CHAPTER II

HISTORICAL

Chemical constituents of *Dendrobium* spp.

According to previous studies, the chemical constituents found in plants of the genus *Dendrobium* could be grouped into six major classes, including bibenzyls, phenanthrenes, dihydrophenanthrenes, flavonoids, alkaloids, and miscellaneous compounds (**Table** 1).

Table 1 Distribution of chemical constituents in the genus *Dendrobium*

Catergory and Compound	Plant	Plant part	Reference*
Aliphatic acid			
Aliphalic acids [1]	*D. clavatum* var. *aurantiacum*	Stem	(Chang, Lin, and Chen, 2001)
Malic acid [2]	*D. huoshanense*	Aerial part	(Chang *et al.*, 2010)
Shikimic acid [3]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
(-)-Shikimic acid [3]	*D. fuscescens*	Whole plant	(Talapatra, Das, and Talapatra, 1989)
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
(3*S*,4*S*,5*R*)-3,4,5-trihydroxy-1-cyclohexene carboxylic acid (Shikimic acid) [3]	*D. longicornu*	Stem	(Hu *et al.*, 2008a)
Aliphatic alcohols [4]	*D. clavatum* var. *aurantiacum*	Stem	Chang *et al.*, 2001
Aliphatic ester			
Dimethyl malate [5]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010

Catergory and Compound	Plant	Plant part	Reference*
Isopentyl butyrate [6]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
Anthracene			
3,6,9-Trihydroxy-3,4-dihydroanthracen-1-(2*H*)-one [7]	*D. chrysotoxum*	Stem	(Hu *et al.*, 2012)
	D. polyanthum	Stem	(Hu *et al.*, 2009)
Anthraquinone			
Chrysophanol [8]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
Emodin [9]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
Physcion [10]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
Aromatic compound			
N-phenylacetamide [11]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
Benzoic acid derivative			
Gallic acid [12]	*D. longicornu*	Whole plant	(Li *et al.*, 2009d)
3-Hydroxy-2-methoxy-5,6-dimethylbenzoic acid [13]	*D. crystallinum*	Stem	(Wang *et al.*, 2009)
Salicylic acid [14]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
Syringic acid [15]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Vanillic acid [16]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Vanilloside [17]	*D. denneanum*	Stem	(Pan *et al.*, 2012)
	D. moniliforme	Stem	(Zhao *et al.*, 2003)

Catergory and Compound	Plant	Plant part	Reference*
Benzoic acid ester			
Bis (2-ethylhexyl) phthalate [**18**]	*D. longicornu*	Whole plant	Li *et al*, 2009d
Dibutyl phthalate [**19**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. longicornu	Whole plant	Li *et al*, 2009d
Diisobutyl phthalate [**20**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
Benzoquinone			
2,6-Dimethoxy benzoquinone [**21**]	*D. chryseum*	Stem	(Ma *et al.*, 1998)
Bibenzyl			
Aloifol I [**22**]	*D. longicornu*	Stem	Hu *et al.*, 2008a
Amoenylin [**23**]	*D. amoenum*	Whole plant	(Majumder, Guha, and Pal, 1999)
Betatasin [**24**]	*D. longicornu*	Stem	Hu *et al.*, 2008a
	D. plicatile	Stem	(Yamaki and Honda, 1996)
	D. polyanthum	Stem	Hu *et al.*, 2009
Batatasin III [**25**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. cariniferum	Stem	(Chen *et al.*, 2008c)
	D. chrysotoxum	Whole plant	(Li *et al.*, 2009c)

Catergory and Compound	Plant	Plant part	Reference*
	D. draconis	Stem	(Sritularak, Anuwat, and Likhitwitayawuid, 2011a)
	D. gratiosissimum	Stem	(Zhang *et al.*, 2008a)
	D. loddigesii	Whole plant	(Ito *et al.*, 2010)
	D. rotundotum	Whole plant	(Majumder and Pal, 1992)
Brittonin A [**26**]	*D. secundum*	Stem	Sritularak *et al.*, 2011b
Chrysotobibenzyl [**27**]	*D. aurontiacum var.denneanum*	Stem	(Yang, Wang, and Xu, 2006a)
	D. capillipes	Stem	Phechrmeekha *et al.*, 2012
	D. chrysanthum	Stem	(Yang *et al.*, 2006b)
	D. chryseum	Stem	Ma *et al.*, 1998
	D. chrysotoxum	Stem	Hu *et al.*, 2012
	D. nobile	Stem	(Zhang *et al.*, 2007a)
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
Chrysotoxine [**28**]	*D. aurantiacum var.denneanum*	Stem	Yang *et al.*, 2006a
	D. capillipes	Stem	Phechrmeekha *et al.*, 2012

Catergory and Compound	Plant	Plant part	Reference*
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. chryseum	Stem	Ma *et al.*, 1998
	D. nobile	Stem	Zhang *et al.*, 2007a
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
Crepidatin [**29**]	*D. aurantiacum var.denneanum*	Whole plant	(Liu *et al.*, 2009a)
	D. capillipes	Stem	Phechrmeekha *et al.*, 2012
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. crepidatum	Whole plant	(Majumder and Chatterjee, 1989)
	D. nobile	Stem	Zhang *et al.*, 2007a
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
Cumulatin [**30**]	*D. cumulatum*	Whole plant	(Majumder and Pal, 1993)
Dendrocandin A [**31**]	*D. candidum*	Stem	(Li *et al.*, 2008)
Dendrocandin B [**32**]	*D. candidum*	Stem	Li *et al.*, 2008
Dendrocandin C [**33**]	*D. candidum*	Stem	(Li *et al.*, 2009a)
Dendrocandin D [**34**]	*D. candidum*	Stem	Li *et al.*, 2009a
Dendrocandin E [**35**]	*D. candidum*	Stem	Li *et al.*, 2009a

Catergory and Compound	Plant	Plant part	Reference*
Dendrocandin F [**36**]	*D. candidum*	Stem	(Li *et al.*, 2009b)
Dendrocandin G [**37**]	*D. candidum*	Stem	Li *et al.*, 2009b
Dendrocandin H [**38**]	*D. candidum*	Stem	Li *et al.*, 2009b
Dendrocandin I [**39**]	*D. candidum*	Stem	Li *et al.*, 2009b
Dendrobin A [**40**]	*D. nobile*	Stem	(Wang, Zhao, and Che, 1985; Ye and Zhao, 2002a)
Dendrophenol [**41**]	*D. candidum*	Stem	Li *et al.*, 2008
Densiflorol A [**42**]	*D. densiflarum*	Stem	(Fan *et al.*, 2001)
3,4-Dihydroxy-5,4′-dimethoxybibenzyl [**43**]	*D. candidum*	Stem	Li *et al.*, 2008
	D. gratiosissimum	Stem	Zhang *et al.*, 2008a
	D. maniliforme	Stem	(Bi, Wang, and Xu, 2004)
3,4′-Dihydroxy-5-methoxybibenzyl [**44**]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
	D. gratiosissimum	Stem	Zhang *et al.*, 2008a
4,4′-Dihydroxy-3,5-dimethoxybibenzyl [**45**]	*D. candidum*	Stem	Li *et al.*, 2008
3,4′-Dihydroxy-5,5′-dimethoxydihydro stilbene [**46**]	*D. nobile*	Stem	Hwang *et al.*, 2010

Catergory and Compound	Plant	Plant part	Reference*
4,5-Dihydroxy-3,3′-dimethoxybibenzyl (Dendrobin A) [**47**]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a
Erianin [**48**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Gigantol [**49**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. aurantiocum vor.denneanum	Whole plant	Liu *et al.*, 2009a
	D. candidum	Stem	Li *et al.*, 2008
	D. capillipes	Stem	Phechrmeekha *et al.*, 2012
	D. coriniferum	Stem	Chen *et al.*, 2008c
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. chrysotoxum	Whole plant	Li *et al.*, 2009c
	D. densiflorum	Stem	Fan *et al.*, 2001
	D. draconis	Stem	Sritularak *et al.*, 2011a
	D. gratiosissimum	Stem	Zhang *et al.*, 2008a
	D. loddigesii	Whole plant	Ito *et al.*, 2010
	D. longicornu	Stem	Hu *et al.*, 2008a
	D. nobile	Stem	Zhang *et al.*, 2007a
	D. polyonthum	Stem	Hu *et al.*, 2009
	D. trigonopus	Stem	(Hu *et al.*, 2008b)

Catergory and Compound	Plant	Plant part	Reference*
4-Hydroxy-3,5,3′-trimethoxybibenzyl [50]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a
4-[2-(3-Hydroxyphenol)-1-methoxy ethyl]-2,6-dimethoxy phenol [51]	*D. longicornu*	Stem	Hu *et al.*, 2008a
5- Hydroxy-3,4,3′,4′,5′-pentamethoxybibenzyl [52]	*D. secundum*	Stem	Phechrmeekha *et al.*, 2012
Isoamoenylin [53]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
Loddigesiinol C [54]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Loddigesiinol D [55]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Longicornuol A [56]	*D. longicornu*	Stem	Hu *et al.*, 2008a
3-*O*-Methylgigantol [57]	*D. candidum*	Stem	Li *et al.*, 2008
	D. plicatile	Stem	Yamaki and Honda, 1996
Moscatilin [58]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
	D. aurantiacum var. denneanum	Stem	Yang *et al.*, 2006a
	D. capillipes	Stem	Phechrmeekha *et al.*, 2012
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. densiflorum	Stem	Fan *et al.*, 2001

Catergory and Compound	Plant	Plant part	Reference*
	D. gratiosissimum	Stem	Zhang *et al.*, 2008a
	D. loddigesii	Whole plant	Chen *et al.*, 1994 ; Ito *et al.*, 2010
	D. longicornu	Stem	Hu *et al.*, 2008a
	D. moscatum	Whole plant	(Majumder and Sen, 1987)
	D. nobile	Stem	(Yang, Sung, and Kim, 2007)
	D. polyanthum	Stem	Hu *et al.*, 2009
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
	D. secundum	Stem	Sritularak *et al.*, 2011b
Nobilin A [**59**]	*D. nobile*	Stem	(Zhang *et al.*, 2006)
Nobilin B [**60**]	*D. nobile*	Stem	Zhang *et al.*, 2006
Nobilin C [**61**]	*D. nobile*	Stem	Zhang *et al.*, 2006
Nobilin D [**62**]	*D. nobile*	Stem	Zhang *et al.*, 2007a
Trigonopol A [**63**]	*D. trigonopus*	Stem	Hu *et al.*, 2008b
Trigonopol B [**64**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
	D. trigonopus	Stem	Hu *et al.*, 2008b
3,3′,4-Trihydroxy bibenzyl [**65**]	*D. longicornu*	Stem	Hu *et al.*, 2008a

Catergory and Compound	Plant	Plant part	Reference*
3,3′,5-Trihydroxy bibenzyl [**66**]	*D. cariniferum*	Whole plant	(Liu *et al.*, 2009b)
3,5,4′-Trihydroxy bibenzyl [**67**]	*D. gratiosissimum*	Stem	Zhang *et al.*, 2008a
4,5,4′-Trihydroxy-3,3′-dimethoxy bibenzyl [**68**]	*D. secundum*	Stem	Sritularak *et al.*, 2011b
Tristin [**69**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
	D. densiflorum	Stem	Fan *et al.*, 2001
	D. gratiosissimum	Stem	Zhang *et al.*, 2008a
	D. longicornu	Stem	Hu *et al.*, 2008a
	D. trigonopus	Stem	Hu *et al.*, 2008b
Bibenzyl glycoside			
Dendromoniliside E [**70**]	*D. moniliforme*	Stem	Zhao *et al.*, 2003
Bisbibenzyl			
Dencryol A [**71**]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Dencryol B [**72**]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Dendrofalconerol A [**73**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
Dendrofalconerol B [**74**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
Dengraol A [**75**]	*D. gratiosissimum*	Stem	Zhang *et al.*, 2008a

Catergory and Compound	Plant	Plant part	Reference*
Dengraol B [**76**]	*D. gratiosissimum*	Stem	Zhang *et al.*, 2008a
Nobilin E [**77**]	*D. nobile*	Stem	Zhang *et al.*, 2007a
Biphenanthrene			
2,2′-Dihydroxy-3,3′,4,4′,7,7′-hexamethoxy-9,9′,10,10′-tetrahydro-1,1′-biphenanthrene [**78**]	*D. nobile*	Stem	Yang *et al.*, 2007
2,2′-Dimethoxy-4,4′,7,7′-tetrahydroxy-9,9′,10,10′-tetrahydro-1,1′-biphenanthrene [**79**]	*D. plicatile*	Stem	Yamaki and Honda, 1996
Denthyrsinol [**80**]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
Denthyrsinone [**81**]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
Flavanthrin [**82**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
Coumarin			
Ayapin [**83**]	*D. densiflorum*	Stem	Fan *et al.*, 2001
Coumarin [**84**]	*D. aurantiacum var.denneanum*	Stem	Yang *et al.*, 2006a
	D. clavatum var. aurantiacum	Stem	Chang *et al.*, 2001
Denthyrsin [**85**]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005

Catergory and Compound	Plant	Plant part	Reference*
Scoparone [86]	*D. densiflorum*	Stem	Fan *et al.*, 2001
	D. thyrsiforum	Stem	Zhang *et al.*, 2005
Scopoletin [87]	*D. densiflorum*	Stem	Fan *et al.*, 2001
Flavanone			
(2*S*)-Homoeriodictyol [88]	*D. densiflorum*	Stem	Fan *et al.*, 2001
Naringenin [89]	*D. aurantiocum vor.denneanum*	Stem	Yang *et al.*, 2006a
	D. densiflorum	Stem	Fan *et al.*, 2001
	D. longicornu	Stem	Hu *et al.*, 2008a
	D. trigonopus	Stem	Hu *et al.*, 2008b
Flavone			
Apigenin [90]	*D. crystallinum*	Stem	Wang *et al.*, 2009
5,6-Dihydroxy-4′-methoxy-flacanone [91]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Luteolin [92]	*D. aurantiacum var.denneanum*	Whole plant	Liu *et al.*, 2009a

Catergory and Compound	Plant	Plant part	Reference*
Flavone glycoside			
6-*C*-(**α**-Arabino pyranosyl)-8-*C*-[(2-*O*-**α**-rhamnopyranosyl) -**β**-galactopyranosyl] apigenin [**93**]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
6-*C*-(**α**-Arabino pyranosyl)-8-*C*-[(2-*O*-**α**-rhamnopyranosyl) -**β**-glucopyranosyl] apigenin [**94**]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
6‴-Glucosyl-vitexin [**95**]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Isoschaftoside [**96**]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
Isoviolanthin [**97**]	*D. crystallinum*	Stem	Wang *et al.*, 2009
6-*C*-[(2-*O*-**α**-Rhamno pyranosyl)-**β**-gluco pyranosyl]-8-*C*-(**α**-arabinopyranosyl) apigenin [**98**]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010

Catergory and Compound	Plant	Plant part	Reference*
6-*C*-(**β**-Xylopyrano syl)-8-*C*-[(2-*O*-**α**-rhamno pyranosyl)-**β**-gluco pyranosyl] apigenin [**99**]	*D. huoshanense*	Aerial part	Chang *et al.*, 2010
Vicenin-2 [**100**]	*D. aurantiacum* var. *denneanum*	Stem	(Xiong *et al.*, 2013)
Flavonol			
Kaempferol [**101**]	*D. aurantiacum* var. *denneanum*	Stem	Yang *et al.*, 2006a
Flavonol glycoside			
Kaempferol-3-*O*-**α**-L-rhamnopyranoside [**102**]	*D. secundum*	Stem	Phechrmeekha *et al.*, 2012
Kaempferol-3,7-*O*-di-**α**-L-rhamnopyranoside [**103**]	*D. secundum*	Stem	Phechrmeekha *et al.*, 2012
Kaempferol-3-*O*-**α**-L-rhamnopyranosyl-(1⟶2)-**β**-D-gluco pyranoside [**104**]	*D. capillipes*	Stem	Phechrmeekha *et al.*, 2012
Kaempferol-3-*O*-**α**-L-rhamnopyranosyl-(1⟶2)-**β**-D-xylo pyranoside [**105**]	*D. capillipes*	Stem	Phechrmeekha *et al.*, 2012

Catergory and Compound	Plant	Plant part	Reference*
Quercetin-3-*O*-**α**-L-rhamnopyranoside [**106**]	*D. secundum*	Stem	Phechrmeekha *et al.*, 2012
Quercetin-3-*O*-**α**-L-rhamnopyranosyl-(1→2)-**β**-D-xylopyranoside [**107**]	*D. capillipes*	Stem	Phechrmeekha *et al.*, 2012
Fluorenone			
Dencrysan A [**108**]	*D. chrysotoxum*	Whole plant	Li *et al.*, 2009c
Dencrysan B [**109**]	*D. chrysotoxum*	Whole plant	(Chen *et al.*, 2008b)
Dendroflorin [**110**]	*D. aurantiacum* var. *denneanum*	Stem	Yang *et al.*, 2006a
	D. chrysotoxum	Whole plant	Chen *et al.*, 2008b
	D. nobile	Stem	Zhang *et al.*, 2007a
Dengibsin [**111**]	*D. aurantiacum* var. *denneanum*	Stem	Yang *et al.*, 2006a
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. chrysotoxum	Whole plant	Li *et al.*, 2009c
	D. densiflorum	Stem	Fan *et al.*, 2001
Nobilone [**112**]	*D. nobile*	Stem	Zhang *et al.*, 2007a
1,4,5-Trihydroxy-7-methoxy-9*H*-fluoren-9-one [**113**]	*D. chrysotoxum*	Whole plant	Chen *et al.*, 2008b

Catergory and Compound	Plant	Plant part	Reference*
2,4,7-Trihydroxy-5-methoxy-9-fluorenone [**114**]	*D. chrysotoxum*	Stem	(Yang *et al.*, 2004)
2,4,7-Trihydroxy-1,5-dimethoxy-9-fluorenone [**115**]	*D. chrysotoxum*	Stem	Yang *et al.*, 2004
Ketone			
Dehydrovomifoliol [**116**]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Lignan			
7-7′-Bis-(4-hydroxy-3,5-dimethoxy phenyl)-8-8′-dihydroxy methyltetra hydrofuran-4-β-D-glucoside [**117**]	*D. chrysanthum*	Stem	(Ye, Zhao, and Qin, 2004)
Dehydrodiconiferyl alcohol-4-β-D-glucoside [**118**]	*D. chrysanthum*	Stem	Ye *et al.*, 2004
Episyringaresinol [**119**]	*D. chrysotoxum* *D. longicornu* *D. nobile*	Stem Stem Stem	Hu *et al.*, 2012 Hu *et al.*, 2008a (Zhang *et al.*, 2008b)

Catergory and Compound	Plant	Plant part	Reference*
(-)-(7*S*,8*R*,7′*E*)-4-Hydroxy-3,3′,5,5′-tetramethoxy-8,4′-Oxyneolign-7′-ene-7,9,9′-triol-7,9′-bis-*O*-β-D-glucopyranoside [**120**]	*D. aurantiacum* var. *denneanum*	Stem	Xiong *et al.*, 2013
Lioniresinol [**121**]	*D. chrysanthum*	Stem	Ye *et al.*, 2004
(-)-Medioresinol [**122**]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
(-)-Pinoresinol [**123**]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Pinoresinol [**124**]	*D. nobile*	Stem	Zhang *et al.*, 2008b
Syringaresinol [**125**]	*D. nobile*	Stem	Zhang *et al.*, 2008b
	D. secundum	Stem	Sritularak *et al.*, 2011b
(-)-Syringaresinol-4,4′-bis-*O*-β-D glucopyranoside [**126**]	*D. aurantiacum* var. *denneanum*	Stem	Xiong *et al.*, 2013
Syringaresinol-4-*O*-D-monoglucopyranoside [**127**]	*D. aurantiacum* var. *denneanum*	Stem	Xiong *et al.*, 2013
Lignan glycoside			
Acanthoside B [**128**]	*D. chrysanthum*	Stem	Ye *et al.*, 2004
Episyringaresinol 4″-*O*-β-D-glucopyranoside [**129**]	*D. moniliforme*	Stem	Zhao *et al*, 2003

Catergory and Compound	Plant	Plant part	Reference*
Erythro-1-(4-*O*-β-D-glucopyranosyl-3-methoxyphenyl)-2-[4-(3-hydroxypropyl)-2,6-dimethoxy phenoxy]-1,3-propanediol [**130**]	*D. longicornu*	Stem	Hu *et al.*, 2008a
Liriodendrin [**131**]	*D. pulchellum*	Stem	Chanvorachote *et al.*, 2013
Long chain hydrocarbon			
n-Nonacosane [**132**]	*D. moniliforme*	Stem	Bi *et al.*, 2004
Naphthalene			
Palmarumycin JC2 [**133**]	*D. crystallinum*	Stem	Wang *et al.*, 2009
Neolignan glucoside			
Denchryside B [**134**]	*D. chrysonthum*	Stem	Ye *et al.*, 2004
Phenanthrene			
Amoenumin [**135**]	*D. amoenum*	Whole plant	(Veerraju *et al.*, 1989)
Bulbophyllanthrin [**136**]	*D. nobile*	Stem	Yang *et al.*, 2007
Coelonin [**137**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. nobile	Stem	Yang *et al.*, 2007; Hwang *et al.*, 2010
Confusarin [**138**]	*D. chryseum*	Stem	Ma *et al.*, 1998

Catergory and Compound	Plant	Plant part	Reference*
	D. chrysotoxum	Stem	Hu *et al.*, 2012
	D. nobile	Stem	Zhang *et al.*, 2008b
Chrysotoxol A [**139**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Chrysotoxol B [**140**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Crystalltone [**141**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
	D. crystallinum	Stem	Wang *et al.*, 2009
Cypripedin [**142**]	*D. densiflorum*	Stem	Fan *et al.*, 2001
Denbinobin [**143**]	*D. moniliforme*	Stem	(Lin *et al.*, 2001)
	D. nobile	Stem	Yang *et al.*, 2007; Ye and Zhao *et al.*, 2002a
Dendrochrysanene [**144**]	*D. chrysanthum*	Stem	Yang *et al.*, 2006b
Dendronone [**145**]	*D. chrysanthum*	Stem	Yang *et al.*, 2006b
	D. longicornu	Stem	Hu *et al.*, 2008a
Densifloral B [**146**]	*D. densiflorum*	Stem	Fan *et al.*, 2001
Denthyrsinin [**147**]	*D. thyrsiforum*	Stem	Zhang *et al.*, 2005
9,10-Dihydromoscatin [**148**]	*D. polyonthum*	Stem	Hu *et al.*, 2009
9,10-Dihydrophenanthrene-2,4,7-triol [**149**]	*D. polyanthum*	Stem	Hu *et al.*, 2009

Catergory and Compound	Plant	Plant part	Reference*
4,5-Dihydroxy-2,3-dimethoxy-9,10-dihydrophenanthrene [150]	*D. sinense*	Whole plant	(Chen *et al.*, 2013)
4,5-Dihydroxy-2,6-dimethoxy-9,10-dihydrophenanthrene [151]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
4,5-Dihydroxy-3,7-dimethoxy-9,10-dihydrophenanthrene [152]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a
2,5-Dihydroxy-3,4-dimethoxyphenanthrene [153]	*D. nobile*	Stem	Yang *et al.*, 2007
2,5-Dihydroxy-4,9-dimethoxyphenanthrene [154]	*D. nobile*	Stem	Zhang *et al.*, 2008b
	D. chrysotoxum	Whole plant	Li *et al.*, 2009c
3,7-Dihydroxy-2,4-di methoxyphenanthrene [155]	*D. chrysotoxum*	Whole plant	Li *et al.*, 2009c
	D. nobile	Stem	Zhang *et al.*, 2008b

Catergory and Compound	Plant	Plant part	Reference*
4,5-Dihydroxy-2-methoxy-9,10-dihydrophenanthrene [156]	*D. nobile*	Stem	Yang *et al.*, 2007
4,7-Dihydroxy-2-methoxy-9,10-dihydrophenanthrene [157]	*D. densiflorum*	Stem	Fan *et al.*, 2001
2,7-Dihydroxy-3,4,6-trimethoxy-9,10-dihydrophenanthrene [158]	*D. rotundatum*	Whole plant	Majumder and Pal, 1992
2,8-Dihydroxy-3,4,7-trimethoxy-9,10-dihydrophenanthrene [159]	*D. nobile*	Stem	Yang *et al.*, 2007
	D. longicornu	Stem	Hu *et al.*, 2008a
4,7-Dihydroxy-2,3,6-trimethoxy-9,10-dihydrophenanthrene [160]	*D. sinense*	Stem	Chen *et al.*, 2013

Catergory and Compound	Plant	Plant part	Reference*
2,6-Dihydroxy-1,5,7-trimethoxyphenanthrene [161]	*D. densiflorum*	Stem	Fan *et al.*, 2001
2,7-Dihydroxy-3,4,6-trimethoxyphenanthrene [162]	*D. rotundatum*	Whole plant	Majumder and Pal, 1992
2,8-Dihydroxy-3,4,7-trimethoxyphenanthrene [163]	*D. nobile*	Stem	Yang *et al.*, 2007
5,7-Dimethoxy phenanthrene-2,6-diol [164]	*D. nobile*	Stem	Hwang *et al.*, 2010
Ephemeranthol A [**165**]	*D. nobile*	Stem	Yang *et al.*, 2007; Hwang *et al.*, 2010
Ephemeranthol C [**166**]	*D. nobile*	Stem	Yang *et al.*, 2007; Hwang *et al.*, 2010
Ephemeranthoquinone [**167**]	*D. plicotile*	Stem	Yamaki and Honda, 1996
Epheranthol B [**168**]	*D. chrysotoxum* *D. plicotile*	Stem Stem	Hu *et al.*, 2012 Yamaki and Honda, 1996

Catergory and Compound	Plant	Plant part	Reference*
Erianthridin [**169**]	*D. nobile*	Stem	Hwang *et al.*, 2010
	D. plicatile	Stem	Yamaki and Honda, 1996
Fimbriatone [**170**]	*D. nobile*	Stem	Zhang *et al.*, 2008b
	D. pulchellum	Stem	Chanvorachote *et al.*, 2013
Fimbriol B [**171**]	*D. nobile*	Stem	Yang *et al.*, 2007; Hwang *et al.*, 2010
Flaccidin (Amoenumin) [**172**]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
Flavanthridin [**173**]	*D. nobile*	Stem	Hwang *et al.*, 2010
Flavanthrinin [**174**]	*D. nobile*	Stem	Zhang *et al.*, 2008b
Hircinol [**175**]	*D. draconis*	Stem	Sritularak *et al.*, 2011a
	D. loddigesii	Whole plant	Ito *et al.*, 2010
	D. nobile	Stem	Hwang *et al.*, 2010
2-Hydroxy-4,7-dimethoxy-9,10-dihydrophenanthrene [**176**]	*D. nobile*	Stem	Yang *et al.*, 2007
5-Hydroxy-2,4-dimethoxyphenanthrene [**177**]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010

Catergory and Compound	Plant	Plant part	Reference*
2-Hydroxy-3,4,7-trimethoxy-9,10-dihydrophenanthrene [178]	*D. nobile*	Stem	Yang *et al.*, 2007
3-Hydroxy-2,4,7-trimethoxy-9,10-dihydrophenanthrene [179]	*D. nobile*	Stem	Yang *et al.*, 2007
3-Hydroxy-2,4,7-trimethoxyphenanthrene [180]	*D. nobile*	Stem	Yang *et al.*, 2007
Loddigesiinol A [181]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Loddigesiinol B [182]	*D. loddigesii*	Whole plant	Ito *et al.*, 2010
Lusianthridin [183]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. loddigesii	Whole plant	Ito *et al.*, 2010
	D. nobile	Stem	Yang *et al.*, 2007; Hwang *et al.*, 2010
	D. plicatile	Stem	Yamaki and Honda, 1996
7-Methoxy-9,10-dihydrophenanthrene-2,4,5-triol [184]	*D. draconis*	Stem	Sritularak *et al.*, 2011a

Catergory and Compound	Plant	Plant part	Reference*
5-Methoxy-7-hydroxy-9,10-dihydro-1,4-phenanthrenequinone [185]	*D. draconis*	Stem	Sritularak *et al.*, 2011a
Moniliformin [186]	*D. moniliforme*	Stem	Lin *et al.*, 2001
Moscatin [187]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
	D. aurontiocum vor. denneanum	Whole plant	Liu *et al.*, 2009a
	D. chrysanthum	Stem	Yang *et al.*, 2006b
	D. chrysotoxum	Whole plant	Li *et al.*, 2009c
	D. densiflorum	Stem	Fan *et al.*, 2001
	D. loddigesii	Whole plant	Chen *et al.*,1994; Ito *et al.*, 2010
	D. polyanthum	Stem	Hu *et al.*, 2009
	D. rotundotum	Whole plant	Majumder and Pal, 1992
Nudol [188]	*D. nobile*	Stem	Yang *et al.*, 2007
	D. rotundatum	Whole plant	Majumder and Pal, 1992
Plicatol A [189]	*D. nobile*	Stem	Yang *et al.*, 2007
	D. plicatile	Stem	(Honda and Yamaki, 2000)

Catergory and Compound	Plant	Plant part	Reference*
Plicatol B [**190**]	*D. plicatile*	Stem	Honda and Yamaki, 2000
Plicatol C [**191**]	*D. plicatile*	Stem	Honda and Yamaki, 2000
Rotundatin [**192**]	*D. rotundatum*	Whole plant	Majumder and Pal, 1992
2,3,5-Trihydroxy-4,9-dimethoxyphenanthrene [**193**]	*D. nobile*	Stem	Yang *et al.*, 2007
3,4,8-Trimethoxy phenanthrene-2,5-diol [**194**]	*D. nobile*	Stem	Hwang *et al.*, 2010
Phenolic compound			
Antiarol [**195**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Ethylhaematommate [**196**]	*D. longicornu*	Whole plant	Li *et al.*, 2009d
p-Hydroxybenz aldehyde [**197**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
Methyl-β-orsellinate [**198**]	*D. langicornu*	Stem	Hu *et al.*, 2008a
Protocatechuic acid [**199**]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a

Catergory and Compound	Plant	Plant part	Reference*
Tachioside [**200**]	*D. denneanum*	Stem	Pan *et al.*, 2012
Phenylpropanoid			
Alkyl 4′-hydroxy-transcinnamates [**201**]	*D. clavatum var. aurantiacum*	Stem	Chang *et al.*, 2001
Alkyl trans-ferulates [**202**]	*D. clovatum var. aurantiacum*	Stem	Chang *et al.*, 2001
Defuscin [**203**]	*D. aurantiacum var. denneanum*	Stem	Yang *et al.*, 2006a
Docosanoyl (*E*)-ferulate [**204**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
n-Docosyl trans-ferulate [**205**]	*D. longicornu*	Whole plant	Li *et al.*, 2009d
Ferulaldehyde [**206**]	*D. longicornu*	Whole plant	Li *et al.*, 2009d
Ferulic acid [**207**]	*D. secundum*	Stem	Sritularak *et al.*, 2011b
2-(*p*-Hydroxyphenyl) ethyl *p*-coumarate [**208**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
1-[4-(β-D-glucopyranosyloxy)-3,5-dimethoxyphenyl]-1-propanone [**209**]	*D. aurantiacum var. denneanum*	Stem	Xiong *et al.*, 2013

Catergory and Compound	Plant	Plant part	Reference*
3-(4-Hydroxy-3-methoxyphenyl)-2-propen-1-ol [**210**]	*D. trigonopus*	Stem	Hu *et al.*, 2008b
p-Hydroxyphenyl propionic methyl ester [**211**]	*D. aphyllum*	Whole plant	Chen *et al.*, 2008a
3-(3-Methoxy,4-hydroxyphenyl)-1-propanol [**212**]	*D. longicornu*	Stem	Hu *et al.*, 2008a
n-Octacosyl ferulate [**213**]	*D. aurantiacum var. denneanum*	Stem	Yang *et al.*, 2006a
	D. moniliforme	Stem	Bi *et al.*, 2004
Phloretic acid [**214**]	*D. candidum*	Whole plant	(Li *et al.*, 2010)
Salidrosol [**215**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Shashenoside I [**216**]	*D. aurantiacum var. denneanum*	Stem	Xiong *et al.*, 2013
Syringin [**217**]	*D. aurantiacum var. denneanum*	Stem	Xiong *et al.*, 2013
Syringoside [**218**]	*D. chrysotoxum*	Stem	Hu *et al.*, 2012
Tetracosyl (*E*)-*p*-coumarate [**219**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009

Catergory and Compound	Plant	Plant part	Reference*
Tetracosyl (*Z*)-*p*-coumarate [**220**]	*D. falconeri*	Stem	Sritularak and Likhitwitayawuid, 2009
n-Triacontyl *p*-hydroxy-cis-cinnamate [**221**]	*D. moniliforme*	Stem	Bi *et al.*, 2004
Purine			
9-β-D-Allofuranul syguanine [**222**]	*D. denneanum*	Stem	Pan *et al.*, 2012
Guanosine [**223**]	*D. denneanum*	Stem	Pan *et al.*, 2012
Purine nucleotide			
9-β-D-Ribofuranosyl-9*H*-purin-6-amine [**224**]	*D. longicornu*	Stem	Hu *et al.*, 2008a
Sesquiterpene			
Aduncin [**225**]	*D. aduncum*	Whole plant	(Gawell and Leander, 1976)
Amoenin [**226**]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
Amotin [**227**]	*D. amoenum*	Whole plant	Majumder *et al.*, 1999
α-Dihydropicrotoxinin [**228**]	*D. moniliforme*	Stem	Bi *et al.*, 2004
Dendrobane A [**229**]	*D. nobile*	Stem	Zhang *et al.*, 2007a
	D. wardianum	Stem	(Fan *et al.*, 2013)
Dendronobilin A [**230**]	*D. nobile*	Stem	(Zhang *et al.*, 2007b)
Dendronobilin B [**231**]	*D. crystallium*	Stem	Wang *et al.*, 2009

Catergory and Compound	Plant	Plant part	Reference*
	D. nobile	Stem	Zhang *et al.*, 2007b
Dendronobilin C [**232**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin D [**233**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin E [**234**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin F [**235**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin G [**236**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin H [**237**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin I [**238**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
	D. wardianum	Stem	Fan *et al.*, 2013
Dendronobilin J [**239**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
Dendronobilin K [**240**]	*D. nobile*	Stem	(Zhang *et al.*, 2008c)
Dendronobilin L [**241**]	*D. nobile*	Stem	Zhang *et al.*, 2008c
Dendronobilin M [**242**]	*D. nobile*	Stem	Zhang *et al.*, 2008c
Dendronobilin N [**243**]	*D. nobile*	Stem	Zhang *et al.*, 2008c
Dendrowarnol A [**244**]	*D. wardianum*	Stem	Fan *et al.*, 2013
Dendrowarnol B [**245**]	*D. wardianum*	Stem	Fan *et al.*, 2013
Dendrowarnol C [**246**]	*D. wardianum*	Stem	Fan *et al.*, 2013
Corchoionoside C [**247**]	*D. polyanthum*	Stem	Hu *et al.*, 2009
Crystallinin [**248**]	*D. findlayanum*	Whole plant	(Qin *et al.*, 2011)
Findlayanin [**249**]	*D. findlayanum*	Whole plant	Qin *et al.*, 2011
10β,12,14-Trihydroxy-alloaromadedrane [**250**]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a

Catergory and Compound	Plant	Plant part	Reference*
Sesquiterpene alkaloid			
Dendrobine [**251**]	*D. nobile*	Stem	Zhang *et al.*, 2007b
3-Hydroxy-2-oxodendrobine [**252**]	*D. nobile*	Stem	Wang *et al.*,1985
Sesquiterpene glycoside			
Dendromoniliside A [**253**]	*D. moniliforme*	Stem	Zhao *et al*, 2003
Dendromoniliside B [**254**]	*D. moniliforme*	Stem	Zhao *et al*, 2003
Dendromoniliside C [**255**]	*D. moniliforme*	Stem	Zhao *et al*, 2003
Dendromoniliside D [**256**]	*D. moniliforme*	Stem	Zhao *et al*, 2003
Dendronobiloside A [**257**]	*D. nobile*	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a
Dendronobiloside B [**258**]	*D. nobile*	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a
Dendronobiloside C [**259**]	*D. nobile*	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a
Dendronobiloside D [**260**]	*D. nobile*	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a

Catergory and Compound	Plant	Plant part	Reference*
Dendronobiloside E [261]	*D. nobile*	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a
Dendroside A [262]	*D. moniliforme*	Stem	Zhao *et al,* 2003
	D. nobile	Stem	Zhao *et al.*, 2001; Ye and Zhao *et al.*, 2002a
Dendroside B [263]	*D. nobile*	Stem	Ye and Zhao *et al.*, 2002a
Dendroside C [264]	*D. moniliforme*	Stem	Zhao *et al,* 2003
	D. nobile	Stem	Ye and Zhao *et al.*, 2002a
Dendroside D [265]	*D. nobile*	Stem	(Ye, Qin, and Zhao, 2002b)
Dendroside E [266]	*D. nobile*	Stem	Ye *et al.*, 2002b
Dendroside F [267]	*D. moniliforme*	Stem	Zhao *et al,* 2003
	D. nobile	Stem	Ye *et al.*, 2002b
Dendroside G [268]	*D. nobile*	Stem	Ye *et al.*, 2002b

Catergory and Compound	Plant	Plant part	Reference*
7,12-Dihydroxy-5-hydroxymethyl-11-isopropyl-6-methyl-9-oxatricyclo [6.2.1.$0^{2,6}$]undecan-10-one-15-*O*-β-D-glucopyranoside (Dendromoniliside D) [269]	*D. nobile*	Stem	(Shu, Zhang, and Guo, 2004)
Triterpene			
Taraxerol [270]	*D. aurantiacum*	Stem	Yang *et al.*, 2006a

* The meaning of word "(Author name, Year)" refers to the author's name citations at the first appearance in this thesis.

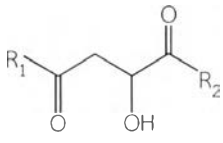
CH_3-$(CH_2)_n$-CH_2-R

[1] Aliphatic acids:

R = COOH, n = 19-31

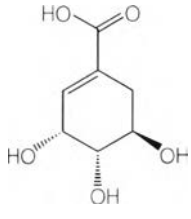
[4] Aliphatic alcohol:

R= OH, n = 22-32

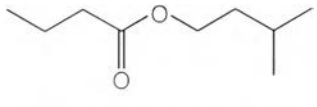


[2] Malic acid: R_1 = R_2 = OH

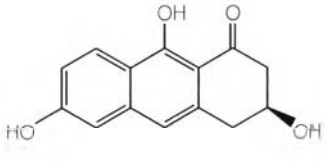
[5] Dimethyl malate: R_1 = R_2 = OMe



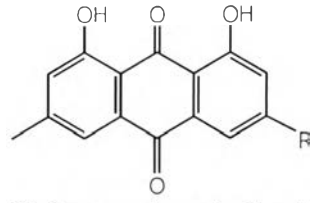
[3] (-)-Shikimic acid



[6] Isopentyl butyrate



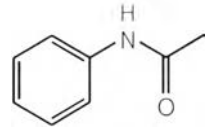
[7] 3,6,9-Trihydroxy-3,4-dihydro anthracen-1-(2*H*)-one



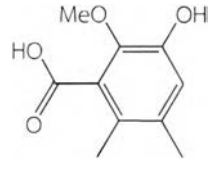
[8] Chrysophanol: R = H

[9] Emodin: R = OH

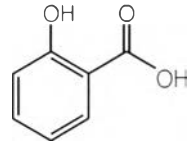
[10] Physcion: R= OMe



[11] *N*-Phenylacetamide

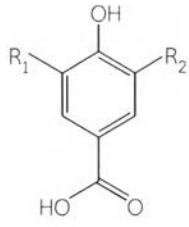


[13] 3-Hydroxy-2-methoxy-5,6-dimethylbenzoic acid



[14] Salicylic acid

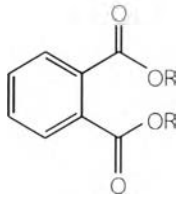
Figure 2 Structures of compounds previously isolated from *Dendrobium* species



[12] Gallic acid: R_1 = OH, R_2 = OH

[15] Syringic acid: R_1 = OMe, R_2 = OMe

[16] Vanillic acid: R_1 = H, R_2 = OMe

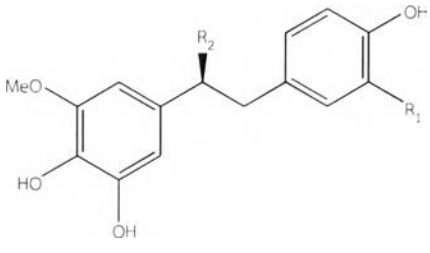


[18] Bis(2-ethylhexyl)phthalate:

R = $CH_2CH(C_2H_5)(CH_2)_3CH_3$

[19] Dibutylphthalate: R = $(CH_2)_3CH_3$

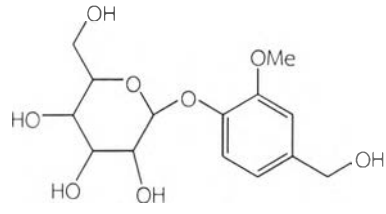
[20] Diisobutylphthalate: R = $CH_2CH(CH_3)_2$



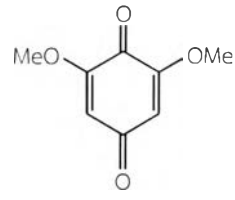
[33] Dendrocandin C: R_1 = H, R_2 = OMe

[34] Dendrocandin D: R_1 = H, R_2 = OCH_2CH_3

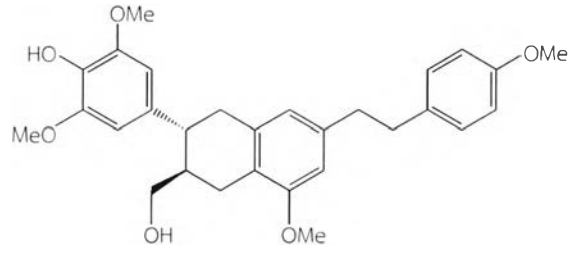
[35] Dendrocandin E: R_1 = OH, R_2 = H



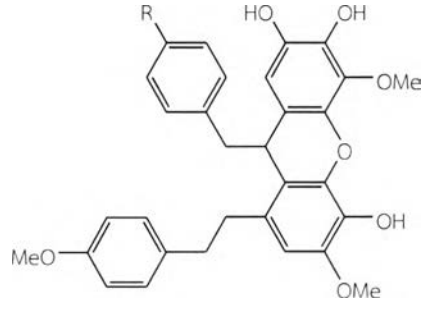
[17] Vanilloside



[21] 2,6-Dimethoxybenzoquinone

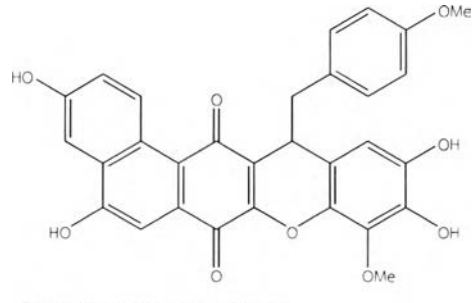


[32] Dendrocandin B



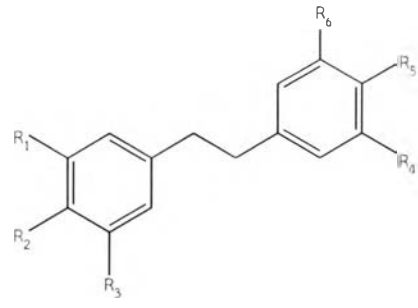
[36] Dendrocandin F: R = OMe

[37] Dendrocandin G: R = OH



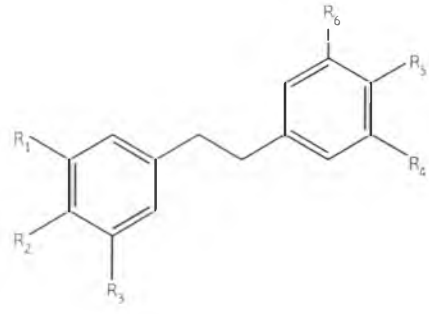
[38] Dendrocandin H

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)

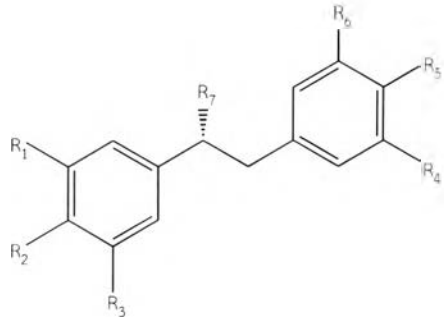


	R_1	R_2	R_3	R_4	R_5	R_6
[22] Aloifol I	OMe	OH	OMe	OH	H	H
[23] Amoenylin	OMe	OH	OMe	H	OMe	H
[24] Betatasin	OMe	H	H	OH	H	OH
[25] Betatasin III	OH	H	OMe	H	H	OH
[26] Brittonin A	OMe	OMe	OMe	OMe	OMe	OMe
[27] Chrysotobibenzyl	OMe	OMe	OMe	OMe	OMe	H
[28] Chrysotoxine	OMe	OH	OMe	OMe	OMe	H
[29] Crepidatin	OMe	OMe	OMe	OMe	OH	H
[30] Cumulatin	OMe	OMe	OH	OH	OMe	OMe
[40] Dendrobin A	OH	OH	OMe	H	H	OMe
[44] 3,4′-Dihydroxy-5-methoxybibenzyl	OH	H	OMe	H	OH	H
[46] 3,4′-Dihydroxy-5,5′-dimethoxy dihydrostilbene	OH	H	OMe	OMe	OH	H

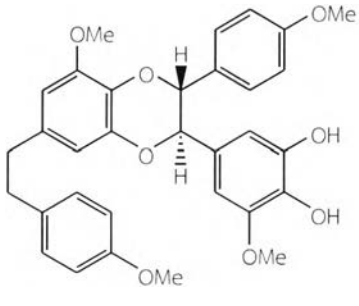
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



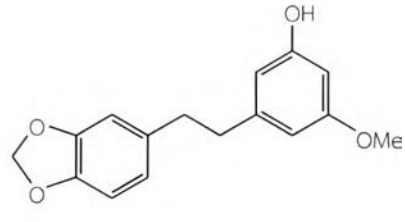
	R_1	R_2	R_3	R_4	R_5	R_6
[47] 4,5-Dihydroxy-3,3′-dimethoxybibenzyl (Dendrobin A)	OMe	OH	OH	H	H	OMe
[49] Gignatol	OMe	H	H	H	OH	OMe
[50] 4-Hydroxy-3,5,3′ trimethoxybibenzyl	OMe	OH	OMe	H	H	OMe
[52] 5-Hydroxy-3,4,3′,4′,5′ pentamethoxybibenzyl	OMe	OMe	OH	OMe	OMe	OMe
[53] Isoamoenylin	OMe	OMe	OMe	H	H	OH
[58] Moscatilin	OMe	OH	OMe	H	OH	OMe
[65] 3,3′,4-Trihydroxybibenzyl	OH	OH	H	H	H	OH
[66] 3,3′,5-Trihydroxybibenzyl	OH	H	OH	H	H	OH
[67] 3,5,4′-Trihydroxybibenzyl	OH	H	OH	H	OH	H
[68] 4,5,4′-Trihydroxy-3-3′-dimethoxybibenzyl	OMe	OH	OH	H	OH	OMe
[69] Tristin	OH	H	OH	H	OH	OMe
[70] Dendromoniliside E	OGlc	OGlc	OMe	H	OMe	H



	R_1	R_2	R_3	R_4	R_5	R_6	R_7
[**31**] Dendrocandin A	OMe	OH	OH	H	H	H	OMe
[**41**] Dendrophenol	OMe	OH	OMe	OH	OH	H	H
[**43**] 3,4-Dihydroxy-5,4′-dimethoxybibenzyl	OH	OH	OMe	H	OMe	H	H
[**45**] 4,4′-Dihydroxy-3,5-dimethoxybibenzyl	OMe	OH	OMe	H	OH	H	H
[**54**] Loddigesiinol C	OMe	OH	OMe	H	OH	OMe	OMe
[**57**] 3-*O*-Methylgigantol	OMe	H	OH	OMe	OMe	H	H

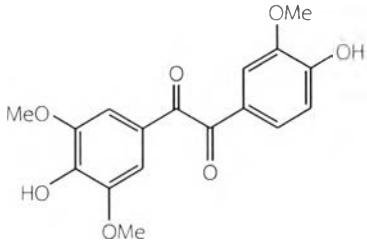


[**39**] Dendrocandin I

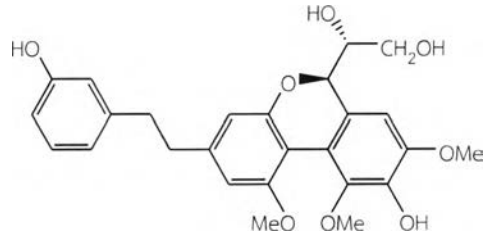


[**42**] Densiflorol A

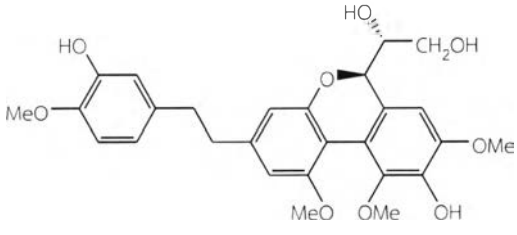
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



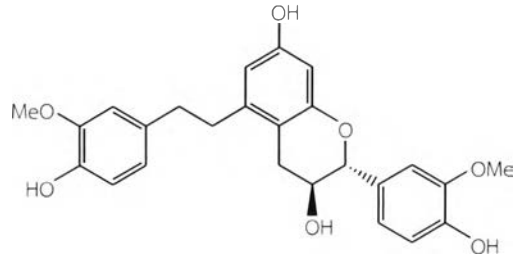
[55] Loddigesiinol D



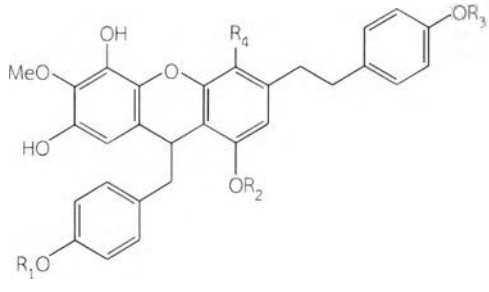
[56] Longicornuol A



[63] Trigonopol A



[64] Trigonopol B

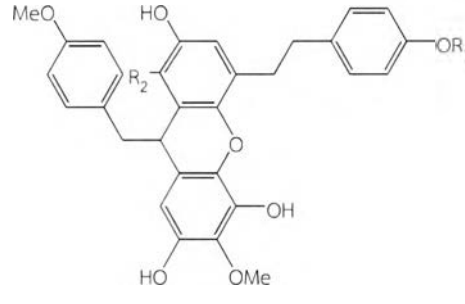


[71] Dencryol A:

R_1 = Me, R_2 = R_3 = R_4 = H

[72] Dencryol B:

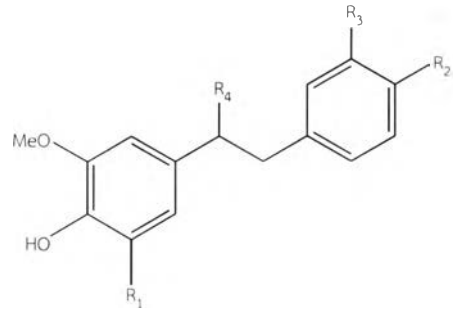
R_1 = H, R_2 = R_3 = Me, R_4 = OH



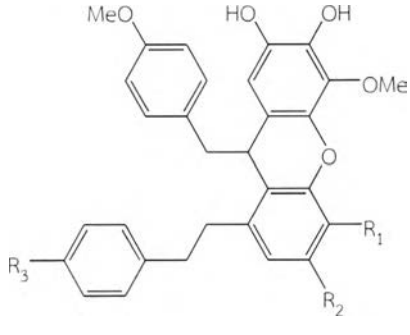
[75] Dengraol A: R_1 = R_2 =H

[76] Dengraol B: R_1 = Me, R_2 = OMe

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



	R_1	R_2	R_3	R_4
[**51**] 4-[2-(3-Hydroxyphenol)-1-methoxyethyl]-2,6-dimethoxyphenol	OMe	H	OH	OMe
[**59**] Nobilin A	OH	H	OMe	OMe
[**60**] Nobilin B	OMe	OH	OMe	OMe
[**61**] Nobilin C	OMe	OMe	OMe	OMe
[**62**] Nobilin D	OMe	OH	OMe	OH

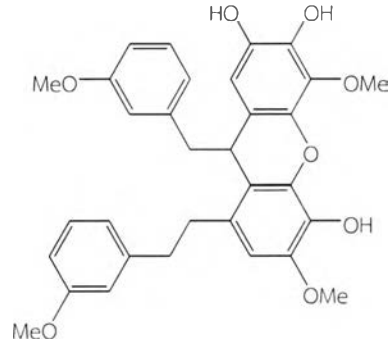


[**73**] Dendrofalconerol A:

R_1 = OH, R_2 = R_3 = OMe

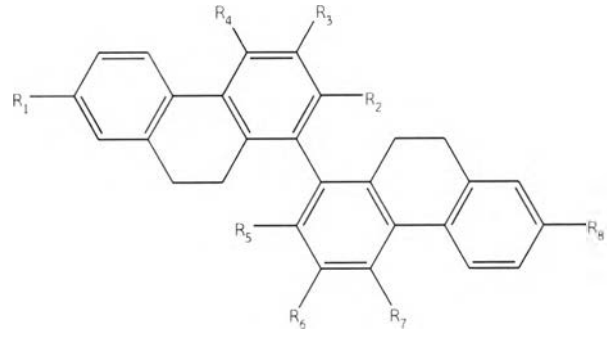
[**74**] Dendrofalconerol B:

R_1 = H, R_2 = R_3 = OH

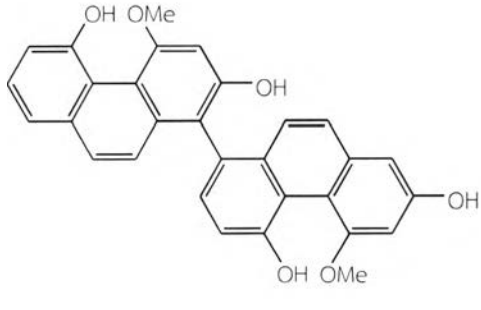


[**77**] Nobilin E

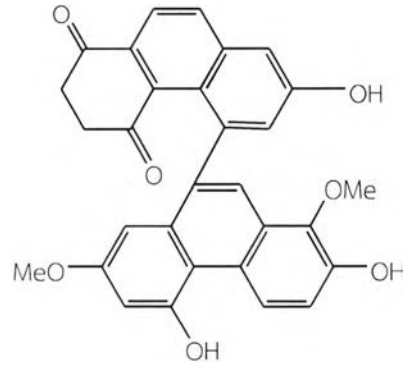
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[78] 2,2′-Dihydroxy-3,3′,4,4′, 7,7′-hexamethoxy -9,9′, 10,10′-tetrahydro-1,1′ -biphenanthrene	OMe	OH	OMe	OMe	OH	OMe	OMe	OMe
[79] 2,2′-Dimethoxy-4,4′,7,7′-tetrahydroxy-9,9′,10,10′-tetrahydro-1,1′-biphenanthrene	OH	OMe	H	OH	OMe	H	OH	OH
[82] Flavanthrin	OH	OH	H	OMe	OH	H	OMe	OH

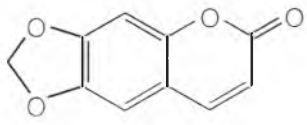


[80] Denthyrsinol

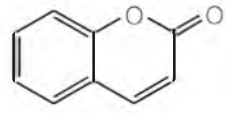


[81] Denthyrsinone

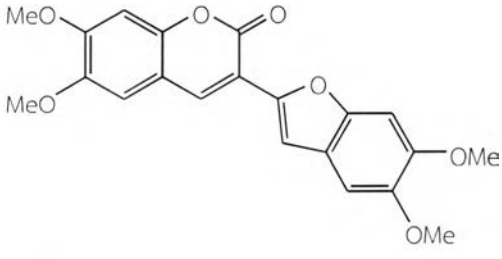
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



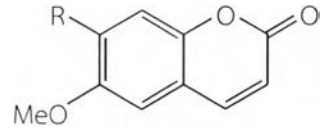
[83] Ayapin



[84] Coumarin

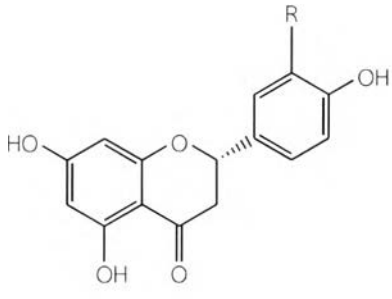


[85] Denthyrsin



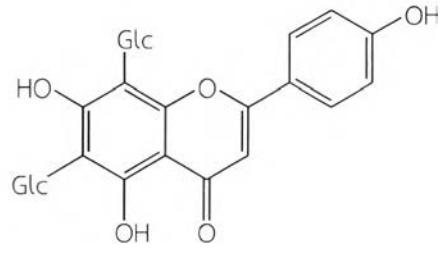
[86] Scoparone: R = OMe

[87] Scopoletin: R = OH

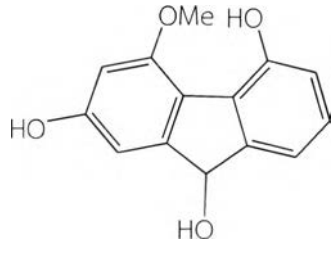


[88] (2*S*)-Homoeriodictyol: R = OMe

[89] Naringenin: R = H

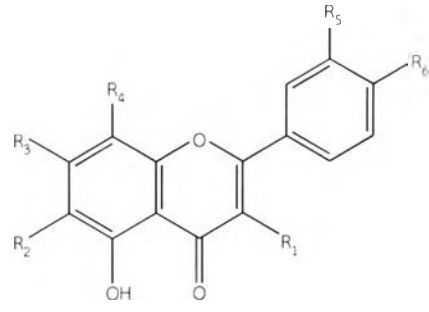


[100] Vicenin-2

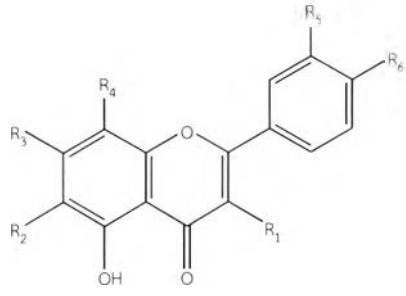


[109] Denchrysan B

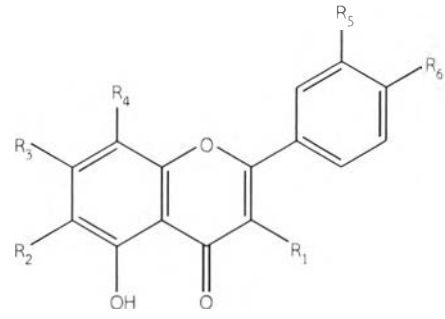
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



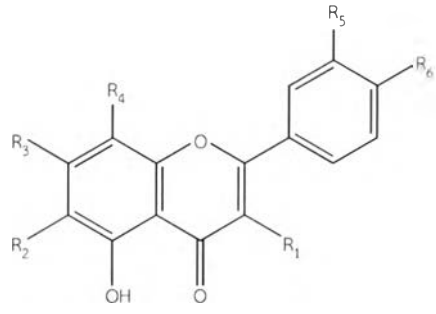
	R_1	R_2	R_3	R_4	R_5	R_6
[**90**] Apigenin	H	H	OH	H	H	OH
[**91**] 5,6-Dihydroxy-4′-methoxy-flacanone	H	OH	H	H	H	OMe
[**92**] Luteolin	H	H	OH	H	OH	OH
[**93**] 6-*C*-(*α*-Arabinopyranosyl)-8-*C*-[(2-*O*-*α*-rhamnopyranosyl) -*β*-galactopyranosyl] apigenin	H	-Ara	OH	-Gal-O-Rha	H	OH
[**94**] 6-*C*-(*α*-Arabinopyranosyl)-8-*C*-[(2-*O*-*α*-rhamnopyranosyl) -*β*-glucopyranosyl] apigenin	H	-Ara	OH	-Glc-O-Rha	H	OH



	R_1	R_2	R_3	R_4	R_5	R_6
[**95**] 6‴-Glucosyl-vitexin	-Glc-O-Glc	H	OH	O-Glc	H	H
[**96**] Isoschaftoside	H	-Ara	OH	-Glc	H	OH
[**97**] Isoviolanthin	H	-Rha	OH	-Glc	H	OH
[**98**] 6-*C*-[(2-*O*-**α**-Rhamnopyranosyl)-**β**-glucopyranosyl]-8-*C*-(**α**-arabinopyranosyl) apigenin	H	-Glc-O-Rha	OH	-Ara	H	OH
[**99**] 6-*C*-(**β**-Xylopyranosyl)-8-*C*-[(2-*O*-**α**-rhamnopyranosyl)-**β**-glucopyranosyl] apigenin	H	-Xyl	OH	-Glc-O-Rha	H	OH
[**101**] Kaempferol	OH	H	OH	H	H	OH

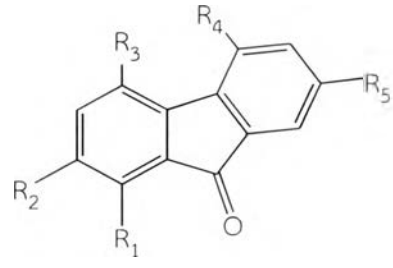


	R_1	R_2	R_3	R_4	R_5	R_6
[**102**] Kaempferol-3-*O*-**α**-L-rhamnopyranoside	O-Rha	H	OH	H	H	OH
[**103**] Kaempferol-3,7-*O*-di-**α**-L-rhamnopyranoside	O-Rha	H	O-Rha	H	H	OH
[**104**] Kaempferol-3-*O*-**α**-L-rhamnopyranosyl-(1⟶2)-**β**-D-glucopyranoside	O-Glc-Rha	H	OH	H	H	OH
[**105**] Kaempferol-3-*O*-**α**-L-rhamnopyranosyl-(1⟶2)-**β**-D-xylopyranoside	O-Xyl-Rha	H	OH	H	H	OH

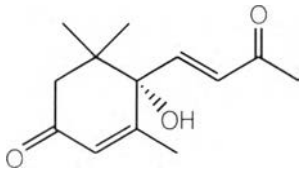


	R_1	R_2	R_3	R_4	R_5	R_6
[106] Quercetin-3-*O*-α-L-rhamnopyranoside	O-Rha	H	OH	H	OH	OH
[107] Quercetin-3-*O*-α-L-rhamnopyranosyl-(1⟶2)-β-D-xylopyranoside	O-Xyl-Rha	H	OH	H	OH	OH

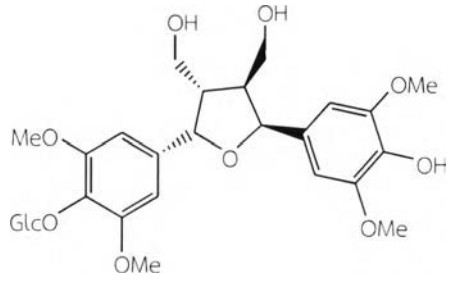
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



	R_1	R_2	R_3	R_4	R_5
[108] Denchrysan A	H	OH	OMe	OH	OH
[110] Dendroflorin	OH	OH	H	OH	OMe
[111] Dengibsin	H	OH	OMe	OH	H
[112] Nobilone	H	OH	OMe	H	OH
[113] 1,4,5-Trihydroxy-7-methoxy-9H-fluoren-9-one	OH	H	OH	OH	OMe
[114] 2,4,7-Trihydroxy-5-methoxy-9-fluorenone	H	OH	OH	OMe	OH
[115] 2,4,7-Trihydroxy-1,5-dimethoxy -9-fluorenone	OMe	OH	OH	OMe	OH

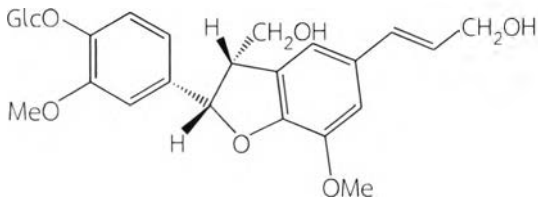


[116] Dehydrovomifoliol

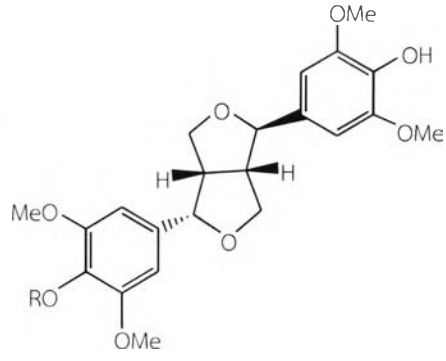


[117] 7,7′-bis-(4-hydroxy-3,5-dimethoxyphenyl)-8,8′-dihydroxymethyltetrahydrofuran-4-*β*-D-glucoside

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)

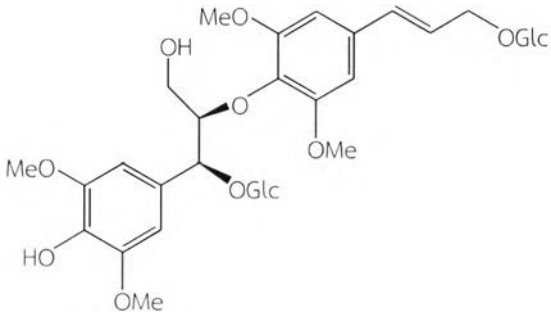


[118] Dehydrodiconiferyl alcohol-4-β-D-glucoside

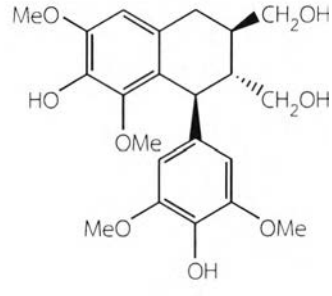


[119] Episyringaresinol: R = H

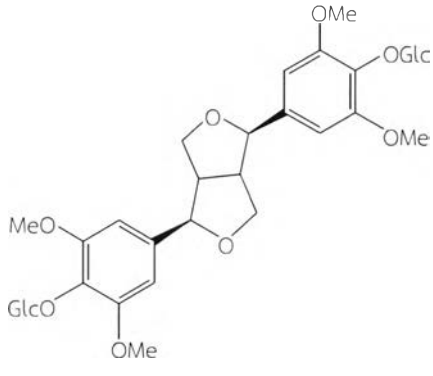
[129] Episyringaresinol 4″-*O*-β-D-glucopyranoside: R = β-D-Glucose



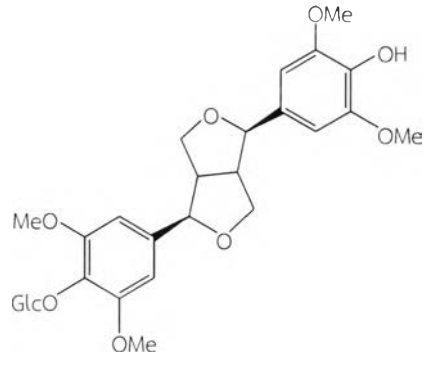
[120] (-)-(7*S*,8*R*,7′*E*)-4-hydroxy-3,3′,5,5′-tetramethoxy-8,4′-oxyneolign-7′-ene-7,9,9′-triol-7,9′-bis-*O*-β-D-glucopyranoside



[121] Lioniresinol

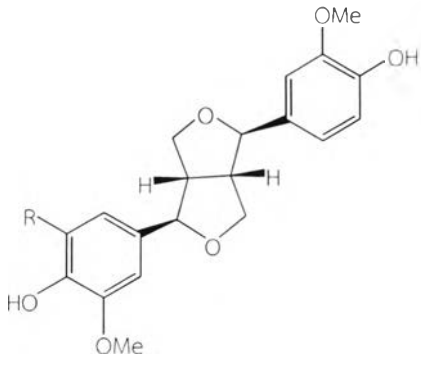


[126] (-)-Syringaresinol-4,4′-bis-*O*-β-D-glucopyranoside



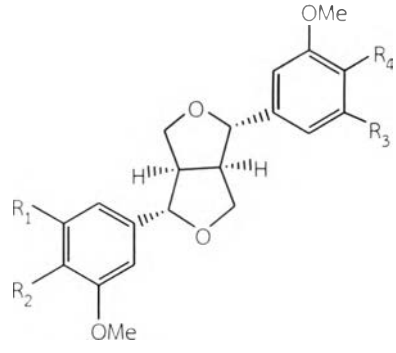
[127] Syringaresinol-4-*O*-D monoglucopyranoside

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



[**122**] (-)-Medioresinol: R = OMe

[**123**] (-)-Pinoresinol: R = H

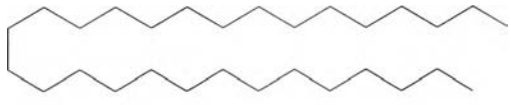


[**124**] Pinoresinol:

R_1 = H, R_2 = OH, R_3 = H, R_4 = OH

[**125**] Syringaresinol:

R_1 = OMe, R_2 = OH, R_3 = OMe, R_4 = OH



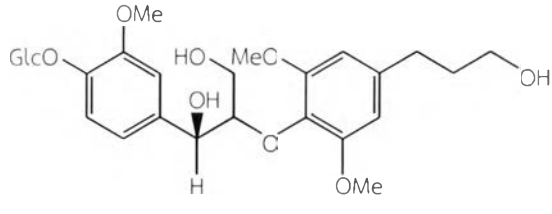
[**132**] *n*-Nonacosane

[**128**] Acanthoside B:

R_1 = OMe, R_2 = OGlc, R_3 = OMe, R_4 = OH

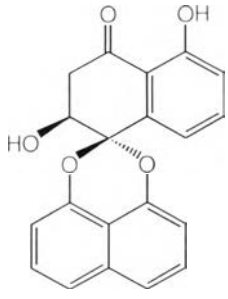
[**131**] Liriodendrin:

R_1 = OMe, R_2 = OGlc, R_3 = OMe, R_4 = OGlc

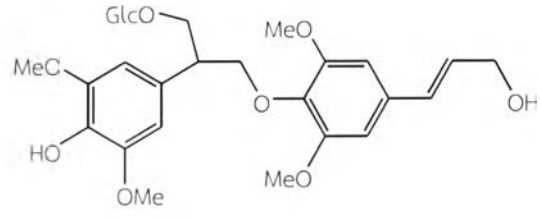


[**130**] Erythro-1-(4-*O*-β-D-glucopyranosyl-3-methoxyphenyl)-2-[4-(3-hydroxypropyl)-2,6-dimethoxyphenoxy]-1,3-propanediol

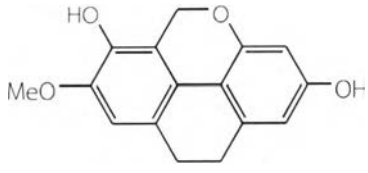
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



[133] Palmarumycin JC2

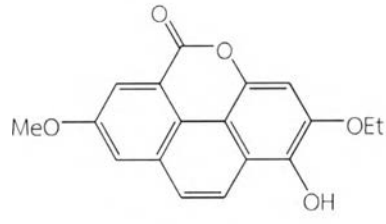


[134] Denchryside B

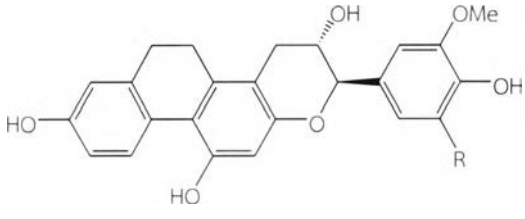


[135] Amoenumin

[172] Flaccidin

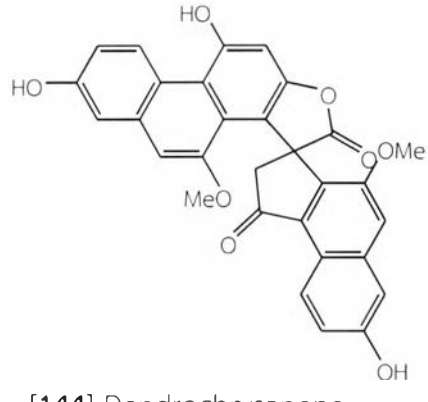


[141] Crystalltone

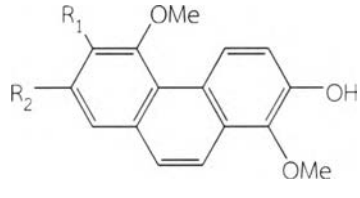


[139] Chrysotoxol A: R = H

[140] Chrysotoxol B: R = OMe

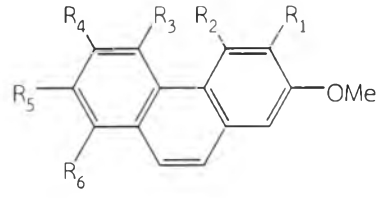


[144] Dendrochrysanene

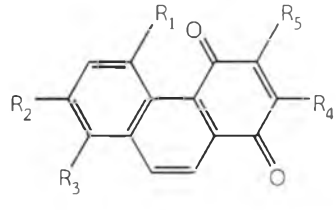


	R_1	R_2
[138] Confusarin	OMe	OH
[161] 2,6-Dihydroxy-1,5,7-trimethoxyphenanthrene	OH	OMe

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)

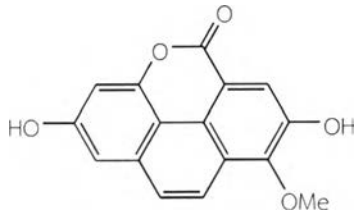


	R_1	R_2	R_3	R_4	R_5	R_6
[**136**] Bulbophyllanthrin	OH	OMe	OH	H	H	H
[**147**] Denthyrsinin	OH	OMe	H	H	OH	OMe
[**177**] 5-Hydroxy-2,4-dimethoxy phenanthrene	H	OMe	OH	H	H	H
[**180**] 3-Hydroxy-2,4,7-trimethoxy phenanthrene	OH	OMe	H	H	OMe	H

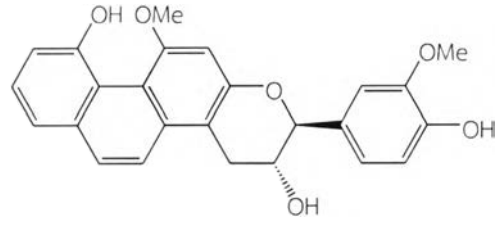


	R_1	R_2	R_3	R_4	R_5
[**142**] Cypripedin	H	OH	OMe	OMe	H
[**146**] Densifloral B	H	OH	H	OMe	H
[**143**] Denbinobin	OH	OMe	H	H	OMe

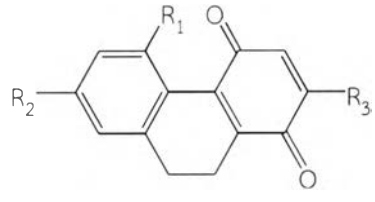
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



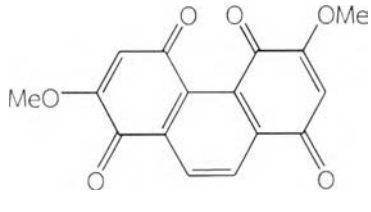
[170] Fimbriatone



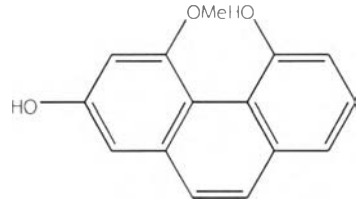
[182] Loddigesiinol B



	R_1	R_2	R_3
[145] Dendronone	OH	OMe	H
[167] Ephemeranthoquinone	H	OH	OMe
[185] 5-Methoxy-7-hydroxy-9,10-dihydro-1,4 phenanthrenequinone	OMe	OH	H

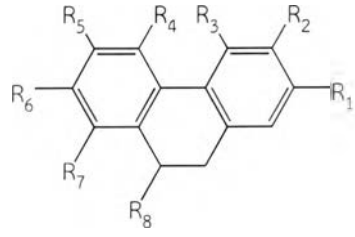


[186] Moniliformin



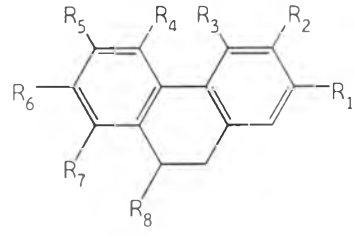
[187] Moscatin

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



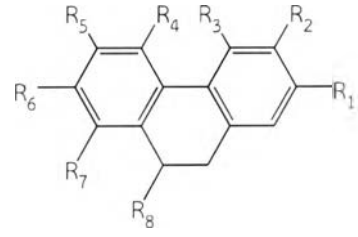
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[**137**] Coelonin	OH	H	OMe	H	H	OH	H	H
[**148**] 9,10-Dihydromoscatin	H	H	OH	OMe	H	OH	H	H
[**149**] 9,10-Dihydrophenan threne-2,4,7-triol	OH	H	OH	H	H	OH	H	H
[**150**] 4,5-Dihydroxy-2,3-dimethoxy-9,10-dihydro phenanthrene	OMe	OMe	OH	OH	H	H	H	H
[**151**] 4,5-Dihydroxy-2,6-dimethoxy-9,10-dihydro phenanthrene	OMe	H	OH	OH	OMe	H	H	H
[**152**] 4,5-Dihydroxy-3,7-dimethoxy-9,10-dihydro phenanthrene	H	OMe	OH	OH	H	OMe	H	H
[**156**] 4,5-Dihydroxy-2-methoxy-9,10-dihydro phenanthrene	OMe	H	OH	OH	H	H	H	H

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



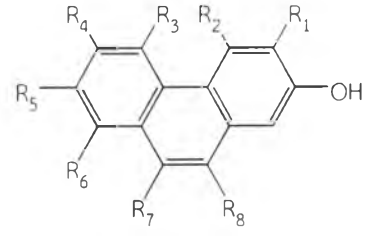
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[157] 4,7-Dihydroxy-2-methoxy-9,10-dihydrophenanthrene	OMe	H	OH	H	H	OH	H	H
[158] 2,7-Dihydroxy-3,4,6-trimethoxy-9,10-dihydrophenanthrene	OH	OMe	OMe	H	OMe	OH	H	H
[159] 2,8-Dihydroxy-3,4,7-trimethoxy-9,10-dihydrophenanthrene	OH	OMe	OMe	H	H	OMe	OH	H
[160] 4,7-Dihydroxy-2,3,6-trimethoxy-9,10-dihydrophenanthrene	OMe	OMe	OH	H	OMe	OH	H	H
[165] Ephemeranthol A	OH	H	H	OH	OMe	OMe	H	H
[166] Ephemeranthol C	OH	OH	OMe	OH	H	H	H	H
[169] Erianthridin	OH	OMe	OMe	H	H	OH	H	H
[173] Flavanthridin	OH	H	H	OMe	OH	OMe	H	H
[175] Hircinol	OH	H	OMe	OH	H	H	H	H

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



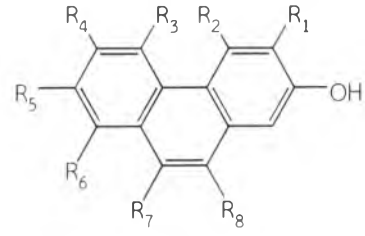
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[176] 2-Hydroxy-4,7-dimethoxy-9,10-dihydro phenanthrene	OH	H	OMe	H	H	OMe	H	H
[179] 3-Hydroxy-2,4,7-trimethoxy-9,10-dihydro phenanthrene	OMe	OMe	H	H	OMe	H	OH	H
[183] Lusianthridin	OMe	H	OH	H	H	OH	H	H
[184] 7-Methoxy-9,10-dihydrophenanthrene-2,4,5-triol	OH	H	OH	OH	H	OMe	H	H
[191] Plicatol C	OH	H	OMe	OH	H	H	H	OH
[192] Rotundatin	OH	H	OMe	OH	H	H	H	OH

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)

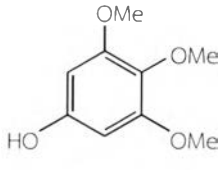


	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[**153**] 2,5-Dihydroxy-3,4-dimethoxyphenanthrene	OMe	OMe	OH	H	H	H	H	H
[**154**] 2,5-Dihydroxy-4,9-dimethoxyphenanthrene	H	OMe	OH	H	H	H	OMe	H
[**155**] 3,7-Dihydroxy-2,4-dimethoxyphenanthrene	H	H	OMe	OH	OMe	H	H	H
[**162**] 2,7-Dihydroxy-3,4,6-trimethoxyphenanthrene	OMe	OMe	H	OMe	OH	H	H	H
[**163**] 2,8-Dihydroxy-3,4,7-trimethoxyphenanthrene	OMe	OMe	H	H	OMe	OH	H	H
[**164**] 5,7-Dimethoxy phenanthrene-2,6-diol	H	H	OMe	OH	OMe	H	H	H
[**168**] Epheranthol B	H	H	OMe	OH	OMe	H	H	H
[**171**] Fimbriol B	OH	OMe	OH	H	H	H	H	H
[**174**] Flavanthrinin	H	H	OMe	H	OH	H	H	H
[**178**] 2-Hydroxy-3,4,7-trimethoxy-9,10-dihydro phenanthrene	OMe	OMe	H	H	OMe	H	H	H

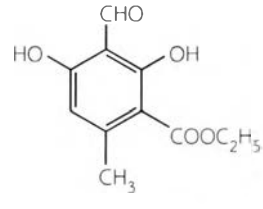
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



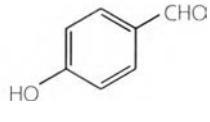
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
[**181**] Loddigesiinol A	H	OMe	OMe	H	H	H	OH	H
[**188**] Nudol	OMe	OMe	H	H	OH	H	H	H
[**189**] Plicatol A	H	OMe	OH	H	H	H	OMe	OMe
[**190**] Plicatol B	H	OMe	OH	H	H	H	H	H
[**193**] 2,3,5-Trihydroxy -4,9-dimethoxyphenanthrene	OH	OMe	OH	H	H	H	OMe	H
[**194**] 3,4,8-Trimethoxy phenanthrene- 2,5-diol	OMe	OMe	OH	H	H	OMe	H	H



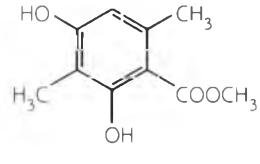
[**195**] Antiarol



[**196**] Ethylhaematommate

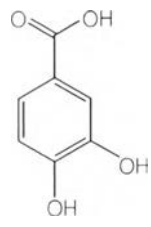


[**197**] *p*-Hydroxybenzaldehyde

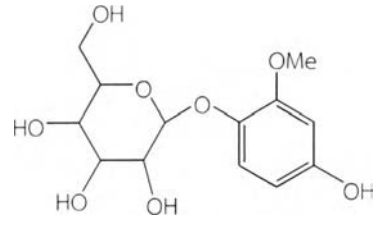


[**198**] Methyl β-orsellinate

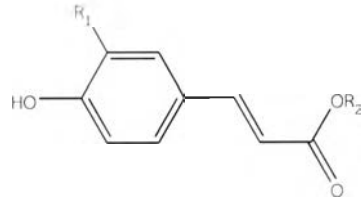
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



[199] Protocatechuic acid



[200] Tachioside



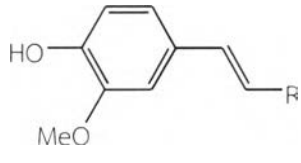
[201] Alkyl 4′-hydroxy-*trans*-cinnamates: R_1 = H, R_2 = C_nH_{2n+1}, n = 22-32

[202] Alkyl *trans*-ferulates: R_1 = OMe, R_2 = C_nH_{2n+1}, n = 18-28, 30

[203] Defuscin: R_1 = OMe, R_2 = $(CH_2)_{27}CH_3$

[213] *n*-Octacosyl ferulate : R_1 = H, R_2 = $(CH_2)_{29}CH_3$

[221] *n*-Triacontyl *p*-hydroxy-cis-cinnamate: R_1 = H, R_2 = C_nH_{2n+1}, n = 30

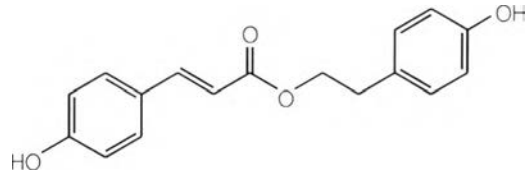


[204] Docosanoyl (*E*)-ferulate
R = $COOCO(CH_2)_{20}CH_3$

[205] *n*-Docosyl trans-ferulate:
R = $COOCH_2(CH_2)_{20}CH_3$

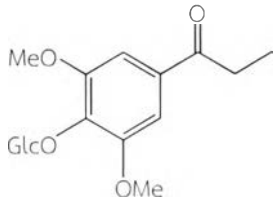
[206] Ferulaldehyde: R = CHO

[207] Ferulic acid: R = COOH

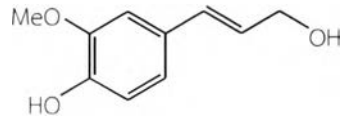


[208] 2-(*p*-Hydroxyphenyl)-ethyl-*p*-coumarate

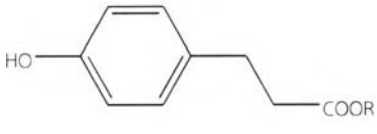
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



[209] 1-[4-(β-D-glucopyranosyloxy)-3,5-dimethoxyphenyl]-1-propanone

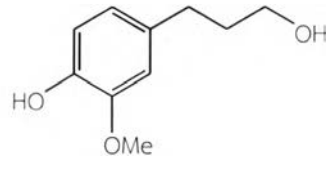


[210] 3-(4-Hydroxy-3-methoxyphenyl)-2-propen-1-ol

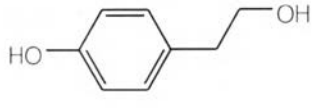


[211] *p*-Hydroxyphenyl propionic methyl ester: R = CH_3

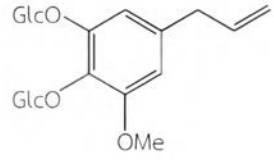
[214] Phloretic acid: R = OH



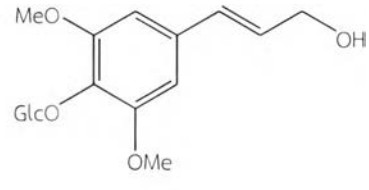
[212] 3-(3-Methoxy,4-hydroxyphenyl)-1-propanol



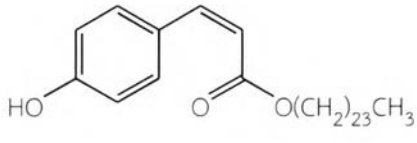
[215] Salidrosol



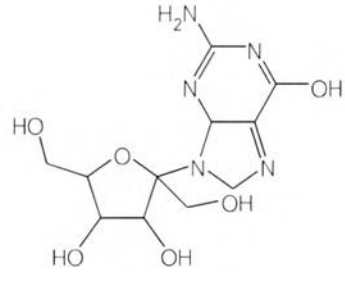
[216] Shashenoside I



[217] Syringin

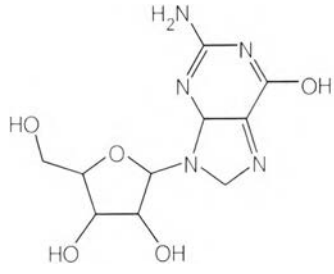


[220] Tetracosyl (*Z*)-*p*-coumarate

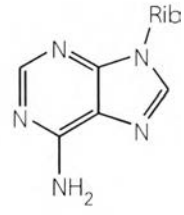


[222] 9-β-D-allofuranulsyguanine

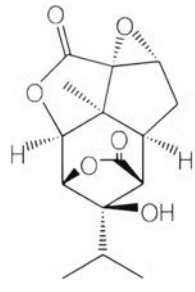
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



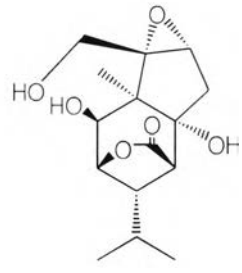
[223] Guanosine



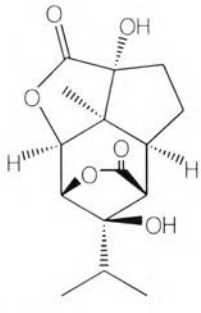
[224] 9-β-D-Ribofuranosyl-9*H*-purin-6-amine



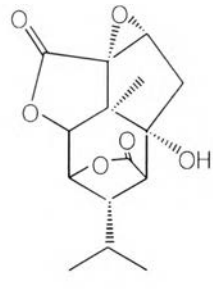
[225] Aduncin



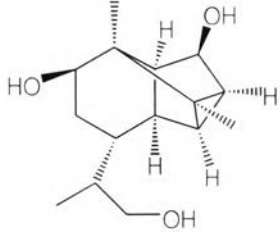
[226] Amoenin



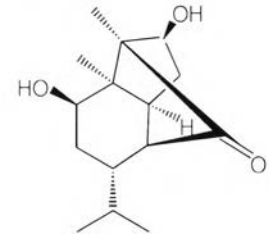
[227] Amotin



[228] α-Dihydropicrotoxinin

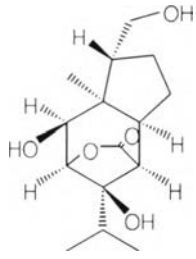


[229] Dendrobane A

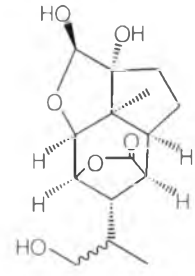


[230] Dendronobilin A

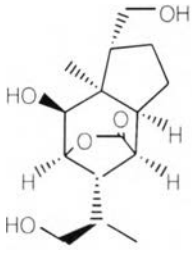
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



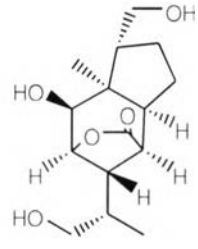
[231] Dendronobilin B



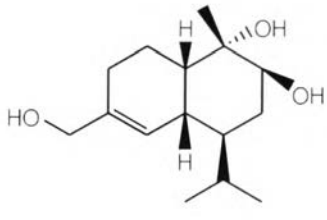
[232] Dendronobilin C



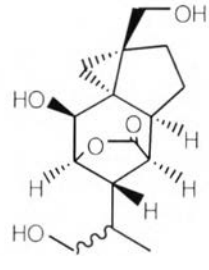
[233] Dendronobilin D



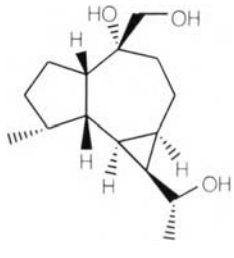
[234] Dendronobilin E



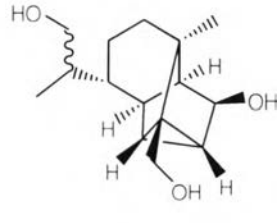
[235] Dendronobilin F



[236] Dendronobilin G

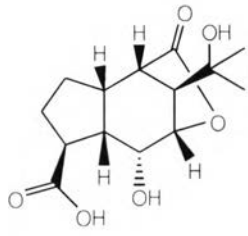


[237] Dendronobilin H

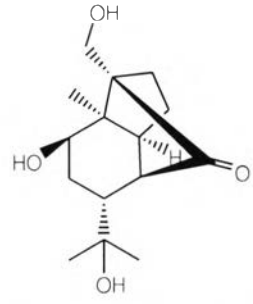


[238] Dendronobilin I

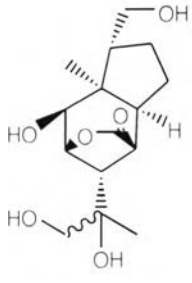
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



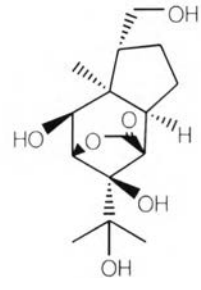
[239] Dendronobilin J



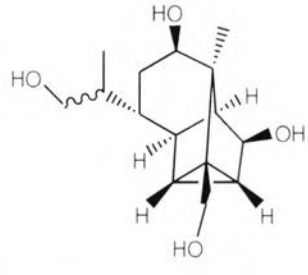
[240] Dendronobilin K



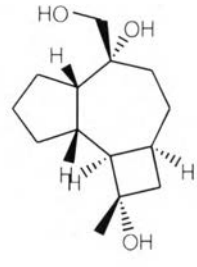
[241] Dendronobilin L



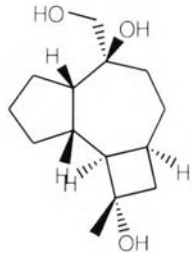
[242] Dendronobilin M



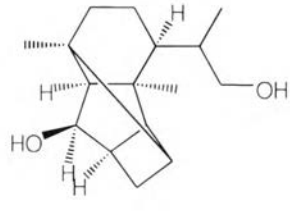
[243] Dendronobilin N



[244] Dendrowardol A

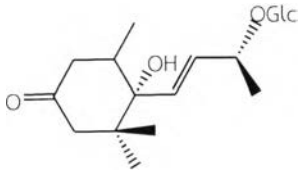


[245] Dendrowardol B

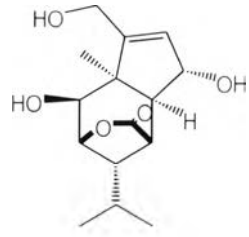


[246] Dendrowardol C

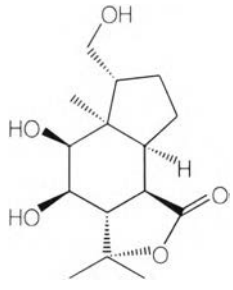
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



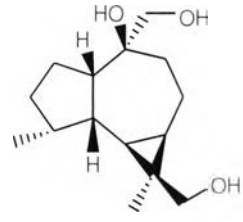
[247] Corchoionoside C



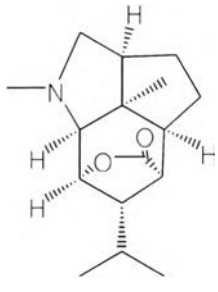
[248] Crystallinin



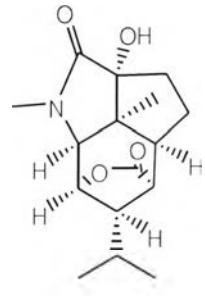
[249] Findlayanin



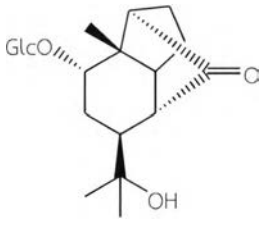
[250] 10β,12,14-Trihydroxyalloaromadendrane



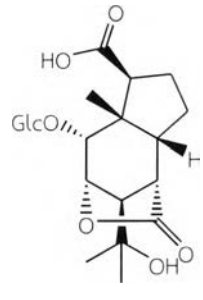
[251] Dendrobine



[252] 3-Hydroxy-2-oxodendrobine

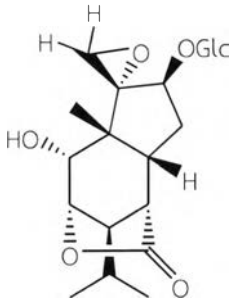


[253] Dendromoniliside A

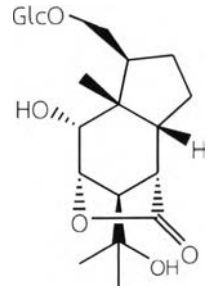


[254] Dendromoniliside B

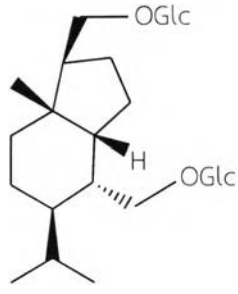
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



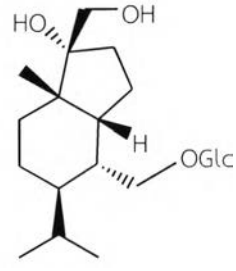
[255] Dendromoniliside C



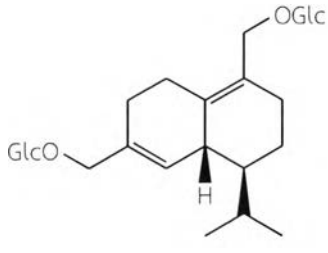
[256] Dendromoniliside D



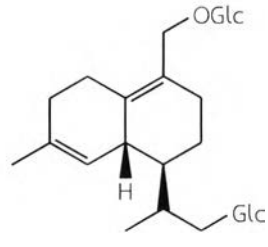
[257] Dendronobiloside A



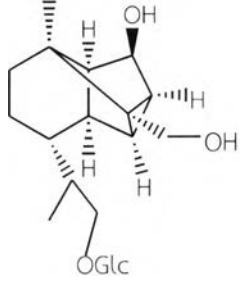
[258] Dendronobiloside B



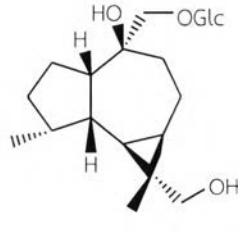
[259] Dendronobiloside C



[260] Dendronobiloside D

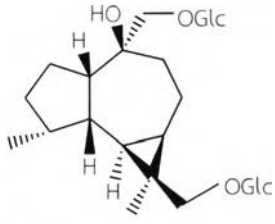


[261] Dendronobiloside E

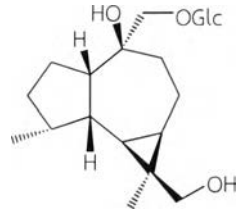


[262] Dendroside A

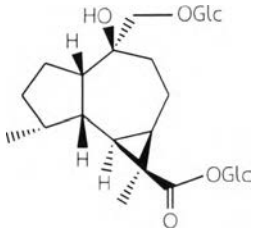
Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)



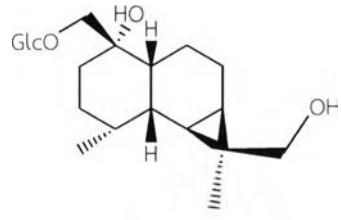
[263] Dendroside B



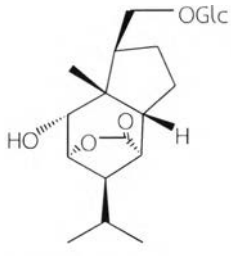
[264] Dendroside C



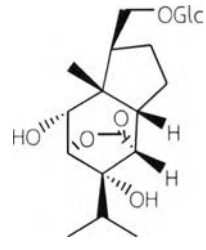
[265] Dendroside D



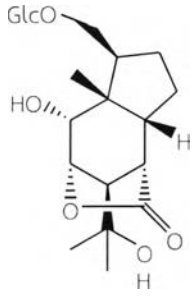
[266] Dendroside E



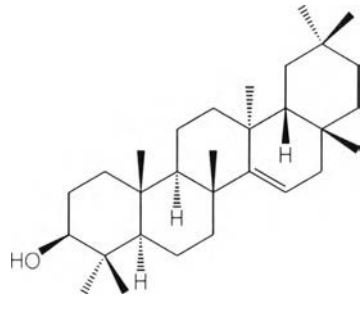
[267] Dendroside F



[268] Dendroside G



[269] Dendromoniliside D



[270] Taraxerol

Figure 2 Structures of compounds previously isolated from *Dendrobium* species (continued)