

LIGNANS FROM *Saururus chinensis*

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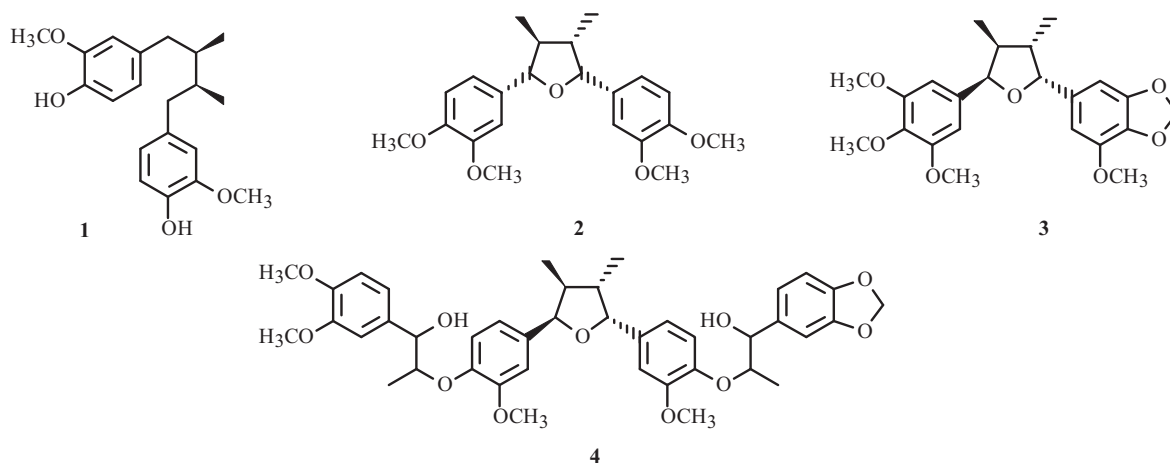
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Saururus chinensis (Lour.) Baill (Saururaceae) has been used in Chinese folk medicine for treatment of various diseases, such as edema, jaundice, and gonorrhea, and as antipyretic, diuretic, and anti-inflammatory agents [1]. Previous biological studies of extracts of this species have shown their antiasthmatic, antioxidative, and antiinflammatory [1], cytotoxic [2], vasorelaxant and inotropic [3], hypolipidemic [4, 5], hypoglycemic [6, 7], analgesic [8], neuroprotective [9], and antihypertensive effects [1]. *S. chinensis* was reported to contain compounds such as lignans, alkaloids, diterpenes, flavonoids, phenylpropanoids, tannins, steroids, and lipids [1].

The herbs were identified as *S. chinensis* and have been described elsewhere [1]. Isolation was described in our previous report [1]. F2 (20 g) was applied to a silica gel column, eluted by petroleum ether–EtOAc, 10:1, 8:1, to get compounds **1** [10] (65 mg) and **2** [11] (62 mg). F4 (4 g) was purified by successive silica gel column chromatography, eluted by petroleum ether–EtOAc, 5:1, to get **3** [12, 13] (38 mg) and **4** [14] (22 mg).

The four lignans **1–4** were identified by comparison of spectral data with those reported previously in the literature. To the best of our knowledge, **2** and **3** were isolated for the first time from *S. chinensis*.

meso-Dihydroguaiaretic Acid (1). ¹H NMR (400 MHz, CD₃OD, δ, ppm, J/Hz): 6.52 (2H, s, J = 2.0, H-2 and H-2'), 6.79 (2H, d, J = 8.0, H-5 and H-5'), 6.58 (2H, dd, J = 8.0, 2.0, H-6 and H-6'), 2.37 (4H, dd, J = 13.6, 6.8, H-7 and H-7'), 1.75 (2H, m, H-8 and H-8'), 0.82 (6H, d, J = 6.4, H-9 and H-9'), 3.80 (6H, s, Ar-OMe). ¹³C NMR (CD₃OD, 100 MHz, δ): 133.6 (C-1 and C-1'), 113.9 (C-2 and C-2'), 146.2 (C-3 and C-3'), 143.5 (C-4 and C-4'), 111.3 (C-5 and C-5'), 121.6 (C-6 and C-6'), 37.5 (C-7 and C-7'), 41.1 (C-8 and C-8'), 13.9 (C-9 and C-9'), 55.8 (OMe).



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Galgravin (2). ¹H NMR (400 MHz, CD₃OD, δ, ppm, J/Hz): 6.85 (2H, s, H-2 and H-2'), 6.80 (2H, d, J = 2.0, H-5 and H-5'), 6.95 (2H, dd, J = 8.0, 2.0, H-6 and H-6'), 5.44 (2H, d, J = 6.0, H-7 and H-7'), 3.85 (12H, s, OMe), 2.27 (2H, m, H-8 and H-8'), 0.69 (6H, d, J = 6.0, H-9 and H-9'). ¹³C NMR (100 MHz, CD₃OD, δ): 134.0 (C-1 and C-1'), 109.7 (C-2 and C-2'), 148.7 (C-3 and C-3'), 148.0 (C-4 and C-4'), 110.8 (C-5 and C-5'), 118.4 (C-6 and C-6'), 83.5 (C-7 and C-7'), 44.1 (C-8 and C-8'), 14.8 (C-9 and C-9'), 55.9 (OMe).

rel-(7R,8R,7'R,8'R)-3',4'-Methylenedioxy-3,4,5,5'-tetramethoxy-7,7'-epoxylignan (3). ¹H NMR (400 MHz, CD₃OD, δ, ppm, J/Hz): 6.66 (2H, m, H-2, H-6), 5.96 (2H, s, OCH₂O), 4.49 (1H, d, J = 8.0, H-7), 2.30 (1H, m, H-8), 1.06 (3H, d, J = 6.8, H-9), 3.90 (6H, s, Ar-OMe), 3.85 (3H, s, Ar-OMe), 3.76 (3H, s, Ar-OMe), 6.62 (2H, d, J = 1.2, H-2', H-6'), 4.46 (1H, d, J = 8.0, H-7'), 2.30 (1H, m, H-8'), 1.04 (3H, d, J = 6.8, H-9'). ¹³C NMR (100 MHz, CD₃OD, δ): 137.9 (C-1), 134.6 (C-1'), 103.3 (C-2), 106.4 (C-2'), 153.2 (C-3), 143.4 (C-3'), 136.8 (C-4), 137.4 (C-4'), 153.2 (C-5), 149.0 (C-5'), 103.3 (C-6), 100.4 (C-6'), 87.4 (C-7), 87.5 (C-7'), 44.4 (C-8), 44.3 (C-8'), 12.8 (C-9), 13.1 (C-9'), 101.4 (C-10), 56.1 (OMe), 60.8 (OMe), 56.1 (OMe).

Saucernetin 7 (4). ¹H NMR (400 MHz, CD₃OD, δ, ppm, J/Hz): 6.76–7.00 (12H, m, Ar-H-2, H-2', H-3, H-3', H-6, H-6' and Ar-H-2'', H-2''', H-3'', H-3''', H-6'', H-6'''), 5.95 (2H, s, OCH₂O), 5.46 (2H, d, J = 6.0, H-7 and H-7'), 4.64 (1H, d, J = 8.4, H-7''), 4.61 (1H, d, J = 8.4, H-7'''), 4.10 (2H, m, H-8'', H-8'''), 3.93 (3H, s, Ar-OMe), 3.92 (3H, s, Ar-OMe), 3.89 (3H, s, Ar-OMe), 3.88 (3H, s, Ar-OMe), 2.29 (2H, m, H-8 and H-8'), 1.17 (3H, d, J = 6.0, H-9'''), 1.15 (3H, d, J = 6.0, H-9''), 0.72 (6H, d, J = 5.6, H-9 and H-9'). ¹³C NMR (100 MHz, CD₃OD, δ): 136.6 (C-1), 136.5 (C-1'), 132.6 (C-1''), 134.0 (C-1'''), 110.2 (C-2 and C-2'), 110.9 (C-2''), 107.6 (C-2'''), 146.5 (C-3), 146.4 (C-3'), 148.9 (C-3''), 147.4 (C-3'''), 150.6 (C-4 and C-4'), 149.1 (C-4''), 147.8 (C-4'''), 118.7 (C-5 and C-5'), 118.9 (C-5''), 108.1 (C-5'''), 120.0 (C-6 and C-6'), 121.1 (C-6''), 119.7 (C-6'''), 83.4 (C-7 and C-7'), 84.0 (C-7'' and C-7'''), 44.2 (C-8 and C-8'), 78.4 (C-8'' and C-8'''), 14.9 (C-9 and C-9'), 17.0 (C-9''), 16.9 (C-9'''), 101.0 (C-10), 55.9 (OMe).

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