tyrosine, some of them with only slight modification (group I)¹⁴⁵. Others (groups II and IIa) have a benzyl-isoquinoline or benzyltetrahydroisoquinoline structure, in the biosynthesis of which two tyrosine units are involved^{146,147}.

The range of lauraceous alkaloids include examples of many of the metabolic modifications which the benzyltetrahydroisoquinoline structure can undergo, such as proaporphine (group III), aporphine (group IV) and

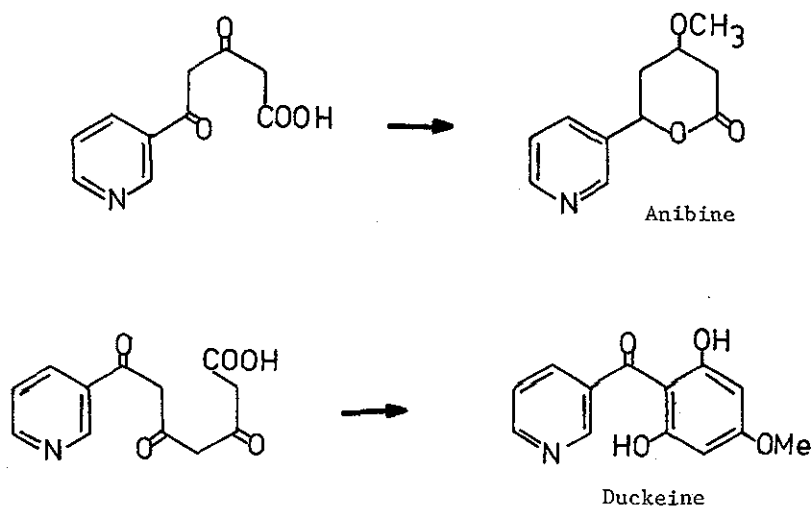
phenanthrene (group VI). Several biosynthetic routes to the aporphines, the largest single group, have been established for individual alkaloids occurring in other plant families¹⁴⁸, and from the considerable variety in the pattern of substitution in the case of the aporphines of the Lauraceae, it would appear that their biogenesis involves more than one of these routes. The origin of the unique dibenzylamino substituent in variabiline (IV₅₀) is particularly intriguing. Oxoaporphines¹⁴⁹ (V) and phenanthrene alkaloids (VI) are probably formed in nature by oxidation or biological Hofmann-type degradation of the aporphine structure respectively. The reported occurrence of berberine in a lauraceous sp.⁹¹ is not supported by later work on the same plant^{95,121,126,127}.

The pavine (group VII), dibenzopyrrocoline (group VIII), and sinomenine (group IX) types represent further modifications of the benzylisoquinoline structure in which extra rings have been formed; the last-named type is related structurally and biosynthetically to morphine¹⁵⁰. On the other hand, cryptopleurospermine (group X) is the sole representative of a type with fewer rings, and it would seem to have been formed by oxidative ring-opening of a tetrahydroisoquinoline structure.

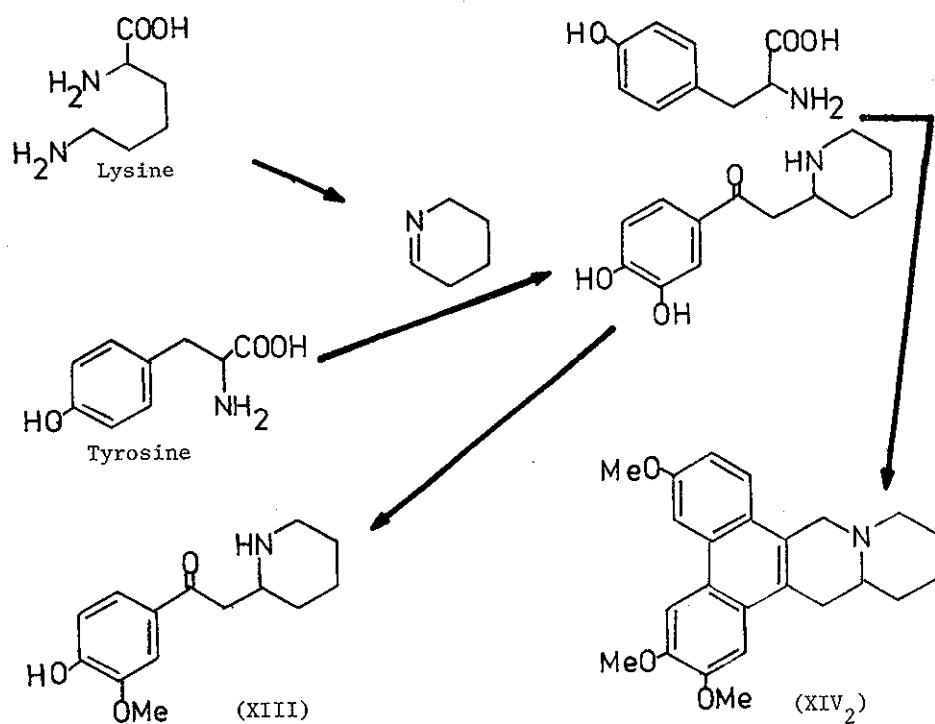
The Lauraceae contains several types of bisbenzylisoquinoline alkaloids (group XI) in which two simple benzylisoquinoline units appear to have been joined together head-to-head, tail-to-tail by phenol oxidative processes¹⁵⁶, and they include examples of a type with a diphenyl in place of the more usual diphenylether link. Group XI bases are confined to *Nectandra* and *Ocotea* spp., and botanical confusion in the earlier literature has led to some confusion regarding their alkaloid content^{89, 92}. More recent work^{95,121,126,127} has not substantiated the occurrence of bisbenzylisoquinoline alkaloids of the head-to-tail type, such as bebeerine, in these plants.

There is a miscellaneous group of pyridine alkaloids (group XII) which

are confined to the genus *Aniba*, including anabesine, an alkaloid well-known from its occurrence in other plant families; in the case of solanaceous plants, it has been shown to be derived from the aminoacids lysine^{152,153} and nicotinic acid^{148,153}. The other pyridine alkaloids, anibine and duckeine, would appear from their structures to be made up of nicotinic acid condensed with two or three units of acetate respectively:



Pleurospermine (XIII) is an alkaloid of the sedamine type, which may be formed from lysine¹⁵⁷ in a corresponding way to the latter except for the possible replacement of phenylalanine by tyrosine or dopa. The phenanthroquinolizidine type (group XIV) could be derived from the same source, with an additional dopa or tyrosine unit. No biosynthetic work has been done on these alkaloids to date, but they are structurally analogous to tylophorine, which has been shown to be built up from units of tyrosine, phenylalanine, and ornithine¹⁵⁴. Cryptopleurine may be formed in a similar way with the substitution of lysine for ornithine.



The only occurrence of an indole alkaloid reported in the Lauraceae so far is the widely distributed serotonin (XV), which occurs in *Persea* spp. together with simple bases related to tyrosine¹³⁰.

3. Classification of alkaloids according to structure

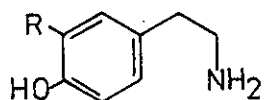


Fig. 1. Phenethylamines

Dopamine R=OH (I₁) Ref. 130

Tyramine R=H (I₂) Ref. 130

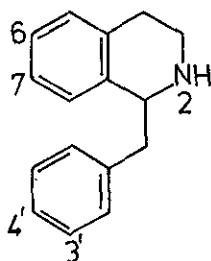


Fig. IIa. Benzyltetrahydroisoquinolines

Alkaloid		Substituent positions					Ref.
		2	6	7	3'	4'	
Cinnamolaurine	(IIa ₁)	Me	-OCH ₂ O-	-	-	OH	44,45
Coclaurine (Machiline)	(IIa ₂)	-	OMe	OH	-	OH	70
Laudanidine	(IIa ₃)	Me	OMe	OMe	OH	OMe	81
Magnocurarine	(IIa ₄)	Me ₂ ⁺	OMe	OH	-	OH	67
N-Norarmepavine	(IIa ₅)	-	OMe	OMe	-	OH	81
Norcinnamolaurine	(IIa ₆)	-	-OCH ₂ O-	-	-	OH	44,45
Reticuline	(IIa ₇)	Me	OMe	OH	OH	OMe	19

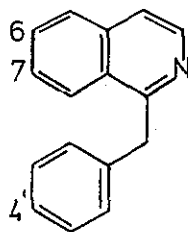


Fig. IIb. Benzylisoquinolines

Alkaloid		Substituent positions			Ref.
		6	7	4'	
Crykonisine	(IIb ₁)	OMe	OMe	OH	80
1-(p-Methoxybenzyl)- 6,7-dimethoxy- isoquinoline	(IIb ₂)	OMe	OMe	OMe	123
1-(p-Methoxybenzyl)- 6,7-methylenedioxy- isoquinoline	(IIb ₃)	-OCH ₂ O-		OMe	123

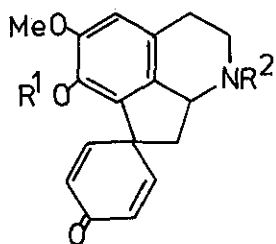


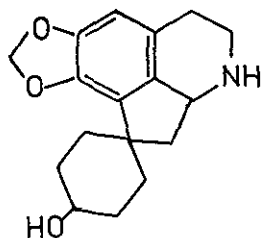
Fig. III. Proaporphines

Ref.

Crotsparine (IIIa₁) R¹=R²=H 136

Glaziovine (IIIa₂) R¹=H, R²=Me 113

Pronuciferine (IIIa₃) R¹=R²=Me 137



Litsericine (IIIb₁), Ref. 102.

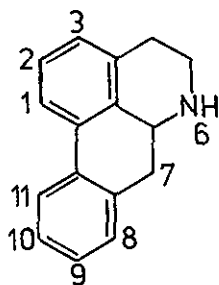
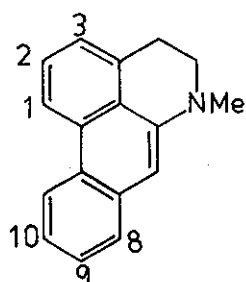


Fig. IV Aporphines

Alkaloid		Substituent positions								Ref.
		1	2	3	6	8	9	10	11	
Actinodaphnine	(IV ₁)	-OCH ₂ O-	-	-	-	-	OH	OMe	-	39
Anonaine	(IV ₂)	-OCH ₂ O-	-	-	-	-	-	-	-	98
Apoglaziovine	(IV ₃)	OH	OMe	-	Me	-	-	OH	-	110,128

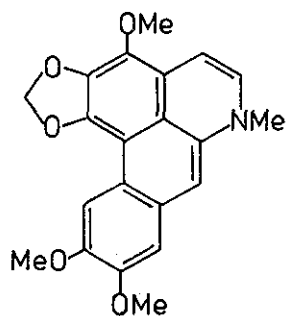
Alkaloid		Substituent positions								Ref.
		1	2	3	6	8	9	10	11	
Asimilobine	(IV ₄)	OMe	OH	-	-	-	-	-	-	138
Boldine	(IV ₅)	OMe	OH	-	Me	-	OH	OMe	-	73
Bulbocapnine	(IV ₆)	-OCH ₂ O-	-	-	Me	-	-	OMe	OH	31
Caaverine	(IV ₇)	OH	OMe	-	-	-	-	-	-	139
Cassyfiline (Cassythine)	(IV ₈)	-OCH ₂ O-	OMe	-	-	-	OH	OMe	-	34,35,37
Cassythicine	(IV ₉)	-OCH ₂ O-	-	-	Me	-	OH	OMe	-	39
Cassythidine	(IV ₁₀)	-OCH ₂ O-	OMe	-	-	-	-OCH ₂ O-	-	-	35
Corydine	(IV ₁₁)	OH	OMe	-	Me	-	-	OMe	OMe	45
Cryptodrine	(IV ₁₂)	-OCH ₂ O-	-	-	-	-	-	-CH ₂ O-	-	52
Dicentrine	(IV ₁₃)	-OCH ₂ O-	-	-	Me	-	OMe	OMe	-	27
2,11-Dihydroxy-1,10- dimethoxyaporphine	(IV ₁₄)	OMe	OH	-	Me	-	-	OMe	OH	20
1,10-Dihydroxy-2- methoxyaporphine	(IV ₁₅)	OH	OMe	-	Me	-	-	OH	-	109
Domesticine	(IV ₁₆)	OH	OMe	-	Me	-	-CH ₂ O-	-	-	34
Glaucine	(IV ₁₇)	OMe	OMe	-	Me	-	OMe	OMe	-	28
Hernovine	(IV ₁₈)	OMe	OH	-	-	-	-	OH	OMe	140
(±)-1-Hydroxy-2- methoxyaporphine	(IV ₁₉)	OH	OMe	-	Me	-	-	-	-	110
10-Hydroxy-1,2- methylenedioxy- aporphine	(IV ₂₀)	-OCH ₂ O-	-	-	Me	-	-	OH	-	20
2-Hydroxy-1,9,10- trimethoxynor- aporphine	(IV ₂₁)	OMe	OH	-	-	-	OMe	OMe	-	28
Isoboldine	(IV ₂₂)	OH	OMe	-	Me	-	OH	OMe	-	27,34,70
(+)-Isocorydine	(IV ₂₃)	OMe	OMe	-	Me	-	-	OMe	OH	52
Launobine	(IV ₂₄)	-OCH ₂ O-	-	-	-	-	-	OMe	OH	61
Laurelliptine (Norisoboldine)	(IV ₂₅)	OH	OMe	-	-	-	OH	OMe	-	27,79
Lauroilsine (Norboldine)	(IV ₂₆)	OMe	OH	-	-	-	OH	OMe	-	70

Alkaloid	Substituent positions									
	1	2	3	6	8	9	10	11	Ref.	
Laurotetanine	(IV ₂₇) OMe	OMe	-	-	-	OH	OMe	-	14,70	
Lindcarpine	(IV ₂₈) OMe	OH	-	-	-	-	OMe	OH	60	
Litsedine	(IV ₂₉) -OCH ₂ O-	-	-	-	-	-	OMe	OMe	76	
N-Methylactinodaphnine	(IV ₃₀) -OCH ₂ O-	-	Me	-	OH	OMe	-	72		
O-Methylbulbocarpine	(IV ₃₁) -OCH ₂ O-	-	Me	-	-	OMe	OMe	59		
O-Methylcassyfiline (O-Methylcassythine)	(IV ₃₂) -OCH ₂ O-	OMe	-	-	OMe	OMe	-	31,35		
N-Methylhernangerine	(IV ₃₃) -OCH ₂ O-	-	Me	-	-	OH	OMe	59		
N-Methylhernovine	(IV ₃₄) -OCH ₂ O-	-	Me	-	-	-OCH ₂ O-	-	59		
N-Methylisocorydine	(IV ₃₅) OMe	OMe	-	Me ₂ ⁺	-	-	OMe	OH	47	
N-Methylaurotetanine	(IV ₃₆) OMe	OMe	-	Me	-	OH	OMe	-	67	
Nandigerine	(IV ₃₇) -OCH ₂ O-	-	-	-	-	OH	OMe	104		
Nantenine	(IV ₃₈) OMe	OMe	-	Me	-	-OCH ₂ O-	-	34		
Neolitsine	(IV ₃₉) -OCH ₂ O-	-	Me	-	-OCH ₂ O-	-	103			
Nordomesticine	(IV ₄₀) OH	OMe	-	-	-	-OCH ₂ O-	-	34		
Nornantenine	(IV ₄₁) OMe	OMe	-	-	-	-OCH ₂ O-	-	41		
Nuciferine	(IV ₄₂) OMe	OMe	-	Me	-	-	-	98		
Ocokryptine	(IV ₄₃) OMe	-OCH ₂ O-	Me	-	-	OMe	OH	116		
Oconovine	(IV ₄₄) OMe	OMe	OMe	Me	-	-	OMe	OH	116	
Ocopodine	(IV ₄₅) -OCH ₂ O-	-	Me	OMe	OMe	OMe	-	116		
Ocoteine (O,N-dimethyl- cassyfiline, thalicmine)	(IV ₄₆) -OCH ₂ O-	OMe	Me	-	OMe	OMe	-	94,125		
Predicentrine	(IV ₄₇) OMe	OH	-	Me	-	OMe	OMe	-	114,115, 128	
Roemerine	(IV ₄₈) -OCH ₂ O-	-	Me	-	-	-	-	47,132		
Ushinsunine	(IV ₄₉) -OCH ₂ O-	-	Me	-	-	-	-	132		
					(OH group at 7)					
Variabiline	(IV ₅₀) OMe	OMe	-	Me	-	-N(CH ₂ Ph) ₂	-	128		



Dehydroaporphines

Alkaloid	Substituent positions						Ref.
	1	2	3	8	9	10	
Dehydrodicentrine (IV ₅₁)	-OCH ₂ O-	-	-	-	OMe	OMe	116
Dehydronantenine (IV ₅₂)	OMe	OMe	-	-	-OCH ₂ O-		123
Dehydroocopodine (IV ₅₃)	-OCH ₂ O-	-		OMe	OMe	OMe	114
Dehydroocoteine (IV ₅₄)	-OCH ₂ O-		OMe	-	OMe	OMe	117

Didehydroocoteine (IV₅₅) Ref. 117

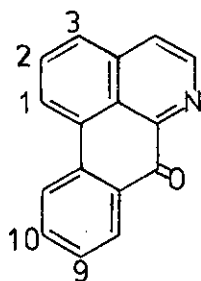


Fig. V. Oxoaporphines

Alkaloid		Substituent positions					Ref.
		1	2	3	9	10	
Cassamedine	(V ₁)	-OCH ₂ O-		OMe	-OCH ₂ O-		31,32
Cassameridine	(V ₂)	-OCH ₂ O-		-	-OCH ₂ O-		31
Dicentrinone	(V ₃)	-OCH ₂ O-		-	OMe	OMe	114
1,2-Dimethoxy-9,10-methylenedioxy-7-oxodibenzo-[de,g]-quinoline	(V ₄)	OMe	OMe	-	-OCH ₂ O-		41
Lirodenine (Oxoushinsunine)	(V ₅)	-OCH ₂ O-		-	-	-	70,132
Thalicminine	(V ₆)	-OCH ₂ O-		OMe	OMe	OMe	118

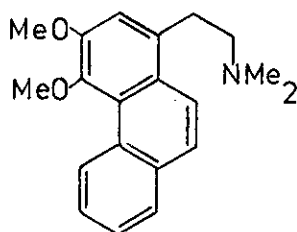


Fig. VI. Phenanthrene

Atherosperminine (3,4-Dimethoxy-1-dimethylaminoethyl-phenanthrene) (VI).

Ref. 47, 134

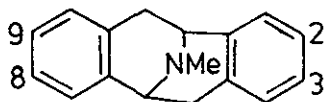


Fig. VII. Pavines

Alkaloid		Substituent positions				Ref.
		2	3	8	9	
Caryachine	(VII ₁)	OH(OMe)	OMe(OH)	-OCH ₂ O-		50
Crychine	(VII ₂)		-OCH ₂ O-		-OCH ₂ O-	50
O-Methylcaryachine	(VII ₃)	OMe	OMe		-OCH ₂ O-	51

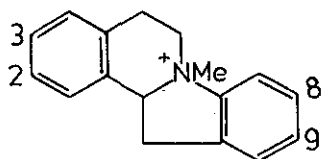
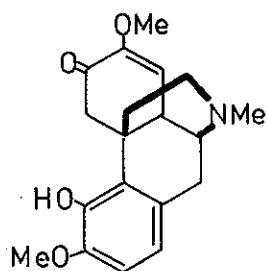


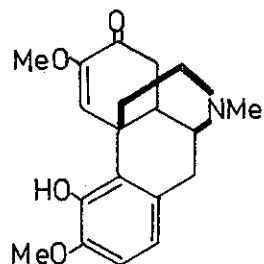
Fig. VIII. Dibenzopyrrocolines

Alkaloid		Substituent positions				Ref.
		2	3	8	9	
Cryptaustoline	(VIII ₁)	OH	OMe	OMe	OMe	49
Cryptowoline	(VIII ₂)	OH	OMe		-OCH ₂ O-	49

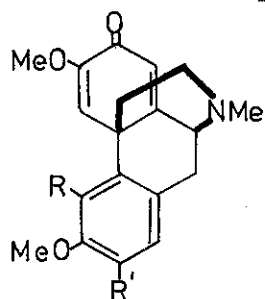


14-Episinomenine (IX₁) Ref. 141

Fig. IX
Sinomenines
(Morphine group)



Ocobotrine (IX₂) Ref. 141



Pallidine (R=H, R'=OH) (IX₃) Ref. 141,144

Sinoacutine (R=OH, R'=H) (IX₄) Ref. 34, 141

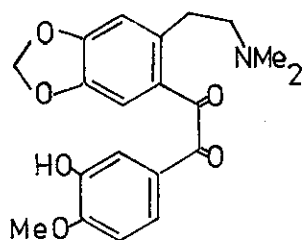


Fig. X. Cryptopleurospermine Ref. 53

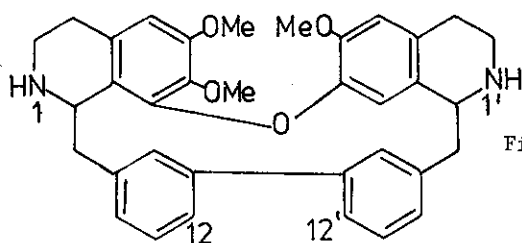
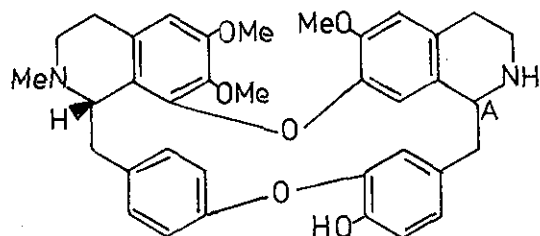


Fig. XI. Bisbenzylisoquinolines
(head-to-head)

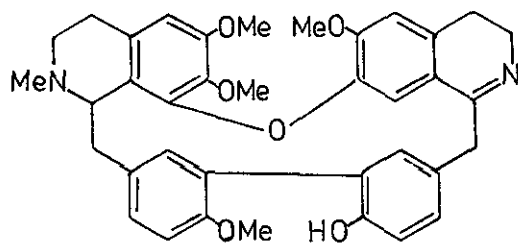
Alkaloid		Substituent positions				Ref.
		1	1'	12	12'	
Norrodiasine	(XI ₁)	H(Me)	Me(H)	OMe	OH	121(126)
Ocotine	(XI ₂)	Me	H	OMe	OH	126
Rodiasine	(XI ₃)	Me	Me	OMe	OH	126,127



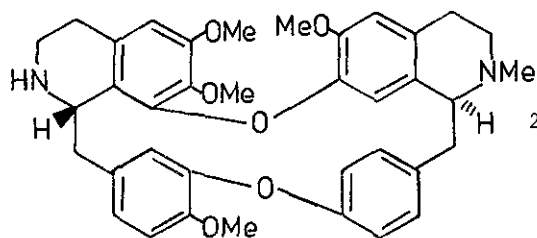
Ocoteamine (Sepeerine) (A=R)

(XI₄) Ref. 95

Demerarine (A=S) (XI₅) Ref. 95



Ocotosine (XI₆) Ref. 126



2-Nor-(+)-tetrandrine (XI₇)

Ref. 126

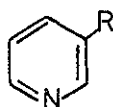
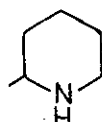


Fig. XII. Pyridines

Alkaloid

Anabasine (XII₁)

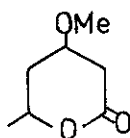
R =



Ref. 21

Anibine (XII₂)

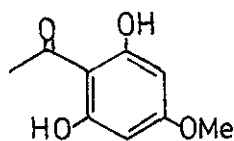
R =



Ref. 24

Duckeine (XII₃)

R =



Ref. 22

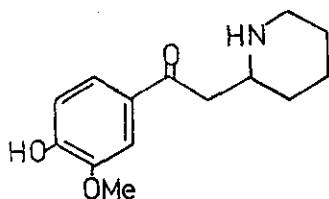


Fig. XIII. Sedamine type

Pleurospermine (XIII) Ref. 54,55,162.

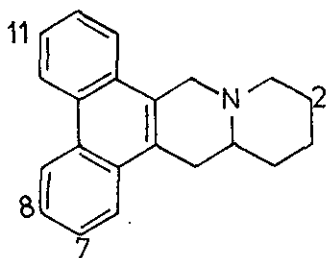


Fig. XIV. Phenanthroquinolizidines

Alkaloid

Substituent positions

	2	7	8	11	Ref.
Cryptopleuridine (XIV ₁)	OH	-OCH ₂ O-		OMe	53
Cryptopleurine (XIV ₂)	-	OMe	OMe	OMe	54,142

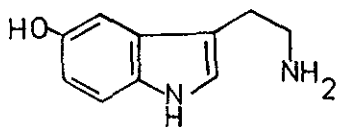


Fig. XV. Indole

Serotonine (5-Hydroxytryptamine) (XV) Ref. 130

Acknowledgements

We wish to thank Dr. Ryutaro Kishimoto for his kindness in translating some of the articles from Japanese. We are grateful also for the award of a Merle White Weaver Postgraduate Research Scholarship to one of us (W.S.).

4. Table 1

Occurrence in the Lauraceae of Alkaloid Types related to Isoquinoline.

For comparison, other families containing one or more of the major alkaloid types are also shown.

	Aporphine	Benzyliso-quinoline	Bisbenzyliso-quinoline	Phenanthrene	Proaporphine	Morphine	Phenethylamine	Pavine	Dibenzo-pyrrococline
Anonaceae	✓	✓	✓	✓					
Aristolochiaceae	✓		✓	✓			✓		
Berberidaceae	✓	✓	✓				✓		
Buxaceae			✓						
Celastraceae	✓						✓		
Combretaceae		✓	✓				✓		
Euphorbiaceae	✓	✓			✓	✓	✓		
Eupomataceae	✓								
Hernandiaceae	✓	✓	✓				✓		
Lauraceae	✓	✓	✓	✓	✓	✓	✓	✓	✓
Liliaceae	✓				✓		✓		
Magnoliaceae	✓	✓	✓				✓		
Menispermaceae	✓	✓	✓	✓	✓	✓			
Monimiaceae	✓	✓	✓	✓	✓		✓		
Myrsinaceae		✓							
Nymphaeaceae	✓	✓	✓		✓				
Papaveraceae	✓	✓			✓	✓	✓	✓	
Ranunculaceae	✓	✓	✓	✓			✓		
Rhamnaceae	✓	✓							
Rutaceae	✓	✓					✓		
Symplocaceae	✓								

5. Table 2

Alkaloids of the Lauraceae

<u>Plant species</u>	<u>Alkaloids present</u>	<u>Formulae</u>	<u>Ref.</u>
<i>Actinodaphne ocutivena</i>	laurolitsine	(IV ₂₆)	9
<i>Actinodaphne hookeri</i> Meissn.	actinodaphnine	(IV ₁)	10,107
<i>Actinodaphne nitida</i>	boldine	(IV ₅)	12
	laurolitsine	(IV ₂₆)	12
<i>Actinodaphne obovata</i> Bl.	actinodaphnine	(IV ₁)	13
	laurotetanine	(IV ₂₇)	13
	N-methyl-laurotetanine	(IV ₃₆)	13
<i>Actinodaphne procera</i> Nees	laurotetanine	(IV ₂₇)	14
<i>Alseodaphne archboldiana</i> (C.K. Allen) Kosterm.	(+), (-)-cocclaurine	(IIa ₂)	19
	(-)-N-norarmepavine	(IIa ₅)	19
	(+)-reticuline	(IIa ₇)	19
<i>Aniba coto</i> (Rusby) Kosterm.	anabasine	(XII ₁)	21
<i>Aniba duckeri</i>	duckeine	(XII ₃)	22
<i>Aniba duckeri</i> Kosterm.	anibine	(XII ₂)	24
<i>Aniba rosaeodora</i> Ducke	anibine	(XII ₂)	24
<i>Beilschmiedia elliptica</i> C.T. White	isoboldine	(IV ₂₂)	27
	laurelliptine	(IV ₂₅)	27
<i>Beilschmiedia podagrica</i>	(+)-2,11-dihydroxy-1,10-dimethoxyaporphine	(IV ₁₄)	28
	glaucine	(IV ₁₇)	28
	(+)-2-hydroxy-1,9,10-trimethoxynoraphorphine	(IV ₂₁)	28
	isoboldine	(IV ₂₂)	28
	laurelliptine	(IV ₂₅)	28
	predicentrine	(IV ₄₇)	28
	isoboldine	(IV ₂₂)	30
<i>Beilschmiedia tawa</i>	isoboldine	(IV ₂₂)	30

Table 2 (continued)

<i>Cassytha americana</i>	actinodaphnine	(IV 1)	31
	bulbocapnine	(IV 6)	31
	cassamedine	(V 1)	31
	cassameridine	(V 2)	31
	cassyfiline (cassythine)	(IV 8)	31
	cassythicine	(IV 9)	31
	cassythidine	(IV 10)	31
	dicentrine	(IV 13)	31
	launobine	(IV 24)	31
	N-methylactinodaphnine	(IV 30)	31
	O-methylcassyfiline	(IV 32)	31
	neolitsine	(IV 39)	31
	nuciferine	(IV 42)	31
<i>Cassytha filiformis</i> L.	cassyfiline (cassythine)	(IV 8)	35, 37
	cassythidine	(IV 10)	35
	laurotetanine	(IV 27)	36
	nantenine	(IV 38)	33
	ocoteine (O,N-di-		
	methylcassyfiline)	(IV 46)	35, 37
<i>Cassytha glabella</i> R.Br.	cassythicine	(IV 9)	39
<i>Cassytha melantha</i> R.Br.	actinodaphnine	(IV 1)	39
	cassythicine	(IV 9)	39
<i>Cassytha pubescens</i> R.Br.	domesticine	(IV 16)	34
	isoboldine	(IV 22)	34
	laurelliptine	(IV 25)	34
	nantenine	(IV 38)	34
	nordomesticine	(IV 40)	34
	sinoacutine	(IX 4)	34
<i>Cassytha racemosa</i>	(+)-cocclaurine	(IIa ₂)	41
	1,2-dimethoxy-9,10-		
	methylenedioxy-7-		
	oxodibenzo (de,g)-		
	quinoline	(V 4)	41
	isoboldine	(IV 22)	41
	laurelliptine	(IV 26)	41

Table 2 (continued)

<i>Cassytha racemosa</i> contd.	laurotetanine	(IV ₂₇)	41
	N-methylaurotetanine	(IV ₃₆)	41
	nantenine	(IV ₃₈)	41
	nornantenine	(IV ₄₁)	41
<i>Cinnamomum camphora</i> (Linn.) Seib.	laurolitsine	(IV ₂₆)	88
	reticuline	(IIa ₇)	88
<i>Cinnamomum laubatii</i> F. Muell.	(+)-reticuline	(IIa ₇)	42
<i>Cinnamomum</i> sp.	cinnamolaurine	(IIa ₁)	44
	(-)-cinnamolaurine	(IIa ₁)	45
	(+)-corydine	(IV ₁₁)	45
	norcinnamolaurine	(IIa ₆)	45
	(+)-reticuline	(IIa ₇)	45
<i>Cryptocarya alba</i>	(+)-reticuline	(IIa ₇)	46
<i>Cryptocarya angulata</i> C.T. White	3,4-dimethoxy-1-		
	(dimethylaminoethyl)-	(VI)	47,134
	phenanthrene		
	(atherosperminine)		
	N-methylisocorydine	(IV ₃₅)	47
<i>Cryptocarya bowiei</i> Druce	roemerine	(IV ₄₈)	47
	cryptaustoline	(VIII ₁)	49
	cryptowoline	(VIII ₂)	49
<i>Cryptocarya chinensis</i> Hemsl.	(±), (-)-caryachine	(VII ₁)	50
	crychine	(VII ₂)	50,51
	(+)-O-methylcaryachine	(VII ₃)	51
<i>Cryptocarya konishii</i> Hayata	(±)-cocclaurine	(IIa ₂)	51
	(±)-N-norarmepavine	(IIa ₅)	51
	(-)-N-norarmepavine	(IIa ₅)	51
	crykonisine	(IIb ₁)	80
<i>Cryptocarya odorata</i>	cryptodorine	(IV ₁₂)	52
	isocorydine	(IV ₂₃)	52
	laurotetanine	(IV ₂₇)	52
	N-methylaurotetanine	(IV ₃₆)	52
<i>Cryptocarya pleurosperma</i> White and Francis	cryptopleuridine	(XIV ₁)	53
	cryptopleurine	(XIV ₂)	54

Table 2 (continued)

<i>Cryptocarya pleurosperma</i> contd. White and Francis	cryptopleurospermine	(X)	53
	pleurospermine	(XIII)	55
<i>Cryptocarya</i> sp.	crykonisine	(IIb ₁)	80
<i>Cryptocarya tomentosa</i> Blume	laurotetanine	(IV ₂₇)	135
<i>Cryptocarya triplinervis</i> R.Br.	N-methylisocorydine (menisperine)	(IV ₃₅)	47
<i>Laurus nobilis</i> L.	actinodaphnine	(IV ₁)	57
	launobine	(IV ₂₄)	57
<i>Lindera benzoin</i>	laurotetanine.	(IV ₂₇)	58
<i>Lindera oldhamii</i>	(+)-dicentrine	(IV ₁₃)	59
	dicentrinone	(V ₃)	59
	O-methylbulbocarpine	(IV ₃₁)	59
	N-methylhernangerine (N-methylnandigerine)	(IV ₃₃)	59
	N-methylhernovine (N-methyllovigerine)	(IV ₃₄)	59
<i>Lindera pipericarpa</i> Boerl	laurotetanine	(IV ₂₇)	68
	lindcarpine	(IV ₂₈)	60
<i>Lindera strychnifolia</i> (Sieb. et. Zucc.) F. Vill.	laurolitsine	(IV ₂₆)	61
<i>Lindera umbellata</i>	launobine	(IV ₂₄)	61
<i>Litsea amara</i> Blume	laurotetanine	(IV ₂₇)	62
<i>Litsea chrysocoma</i> Blume	laurotetanine	(IV ₂₇)	56
<i>Litsea</i> (Tetranthera) <i>citrata</i> Blume	laurotetanine	(IV ₂₇)	65
	N-methyl-laurotetanine	(IV ₃₆)	64
<i>Litsea cubeba</i> Pers.	isocorydine	(IV ₂₃)	66
	laurotetanine	(IV ₂₇)	62, 66
	(+)-magnocurarine	(IIa ₄)	67
	N-methyl-laurotetanine	(IV ₃₆)	66, 67
<i>Litsea deccanensis</i> Gamble	actinodaphnine	(IV ₁)	69
<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	isoboldine	(IV ₂₂)	70
	laurelliptine	(IV ₂₅)	70

Table 2 (continued)

<i>Litsea glutinosa</i> contd. (Lour.) C.B. Rob.	laurolitsine	(IV ₂₆)	70
	laurotetanine	(IV ₂₇)	70
	liriodenine	(V ₅)	70
<i>Litsea glutinosa</i> var. <i>glabraria</i> Hook	actinodaphnine	(IV ₁)	72
	boldine	(IV ₅)	72
	laurolitsine (norbaldine)	(IV ₂₆)	72
	laurotetanine	(IV ₂₇)	72
	N-methylactinodaphnine	(IV ₃₀)	72
	N-methyl-laurotetanine	(IV ₃₆)	72
<i>Litsea hayatae</i>	laurolitsine	(IV ₂₆)	9
	liriodenine (oxoushinsunine)	(V ₅)	9
	ushinsunine	(IV ₄₉)	9
<i>Litsea intermedia</i> Boerl	laurotetanine	(IV ₂₇)	62
<i>Litsea japonica</i> Mirb.	laurolitsine	(IV ₂₆)	74
<i>Litsea javanica</i> Blume	laurotetanine	(IV ₂₇)	62
<i>Litsea lanoifolia</i> Villar	laurotetanine	(IV ₂₇)	62
<i>Litsea latifolia</i> Blume	laurotetanine	(IV ₂₇)	65
<i>Litsea leefeana</i>	boldine	(IV ₅)	75
	laurolitsine	(IV ₂₆)	75
	(+)-reticuline	(IIa ₇)	75
<i>Litsea lucida</i> Blume	laurotetanine	(IV ₂₇)	62
<i>Litsea nitida</i> Roxb.	actinodaphnine	(IV ₁)	76
	dicentrine	(IV ₁₃)	76
	litsedine	(IV ₂₉)	76
<i>Litsea sebifera</i> Pers.	actinodaphnine	(IV ₁)	13
	boldine	(IV ₅)	13
	laurotetanine	(IV ₂₇)	13
	N-methyl-laurotetanine	(IV ₃₆)	13
<i>Litsea solomensis</i> Allen	laurolitsine	(IV ₂₆)	70
	reticuline	(IIa ₇)	70

Table 2 (continued)

<i>Litsea</i> sp. (<i>Tetranthera intermedia</i> Blume)	laurotetanine	(IV ₂₇)	70
<i>Litsea</i> sp.	actinodaphnine	(IV ₁)	69
	(+)-cocclaurine	(IIa ₂)	69,70
	(+)-isocorydine	(IV ₂₃)	66
	laurolitsine	(IV ₂₆)	70,74
	laurotetanine	(IV ₂₇)	70,77
	(-)-magnocurarine	(IIa ₄)	67
	reticuline	(IIa ₇)	70
<i>Litsea turfosa</i>	boldine	(IV ₅)	78
	laurolitsine (norboldine)	(IV ₂₆)	78
<i>Litsea wightiana</i> Hook f.	boldine	(IV ₅)	13
	laurolitsine (norboldine)	(IV ₂₆)	13
<i>Litsea zeylanica</i>	(+)-isoboldine	(IV ₂₂)	79
	(+)-N-norisoboldine	(IV ₂₅)	79
	(+)-reticuline	(IIa ₇)	79
<i>Machilus acuminatissima</i> (Hay.) Kanehira	(±)-cocclaurine (machiline)	(IIa ₂)	80
	crykonisine	(IIb ₁)	80
	(±)-N-norarmepavine	(IIa ₅)	80
	(-)-N-norarmepavine	(IIa ₅)	80
<i>Machilus arisanensis</i> Hayata.	(+)-laudanidine	(IIa ₃)	81
	(±)-(-)-N-norarmepavine	(IIa ₅)	81
	(-)-N-norarmepavine	(IIa ₅)	81
<i>Machilus kusanoi</i> Hayata	cocclaurine	(IIa ₂)	82
	(-)-N-norarmepavine	(IIa ₅)	82
<i>Machilus macrantha</i> Blume	(±)-cocclaurine (machiline)	(IIa ₂)	84
<i>Machilus macrantha</i> Nees.	(±)-cocclaurine	(IIa ₂)	86
<i>Machilus obovatifolia</i> (Hayata) Kanehira and Sasaki	(+)-laudanidine	(IIa ₃)	81
	(±)-N-norarmepavine	(IIa ₅)	81
	(-)-N-norarmepavine	(IIa ₅)	81
<i>Machilus pseudolongifolia</i> Hayata	(±)-N-norarmepavine	(IIa ₅)	85
	(-)-N-norarmepavine	(IIa ₅)	85

Table 2 (continued)

<i>Machilus thunbergii</i> Sieb. and Zucc.	(±)-N-norarmepavine	(IIa ₅)	81,87
	(-)-N-norarmepavine	(IIa ₅)	87
	reticuline	(IIa ₇)	87
<i>Machilus zuihoensis</i> Hayata	(±)-N-norarmepavine	(IIa ₅)	81
	(-)-N-norarmepavine	(IIa ₅)	81
<i>Nectandra pichurim</i> (H.B.K.) Mez. (<i>Ocotea pichurim</i> H.B.K.)	isoboldine	(IV ₂₂)	90
<i>Nectandra rodioei</i> Hook	ocotine	(XI ₂)	93
	rodiasine	(XI ₃)	93
	sepeerine	(XI ₄)	93
<i>Nectandra saligna</i> (Nees et Mart.) Nees	dehydroocoteine	(IV ₅₄)	94
	ocoteine	(IV ₄₆)	94
<i>Neolitsea acuminatissima</i> Kanehira and Sasaki	(+)-laurotetanine	(IV ₂₇)	98
<i>Neolitsea pubescens</i>	boldine	(IV ₅)	105
	laurokitsine	(IV ₂₆)	105
	N-methyl-laurotetanine	(IV ₃₆)	105
	roemerine	(IV ₄₈)	105
<i>Neolitsea pulchella</i>	neolitsine	(IV ₃₉)	103
<i>Neolitsea sericea</i> (Blume) Koidzumi	actinodaphnine	(IV ₁)	98
	anonaine	(IV ₂)	98
	boldine	(IV ₅)	98
	laurokitsine	(IV ₂₆)	101
	laurotetanine	(IV ₂₇)	98,101
	liriodenine (oxoushinsunine)	(V ₅)	98
	litsericine	(IIIb ₁)	98,101
	N-methylactinodaphnine	(IV ₃₀)	98,101
	N-methyl-laurotetanine	(IV ₃₆)	98,101
	nuciferine	(IV ₄₂)	98,101
	roemerine	(IV ₄₈)	98,101
	(-)-roemerine	(IV ₄₈)	100
	(-)-hernovine	(IV ₁₈)	104
	(-)-N-methylhernovine	(IV ₃₄)	104
	(-)-nandigerine	(IV ₃₇)	104

Table 2 (continued)

<i>Notaphoebe konishii</i> Hayata	(±)-N-norarmepavine	(IIa ₅)	106
	(-)-N-norarmepavine	(IIa ₅)	106
	(-)-laudanidine	(IIa ₃)	106
<i>Notaphoebe</i> sp.	actinodaphnine	(IV ₁)	107
<i>Notaphoebe umbelliflora</i> Blume	laurotetanine	(IV ₂₇)	108
<i>Ocotea brachybotra</i> (Meiss.) Mez.	14-episinomenine	(IX ₁)	141
	ocobitrine	(IX ₂)	141
	pallidine	(IX ₂)	141
	sinoacutine	(IX ₄)	141
<i>Ocotea glaziovii</i>	glaziovine	(IIIa ₂)	112
<i>Ocotea glaziovii</i> Mez.	(±)-apoglaziovine	(IV ₃)	110
	asimilobine	(IV ₄)	110
	caaverine	(IV ₇)	110
	(±)-crotsparine	(IIIa ₁)	110
	1,10-dihydroxy-2-methoxyaporphine	(IV ₁₅)	109
	(±)-glaziovine	(IIIa ₂)	109
	(±)-1-hydroxy-2-methoxyaporphine	(IV ₁₉)	110
	isoboldine	(IV ₂₂)	110
	(-)-pronuciferine	(IIIa ₃)	110
<i>Ocotea glaziovii</i> (?)	glaziovine	(IIIa ₂)	113
<i>Ocotea leucocorydon</i>	dicentrine	(IV ₁₃)	18
<i>Ocotea macrophylla</i>	dehydroantenine	(IV ₅₂)	123
	(+)-glaucine	(IV ₁₇)	123
	(+)-isocorydine	(IV ₂₃)	123
	1-(p-methoxybenzyl)-6,7-dimethoxyisoquinoline	(IIb ₂)	123
	1-(p-methoxybenzyl)-6,7-methylenedioxyisoquinoline	(IIb ₃)	123
	(+)-nantenine	(IV ₃₈)	123
<i>Ocotea macropoda</i>	dehydrodicentrine	(IV ₅₁)	114, 116
	dehydroocopodine	(IV ₅₃)	114
	dicentrine	(IV ₁₃)	114, 116
	dicentrinone	(V ₃)	114

Table 2 (continued)

<i>Ocotea macropoda</i> contd.	ocopodine	(IV ₄₅)	114,116
	predicentrine	(IV ₄₇)	114,115
<i>Ocotea puberula</i> (Nees et Mart.) Nees	dehydroocoteine	(IV ₅₄)	117
	didehydroocoteine	(IV ₅₅)	117
	ocoteine	(IV ₄₆)	118,125
	thalicminine	(V ₆)	118
<i>Ocotea rodiaei</i> (Nectandra rodioei)	demerarine	(XI ₅)	121
	norrodiasine	(XI ₁)	121
	2-(+)-nortetrandrine	(XI ₇)	126
	ocoteamine (sepeerine)	(XI ₄)	121,122
	ocotine	(XI ₂)	122,126
	ocotosine	(XI ₆)	126
	rodiasine	(XI ₃)	120,121, 126
<i>Ocotea</i> sp.	isocorydine	(IV ₂₃)	116
	1-(p-methoxybenzyl)- 6,7-dimethoxyisoquinoline	(IIb ₂)	123
	1-(p-methoxybenzyl)-6,7- methylenedioxyisoquinoline	(IIb ₃)	123
	ocokryptine	(IV ₄₃)	116
	oconovine	(IV ₄₄)	116
<i>Ocotea variabilis</i>	(+)-apoglaziovine	(IV ₃)	128
	(+)-glaziovine	(IIIa ₂)	128
	(+)-nantenine	(IV ₃₈)	128
	variabiline	(IV ₅₀)	128
<i>Ocotea venenosa</i>	rodiasine	(XI ₃)	129
<i>Persea gratissima</i> Gaertn. f.	dopamine	(I ₁)	130
	(hydroxytyramine)		
	serotonine	(XV)	130
<i>Persea</i> sp.	(5-hydroxytryptamine)		
	dopamine	(I ₁)	130
	serotonine	(XV)	130
	tyramine	(I ₂)	130
<i>Phoebe clemensii</i> C.K. Allen			
	2,11-dihydroxy-1,10- dimethoxyaporphine	(IV ₁₄)	37

Table 2 (continued)

<i>Phobe clemensii</i> C.K. Allen contd.	10-hydroxy-1,2-(methylene- dioxy)-aporphine	(IV ₂₀)	37
	isocorydine	(IV ₂₃)	37
	laurolitsine	(IV ₂₆)	37
<i>Phobe formosana</i> Hay.	laurolitsine	(IV ₂₆)	132
	liriodenine (oxoushinsunine)	(V ₅)	132
	roemerine	(IV ₄₈)	132
	ushinsunine	(IV ₄₉)	132
<i>Phobe porfiria</i>	ocoteine	(IV ₄₆)	94
<i>Ravensara aromatica</i>	N-methylisocorydine (menisperine)	(IV ₃₅)	133

6. Table 3

Number of occurrences of each alkaloid group by genus

Genus (no. of species examined)	I Phenethylamine	II Benzyloisquinoline	III Proaporphine	IV Aporphine	V Oxaporphine	VI Phenanthrene	VII Pavine	VIII Dibenzopyrrocoline	IX Sinomenine	X Cryptopleurospermine	XI Bisbenzyloisquinoline	XII Pyridine	XIII Sedamine	XIV Phenanthroquinolinizidine	XV Indole
<i>Actinodaphne</i> (5)				8											
<i>Alseodaphne</i> (1)		3													
<i>Aniba</i> (4)												4			
<i>Beilschmiedia</i> (3)				9											
<i>Cassytha</i> (6)		1		30	3				1						
<i>Cinnamomum</i> (3)		6		2											
<i>Cryptocarya</i> (10)		6		8		1	3	2		1			1	2	
<i>Laurus</i> (1)				2											
<i>Lindera</i> (5)				9	1										
<i>Litsea</i> (23)		7		47	2										
<i>Machilus</i> (9)		21													
<i>Nectandra</i> (3)				3							3				
<i>Neolitsea</i> (5)			1	19	1										
<i>Notaphoebe</i> (3)		3		2											
<i>Ocotea</i> (12)		4	6	25	2				4		8				
<i>Persea</i> (2)														2	
<i>Phoebe</i> (3)				8	1										
<i>Ravensara</i> (1)				1											

7. Uncharacterised and Partly Characterised Alkaloids

In addition to the alkaloids shown in Figs. I-XV, the following incompletely characterised bases have been described:

- Actinodaphne montana* Gamble¹¹. Uncharacterised bases.
- Actinodaphne sesquipedalis* Hook f. and Thoms¹⁵. Uncharacterised bases.
- Actinodaphne* sp.¹⁷. Uncharacterised bases.
- Andrographis paniculata* Nees¹⁵. Uncharacterised bases.
- Beilschmiedia bancroftii* J.F. Bailey and C.T. White^{25,26}. Uncharacterised bases.
- Beilschmiedia obtusifolia* (?) Benth²⁵. Uncharacterised bases.
- Cassytha filiformis* L³⁸. Uncharacterised bases.
- Cassytha pomiformis* Nees⁴⁰. 0.04% of crude alkaloids.
- Cassytha* spp.²⁵. Uncharacterised bases.
- Cinnamomum laubatii* F. Muell.²⁵. Uncharacterised bases.
- Cinnamomum mercadoi* Vidal.⁴³. Uncharacterised bases.
- Cinnamomum oliveri* F.M. Bailey^{25,26}. Uncharacterised bases.
- Cryptocarya angulata* C.T. White²⁶. Uncharacterised bases.
- Cryptocarya australis* Benth²⁵. Uncharacterised bases.
- Cryptocarpine*⁴⁸, needles, insoluble in water, soluble in alcohol, chloroform, ether, dilute acids.
- Cryptocarya chinensis* Hemsl.⁵⁰. Base A, m.p. 210-211°; base C, picrate, yellow-orange needles, m.p. 164-168°.
- Cryptocarya cinnamomifolia* Benth.^{25,26}. Uncharacterised bases.
- Cryptocarya erythroxylon* Maiden and Betcher^{25,26}. Uncharacterised bases.
- Cryptocarya foveolata* C.T. White²⁶. Uncharacterised bases.
- Cryptocarya glaucescens* R.Br.²⁵. Uncharacterised bases.

Uncharacterised and Partly Characterised Alkaloids continued.

Cryptocarya hypospodia F. Muell. (*C. obovata* var. *tropica*)²⁶.

Uncharacterised bases.

Cryptocarya konishii Hayata⁵¹. Base IV, small greyish-brown crystals (MeOH), m.p. 234-235°.

Cryptocarya mackinnoniana F. Muell²⁶. Uncharacterised bases.

Cryptocarya meissneri F. Muell.²⁶. Uncharacterised bases.

Cryptocarya obovata R. Br.²⁶. Uncharacterised bases.

Cryptocarya pleurosperma C.T. White²⁵. Uncharacterised bases.

Cryptocarya sp. nov. aff. *hypospodia*²⁶. Uncharacterised bases.

Cryptocarya sp.¹⁷. Uncharacterised bases.

Dehaasia firma Java⁶⁵. Uncharacterised bases.

Dehaasia incrassata (Jack) Kosterm¹¹. Uncharacterised bases.

Dehaasia squarrosa Java⁵⁶. Uncharacterised bases.

Endiandra glauca R.Br.²⁵. Uncharacterised bases.

Endiandra palmerstonii C.T. White²⁵. Uncharacterised bases.

Endiandra pubens Meissn.²⁶. Uncharacterised bases.

Endiandra sieberi Nees.²⁵. Uncharacterised bases.

Endiandra tooram (?) F.M. Bailey²⁶. Uncharacterised bases.

Lindera pipericarpa Boerl¹⁵. Uncharacterised bases.

Lindera spathacea Gamble *tomentosa*¹⁵. Uncharacterised bases.

Litsea cubeba Pers.¹⁵. Uncharacterised bases.

Litsea dealbata Nees²⁵. Uncharacterised bases.

Litsea glutinosa (Lour.) C.B. Rob (*L. chinensis* Lam.)²⁶.

Uncharacterised bases.

Litsea leefeana (*L. ferruginea* Blume)²⁶. Uncharacterised bases.

Litsea reticulata (Benth and Hook f.)²⁵. Uncharacterised bases.

Litsea spathacea Gamble^{11,15}. Uncharacterised bases.

Uncharacterised and Partly Characterised Alkaloids continued.

Machilus acuminatissima (Hay.) Kanehira⁸⁰. Unknown base, m.p. 254-255°.

*Machilus macrantha*⁸³. Macranthine, crystalline hydrochloride
m.p. 242-243°, $C_{13}H_{17}O_3N.HCl$, with a phenolic OH and an OCH_3 group.

Machilus obovatifolia (Hayata) Kanehira and Sasaki⁸¹. Unknown base.
m.p. 258-259°.

Machilus pseudolongifolia Hayata⁸⁵. Non-phenolic base, oxalate,
m.p. 188-189°.

Machilus zuihoensis Hayata⁸¹. Unknown base, m.p. 258-259°.

Nectandra coto Rusby⁹⁷. Parostemine (non-phenolic); parostemine
(phenolic).

Neolitsea sericea (Blume) Koidzumi¹⁰¹. Base III, phenolic,
m.p. 133°, $C_{19}H_{19}O_4N$ $[\alpha]_D^{23} + 42.9^\circ$, with NCH_3 , OCH_3 , O_2CH_2 and
phenolic OH groups; picrate m.p. 218-220°. Base V, hydrochloride,
 $C_{19}H_{17}O_4N.HCl$, m.p. 266°. Water-soluble bases:

Base VII - styphnate, $C_6H_{14}(16)ON.C_6H_2O_8N_3$, m.p. 165°.

Base VIII - styphnate, $C_9H_{18}ON.C_6H_2O_8N_3$, m.p. 182-183°.

Base IX - styphnate (choline styphnate), $C_5H_{14}ON.C_6H_2O_8N_3$,
m.p. 203°.

*Neolitsea pulchella*¹⁰³. Neolitsinine ($C_{18}H_{23}O_3N$), one OMe and
one NMe group, two active Hs., one phenolic and one non-phenolic OH,
m.p. 214-215°, $[\alpha]_D + 94.7^\circ$. Pulchelline ($C_{18}H_{23}O_3N$), one phenolic
and one non-phenolic OH, m.p. 189°, $[\alpha]_D + 80.1^\circ$.

Neolitsea zeylanica (*Litsea zeylanica* C and T. Nees) Merrill²⁶.

Uncharacterised bases.

Notaphoebe konishii Hayata¹⁰⁶. Unknown base, D, m.p. 180-181°.

Unknown base E, m.p. 254-255°.

Notaphoebe pandiriformis Gamble¹¹. Uncharacterised bases.

Uncharacterised and Partly Characterised Alkaloids continued.

*Ocotea leucoxydon*¹⁸. Leucoxine, $C_{20}H_{21}O_5N$, m.p. 213-217°, $[\alpha]_D^{23} + 81^\circ$,

two OMe and an O_2CH_2 group. Leucoxytonine, $C_{22}H_{25}O_6N$, m.p. 54-58°, $[\alpha]_D^{24} + 52^\circ$, four OMe and an O_2CH_2 group.

*Ocotea rodiaei*⁹⁵. Dirosine has a bisbenzylisoquinoline structure with one diphenyl ether linkage. Otocamine and ocodemerine have bisbenzylisoquinoline structures with two diphenyl ether linkages.

*Ocotea rodioei*¹²². Unknown base, insoluble methiodide, $C_{36}H_{38}N_2O_6 \cdot 2CH_3I$, colourless cubes from MeOH, decomp. above 280°.

Ocotea sp.¹²⁴. Uncharacterised bases.

*Ocotea venenosa*¹²⁹. Demethylrodiasine is a bisbenzylisoquinoline alkaloid related to d-tubocurarine.

Phoebe macrophylla Blume¹¹. Uncharacterised bases.

Phoebe opaca Blume¹⁵. Uncharacterised bases.

Phoebe sp.⁵⁶. Uncharacterised bases.

Sassafras albidum Nees³⁸. Uncharacterised bases.

Stemmatodaphne perakensis Gamble^{11,15}. Uncharacterised bases.

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