

## A Novel Fortunate A from *Cryptomeria fortunei*

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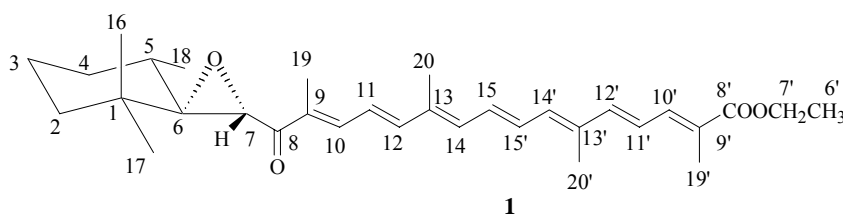
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**Abstract:** A novel compound, named fortunate A, was isolated from the ethanol extract of the stem bark of *Cryptomeria fortunei*. Its structure was established on the basis of the spectral evidences including 1D and 2D NMR spectrum.

**Keywords:** *Cryptomeria fortunei*, carotenoids.

Chinese cedar, *Cryptomeria fortunei*, is a large fast growing tree. Many authorities consider *C. fortunei* to be a variety of *C. japonica* (*fortunei* = *japonica* var. *sinensis*). The Chinese cedar grows to a height of 240 ft. and is probably the tallest tree native to China. The root barks and stem barks are used in traditional Chinese medicine as antidote, insecticide, and antipruritic. Chemical ingredients of *C. japonica* has already been intensively studied. Lots of biflavonoids, sesquiterpenoids, diterpenoids, and triterpenoids<sup>1-5</sup> were isolated from the leaves, cones, woods of *C. japonica*. But chemical study on *C. fortunei* had not been reported yet. We investigated the chemical ingredients of the stem barks of *C. fortunei* and led to isolation of a new compound, named fortunate A. In the present paper, the isolation and structural elucidation of this compound was presented.

**Figure 1** The structure of fortunate A

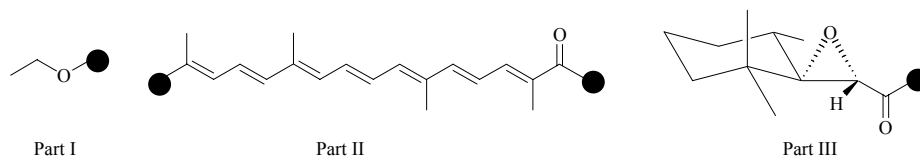


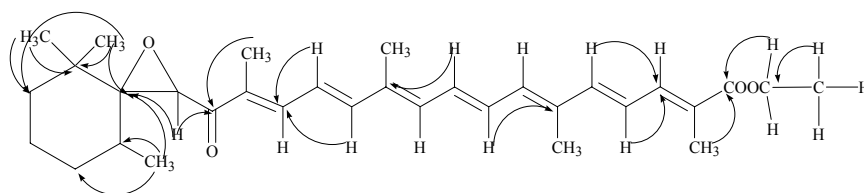
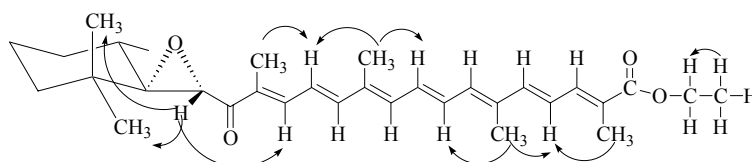
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The ethanol extract of the stem barks of *Cryptomerica fortunei*, which were collected in Nanchuan county, Sichuan Province, was chromatographed on silica gel column with different solvent system, then was chromatographed on ODS to yield fortunate **A**.

Fortunate **A** (**1**) was obtained as a red gum. According to its ESI-MS ( $m/z$  493  $[M+H]^+$ , 515  $[M+Na]^+$ ),  $^1H$  NMR and  $^{13}C$  NMR spectral data, its molecular formula was determined to be  $C_{32}H_{44}O_4$ , which was further confirmed by its HR-ESI-MS (found:  $m/z$  493.3340  $[M+H]^+$ , calcd.  $C_{32}H_{44}O_4$  for 493.3318). In the  $^1H$  NMR spectrum of **1** (**Table 1**), four characteristic methyl groups at  $\delta_H$  2.02, 2.00 (two methyl overlapped), 1.97 and eight olefinic protons (from  $\delta_H$  6.36 to 7.40) were observed. The  $^{13}C$  and DEPT NMR spectral (**Table 1**) of **1** indicated 32 distinct signals including eight methyls, four methylenes (including an oxymethylene at  $\delta_c$  60.8), twelve methines (including an oxymethine to  $\delta_c$  62.9, ten olefinic carbons), eight quaternary carbons [including four olefinic carbons, a ketone carbonyl carbon ( $\delta_c$  196.3), a ester carbonyl carbon ( $\delta_c$  168.6)]. The spectral data of **1** indicated that its structure was similar to an azafrin methyl ester 5-*O*-monomethyl ether<sup>6</sup>. Cross peaks observed in its  $^1H$ - $^1H$  COSY spectrum, between  $\delta_H$  7.38/6.67, 7.29/6.52, 6.74/6.38, 6.74/6.46, 6.67/6.65, 6.57/6.52, 4.32/1.32, established **1** contained two fragments  $OCH_2CH_3$  (part I) and  $-C(CH_3)=CH-CH=CH-C(CH_3)=CH-CH=CH-CH=C(CH_3)-CH=CH-CH=C(CH_3)-$  (part II). In the HMBC spectrum, the two methyl protons at  $\delta_H$  1.01 and 1.11 (1,1-dimethyl) were correlated with carbon signals at  $\delta_c$  39.7 (C-2), 35.9 (C-1), and 71.1 (C-6); the 5-methyl protons at  $\delta_H$  0.80 were correlated with carbon signals at  $\delta_c$  33.2 (C-4), 31.4 (C-5), 71.1 (C-6); the oxymethine at  $\delta_H$  3.94 (H-7) was correlated with carbon signals at  $\delta_c$  71.1 (C-6), 196.3 (C-8). Therefore, the third structural fragment was deduced as shown in **Figure 2** (part III). The methylene protons at  $\delta_H$  4.24 (H-7') were correlated with the carbonyl carbon signal at  $\delta_c$  168.6 (C-8'), the methyl protons at  $\delta_H$  1.97 (9-Me) were correlated with the carbonyl carbon signal at  $\delta_c$  196.3 (C-8). Thus, the three parts were connected into the planar structure of compound **1** as showed in **Figure 3**. In its NOESY spectrum,  $\delta_H$  1.01 (H-16) and 1.11 (H-17) were correlated with  $\delta_H$  3.79 (H-7),  $\delta_H$  3.79 (H-7) were correlated with  $\delta_H$  7.38 (H-10), its key NOESY correlations were showed in **Figure 4**. The full assignment of protons and carbons of compound **1** was made by means of  $^1H$  NMR,  $^{13}C$  NMR, HMQC, and HMBC spectra.

**Figure 2** The structures of the fragments of compound **1**



**Figure 3** The key HMBC correlations of compound **1****Figure 4** The key NOESY correlations of compound **1****Table 1** NMR data of compound **1**\* ( $\delta$  ppm)

Position	$\delta_{\text{H}}$ (J in Hz)	$\delta_{\text{C}}$	Position	$\delta_{\text{H}}$ (J in Hz)	$\delta_{\text{C}}$
1		35.9	17	1.11 (s, 3H)	26.7
2	1.54 (2H, overlapped)	39.0	18	0.80 (d, 3H, 7.2)	17.7
3	1.62 (2H, overlapped)	19.7	19	1.97 (s, 3H)	11.7
4	1.46 (2H, overlapped)	33.2	20	2.02 (s, 3H)	13.0
5	1.85 (1H, overlapped)	31.4	6'	1.32 (t, 3H, 6.9)	14.6
6		71.1	7'	4.24 (q, 2H, 6.9)	60.8
7	3.79 (s, 1H)	62.9	8'		168.6
8		196.3	9'		127.2
9		134.8	10'	7.29 (d, 1H, 11.7)	138.7
10	7.38 (d, 1H, 9)	141.4	11'	6.52 (1H, overlapped)	143.6
11	6.67 (1H, overlapped)	145.3	12'	6.57 (1H, overlapped)	124.4
12	6.65 (1H, overlapped)	124.1	13'		136.7
13		137.5	14'	6.38 (d, 1H, 9.9)	135.3
14	6.46 (d, 1H, 9.6)	136.8	15'	6.74 (1H, overlapped)	132.3
15	6.74 (1H, overlapped)	131.3	19'	1.97 (s, 3H)	13.1
16	1.01 (s, 3H)	25.0	20'	2.00 (s, 3H)	13.0

\* (Spectra taken at 300 and 75 MHz for proton and carbon in  $\text{CDCl}_3$ , respectively)

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Received 12 July, 2004