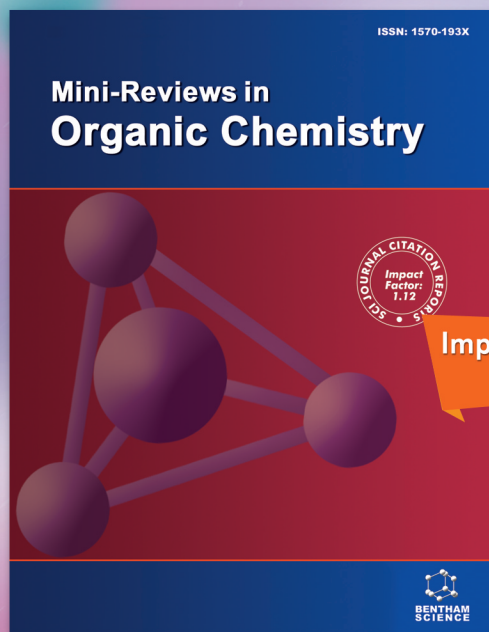


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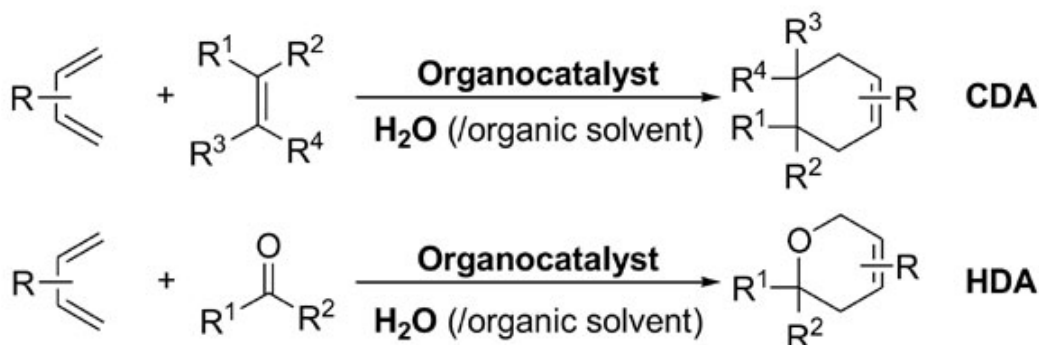
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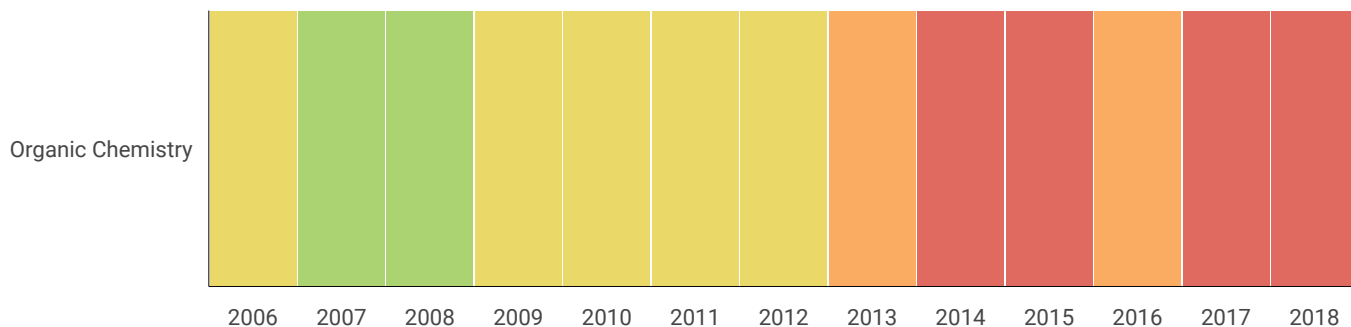
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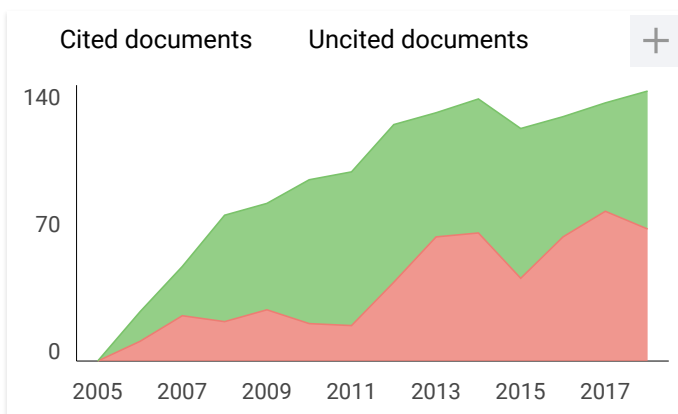
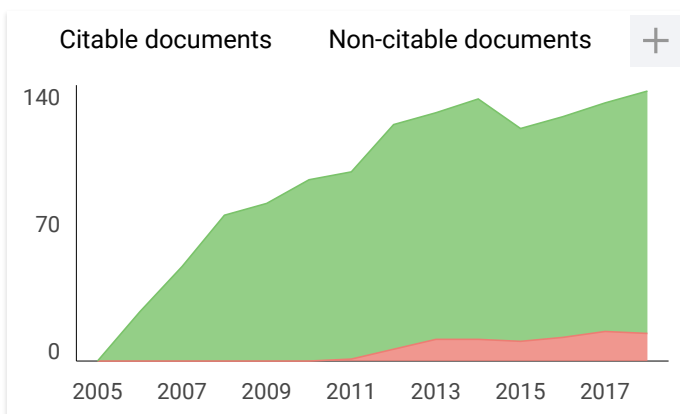
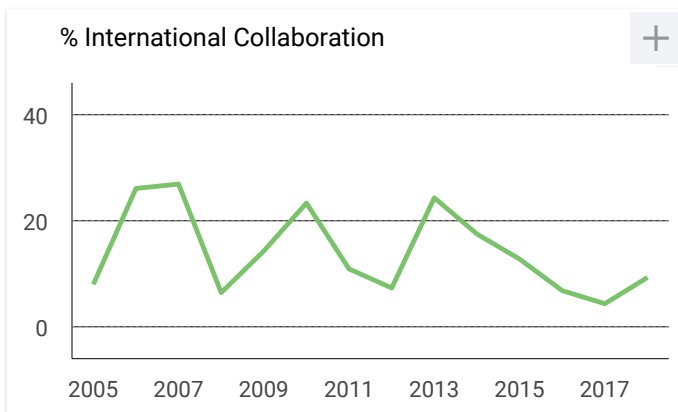
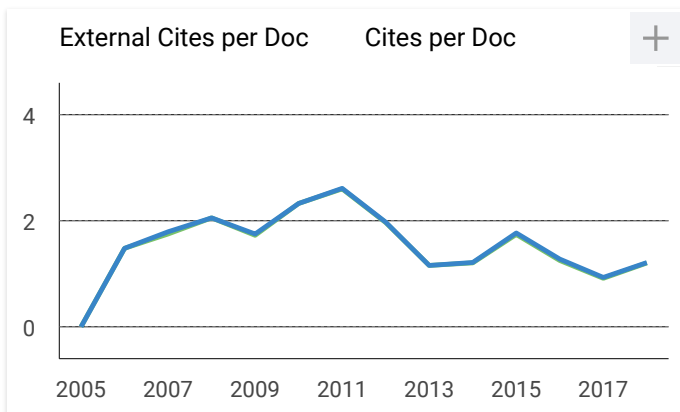
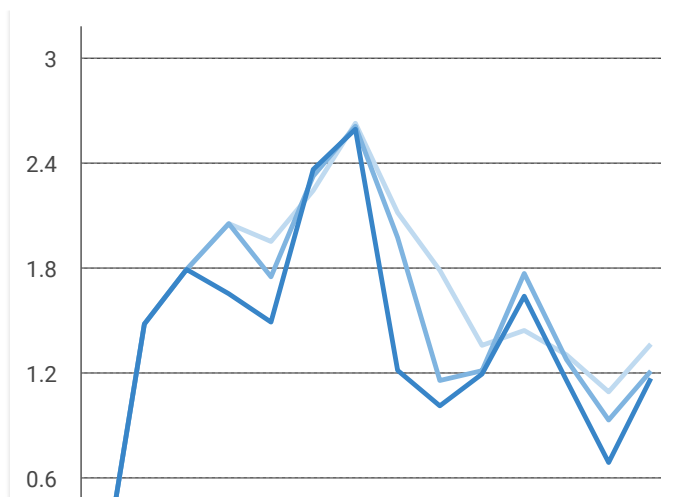
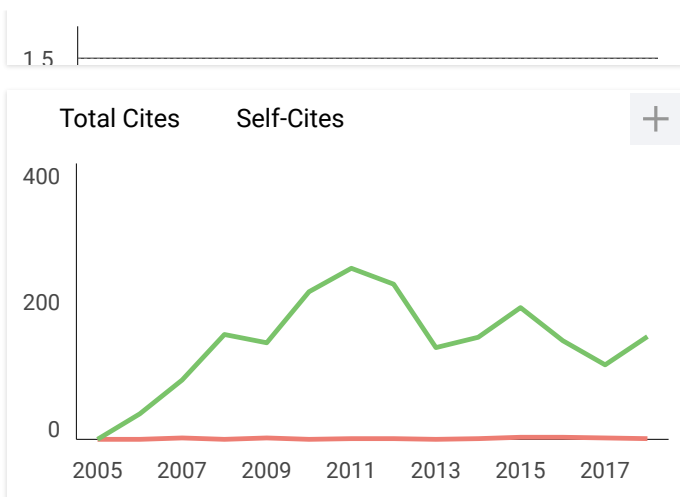


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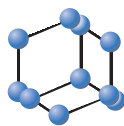
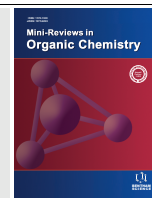
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REVIEW ARTICLE

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SCIENCEReview: Secondary Metabolites of *Aquilaria*, a Thymelaeaceae Genus

Alfinda Novi Kristanti*, Mulyadi Tanjung and Nanik Siti Aminah

Department of Chemistry, Faculty of Science and Technology, Universitas Airlangga, Surabaya 60115, Indonesia

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Abstract: Background: *Aquilaria*, a genus belonging to the Thymelaeaceae, produces fragrant resinous agarwood, also known as eaglewood, which has been used as incense since old times. The intense fragrance is the result of the presence of a wide variety of secondary metabolites.

Objective: This genus was reported contained sesquiterpenes, chromones, flavonoids, benzophenones, diterpenoids, triterpenoids, and lignans.

Conclusion: Here, we review the different secondary metabolites that have been identified in *Aquilaria* to show their diversity and to allow comparison with other Thymelaeaceae genera.

Keywords: *Aquilaria*, Thymelaeaceae, sesquiterpene, chromone, flavonoid, benzophenone, diterpenoid, triterpenoid, lignan.

1. INTRODUCTION

The Thymelaeaceae are a family of dicotyledonous plants mainly found in the tropics and subtropics. They are mostly trees and shrubs, but include also a few vines and herbaceous plants. The family is especially diverse in the southern hemisphere, with many different species present in Africa and Australia [1]. Some species can also be found in Europe, and in parts of Asia and South America, but, in these latter regions, their diversity is much less [2]. Some genera are commercially grown for their sweet-scented and fragrant flowers. Other genera are cultivated for their hardwood, for their bark, which is a raw material for paper making, or for their odorous, highly resinous wood (agarwood), which is used for incense and perfume production.

Thymelaeaceae synthesize many, highly diverse secondary metabolites with a wide range of bioactivities, which has led to numerous applications of Thymelaeaceae plant extracts in traditional medicine. For instance, in Kambo medicine in Japan, agarwood preparations are used as sedative, analgesic or digestive [3]. In China, *Aquilaria* leaves are applied topically to treat injuries such as fractures and bruises [4], and, in Korea, agarwood has been used for the treatment of cough, asthma, and as a sedative among others [5].

A completely different application exploits the strong fragrance of Thymelaeaceae plants, in particular of *Aquilaria* species. In Saudi Arabia and other Arabic countries, the wood of *Aquilaria* trees is used as incense at important religious occasions [5, 6]. Wood from closely related species is used during Buddhist ceremonies in Asian countries such as Japan and India. Interestingly, the fragrant agarwood resin is not produced in normal wood tissues, but it is only formed when the plant is injured, e.g., by wind, lightning, gnawing by ants or insects, or by microbial infection. These natural pro-

cesses are slow and occur by chance, causing the agarwood to develop very slowly over decades. Therefore, agarwood is also produced artificially by burning, holing, cutting, or de-liberate inoculation of the trees with fungi such as *Fusarium* spp [7-10]. Nevertheless, despite the artificial production, the demand for agarwood far exceeds the available supply, fostering a deep interest in the secondary metabolites that are responsible for the fragrance properties of agarwood

Widely studied *Aquilaria* species include *A. sinensis*, *A. malaccensis*, *A. crassna*, and *A. agallocha*. Depending on the region where these species grow, different names are used for the produced agarwood, such as Eaglewood, Gaharu, Kanankoh, Jinkoh, Chen Xiang or Tram [8, 9]. It is also called aloeswood or agalloch [8]. Each species produces agarwood with different fragrance properties, depending on the variety and quantity of the secondary metabolite content, especially sesquiterpenes and chromones. To assist in the search for alternative sources of agarwood-like fragrant resins, we review here the different secondary metabolites that have so far been characterized in *Aquilaria*.

There are two reviews that have been published that discussed about the same genus [11, 12]. These previous reviews did not discuss several classes of compounds such as diterpenoid, benzophenone, lignan and used references before 2011. Otherwise, this review was compiled using references, mostly published in 2001-2016. Some references which were dated before 2000 showed that the study of this genus had lasted for longtime. Another review published in 2016 discussed more on bioactivity of compounds contained in this genus [13].

2. PHYTOCHEMISTRY ASPECTS

2.1. Sesquiterpenes

The fragrant sesquiterpenes that have been found in the *Aquilaria* genus include compounds with a guaiane, eudesmane/selinane, eremophilane/nootkatane, agarofuran, vetispirane/agarospirane, or prezizane skeleton (Fig. 1). Most of these sesquiterpenes are oxygenated [14-16].

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Almost all of these sesquiterpenes have been isolated from agarwood of several species of *Aquilaria*. For instance, guaiane sesquiterpenes were obtained from the agarwood of *A. agallocha* including α -guaiene (1), α -bulnesene (2), rondone (3), 1,5-epoxy-nor ketoguaiene (4), as well as several guaia-1(10),11-diene derivatives (5a-g) [17, 18]. All reported guaiane sesquiterpenes were unsaturated guaianes with some of them being oxygenated.

An interesting guaiane sesquiterpene is 1,10-dioxo-4 α H-5 α H-7 β H-11 α H-1, 10-secoguaia-2(3)-en-12, 8 β -olide (7), which exhibits anti-inflammatory activity with an IC₅₀ value of 8.1 μ M. This compound was isolated from *A. sinensis* agarwood, together with its derivatives 7 β H-guaia-1(10)-en-12,8 b -olide (6) and 1 β -hydroxy-4 β H-5 β H-7 β H-11 α H-8,9-secoguaia-9(10)-en-8,12-olide (8) [19], Fig. (2).

The sesquiterpene 10-epi- γ -eudesmol (9), which has a eudesmane skeleton, has been isolated from the wood of *A. malac-*

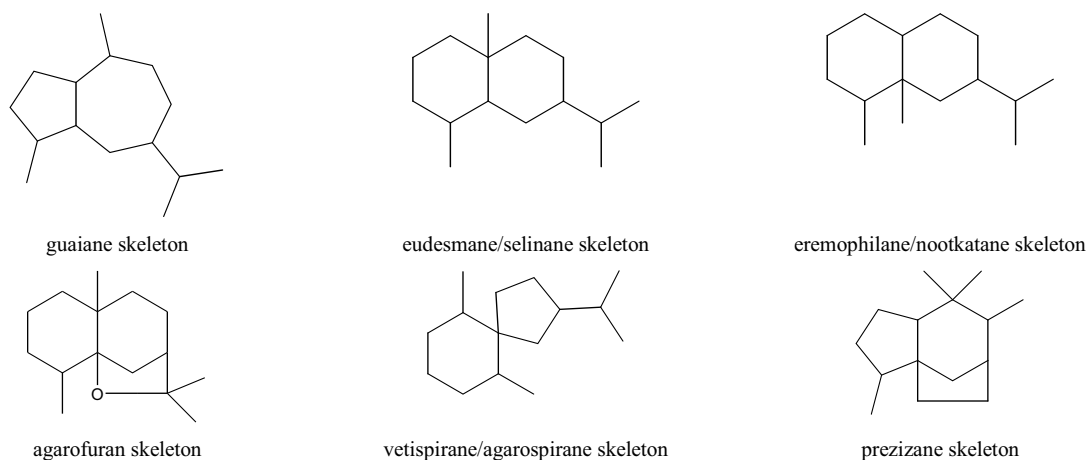


Fig. (1). Sesquiterpene skeletons present in the genus *Aquilaria*.

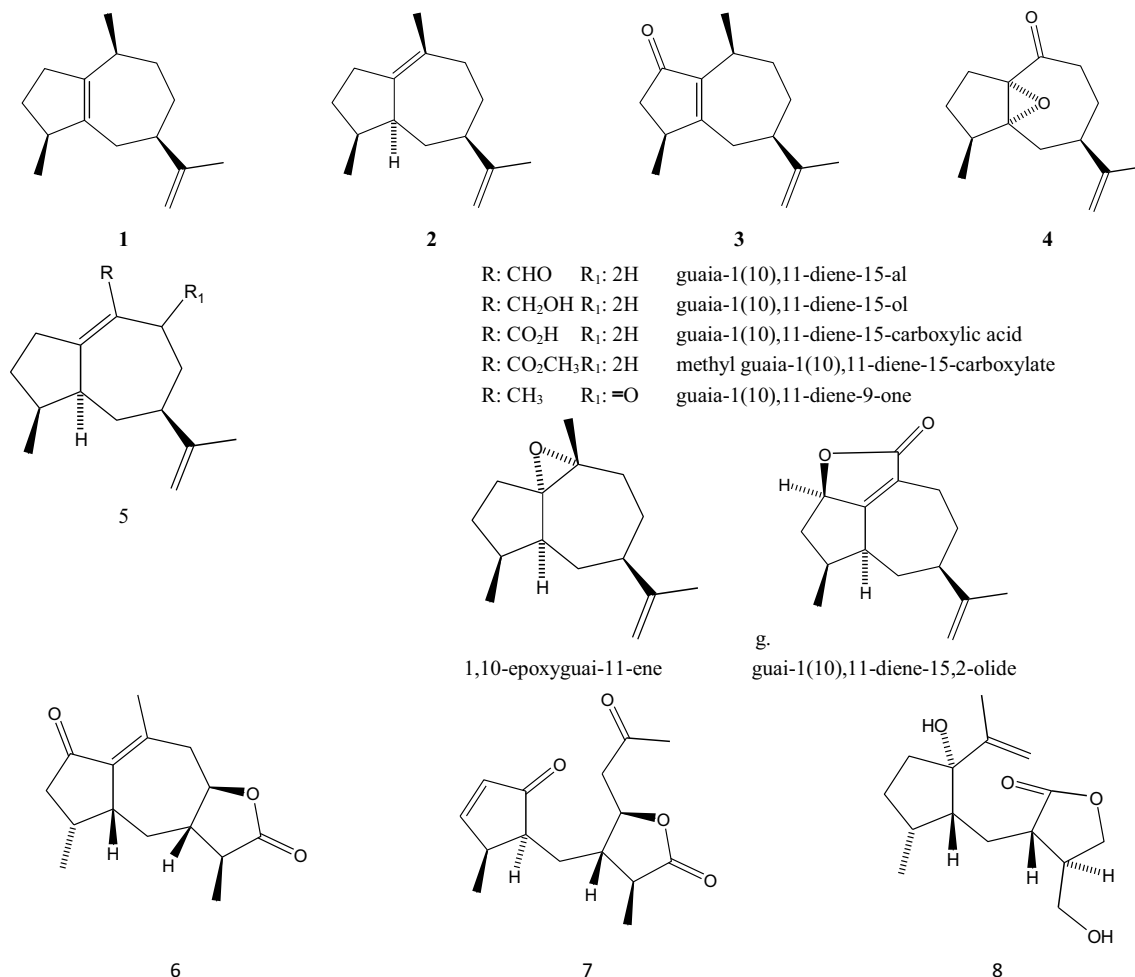


Fig. (2). Guaiane sesquiterpenes in *Aquilaria*.

censis [20]. Other eudesmanes, including selina-3,11-diene-9-one (**10**), selina-3,11-diene-9-ol (**11**), selina-3,11-diene-14-al (**12**), selina-4,11-diene-14-al (**13**), selina-3,11-diene-14-carboxylic acid (**14**), selina-4,11-diene-14-carboxylic acid (**15**), 9-hydroxyselina-4,11-diene-14-carboxylic acid (**16**) were isolated from agarwood of *A. agallocha* [18, 21]. In addition, *A. sinensis*, which had been subjected to artificial holing, produced several other eudesmane sesquiterpenes, such as 9-hydroxy-selina-3,11-diene-12-al (**17**), 9-hydroxy-selina-3,11-diene-14-al (**18**), 9-hydroxy-eudesma-3,11(13)-diene-12-methyl ester (**19**), 9-hydroxy-selina-4,11-diene-14-al (**20**), 8,12-dihydroxy-selina-4,11-diene-14-al (**21**), 3,4,4 α ,5,6,7,8 α -octahydro-7-[1-(hydroxymet-

hyl)ethenyl]-4 α -methyl-naphthalene-1-carboxaldehyde (**22**), 12,15-dioxo- α -selinen (**23**), 15-hydroxy-12-oxo- α -selinen (**24**), eudesmane-1 β ,5 α ,11-triol (**25**), 7 β H-eudesmane-4 α ,11-diol (**26**), and ent-4(15)-eudesmen-1 α ,11-diol (**27**) [22]. Compound **23** has also been isolated from *A. sinensis* by Zhao together with its isomer (**28**) [19]. In the same year, Wu *et al.* reported a new eudesmane sesquiterpene (**29**) that was isolated from 70% MeOH extract of *A. malaccensis* agarwood chips along with (**28**) and (**30**) [23], Fig. (3).

The agarofuran skeleton was the first reported sesquiterpene skeleton found in *Aquilaria*. Three different sesquiter-

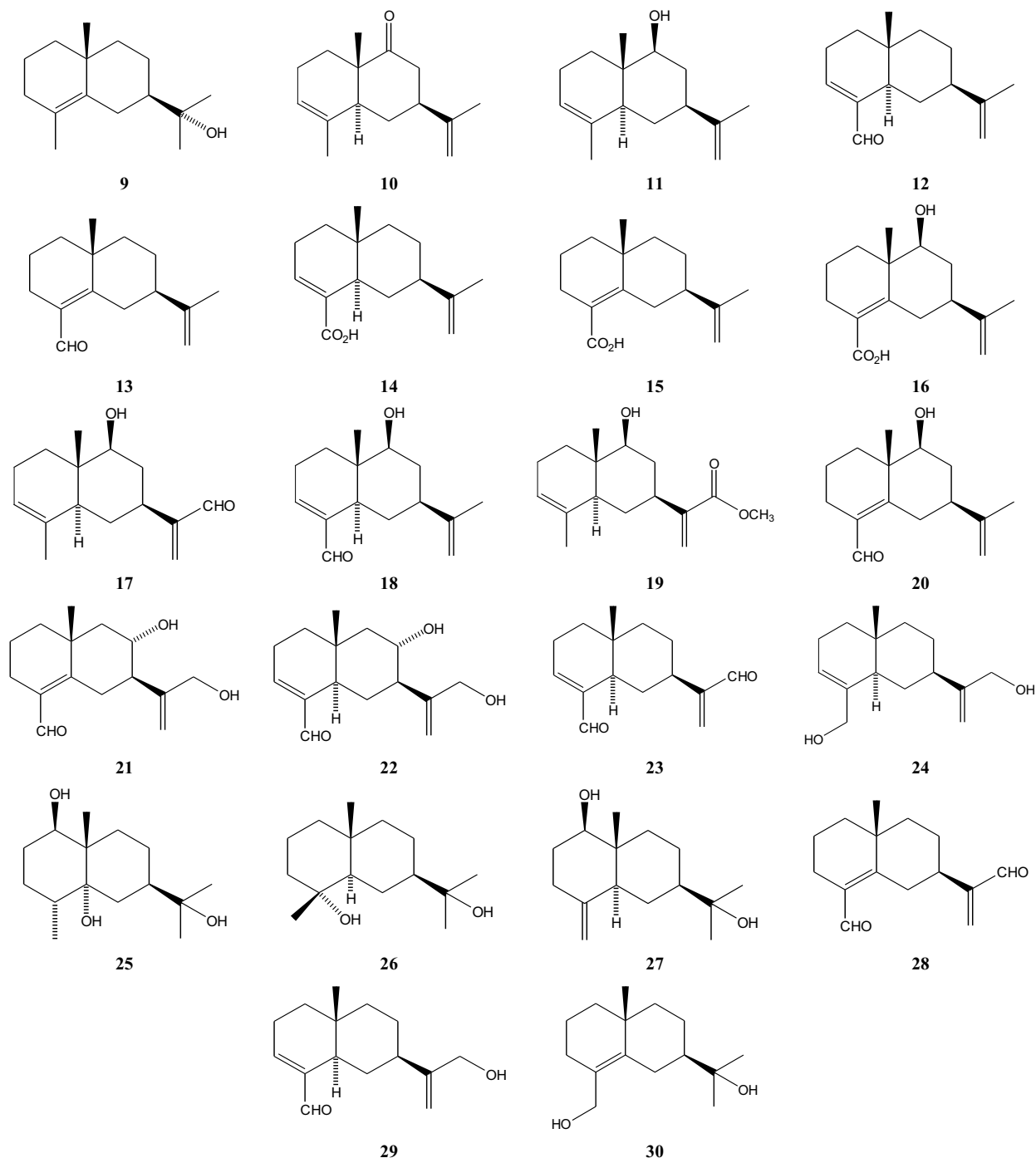


Fig. (3). Eudesmane sesquiterpenes in *Aquilaria*.

penes with this skeleton were isolated from agarwood oil, obtained from fungus-infected *A. agallocha* Roxb plants, and their structures and absolute configurations were determined by degradative studies and physical measurements. These sesquiterpenes were α -agarofuran (**31**), β -agarofuran (**32**) and dihydroagarofuran (**33**) [24]. β -agarofuran has also been isolated from finely powdered *A. agallocha* wood originating from Vietnam, together with another agarofuran and nor-ketoagarofuran (**34**) [25], Fig. (4).

Another sesquiterpene skeleton present in *Aquilaria* plants is that of agarospirane. Some agarospirane sesquiterpenes that have been identified are agarospirol (**35**), isolated from agarwood of infected *A. agallocha* [26], oxo-agarospirol (**36**), isolated from *A. malaccensis* [20] and also found in *A. agallocha* agarwood [18, 25], and 1(10)-spirovetiven-11-ol-2-one (**37**), isolated from Vietnamese agarwood [8]. Zhao isolated compound (**36**) from *A. sinensis*, but named it baimuxinal [19] Fig.

(5). This compound was also reported by Wu *et al.* in 2012, isolated from 70% MeOH extract of *A. malaccensis* agarwood chips [27], Fig. (5).

Sesquiterpenes with an eremophilane skeleton have also been identified in *A. agallocha* agarwood such as jinkoh eremol (**38**), kusunol (**39**), and dihydrokaranone (**40**) [25]. Alkathlan *et al.* also successfully isolated the latter compound, but named it dehydrofukinone [6]. Ishihara *et al.* discovered the presence of the eremophilane sesquiterpene karanone (**41**) in agarwood from *A. agallocha* [17]. Two other eremophilane sesquiterpenes from *A. agallocha* were reported by Ishihara *et al.* in 1993, namely dehydrojinkoh-eremol (**42**) and neopetasane (**43**) [21]. The last compound, also reported by Wu *et al.* was isolated from 70% MeOH extract of *A. malaccensis* agarwood chips [27]. In 2014, Yang *et al.* published their research on the isolation and identification of compound (**43**), 7 β -H-9(10)-ene-11,12-epoxy-8-oxoeremo-

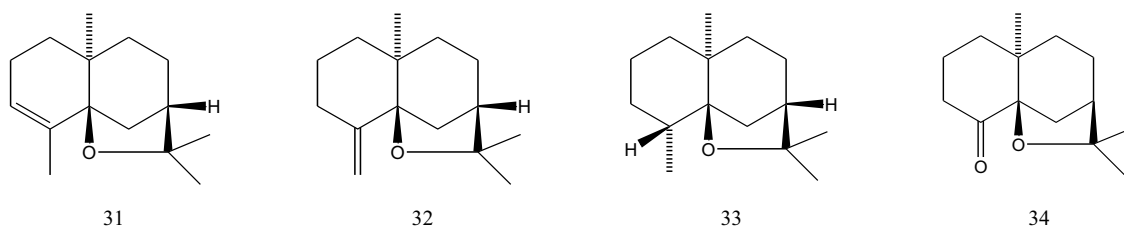


Fig. (4). Agarofuran sesquiterpenes in *Aquilaria*.

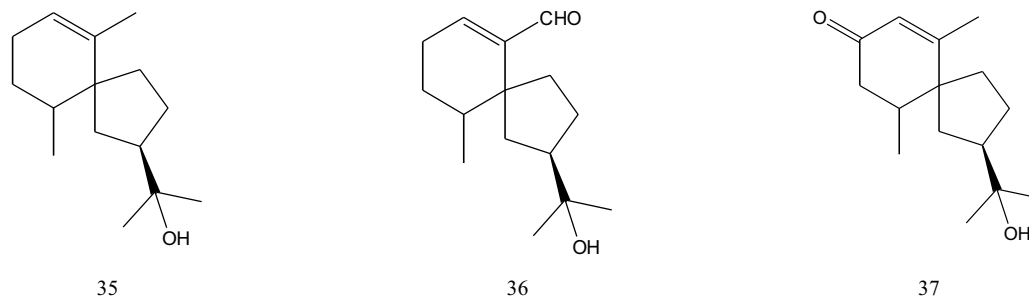


Fig. (5). Agarospiran sesquiterpenes in *Aquilaria*.

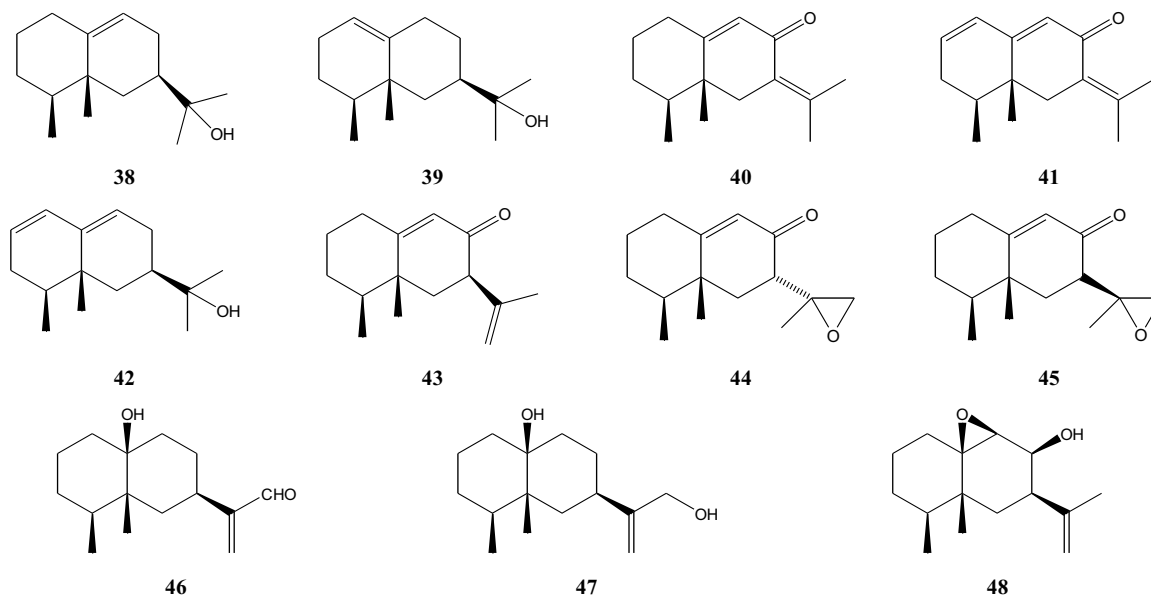


Fig. (6). Eremophilane sesquiterpenes in *Aquilaria*.

philane (**44**) and 7 α -H-9(10)-ene-11,12-epoxy-8-oxoeremophilane (**45**) from Chinese agarwood (*A. sinensis* (Lour.) Gilg.) [16]. In 2012, Wu *et al.* reported the presence of three eremophilane sesquiterpenes (**46**), (**47**), and (**48**) isolated from 70% MeOH extract of *A. malaccensis* agarwood chips [23], Fig. (6).

The presence of prezizane sesquiterpenes in *Aquilaria* appears to be limited. Jinkohol (**49**) and jinkohol II (**50**) were present in agarwood from *A. malaccensis*. This finding was reported by Yoneda *et al.* in 1984 [25], Fig. (7). Previously, Nakanishi *et al.* had already reported the existence of jinkohol in *Aquilaria sp.* (Indonesian agarwood) [14].

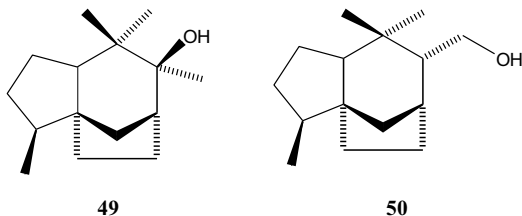


Fig. (7). Prezizane sesquiterpenes in *Aquilaria*.

Miscellaneous sesquiterpenes found in *Aquilaria* are gmelofuran (**51**) and 8 β -dihydrogmelofuran (**52**), which were isolated from wood of *A. agallocha* [27]. Aquilarin B, a degraded sesquiterpene (**53**), as well as another sesquiterpene (**54**), both with a guaiane-like skeleton, were identified from the stem of *A. sinensis* [28, 29]. In addition, Yang *et al.* obtained two other compounds from Chinese eaglewood, with one of them also having a guaiane-like skeleton. These two compounds are 8 β -hydroxy-longicamphenylone (**55**) and 11 β -hydroxy-13-isopropyl-dihydro-dehydrocostus lactone (**56**) [30]. Another compound identified in Chinese eaglewood, *A. sinensis* (Lour.) Gilg., is the sesquiterpenoid derivative 1 α -hydroxy-4 α ,10 α -dimethyl-5 β H-octahydroazulen-8-one (**57**), which was isolated from a 95% ethanolic extract [19], Fig. (8).

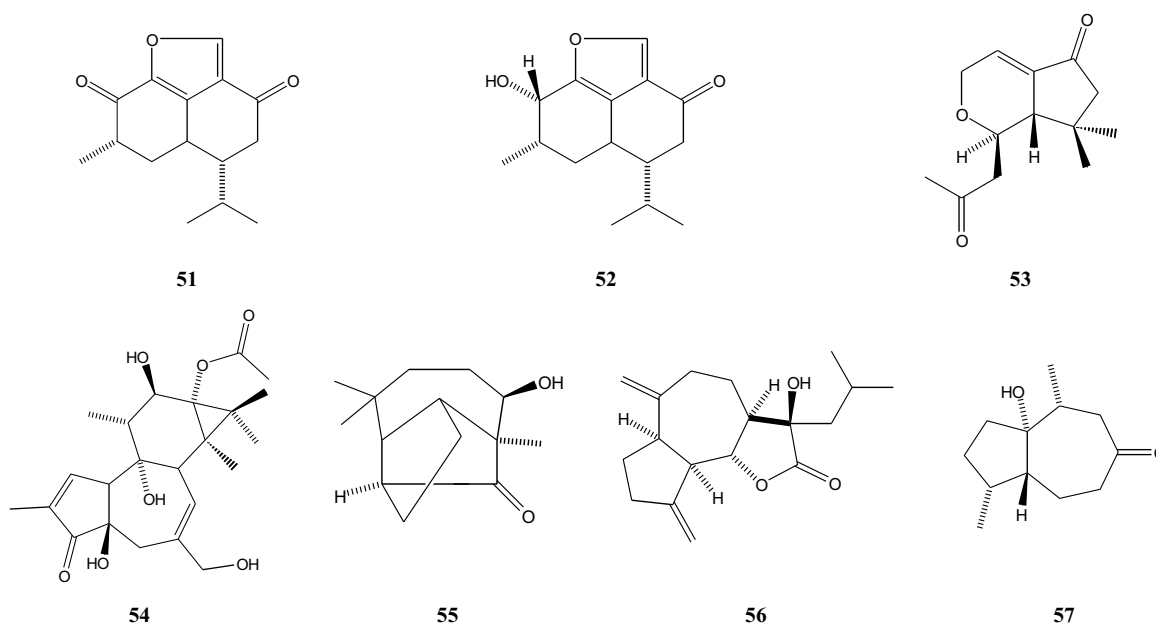
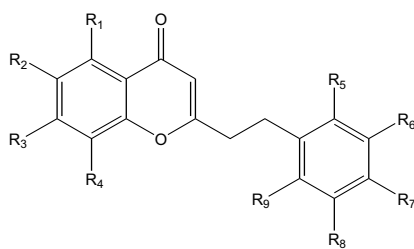


Fig. (8). Miscellaneous sesquiterpenes in *Aquilaria*.

2.2. Chromones

Another class of extensively reported secondary metabolites that have been isolated from *Aquilaria* species is the chromones, Fig. (9). All isolated chromones are derivatives of 2-(2-phenylethyl) chromone. The first two chromones identified (**58** and **59**) were isolated from *A. agallocha* wood [31], but the most simple chromone reported was 2-(2-phenylethyl)chromone or flidersiachromone (**60**) which was isolated for the first time from the ether extract of powdered agarwood of *A. malaccensis* along with 6-methoxy-2-[2-(3-methoxy-4-hydroxyphenyl)ethyl]chromone (**61**), 6,8-dihydroxy-2-(2-phenylethyl)chromone (**62**), 6-hydroxy-2-[2-(4-hydroxyphenyl)ethyl]chromone (**63**), 6-hydroxy-2-[2-(2-hydroxyphenyl)ethyl]chromone (**64**); 7-hydroxy-2-(2-phenylethyl)chromone (**65**), and 6-hydroxy-7-methoxy-2-(2-phenylethyl)chromone (**66**) [32]. Another 2-(2-phenylethyl) chromone derivative, namely 7,8-dimethoxy-2-[2-(3'-acetoxyphenyl)ethyl] chromone (**67**), was isolated from an acetone extract of Cambodian agarwood of *A. agallocha* along with two other chromones, 6-methoxy-2-(2-phenylethyl) chromone (**68**) and 6,7-dimethoxy-2-(2-phenylethyl) chromone (**69**) [6]. Then, Yang *et al.* obtained eight 2-(2-phenylethyl) chromone derivatives (**70-77**) from an EtOH extract of Chinese eaglewood from the *A. sinensis* [33]. Six 2-(2-phenylethyl) chromones were isolated from a 70% MeOH extract of *A. malaccensis* agarwood chips [23]. Two chromones were reported before and identified as compound (**58**) and (**59**) and four others were compound **78-81**. In the same year, 2012, Wu published again the report about some compounds contained in 70% MeOH extract of *A. malaccensis* agarwood chips. In that report, six chromones were isolated and identified [27]. Three compounds were reported before (**60**), (**68**) and (**69**), whereas three others had not been reported yet (**82-84**). In 2014, Li *et al.* reported the isolation of four 2-(2-phenylethyl)chromones (**85-88**), as well as other compounds that had been reported before, such as compounds **59**, **61**, **69**, **76**, **78**, **79** and **84** from the EtOAc extract



Compound	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉
58	H	H	H	H	H	H	OCH ₃	H	H
59	H	OCH ₃	H	H	H	H	OCH ₃	H	H
60	H	H	H	H	H	H	H	H	H
61	H	OCH ₃	H	H	H	OCH ₃	OH	H	H
62	H	OH	H	OH	H	OCH ₃	OH	H	H
63	H	OH	H	H	H	H	OH	H	H
64	H	OH	H	H	OH	H	H	H	H
65	H	H	OH	H	H	H	H	H	H
66	H	OH	OCH ₃	H	H	H	H	H	H
67	OCH ₃	H	H	OCH ₃	H	OAc	H	H	H
68	H	OCH ₃	H	H	H	H	H	H	H
69	H	OCH ₃	OCH ₃	H	H	H	H	H	H
70	H	OH	OCH ₃	H	H	OH	OCH ₃	H	H
71	H	OCH ₃	OCH ₃	H	H	OH	OCH ₃	H	H
72	H	OCH ₃	OH	H	H	OH	OCH ₃	H	H
73	H	OCH ₃	OCH ₃	H	H	OCH ₃	OH	H	H
74	H	OH	OH	H	H	H	OCH ₃	H	H
75	H	OH	OCH ₃	H	H	H	OH	H	H
76	H	OH	H	OH	H	OH	OCH ₃	H	H
77	H	OH	H	H	H	OCH ₃	OH	H	H
78	OH	OCH ₃	H	H	H	H	OCH ₃	H	H
79	H	H	OCH ₃	H	H	H	H	H	H
80	OH	OCH ₃	H	H	H	H	H	H	H
81	H	OCH ₃	H	H	H	OCH ₃	H	H	H
82	H	OCH ₃	OH	H	H	H	OCH ₃	H	H
83	H	OCH ₃	OCH ₃	H	H	H	OCH ₃	H	H
84	H	OH	H	H	H	H	H	H	H
85	H	OCH ₃	H	H	H	OH	OCH ₃	H	H
86	OH	OCH ₃	H	H	H	OH	OCH ₃	H	H
87	H	OCH ₃	H	H	H	H	OH	H	H
88	H	OH	H	H	H	H	OCH ₃	H	H
89	H	OCH ₃	OCH ₃	H	H	H	OH	H	H
90	H	H	H	H	H	H	OH	H	H
91	H	H	H	OH	H	H	H	H	H

Fig. (9). Chromone basic skeleton.

of Chinese agarwood induced by artificial holing originating from *A. sinensis* (Lour.) Gilg [9]. Phytochemical analysis of high quality Chinese agarwood from *A. sinensis* led to the isolation of three new 2-(2-phenylethyl) chromone derivatives (**89-91**) and two compounds that had been reported

before [7]. In 2015, three 2-(2-phenylethyl) chromone derivatives were also isolated from the petioles and leaves of *A. sinensis*. The structures of these three chromones were elucidated and its structure were identical to compounds **58**, **61** and **63** [34].

In addition to having been isolated from *A. agallocha*, compound **68** was also obtained from withered wood of *A. sinensis*, together with three other chromones (**92**, **93** and **94**) [3]. The agarwood of the same plant gave also the 8-chloro-5,6,7,8-tetrahydro-2(3-hydroxy-4-methoxyphenylethyl)-5,6,7,8-tetrahydro-4H-chromen-4-one (**95**), which was isolated and identified by a Chinese research team [35]. Compound **93**, **94** and **95** belong to tetrahydrochromones. However, compound **94** and **95** are tetrahydrochromones that substituted by chloro in its structure. The presence of chloro in secondary metabolites structure is very rare. Meanwhile, compound **92** is unique because it is the only one chromone isolated and identified from *Aquilaria* that is hydroxylated in

ethyl moiety. Subsequently, Dai *et al.* isolated and structurally characterized two isomers of another tetrahydrochromones (**96** and **97**) from the EtOH extract of the withered wood of *A. sinensis* [36], Fig. (10).

Three di-epoxy-tetrahydrochromones - oxidoagarochromones A (**98**), B (**99**), and C (**100**) - were isolated from agarwood that was artificially produced by intentional wounding of *A. crassna* [37]. Compounds **98** and **99** have also been obtained from Chinese agarwood of *A. sinensis* wounded by artificial holing [9]. In 2014, Li *et al.* reported the isolation of mono-epoxy-tetrahydrochromones (**101**, **102** and **103**) [9], Fig. (11).

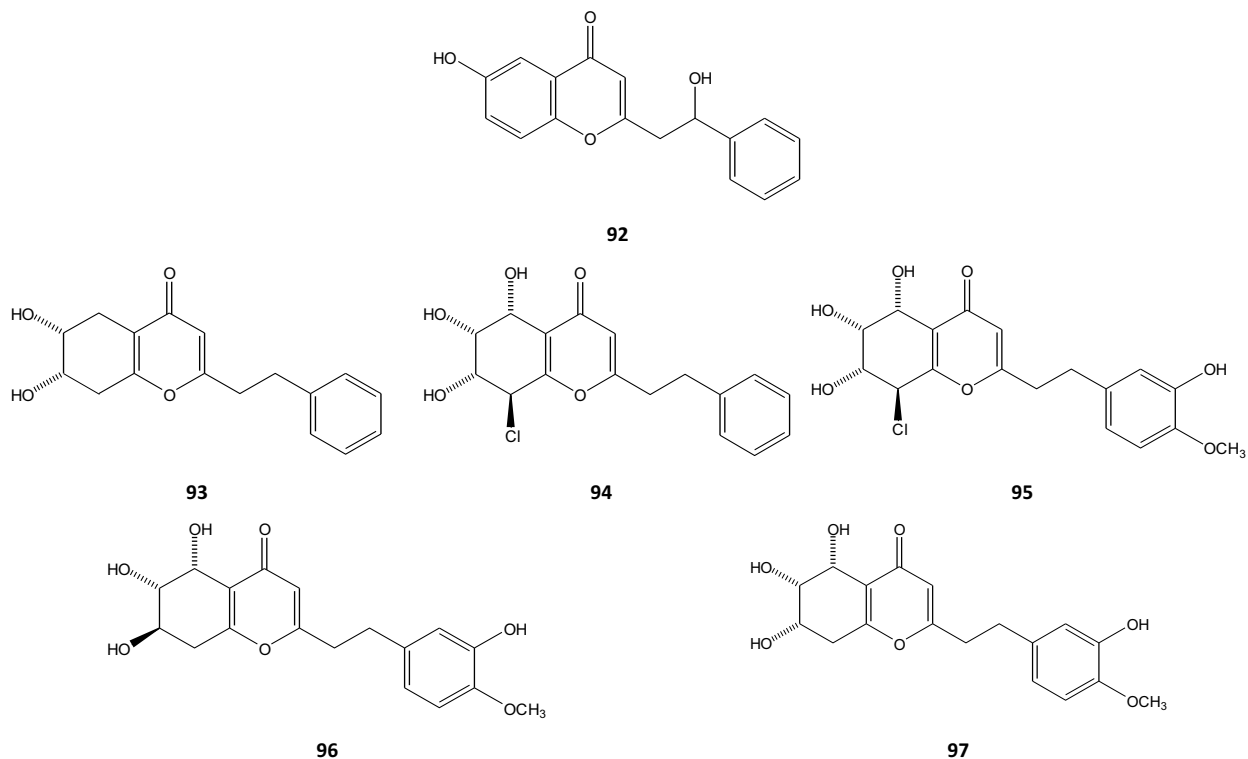


Fig. (10). Some tetrahydrochromones from *A. sinensis*.

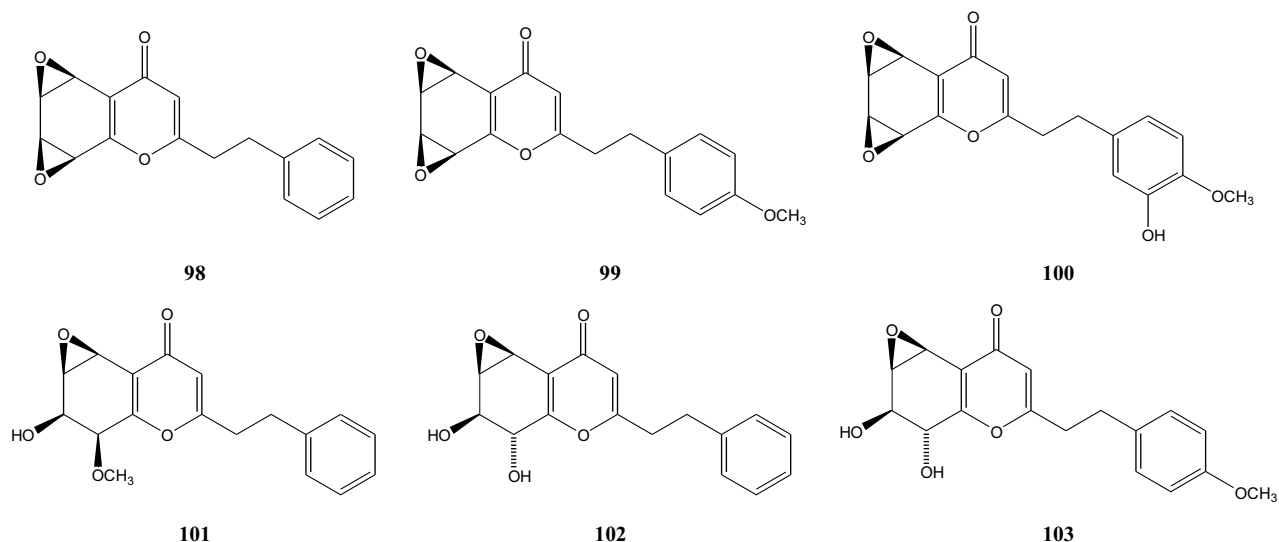
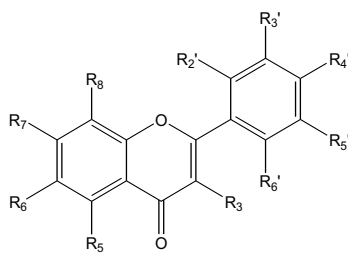


Fig. (11). Epoxy-tetrahydrochromones from *Aquilaria*.



Compound	R ₃	R ₅	R ₆	R ₇	R ₈	R _{2'}	R _{3'}	R _{4'}	R _{5'}	R _{6'}
104	H	OH	H	OH	H	H	OH	OH	H	H
105	H	OH	H	OCH ₃	H	H	H	OH	H	H
106	H	OH	H	OCH ₃	H	H	OH	OH	H	H
107	H	OH	H	OCH ₃	H	H	OH	OCH ₃	H	H
108	H	OCH ₃	H	OCH ₃	H	H	OCH ₃	OCH ₃	H	H
109	H	OCH ₃	H	OCH ₃	H	H	H	OCH ₃	H	H
110	OCH ₃	OH	OCH ₃	OCH ₃	H	H	H	OCH ₃	H	H
111	H	OH	H	OCH ₃	H	H	H	OCH ₃	H	H
112	H	OH	H	OCH ₃	H	H	OCH ₃	OCH ₃	H	H
113	H	OH	H	OH	H	H	H	OCH ₃	H	H

Fig. (12). Flavonoid basic skeleton.

2.3. Flavonoids

From the leaves of *A. sinensis*, several flavonoids, both as glycoside or aglycon, have been isolated and identified. Some aglycon flavonoids found in *Aquilaria* were luteolin (**104**), genkwanin (**105**), and hydroxygenkwanin (**106**) that were isolated by Qi *et al.* [38]. Cheng *et al.* identified several other aglycon flavonoids, such as 7,4'-dimethyl luteolin (**107**), 5,7,3',4'-tetramethoxy-flavone (**108**), 5,7,4'-trimethoxyflavone (**109**) and 5-hydroxy-3,4',6,7-tetramethoxyflavone (**110**) [39]. Furthermore, several aglycon flavonoids were also isolated from the stem of this plant, such as 5-hydroxyl-7,4'-dimethoxyflavone (**111**), 7, 3', 4'-trimethyl luteolin (**112**) and 5, 7-dihydroxyl-4'-methoxyflavone (**113**) [40], Fig. (12). All of aglycone flavonoids that has been reported belong to flavone, except compound **110** that was part of flavanol.

Flavonoids glycoside identified from *A. sinensis* were mono- or di-glycoside. This sugar moiety most often substituted the hydroxy group at position 5, but substitutions can also occur in positions 7 and 8. These flavonoids mono-glycoside were the 7-β-D-glucoside of 5-O-methylapigenin (**114**), the 5-β-D-glucoside of 7,3-di-O-methyl-luteolin (**115**) [38], aquilarisin (**116**), and hypolaetin 5-O-β-D-glucuronopyranoside (**117**) [41]. Several flavonoids glycoside were also isolated from the stem of this plant, such as 5-O-glucosides of 7,3',4'-tri-O-methyl-luteolin (lethodoside A) (**118**), 7-hydroxyl-4'-methyl-5-O-glucosideflavonoid (**119**) and 7, 4'-dimethyl-5-O-glucosideflavonoid (**120**) [40], Fig. (13).

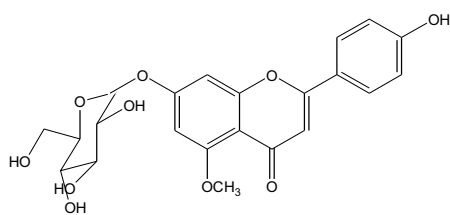
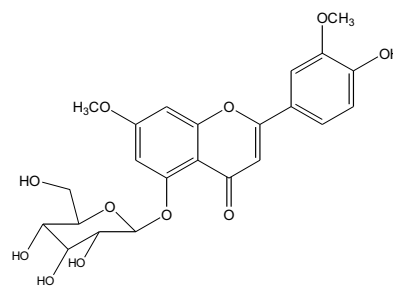
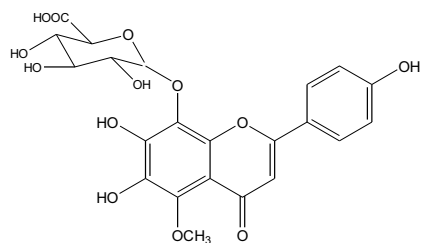
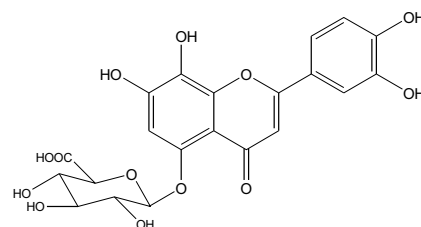
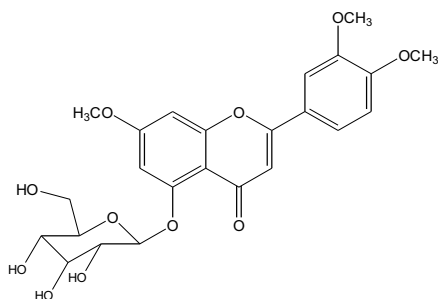
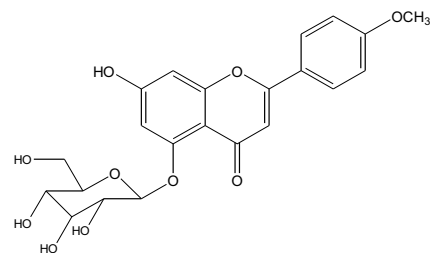
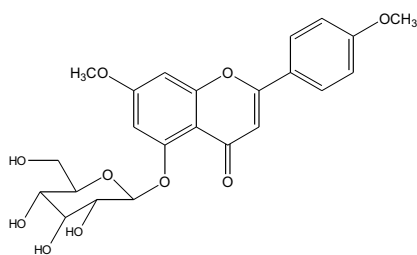
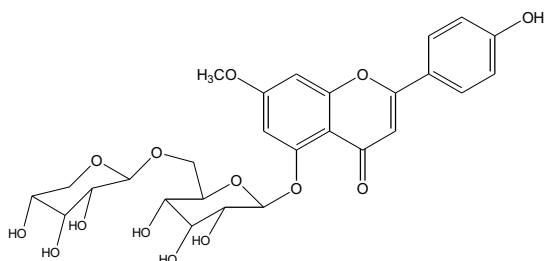
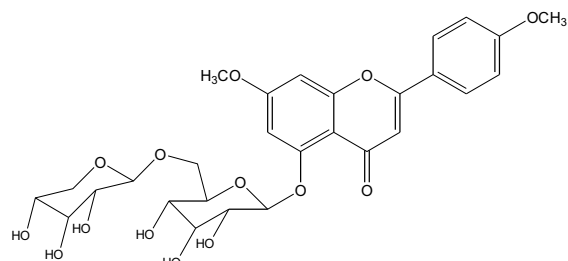
Flavonoid di-glycoside reported from *Aquilaria* were 5-O-xylosylglucoside of 7-O-methylapigenin (**121**), 5-O-xylosylglucoside of 7,4'-di-O-methylapigenin (**122**) [38],

aquisiflavoside (**123**) [42], aquilarinoside A₁ (**124**) and lethodoside A (= 5-O-xylosylglucosides of 7,3',4'-tri-O-methyl-luteolin) (**125**) [40], Fig. (14).

Besides flavonoids, the presence of several xanthons has been reported, particularly mangiferin (**106**) and aquilarixanthone (**107**) in *A. sinensis* [38, 41]. One isoflavonoid, formononetin (**108**), was also isolated and identified from the stem of this plant [40], Fig. (15).

2.4. Benzophenones

Such as flavonoids, *Aquilaria* benzophenone was also divided over the benzophenone aglycone and benzophenone glycoside. All benzophenone glycoside identified in *Aquilaria* are derivate of benzophenone iriflophenone (**129**) that was isolated from the leaves of *A. sinensis* along with the flavonoids described above [38]. An iriflophenone derivative, aquilarinoside A (**130**), was also obtained from the leaves of *A. sinensis*. Aquilarinoside A (**130**) was a benzophenone mono-glycoside with α-fructofuranose as a sugar moiety [38]. Some others iriflophenone mono-glycoside were iriflophenone 2-O-α-L-rhamnopyranoside (**131**) that was isolated from the leaves of *A. sinensis*, iriflophenone 3-C-β-D-glucoside (**132**) that were isolated from the petioles and leaves of *A. sinensis* [34] and another benzophenone that have been reported by other researchers and were identified as benzophenone C-glycoside (= 3C-β-D-glucopyranosyl-4',2,4,6-tetrahydroxybenzophenone (**133**) [39, 43]. Aquilarisin (**134**) and iriflophenone 3,5-C-β-D-diglycopyranoside (**135**) that were isolated from the petioles and leaves of *A. sinensis* were examples benzophenone iriflophenone di-glycoside [34]. In 2014, Sun *et al.* published four benzophenone glycosides, the aquilarinensides A-D (**136-139**), which

**114****115****116****117****118****119****120****Fig. (13).** Mono-glycoside flavonoids in *A. sinensis*.**121****122****Fig. (14).** Contd...

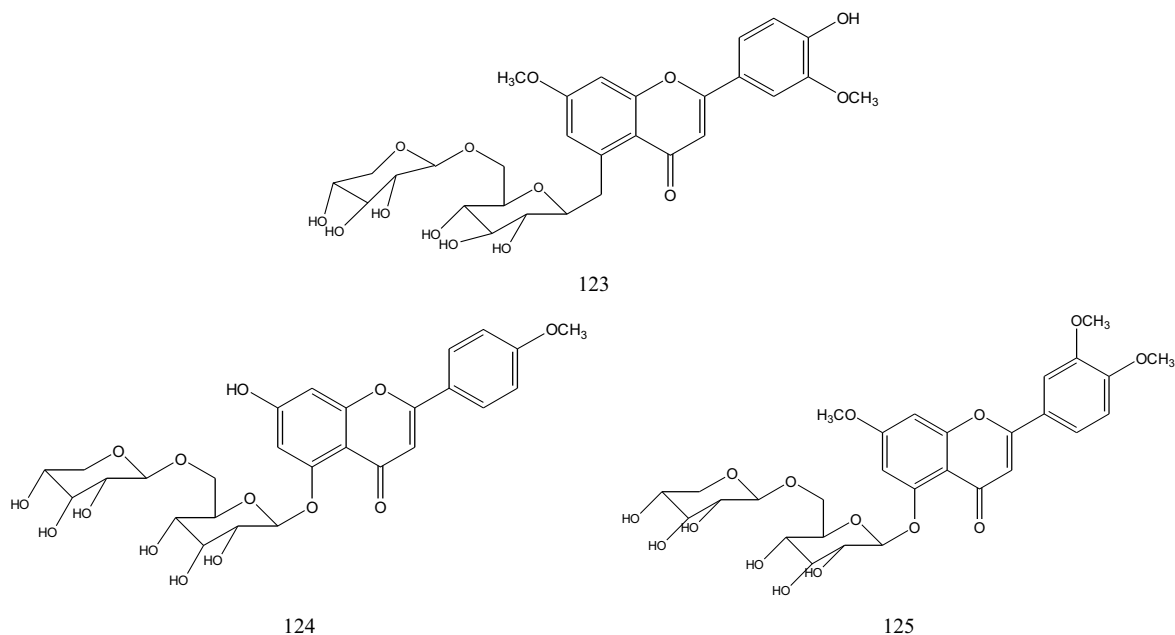


Fig. (14). Di-glycoside flavonoid in *A. sinensis*.

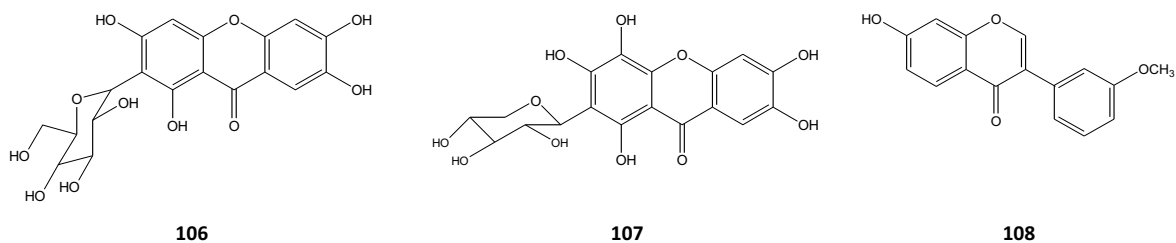


Fig. (15). Xanthenes and isoflavonoid in *A. sinensis*.

had also been isolated from the leaves of the same plant [44]. In addition to these four compounds, an iriflophenone glycoside with acetyl group (**140**) was also reported. Based on these structures, it can be seen that there are iriflophenone-O-glycoside and iriflophenone-C-glycoside. A sugar moiety could substitute hydroxyl group either at position 2 or 6, Fig. (16). Meanwhile for iriflophenone-C-glycoside, a sugar moiety could be substituted at position 3, 5 or 5'.

2.5. Diterpenoids

All diterpenoid compounds that so far have been isolated from *Aquilaria* species have an abietane and podocarpane skeleton. Seven abietane diterpenoids (aquilarabietic acids **141-147**) and one podocarpane diterpenoid (**148**) were obtained from the Chinese eaglewood, *A. sinensis* [45]. Meanwhile, a phorbol derivative - phorbol-13-acetate (**149**) - was isolated from the EtOH extract of the fresh stem of *A. sinensis* (Lour.) Gilg. [29]. Phorbol is a member of the trigliane family of diterpenes. Another phorbol compound had previously been isolated from the stem bark of the Thai *A. malaccensis* tree, namely 12-*O*-*n*-deca-2,4,6-trienoylphorbol-13-acetate (**150**) [46], Fig. (17).

2.6. Triterpenoids

From the fruits of *A. sinensis*, five cucurbitacine triterpenoid compounds were isolated and identified as hexanocucurbitacin I (**151**), cucurbitacin I (**152**), cucurbitacin D (**153**),

isocucurbitacin D (**154**), and neocucurbitacin B (**155**) [47]. Another cucurbitacine triterpenoid, namely dihydrocucurbitacine F (**156**), was isolated from the EtOH extract of the fresh stem of *A. sinensis* (Lour). Gilg. [29]. Furthermore, an aglycon cucurbitacine triterpenoid (**157**) were reported by Wang along with some cucurbitane triterpene glycosides (**158-161**) [34], Fig. (18).

Three triterpenoids with a tirucallane skeleton have also been identified in *A. sinensis*. They are aquilacallane A (24-methylenetirucall-7(8)-en-3 β ,25-diol) (**162**), aquilacallane B (24-methylene-25-methyltirucall-8(9)-en-3 β -ol-7,11-dione) (**163**), and 24-methylene-25-methyltirucall-7-en-3-one (wallenone) (**164**). They were isolated from the leaves of *A. sinensis* [39, 48]. The presence of these two tirucallane triterpenoids (**162** and **163**) in the petioles and leaves of *A. sinensis* have also reported by Wang [34], Fig. (19).

Oleanane triterpenoid skeletons were also found in *A. sinensis* such as those of 11-oxo- β -amyrin (**165**), hederagenin-an (**166**), 3 β -acetyxyfriedelane (**167**) and ursolic acid (**168**). Their presence was reported by Cheng [39], Fig. (20).

2.7. Lignans

From the dried stems of *A. sinensis* that were collected in Qingyuan, Guangdong Province of China, seven lignans were isolated, including lignan aglycon and lignan glycoside [49]. They were identified as simulanol (**169**), syringaresinol

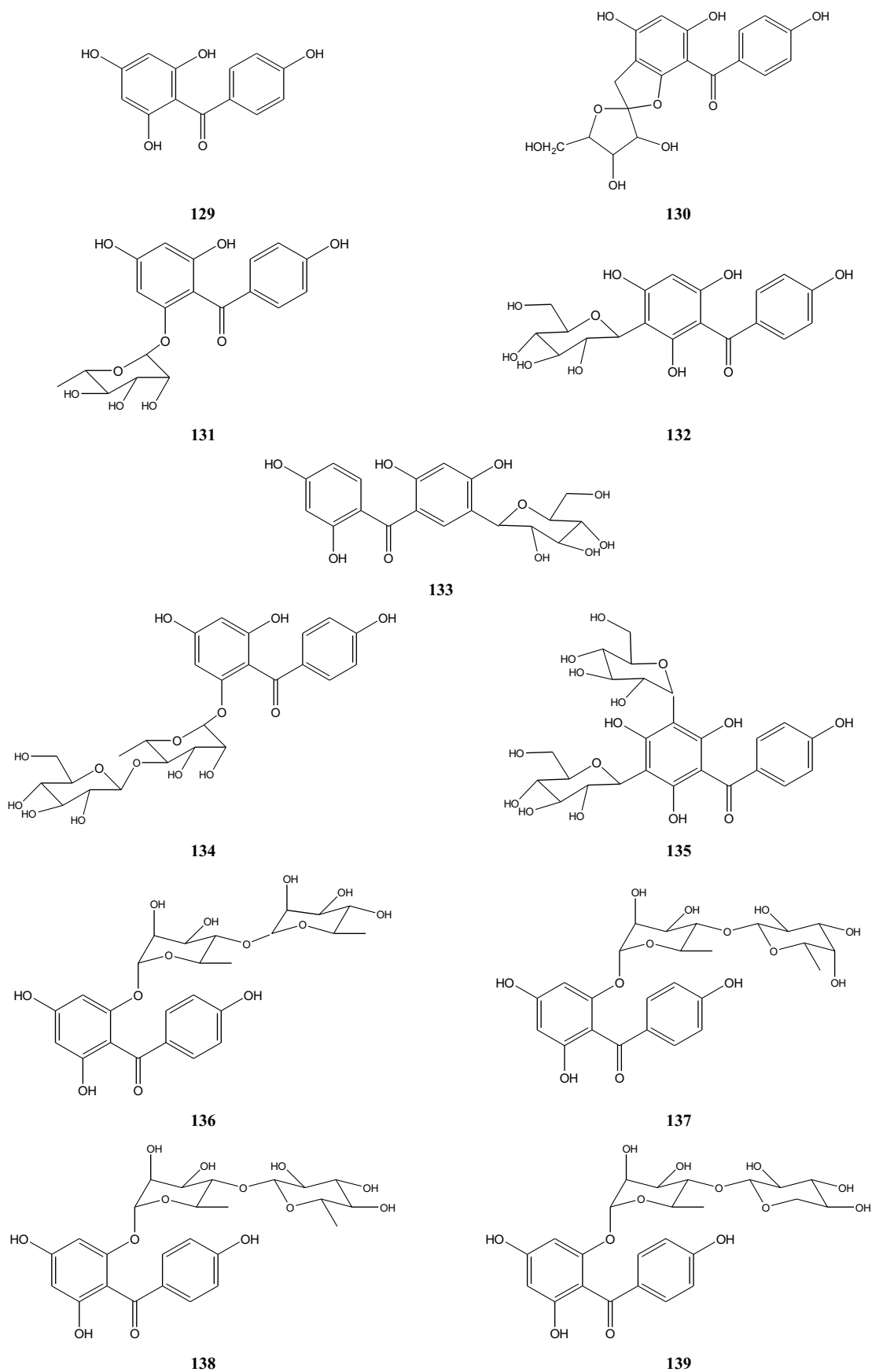
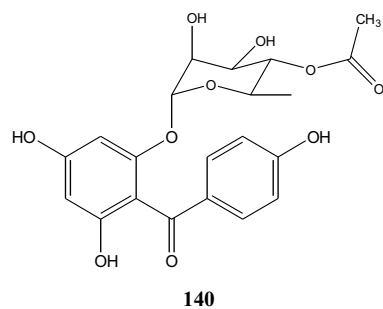
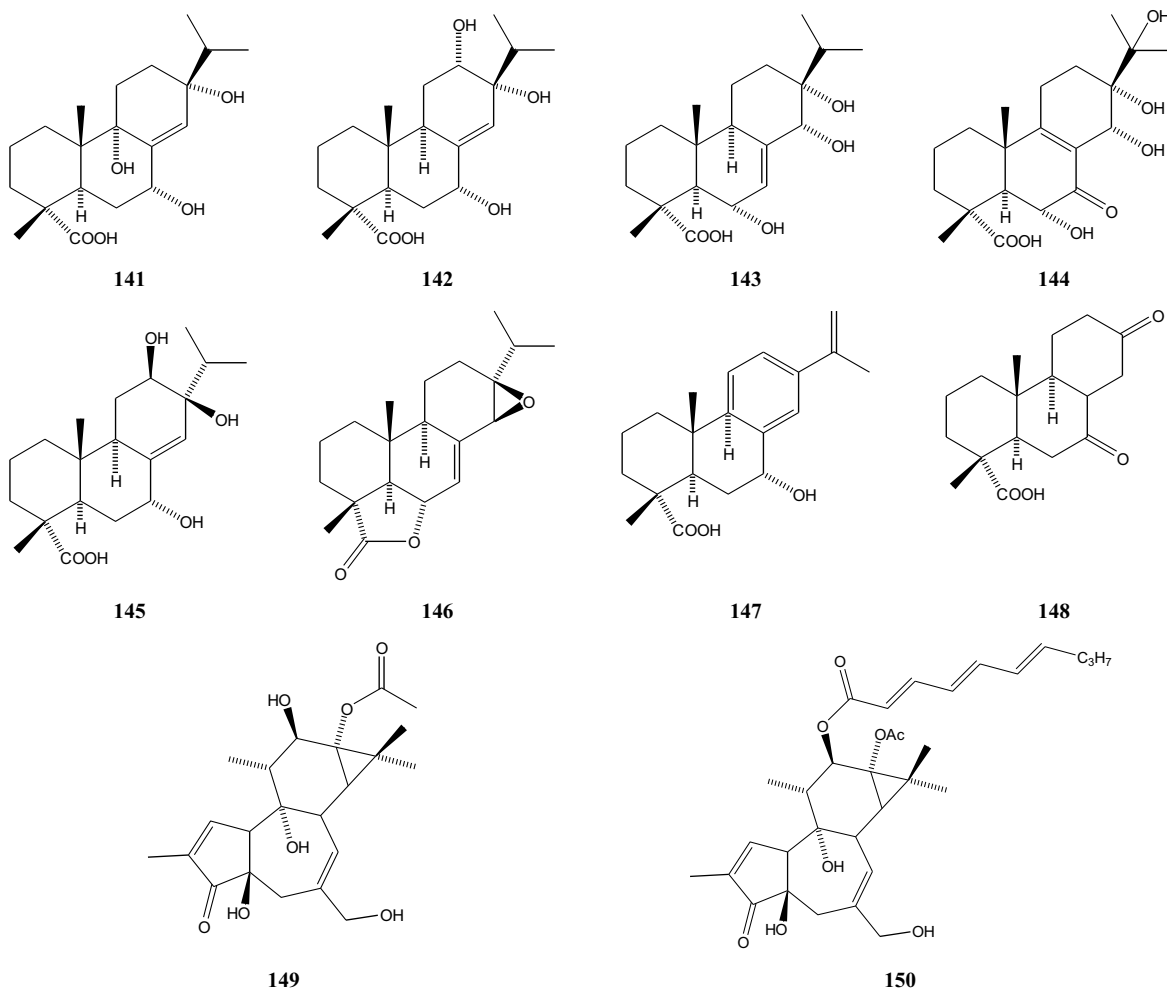
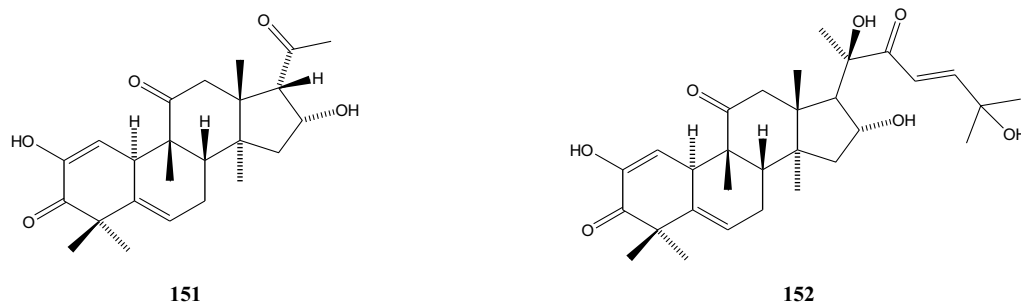


Fig. (16). Contd..

Fig. (16). Benzophenones in *Aquilaria*.Fig. (17). Diterpenoides in *Aquilaria*.

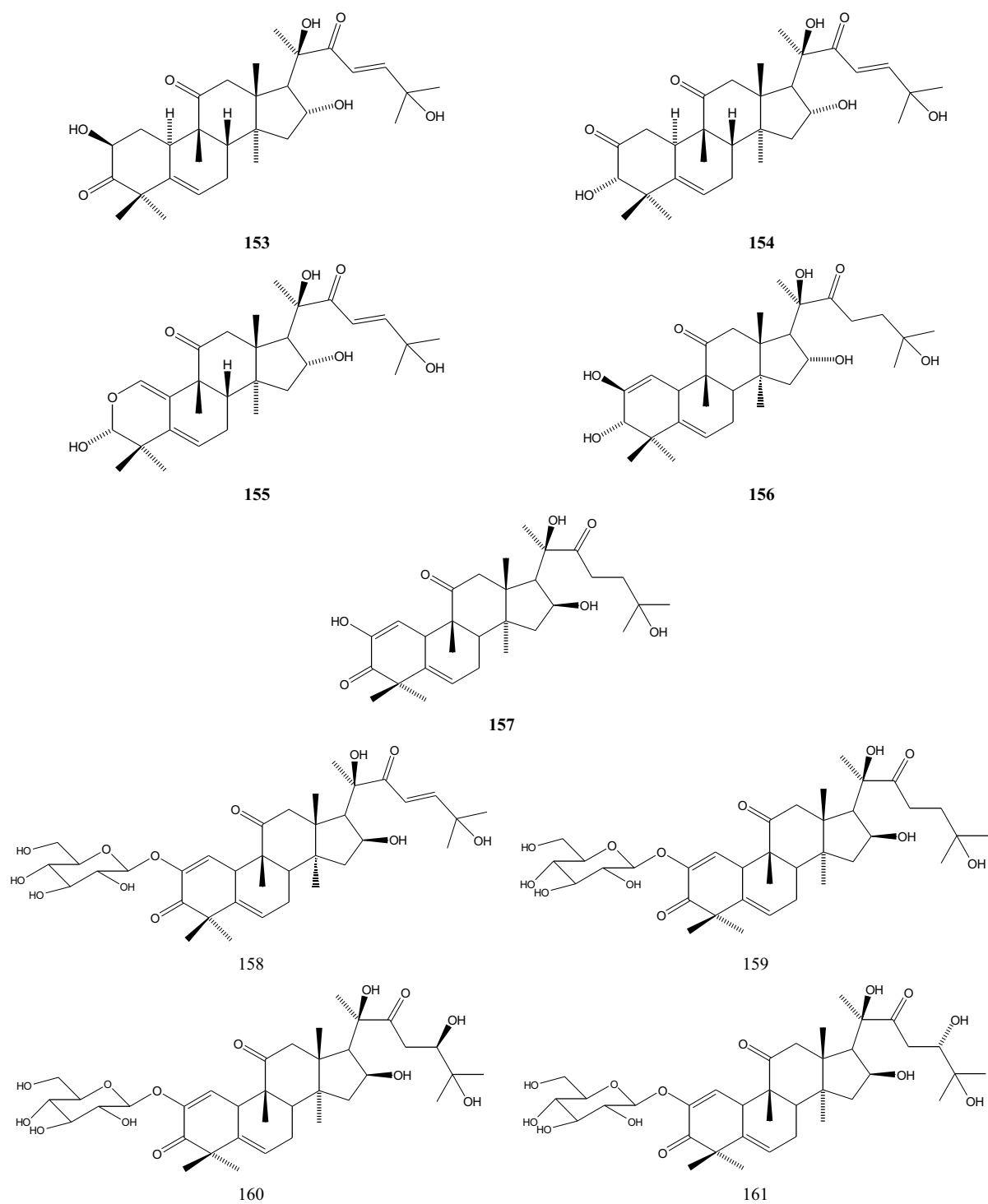


Fig. (18). Cucurbitacine triterpenoid in *Aquilaria*.

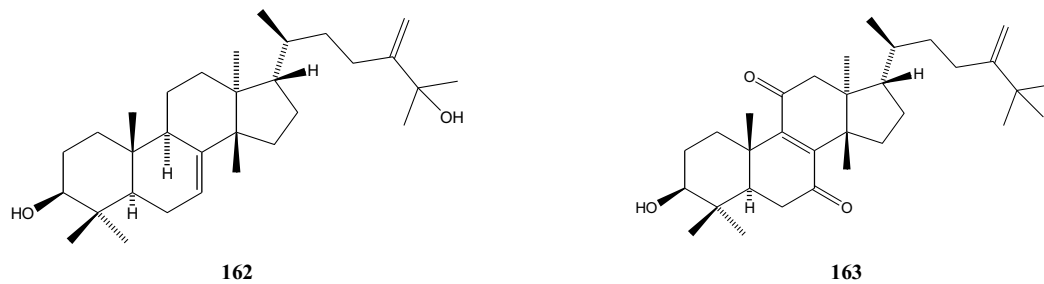
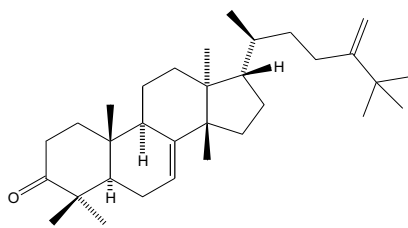
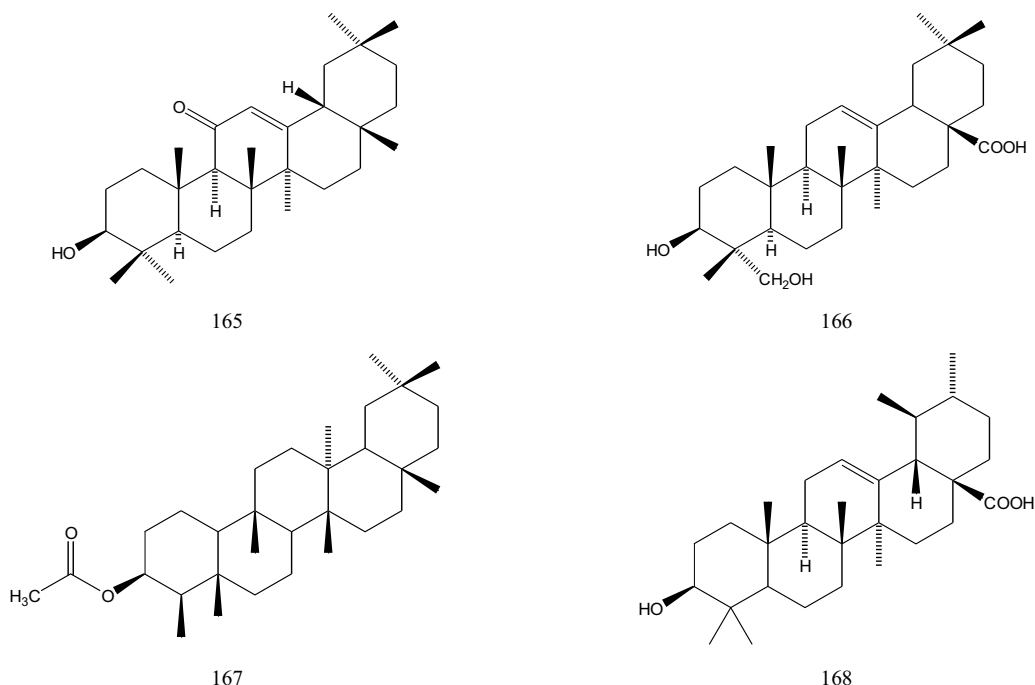


Fig. (19). Contd..



164

Fig. (19). Tirucallane triterpenoid in *Aquilaria*.

165

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167

168

Fig. (20). Oleanane triterpenoids in *Aquilaria*.

(170), conicaol B (171), aquilaroside A (172), longifloroside A (173), conicaoside (174) and liriiodendrin (175). These compounds are lignan derivatives with different skeletons, which are widely distributed in higher plants. Compounds 169, 172 and 173 are common benzofuran-type lignan derivatives, but compounds 170 and 175 are di-tetrahydrofuran lignans, while compounds 174 and 171 represent tetrahydrofuran and dibenzylbutyrolactone types, respectively. A coumarinolignan, namely aquillochin (176), was isolated from the whole plant of *A. agallocha*. The structure was proposed by Bhandari *et al.* on the basis of chemical and physical characterization [50], Fig. (21).

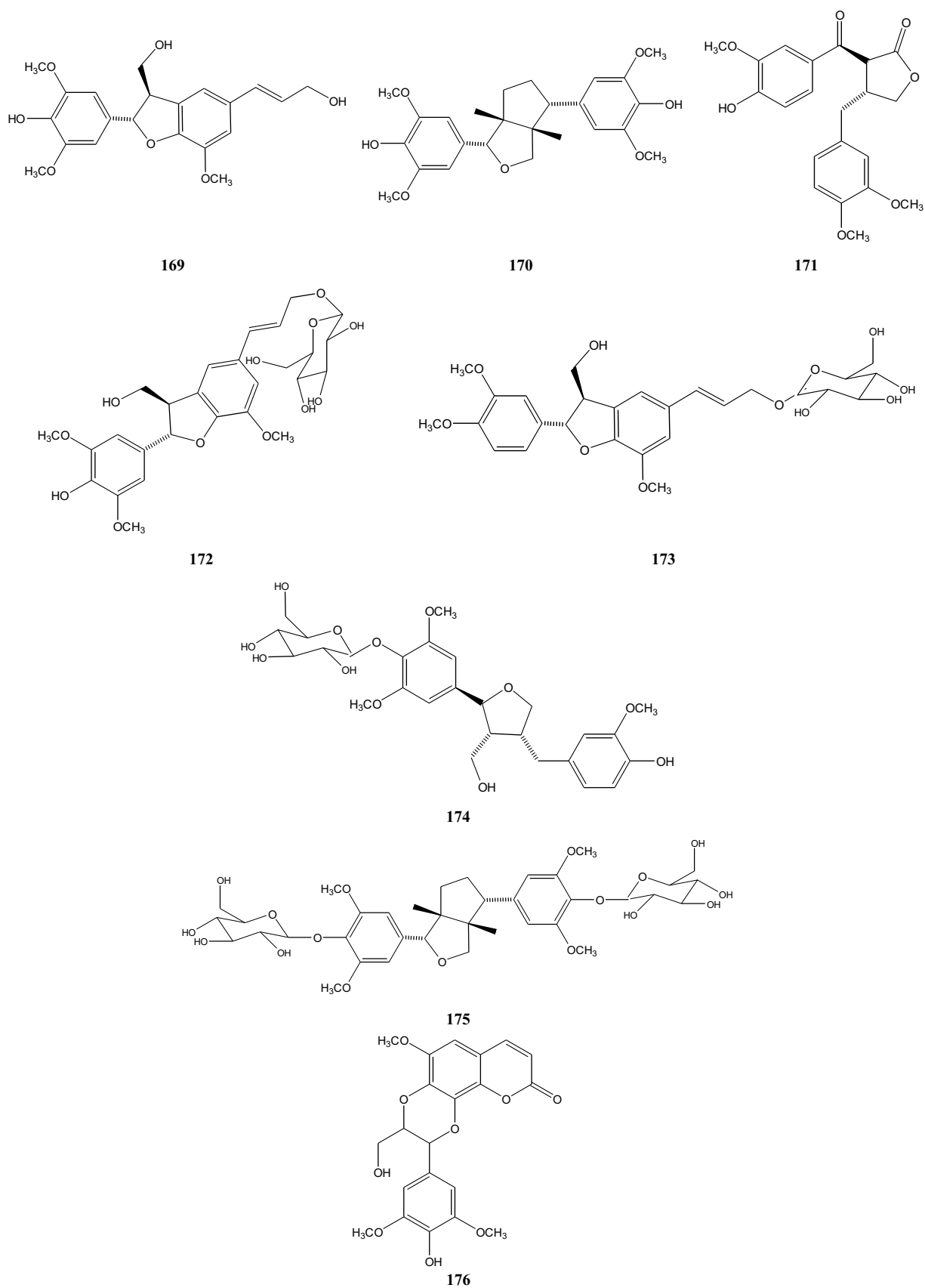
2.8. Miscellaneous

Several other compounds outside the compound classes discussed above are also found in *Aquilaria*. They include several nucleosides (177-182) and 4-hydroxyacetanilide (183). The nucleosides were isolated from the petioles and leaves of *A. sinensis*, whereas 4-hydroxyacetanilide (183) was obtained from a leaves extract of *A. malaccensis* [34, 51]. From the stem bark of *A. malaccensis* tree, the glyceride 1,3-dibehenyl-2-ferulyl glyceride (184) was isolated and identified [46], Fig. (22).

As *Aquilaria* plants are known as producers of high-quality fragrant material, then it is to be expected that these plants produce essential oils. 4-Phenyl-2-butanone, α -bulnesene, α -guaiene, agarospirol, ledene oxide-(II), elemol and γ -eudesmol were identified as the major chemical constituents of Malaysian agarwood (*A. malaccensis*) oils [52]. The composition of essential oils can be used to determine the quality of agarwood obtained from healthy, naturally infected, or artificially wounded trees. Such research has been done with agarwood from *A. agallocha* Roxb. [53].

Not only *Aquilaria* species, but also the fungi infecting them may produce fragrant compounds. For instance, from a fermentation of the endophytic Chinese eaglewood fungus HP-1, four compounds were isolated that were identified as 3 α , 3 β , 10 β -trimethyl-decahydroazuleno [6, 7] furan-8, 9, 14-triol (185), 4-hydroxyphenylacetic acid (186), 4-hydroxyphenethyl alcohol (187) and 5-hydroxymethyl-2-furancarboxaldehyde (188) [54], Fig. (23).

Table 1 provides a summary of secondary metabolites have been reported, along with parts of the plant and the species from which they were isolated.

**Fig. (21).** Lignans in *Aquilaria*.

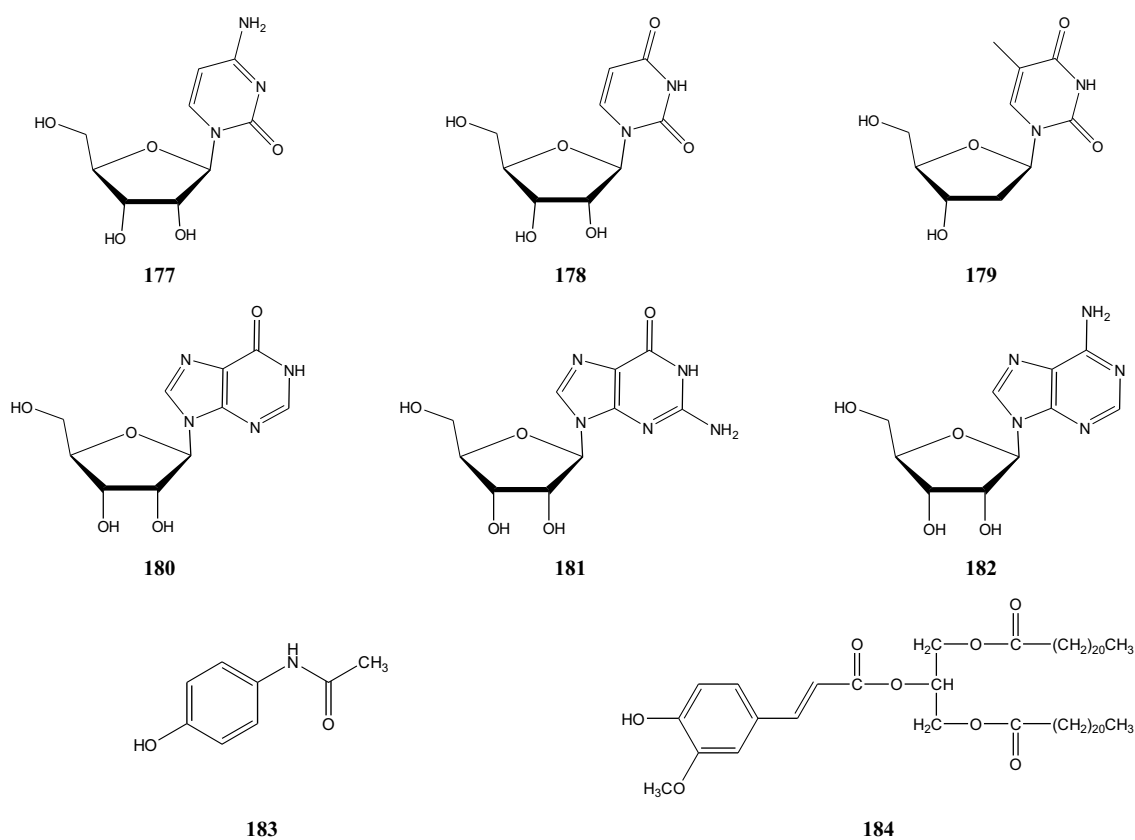
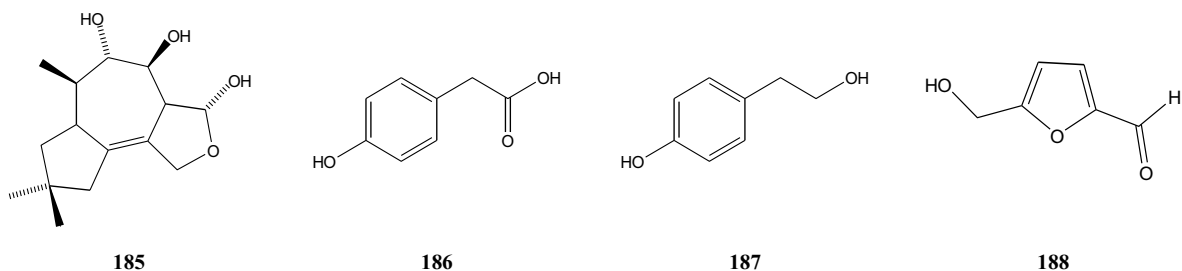
Fig. (22). Miscellaneous compounds in *Aquilaria*.

Fig. (23). Compounds producing by endophytic Chinese eaglewood fungus HP-1.

Table 1. Summary of secondary metabolites isolated from some *Aquilaria* species.

Secondary Metabolites	Part	Species	References
Guaiane Sesquiterpenes	Agarwood	<i>Aquilaria agallocha</i>	Ishihara, M. <i>et al.</i>
		<i>Aquilaria sinensis</i>	Zhao, H. <i>et al.</i>
Eudesmane Sesquiterpenes	Wood	<i>Aquilaria malaccensis</i>	Nakanishi, T. <i>et al.</i>
	Agarwood	<i>Aquilaria agallocha</i>	Ishihara, M. <i>et al.</i>
		<i>Aquilaria sinensis</i>	Li, W. <i>et al.</i> Zhao, H. <i>et al.</i>
		<i>Aquilaria malaccensis</i>	Wu, B. <i>et al.</i>
Agarofuran Sesquiterpenes	Agarwood	<i>Aquilaria agallocha</i>	Maheswari, M.L. <i>et al.</i>
	Wood		Yoneda, K. <i>et al.</i>

Table 1. (contd...)

Secondary Metabolites	Part	Species	References
Agarspirane Sesquiterpenes	Agarwood	<i>Aquilaria agallocha</i>	Varma, K.R. et al. Ishihara, M. et al. Yoneda, K. et al.
		<i>Aquilaria malaccensis</i>	Nakanishi, T. et al.
		<i>Aquilaria sp.</i> (Vietnam)	Ueda, J. et al.
		<i>Aquilaria sinensis</i>	Zhao, H. et al. Wu, B. et al.
Eremophilane Sesquiterpenes	Agarwood	<i>Aquilaria agallocha</i> ,	Yoneda, K. et al. Alkathlan, H.Z. et al. Ishihara, M. et al.
		<i>Aquilaria malaccensis</i>	Wu, B. et al.
		<i>Aquilaria sinensis</i>	Yang, D.L. et al.
Prezizane Sesquiterpenes	Agarwood	<i>Aquilaria malaccensis</i> ,	Yoneda, K. et al.
		<i>Aquilaria sp.</i> (Indonesia)	Nakanishi, T. et al.
Miscellaneous Sesquiterpenes	Wood	<i>Aquilaria agallocha</i>	Wu, B. et al.
	Stem	<i>Aquilaria sinensis</i>	Pant, P. et al.
	Agarwood/ Eaglewood		Yang, L. et al. Zhao, H. et al.
Chromones	Wood	<i>Aquilaria agallocha</i>	Nakanishi, T. et al.
	Agarwood/ Eagle- wood	<i>Aquilaria malaccensis</i> ,	Konishi, T. et al. Wu, B. et al.
		<i>Aquilaria agallocha</i> ,	Alkathlan, H.Z. et al.
		<i>Aquilaria sinensis</i>	Yang, L. et al. Li, W. et al. Yang, D.L. et al.
	Petioles And Leaves	<i>Aquilaria sinensis</i>	Wang, S.C. et al.
	Withered Wood		Yagura, T. et al.
Tetrahydrochromone	Withered Wood	<i>Aquilaria sinensis</i>	Yagura, T. et al. Dai, H.F. et al.
	Agarwood/ Eagle- wood		Liu, J. et al.
Di-Epoxy-Tetrahydrochromone	Agarwood	<i>Aquilaria crassna</i> ,	Yagura, T. et al.
		<i>Aquilaria sinensis</i>	Li, W. et al.
Mono-Epoxy-Tetrahydrochromone	Agarwood	<i>Aquilaria sinensis</i>	Li, W. et al.
Aglycon Flavonoids	Leaves	<i>Aquilaria sinensis</i>	Qi, J. et al. Cheng, J.T. et al.
	Stem		Chen, D. et al.
Mono-Glycoside Flavonoids	Leaves	<i>Aquilaria sinensis</i>	Qi, J. et al. Feng, J. et al.
	Stem		Chen, D. et al.

Table 1. (contd...)

Secondary Metabolites	Part	Species	References
Di-Glycoside Flavonoids	Leaves	<i>Aquilaria sinensis</i>	Qi, J. <i>et al.</i> Yang, X.B. <i>et al.</i>
	Stem		Chen, D. <i>et al.</i>
Xanthons	Leaves	<i>Aquilaria sinensis</i>	Qi, J. <i>et al.</i> Cheng, J.T. <i>et al.</i>
Isoflavonoid	Stem	<i>Aquilaria sinensis</i>	Wu, Y. <i>et al.</i>
Aglycon Benzophenones	Leaves	<i>Aquilaria sinensis</i>	Qi, J. <i>et al.</i>
Mono-Glycoside Benzophenone	Leaves	<i>Aquilaria sinensis</i>	Qi, J. <i>et al.</i> Cheng, J.T. <i>et al.</i>
	Leaves and petioles		Wang, S.C. <i>et al.</i>
Di-Glycoside Benzophenone	Petioles and leaves	<i>Aquilaria sinensis</i>	Wang, S.C. <i>et al.</i>
	Leaves		Sun, G.J. <i>et al.</i>
Abietane And Podocarpane Diterpenoid	Agarwood	<i>Aquilaria sinensis</i>	Yang, L. <i>et al.</i>
Tigliane Diterpenoids	Stem	<i>Aquilaria sinensis</i>	Peng, K. <i>et al.</i>
	Stem bark	<i>Aquilaria malaccensis</i>	Gunasekera, S.P. <i>et al.</i>
Cucurbitacine Triterpenoids	Fruits	<i>Aquilaria sinensis</i>	Mei, W.L. <i>et al.</i>
	Stem		Peng, K. <i>et al.</i>
Aglycon And Glycoside Cucurbitane Triterpenoid	Petioles and leaves	<i>Aquilaria sinensis</i>	Wang, S.C. <i>et al.</i>
Tirucallane Triterpenoid	Petioles and leaves	<i>Aquilaria sinensis</i>	Cheng, J.T. <i>et al.</i> Wang, S.C. <i>et al.</i>
Oleanane Triterpenoid	Leaves	<i>Aquilaria sinensis</i>	Cheng, J.T. <i>et al.</i>
Benzofuran-Type Lignan (Aglycon And Glycoside)	Stem	<i>Aquilaria sinensis</i>	Wu, Y. <i>et al.</i>
Coumarinolignan	Whole plant	<i>Aquilaria agallocha</i>	Bhandari, P. <i>et al.</i>
Nucloesides	Petioles and leaves	<i>Aquilaria sinensis</i>	Wang, S.C. <i>et al.</i>
Acetanilide	Leaves	<i>Aquilaria malaccensis</i>	Afiffudden, S.K.N. <i>et al.</i>
Glyceride	Stem bark	<i>Aquilaria malaccensis</i>	Mei, W.L. <i>et al.</i>
Essential Oil	Agarwood	<i>Aquilaria malaccensis</i>	Tajuddin, S.N. <i>et al.</i>
		<i>Aquilaria agallocha</i>	Bhuiyan, M.N.I. <i>et al.</i>

CONCLUSION

The *Aquilaria* genus is very rich in different classes of natural products, such as sesquiterpenes, chromones, flavonoids, benzophenones, diterpenoids, triterpenoids and lignans. Hundreds of compounds have been identified in extracts from these plants, with *A. sinensis* as the most intensively studied source. Almost all parts of the *A. sinensis* plant have been investigated. Knowing the content of secondary metabolites from each part will be able to help understand the diversity of the usefulness of this plant. An example is the use of leaves that were reported to be used locally in trauma-related diseases such as fracture, bruise etc. It was

also reported that agarwood has significant anticancer activities, analgesic and anti-inflammatory activities and antidepressant activities [55]. Research on the phytochemicals from this genus (*Aquilaria*) will continue certainly because there are still some species that have not been studied. There is a high possibility to find other compounds, even new compounds, from species that have not yet been studied. In addition, knowledge of the fragrant constituents of agarwood may be useful for the development of new fragrance products from other natural sources in the future.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Attention Editorial Office Mini-Reviews in Organic Chemistry:

Following Abstract has been submitted by Mrs. Kristanti to Mini-Reviews in Organic Chemistry.

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Abstract Details:

=====

Abstract Title: Structural diversity of secondary metabolites of *Aquilaria*, a Thymelaeaceae genus

Contributing Authors: Alfinda Novi Kristanti, Mulyadi Tanjung, Nanik Siti Aminah

Author Affiliation: Department of Chemistry, Faculty of Science and Technology, Universitas Airlangga, Indonesia

Abstract Keywords: *Aquilaria*, Thymelaeaceae, sesquiterpene, chromone,

flavonoid, benzophenone, diterpenoid, triterpenoid, lignan

Abstract Description: Aquilaria, a genus belonging to the Thymelaeaceae, produces fragrant resinous agarwood, also known as eaglewood, which has been used as incense since old times. The intense fragrance is the result of the presence of a wide variety of secondary metabolites, such as sesquiterpenes and chromones. Other secondary metabolites also presents in this genus are flavonoid, benzophenone, diterpenoid, triterpenoid and lignan. Here, we review the different secondary metabolites that have been identified in Aquilaria to show their diversity and to allow comparison with other Thymelaeaceae genera

Tentative Date of manuscript submission: October 24th, 2016

=====
Contact Details:

=====
Title: Mrs.

First Name: Alfinda Novi

Last Name: Kristanti

Address: Department of Chemistry, Faculty of Science and Technology,
Universitas Airlangga, Indonesia

Email: alfinda-n-k@fst.unair.ac.id

City: Surabaya

State: Not Applicable

Zip Code: 60115

Country: Indonesia

=====
Message ID: a55464b6041015716a11e659ad9bb49c
=====

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id

Fri, Oct 28, 2016 at 6:57 PM

Dear Dr. Novi,

With reference to below email, we are pleased to inform you that your abstract has been approved by our EIC, you are kindly requested to submit your manuscript as soon as possible through our online system.

Best regards,

Raheela Anjum
Manager, Publications
Mini-Reviews in Organic Chemistry
Bentham Science Publishers
Email: mroc@benthamscience.org
URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Sat, Oct 29, 2016 at 2:49 AM

Dear Mr. Anjum,

Thank you very much for your kind information. That is a very pleasure information for me, but I have to revise my manuscript because all of the figures (many structure of compounds) must be separated from manuscript and must be in chemdraw's file form. I hope that I have still the chance to submit my manuscript to your journal. I try to do my best to finish my revision as soon as possible

Best regards
Dr. Alfinda N. K

[Quoted text hidden]

MROC <mroc@benthamscience.org>
To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Mon, Oct 31, 2016 at 11:23 AM

Dear Dr. Novi,

Thank you for your email, we are eagerly looking forward to receive your manuscript soon.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

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[MROC] Journal Registration

1 message

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>
To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Fri, Nov 11, 2016 at 3:03 PM

Dear Dr. Alfinda Novi Kristanti,

You have now been registered as a user with Mini-Reviews in Organic Chemistry. We have included your username and password in this email, which are needed for all work with this journal through its website. At any point, you can ask to be removed from the journal's list of users by contacting me.

Username: alfinda_novi_kristanti
Password: 15Nov1967

Thank you,

Mini-Reviews in Organic Chemistry

[MROC] Submission Acknowledgement | BSP-MROC-2016-338

3 messages

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>
To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Tue, Nov 15, 2016 at 3:04 PM

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of *Aquilaria*, a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

Thank you for your submission to Mini-Reviews in Organic Chemistry. It will be sent to the Editor in Chief for his approval, and once this is obtained for peer-reviewing, on the understanding that the manuscript contains original work that has neither been published earlier nor has simultaneously been submitted elsewhere. In case this is not so, please let us know immediately.

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Your manuscript has been assigned to the following Editor/Manager, to whom all correspondence is to be addressed:

Name: Roberto Paolesse

Affiliation: Dept. of Chemical Science and Technologies University of Rome

Country: Italy

Email: roberto.paolesse@uniroma2.it

Looking forward to the successful publication of your article.

In case of delay, please feel free to write info@benthamscience.org

Sincerely,

Editorial Office

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Mini-Reviews in Organic Chemistry

<http://bsp-cms.eurekaselect.com/index.php/MROC>

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: herys08032002@yahoo.com

Tue, Nov 15, 2016 at 3:24 PM

----- Pesan terusan -----

Dari: "Mini-Reviews in Organic Chemistry" <mroc@benthamscience.org>

Tanggal: 15 Nov 2016 15.05

Subjek: [MROC] Submission Acknowledgement | BSP-MROC-2016-338

Kepada: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc:

[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Wed, Nov 16, 2016 at 4:05 PM

Dear Editorial of Mini Reviews in Organic Chemistry,

Thank you for your email. I have tried to follow all the provisions before doing submit my manuscript in accordance with the instructions. I hope that my manuscript is worthy to publish in your journal.

Best regards,
Dr. Alfinda Novi Kristanti, DEA
[Quoted text hidden]

[MROC] Quick Track Notification | BSP-MROC-2016-338

3 messages

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Tue, Nov 15, 2016 at 3:04 PM

To: "Dr. Alfinda Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>, fastrack@benthamscience.org

Dear Dr. Alfinda Kristanti,

We thank you for submitting your manuscript, "Structural diversity of secondary metabolites of Aquilaria, a Thymelaeaceae genus", to be published in "Mini-Reviews in Organic Chemistry". Please note that all approved manuscripts, subject to their acceptance by the referees, take at least 10 weeks to appear online and in the print issue of the journal. If you wish to get your article published urgently, we would like to offer you our Quick Track services.

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Note: Authors are encouraged to submit the revised manuscript within 48 hours for timely publication of their manuscript submitted in QUICK TRACK category.

Waiting keenly to hear from you soon

Thanks and regards,
Mini-Reviews in Organic Chemistry

----- Pesan terusan -----

Dari: "Mini-Reviews in Organic Chemistry" <mroc@benthamscience.org>

Tanggal: 15 Nov 2016 15.05

Subjek: [MROC] Quick Track Notification | BSP-MROC-2016-338

Kepada: "Dr. Alfinda Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc: "Mini-Reviews in Organic Chemistry" <mroc@benthamscience.org>, <fastrack@benthamscience.org>

[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Thu, Nov 17, 2016 at 1:06 PM

Dear Editor of Mini Reviews in Organic Chemistry,

I decided to use Quick Track facility, but I can not find the form that I must fill. So, please send me that Quick Track Form or please show me where I can download it. Thank You very much

Best Regards

Dr. Alfinda Novi Kristanti

[Quoted text hidden]

RE: urgent Quick Track Notification | BSP-MROC-2016-338

5 messages

MROC <mroc@benthamscience.org>

Fri, Nov 18, 2016 at 5:56 PM

To: alfinda-n-k@fst.unair.ac.id

Cc: MROC <mroc@benthamscience.org>, fastrack@benthamscience.org, Hira Iftakhar <hira@benthamscience.org>

Dear Dr. Kristanti,

Thank you for availing our quick track service for rapid publication of your manuscript. Please find attached quick track form and duly fill it with complete billing details.

A prompt response in this regard is highly appreciated.

Best Regards,

Hira Iftikhar

Assistant Manager Publications

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From: alfinda novi kristanti [mailto:alfinda-n-k@fst.unair.ac.id]

Sent: Thursday, November 17, 2016 11:07 AM

To: Mini-Reviews in Organic Chemistry

Subject: Re: [MROC] Quick Track Notification | BSP-MROC-2016-338

Dear Editor of Mini Reviews in Organic Chemistry,

I decided to use Quick Track facility, but I can not find the form that I must fill. So, please send me that Quick Track Form or please show me where I can download it. Thank You very much

Best Regards

Dr. Alfinda Novi Kristanti

On Tue, Nov 15, 2016 at 12:04 AM, Mini-Reviews in Organic Chemistry <mroc@benthamscience.org> wrote:

Dear Dr. Alfinda Kristanti,

We thank you for submitting your manuscript, "Structural diversity of secondary metabolites of Aquilaria, a Thymelaeaceae genus", to be published in "Mini-Reviews in Organic Chemistry". Please note that all approved manuscripts, subject to their acceptance by the referees, take at least 10 weeks to appear online and in the print issue of the journal. If you wish to get your article published urgently, we would like to offer you our Quick Track services.

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Please note that whether you opt for the QUICK TRACK facility or not, standard reviewing practices will be followed. Your opting for the QUICK TRACK facility will not in any way affect the acceptance or rejection of the manuscript by the reviewers.

If you feel interested, please fill the attached Quick Track Form and email it to "mroc@benthamscience.org" or fastrack@benthamscience.org. We must receive this form in the next 4 working days before we can proceed with peer reviewing process.

Note: Authors are encouraged to submit the revised manuscript within 48 hours for timely publication of their manuscript submitted in QUICK TRACK category.

Waiting keenly to hear from you soon

Thanks and regards,
Mini-Reviews in Organic Chemistry



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Dear Mr./Mrs. Hira Iftikhar
Assistant Manager Publications
Mini Reviews in Organic Chemistry
Bentham Science Publishers

I'm sorry if I canceled my decision to use Quick track facility. Before your email, I think that the price for this facility was US\$300, but when I tried to fill the form, I just knew that the real price was US\$ 205 per published page. It is too expensive for me. I hope that you can understand my situation and forgive me. So I'll wait for the reviews on my manuscript in a predetermined time, hoping that you will accept it for publication in your journal. Thank you very much .

Best regards
Dr. Alfinda Novi Kristanti, DEA

[Quoted text hidden]

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id
Cc: Hira Iftakhar <hira@benthamscience.org>, MROC <mroc@benthamscience.org>

Wed, Nov 30, 2016 at 6:23 PM

Dear Dr. Kristanti,

This is with reference to below email; kindly confirm if you are availing fast track service for rapid publication of your manuscript.

A prompt response in this regard is highly appreciated.

Best Regards,

Hira Iftikhar

Assistant Manager Publications
Mini Reviews in Organic Chemistry
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alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Thu, Dec 1, 2016 at 11:31 AM

Dear Mr/Mrs.Hira Iftikhar

I would like to say that I have decided to NOT use fast track service for rapid publication of my manuscript. This is due to the price that is very expensive for me. I'm very sorry. I will wait the review process in 10 weeks hoping my article will be published in the journal. Thank you very much to understand my situation.

Best Regards
Dr. Alfinda Novi Kristanti, DEA

[Quoted text hidden]

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id
Cc: MROC <mroc@benthamscience.org>, Hira Iftakhar <hira@benthamscience.org>

Fri, Dec 2, 2016 at 12:30 PM

Dear Dr. Kristanti,

Thank you for acknowledging us. We will proceed with standard publication process.

Looking forward to a successful and fruitful collaboration ahead.

Best Regards,

Hira Iftikhar

Assistant Manager Publications

Mini Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/#top>

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MROC- Ms for Review [BSP-MROC-2015-338]

2 messages

MROC <mroc@benthamscience.org>

Wed, Dec 14, 2016 at 1:14 PM

To: alfinda-n-k@fst.unair.ac.id

Cc: MROC <mroc@benthamscience.org>, Hira Iftakhar <hira@benthamscience.org>

Dear Dr. Kristanti,

This is with reference to your manuscript entitled "**Structural diversity of secondary metabolites of Aquilaria, a Thymelaeaceae genu**" submitted for publication in *Mini Reviews in Organic Chemistry*. The manuscript is initially accepted by editor in chief of the journal. The manuscript will be verified for similarity and plagiarism in the text.

It was observed that **figures** are missing in the text. Kindly upload all the figures to proceed further for reviewing process.

A prompt response in this regard is highly appreciated.

Best Regards,

Hira Iftikhar

Assistant Manager Publications

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alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Thu, Dec 15, 2016 at 8:34 AM

To: MROC <mroc@benthamscience.org>

Dear Mr./Mrs. Hira Iftikhar,

I am very grateful upon the acceptance of my manuscript for publication in *Mini Reviews in Organic Chemistry*. For figures, in fact I have sent all at the same time as I did online submission, but apart from the manuscript. All the figures I sent in the form of cdx files (Chem Draw) according in the guidelines. Nevertheless I would send it again via this email as an attachment. I send also the complete manuscript in pdf file form. I apologize for my lack in

understand the guideline. I thank you while waiting for good news from you for my manuscript.

Best Regards,
Dr. Alfinda Novi Kristanti, DEA

[Quoted text hidden]

42 attachments

 **Aquilaria-Alfinda complete.pdf**
877K

 **Fig 1-Alfinda-Aquilaria.cdx**
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 **Fig 3a-Alfinda-Aquilaria.cdx**
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[MROC] Editor Decision | BSP-MROC-2016-338

1 message

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Wed, Jan 4, 2017 at 11:28 PM

To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc: raheela@benthamscience.org, Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>, "Dr. Mulyadi - Tanjung" <mulyadi-t@fst.unair.ac.id>, "Dr. Nanik Siti Aminah" <naniksa2000@gmail.com>

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of *Aquilaria*, a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

Thanks for submitting the manuscript to "Mini-Reviews in Organic Chemistry". Your manuscript has been reviewed by the experts in the field, and the consensus is that it needs a revision with rewriting and checking. I am attaching the comments below and encouraging you to address the comments, revise the manuscript indicating the exact changes you made and to resubmit it at your earliest convenience.

Reviewers' comments:

There are some issues that should be addressed before the article can be considered for publication.

- 1) It is not clear what period of time is taken for search and review of publications.
- 2) There are several review articles that provide information on chemical constituents of *Aquilaria* species but are not discussed and cited. This is a serious issue, and the authors should clearly state the aim of their review and what is new in their submitted manuscript.
 - Naef, R. (2011), The volatile and semi-volatile constituents of agarwood, the infected heartwood of *Aquilaria* species: a review. *Flavour Fragr. J.*, 26: 73–87. doi:10.1002/ffj.2034
 - Chen, H.-Q., Wei, J.-H., Yang, J.-S., Zhang, Z., Yang, Y., Gao, Z.-H., Sui, C. and Gong, B. (2012), Chemical Constituents of Agarwood Originating from the Endemic Genus *Aquilaria* Plants. *Chemistry & Biodiversity*, 9: 236–250. doi:10.1002/cbdv.201100077
 - Wu, B., Kwon, S. W., Hwang, G. S. and Park, J. H. (2012), Eight New 2-(2-Phenylethyl)chromone (=2-(2-Phenylethyl)-4H-1-benzopyran-4-one) Derivatives from *Aquilaria malaccensis* Agarwood. *HCA*, 95: 1657–1665. doi:10.1002/hlca.201200069
 - Wu, B., Lee, J. G., Lim, C. J., Jia, S. D., Kwon, S. W., Hwang, G. S. and Park, J. H. (2012), Sesquiterpenoids and 2-(2-Phenylethyl)-4H-chromen-4-one (=2-(2-Phenylethyl)-4H-1-benzopyran-4-one) Derivatives from *Aquilaria malaccensis* Agarwood. *HCA*, 95: 636–642. doi:10.1002/hlca.201100409
 - Yumi Zuhani Has-Yun Hashim, Philip G. Kerr, Phirdaous Abbas, Hamzah Mohd Salleh, *Aquilaria* spp. (agarwood) as source of health beneficial compounds: A review of traditional use, phytochemistry and pharmacology, *Journal of Ethnopharmacology*, Volume 189, 2 August 2016, Pages 331-360, ISSN 0378-8741, <http://dx.doi.org/10.1016/j.jep.2016.06.055>
- 3) The content of compounds is not given. As a result, it is impossible to understand which class of compounds is major. Which compound(s) can be obtained in preparative amounts?
- 4) There is no summarization of distribution and content of substances in different species of *Aquilaria*. This information would improve the overall manuscript greatly.
- 5) Sometimes, it is not clear what part of the plant was used for the isolation of compound(s).

6) Sometimes, it is better to group structure of compounds of the same class in to one structure with substituents (fig. 3, 9, 11 etc.).

7) Almost all sugars are drawn without their stereochemistry (see fig. 13, 14, etc.). The stereochemistry should be clearly shown in the same way as in fig. 15.

The conclusion could be improved for the importance of the applications and/or some novel compounds reported from Aquilaria. Some very close papers including:

1- DOI 10.1007/s10600-014-1174-7

2- Secondary Metabolites from the Leaves of Aquilaria agallocha Cheng-Ta Li Chen, Chiu-Li Kao, Chi-Ming Liu, Wei-Jen Li, Hsing-Tan Li, Hui-Ming Wu, Cheng-Tsung Huang, Chung-Yi Chen

and the reported compounds are required to be check and carefully cited.

Actually it represents a big list of compounds and of the sources they were obtained with the bibliographical references.

The title and the content of the paper do not match quite well, because no information are really reported about the structural diversity of the metabolites. Maybe you should simply change it writing: Review of secondary

.....

I could not see the figures but I suppose they just represent examples of the molecules you were referring on.

Maybe you should produce further information regarding the properties of the different metabolites, linked to their chemical structure.

To obtain that stakeholders pay more attention to your paper, it could be very useful to introduce, (even as supplementary material) a big table with the rows reporting the secondary metabolites (organized on the base of the different group they belong), and many columns reporting the different botanic species, bibliography source, country... and so on.

With warm regards,

Editorial Office

Bentham Science Publishers

Mini-Reviews in Organic Chemistry

<http://bsp-cms.eurekaselect.com/index.php/MROC>

[MROC] Reminder for Revised Submission | BSP-MROC-2016-338

1 message

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Thu, Jan 12, 2017 at 2:01 PM

To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>, raheela@benthamscience.org

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of *Aquilaria*,
a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

Just a gentle reminder for revised submission for your submission, for
Mini-Reviews in Organic Chemistry.

Sincerely,

Editorial Office
Bentham Science Publishers
Mini-Reviews in Organic Chemistry
<http://bsp-cms.eurekaselect.com/index.php/MROC>

[MROC] Reminder for Revised Submission | BSP-MROC-2016-338

3 messages

Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Thu, Jan 19, 2017 at 2:01 PM

To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>

Cc: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>, raheela@benthamscience.org

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of Aquilaria, a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

Just a gentle reminder for revised submission for your submission, for Mini-Reviews in Organic Chemistry.

Sincerely,

Editorial Office
Bentham Science Publishers
Mini-Reviews in Organic Chemistry
<http://bsp-cms.eurekaselect.com/index.php/MROC>

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Tue, Mar 14, 2017 at 12:23 PM


To: Mini-Reviews in Organic Chemistry <mroc@benthamscience.org>

Dear Editorial Office
Bentham Science Publishers

First of all, I apologize for only now that I send back the manuscript revision in accordance with the input from reviewer. I need a long enough time to make improvements. I still hope of course that this manuscript can be published in your journal. Thank you for your attention

Best regards
Dr. Alfinda Novi Kristanti

[Quoted text hidden]

 **Aquilaria reviewed .pdf**
942K

MROC <mroc@benthamscience.org>

Sun, Apr 30, 2017 at 10:18 PM

To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Dear Dr. Kristanti,

Thank you for your email, we appreciate if you could send us revised manuscript in word format along with point by point reply to referee's comments as soon as possible.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

Forthcoming important conferences:

<http://2017.ddtwc.com/>

<http://2017.globalbiotechcongress.com/>

[Quoted text hidden]

Reminder for Revised Submission | BSP-MROC-2016-338

3 messages

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id

Thu, May 11, 2017 at 12:37 AM

Dear Dr. Alfinda Novi Kristanti,

Just a gentle reminder for revised submission for your submission, for Mini-Reviews in Organic Chemistry.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

Forthcoming important conferences:

<http://2017.ddtwc.com/>

<http://2017.globalbiotechcongress.com/>

From: MROC [mailto:mroc@benthamscience.org]

Sent: Sunday, April 30, 2017 8:18 PM

To: 'alfinda novi kristanti'

Subject: RE: [MROC] Reminder for Revised Submission | BSP-MROC-2016-338

Dear Dr. Kristanti,

Thank you for your email, we appreciate if you could send us revised manuscript in word format along with point by point reply to referee's comments as soon as possible.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

Forthcoming important conferences:

<http://2017.ddtwc.com/>

<http://2017.globalbiotechcongress.com/>

From: alfinda novi kristanti [mailto:alfinda-n-k@fst.unair.ac.id]

Sent: Tuesday, March 14, 2017 10:24 AM

To: Mini-Reviews in Organic Chemistry

Subject: Re: [MROC] Reminder for Revised Submission | BSP-MROC-2016-338

Dear Editorial Office
Bentham Science Publishers

First of all, I apologize for only now that I send back the manuscript revision in accordance with the input from reviewer. I need a long enough time to make improvements. I still hope of course that this manuscript can be published in your journal. Thank you for your attention

Best regards

Dr. Alfinda Novi Kristanti

On Wed, Jan 18, 2017 at 11:01 PM, Mini-Reviews in Organic Chemistry <mroc@benthamscience.org> wrote:

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of Aquilaria, a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

Just a gentle reminder for revised submission for your submission, for Mini-Reviews in Organic Chemistry.

Sincerely,

Editorial Office
Bentham Science Publishers
Mini-Reviews in Organic Chemistry
<http://bsp-cms.eurekaselect.com/index.php/MROC>

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Thu, May 18, 2017 at 8:25 AM

Dear Dr. Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

I send you the revised manuscript in word format along with point by point reply to referee's comments. Thank you very much for your attention.

Best regards

Dr. Alfinda Novi Kristanti

[Quoted text hidden]

2 attachments



Aquilaria reviewed.docx
737K



Reviewers-Answer.docx
20K

MROC <mroc@benthamscience.org>
To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Tue, May 30, 2017 at 12:55 PM

Dear Dr. Kristanti,

Thank you for your email and sending us revised manuscript, we will get back to you soon.

[Quoted text hidden]

RE: [MROC] Manuscript Acceptance letter | BSP-MROC-2016-338

8 messages

MROC <mroc@benthamscience.org>
To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>
Cc: "Dr. Nanik Siti Aminah" <naniksa2000@gmail.com>

Wed, Jul 19, 2017 at 6:33 PM

Dear Dr. Kristanti,

Please provide us attached filled form urgently so we can send you galley proofs.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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From: Mini-Reviews in Organic Chemistry [mailto:mroc@benthamscience.org]

Sent: Thursday, July 06, 2017 2:42 PM

To: Dr. Alfinda Novi Kristanti

Cc: Roberto Paolesse; Mini-Reviews in Organic Chemistry; Ambreen; raheela@benthamscience.org; Dr. Mulyadi - Tanjung; Dr. Nanik Siti Aminah

Subject: [MROC] Manuscript Acceptance letter | BSP-MROC-2016-338

Reference#: BSP-MROC-2016-338

Submission Title: Structural diversity of secondary metabolites of *Aquilaria*, a Thymelaeaceae genus

Dear Dr. Alfinda Novi Kristanti,

I am pleased to inform you that your article entitled "**Structural diversity of secondary metabolites of *Aquilaria*, a Thymelaeaceae genus**" has been accepted for publication in "**Mini-Reviews in Organic Chemistry**" after independent peer review.

Please note the figures provided in color will be published against payment. For further details, please refer to the Instruction for Authors at <http://benthamscience.com/journal/authors-guidelines.php?journalID=mroc#top>

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We wish to thank you for submission of the manuscript to Mini-Reviews in Organic Chemistry and look forward to continued collaboration in future.

With warm regards,

Editorial Office
Bentham Science Publishers
Mini-Reviews in Organic Chemistry
<http://bsp-cms.eurekaselect.com/index.php/MROC>

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 **copyright-letter-mroc.pdf**
144K

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: ADM PPJPI <adm@ppjpi.unair.ac.id>

Mon, Jul 31, 2017 at 8:07 AM

[Quoted text hidden]

 **copyright-letter-mroc.pdf**
144K

ADM PPJPI <adm@ppjpi.unair.ac.id>
To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

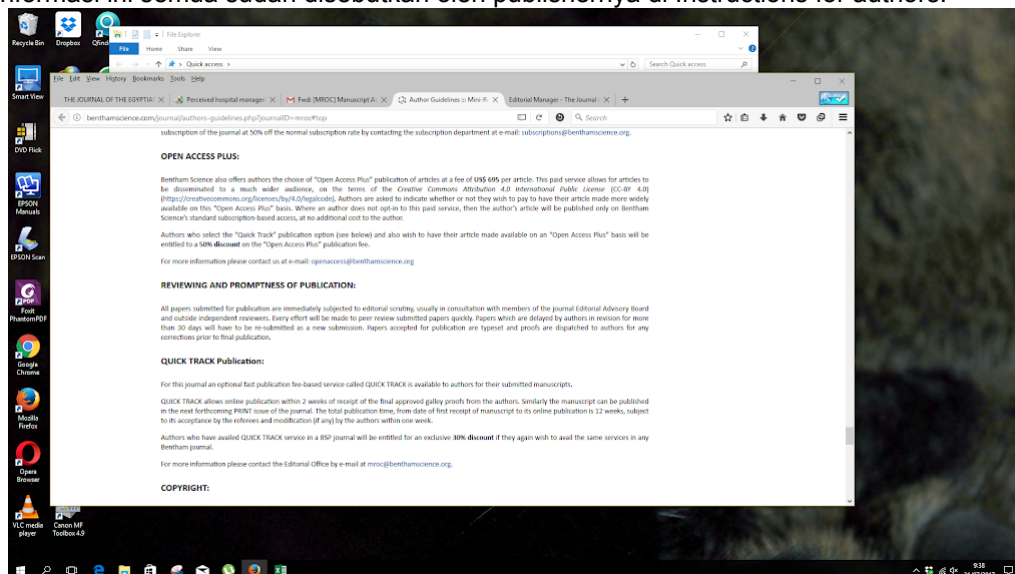
Mon, Jul 31, 2017 at 9:43 AM

Yth.

Ibu Alfinda Novi Kristanti, jurnal tsb (**Mini-Reviews in Organic Chemistry**) telah memberikan pilihan kepada author untuk publish secara open access atau standard.

bila author memilih open access, maka akan dikenakan biaya penerbitan, bila tidak memilih itu maka secara otomatis akan diterbitkan secara standard (author free, pembaca berbayar).

informasi ini semua sudah disebutkan oleh publishernya di Instructions for authors.



Gambar diatas saya capture-kan tampilan dari instruction for authors tentang informasi pilihan open access.

demikian penjelasan dari kami, semoga dapat membantu ibu dalam submit article.

terima kasih

PPJPI

arif w

[Quoted text hidden]

Administration Officer

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(Centre of Journal Development and Scientific Publication)
Floor 3, Amerta 3 no.303 Gedung Manajemen Kampus C Mulyorejo,
Universitas Airlangga - Surabaya 60115
Telp. (031) 5914042-43 ext.314

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: Windarto Windarto <windarto@fst.unair.ac.id>

Mon, Jul 31, 2017 at 11:10 AM

----- Forwarded message -----

From: **MROC** <mroc@benthamscience.org>
Date: Wed, Jul 19, 2017 at 4:33 AM
Subject: RE: [MROC] Manuscript Acceptance letter | BSP-MROC-2016-338
To: "Dr. Alfinda Novi Kristanti" <alfinda-n-k@fst.unair.ac.id>
Cc: "Dr. Nanik Siti Aminah" <naniksa2000@gmail.com>

[Quoted text hidden]

 **copyright-letter-mroc.pdf**
144K

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Tue, Aug 1, 2017 at 6:39 PM

Dear Dr. Raheela Anjum
Manager, Publications
Mini-Reviews in Organic Chemistry
Bentham Science Publishers

Herewith I send you a Copyright Letter which I have filled and signed. Thank you very much to accept my article for publication.

Best regards,
Dr. Alfinda Novi Kristanti

[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Tue, Aug 1, 2017 at 6:40 PM

Dear Dr. Raheela Anjum
Manager, Publications
Mini-Reviews in Organic Chemistry
Bentham Science Publishers

Herewith I send you a Copyright Letter which I have filled and signed. Thank you very much to accept my article for publication.

Best regards,
Dr. Alfinda Novi Kristanti

[Quoted text hidden]

 **Copyright Letter 2017.docx**
252K

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Wed, Aug 2, 2017 at 8:38 AM

Dear Dr. Raheela Anjum
Manager, Publications
Mini-Reviews in Organic Chemistry
Bentham Science Publishers

I apologize first because I want to tell you that there has been a small typo in the title of my article. In your letter it has been written "**Structural *diversi*y of secondary metabolites of Aquilaria, a Thymelaeaceae genus**". It should be "**Structural *diversity* of secondary metabolites of Aquilaria, a Thymelaeaceae genus**".

Thank you very much for your attention.

Best Regards
Dr. Alfinda Novi Kristanti

[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamscience.org>

Thu, Aug 3, 2017 at 11:11 AM

Dear Dr. Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

I want also to remind you that Alfinda Novi Kristanti is the main author as well as the corresponding author. I'm telling you this because in [http://www.eurekaselect.com/search/apachesolr_search/Structural diversity Aquilaria](http://www.eurekaselect.com/search/apachesolr_search/Structural%20diversity%20Aquilaria), I found that Nanik Siti Aminah is the main author. I apologize if I am wrong with this.

Best regards
Dr. Alfinda Novi Kristanti

[Quoted text hidden]

MROC-17-16932:Second Proof of your manuscript for MROC 14-4 (Alfinda Novi Kristanti)

2 messages

MROC <mroc@benthamscience.org>

Thu, Sep 14, 2017 at 1:54 PM

To: alfinda-n-k@fst.unair.ac.id

Second Proof

Dear Dr. Kristanti,

With reference to your email regarding the proofs corrections. Please find attached the **Second Proof** of your manuscript in PDF format for your FINAL review, and suggest any corrections that need to be incorporated before its publication. Kindly return the corrected proofs of the manuscript or your acceptance of this draft as final proofs within **24** hours. On receipt of your reply, the manuscript will be finalized for printing.

Please make sure that you have returned the copyright letter and have sufficiently replied to the matter concerning the color figure publications in your manuscript (if any).

The references were formatted by our skilled editor according to journal's reference style. The figures/photo will be published in black/white in the print version and color figure in the online version (free of cost). The graphical abstract and schemes are now placed appropriately, kindly re-check all the schemes.

Looking forward to a prompt response in this regard.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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From: alfinda novi kristanti [<mailto:alfinda-n-k@fst.unair.ac.id>]

Sent: Thursday, September 14, 2017 9:26 AM

To: Galley Proofs-C

Subject: Re: MROC-17-16932: Composed version of your manuscript for MROC 14-4 (Alfinda Novi Kristanti)

Dear Miss Raheela Anjum

Sr. Manager Publications

Bentham Science Publishers

Herewith I send you the corrected article with Reference No: MROC-17-16932. I resend you the pdf file. I used the "Tools Comments". There are 9 comments which it means there are 9 corrections on my article. Thanks you very much for your kind attention.

Best regards

Dr. Alfinda Novi Kristanti

On Tue, Sep 12, 2017 at 2:27 AM, Galley Proofs-C <galleyproofs-c@benthamscience.org> wrote:

Reference No: MROC-17-16932

URGENT

Dear Dr. Alfinda Novi Kristanti,

Please find enclosed the composed version of your article. I shall be grateful if you could kindly carefully check the manuscript for any potential errors, missing lines/paragraphs and errors in figures/diagrams etc. A reprint order form will also be mailed to you shortly through which you can avail various services that we offer.

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Miss Raheela Anjum

Sr. Manager Publications

Bentham Science Publishers
Executive Suite Y-2
P.O. Box 7917, Saif Zone
Sharjah, U.A.E.

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E-mail: galleyproofs-c@benthamscience.org

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With best wishes,

Miss Raheela Anjum

Manager Publications

Bentham Science Publishers

galleyproofs-c@benthamscience.org

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2 attachments



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Alfinda Novi Kristanti-GA.PDF
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Dear Dr. Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

I have read the Second Proof of my manuscript and I have not found anything to revise. So, I accept this draft as final proofs. I want also to inform you that we decided to use the OPEN ACCESS PLUS that you offered to us and I will fill the form and send it soon. Thank you very much more for your kind attention.

Best regards

Dr. Alfinda Novi Kristanti

[Quoted text hidden]

Open Access Plus Offer [MROC-17-16932]

3 messages

ghussain@benthamscience.org <ghussain@benthamscience.org>
Reply-To: ghussain@benthamscience.org
To: alfinda-n-k@fst.unair.ac.id

Wed, Sep 13, 2017 at 1:37 AM



Dear Dr. Kristanti,

With reference to your article entitled "**Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus**" which has been submitted for publication in "**Mini-Reviews in Organic Chemistry**", the galley proofs have been dispatched to you for your review and we hope that the article will soon be finalized for publication.

All articles published in subscription-based journals by Bentham Science can now also be published online as free-to-view open access, at an affordable fee of **US\$ 695** which allows indefinite online availability.

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Please note that if you do not choose for the Open Access Plus option, then your article will be published in the journal with the standard subscription-based access, at no cost to you.

If you are interested in publishing your article as open access, please respond to ghussain@benthamscience.org or info@benthamscience.org at your earliest.

I look forward to receiving your positive response.

With best regards,

Sincerely,

Rao G. Hussain
Manager Promotions
[Bentham Science Publishers](#)



[Click here](#), to find a list of funding agencies where authors can apply for funding to have their articles published as open access in the journal. "**Mini-Reviews in Organic Chemistry**".

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: ghussain@benthamscience.org

Fri, Sep 15, 2017 at 2:25 PM

Dear Dr. Rao G. Hussain
Manager Promotions
Bentham Science Publishers

Our article which the title is "**Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus**" will be published in "**Mini-Reviews in Organic Chemistry**". We have decided to apply for **OPEN ACCESS PLUS** that you offered to us. Herewith, I send you the Form to order this service as attachment. Please let me know how to pay this service and when we have to pay this service. Thank you very much for your kind attention.

Best regards
Dr. Alfinda Novi Kristanti
[Quoted text hidden]

 **Reprint-Order-Form-Alfinda.pdf**
513K

G. Hussain <ghussain@benthamscience.org>
To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
Cc: mroc@benthamscience.org, Raheela Anjum <raheela@benthamscience.org>

Mon, Sep 18, 2017 at 6:38 PM

Dear Dr. Kristanti,

Many thanks for your kind response. My colleagues will proceed it accordingly.

Best wishes for your future endeavors!

Cordial regards,

Sincerely,

HUSSAIN

Rao G. Hussain
BENTHAM SCIENCE PUBLISHERS



From: alfinda novi kristanti [mailto:alfinda-n-k@fst.unair.ac.id]
Sent: Friday, September 15, 2017 12:25 PM
To: ghussain@benthamscience.org
Subject: Re: Open Access Plus Offer [MROC-17-16932]

Dear Dr. Rao G. Hussain
Manager Promotions
Bentham Science Publishers

Our article which the title is "**Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus**" will be published in "**Mini-Reviews in Organic Chemistry**". We have decided to apply for **OPEN ACCESS PLUS** that you offered to us. Herewith, I send you the Form to order this service as attachment. Please let me know how to pay this service and when we have to pay this service. Thank you very much for your kind attention.

Best regards

Dr. Alfinda Novi Kristanti

On Tue, Sep 12, 2017 at 11:37 AM, <ghussain@benthamscience.org> wrote:

Dear Dr. Kristanti,

With reference to your article entitled "**Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus**" which has been submitted for publication in "**Mini-Reviews in Organic Chemistry**", the galley proofs have been dispatched to you for your review and we hope that the article will soon be finalized for publication.

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If you are interested in publishing your article as open access, please respond to ghussain@benthamscience.org or info@benthamscience.org at your earliest.

I look forward to receiving your positive response.

With best regards,

Sincerely,

Rao G. Hussain
Manager Promotions
Bentham Science Publishers

[Quoted text hidden]

[Quoted text hidden]

FW: open access invoice: 5316

1 message

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id

Thu, Oct 5, 2017 at 3:23 PM

Dear Dr. Kristanti,

Thank you for your email, your article is lined up for volume 15/1, 2018 issue which will be submitted for printing by the end of this month. While submitting the manuscripts for printing we change the volume issue and page number accordingly.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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From: alfinda novi kristanti [<mailto:alfinda-n-k@fst.unair.ac.id>]

Sent: Monday, September 25, 2017 1:49 PM

To: LEENA

Subject: Re: quick track invoice: 5316

Dear Dr. Leena Menon

BENTHAM SCIENCE PUBLISHERS

EXE.SUITE Y #2

SAIF ZONE, SHARJAH

UAE

Thank you very much for your information about the payment for OPEN ACCESS PLUS. However, I want ask you about the volume where my manuscript will be published. I had received the email from Miss Raheela Anjum with attachment the proof of manuscript and the Graphical Abstracts . It was written there that my manuscript will be published on Vol. 14 No 6, 2017, but in your email, you wrote on Invoice that my manuscript will be published on Vol 16 No 1, 2018. Which is right ?. Thank you for your kind explanation.

Best regards

Dr. Alfinda Novi Kristanti

On Mon, Sep 25, 2017 at 12:35 AM, LEENA <bspsaif@eim.ae> wrote:

Dear Sir / Madam,

Please find attached invoice #5316 , which is self explanatory.

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FAX: 009716 5571134

leena@benthamscience.ae

quick track invoice: 5316

5 messages

LEENA <bpsaif@eim.ae>
To: alfinda-n-k@fst.unair.ac.id

Mon, Sep 25, 2017 at 2:35 PM

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FAX: 009716 5571134

leena@benthamscience.ae

 **Invoice5316.pdf**
112K

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: LEENA <bspsaif@eim.ae>

Mon, Sep 25, 2017 at 4:48 PM

Dear Dr. Leena Menon

BENTHAM SCIENCE PUBLISHERS
EXE.SUITE Y #2
SAIF ZONE, SHARJAH
UAE

Thank you very much for your information about the payment for OPEN ACCESS PLUS. However, I want ask you about the volume where my manuscript will be published. I had received the email from Miss Raheela Anjum with attachment the proof of manuscript and the Graphical Abstracts . It was written there that my manuscript will be published on Vol. 14 No 6, 2017, but in your email, you wrote on Invoice that my manuscript will be published on Vol 16 No 1, 2018. Which is right ?. Thank you for your kind explanation.

Best regards
Dr. Alfinda Novi Kristanti
[Quoted text hidden]

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: LEENA <bspsaif@eim.ae>

Thu, Oct 5, 2017 at 10:41 AM

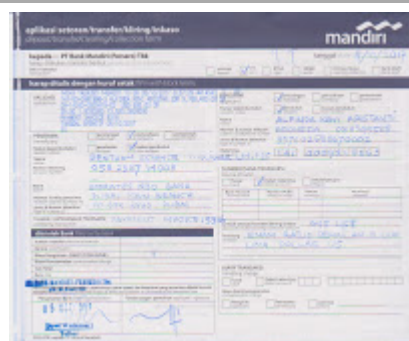
Dear Dr. Leena Menon

BENTHAM SCIENCE PUBLISHERS
EXE.SUITE Y #2
SAIF ZONE, SHARJAH
UAE

Herewith I send you the the evidence for the payment of Invoice 5316. That is for OPEN ACCESS PLUS service of our manuscript. Hopefully you receive it well. Thank you very much.

Best regards
Dr. Alfinda Novi Kristanti

[Quoted text hidden]



transfer for payment Invoice 5316.jpg
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alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: MROC <mroc@benthamsience.org>

Thu, Oct 5, 2017 at 3:41 PM

[Quoted text hidden]



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506K

LEENA <bspsaif@eim.ae>
To: alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>

Sun, Oct 15, 2017 at 4:22 PM

Thanks, we received the payment.

From: alfinda novi kristanti [mailto:alfinda-n-k@fst.unair.ac.id]
Sent: Thursday, October 05, 2017 7:42 AM
To: LEENA
Subject: Re: quick track invoice: 5316

Dear Dr. Leena Menon

[Quoted text hidden]
[Quoted text hidden]

Best regards

Dr. Alfinda Novi Kristanti

[Quoted text hidden]

Most urgent (Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus) MROC

2 messages

MROC <mroc@benthamscience.org>

Wed, Dec 27, 2017 at 2:08 PM

To: alfinda-n-k@fst.unair.ac.id

Dear Dr. Kristanti,

I hope my email finds you well. This is with reference to your article entitled "**Review: Secondary Metabolites of Aquilaria, a Thymelaeaceae genus**" submitted in MROC journal. Your article is included in volume 15 issue 1 of the journal which is soon going to be published. But before proceeding the article in printing it is observed that structured abstract, which is a mandatory requirement for publication, is not provided in your manuscript. For your convenience find below the modified abstract with headings added. Please inform if you find it ok? If yes, we can proceed the article for printing. If not, kindly provide the structured abstract of your article, within **24 hours** or the article will be finalized with the abstract given below.

Abstract: Background: Aquilaria, a genus belonging to the Thymelaeaceae, produces fragrant resinous agarwood, also known as eaglewood, which has been used as incense since old times. Objective: The intense fragrance is the result of the presence of a wide variety of secondary metabolites, such as sesquiterpenes, chromones, flavonoids, benzophenones, diterpenoids, triterpenoids, and lignans.

Conclusion: Here, we review the different secondary metabolites that have been identified in Aquilaria to show their diversity and to allow comparison with other Thymelaeaceae genera.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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Dear Dr. Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Herewith I send you the Abstract :

Abstract: Background: Aquilaria, a genus belonging to the Thymelaeaceae, produces fragrant resinous agarwood, also known as eaglewood, which has been used as incense since old times. The intense fragrance is the result of the presence of a wide variety of secondary metabolites. Objective : This genus was reported contained sesquiterpenes, chromones, flavonoids, benzophenones, diterpenoids, triterpenoids, and lignans.

The conclusion that you proposed is appropriate for me. Thank you

Best regards

Dr. Alfinda Novi Krsiatnti

[Quoted text hidden]

Marketing Letter

1 message

admin@eurekaselect.com <admin@eurekaselect.com>

Thu, Feb 1, 2018 at 11:10 AM

Reply-To: mroc@benthamscience.org

To: alfinda-n-k@fst.unair.ac.id

Cc: mroc@benthamscience.org

Dear Dr. Kristanti,

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Should you require more information support@benthamscience.org

I greatly look forward to hearing from you.

Best Regards,

Raheela Anjum
Manager, Publications
Mini-Reviews in Organic Chemistry
Email: mroc@benthamscience.org
Bentham Science Publishers
www.benthamscience.com

Letter of Thanks

3 messages

marketing@eurekaselect.com <marketing@eurekaselect.com>
Reply-To: latifurrehman@benthamscience.org
To: alfinda-n-k@fst.unair.ac.id, faizan@benthamscience.org

Wed, Feb 7, 2018 at 11:11 AM

February 06, 2018

Attn.: **Dr. Alfinda Novi Kristanti**

Dear Dr. Kristanti,

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I look forward to hearing from you at latifurrehman@benthamscience.org

Sincerely,

LATIF UR REHMAN
Assistant Manager Marketing
Bentham Science Publishers

<https://www.linkedin.com/company/benthamopen>

https://twitter.com/bentham_open

alfinda novi kristanti <alfinda-n-k@fst.unair.ac.id>
To: latifurrehman@benthamscience.org

Fri, Feb 9, 2018 at 9:54 AM

Dear Dr. LATIF UR REHMAN
Assistant Manager Marketing

Bentham Science Publishers

First of all, I want to thank you for accepting our manuscript to publish in one of your journals, Mini-Reviews in Organic Chemistry. I want remark the process of revision according to reviewers' comments. All of these comments gave us the knowledge how to make a good review. This is very useful for us. Furthermore, the whole process run very smoothly and did not take long time. Communication was also very good and clear. Hopefully Bentham Science Publisher will continue to grow so that all the journals will also increase in quality. Thank you.

Best regards,

Dr. Alfinda Novi Kristanti

[Quoted text hidden]

MROC <mroc@benthamscience.org>
To: alfinda-n-k@fst.unair.ac.id

Fri, Apr 13, 2018 at 5:49 PM

Dear Dr. Kristanti,

Thank you for your email and kind words, we hope that you will keep continue to submit more reviews to our journal.

Best regards,

Raheela Anjum

Manager, Publications

Mini-Reviews in Organic Chemistry

Bentham Science Publishers

Email: mroc@benthamscience.org

URL: <http://benthamscience.com/journals/mini-reviews-in-organic-chemistry/>

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<https://www.youtube.com/channel/UCFzSVHgGkjFW2Q8WV8-gzUw>

From: Latif ur Rehman [mailto:latifurrehman@benthamscience.org]

Sent: Monday, February 12, 2018 3:24 PM

To: 'Mahmood Alam' <mahmood@benthamscience.org>; 'Faizan ul Haq' <faizan@benthamscience.net>; 'Rehana Raza' <rehana@benthamscience.org>; mroc@benthamscience.org

Subject: FW: Letter of Thanks

Dear All,

Please find below highlighted comment by the author of the journal “ MROC”

Regards,

Latif Ur Rehman

Assistant Manager Marketing

Bentham Science Publishers

Latifurrehman@benthamscience.org

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