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Styryl Lactones from Roots and Barks *Goniothalamus lanceolatus*

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A new styryl lactone, 5*R*,6*R*-5-hydroxy-6-styryltetrahydropyrane-2-one **2** was isolated from the roots of an endemic *Goniothalamus lanceolatus* Miq. of Sarawak, Malaysia. Furthermore, seven previously undescribed diastereomers, 5*R*,6*R*-5-hydroxygoniothalamin **3**, 5*R*,6*R*-5-acetylgoniothalamin **4**, 6*S*,7*S*,8*S*-goniodiol-7-monoacetate **5**, 6*S*,7*S*,8*S*-goniodiol-8-monoacetate **6**, goniofupyrone B **7**, deoxygoniopypyrone B **8** and 1*S*,5*S*,7*R*,8*S*,3-*endo*,7-*endo*-(+)-8-*epi*-9-deoxygoniopypyrone acetate **9**, along with six known styryl lactones (**1**, **10-15**) were also isolated and characterized. 6*S*-goniothalamin **1** is reported for the first time from a *Goniothalamus* species. **1**, **11** and **12** showed cytotoxic activity against human colon and lung cancer cell lines with IC_{50} values ranging from 2.38-7.59 µM.

Keywords: *Goniothalamus lanceolatus*, Styryl lactones, Cytotoxicity.

Goniothalamus lanceolatus Miq. is an ethnomedicinal plant indigenous to Sarawak, Malaysia, used as traditional remedy for fever, skin infection, postpartum, abortion, as well as cancer treatment [1]. We previously reported cytotoxic lactam alkaloid and naphthoquinones from the roots of this plant [2]. Generally, *Goniothalamus* species are dominated by presences of styryl lactones. In continuation of our study on *G. lanceolatus* Miq., we herein report series of interesting styryl lactone derivatives from the roots and barks of the plant. The cytotoxic activity of the styryl lactones against a panel of human lung and colon cancer cell lines are also reported.

6*S*-goniothalamin **1** $[\alpha]_D^{20}$ -57.1, negative Cotton effect (CE) at 254 nm in ECD spectrum, isolated from roots of *G. lanceolatus* Miq., is reported for the first time from a *Goniothalamus* species [3, 4]. This particular configuration at C-6 of **1** forms the basis of establishing configuration of C-6 in all other styryl pyrones, and C-1 in the case of furano-pyrone and pyrano-pyrone isolated from this plant.

Compound **2** was obtained as a brown oil, $[\alpha]_D^{20}$ -11.1 (*c* 0.20, MeOH) with molecular formula $C_{13}H_{14}O_3Na$, determined by pseudomolecular ion peak LC-ESI-OBITRAP-MS at *m/z* 241.0833 (calculated 241.0835) $[M+Na]^+$. The IR spectrum of **2** displayed adsorption bands at 3388 cm^{-1} and 1755 cm^{-1} indicated presence of hydroxyl and carbonyl functionality. The UV spectrum revealed maximal absorption band at 214 and 256 nm. The ^{1}H-NMR spectrum displayed protons of monosubstituted benzene ring in the region δ_H 7.24-7.37 and *trans* olefinic H-7 and H-8 (δ_H 6.20 and 6.71). In addition, two oxymethine protons H-5 and H-6 resonated at δ_H 4.52 and 4.30, while two methylene protons of H-3 and H-4 were observed as two sets of multiplet centered at δ_H 2.16 and 2.56. The ^{13}C-NMR and DEPT 135 spectra revealed the presence of

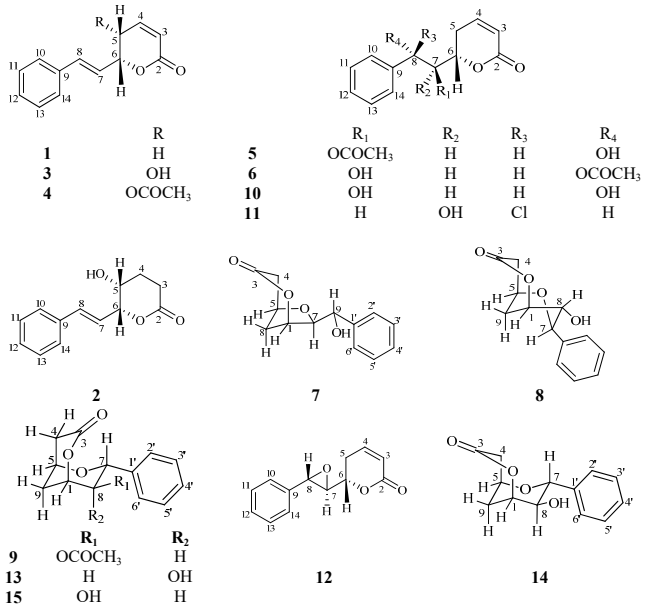

Figure 1: Structure of compounds **1**-**15**.

carbonyl (δ_C 177.1; C-2), aromatic ring (δ_C 126.9, 128.5, 128.9 and 136.1; C-10, C-12, C-11 and C-9), olefinic (δ_C 125.9 and 134.2; C-7 and C-8), methylene (δ_C 24.0 and 28.7; C-4 and C-3) and oxymethine (δ_C 75.2 and 82.7; C-6 and C-5) carbons, in which signals at δ_C 126.9 and 128.9 are presenting two carbons each. Long range correlation was observed between H-3 to C-2, C-4 and C-5, and H-4 to C-2, C-3, C-5 and C-6 which led to establishment of pyrano lactone moiety in chair conformation. Long-range