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## Phytoconstituents from the genus *Polyalthia* – a review

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### ABSTRACT

A review of the phytoconstituents of the genus *Polyalthia* (Annonaceae) so far reported, has been presented considering that the genus comprises of 70 species and distributed all around the world. Keeping in view of the potential of the genus, an attempt is made to present a review of phytoconstituents of the genus *Polyalthia* which still remains as a source of lead molecules.

**Key words:** *Polyalthia*; phytoconstituents; Annonaceae

### INTRODUCTION

Genus *Polyalthia* (Annonaceae) comprises of about 70 species, out of which only 7 are indigenous to India. These include *P. longifolia*, *P. longifolia* var *pendulla*, *P. simiarium*, *P. cerasoides*, *P. fragens*, *P. coffeoides* and *P. jentensii* (1). In Indian System of Medicine, the plants are being used as bitter tonic, abortifacient, febrifuge, a cure for scorpion stings, high blood pressure and as a respiratory stimu-

lant (2). The genus has been investigated phytochemically and was reported to contain alkaloids, flavonoids, acetogenin, triterpenoids etc. Due to abundance of bioactive constituents (mostly alkaloids) in this genus and research work published on *Polyalthia* species, it was felt worthwhile to present a phytochemical review of all the compound isolated so far from the genus *Polyalthia*.

A list of chemical constituents reported in literature from the genus *Polyalthia* till date is given below in the Table no. 1.

**Table no. 1: List of chemical constituents isolated from genus *Polyalthia***

Name of the compound	Source (plant part)	Structure	Reference numbers
<b>ALKALOIDS</b>			
<b>APORPHINE</b>			
Anolobine	<i>P. acuminata</i> (b & l)	1	3
Anonaine	<i>P. acuminata</i> (b & l)	2	3
	<i>P. emarginata</i> (l)		6
	<i>P. oliveri</i> (sb & l)		9
	<i>P. longifolia</i> (l)		24
	<i>P. purpurea</i> (w)		56
Asimilobine	<i>P. acuminata</i> ( l)	3	3
	<i>P. stenopetala</i> (sb)		25
	<i>P. suberosa</i> (sb)		34
	<i>P. insignis</i> (b)		57
Cavarine	<i>P. acuminata</i> (b & l)	4	3
3-hydroxy-nornuciferine	<i>P. acuminata</i> (l)	5	3
Isoboldine	<i>P. acuminata</i> (l)	6	3
Isopiline	<i>P. acuminata</i> (l)	7	3
3-hydroxy nuciferine	<i>P. acuminata</i> (l)	8	3
O-methyl isopiline	<i>P. acuminata</i> (l)	9	3
Norannuradhapurini	<i>P. acuminata</i> (l)	10	3
Norliridinine	<i>P. acuminata</i> (l)	11	3
Nornuciferine	<i>P. acuminata</i> (l)	12	3
Tuduranine	<i>P. acuminata</i> (l)	13	3
Boldine	<i>P. cauliflora</i> var <i>beccari</i> (b)	14	4
N-methyl cordine	<i>P. oliveri</i> (sb & l)	15	9
Norconovine	<i>P. oligosperma</i> (tb)	16	6
Predicentrine	<i>P. cauliflora</i> var <i>beccari</i> (b)	17	4
Polygospermine	<i>P. oligosperma</i> (b)	18	6
Dehydropredicentrine	<i>P. cauliflora</i> var <i>beccarii</i> (l)	19	4
Bidebilines A-D	<i>P. debilis</i> (rt)	-	63
Bidebiline E	<i>P. cerasoides</i> (rt)	-	68



Name of the compound	Source (plant part)	Structure	Reference numbers
<b>7-SUBSTITUTED APORPHINE</b>			
Guatterine	<i>P.suaveolens</i> (tb)	<b>20</b>	11
N-methyl pachypodanthine N-oxide	<i>P.oliveri</i> (sb &l)	<b>21</b>	9
Noroliveridine	<i>P.oliveri</i> (sb &l)	<b>22</b>	9
Noroliverine	<i>P.oliveri</i> (sb & l)	<b>23</b>	9
	<i>P.suaveolens</i> (tb)		11
Noroliveroline	<i>P.acuminata</i> (b & l)	<b>24</b>	3
	<i>P.longifolia</i> (st)		26
Norushinsunine	<i>P.acuminata</i> (b & l)	<b>25</b>	3
	<i>P.nittidissima</i> (b)		8
	<i>P.cauliflora</i> (b)		4
Oliveridine	<i>P.oliveri</i> (sb &l)	<b>26</b>	9,10
	<i>P.suaveolens</i> (b)		11
	<i>P.longifolia</i> (b)		9
Oliveridine N-oxide	<i>P. suaveolens</i> (b)	<b>27</b>	12
Oliverine	<i>P.oliveri</i> (sb & l)	<b>28</b>	9,10
	<i>P.suaveolens</i> (b)		11
	<i>P.longifolia</i> (b)		9
Oliverine N-oxide	<i>P.suaveolens</i> (tb)	<b>29</b>	12
	<i>P.macropoda</i> (sb)		25
Oliveroline	<i>P.oliveri</i> (sb & l)	<b>30</b>	9
	<i>P.suaveolens</i> (tb)		11
	<i>P.macropoda</i> (sb)		25,45
Oliveroline N-oxide	<i>P.oliveri</i> (sb & l)	<b>31</b>	9
	<i>P.longifolia</i> (st)		24,26
	<i>P.macropoda</i> (sb)		25
Pachypodanthine	<i>P.oliveri</i> (sb & l)	<b>32</b>	9
	<i>P.suaveolens</i> (sb)		11
Polyalthine	<i>P.suaveolens</i> (sb)	<b>33</b>	11
	<i>P.oliveri</i> (sb & l)		9
Polysuavine	<i>P.suaveolens</i> (tb)	<b>34</b>	11,12
	<i>P.oliveri</i> (sb & l)		9
Ushinsunine	<i>P.nittidissima</i> (b)	<b>35</b>	8
	<i>P.cauliflora</i> (b)		4
Norlirioferine	<i>P.longifolia</i> (tb)	<b>36</b>	24
<b>OXOAPORPHINE</b>			
Atherospermidine	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>37</b>	4
	<i>P.purpurea</i> (w)		56
Lanuginosine	<i>P.suberosa</i> (sb)	<b>38</b>	34
	<i>P.longifolia</i> var <i>pendulla</i> (b)		35
	<i>P.emarginata</i> (tb)		6
	<i>P.oliveri</i> (sb & l)		9
Liriodenine	<i>P.oliveri</i> (sb &l)	<b>39</b>	9
	<i>P.acuminata</i> (b)		3
	<i>P.cauliflora</i> var <i>beccarii</i> (sb)		4
	<i>P.emarginata</i> (l)		6
	<i>P.nittidissima</i> (b)		7,8
	<i>P.insignis</i> (b)		57
	<i>P.longifolia</i> var <i>pendulla</i> (sb)		39
	<i>P.longifolia</i> (st & sb)		24,26
	<i>P.macropoda</i> (sb)		25
	<i>P.stenopetala</i> (sb)		25
	<i>P.suberosa</i> (sb)		34
	<i>P.purpurea</i> (w)		56
Lysicamine	<i>P.cauliflora</i> var <i>beccarii</i> (sb)	<b>40</b>	4
	<i>P.suaveolens</i> (tb)		11
O-methyl moschatoline	<i>P.acuminata</i> (b & l)	<b>41</b>	3
	<i>P.insignis</i> (b)		57
	<i>P. cauliflora</i> var <i>beccarii</i> (sb)		4
	<i>P.sericea</i> (b)		13
Oxostephanine	<i>P. cauliflora</i> var <i>beccarii</i> (sb)	<b>42</b>	7,8
	<i>P.suaveolens</i> (tb)		14,15



Name of the compound	Source (plant part)	Structure	Reference numbers
	<i>P.stenopetala</i> (sb)		25
	<i>P.suberosa</i> (sb)		34
	<i>P.insignis</i> (b)		57
Thailandine	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>43</b>	4
10 hydroxy liriodenine	<i>Polyalthia</i> species	<b>44</b>	41
Oxolaureline	<i>Polyalthia</i> species	<b>45</b>	41
<b>BISAPORPHINE</b>			
Beccapoline	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>46</b>	4,5
Beccapolinium	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>47</b>	4,5
Polybeccarine	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>48</b>	4
Beccapolydione	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>49</b>	4
<b>BISDEHYDROAPORPHINE</b>			
7,7-bisdehydro-O-methyl isopiline	<i>P.bullata</i> (sb)	<b>50</b>	54
7dehydronornuciferine-7' dehydro-O-methyl isopiline	<i>P.bullata</i> (sb)	<b>51</b>	54
Urabaine	<i>P.bullata</i> (sb)	<b>52</b>	54
Bis 7,7' dehydroanonaine	<i>P.debilis</i> (rt)	-	63
7 dehydro anonaine 7' dehydro - 8' methoxy anonaine	<i>P.debilis</i> (rt)	-	63
Bis 7,7' dehydro 8,8' dimethoxyanonaine	<i>P.debilis</i> (rt)	-	63
Bis 7,7' dehydro 10,10' dimethoxy anonaine	<i>P.debilis</i> (rt)	-	63
<b>PROAPORPHINE</b>			
Stepharine	<i>P.acuminata</i> (b & l)	<b>53</b>	3
O-methyl bulbo-carpine $\beta$ -N-oxide	<i>P.longifolia</i> (l)	<b>54</b>	24
O-methyl bulbo-carpine $\alpha$ -N-oxide	<i>P.longifolia</i> (l)	<b>55</b>	24
N-methyl nandigerine $\beta$ -N-oxide	<i>P.longifolia</i> (l)	<b>56</b>	24
<b>BENZYLISOQUINOLINE</b>			
Reticuline	<i>P.acuminata</i> (b & l)	<b>57</b>	3
	<i>P.nitidissima</i> (b)		8
	<i>P.cerasoides</i> (rt)		68
Laudanosine	<i>P.cerasoides</i> (rt)	-	68
Codamine	<i>P.cerasoides</i> (rt)	-	68
laudanidine	<i>P.cerasoides</i> (rt)	-	68
Protosinomenine	<i>P.nitidissima</i> (b)	<b>58</b>	8
Coclaurine	<i>P.macropoda</i> (sb)	<b>59</b>	25
	<i>P.acuminata</i> (b & l)		3
N-methyl coclaurine	<i>P.acuminata</i> (b & l)	<b>60</b>	3
<b>BISBENZYL ISOQUINOLINE</b>			
Lindoldhamine	<i>P.nitidissima</i> (b)	<b>61</b>	8
O-methyl-7-lindoldhamine	<i>P.nitidissima</i> (b)	<b>62</b>	8
O-methyl-7'-lindoldhamine	<i>P.nitidissima</i> (b)	<b>63</b>	8
N-N'-dimethyl lindoldhamine	<i>P.nitidissima</i> (b)	<b>64</b>	8
Daurisoline	<i>P.nitidissima</i> (b)	<b>65</b>	8
Isodaurisoline	<i>P.nitidissima</i> (b)	<b>66</b>	8
Dauricine	<i>P.nitidissima</i> (b)	<b>67</b>	8
<b>PHENANTHRENE</b>			
Uvariopsamine	<i>P.oliveri</i> (b)	<b>68</b>	42
<b>TETRAHYDROPROTOBERBERINE</b>			
Kikemanine	<i>P.oligosperma</i> (b)	<b>69</b>	6
	<i>P.acuminata</i> (b)		3
Xylopinine	<i>P.oligosperma</i> (b)	<b>70</b>	6
Stepholidine	<i>P.longifolia</i> (b)	<b>71</b>	28
	<i>P.nitidissima</i> (b)		8
	<i>P.acuminata</i> (b & l)		3
Thaipetaline	<i>P.stenopetala</i> (sb)	<b>72</b>	25
	<i>P.macropoda</i> (sb)		25
Tetrahydropalmatine	<i>P.suberosa</i> (sb)	<b>73</b>	44
Discretamine	<i>P.stenopetala</i> (sb)	<b>74</b>	25
<b>SESQUITERPENYLINDOLE</b>			
Polyalthenol	<i>P.oliveri</i> (b)	<b>75</b>	9,50
	<i>P.suaveolens</i> (st)		51
Isopolyalthenol	<i>P.suaveolens</i> (st)	<b>76</b>	51
Neopolyalthenol	<i>P.suaveolens</i> (st)		51



Name of the compound	Source (plant part)	Structure	Reference numbers
Polyveoline	<i>P.suaveolens</i> (st)	<b>77</b>	11,33
Polyavolensine	<i>P.suaveolens</i> (st)	<b>78</b>	22,27
Polyavolensinol	<i>P.suaveolens</i> (st)	<b>79</b>	22,27
Polyavolensione	<i>P.suaveolens</i> (st)	<b>80</b>	22,27
Polyavolinamide	<i>P.suaveolens</i> (st)	<b>81</b>	27
Greenwayodendrine	<i>P.suaveolens</i> (st)	<b>82</b>	12
Greenwayodendrine-3-one	<i>P.suaveolens</i> (st)	<b>83</b>	12
Greenwayodendrine-3 $\beta$ -yl acetate	<i>P.suaveolens</i> (st)	<b>84</b>	12
Greenwayodendrine 3 $\beta$ -ol	<i>P.suaveolens</i> (st)	<b>85</b>	12
Greenwayodendrine 3-ol	<i>P.suaveolens</i> (st)	<b>86</b>	12
$\alpha$ -humulene	<i>P.cerasoides</i> (rt)	-	68
Caryophyllene oxide	<i>P.cerasoides</i> (rt)	-	68
$\alpha$ -cadinol	<i>P.cerasoides</i> (rt)	-	68
<b>AZAFLUORENE</b>			
Darienine	<i>P.longifolia</i> (st & sb)	<b>87</b>	26
Polyfothine	<i>P.longifolia</i> (st & sb)	<b>88</b>	26,28
Isoncodine	<i>P.longifolia</i> (st & sb)	<b>89</b>	26
Onychine	<i>P.longifolia</i> (sb)	<b>90</b>	26
Isoursuline	<i>P.stenopetala</i> (sb)	<b>91</b>	25
	<i>P.longifolia</i> var <i>pendulla</i> (rt)		4
<b>MORPHINANEDIENONE</b>			
Sebiferine	<i>P.cauliflora</i> var <i>beccarii</i> (b)	<b>92</b>	4
<b>OTHERS</b>			
Polynemoralines A	<i>P.nemoralis</i> (st & l)	-	58
Polynemoralines B	<i>P.nemoralis</i> (st & l)	-	58
Polynemoralines C	<i>P.nemoralis</i> (st & l)	-	58
Polynemoralines D	<i>P.nemoralis</i> (st & l)	-	58
Pendulamine A	<i>P.longifolia</i> var <i>pendulla</i> (rt)	-	64
Pendulamine B	<i>P.longifolia</i> var <i>pendulla</i> (rt)	-	64
Penduline	<i>P.longifolia</i> var <i>pendulla</i> (rt)	-	64
Kalasinamide	<i>P.suberosa</i> (st)	-	67
<b>CLERODANE DITERPENOID</b>			
16 $\alpha$ hydroxyl cleroda,3,13 Z dien,16,15,olide	<i>P.longifolia</i> (b, sb & l)	<b>93</b>	16,18,21
	<i>P.viridis</i> (b)		14
	<i>P.barnesii</i> (sb)		54
	<i>P.chelienesis</i> (sb)		37
3 $\beta$ ,16 $\alpha$ -dihydroxy cleroda 4C(18)-13(14) Z dien-15,16 olide	<i>P.barnesii</i> (sb)	-	54
	<i>P.chelienesis</i> (sb)		37
	<i>P.longifolia</i> var <i>pendulla</i> (l)		54,59
4 $\beta$ ,16 $\alpha$ dehydroxycleroda13(14)Z-dien-15,16 olide	<i>P.barnesii</i> (sb)	-	54
	<i>P.longifolia</i> (b)	<b>94</b>	21
16 a methoxycleroda 3,13 Z-dien 15,16 olide	<i>P.viridis</i> (b)		14
16 (R) 3,13 Z kolavadien 15,16 olide	<i>P.viridis</i> (b)	<b>95</b>	19
Methyl 2E 6E farnesoate-3,13 E kolavadien 15 oic acid	<i>P.viridis</i> (b)	<b>96</b>	19
16 (R & S) 3,13 Z kolavadien -15,16 olide 2-one	<i>P.viridis</i> (b)	<b>97</b>	19
	<i>P.longifolia</i> var <i>pendulla</i> (l)		59
16 oxocleroda 3,13 (14) E dien -15 oic acid (Polyalthialdoic acid)	<i>P.longifolia</i> (sb & l)	<b>98</b>	16,18
	<i>P.chelienesis</i> (sb)		37
	<i>P.longifolia</i> var <i>pendulla</i> (sb & l)		39,59
Kolavenic acid	<i>P.longifolia</i> (sb)	<b>99</b>	16
	<i>P.longifolia</i> var <i>pendulla</i> (sb & l)		39,59
16 $\beta$ hydroxy cleroda 3,13(14)Z-dien 15,16 olide	<i>P.longifolia</i> var <i>pendulla</i> (sb)	<b>100</b>	39
2-oxo-kolavenic acid	<i>P.longifolia</i> var <i>pendulla</i> (sb & l)	<b>101</b>	38,59
	<i>P.viridis</i> (sb)		46
3,13E kolavadien 15 oic acid 16 al	<i>P.longifolia</i> (l)	<b>102</b>	18
	<i>P.viridis</i> (b)		46
16 hydroxy cleroda 3, 13(14)-	<i>P.longifolia</i> (l)	<b>103</b>	18

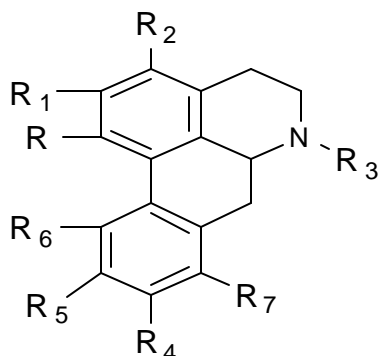


Name of the compound	Source (plant part)	Structure	Reference numbers
E dien 15 oic acid			
14,15 bisnor 3,11 E kolavadien 13 one	<i>P. viridis</i> (b)	<b>104</b>	19
(4→2) abeo 16 (R&S)2,13 Z- kolavadien 15,16 olide 3 ol	<i>P. viridis</i> (b)	<b>105</b>	19
(4→2) abeo 16 (R&S)2,13 Z- kolavadien 15 oic acid 3 al	<i>P. viridis</i> (b)	<b>106</b>	47,48
(4S,9R,10R) methyl 18- carboxy labda 8,13 E dien 15 oate	<i>P. longifolia</i> var <i>pendulla</i> (l)		59
3,12 E kolavadien 15 oic acid 16 al	<i>P. macropoda</i> (sb)	<b>107</b>	17,36
16 hydroxy cleroda 4 (18) 13- dien 15,16 olide	<i>P. viridis</i> (b)	<b>108</b>	46
Cleroda 6 (18) 13 E diene 15 oic acid	<i>P. longifolia</i> (sb)	<b>109</b>	49
	<i>P. cheliensis</i> (sb)	<b>110</b>	49
16 hydroxy ent halima 5(10) 13- dien 15,16 olide	<i>P. longifolia</i> (sb)	<b>111</b>	37
Ent halima 5 (10) 13 E dien 15 oic acid	<i>P. longifolia</i> (sb)	<b>112</b>	49
Ent halima 1 (10) 13 E dien 15 oic acid	<i>P. longifolia</i> (sb)	<b>113</b>	49
Polyalthic acid	<i>P. fragrans</i> (sb)	<b>121</b>	15
16 (R & S) hydroxyl cleroda 3,13- (14) Z dien 15,16 olide	<i>P. longifolia</i> var <i>pendulla</i> (l)	-	59
Methyl 16 oxo cleroda 3,13- (14)E dien 15 oate	<i>P. longifolia</i> var <i>pendulla</i> (l)	-	59
Solidagonal acid	<i>P. longifolia</i> var <i>pendulla</i> (l)	-	59
16 hydroxy cleroda 13 ene - 15,16 olide 3 one	<i>P. longifolia</i> var <i>pendulla</i> (b)	-	66
3β 5β 16 α trihydroxyhalima- 13,14 en 15,16 olide	<i>P. longifolia</i> var <i>pendulla</i> (sb)	-	66
<b>BISCLERODANE</b>			
Bisclerodaneimide	<i>P. viridis</i> (sb)	<b>114</b>	46
<b>TRITERPENE</b>			
Suberosol	<i>P. suberosa</i> (st & l)	<b>115</b>	20
Polycarpol	<i>P. oliverii</i> (b)	<b>116</b>	9,29
	<i>P. suaveolens</i> (b)		51
<b>PHENYL TETRAHYDROFURANO-5-PYRONE</b>			
Altholactone	<i>P. longifolia</i> (sb)	<b>117</b>	30
	<i>P. crassa</i> (l)		61
3-acetyl altholactone	<i>P. crassa</i> (l)	-	61
Crassalactones A-D	<i>P. crassa</i> (l)	-	61
19(2-furyl)nonadeca 5,7 diynoic acid	<i>P. evecta</i> (rt)	-	62
19(2-furyl)nonadeca 5ynoic acid	<i>P. evecta</i> (rt)	-	62
1(2-furyl)pentacosa 7,9 diyne	<i>P. evecta</i> (rt)	-	62
21 (2furyl) heneicosa 14,16 diyne			
19 (2-furyl)nonadeca 5,7 diynoate	<i>P. evecta</i> (rt)	-	62
1(2-furyl)pentacosa 16,18 diyne	<i>P. suberosa</i> (st)	-	65
23 (2-furyl) tricosa 5,7 diynoic acid	<i>P. suberosa</i> (st)	-	65
<b>FLAVONOID</b>			
Rutin	<i>P. longifolia</i> (l)	<b>118</b>	31
Quercetin	<i>P. longifolia</i> (l)	<b>119</b>	31
Hyperoside	<i>P. longifolia</i> (l)	<b>120</b>	31
<b>ACETOGENIN</b>			
Howiicin A	<i>P. plagineura</i> (s)	-	40
	<i>P. crassa</i> (l)	-	61
Plagionicin A	<i>P. plagineura</i> (s)	-	40
<b>NON ALKALOID NITROGEN HETEROCYCLE</b>			
Zinc polyanemine	<i>P. nemoralis</i> (sb)	-	32
2 mercapto pyridine N oxide Zinc salt	<i>P. nemoralis</i> (sb)	<b>122</b>	32
	<i>P. longifolia</i> (sb)		30
<b>PRENYLATED BENZOPYRAN</b>			
Polycerasoidin	<i>P. cerasoides</i> (sb)	<b>123</b>	23
	<i>P. sclerophylla</i> (sb)		55
Polyacerasoidol	<i>P. cerasoides</i> (sb)	<b>124</b>	55
	<i>P. sclerophylla</i> (sb)		23

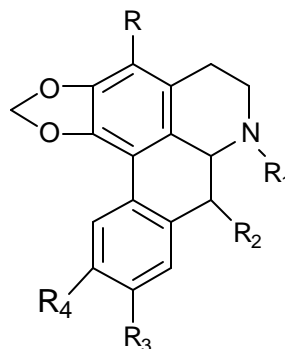


Name of the compound	Source (plant part)	Structure	Reference numbers
Polyalthidin	<i>P. cerasoides</i> (sb)	125	52
6 E 10E isopolycerasoidol	<i>P. sclerophylla</i> (sb)	-	55
	<i>P. cerasoides</i> (sb)		55
Polycerasoidin methyl ester	<i>P. cerasoides</i> (sb)	-	55
Trans asarone	<i>P. sclerophylla</i> (sb)	-	55
	<i>P. cerasoides</i> (sb)		55

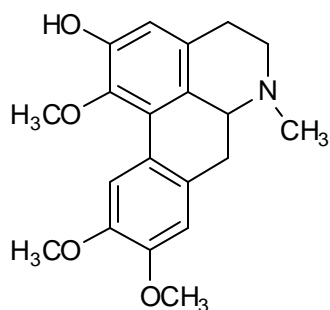
sb: stem bark; l: leaves; st: stem; rt: roots; b: bark; tb: trunk bark; w: whole plant



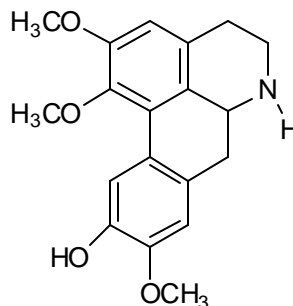
- 1: R & R<sub>1</sub> = OCH<sub>2</sub>O; R<sub>4</sub> = OH; R<sub>5</sub> = OCH<sub>3</sub>; R<sub>2</sub> = R<sub>3</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 2: R & R<sub>1</sub> = OCH<sub>2</sub>O; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 3: R = OCH<sub>3</sub>; R<sub>1</sub> = OH; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 4: R = OH; R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 5: R = R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = OH; R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 6: R = R<sub>4</sub> = OH; R<sub>1</sub> = R<sub>5</sub> = OCH<sub>3</sub>; R<sub>3</sub> = CH<sub>3</sub>; R<sub>2</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 7: R = OH; R<sub>1</sub> = R<sub>2</sub> = OCH<sub>3</sub>; R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 8: R = R<sub>1</sub> = R<sub>2</sub> = OCH<sub>3</sub>; R<sub>3</sub> = CH<sub>3</sub>; R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 9: R = R<sub>1</sub> = R<sub>2</sub> = OCH<sub>3</sub>; R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 10: R = R<sub>1</sub> = OCH<sub>2</sub>O; R<sub>4</sub> = OCH<sub>3</sub>; R<sub>7</sub> = OH; R<sub>2</sub> = R<sub>3</sub> = R<sub>5</sub> = R<sub>6</sub> = H  
 11: R & R<sub>1</sub> = OCH<sub>3</sub>; R<sub>1</sub> = OH; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 12: R = R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>5</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 13: R = R<sub>1</sub> = OCH<sub>3</sub>; R<sub>5</sub> = OH; R<sub>2</sub> = R<sub>3</sub> = R<sub>4</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 14: R = R<sub>5</sub> = OCH<sub>3</sub>; R<sub>1</sub> = R<sub>4</sub> = OH; R<sub>3</sub> = CH<sub>3</sub>; R<sub>2</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 15: R = OH; R<sub>1</sub> = R<sub>5</sub> = R<sub>6</sub> = OCH<sub>3</sub>; R<sub>3</sub> = (CH<sub>3</sub>)<sub>2</sub>; R<sub>2</sub> = R<sub>7</sub> = H  
 16: R = R<sub>1</sub> = R<sub>2</sub> = R<sub>5</sub> = OCH<sub>3</sub>; R<sub>6</sub> = OH; R<sub>3</sub> = R<sub>4</sub> = R<sub>7</sub> = H  
 17: R = R<sub>4</sub> = R<sub>5</sub> = OCH<sub>3</sub>; R<sub>1</sub> = OH; R<sub>3</sub> = CH<sub>3</sub>; R<sub>2</sub> = R<sub>6</sub> = R<sub>7</sub> = H  
 18: R = R<sub>1</sub> = R<sub>2</sub> = OCH<sub>3</sub>; R<sub>5</sub> = R<sub>6</sub> = OCH<sub>2</sub>O; R<sub>3</sub> = R<sub>4</sub> = R<sub>7</sub> = H



- 20: R = OCH<sub>3</sub>; R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = OH; R<sub>3</sub> = R<sub>4</sub> = H  
 21: R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>3</sub> = R<sub>4</sub> = H  
 22: R<sub>3</sub> = OCH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>1</sub> = R<sub>4</sub> = H  
 23: R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>3</sub> = OCH<sub>3</sub>; R<sub>1</sub> = R<sub>4</sub> = H  
 24: R<sub>2</sub> = β-OH; R<sub>1</sub> = R<sub>3</sub> = R<sub>4</sub> = H  
 25: R<sub>2</sub> = α-OH; R<sub>1</sub> = R<sub>3</sub> = R<sub>4</sub> = H  
 26: R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>3</sub> = OCH<sub>3</sub>; R<sub>4</sub> = H  
 27: R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>3</sub> = OCH<sub>3</sub>; R<sub>4</sub> = H  
 28: R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>3</sub> = OCH<sub>3</sub>; R<sub>4</sub> = H  
 29: R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>3</sub> = OCH<sub>3</sub>; R<sub>4</sub> = H  
 30: R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>3</sub> = R<sub>4</sub> = H  
 31: R<sub>1</sub> = OCH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>3</sub> = R<sub>4</sub> = H  
 32: R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>1</sub> = R<sub>3</sub> = R<sub>4</sub> = H  
 33: R = R<sub>3</sub> = OCH<sub>3</sub>; R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = β-OH; R<sub>4</sub> = H  
 34: R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = β-OCH<sub>3</sub>; R<sub>3</sub> = OH; R<sub>4</sub> = H  
 35: R<sub>1</sub> = CH<sub>3</sub>; R<sub>2</sub> = α-OH; R<sub>3</sub> = R<sub>4</sub> = H

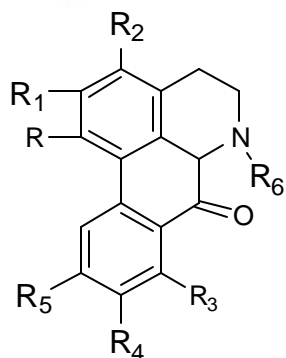


19

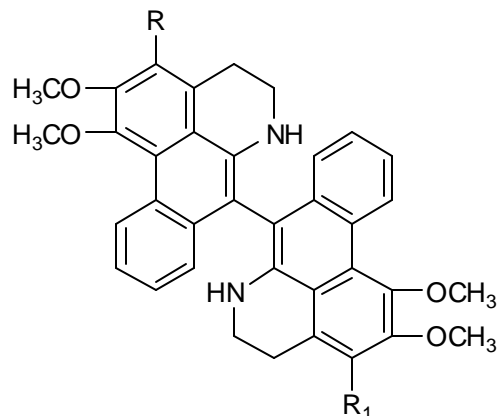


36

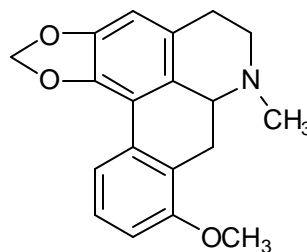
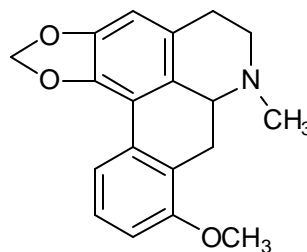




- 37:  $R=R_1=OCH_2O$ ;  $R_2=OCH_3$ ;  $R_6=R_3=R_4=R_5=H$   
 38:  $R=R_1=OCH_2O$ ;  $R_4=OCH_3$ ;  $R_6=R_2=R_3=R_5=H$   
 39:  $R=R_1=OCH_2O$ ;  $R_6=R_2=R_3=R_4=R_5=H$   
 40:  $R=R_1=OCH_3$ ;  $R_6=R_2=R_3=R_4=R_5=H$   
 41:  $R=R_1=R_2=OCH_3$ ;  $R_6=R_3=R_4=R_5=H$   
 42:  $R=R_1=OCH_2O$ ;  $R_3=OCH_3$ ;  $R_6=R_2=R_4=R_5=H$   
 43:  $R=R_1=OCH_2O$ ;  $R_3=OCH_3$ ;  $R_6=CH_3$ ;  $R_2=R_4=R_5=H$   
 44:  $R=R_1=OCH_2O$ ;  $R_5=OH$ ;  $R_6=R_2=R_3=R_4=H$   
 45:  $R=R_1=OCH_2O$ ;  $R_5=OCH_3$ ;  $R_6=R_2=R_3=R_4=H$

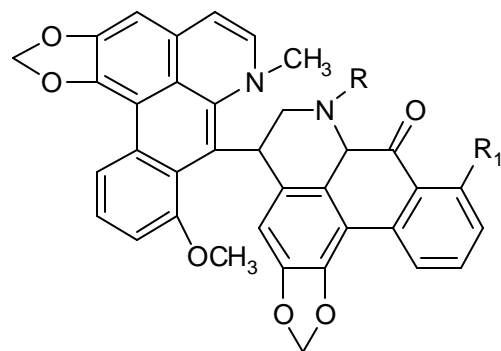


- 50:  $R=R_1=OCH_3$   
 51:  $R=H$ ;  $R_1=OCH_3$   
 52:  $R=R_1=H$

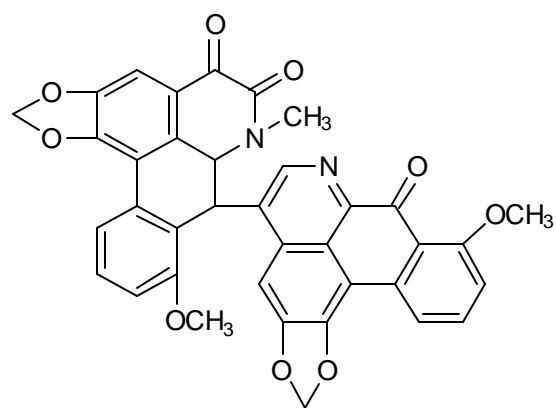


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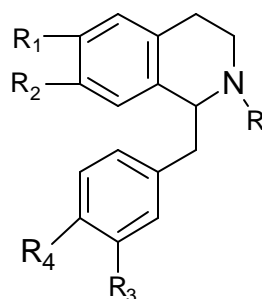
- 54:  $R=CH_3$ ;  $R_1=\beta-O$ ;  $R_2=\alpha-CH_3$   
 55:  $R=CH_3$ ;  $R_1=\alpha-O$ ;  $R_2=\beta-CH_3$   
 56:  $R=H$ ;  $R_1=\beta-O$ ;  $R_2=\alpha-CH_3$



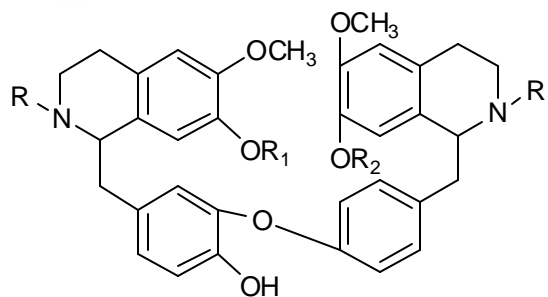
- 46:  $R=O$ ;  $R_1=OCH_3$   
 47:  $R=CH_3$ ;  $R_1=OCH_3$   
 48:  $R=R_1=O$



49



- 57:  $R=CH_3$ ;  $R_1=R_4=OCH_3$ ;  $R_2=R_3=OH$   
 58:  $R=CH_3$ ;  $R_2=R_4=OCH_3$ ;  $R_1=R_3=OH$   
 59:  $R=R_3=H$ ;  $R_1=OCH_3$ ;  $R_2=R_4=OH$   
 60:  $R=CH_3$ ;  $R_3=H$ ;  $R_1=OCH_3$ ;  $R_2=R_4=OH$



61: R=R<sub>1</sub>=R<sub>2</sub>=H

62: R<sub>1</sub>=CH<sub>3</sub>; R=R<sub>2</sub>=H

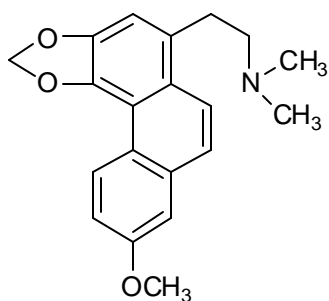
63: R<sub>2</sub>=CH<sub>3</sub>; R=R<sub>1</sub>=H

64: R=CH<sub>3</sub>; R<sub>1</sub>=R<sub>2</sub>=H

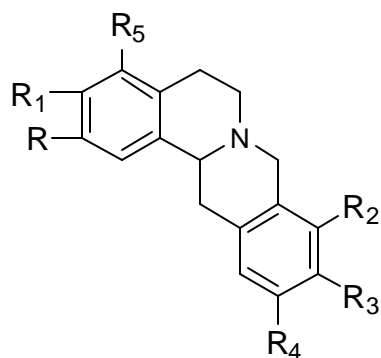
65: R=R<sub>2</sub>=CH<sub>3</sub>; R<sub>1</sub>=H

66: R=R<sub>1</sub>=CH<sub>3</sub>; R<sub>2</sub>=H

67: R=R<sub>1</sub>=R<sub>2</sub>=CH<sub>3</sub>



68



69: R=R<sub>1</sub>=R<sub>2</sub>=OCH<sub>3</sub>; R<sub>3</sub>=OH; R<sub>4</sub>=R<sub>5</sub>=H

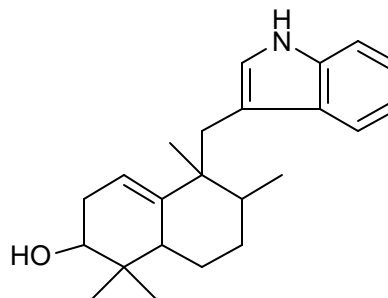
70: R=R<sub>1</sub>=R<sub>3</sub>=R<sub>4</sub>=OCH<sub>3</sub>; R<sub>2</sub>=R<sub>5</sub>=H

71: R=R<sub>3</sub>=OH; R<sub>1</sub>=R<sub>2</sub>=OCH<sub>3</sub>; R<sub>4</sub>=R<sub>5</sub>=H

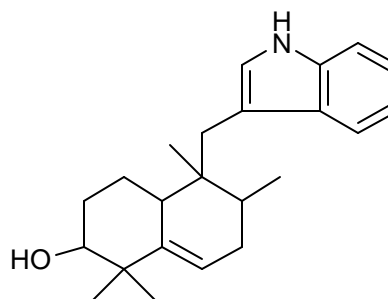
72: R=R<sub>1</sub>=R<sub>2</sub>=OCH<sub>3</sub>; R<sub>3</sub>=R<sub>5</sub>=OH; R<sub>4</sub>=H

73: R=R<sub>1</sub>=R<sub>2</sub>=R<sub>3</sub>=OCH<sub>3</sub>; R<sub>4</sub>=R<sub>5</sub>=H

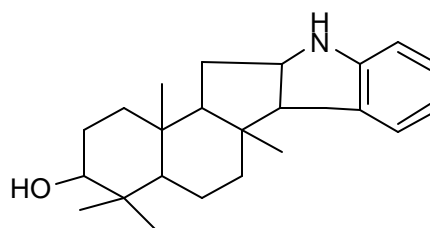
74: R=R<sub>2</sub>=OCH<sub>3</sub>; R<sub>1</sub>=R<sub>3</sub>=OH; R<sub>4</sub>=R<sub>5</sub>=H



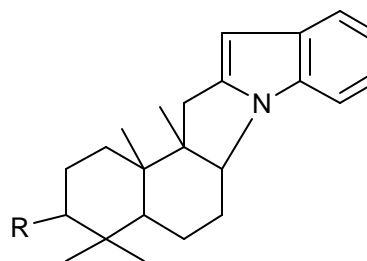
75



76



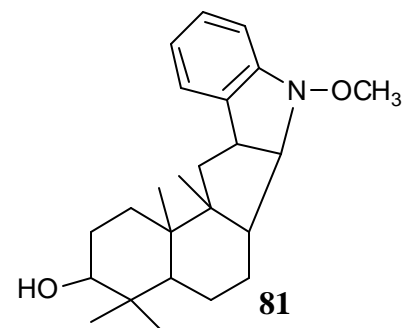
77



78: R=Ac

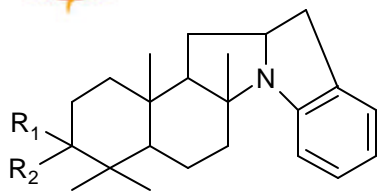
79: R=H

80: R=O



81





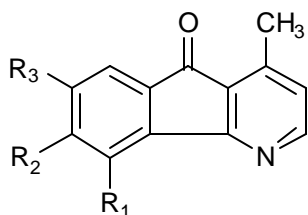
82:  $R_1=R_2=H$

83:  $R_1=R_2=O$

84:  $R_1=OAc; R_2=H$

85:  $R_1=OH; R_2=H$

86:  $R_1=H; R_2=OH$



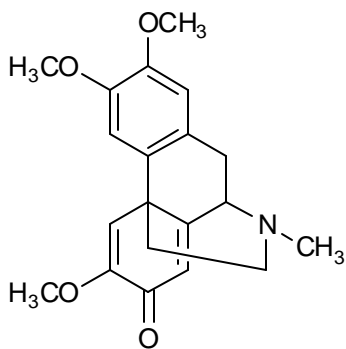
87:  $R_1=R_2=OCH_3; R_3=OH$

88:  $R_1=H; R_2=R_3=OCH_3$

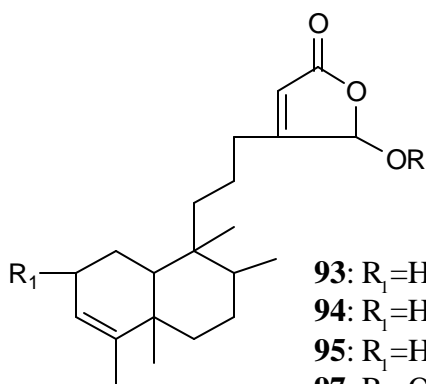
89:  $R_1=H; R_2=OCH_3; R_3=OH$

90:  $R_1=R_2=R_3=H$

91:  $R_1=OH; R_2=OCH_3; R_3=H$



92



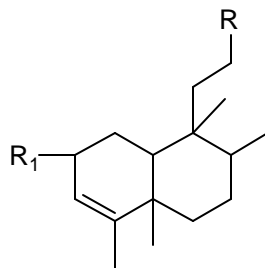
93:  $R_1=H; R=OH$

94:  $R_1=H; R=OCH_3$

95:  $R_1=H; R=\beta-OH$

97:  $R_1=O; R=OH$

100:  $R_1=H; R=\alpha-OH$



96:  $R=HOOC-CH=C-CH_3; R_1=H$

98:  $R=HOOC-CH=C-CHO; R_1=H$

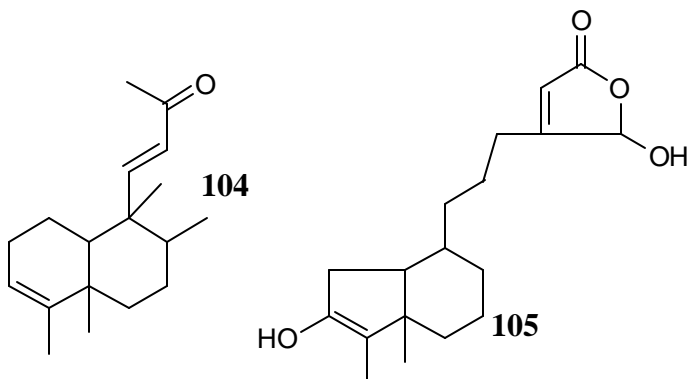
99:  $R=HOOC-CH=C-CH_3; R_1=H$

100:  $R_1=H; R=\alpha-OH$

101:  $R=HOOC-CH=C-CH_3; R_1=O$

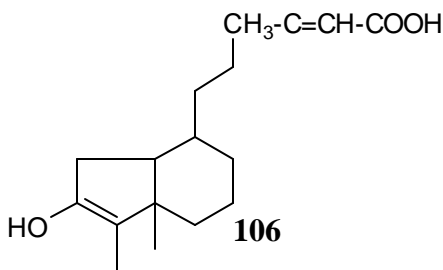
102:  $R=HOOC-CH=C-CHO; R_1=H$

103:  $R=HOOC-CH=C-CH_2OH; R_1=H$



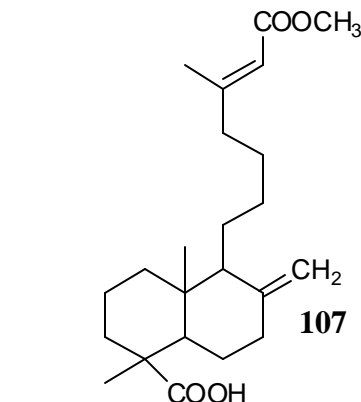
104

105



$CH_3-C=CH-COOH$

106

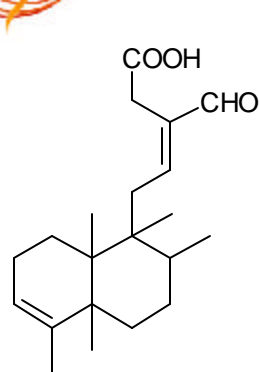


$COOCH_3$

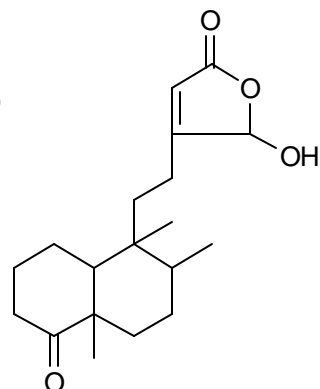
$CH_2$

107

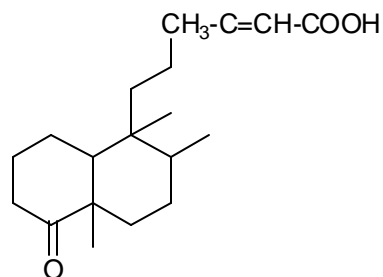
$COOH$



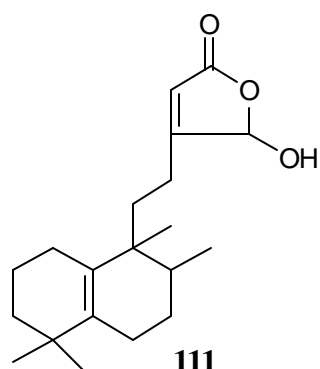
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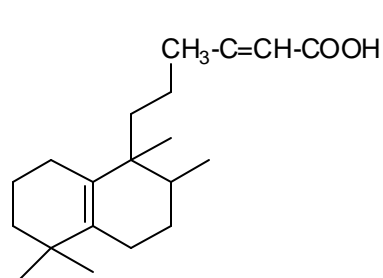
109



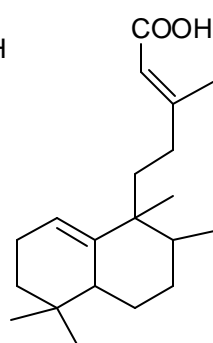
110



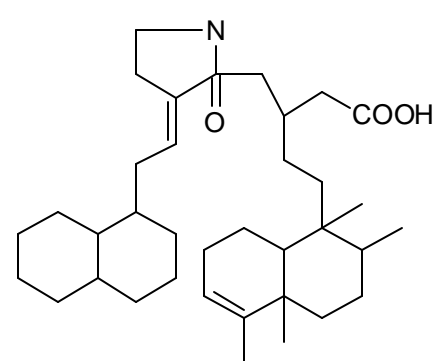
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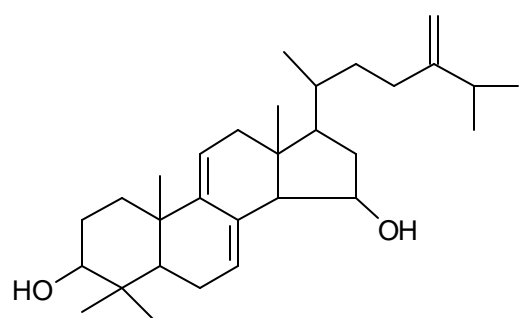
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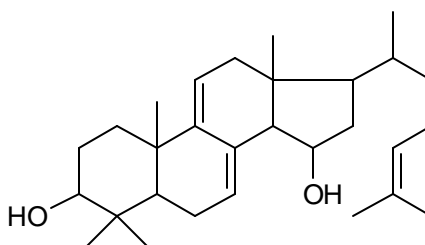
113



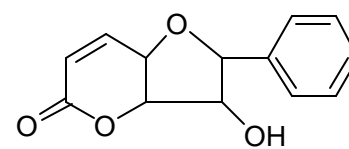
114



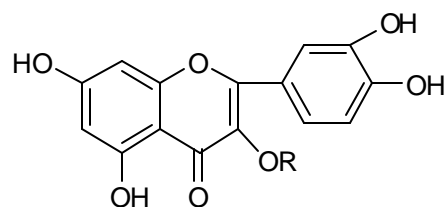
115



116



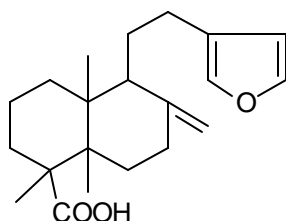
117



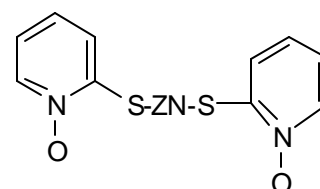
118: R=Rh-Glu

119: R=H

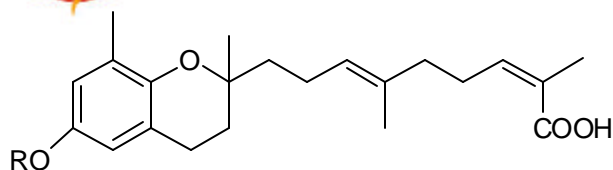
120: R=Gala



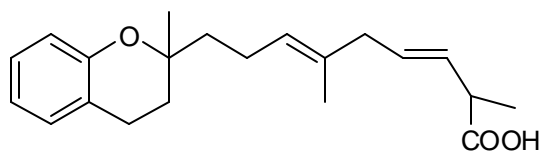
121



122

Padmaa. M. Paarakh et al., Phytoconstituents from the genus *Polyalthia* – a review123: R=CH<sub>3</sub>

124: R=H



125

## CONCLUSION

The genus *Polyalthia* has been carefully studied for its phytoconstituents. Out of 70 species, only 18 species have been phytochemically examined. Occurrence of the compounds mostly alkaloid of aporphine, oxoaporphine, bisaporphine, bisdehydroaporphine, proaporphine, benzyl isoquinoline categories etc are quite common in almost all the species examined. Hence these compounds can be used as marker for the genus *Polyalthia*. Many species of the plants are reported to be used as anti-inflammatory, hepatoprotective, cytotoxic activity, antimalarial, antioxidant, analgesic, antifilarial, antimicrobial, hypotensive activity and anti-AIDS agents. Hence exploration of this genus for phytoconstituents is by no means exhaustive and there still remains more scope for the study of bioactive molecules.

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