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A new bisabolane-type sesquiterpenoid from *Curcuma domestica*

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1. Subject and source

Turmeric is the common name for a perennial tropical herb, *Curcuma domestica* (syn. *Curcuma longa*) of the ginger family, Zingiberaceae. It is widely distributed in tropical regions of the world including India, Indonesia and Malaysia (Nagarathnam et al., 2010). Its rhizome has been traditionally and extensively used as a food additive and a coloring agent in many foods and cosmetics all over the world (Jayaprakasha et al., 2005; Wang et al., 2008). In Malaysia, the Zingiberaceae plants, *Curcuma* in particular, are extensively farmed for domestic and international market. Their chemical constituents have been well investigated due to its economic and biomedical importance (Vimala et al., 1999; Abas et al., 2005; Malek et al., 2006). Quality of *Curcuma* has been suggested to differ with the quality of soil and elevation of farms (Mridula and Jayachandran, 2001; Ishii et al., 2010). Hence, we carried out a population study to investigate the chemical contents in five populations of *Curcuma* from lowland farms (below 800 M) (Tamparuli, Kota Kinabalu, Sabah) and eight populations from highland (above 800 M) (Tambunan, Sabah). Voucher specimens were deposited in the BORNEENSIS Collection of Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, ((Tamparuli Specimens: GIN39888BOR-GIN39892BOR, Tambunan: GIN39893BOR-GIN39900BOR)). In the course of this investigation, we isolated a new bisabolane-type sesquiterpenoid from *Curcuma* grown at highlands.

2. Previous work

Previous phytochemical investigations on genus *Curcuma* have resulted in the isolation of wide variety of secondary metabolites, which mainly include sesquiterpenoids (Ohshiro et al., 1990; He et al., 1998; Sadhu et al., 2009; Sheeja and Nair, 2010) and diarylheptanoids (Masuda et al., 1993; Taylor and McDowell, 1992; Wang et al., 2008). To date, a number of bisabolane-type sesquiterpenoids have been isolated from genus *Curcuma* (Kiso et al., 1983; Uehara et al., 1989; Jayaprakasha et al., 2005; Zeng et al., 2007; Herebian et al., 2009).

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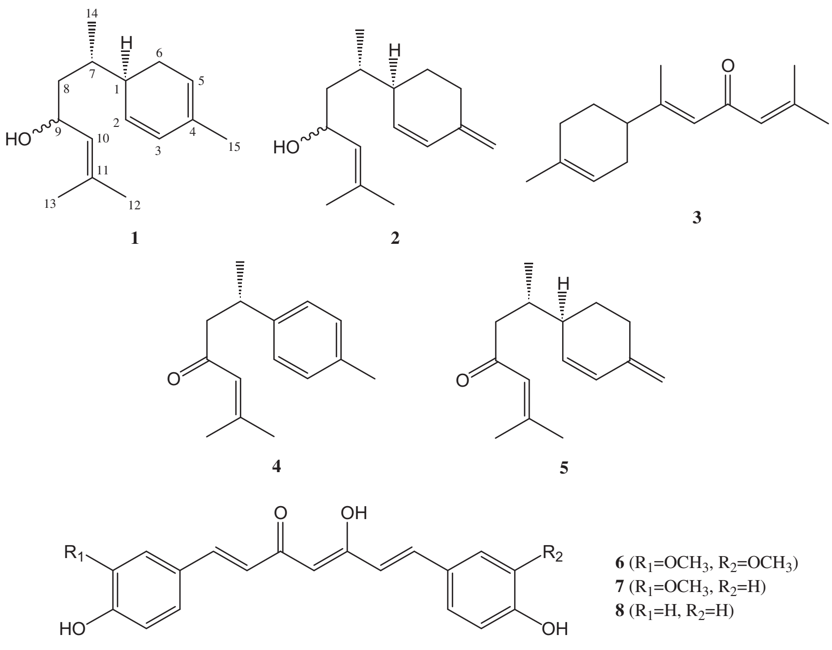

Fig. 1. Structures of compounds **1**–**8**.

3. Present work

Our investigation on the chemical constituents of the rhizome of *C. domestica* from highland farms in Sabah, Malaysia led to the isolation of a new bisabolane-type sesquiterpenoid, bisacurol B (**1**) together with seven known compounds, bisacurol (**2**) (Uehara et al., 1989; Kreiser and Korner, 1999), *E*-α-atlantone (**3**) (Friesen and Blouin, 1996), *ar*-turmerone (**4**) (Kamal et al., 2009), β-turmerone/curlone (**5**) (Kiso et al., 1983; Uehara et al., 1989; Kreiser and Korner, 1999), curcumin (**6**) (Masuda et al., 1992), demethoxycurcumin (**7**) (Masuda et al., 1992) and bisdemethoxycurcumin (**8**) (Masuda et al., 1992). *C. domestica* from lowland farms only contained compounds **3**–**8**. In this paper we report the isolation and structural determination by spectroscopic methods of new compound **1**.

Fresh rhizome of *C. domestica* (500 g dry wt) was extracted in a Soxhlet apparatus with EtOH. Concentration of the extract under reduced pressure afforded the crude extract (18.3 g). The EtOH fraction (670 mg) was chromatographed on a Si gel column using a $CHCl_3$/MeOH gradient solvent system of increasing polarity to yield 3 fractions. Fraction 1 (301 mg) eluted with $CHCl_3$/MeOH (99:1) was subjected to reversed-phase HPLC (Luna 5μ Phenyl-Hexyl) with 70% MeCN to give compounds **3** (2.1 mg), **4** (2.4 mg) and **5** (2.8 mg). In addition, fraction 2 (169 mg) eluted with $CHCl_3$/MeOH (95:5) was submitted to reversed-phase HPLC (Luna 5μ Phenyl-Hexyl) with 70% MeCN to yield a mixture of **1**/**2** (6.5 mg) and **6** (6.8 mg). Fraction 3 (106 mg) eluted with $CHCl_3$/MeOH (9:1) was purified by repeated preparative TLC with $CHCl_3$/MeOH (98:2) to give compounds **7** (7.4 mg) and **8** (1.8 mg).

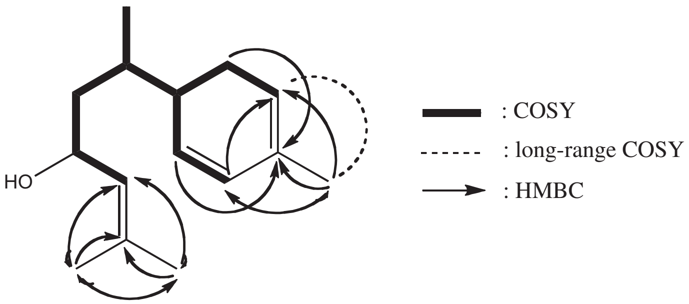

Fig. 2. ^1H–^1H COSY correlations (bold lines) and key HMBC correlations (H → C) of **1**.

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