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A METHYLENEDIOXY FLAVONE FROM *LIMNOPHILA INDICA*

K. S. MUKHERJEE,* G. BRAHMACHARI, T. K. MANNA and P. MUKHERJEE

Department of Chemistry, Visva-Bharati University, Santiniketan, West Bengal, Pin 731235, India

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Key Word Index—*Limnophila indica*; Scrophulariaceae; 5-Hydroxy-6,8-dimethoxy-3′,4′-methylenedioxyflavone.

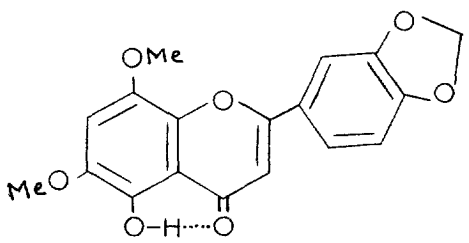
Abstract—The petrol extract of the aerial parts and roots of *Limnophila indica* yielded a new flavone, 5-hydroxy-6,8-dimethoxy-3′,4′-methylenedioxyflavone, characterized by spectral studies. © 1998 Elsevier Science Ltd. All rights reserved

INTRODUCTION

Limnophila indica (L.) Druce (Scrophulariaceae) [1, 2] is a small herb, which is used widely in traditional medicine [3] and shows antimicrobial activity [4]. No previous chemical examination has been carried out on this plant. The present communication reports the isolation and characterization of a new flavone from the whole plant petrol extract of *L. indica*.

Compound (**1**), $C_{18}H_{14}O_7$ ([M^+] at *m/z* 342), gave a positive flavonoid test with magnesium-hydrochloric acid and exhibited UV absorption at λ_{max} (MeOH) nm (log ϵ) 283 (4.27) and 329 (3.76). Its IR spectrum showed absorption bands at ν_{max} (KBr) 3380 (bonded hydroxyl), 1635, 1610, 1510 cm^{-1} (chelated α,β-unsaturated carbonyl). The ^{1}HNMR spectrum (90 MHz, $CDCl_3$) of **1** displayed resonances at δ 3.9 (6H, *s*, two Ar–OCH_3 groups), 6.1 (2H, *s*, –O–CH_2–O–), 6.4 (1H, *s*, H-7), 6.72 (1H, *s* C_3–H), 6.9 (1H, *d*, J = 8 Hz, H-5′), 7.3 (1H, *d*, J = 2 Hz, H-2′), 7.5 (1H, *dd*, J = 2, 8 Hz, H-6′) and δ 13 (phenolic OH). The EIMS exhibited significant mass peaks at *m/z* (% rel. int.) 342 (M^+, 60.2), 327 ($M^+ - CH_3$, 100), 314 ($M^+ - CO$, 7.9), 313 ($M^+ - CO - H$, 18.2), 299 ($M^+ - CH_3CO$, 20.7), 196 and 146 (R.D.A. of **1**; 21.6, 14.7), 181 and 146 (R.D.A. of mass fragment 327; 15.2, 14.7), 149 (4.3) and 132 (146 – CH_2, 50.6). This characteristic MS fragmentation [5, 6] suggests the presence of two methoxyls and one hydroxyl in ring-A, while the ^{1}HNMR spectral analysis indicated one –O–CH_2–O– chain at the 3′,4′-position in ring B.

The bathochromic shift of UV band I by 20 (283–303) nm in the presence of $AlCl_3$, which remained unchanged on addition of hydrochloric acid suggested the presence of a hydroxyl function at C_5 and one of the methoxyl groups at the C_6 position [7, 8]. Thus, the other methoxyl must be either at C_7 or C_8 in ring-A. The presence of an ^{1}H NMR signal at δ 6.4 (1H, *s*, H-7) and failure of the compound (**1**) to respond to the gossypetone test [9] confirmed the presence of the second methoxyl group at C_8. The above data led us to formulate the new flavone as 5-hydroxy-6,8-dimethoxy-3′,4′-methylenedioxyflavone (**1**) and the structure was confirmed by ^{13}CNMR spectral analysis (Table 1).



EXPERIMENTAL

Plant material

Whole plants of *Limnophila indica* were collected from Santiniketan and their identity verified by Dr H. R. Chowdhury and Dr S. Mondal (Visva-Bharati University). A voucher specimen has been deposited in the Natural Products Laboratory of this university.

*Author to whom correspondence should be addressed.

Table 1. ^{13}C NMR spectral data for compound (1) (100 MHz, $CDCl_3$)

C-atom	δ-value
2	163.8
3	104.1
4	183.6
5	149.6
6	132.0
7	118.6
8	129.1
9	152.0
10	104.1
1′	122.9
2′	110.0
3′ and 4′	147.1
5′	112.2
6′	119.5
$-O-CH_2-O-$	101.0
C_6-OCH_3	60.8
C_8-OCH_3	61.9

Extraction of L. indica

Air-dried defatted powdered whole plants (1.5 kg) of *L. indica* were extracted with petrol (60–80°) in a Soxhlet apparatus for 56 h. The extract was concd under red. pres. and then subjected to CC on 200 g silica gel (60–120 mesh).

Isolation of flavone (1)

The benzene–chloroform (1:1) fraction afforded 5-hydroxy-6,8-dimethoxy-3′,4′-methylenedioxyflavone (yield 0.6 g), yellow needles, m.p. 192–193°; UV, IR, ^1H NMR (90 MHz, $CDCl_3$), ^{13}C NMR (100 MHz, $CDCl_3$) and mass spectral data are described in the text.

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