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ประมณิพนธ์

ORIGINAL ARTICLE

Lignan from the Stem Bark of *Aglaia pirifera* Hance

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ABSTRACT

From the pentane extract of the stem bark of *Aglaia pirifera* Hance, a lignan compound was isolated and characterized. The isolated lignan was identified as a known lignan called grandisin which has never been reported to be found in this species before. The chemical and physical properties of this compound were studied. (Th. J. Pharm. Sci., Vol. 12 No. 4, 335-339 (1987))

KEY WORDS

Aglaia pirifera Hance, lignan, grandisin, Meliaceae

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INTRODUCTION

The Thai plant, Kang-Kao (*Aglaia pirifera* Hance, family Meliaceae) is widely distributed in Thailand especially in the Central and Northeast regions where the usage of this plant was told. The local residents believed that the roots and leaves of this plant can induce vomiting and are useful antidotes for poisoning. Previous study of this plant was done on the leaf materials (1), and the presence of a new bis-amide of 2-aminopyrrolidine type alkaloid, named piriferine, was reported. We report herein the isolation and structure determination of a lignan compound from the stem bark of *Aglaia pirifera* Hance.

This is the first report of lignan compound in the genus *Aglaia*.

MATERIALS AND METHODS

Materials

Plant materials were collected from Phanat Nikhom, Chonburi, Thailand. The melting point (mp) of the compound was determined on a melting point apparatus (Gallenkamp) and uncorrected. Infrared (ir) spectrum was determined on a Hitachi 260 spectrophotometer. Proton nuclear magnetic resonance ($^1\text{H-nmr}$) was recorded on Jeol model FX 270 spectrometer. Mass spectrum (ms) was obtained at low resolution on a Hitachi RMU-60 mass spectrometer and high resolution on a Hitachi RMU-7M. All reported intensities were from the low resolution ms. Thin layer chromatography (tlc) was carried on Silica gel [type 60 (E. Merck)] coated plates. Visualization of chromatograms were by anisaldehyde-sulfuric acid spray reagent. Column chromatography (cc) was carried out on Silica gel-60 (230-400 mesh, E. Merck). Solvent A was benzene : ethylacetate (9 : 1), solvent B was cyclohexane : ethylacetate (8.5 : 1.5).

Extraction and chromatography

Dried powdered stem bark (11 kg) was extracted three times for 7 day periods each with methanol (36L, 27L, and 21L). The methanolic extract was concentrated to a syrupy mass and was exhaustively extracted with n-pentane in a liquid-liquid extractor. The 50.43 g of pentane soluble material was not further investigated. The methanolic extract was diluted with an equal volume of distilled water. Exhaustively extracted with chloroform gave, on evaporation, 30.16 g of residue. The residue was divided into three portions (approx. 10 g each), each portion was subjected to a column chromatography in the same manner. Column chromatography of 10 g sample on Silica gel (200 gm) in a flat bottom column (100 mm, id) employing solvent A gave a TLC one spot residue. Rechromatographed of 200 mg residue on Silica gel (40 gm) employing solvent B gave compound I.

Compound I (20 mg), appeared as white crystal from diethyl-ether, mp 124.5-125.5°C, exhibited the following properties: ir ν_{max} CHCl_3 (cm^{-1}): 1600, 1510, 1470, 1420, 1330, 1130, 1000, 830; $^1\text{H-nmr}$ (270 MHz, CDCl_3): δ 1.10 (6H, d), 1.80 (2H, m), 3.84 (6H, s), 3.89 (12H, s), 4.65 (2H, d), 6.63 (4H, s); ms m/z (% rel int.): 432 (M^+ , 34), 237 (9), 236 (54), 224 (72), 221 (49), 209 (22), 208 (100), 205 (43), 196 (4), 190 (9), 168 (10), 146 (5), 91 (4).

DISCUSSION and CONCLUSION

Column chromatography of crude pentane extract yielded one lignan compound (I).

Compound I has been identified as a known lignan called grandisin. The mass spectral fragmentation of compound I showing molecular ion and the base peak at m/z 432 and 208 respectively, indicated a molecular formula of $\text{C}_{24}\text{H}_{32}\text{O}_7$. The other important peaks appeared at m/z 224, 236, and 169. The ms fragmentation pattern of I was shown in figure 1. The ir spectrum showed phenyl group at 1600 and 1470 cm^{-1} , and the ether group at 1130 and 1000 cm^{-1} . The $^1\text{H-nmr}$ spectrum showed signals corresponding to two pyrogallol trimethyl ether moiety with six methyl groups. The corresponding signals appeared at δ 3.84 (6H) and 3.89 (12H) respectively. A four proton singlet at δ 6.63 indicated four

magnetically equivalent aromatic protons. The symmetry of the rest of the spectrum indicated a lignan of tetrahydrofuran type which was confirmed by the ms fragmentation pattern. The melting point and the spectral data of I are in full agreement with those of reported value for a known lignan called grandisin (2). The complete $^1\text{H-nmr}$ assignment of grandisin is shown in figure 2.

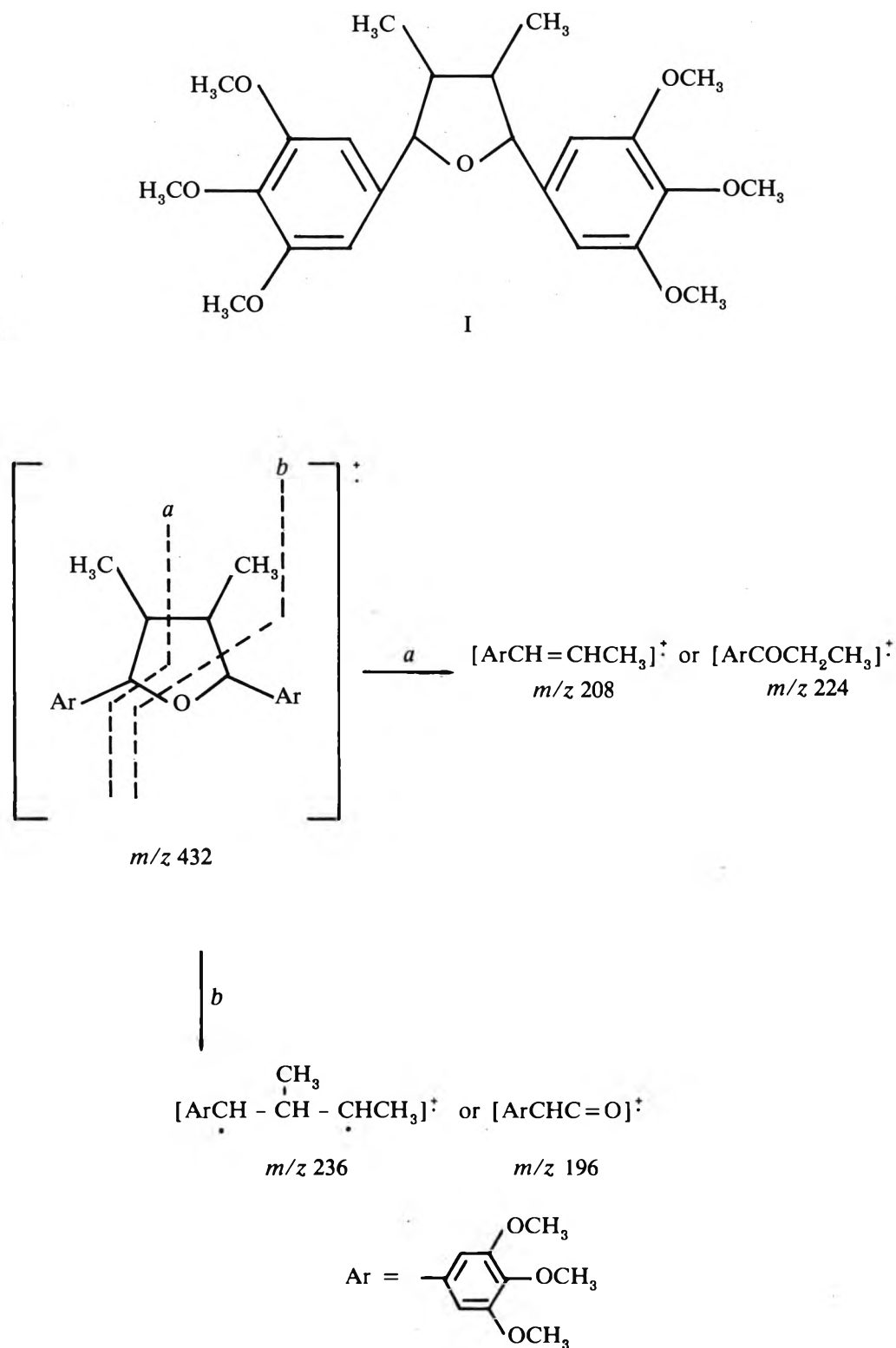


Figure 1. ms Fragmentation pattern of I.

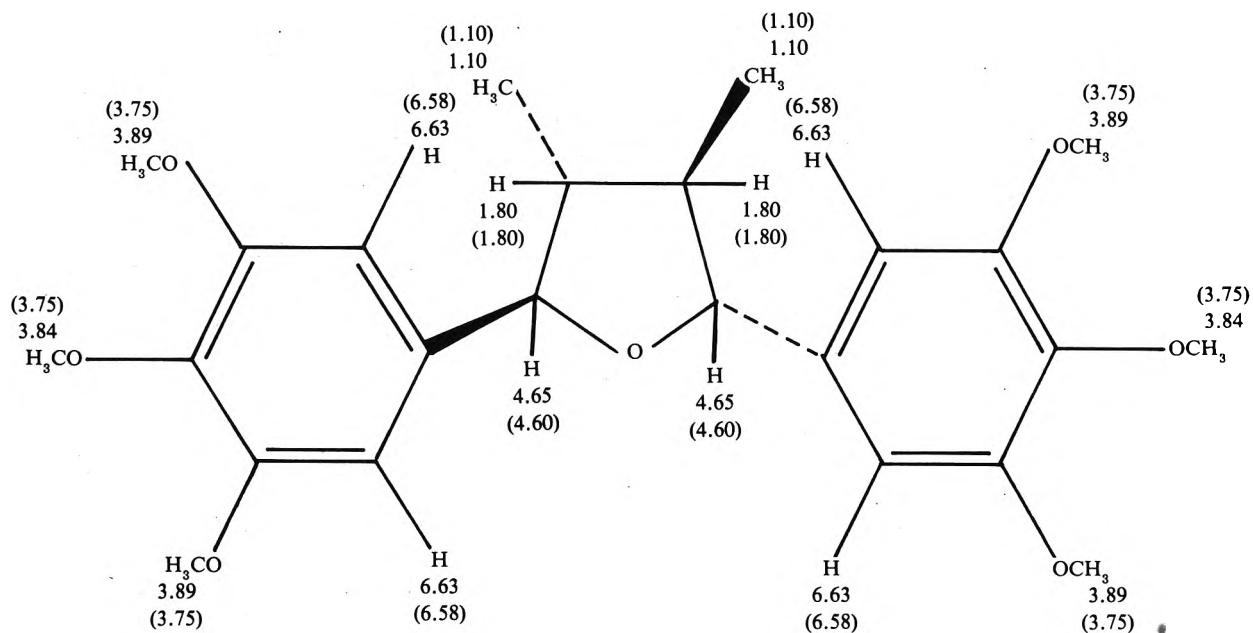


Figure 2. ^1H -nmr assignment of grandisin [Shift values in parentheses are for reported values of grandisin (2)]

From the literature survey, it was found that grandisin showed interesting pharmacological activities in animals (3). It was first isolated from the bark of *Litsea grandis* (wall.) Hook. f. (Lauraceae) (2). The other alternative source of grandisin was from the chemical synthesis (4, 5). Moreover, grandisin was appeared to be an intermediate product in the synthetic pathway of deoxyschizandrin (6).

The result of this investigation suggested an alternative source of grandisin in the nature.

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สารประกอบ lignan จากเปลือกต้นค่างคาว

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บทคัดย่อ

จากสิ่งสกัดด้วย pentane ของเปลือกต้นค่างคาว สามารถแยกและพิสูจน์เอกลักษณ์ได้สารจำพวก lignan ชื่อ grandisin ซึ่งยังไม่เคยมีรายงานว่าพบในพืชชนิดนี้มาก่อน และได้ทำการศึกษาคุณสมบัติทางเคมีและทางกายภาพของสารที่สกัดได้ (ไทยเภสัชสาร ปีที่ 12(4): หน้า 335-339 (2530))

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