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HORTIAMIDE, A NEW TYRAMINE ALKALOID FROM
*HORTIA REGIA*WINSTON F. TINTO,^{*1}

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ABSTRACT.—A new tyramine derivative, hortiamide (**1**), was isolated from the roots of *Hortia regia*. The structure was determined from a series of 2D nmr experiments.

Hortia regia Vand. (Rutaceae) has previously afforded a number of terpenoid and alkaloidal constituents (1–4). In a further investigation of this plant, we describe here the isolation and structural elucidation of a new tyramine derivative, designated hortiamide (**1**), along with 5-methoxy-2,2-dimethyl-1-2*H*-benzopyran-6-propanoic acid (**2**), isolated for the first time as the free acid.

Hortiamide was isolated as colorless crystals, mp 109–111°, and had the molecular formula C₂₀H₂₃O₂N on the basis of hrms. The ir spectrum had absorptions due to a secondary amide (3356 and 1642

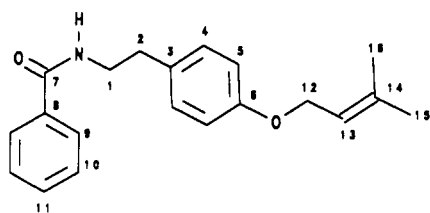
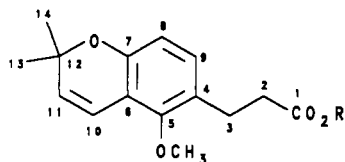
cm⁻¹), while the uv spectrum had absorbances characteristic of an aromatic chromophore. The ¹H- and ¹³C-nmr spectra revealed the presence of a 1,4-disubstituted benzene ring, a benzoyl group, and a dimethylallyl moiety.

A standard HETCOR experiment was used to determine connectivity between carbons and their directly bonded protons, while the FLOCK pulse sequence (5) was used to establish 2- and 3-bond correlations. In the FLOCK spectrum, the amide carbon at δ 167.43 displayed 3-bond correlation with the *ortho* protons of the benzoyl group at δ 7.69 (δ_c 126.80), while an oxymethylene carbon at δ 64.77 had cross peaks with an olefinic proton at δ 5.49. Further, both olefinic carbons had long-range correlations with the two Me groups. The results of these experiments (Table 1) led to the assignment of the structure **1** for hortiamide.

Compound **2**, mp 108–109°, had ir absorptions characteristic of carboxylic and aromatic functionalities. The ¹H- and ¹³C-nmr spectra suggested that it was the chromene acid, 5-methoxy-2,2-dimethyl-1-2*H*-benzopyran-6-propanoic acid; the methyl ester **3** was previously isolated from this same plant (2). Methylation of compound **2** gave a product that was identical to **3** in all respects (2).

EXPERIMENTAL

GENERAL EXPERIMENTAL PROCEDURES.—Mp's were taken on a Kofler hot stage apparatus and are uncorrected. Uv spectra were obtained on a Cary 14UV spectrophotometer. Ir spectra were obtained on a Nicolet 3DX FTIR spectrometer in

**1**

2 R=H
3 R=Me

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TABLE 1. Nmr Characteristics of Hortiamide [1] in CDCl₃.^a

Position	δ_C	δ_H	2- or 3-bond connectivity
1	41.29	3.68 (6.9, 1.0)	2.87
2	34.78	2.87 (6.9)	7.14, 3.68
3	130.76	—	7.14, 6.88, 2.87
4	129.72	7.14 (8.7)	7.14, 6.88, 2.87
5	114.86	6.88 (8.7)	6.88
6	157.60	—	7.14, 6.88, 4.49
7	167.43	—	7.69
8	134.67	—	7.40
9	126.80	7.69 (8.3, 1.4)	7.69, 7.48, 7.40
10	128.54	7.40 (8.3, 7.2)	7.40
11	131.36	7.48 (7.2, 1.4)	7.69, 7.40
12	64.77	4.49 (6.8, 1.6, 0.8)	5.49
13	119.66	5.49 (6.8, 2.8, 1.3)	4.49, 1.80, 1.74
14	138.20	—	1.80, 1.74, 4.49
15	25.84	1.80 (1.0)	4.49, 1.74
16	18.20	1.74 (1.3, 0.8)	1.80
NH	—	6.20 (1.0)	

^aAssignments are based on COSY (200 MHz), HETCOR (200 MHz), and FLOCK (400 MHz) experiments. Values in parentheses are coupling constants in Hz.

CHCl₃ solutions. The nmr spectra were recorded on a Varian XL-200 or XL-400 spectrometer in CDCl₃ solutions with TMS as an internal standard. A VG 70-250S mass spectrometer operating at 70 eV was used to obtain ms.

PLANT MATERIAL.—*H. regia* was collected in the forest west of the Mahaica river, Demerara, Guyana in November 1987. Voucher specimens are deposited in the Herbarium of the University of Guyana.

EXTRACTION AND ISOLATION.—The dried, ground roots (3.75 kg) were extracted with 95% EtOH (14 liters), and the resulting extract was taken up in CHCl₃. The CHCl₃-soluble material (76.8 g) was chromatographed on Si gel using 20% EtOAc in hexane as eluent to give the chromene acid **2** (318 mg) and hortiamide [1] (175 mg).

Hortiamide [1].—Mp 109–111°; ir 3356, 1642, 1610, 1579, 1537, 1509 cm⁻¹; uv (MeOH) 214 nmr (ϵ 1200) and 230 nm (ϵ 1900); ¹H and ¹³C nmr see Table 1; eims *m/z* [M]⁺ 309 (2%), 241 (15), 188 (4), 134 (6), 120 (100), 105 (50), 77 (27), 69 (27); hrcims (isobutane) 310.1810 (calcd for C₂₀H₂₄O₂N [MH]⁺ 310.1807).

5-Methoxy-2,2-dimethyl-1-2H-benzopyran-6-propanoic acid [2].—Mp 108–109°; ir 3430–2000 (br), 1714, 1636, 1602 cm⁻¹; ¹H nmr δ 11.47 (CO₂H), 6.93 (1H, d, 8.4 Hz, H-8), 6.57 (1H, d, 10.0 Hz, H-10), 6.53 (1H, d, 8.4 Hz, H-9), 5.64

(1H, d, 10.0 Hz, H-11), 3.75 (3H, s, OMe), 2.88 (2H, t, 7.3 Hz, H-3), 2.65 (2H, t, 7.3 Hz, H-2), 1.42 (6H, s, CMe₂); ¹³C nmr δ 179.9 (C-1), 154.4 (C-6), 152.8 (C-7), 130.6 (C-11), 129.5 (C-6), 124.9 (C-4), 117.3 (C-10), 114.9 (C-8), 112.4 (C-5), 76.0 (C-12), 61.9 (OMe), 34.8 (C-2), 27.5 (C-13 and C-14), 24.5 (C-3) eims *m/z* [M]⁺ 262 (21%), 247 (100), 187 (26), 173 (23), 159 (5), 145 (7), 128 (9), 115 (11); hrcims 262.1211 (calcd for C₁₅H₁₈O₄, 262.1205).

Compound **2** (25 mg) was treated with excess ethereal CH₂N₂ to give the methyl ester **3**, identical with an authentic sample (¹H nmr, ¹³C nmr, and co-tlc).

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LITERATURE CITED

1. H. Jacobs, F. Ramdayal, W.F. Reynolds, and S. McLean, *Tetrahedron Lett.*, **27**, 1453 (1986).
2. H. Jacobs, F. Ramdayal, W.F. Reynolds, J. Poplawski, and S. McLean, *Can. J. Chem.*, **64**, 580 (1986).
3. H. Jacobs, F. Ramdayal, S. McLean, M. Perpich-Dumont, F. Puzzuoli, and W.F. Reynolds, *J. Nat. Prod.*, **50**, 507 (1987).

4. S. McLean, M. Perpick-Dumont, W.F. Reynolds, J.F. Sawyer, H. Jacobs, and F. Ramdayal, *J. Am. Chem. Soc.* **110**, 5339 (1988).
5. W.F. Reynolds, S. McLean, M. Perpick-Dumont, and R.G. Enriquez, *Magn. Reson. Chem.* **27**, 162 (1989).

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