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PHYTOCHEMICAL AND PHARMACOLOGICAL RESEARCH ON PLANTS FROM THE GENUS PHOLIDOTA (ORCHIDACEAE)

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ABSTRACT

Ethnopharmacological Relevance: The plant of the *genus Pholidota* (Orchidaceae) is widely distributed, and have long been used in folk medicine for the treatment of various chronic bronchitis, toothache, treatment of dysentery, infections, asthma, bronchitis, eczema and duodenal ulcer, infections, rheumatism, cough suppressant, asthma, bronchitis, eczema inflammation, and muscular pain. **Aim of the Review:** In present review we emphasized the recent progress in the chemistry and biology this genus as well as its traditional uses. This database may provide guidance for researchers, chemists and herbologists for further investigation in the field **Materials and Methods:** All literature available on the genus *Pholidota* was collected via electronic search (using Scifinder, Google scholar,Scirus and Web of science), books, thesis and journals. **Results:** Ethnobotanical uses of different species of genus *Pholidota* have been reported from China, Pakistan, India, tropical asia to tropical australia and Nepal for their different types of ailments,Genus Senecio possesses different chemical constituents including alkaloids, bibenzyls, stilbenes, phenolic compounds, and some other compounds.Crude extract, fraction, and isolated secondary metabolities of genus *Pholidota* have shown a wide range of pharmacological activities including antibacterial, antifungal, antiproliferative Effects, antioxidant , anti-Inflammatory and cholinesterase inhibiting activities. **Conclusion:** The leaves and roots of *Pholidota* plants have been used for the treatment of dysentery, conjunctivitis, infections, rheumatism, fever in the folk medicine system for years without any adverse effect. However there is a need to search for individual secondary metabolities responsible for these actions and study their mode of actions, and physiological pathways in sufficient details.

KEYWORDS: *Pholidota species P,articulata P. imbricata*; *P.yunnanensis* Orchidaceae antiproliferative Effects.

INTRODUCTION

The genus *Pholidota* (Orchidaceae) belongs to the tribe coelogyneae, and comprises 55 species with a distrubution from tropical asia to tropical australia and china. Among them 9 species in India. Commonly distributed from submontane to montane Himalaya. The genus *Pholidota* are epiphytic herbs generally grown on rocks and trees (Gaur. R.D et al., 1999).

Traditional Uses

The plants of the genus *Pholidota* are used traditionally for medicinal purposes. The whole plant has long been used as a remedy for acute or chronic bronchitis, toothache, treatment of dysentery, infections, asthma, bronchitis, eczema and duodenal ulcer (Zhong Hua, et al.,1999). A marketed syrup made from the ethyl alcohol extracts of the plant exhibited obvious activity to treat headache without side effects (X. S. Lin, et al., 1985). The whole plant or pseudobulb of *P. yunnanensis* a perennial herb is used as a folk medicine for the treatment of cough, rheumatism, stomachache, and trauma (Jiangsu et al., 1986; Institute of Botany, et al., 1976). The occasionally used as *Pholidota* species as a remedy for altitude sickness to relieve joint pain and tonic (Gaur. R.D et al.,1999).

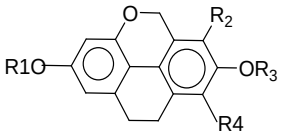
Chemical Constituents and Biological Activities of Genus *Pholidota*

Chemical constituents and biological activities of important *Pholidota* species have been summarized below

Chemical constituents of genus *Pholidota*

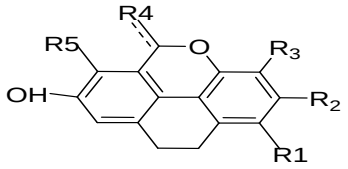
Pholidota articulala

Flavidin (P.L.Majumder.et al.,1982;),[1] Isoflavinin, Isooxo flavidinin (P.L. Majumder et al.,1982),[2] Flavidin diacetate (T. Onaka et al., 1965),[3] Diacetyl derivative (Y. Inubushi, et al.,2007),[4] Coelogin (L. Blonquist et al.,1973),[5] 9.10–dihydrophenanthrene derivatives (P.L. Majumder et al.,1980),[6] Orchinol (R.M . Letcher et al.,1973), Phytoalexin (L.V. Metlitskii et al.,1970), Coelogin acetate (J.B. Stothers et al.,1972), Oxymethylene (E.L. Eliel, et al., 1975), 9,10, Methylene (R.M. Letcher et al.,1972), Flavidin dimethyl Ether (C. M. Natsume et al., 1966), Dimethyl ether (P. L. Majumder. et al., 1982).



1

3 : R1 = R3 =AC, R2 =R4 =H
4 : R1 =R3 =Me , R2 = R4 =H
5 : R1 =H,R2 =OH, R3 =Me, R4 =OMe
6 : R1 = R2 = R3 = R4 =H

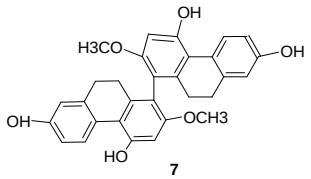


R1	R2	R3	R4	R5
H	MeO	H	-H	H
MeO	H	=O	H	H

2

Pholidota Yunnanensis

4,4',7,7'tetrahydroxy-2,2'-dimethoxy–9,9',10,10'-tetrahydro1,1'-bi-phenanthrene,(B, Zhinming, et al.,2004),[7] 9,10,dihydro-2,4-7-trihydroxy phenanthrene,[8] Lusianthridin (X. Guojun China B, et al.,2004; R.G. Knoules et al.,1994),[9] 2,4.7-trihydroxy -9,10 dihydro-phenanthrene (P.L.Majumder. et al.,1990),[10] Imbricatin (T.T Lee. et al., 1978; P.L.Majumder et al.,1982; X.Y- Guo et al.,2006; X.Y. Guo et al.,2007),[11] 6-[2'-3',3 dihydroxy–5-methoxybibenzey]–4,7-dihydroxy–2 –methoxy -9,10 –di -hydro-phenanthrene (Jiuyngsu, et al.,1986),[12] 6-[6'-(trans3',3"-dihydroxy-5'-methoxy-stilbene)]-4,7, -dihydroxy-2methoxy 9,10dihydro phenan threne(The institute of botany et al.,1976),[13] 2,4,7,trihydroxy-9,10-dihydro phenanthrene (H. Yang et al.,2002),7-[2-(3-hydrophenyl)- 4 – hydroxyl – 6 – methoxy -phenoxy]-4-hydroxy-2methoxy 9,10 dihydrophenanthrene (Jiangsu et al.,1986),[14] 1-[(9,10-dihydro-4-hydroxy-2-methoxy-7-phenanthrenyl)oxy]-4,7-dihydroxy-2methoxy-2-methoxy-9,10 dihydro-phenanthrene (Institute of Botany et al., 1976),[15] Trans-3,3-dihydroxy 2,4,5-trimethoxytilbene (X.M.Ma et al., 1995),[16] Trans-3,4dihydroxy-2,3,5 dimethoxy-stilbene,[17] Trans-3,3-dihydroxy-2,5-dimethoxystilbene (Bi. Z.M Wang et al., 2004),[18] Trans-3-hydroxy-2,3,5-trimethoxystilbene(Majumder.P.L et al., 1990),[19] (E)-4'- hydroxy- 2'3.3'5- tetramethoxy stilbene (Jiuyngsu et al.,1986),[20] (E)-3.4 dihydroxy- 2.6. bis (4-hydroxybenzyl) 2', 3', 5 trimethoxybenzyl (provinee. Yi et al.,2005),[21] Phoyunnanin A,[22] Phoyunnanin B,[23] Phoyunnanin C (X.Y.Guo, et al.,2007),[24] 2.5-dihydroxy-3.4-dimethoxy- 9,10- dihydro phenan -threne (D.O. Adaun et.al.,1984), 2,5-dihyclroxy-3-4.6–trimethoxy-9,10 dihydro phenanthrene (P.L. Majumder et al.,1982), 2,4,7 trihydroxy-9,10diphenanthrene (S.R. Bhandari et al.,1983), Coelogin (E- Samuel, et al.,1999),[25] Bulbophyll B (P.L. Majumder et al.,1990), Moscatirisine (M. Toshio et al.,1988), 2,5 dhydroxy 3.4 – dimethoxy phenantherene (H. yang. Zbhu et al.,2002), Phoyunbene B (Y. W. Leong, et al., 1997), E- 2'3 – dihydroxy – 2-6 bis (4- hydroxy benzyl)- 5-methoxystilbene (P.L. Majumder et al.,1985), Bulbophyll (P.L. Majumder et al.,1987), 3,3'–dihydroxy–2-6-bis(4-hydroxybenzyl)-5-Methoxybibenzyl (E. Gan. et al., 2007), Coelonin (X.Y. Guo et al., 2006),[26] Lusianthridin,[27] 9.10. dihydro- 4,5-dihydroxy-2- methoxyphenanthrene (G.H. Wang et al.,2007),[28] pholidotol,[29] 9.9', 10,10' Tetra hydro 4,4', 4,7, tehramptoxy 2,2'- dimethoxy-1, 1-biphenanthrene,[30] Phoyunnanin D,[31] Phoyunnanin E (X.Y. Guo. et al.,2006),[32] Densiflorol B (Z.M. Bi et al.,2005),[33] 3.3', 5- trihydrobibenzyl (X.Y. Guo. et al.,2006),[34] Batatasin III,[35] Gigantol,[36] (Z) 3,3', dihyohroxy -5- methoxy stilbene,[37] (E)3.3', 5-trihydroxy stilbene,[38] (E)3,3'5- Trihydroxy- 2'-methoxy stilbene (Z.M. Bi et al.,2004),[39] Phoyunbene A,[40] Phoyunbene B,[41] Phoyunbene C,[42] Phoyunbene D (X.Y. Guo et al.,2006),[43] Cyclopholidone,[44] Cyclopholidonal,[45] Cycloneolitsol (Z.M. Bi et al.,2005),[46] Pholidotanin,[47] Pholidotanin A (X.M. Ma et al.,1995),[48] Pholidotine B,[49] β-Sitostorol (Z.M. Bi et al.,2005),[50] Daucosterol (Z.M. Bi et al.,2004),[51] (6 β,24 R)- 6 – Hydroxy -24. ethylcholest – 4- en- 3 one,[52] (3 β, 5α, 8α, 24 R), 5 – 8, Epidioxy- 24- methylcholesta-6-22-dien- 3-ol (Z.M. Bi, et al.,2005),[53] (-) Pinoresinol,[54] (-) Syringaresinol,[55] 4- (3 Hydroxyphenyl) butan–2-one,[56] 4-(3- Hydroxy- 2-methoxyphenyl) butan-2-One (X.Y.Guo et al.,2006),[57] 4- Hydroxy -3,5. Dimethoxypropiophenone (Z.M. Bi, et al., 2005),[58] Nonacosane,[59] Dotriacontanoic acid,[60] Octacosyl ferulate (Z.M. Bi et al.,2004).[61]



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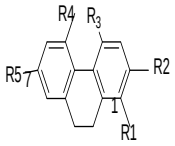
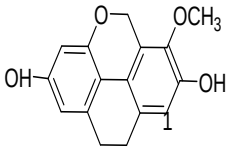


8R1 = R4 = H, R2 = OCH3, R3 = R5 =OH
9R1 = R4 = OH R2 = R5= O CH3, R3 = H
10R1 = R4 = H, R2 = R3 = R5 = OH



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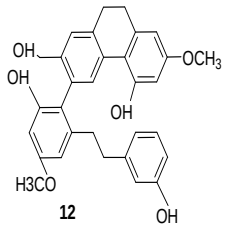

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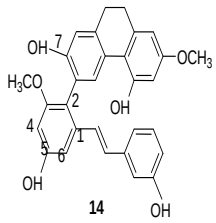

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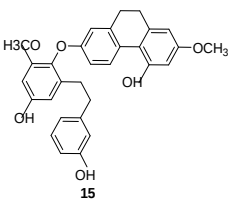

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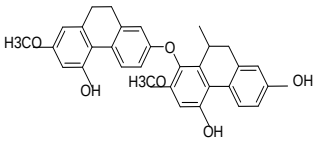

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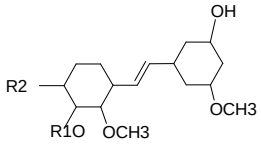
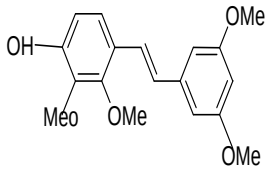


17 R1 =CH3,R2 =OH
18 R1 =R2 =H
19 R1 =CH3 ,R2 =H



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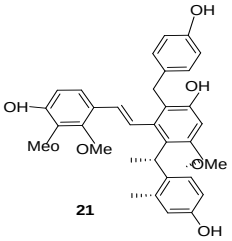

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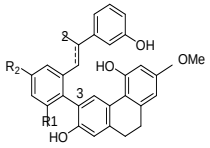
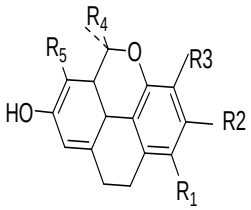
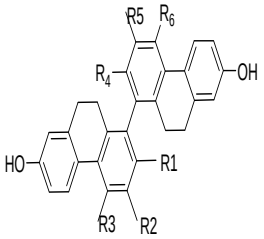
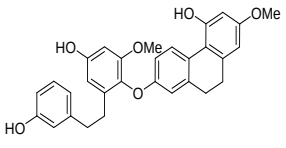


	R1	R2	
22	Meo	OH	C(1)-C(2)
23	OH	Meo	C(1)-C(2)
24	OH	Meo	C(1)=C(2





25 H OH H -H Meo R1 R2 R3 R4 R5 R6
26 H OH H MeO H OH
27 H MeO H OH H OH
28 H MeO H OH OH H
29 OH MeO H - O - OH
30 Meo H OH Meo H OH



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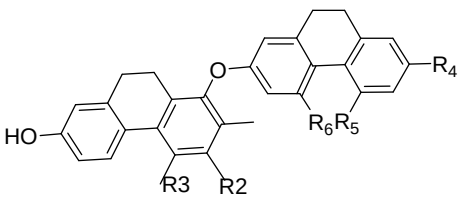
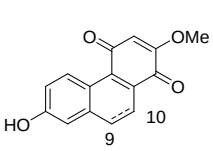
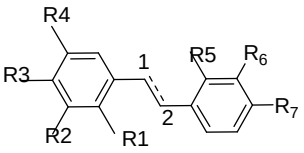


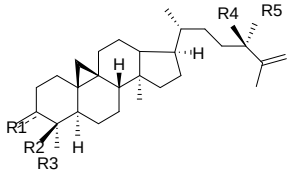
R1	R2	R3	R4	R5	R6

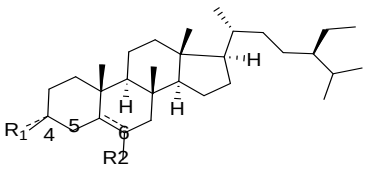
32	MeoH	OH	Meo	OH	H





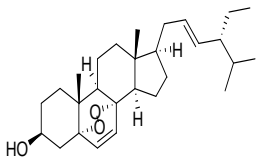
33 C (9) = C (10)
R1 R2 R3 R4 R5 R6 R7
34 H OH H OH H OH H C (1)-C (2)
35 H OH H Meo H OH H C (1)-C (2)
36 H OH H Meo H Meo OH C (1)-C (2)
37 H OH H Meo H H OH (Z) –C (1)-C (2)
38 H OH H OH H OH H (E)- C (1)-C (2)
39 H OH H OH Meo OH H (E)- C (1)-C (2)
40 H OH H Meo Meo OH Meo (E)-C (1)-C (2)
41 H OH H Meo Meo Meo OH (E)-C (1) =C (2)
42 H OH H Meo Meo OH H (E)-C (1) =C (2)
43 H OH H Meo Meo Meo H (E)-C (1) =C (2)





	R1	R2	R3	R4	R5
44	=O	H	H	Me	Me
45	B-OH	H	Me	Me	Me
46	B-OH	Me	Me	Me	Me
47	B-(p-hydroxy-trans-cinnamoyl)O	Me	Me	H	H
48	B-(p-hydroxy-trans-cinnamoyl)O	H	Me	Me	Me
49	B-(p-hydroxy-cis-cinnamoyl)O	H	Me	Me	Me

	R1	R2	
50	B-OH	H	C(5)=C(6)
51	B-GlcO	H	C(5)=C(6)
52	=O	B-OH	C(4)=C(5)



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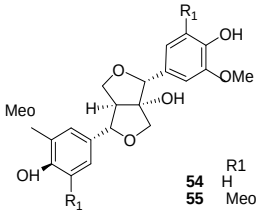
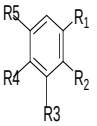
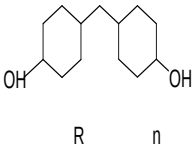


	R1	R2
54	H	H
55	Meo	Meo



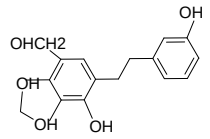


	R1	R2	R3	R4	R5
56	MeC(O)(CH2)2	H	OH	H	H
57	MeC(O)(CH2)2	MeO	OH	H	H
58	MeC(O)(CH2)2	H	MeO	OH	MeO

	R	n
59	Me	27
60	COOH	30
61	OH	25

Pholidota Chinensis

Pholidotol A (Lih, Feng, et al.,2006),[62] Pholidotol B (Zhanhg, et al.,1999),[63] 2-hydrocy-5-methoxy-3,4,3'4'-Dimethoxylenedioxy-5-methoxydihydrostilbene (Majumder, P.L et al.,1993),[64] 3,4'dihydroxy-4 methoxy dihydrostilbene (Yamato M et al.,1977),[65] Thunalbene (Majumder P.L et al.,1998),[66] Trans-3-hydroxy-2-3'-5 trimethoxystilbene (Guo X.Y et al.,1977),[67] Resveratrol (Ingham. J. Let al.,1976),[68] Trans-3-3' dihydroxy-2',5dimethoxystilbene (Guo X.Y. wang et al.,2006),[69] Coelonin,[70] Cannabidihydrophenanthrene,[71] Hircinol,[72] 9,10-dihydro-7-hydroxy-2,3,4-trimethoxyphenanthrene,[73] Eulophiol,[74] 9,10,dihydro-2,4-7-trihydroxy phenanthrene (J. wang et al.,2007),[75] 9,10,dihydro-2,4 dihydroxy-7 methoxyphenanthrene (B. Wu. et al.,2008),[76] Flavanthrin,[77] Gymconpin,[78] Blestrianol A,[79] Blestrin A,[80] Phochinenin A,[81] Phochinenin B,[82] Phochinenin C,[83] Phochinenin D,[84] Phochinenin E,[85] Phochinenin F,[86] Phochinenin G,[87] Phochinenin H,[88] Phochinenin I,[89] Phochinsenin J,[90] Phochinenin K,[91] Phochinenin L (S. Yao et al.,2007,[92] Phohyunnain D,[93] Batatasin III,[94] Gigantol (S.Yao,et al.,2008),[95] 2,5-Dimehtoxy-3,4:3',4'-bis(methylenedioxy)bibenzyl,[96] 3'5'-Dihydeoxy-2,3-(methylenedioxy) bibenzyl (B. Wu. H et al.,2008),[97] Pholidotol A,[98] Pholidotol B,[99] 3,4'Dihydroxy-4-methoxydihydrostilbene,[100] 3,4'-Dihydroxy-5-mehoxydihydro stilbene (J. Wang k.et al.,al.,2006),[101]



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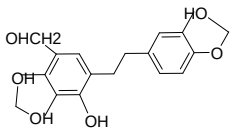

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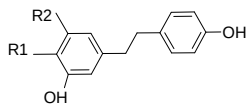
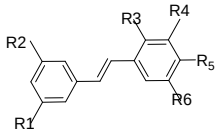
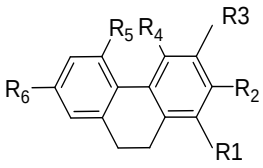
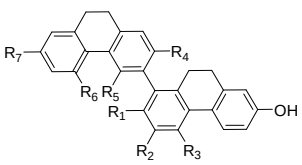


	R1	R2
64	H	OCH3
65	OCH3	H



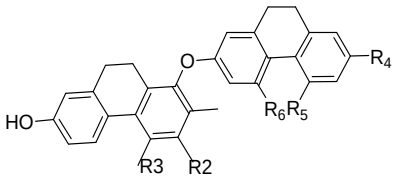
	R1	R3	R4	R5	R6	R7
66	OH	OCH3	H	OH	H	H
67	OH	OCH3	OCH3	OCH3	H	H
68	OH	OH	H	H	OH	H
69	OH	OCH3	OCH3	OH	H	H



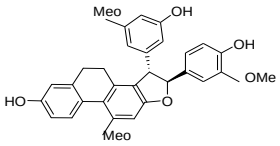


	R1	R2	R3	R4	R5	R6	R7
70	H		OH	H	Meo	H	OH
71	H		H	OH	H	OH	Meo
72	H		OH	H	Meo	OH	H
73	H		Meo	H	OH	OH	H
74	OH		Meo	H	H	OH	Meo
75	H		OH	H	OH	H	OH
76	H		OH	H	OH	H	Meo
77	OH		H	Meo	OH	H	Meo

	R1	R2	R3	R4	R5	R6	R7
78	OH	H	MeO	OH	H	MeO	OH
79	OH	H	MeO	OH	MeO	H	OH



	R1	R2	R3	R4	R5	R6
80	OH	H	MeO	OH	H	MeO
81	H	Meo	OH	OH	H	OH
82	H	Meo	OH	H	Meo	OH
83	H	MeO	OH	OH	MeO	H
84	H	MeO	OH	MeO	OH	H
85	H	MeO	OH	OH	H	MeO



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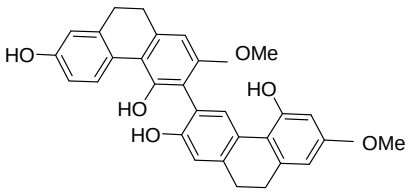
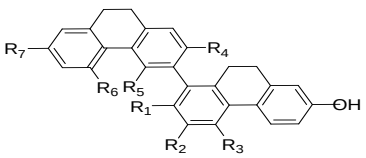
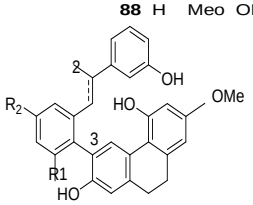
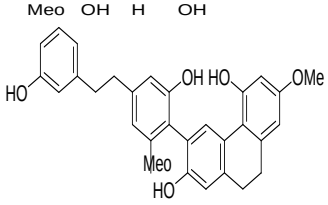


87



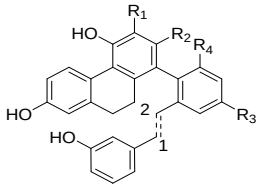
88 H Meo OH Meo OH H OH



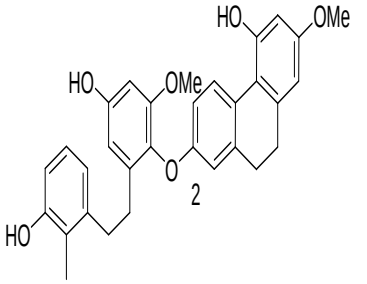


	R1	R2	
89	Meo	OH	C(1)-C(2)

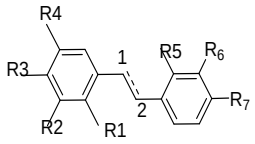
90



	R1	R2	R3	R4	
91	H	Meo	OH	Meo	C(1)-C(2)
92	Meo	H	Meo	OH	C(1)=C(2)



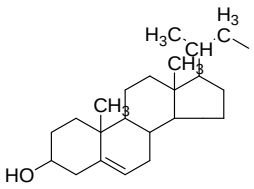
93



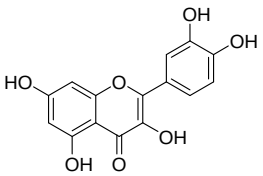
	R1	R2	R3	R4	R5	R6	R7	
94	H	OH	H	MeO	H	OH	H	C(1)-C(2)
95	H	OH	H	MeO	H	MeO	OH	C(1)-C(2)
96	MeO	O-CH2-O		MeO	H	O- CH2-O		C(1)-C(2)
97	O -CH2 -O		H	OH	H	OH	H	C(1)-C(2)
98	OH	O-CH2-O		MeO	H	OH	H	C(1)-C(2)
99	OH	O-CH2-O		MeO	H	O-CH2-O		C(1)-C(2)
100	H	OH	MeO	H	H	H	OH	C(1)-C(2)
101	H	OH	H	MeO	H	H	OH	C(1)-C(2)

Pholidota Pallida

Cholesterol (Finar. I.L, et al., 1986),[102] Quercetin (Zhishen., J et al.,1999),[103] Catechol (Sadasivam. S, et al., 1997)



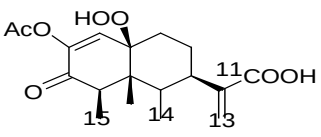
102



103

Pholidota Haeckeria

2-Acetoxy –10β-hydro-Peroxy-7.α H- eremophile- 1(2), 11(13)- dien-3-on-12-oic acid (C. Zdero. F. Bohlmann et al.,1991),[104]



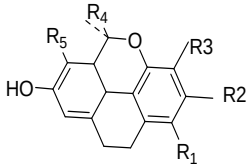
104

Pholidota Protracta

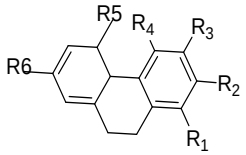
Flaccidin,[105] Coelogin,[106] Coelonin,[107] 9-10, Dihydro-7-hydroxy 2,3,4

Trimethoxyphenanthrene,[108] 3- Hydroxy-5- mehoxy bibenzyl,[109] Batatasin iii,[110] Gigantol,[111] Hydroquinone,[112] 3- (Hydroxymethyl) phenol,[113]

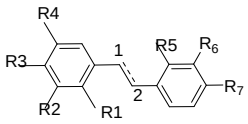
Dihydroceniferylalcohol,[114] Salicylic acid (R. Zhan K. Min et al.,2010).[115]



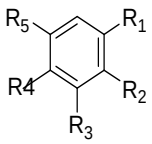
R1 R2 R3 R4 R5
105 H Meo OH -H H
106 Meo Meo OH -H H



R1 R2 R3 R4 R5 R6
107 H OH H Meo H OH
108 H Meo Meo Meo H OH



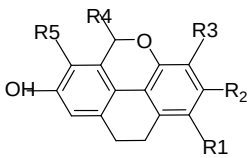
	R1	R2	R3	R4	R5	R6	R7
109	H	OH	H	MeO	H	H	H
110	H	OH	H	MeO	H	OH	H
111	H	OH	H	MeO	H	MeO	OH



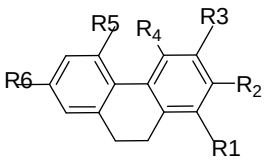
	R1	R2	R3	R4	R5
112	OH	H	H	OH	H
113	OH	H	HO-CH2	H	H
114	OH	MeO	H	HO-(CH2)3	H
115	COOH	OH	H	H	H

Pholidota imbricata

Imbricatin.[116] Coelonin (P.L. Majumder et al., 1982).[117]



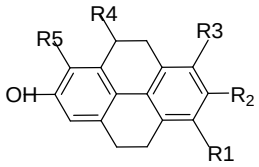
R1 R2 R3 R4 R5
116 H OH H -H MeO



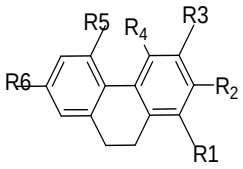
R1 R2 R3 R4 R5 R6
117 H OH H MeO H OH

Pholidota rubra

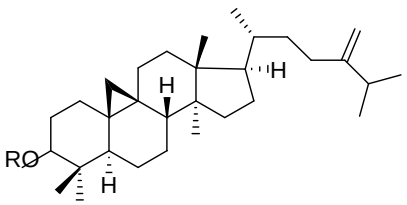
Imbricatin,[118] Coelonin,[119] Pholidotin,[120] 24-Methylidenecycloartan 3-yl, p- Hydroxyeinnamate (P.L. Majumder et al.,1987).[121]



	R1	R2	R3	R4	R5
118	H	OH	H	-H	MeO



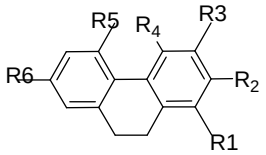
	R1	R2	R3	R4	R5	R6
119	H	OH	H	MeO	H	OH



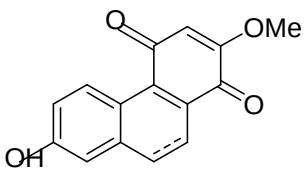
120 R = p-hydroxy-cis-cinnamoyl
121 R = p-hydroxy-trans-cinnamoyl

Pholidota Contonensis

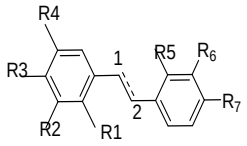
9, 10-Dihydro-4, 5 Dihydroxy-2-methoxyphenanthrene,[122] Ephemerantho-quinene,[123] Batatasin iii,[124] Pholidonene (J.C.,Li, L.Feng, et al.,2008).[125]



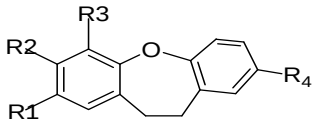
	R1	R2	R3	R4	R5	R6
122	H	Meo	Meo	Meo	H	OH



123 C(9)=C(10)



	R1	R2	R3	R4	R5	R6	R7	
124	H	OH	H	Meo	H	OH	H	C(1)-C(2)



	R1	R2	R3	R4
125	O- CH2-O		OH	Meo

Pholidota Leveilleana

9,10-Hydrophenanthropyrene,9,10- dihydrophenanhrens, Bibenzyls. Stilbenes, Triterpens, Steroids, Lignans, benzoxepins and phenolic compound,(Zhi-Peng Yuan et al., 2013).

Biological Activities of Genus *Pholidota*

Cytotoxic Activity The cytotoxicity of stilbenoids, 9,10-Dihydro-2,4-dihydroxy-7-methoxyphenanthrene,2,5-Dimethoxy-3,4:3',4bis(methylenedioxy)bibenzyl and 3',5-Dihydroxy-2,3-(methylenedioxy) bibenzyl isolated from *P. chinensis* against four human tumor cell lines by using the MTT (B.Wu et al.,2008).

DPPH Free Radical Scavenging Activity 9,10-dihydrophenanthrene derivatives, Imbricatin, Lusianthridin, Eulophiol isolated from the whole plant of *P. yunnanensis* were tested for 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity (X.-Y. Guo, et al.,2007).whole plant showed potent antioxidant effects against the DPPH free radical with IC50 values in the range of 13.5– 58.7 mm, similar to those of quercetin (IC50 32.1 mm) and ascorbic acid(IC50 8.9 mm) (J. Wang et al., 2007).

Anti-Inflammatory Activity During anti-allergic activity studies, it was found that the AcOEt extract of *P. chinensis* aerial parts showed strong nitric oxide (NO) production inhibitory activity (89.2% at 30 mg/ml) in murine macrophage-likecell line (RAW 264.7), activated by lipo-polysaccharide (LPS) and interferon-γ (IFNγ) (J. Wang et al., 2006). Further bioassay-guided purification of the AcOEt extract resulted in the isolation of eight anti-inflammatory constituents,

Antiproliferative Effects The antiproliferative effects of a fraction prepared from the CHCl3 extract of *P. yunnanensis* against HepG2, NCI-H460, and MCF-7 human carcinoma cells (G.H.Wang et al., 2006).

Nitric Oxide Production-Inhibitory Activity Compounds, Coelonin, Lusianthridin, Cannabidihydrophenanthrene, Cannabidihydrophenanthrene, 9, 10-Dihydro-4, 5-

dihydroxy-isolated from *P. chinensis* were tested for their NO production inhibitory activities by (J.Wang et al.,2007). The whole plant of *P. yunnanensis*, in activated ratmacrophage-like cell line (RAW 264.7) by a microplate ultraviolet colorimetric method (X.-Y. Guo et al., 2006).

Other Activities Bulbophylol B isolated from *P. chinensis*, inhibited inducible nitric oxide synthase (iNOS) expression stimulated by LPS and IFN-g at 30 mm, compared to resveratrol (100 mm) (J. Wang, et al., 2007). The EtOH extracts of *P. chinensis* was reported to have an inhibitory activity on the central nervous system (J. X. Liu, et al., 2004) as well as analgesic, antifatigue, and antihypoxia effects (H. X. Liu et al., 2004; J. X. Liu et al., 2006).

CONCLUSIONS

Pholidota species are distributed all over the world, Phytochemical studies on the plants of this genus had led to the isolation of above 100 compounds including stilbenoids, alkaloids, triterpenes, steroids, lignans, benzoxepins, phenolic compounds, etc. Moreover, the crude extracts and some chemical constituents were found to possess different biological activities. Thus, much attention should be paid to Pholidota species on further phytochemical and pharmacological studies.

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