A New Anthraquinone Glycoside from *Rhamnus nakaharai* and Anti-tyrosinase Effect of 6-Methoxysorigenin

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In continual study on the heartwood of *Rhamnus nakaharai*, a new alaternin-8-O-glucoside, namely 1,2,6,8-tetrahydroxy-3-methylanthraquinone-8-O-β-glucopyranoside (1), together with some known compounds were further isolated and characterized by 1D, 2D NMR and other spectral evidences. The free radical scavenging and anti-tyrosinase activities of the isolates including alaternin (1a), emodin (2a), emodin-8-O-β-glucopyranoside (2), 6-methoxysorogenin-8-O-β-glucopyranoside (3), and 6-methoxysorogenin (3a) were tested. Alaternin (1a) exhibited to be mild DPPH radical scavenger with half as potent as vitamin C, while both alaternin (1a) and emodin-8-O-β-glucopyranoside (2) exhibited stronger SOD-like activity than that of BHA. 6-Methoxysorogenin (3a), a reported potential antioxidant, and its 8-O-glucoside (3) both performed significant inhibitory effect on mushroom tyrosinase with about twice as potent as kojic acid, the positive control.

**Keywords:** alaternin; anthraquinone; glycoside; 6-methoxysorogenin; *Rhamnus nakaharai*; tyrosinase.
Figure S1-1: $^1$H NMR spectrum of Alaternin-8-O-glucopyranoside (1)
Figure S1.2: 13C NMR spectrum of Alaternin-8-O-glucopyranoside (1)

Solvent: Pyridine
Ambient temperature
Mercury-40000 "Talente"

Relax. delay 6.300 sec
Pulse 47.6 degrees
Acq. time 1.800 sec
Width 2025.5 Hz
20000 repetitions
DECODE C13, 100.632111 MHz
DECOUPLE H1, 600.2086492 MHz
Power 50 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 1.0 Hz
FT size 65536
Total time 7 hr, 11 min, 19 sec
Figure S1-3: HMQC spectrum of Alaternin-8-O-glucopyranoside (1)
Figure S1-4: HMBC spectrum and key information of Alaternin-8-O-glucopyranoside (1)
Figure S1-5: FAB-MS spectrum of Alaternin-8-O-glucopyranoside (1)
Figure S2.1: HMOC NMR spectrum of emodin-8-O-glucopyranoside (2)
Figure S2-2: $^{13}$C NMR spectrum of emodin-8-O-glucopyranoside (2)

Figure S2-3: DEPT pulse sequence spectrum of emodin-8-O-glucopyranoside (2)
