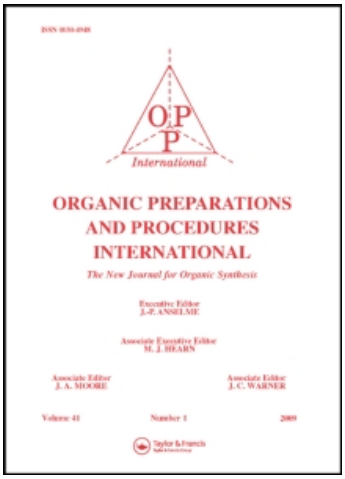

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A NEW SYNTHESIS OF 2-BROMO-1-(9-PHENANTHRYL)ETHANE

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A NEW SYNTHESIS OF 2-BROMO-1-(9-PHENANTHRYL)ETHANE

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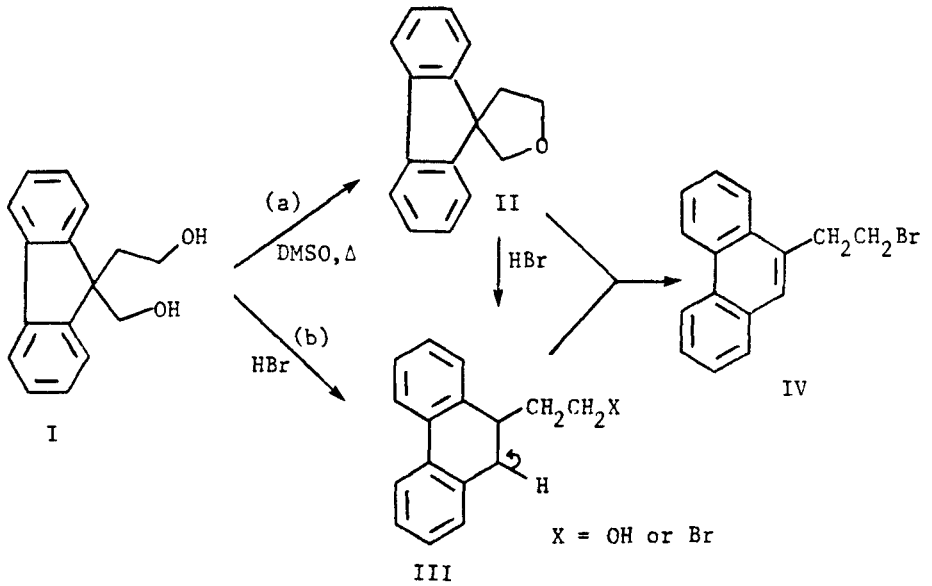
It has previously been shown[1-3] that azaspirofluorenes display a wide variety of biological activity. We extended our studies to oxaspirofluorenes in order to examine the effect of structural changes on the biological activity.

The reaction of the tricyclic diol (I) with 48% hydrobromic acid did not afford the desired oxaspirofluorene (II) but instead gave 2-bromo-1-(9-phenanthryl)ethane (IV) in 79% yield. However, DMSO-catalyzed ring closure[3] of I at 100° for 18 hrs afforded II in 75% yield. A plausible mechanism for



the formation of IV involves protonation of the hydroxymethyl side chain of I, followed by cyclization (path a) to oxaspirofluorene II or rearrangement

(path b) and ring expansion to form a more stable benzylic carbonium ion III. In the presence of excess HBr both II and III will lead to the bromo compound (IV). In support of this path, oxaspirofluorene II was converted to IV in 80% yield upon treatment with hydrobromic acid.

EXPERIMENTAL SECTION

All melting points were determined on a Thomas-Hoover Unimelt apparatus and are uncorrected. Infrared spectra were recorded on a Perkin-Elmer Infracord. The mass spectra were recorded on a Finnigan-4000 quadrupole mass spectrometer operating at an ionizing voltage of 70 eV and a source temperature of 250°. The ^{1}H NMR spectra were obtained using a Varian A-60 and XL-100 instruments and ^{13}C NMR spectrum was determined using a Varian FT-80A instrument. Elemental analyses were performed by Robertson and Galbraith Laboratories.

9-Hydroxymethyl-9-(β-hydroxyethyl)fluorene(I).- To a stirred solution of lithium aluminum hydride (2 g, 5 mmoles) in 50 ml of ether, was added a solution (2.5 g, 10 mmoles) of spiro[fluorene-9,3[1]-furan-2',5'-dione][3] in 50 ml of dry THF. The reaction mixture was stirred under reflux for 18 hrs. Excess hydride was decomposed with water and the ethereal solution was dried (Na_2SO_4) and evaporated under reduced pressure to afford a white solid which was recrystallized from ether to yield 1.8 g (75%) of I, mp. 91-92°. IR(KBr): 3300 (OH) cm^{-1}; ^{1}H NMR($CDCl_3$): δ 1.5-1.9 (broad, 2H exchanged with D_2O), 2.22 (t, 2H), 3.18 (t, 2H), 7.30 (m, 6H), 7.69 (m, 2H).

Anal. Calcd for $C_{16}H_{16}O_2$: C, 79.97; H, 6.71

Found: C, 80.14; H, 6.50

Spiro[fluorene-9,3'-tetrahydrofuran] (II).- A solution of spirodiol I (1.2 g, 5 mmoles) in 15 ml of dry DMSO was heated on an oil bath at 95-100° for 18 hrs. The reaction mixture was evaporated under reduced pressure and 50 ml of dry ether was added to the oily residue. The ethereal solution was washed with water and dried (Na_2SO_4). The ether was evaporated and the residue was recrystallized from ether to afford white crystals 0.8 g (75%) of II, mp. 58°. IR(KBr): 2950 (ArCH), 2850 and 2800 ($-CH_2$), 1495 (C=C) and

1015 and 1030 (OH) cm^{-1}; ^1H NMR ($CDCl_3$): δ 2.35 (t, 2H), 4 (s, 2H), 4.25 (t, 2H) and 7.25-7.83 (m, 8H); MS m/e 222 (M^+).

Anal. Calcd for $C_{16}H_{14}O$: C, 86.45; H, 6.35

Found: C, 86.21; H, 6.11

Reaction of the Spirodiol I with Hydrobromic Acid. Formation of 2-Bromo-1-(9-phenanthryl)ethane (IV).- To a solution of 1.2 g (5 mmoles) of I in 20 ml of dry toluene 48% HBr (5 ml) was added. The mixture was refluxed on an oil bath for 3 hrs. The solvent was removed under reduced pressure and the residue was dissolved in ether. The ethereal solution was washed with dilute $NaHCO_3$ solution, water and dried (Na_2SO_4). Evaporation of the ether under reduced pressure afforded a yellow oil which solidified upon standing. Recrystallization from ether-petroleum ether (1:1) afforded 0.95 g (79%) of (IV), mp. 85-86°. IR(KBr): 3000 (ArCH), 2910 and 2810 ($-CH_2$), 1590 (C=C) and 749 (ring-H) cm^{-1}; ^1H NMR ($CDCl_3$): δ 3.82 (m, 4H), 7.70 (s, 1H), 7.74-8.25 (m, 6H) and 8.81 (m, 2H); ^{13}C NMR ($CDCl_3$): δ 133.2(s), 131.8(s), 131(s), 130.7(s), 130.2(s), 129.5(d), 127.5(d), 127(d), 126.9(d), 126.7(d), 126.2(d), 123.8(d), 123.6(d), 122.7(d), 37.2(t) and 31.9(t); MS m/e (relative intensity): 286(25), 284(25), 205(19), 191(100), 165(16), 151(6), 101(38), 88(21).

Anal. Calcd for $C_{16}H_{13}Br$: C, 67.38; H, 4.59; Br, 28.02

Found: C, 67.44; H, 4.62; Br, 28.21

Reaction of II with Hydrobromic Acid. Formation of 2-Bromo-1-(9-phenanthryl)ethane (IV).- The reaction carried out as previously described using 1.1 g (5 mmoles) of II and 5 ml of 48% HBr afforded 1.1 g (80%) of IV, mp. 85-86°; a mixture mp. with an authentic sample of IV melted at 85-86°.

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SYNTHESIS OF SOME 2-PYRAZOLIN-5-ONE DERIVATIVES STRUCTURALLY RELATED TO CERTAIN ANALGESIS AND ANTIPYRETIC DRUGS

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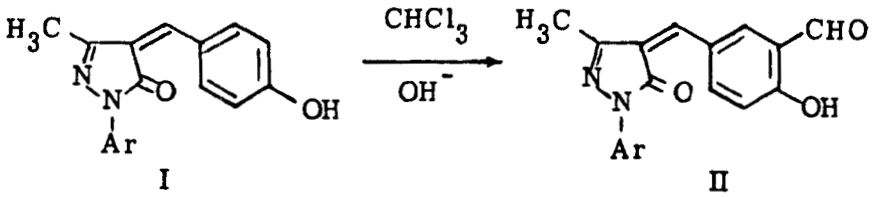
The present manuscript describes the synthesis of some 2-pyrazolin-5-one derivatives structurally related to certain analgesic and antipyretic drugs.[1,2] The Riemer-Tiemann reaction of 4-(p-hydroxybenzylidene)-3-



I II

Ar = p-$NO_2C_6H_4$

methyl-1-(p-nitrophenyl)-2-pyrazolin-5-one (I) resulted in the formation of α-[3-methyl-1-(p-nitrophenyl)-5-oxo-2-pyrazolin-4-ylidine]-2,5-cresotaldehyde in good yield.