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Note

Preparation of 2-aryl-6,7-dihydroxy-8-undecyl-4*H*- 1,3,4-benzoxadiazines

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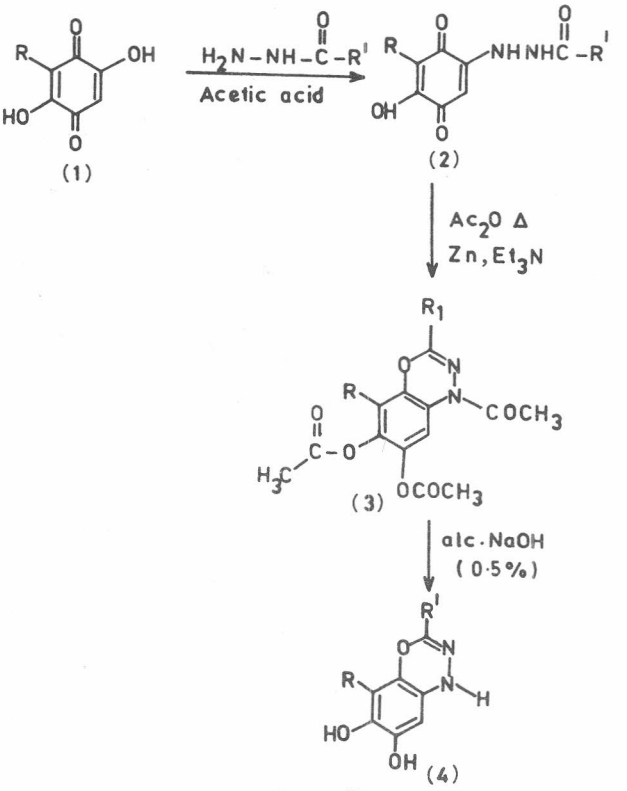
The hitherto unreported 2-aryl-6,7-dihydroxy-8-undecyl-4*H*-1,3,4-benzoxadiazines **4** have been accomplished by deacetylation reaction of N^3-acetyl-2-aryl-6, 7-di-acetoxy-8-undecyl-4*H*-1,3,4-benzoxadiazines **3** obtained by the reaction of 2-aroylhydrazino-5-hydroxy-6-undecyl-1, 4-benzoquinones **2**.

In recent years much attention has been focussed on 1,2,4-oxadiazines because of their monoamine oxidase inhibitory[1-5], cancerocidal[6], anticonvulsant and antidepressant[7] properties. 5,6-Dihydro-4*H*-1,3,4-oxadiazines were synthesised from certain 2-(β-hydroxyalkyl)acid hydrazides[8].

In continuation of our earlier work on heterocyclic systems from quinones[9-12], we are now reporting the preparation of novel heterocyclic system, 2-aryl-6,7-dihydroxy-8-undecyl-4*H*-1,3,4-benzoxadiazine **4** in a three-step process from embelin (2,5-dihydroxy-6-undecyl-1,4-benzoquinone), a natural quinone, in good yields. Embelin **1**, extracted from *Embelia ribes*, was first treated with alkyl- or aroyl-hydrazine in acetic acid to give a single product 2-aroylhydrazino-5-hydroxy-6-undecyl-1,4-benzoquinone, **2** in excellent yields instead of the corresponding schiff bases. Compounds **2** were then subjected to reductive cyclization with Zn dust and acetic anhydride to give N^3-acetyl-2-aryl-6,7-diacetoxy-8-undecyl-4*H*-1,3,4-benzoxadiazines **3** (Scheme I). Finally the title compounds **4** were prepared from deacetylation of **3**. Chemical analysis was carried out at each stage to confirm the presence or absence of 1,4-quinone moiety by reduction with Zn-AcOH and reoxidation on exposure to air. The present method for the synthesis of oxadiazines is easy, yields are good, and it involves regioselective preparation of linear oxadiazines from hydroxyquinones. The



Scheme I

study on the utility of this reaction is in progress with other halo- and alkoxy-quinones. These results will be published elsewhere. The structures of all the new compounds prepared were established by analytical and spectral data.

Experimental Section

General procedure for 2-aroylhydrazino-5-hydroxy-6-undecyl-1,4-benzoquinones 2. A mixture of embelin **1** (2.94 g; 0.01 mole) and appropriate aroylhydrazine (0.01 mole) in acetic acid (30 mL) was refluxed on a steam-bath for a period of 3-4 hr. The reaction mixture was cooled and poured over crushed ice. The solid which separated out was collected and crystallised from a suitable solvent (Table I).

General procedure for N^3-acetyl-2-aryl-6-diacetoxy-8-undecyl-4*H*-1,3,4-benzoxadiazines 3. 2-Aroylhydrazino-5-hydroxy-6-undecyl-1,4-benzoquinone **2** (0.01 mole) was dissolved in acetic anhydride (15 mL) and treated with catalytic amounts of zinc powder and triethylamine. After refluxing on a steam-bath for 6 hr the reaction mixture was

Table I—Physical data of aroyl hydrazines **2**, triacetyloxadiazines **3** and benzoxadiazines **4**

Compd	R′	Yield (%)	m.p.* (°C)	Mol. formula (M)	Found (%) (Calcd)			^{1}H NMR ($CDCl_3$ / TM)
					C	H	N	
2a	Phenyl	72	189-90	$C_{24}H_{32}N_2O_4$ (412)	69.90 (69.89	7.76 7.72	6.79 6.72)	0.9 (t, 3H, undecyl), 1.25 (m, 18H, aliphatic), 2.5 (t, 2H, allylic), 6.1 (s, 1H, vinylic), 7.55 (m, 5H, arom), 7.90 (s, 1H, −NH) and 8.0 (s, H, −NHCO−), 11.0 (s, 1H, OH).
2b	Methyl	60	152-53	$C_{19}H_{30}N_2O_4$ (350)	65.14 (65.12	8.57 8.52	8.00 8.00)	0.8 (t, 3H, end CH_3 of undecyl), 1.20 (m, 18H, aliphatic), 1.8 (t, 2H, allylic CH_2), 1.9 (1.9 (s, 3H, CH_3 of oxadiazine), 6.0 (s, H, vinylic), 7.9 (s, 1H, −NH), 8.0 (s, 1H, NHCO) and 10.9 (s, 1H, OH).
3a	Phenyl	65	103-4	$C_{30}H_{38}N_2O_6$ (522)	68.96 (68.92	7.27 7.25	5.36 5.32)	0.8 (t, 3H, end CH_3 of undecyl), 1.25 (m, 18H, aliphatic), 1.8 (t, 2H, allylic CH_2), 2.2 (s, 3H, NAc), 2.3 (s, 6H, 2 × OAc) and 7.0-7.25 (m, 6H).
3b	Methyl	86	110-11	$C_{24}H_{36}N_2O_6$ (448)	64.28 (64.24	8.03 8.00	6.25 6.21)	0.8 (t, 3H, end methyl), 1.2 (m, 18H, middle chain), 1.8 (t, 2H, allylic CH_2), 1.9 (s, 3H, CH_3 of oxadiazine), 2.2 (s, 3H), 2.3 (s, 6H, 2 × OAc), 7.0 (s, 1H, aromatic).
4a	Phenyl	85	179-80	$C_{24}H_{32}N_2O_3$ (396)	72.72 (72.68	8.08 8.02	7.07 7.00)	0.8 (t, 3H, end CH_3), 1.2 (m, 18H, middle chain), 1.8 (t, 2H, allylic CH_2), 5.3 (s, 1H, NH, b), 7.1-7.4 (m, 6H, aromatic).
4b	Methyl	72	175-76	$C_{19}H_{30}N_2O_3$ (334)	68.26 (68.16	8.98 8.91	8.38 8.29))	0.8 (t, 3H, end CH_3), 1.2 (m, 18H, middle chain), 1.8 (t, 2H, allylic CH_2), 1.9 (s, 1H, CH_3 of oxadiazine), 5.2 (s, 1H, NH, b), 6.9 (s, 1H, aromatic)

*Uncorrected, determined in a sulphuric acid bath. All the compounds were recrystallised from ethanol.

cooled and poured over crushed ice and kept aside overnight. The solid which separated out was collected and crystallized from a suitable solvent (Table I).

General procedure for 2-aroyl-6,7-dihydroxy-8-undecyl-4*H*-1,3,4-bekzoxadiazines 4. N^3-Acetyl-2-aryl-6, 7-diacetoxy-8-undecyl-4*H*-1,3,4-benzoxadiazine **3** (0.01 mole) was refluxed in 0.5% ethanolic sodium hydroxide solution on a steam-bath for 30 min. The reaction mixture was cooled to 0°C and neutralized with cold 1% HCl. The solid which separated out was collected and crystallized from a suitable solvent (Table I).

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