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CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *Cephalotaxus lanceolata* FRESH LEAVES

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The genus *Cephalotaxus* (Cephalotaxaceae) is composed of 9 species. In China, there are 7 species and 3 varieties [1]. A great deal of interest in phytochemical studies on plants of the *Cephalotaxus* genus has yielded cephalotaxine ester type alkaloids, harringtonine, and related cytotoxic substances. Clinical trials in China and elsewhere have demonstrated that harringtonine, homoharringtonine, and homodeoxyharringtonine are effective in the treatment of acute leukemia [2–8]. Thus, intensive investigations have been made to discover other antitumor cephalotaxus alkaloids.

Cephalotaxus lanceolata is distributed in Burma and Yunnan of southwestern China. Previously there has been no report on its chemical constituents. In the course of our search for bioactive natural products from medicinal plants in Yunnan of China, we reported here the results of our studies on the composition of essential oil from the fresh leaves of *C. lanceolata*.

The fresh leaves were collected from Gongshan, Yunnan of China and identified by Dr. Zhi-Min Li, Biological Department of Yunnan Normal University, Kunming, Yunnan of China. A voucher specimen is kept in the Herbarium of the Department of Chemistry, Yunnan Normal University, Kunming, China.

The fresh leaves were crumbled and hydrodistilled for 5 hours using a Clevenger apparatus. The oil was subsequently dried over anhydrous sodium sulfate and stored at 4°C until analysis.

The essential oil was subjected to GC-MS analysis using an Agilent 6890 GC with Agilent 5973 mass selective detector.

The fresh leaves of *C. lanceolata* yielded 0.73% of a yellowish oil. Sixty-two components were detected in the oil, representing 96.60% of the total oil. The identified components and their percentages are given in Table 1, where the components are listed in the order of their elution on the column. As can be seen, the major components of the oil are heptacosane (9.71%), tricosane (9.22%), 1-octen-3-ol (8.95%), hentriacontane (8.90%), 3-(1-ethoxyethoxy)-2-methyl-1-butanol (7.60%), tritriacontane (5.66%), *ent*-pimara-8(14),15-diene (5.17%), and pentatriacontane (4.10%). The aliphatic hydrocarbons were the dominant group in the oil (72.81%), while terpenes (monoterpenes, 7.48%; sesquiterpenes, 5.09%; diterpenes, 5.89%) and aromatics (5.33%) comprised 23.79 %.

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TABLE 1. Composition of the Essential Oil from the Fresh Leaves of *Cephalotaxus lanceolata*

Compound	%	Compound	%
α-Pinene	0.40	Diisobutyl adipate	0.80
3-(1-Ethoxyethoxy)-2-methyl-1-butanol	7.60	Heptadecane	0.41
Sabinene	0.23	7,8-Dimethoxy-2,2-dimethyl-2*H*-chromene	1.22
1-Octen-3-ol	8.95	Tetradecanoic acid	0.25
p-Cymene	0.29	Octadecane	0.37
Limonene	0.83	Diisobutyl phthalate	2.77
Phenylacetaldehyde	0.80	Nonadecane	0.45
cis-Sabinene hydrate	0.61	*ent*-Pimara-8(14),15-diene	5.17
Linalool	0.37	Isoprimaradiene	0.49
5,6-Dimethyldecane	0.24	Podocarpa-8,11,13-triene	0.23
Verbenol	1.09	Heneicosane	0.39
4-Terpineneol	0.35	Docosane	0.32
α-Terpineol	2.30	Tricosane	9.22
Dodecane	0.26	Tetracosane	0.42
(*S*)-(–)-Verbanone	0.71	Pentacosane	0.56
(*S*)-(–)-Verbenone	0.30	Hexacosane	0.51
Benzothiazole	0.23	Heptacosane	9.71
Pentadecane	0.50	Octacosane	0.37
2,6-Di-tert-butyl-4,4-dimethyl-2,5-cyclohexadien-1-one	0.52	Nonacosane	0.91
Tetradecane	3.89	Triacontane	0.54
β-Caryophyllene	0.32	Hentriacontane	8.90
β-Gurjunene	1.01	Dotriacontane	0.52
α-Caryophyllene	0.56	Tritriacontane	5.66
2,6-Di-tert-butyl-*p*-benzoquinone	0.31	Tetratriacontane	0.42
2,6-Di-tert-butyl-4-hydroxy-4-methyl-2,5-cyclohexadien-1-one	0.56	Pentatriacontane	4.10
α-Muurolene	0.31	Hexatriacontane	0.27
γ-Cadinene	0.45	Heptatriacontane	2.72
δ-Cadinene	0.23	Octatriacontane	1.99
Caryophyllene oxide	0.41	Aliphatic hydrocarbons	72.81
Hexadecane	0.48	Monoterpenes	7.48
Humulene epoxide	0.52	Sesquiterpenes	5.09
α-Cadinol	0.72	Diterpenes	5.89
(–)-Thujopsen	0.26	Aromatics	5.33
t-Cadinol	0.30		

%: calculated from TIC data.

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