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Chemical constituents from the fruiting bodies of *Xylaria euglossa* Fr. and its chemotaxonomic study



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ABSTRACT

Three anthracenones (**1–3**), two lactams (**4–5**), three sterols (**6–8**), one ceramides (**9**), one long-strain fatty acid (**10**) were isolated from the fruiting bodies of *Xylaria euglossa* Fr. All the compounds were isolated from this fungus for the first time. Compound **1**, **4** and **5** were isolated from the family Xylariaceae for the first time. Compound **1** and **4–5** were considered chemotaxonically significant for the species *Xylaria euglossa*.

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1. Subject and source

Xylaria is a genus of Ascomycetes fungi composed of more than 600 described species, inclusive of those wood-decaying and endophytic, of which, only about 100 species are cosmopolitan fungi widely distributed in tropical and subtropical areas and commonly found on dead wood.

Xylaria euglossa Fr. is a rare rot-wood inhabiting mushroom, mainly occurring on stumps and fallen branches of forested areas in the Southwest of China. It is used as medicine in some areas (Mao, 2000). Fresh *X. euglossa* was collected at the Ailao mountain of Yunnan province, P. R. China, in June 2009, and identified by Prof. Mu Zang, Kunming Institute of Botany, Chinese Academy of Sciences. The fruiting bodies of the fungus were preserved after dry. The voucher specimen (Accession No. 912) was deposited in the Herbarium of Kunming Institute of Botany, Chinese Academy of Sciences.

2. Previous work

Previous chemical investigation on the genus *Xylaria* in nature and culture, have resulted in the isolation of structurally diverse metabolites such as cytochalasins (Dagne et al., 1994; Espada et al., 1997; Rukachaisirikul et al., 2013), long strain fatty

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acids (Adeboya et al., 1995; Jang et al., 2009), diterpene glycosides (Shiono et al., 2009), sesquiterpenoids (Silva et al., 2010; Isaka et al., 2012; Singh et al., 1999), steroids (Jang et al., 2009; Ma et al., 2008), ceramides (Yang et al., 2011), lactone (Adeboya et al., 1995; Adeboya et al., 1996; Abate et al., 1997; Jang et al., 2009; Shiono et al., 2013; Baraban et al., 2013; Isaka et al., 2012; Oliveira et al., 2011).

3. Present study

The air-dried fruiting bodies of *X. euglossa* (0.5 kg) were crushed and extracted with chloroform/methanol (1/1, V/V) at room temperature. The combined extracts (25 g) were partitioned between chloroform and water. The chloroform soluble part (17 g) was subjected to silica gel CC. Gradient elution with chloroform/methanol from 100/0–0/100 (v/v) yielded nine fractions. Compound **9** was got from fraction II (chloroform/methanol, 100/1) after deposition. Then compounds **3** and **6** were isolated on silica gel (petroleum ether/acetone, 85/15) and Sephadex LH-20 (chloroform/methanol, 1/1) CC. Fraction III (chloroform/methanol, 100/2) was passed through silica gel CC with petroleum ether/acetone, and compound **8** was obtained at 95/5, compound **2** and **5** were obtained at 85/15. Compound **10** was got from fraction V (chloroform/methanol, 100/8) after deposition and compound **7** was obtained by using Sephadex LH-20 (chloroform/methanol, 1/1). Fraction VI (chloroform/methanol, 100/15) was passed through Sephadex LH-20 (chloroform/methanol, 1/1) and the part with strong yellow and blue-white fluorescence under UV light at 254 nm was collected and passed through silica gel CC with petroleum ether/acetone. Compound **1** (15 mg) was obtained at 85/15 and following compound **4** (8 mg) was obtained at 70/30.

By comparison of their ^1H , ^{13}C NMR spectra data with those reported, compounds **1–10** (Fig. 1) were identified as xylarione (Wang et al., 2005a) (**1**), 3,9-dihydroxy-3-methyl-6,8-dimethoxy-dihydroanthracenone (Steglich and Oertel, 1984) (**2**), 1-hydroxy-6,8-dimethoxy-2-methylanthraquinone (Rao et al., 1983) (**3**), xylactam (Wang et al., 2005b) (**4**), neochinulin A (Nagasaki et al., 1979) (**5**), (22E,24R)-ergosta-7,22-dien-3 β ,5 α ,6 β -triol (Gao et al., 2001) (**6**), ergosta-4,6,8(14),22-tetraen-3-one (Kobayashi et al., 1992) (**7**), 5 α ,8 α -epidioxy-ergosta-6,22-dien-3 β -ol (Keller et al., 1996) (**8**), (2S,2'R,3S,4R)-2-(2'-hydroxy-stearamide)docosane-1,3,4-triol (Inagaki et al., 1998) (**9**), palmitic acid (Inagaki et al., 1998) (**10**).

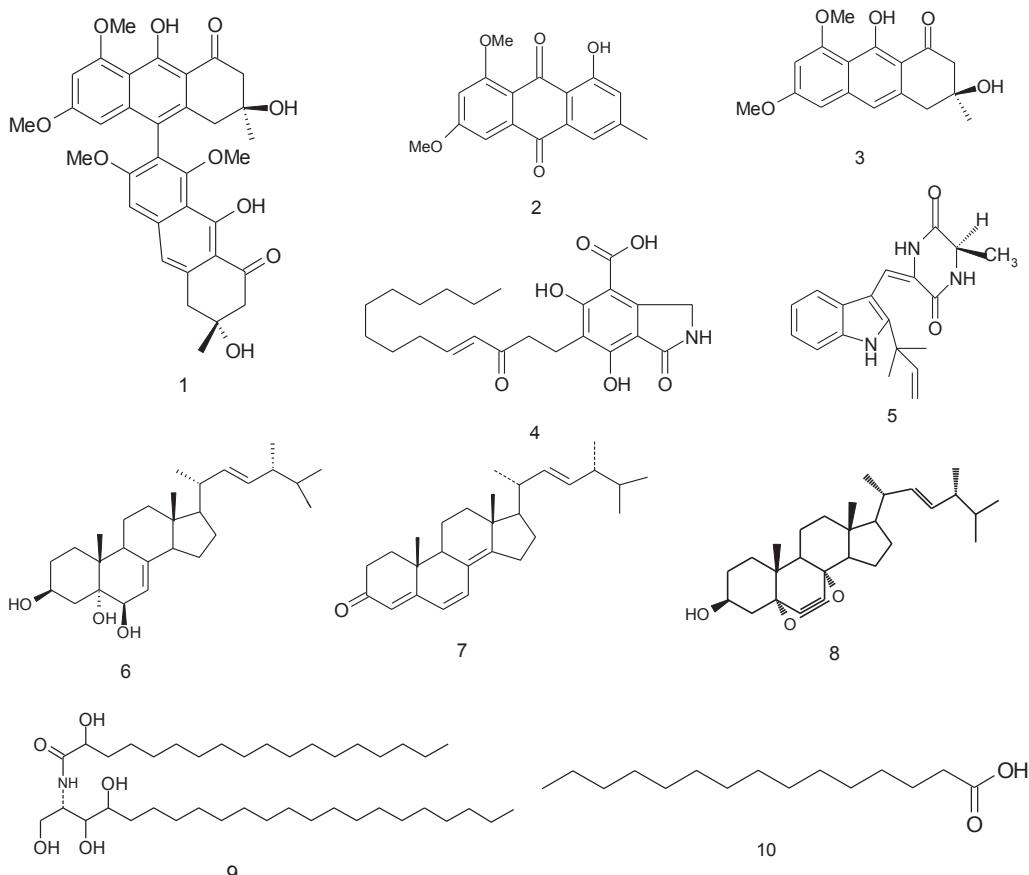


Fig. 1. Compounds (1–10) isolated from *Xylaria euglossa*.

4. Chemotaxonomic significance

Compounds **1–10** isolated in current research were classified as anthracenones (**1–3**), lactams (**4–5**), steroids (**6–8**), ceramide (**9**) and long-strain fatty acid (**10**). Compound **2** and **3** were previously isolated from *X. longipes* (Ma et al., 2008). Compound **4** has a similar structure to xylaral isolated from *X. polymorpha* (Gunawan et al., 1990). Steroids and ceramides and fatty acids are common within the genus *Xylaria*, **6–9** are common compounds in the fruiting bodies of *Xylaria*. Compounds **4**, **9** and **10** have a long strain alkyl group, which is a feature of metabolites from species of *Xylaria* (Adeboya et al., 1995; Jang et al., 2009). These compounds support the taxonomic position of *X. euglossa*.

Compound **1** is a dimer of **3** which has to date only been reported from *X. euglossa*. Lactams (**4–5**) were isolated from the family Xylariaceae for the first time; of which compound **4** has not previously been isolated (Wang et al., 2005a). The results show that *X. euglossa* could be another source of neoechinulin A (**5**) which was previously isolated from fungal species of *Microsporum* (Wijesekara et al., 2013) and *Aspergillus* (Casnati et al., 1972). This compound has potential for the treatment of neurodegenerative diseases (Dewapriya et al., 2013) and human cervical carcinoma (Wijesekara et al., 2013). Compound **5**, isolated as major secondary metabolites from fungi species *Microsporum* sp. (Wijesekara et al., 2013) and *Aspergillus* sp. (Casnati et al., 1972) previously, might be a useful compound for the treatment of neurodegenerative diseases (Dewapriya et al., 2013) and human cervical carcinoma (Wijesekara et al., 2013). Compounds **1**, **4** and **5** could be considered chemotaxonically significant for the discriminating between *Xylaria euglossa* and other species in the genus.

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