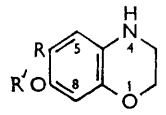
716. 3,4-*Dihydro*-2H-1,4-*benzoxazines*.

By J. Hill and G. R. Ramage.

Syntheses for 6-acetyl-3,4-dihydro-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine and several related 3,4-dihydro-2*H*-1,4-benzoxazines are described.

3,4-Dihydro-2*H*-1,4-benzoxazines (I; R = H or Ac), possessing an oxygen function at position 7, either alone or together with a 6-acetyl group, were required for use as intermediates in the preparation of heterocyclic chromones as potential spasmolytics. The two routes most favoured by previous workers involved either cyclisation of 2-β-halogenoalkylaminophenols (III; R = H or alkyl),[1] or reductive cyclisation of 2-nitroaryl 2-oxoalkyl ethers (III; R = H or alkyl).[2,3]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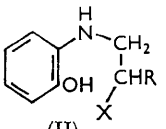
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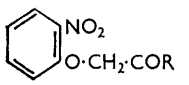
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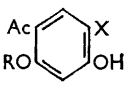
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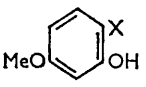
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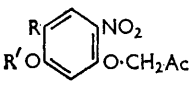
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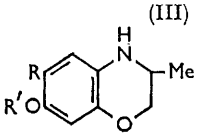
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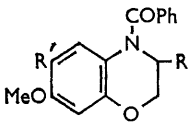
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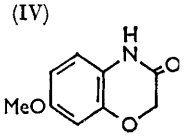
(IX)

In an attempt to follow the former route, 5-aminoresacetophenone [4] (IV; R = H, X = NH_2), with ethylene chlorhydrin gave 5-(2′-hydroxyethylamino)resacetophenone (IV; R = H, X = NH·CH_2·CH_2OH), but various methods for its cyclisation failed. Resorcinol monomethyl ether [5] was nitrated to give 5-methoxy-2-nitrophenol (V; X = NO_2),[6] which was also obtained, more conveniently, by methylation and hydrolysis of 3-benzoyloxy-4-nitrophenol, a by-product of the nitration [7] of resorcinol monobenzoate. Hydrogenation yielded the amine (V; X = NH_2) which was unstable under the conditions used in the attempted formation of its *N*-2-hydroxyethyl derivative.

Several 2-nitrophenoxyacetones (VI) were prepared with the intention of synthesising 3,4-dihydro-2*H*-1,4-benzoxazines by the second of the two routes. 4-Hydroxy-2-methoxyacetophenone [8] was nitrated by a modification of the method outlined by Kaneniwa [9] to give 4-hydroxy-2-methoxy-5-nitroacetophenone (IV; R = Me, X = NO_2). Condensation with chloroacetone afforded 4-acetyl-5-methoxy-2-nitrophenoxyacetone (VI; R = Ac, R′ = Me) which on hydrogenation over Raney nickel gave 6-acetyl-3,4-dihydro-7-methoxy-3-methyl-2*H*-1,4-benzoxazine (VII; R = Ac, R′ = Me). This and the subsequently described hydrogenations of 2-nitrophenoxyacetones were carried out at room temperature and atmospheric or moderate pressures (1—50 atm.), whereas in previous hydrogenations of this type [3] high temperatures and pressures were used.

5-Methoxy-2-nitrophenol (V; X = NO_2) was condensed with chloroacetone to yield a 2-nitrophenoxyacetone (VI; R = H, R′ = Me) which on hydrogenation and subsequent benzoylation gave 4-benzoyl-3,4-dihydro-7-methoxy-3-methyl-2*H*-1,4-benzoxazine (VIII; R = Me, R′ = H). Acetylation, using a mixture of acetic acid and polyphosphoric acid,

[1] Knorr, *Ber.*, 1889, **22**, 2081.
[2] Stoermer and Brockerhof, *Ber.*, 1897, **30**, 1631.
[3] U.S.P. 2,381,935/1945; 2,432,393/1947; 2,448,869/1948.
[4] Omer and Hamilton, *J. Amer. Chem. Soc.*, 1937, **59**, 642.
[5] Perkin, Ray, and Robinson, *J.*, 1926, 941.
[6] Hodgson and Dyson, *J.*, 1935, 946.
[7] Barton, Linnell, and Senior, *J.*, 1945, 436.
[8] Mahesh, Neelakantan, and Seshadri, *J. Sci. Ind. Res., India*, 1956, **15***B*, 287.
[9] Kaneniwa, *J. Pharm. Soc. Japan*, 1955, **75**, 785.

afforded the 6-acetyl derivative (VIII; R = Me, R′ = Ac), identical with the compound obtained on benzoylation of the benzoxazine (VII; R = Ac, R′ = Me). With the boron trifluoride–acetic acid complex as the acetylating reagent, both acetylation and demethylation occurred to give a low yield of 6-acetyl-3,4-dihydro-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine (VII; R = Ac, R′ = H). This compound was more suitably prepared from resorcinol monobenzoate, which on nitration gave a mixture of 3-benzoyloxy-4-nitrophenol and 5-benzoyloxy-2-nitrophenol.[7] The latter was condensed with chloroacetone and the product (VI; R = H, R′ = COPh) was hydrogenated, yielding 7-benzoyloxy-3,4-dihydro-3-methyl-2*H*-1,4-benzoxazine (VII; R = H, R′ = COPh). Treatment with boron trifluoride–acetic acid afforded the 6-acetyl compound (VII; R = Ac, R′ = H).

3,4-Dihydro-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine (VII; R = R′ = H) was obtained from the corresponding 7-benzoyloxy compound by acid-hydrolysis.

The 6-acetyl-7-hydroxy-compound (VII; R = Ac, R′ = H) was accessible by a further, unambiguous but inferior, route in which 5-nitroresacetophenone [4] (IV; R = H, X = NO_2) was condensed with chloroacetone and the resulting 2-nitrophenoxyacetone (VI; R = Ac, R′ = H), obtained in low yield, was hydrogenated. A third route to a 3,4-dihydrobenzoxazine involved reduction of the corresponding 3-oxo-3,4-dihydrobenzoxazine (see Cymerman-Craig *et al.*[10]). 2-Amino-5-methoxyphenol (V; X = NH_2) was treated with chloroacetyl chloride and the resulting chloroamide (V; X = NH·CO·CH_2Cl) was cyclised to 3,4-dihydro-7-methoxy-3-oxo-2*H*-1,4-benzoxazine (IX). Reduction with lithium aluminium hydride gave an oil which on benzoylation yielded 4-benzoyl-3,4-dihydro-7-methoxy-2*H*-1,4-benzoxazine (VIII; R = R′ = H) and formed the picrate of 3,4-dihydro-7-methoxy-2*H*-1,4-benzoxazine (I; R = H, R′ = Me).

The infrared absorption spectra of several of the above benzoxazines and nitroketones were examined (see Table). The absorption band due to the secondary amino-group in the

Infrared absorption spectra.

Compound	Wavelength (μ) OH- or NH-stretching	CO
5-Nitroresacetophenone	3·05, 3·10 *	6·08
4-Acetyl-5-hydroxy-2-nitrophenoxyacetone	—	5·78, 6·08
4-Acetyl-5-methoxy-2-nitrophenoxyacetone	—	5·81, 6·00
6-Acetyl-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine	2·95	6·10
6-Acetyl-7-methoxy-3-methyl-2*H*-1,4-benzoxazine	2·96	6·10
7-Benzoyloxy-3-methyl-2*H*-1,4-benzoxazine	2·93	5·79

* Shoulder.

All absorption bands are strong (over 60% of maximum absorption band).

dihydrobenzoxazine occurs in the region 2·93—2·96 μ. Absorption by the 6-acetyl group (6·1 μ) is at a longer than normal wavelength for an acetophenone derivative (5·95—6·00 μ). This may be attributed to the influence of the amino-group, an effect similar to that described by Soloway and Friess [11] in a study of the infrared spectra of substituted acetophenones. Both 5-nitroresacetophenone and 4-acetyl-5-hydroxy-2-nitrophenoxyacetone exhibit long wavelength carbonyl absorption at 6·08 μ, due to hydrogen bonding between the carbonyl and adjacent hydroxyl group.[12] The absorption band of the acetyl group in 4-acetyl-5-methoxy-2-nitrophenoxyacetone occurs at the lower value of 6·0 μ in the absence of hydrogen bonding. Carbonyl absorption by the acetonyl groups of the phenoxyacetones lies between 5·75 and 5·85 μ.

The two most water-soluble of the above benzoxazines, 3,4-dihydro-7-methoxy-3-oxo-2*H*-1,4 benzoxazine, and 6-acetyl-3,4-dihydro-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine,

[10] Cymerman-Craig, Rogers, and Tate, *Austral. J. Chem.*, 1956, **9**, 397.
[11] Soloway and Friess, *J. Amer. Chem. Soc.*, 1951, **73**, 5000.
[12] Cullinane, Woolhouse, and Bailey-Wood, *Rec. Trav. chim.*, 1961, **80**, 116.

possessed approximately a quarter of the spasmolytic activity shown by the naturally occurring substance, khellin.[13]

Experimental

Infrared spectra were determined as nujol mulls, using a Perkin-Elmer 221 spectrophotometer.

5-*Aminoresacetophenone* (IV; R = H, X = NH_2).—5-Nitroresacetophenone was reduced by the method of Omer and Hamilton [4] and the resulting 5-aminoresacetophenone, from the hydrochloride, crystallised from benzene as prisms, m. p. 151° (decomp.) (Found: C, 57·8; H, 5·4. Calc. for $C_8H_9NO_3$: C, 57·5; H, 5·4%). Omer and Hamilton [4] gave m. p. 137—142° (decomp.). The amine formed a *monobenzoate* as needles (from dioxan–cellosolve), m. p. 289—290° (Found: C, 66·5; H, 4·7. $C_{15}H_{13}NO_4$ requires C, 66·4; H, 4·8%).

5-(2′-*Hydroxyethylamino*)*resacetophenone* (IV; R = H, X = $NH{\cdot}CH_2{\cdot}CH_2OH$).—5-Aminoresacetophenone (3·9 g.) was heated on the water-bath with ethylene chlorhydrin (10 ml.) during 15 hr. Acetone (10 ml.) was added and after cooling the resulting mixture for 24 hr. at 0°, the pale blue solid was filtered off and dissolved in the minimum amount of water. The solution was boiled for 5 min. (charcoal) and filtered before adding anhydrous potassium acetate (5 g.) to the cooled filtrate. 5-(2′-*Hydroxyethylamino*)*resacetophenone* (2·6 g.) separated as a pale yellow solid which crystallised from ethyl acetate as needles, m. p. 161° (Found: C, 56·9; H, 5·8; N, 6·7. $C_{10}H_{13}NO_4$ requires C, 56·9; H, 6·2; N, 6·6%). 5-(2′-Hydroxyethylamino)-resacetophenone gave a *formyl derivative* which crystallised from water as needles, m. p. 152—157° (Found: N, 5·9. $C_{11}H_{13}NO_5$ requires N, 5·9%).

2-*Amino*-5-*methoxyphenol* (V; X = NH_2).—5-Methoxy-2-nitrophenol (4·4 g.) in acetone (80 ml.) was hydrogenated using a Raney nickel catalyst, the hydrogen uptake being theoretical for reduction to the amine. The filtered solution was extracted with ether from which the amine was extracted by dilute hydrochloric acid. 2-*Amino*-5-*methoxyphenol* (3 g.) was precipitated from the acid solution by addition of an excess of potassium acetate. On crystallisation from ethyl acetate it formed prisms, m. p. 128—130° (Found: C, 60·9; H, 6·7; N, 9·7. $C_7H_9NO_2$ requires C, 60·4; H, 6·5; N, 10·1%).

4-*Acetyl*-5-*methoxy*-2-*nitrophenoxyacetone* (VI; R = Ac, R′ = Me).—4-Hydroxy-2-methoxy-5-nitroacetophenone (2·65 g.) in acetone (40 ml.) was heated under reflux, with stirring, during 12 hr. with chloroacetone (1·1 ml.), anhydrous potassium carbonate (1·75 g.), and potassium iodide (0·5 g.). The mixture was filtered and the filtrate was evaporated to a volume of 15 ml. On cooling to 0°, 4-*acetyl*-5-*methoxy*-2-*nitrophenoxyacetone* (0·88 g.) separated from the solution and crystallised from chloroform–acetone as needles, m. p. 175° (Found: C, 54·1; H, 5·1. $C_{12}H_{13}NO_6$ requires C, 53·9; H, 4·9%).

6-*Acetyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (VII; R = Ac, R′ = Me).—A suspension of 4-acetyl-5-methoxy-2-nitrophenoxyacetone (0·7 g.) in methanol (60 ml.) was shaken, in the presence of Raney nickel, under hydrogen until the uptake ceased (adsorption theoretical for formation of the dihydro-oxazine ring). Filtration, followed by concentration of the filtrate, yielded 6-*acetyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (0·29 g.) which crystallised from methanol as yellow plates, m. p. 140° (Found: C, 64·9; H, 6·5. $C_{12}H_{15}NO_3$ requires C, 65·1; H, 6·8%).

5-*Methoxy*-2-*nitrophenoxyacetone* (VI; R = H, R′ = Me).—5-Methoxy-2-nitrophenol (19·5 g.) was heated under reflux, with stirring, during 6 hr. with chloroacetone (11·1 ml.), anhydrous potassium carbonate (16·3 g.), potassium iodide (3 g.), and acetone (200 ml.). The mixture was filtered and the filtrate concentrated to give 5-*methoxy*-2-*nitrophenoxyacetone* (16·1 g.) which crystallised from benzene as prisms, m. p. 125° (Found: C, 53·4; H, 5·1. $C_{10}H_{11}NO_5$ requires C, 53·3; H, 4·9%).

4-*Benzoyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (VIII; R = Me, R′ = H).—5-Methoxy-2-nitrophenoxyacetone (5·0 g.) in methanol (350 ml.) was agitated in the presence of hydrogen at 60—70° and 50 atm. during 6 hr., using a Raney nickel catalyst. The filtered solution was evaporated and the residue was dissolved in ether. On shaking the ethereal solution with dried magnesium sulphate and charcoal, followed by filtration and evaporation of the filtrate, an orange oil was obtained. The oil was heated for 5 min. on the water-bath with pyridine (10 ml.) and benzoyl chloride (3·15 ml.), and the brown oil obtained after shaking the

[13] Huttrer and Dale, *Chem. Rev.*, 1951, **48**, 543.

reaction mixture with dilute hydrochloric acid was washed, by decantation, with water. Crystallisation occurred from ethanol (charcoal) and yielded 4-*benzoyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (2·95 g.), m. p. 111° (Found: C, 71·7; H, 5·8. $C_{17}H_{17}NO_3$ requires C, 72·1; H, 6·0%).

6-*Acetyl*-4-*benzoyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (VIII; R = Me, R′ = Ac).—A mixture of 4-benzoyl-3,4-dihydro-7-methoxy-3-methyl-2*H*-1,4-benzoxazine (1·0 g.), acetic acid (1·5 ml.), and polyphosphoric acid (20 ml.) was heated, with occasional stirring, during 3 hr. at 80—90°. The cooled mixture was poured into ice–water, stirred, and extracted with ether. After being washed with dilute sodium hydroxide and water, the ethereal extract was dried and evaporated to give a pale yellow oil which on stirring with a little aqueous ethanol yielded 6-*acetyl*-4-*benzoyl*-3,4-*dihydro*-7-*methoxy*-3-*methyl*-2H-1,4-*benzoxazine* (0·4 g.). Crystallisation from light petroleum gave prisms, m. p. 131° (Found: C, 70·2; H, 5·9. $C_{19}H_{19}NO_4$ requires C, 70·1; H, 5·9%).

This material was identical with the benzoyl derivative of 6-acetyl-3,4-dihydro-7-methoxy-3-methyl-2*H*-1,4-benzoxazine, and both samples afforded the same 2,4-*dinitrophenylhydrazone*, red needles (from ethanol), m. p. 218—219° (Found: C, 59·6; H, 4·6. $C_{25}H_{23}N_5O_7$ requires C, 59·4; H, 4·6%).

5-*Benzoyloxy*-2-*nitrophenoxyacetone* (VI; R = H, R′ = Bz).—A well-stirred mixture of 5-benzoyloxy-2-nitrophenol (41 g.), anhydrous potassium carbonate (23 g.), potassium iodide (5 g.), chloroacetone (15·4 ml.), and acetone (500 ml.), was heated under reflux during 4 hr. The mixture was filtered and the filtrate was evaporated almost to dryness. The solid obtained on trituration with ethanol (20 ml.) was filtered off, washed with ethanol (20 ml.) and crystallised from ethanol to yield 5-*benzoyloxy*-2-*nitrophenoxyacetone* (28·5 g.). Recrystallisation from ethanol gave blades, m. p. 124° (Found: C, 60·6; H, 4·1. $C_{16}H_{13}NO_6$ requires C, 61·0; H, 4·2%).

7-*Benzoyloxy*-3,4-*dihydro*-3-*methyl*-2H-1,4-*benzoxazine* (VII; R = H, R′ = Bz).—5-Benzoyloxy-2-nitrophenoxyacetone (23·1 g.) in methanol (800 ml.) was hydrogenated to completion at 70 atm., in the presence of Raney nickel. The mixture was filtered and the filtrate was evaporated to 50 ml. On cooling at 0°, 7-*benzoyloxy*-3,4-*dihydro*-3-*methyl*-2H-1,4-*benzoxazine* (10·8 g.) separated as a grey solid. Crystallisation of the benzoxazine from ethanol yielded prisms, m.p. 107° (Found: C, 71·5; H, 5·9. $C_{16}H_{15}NO_3$ requires C, 71·4; H, 5·6%).

When dry hydrogen chloride was passed through the mother-liquors, 7-*benzoyloxy*-3,4-*dihydro*-3-*methyl*-2H-1,4-*benzoxazine hydrochloride* (0·8 g.) was obtained as a solid which crystallised from ethanol as needles, m. p. 232—234° (Found: C, 62·9; H, 5·5. $C_{16}H_{16}ClNO_3$ requires C, 62·8; H, 5·3%).

The benzoxazine formed a *benzoyl derivative*, prisms (from ethanol), m. p. 146° (Found: C, 74·0; H, 5·3. $C_{23}H_{19}NO_4$ requires C, 74·0; H, 5·1%) and an *acetyl derivative*, rhombs (from ethanol), m. p. 125° (Found: C, 69·6; H, 5·7. $C_{18}H_{17}NO_4$ requires C, 69·4; H, 5·5%).

3,4-*Dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine* (VII; R = R′ = H).—7-Benzoyloxy-3,4-dihydro-3-methyl-2*H*-1,4-benzoxazine hydrochloride (1·5 g.) was heated under reflux with acetic acid (3 ml.) and hydrochloric acid (25%, 7 ml.) during 1 hr. The resulting solution was cooled, basified with potassium carbonate, filtered, and the solid residue dried at room temperature. Extraction of the solid with hot light petroleum gave 3,4-*dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine* (0·2 g.) which crystallised from carbon tetrachloride as light-brown fibrous crystals, m. p. 147—148° (Found: N, 8·8. $C_9H_{11}NO_2$ requires N, 8·5%).

6-*Acetyl*-3,4-*dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine* (VII; R = Ac, R′ = H).—(*a*) 7-Benzoyloxy-3,4-dihydro-3-methyl-2*H*-1,4-benzoxazine (8·7 g.) in the boron trifluoride–acetic acid complex (15 ml.) was heated during 4 hr. on the water-bath. The resulting solution was stirred into warm water (50 ml.). After filtration the filtrate was cooled and basified with potassium carbonate. The precipitate which formed was collected, extracted with ether, and the dried ethereal solution evaporated. Crystallisation of the residue from methanol gave 6-*acetyl*-3,4-*dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine* (2·8 g.) as yellow-green prisms, m. p. 114° (Found: C, 63·7; H, 6·3; N, 6·7. $C_{11}H_{13}NO_3$ requires C, 63·8; H, 6·3; N, 6·8%).

(*b*) A solution of 4-benzoyl-3,4-dihydro-7-methoxy-2*H*-1,4-benzoxazine (1·1 g.) in boron trifluoride–acetic acid (4 ml.) was heated during 7 hr. at 95—100°. On stirring the mixture into sodium carbonate solution, a green tar was obtained which was extracted with chloroform, and the chloroform solution was then extracted with 15% sodium hydroxide. The alkaline solution was acidified with 10% hydrochloric acid, and the mixture was rebasified with sodium carbonate, to give the benzoxazine (0·2 g.), identical with the material prepared as above.

(*c*) 4-Acetyl-5-hydroxy-2-nitrophenoxyacetone (1·0 g.) (see below) in methanol (100 ml.) was shaken during 4 hr. with hydrogen at 50 atm., in the presence of Raney nickel. The mixture was filtered and the filtrate was concentrated to give the benzoxazine (0·2 g.), identical with the material prepared by method (*a*).

The 6-acetyl compound formed a *hydrochloride*, needles (from ethanol), m. p. 228—229° (Found: C, 54·8; H, 5·6. $C_{11}H_{14}ClNO_3$ requires C, 54·2; H, 5·8%), and a *benzoyl derivative*, plates (from ethanol), m. p. 175° (Found: C, 69·5; H, 5·5. $C_{18}H_{17}NO_4$ requires C, 69·4; H, 5·5%).

4,6-*Diacetyl*-3,4-*dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine*.—6-Acetyl-3,4-dihydro-7-hydroxy-3-methyl-2*H*-1,4-benzoxazine (0·5 g.) in acetic anhydride (1 ml.) was heated during 45 min. on the water-bath. 4,6-*Diacetyl*-3,4-*dihydro*-7-*hydroxy*-3-*methyl*-2H-1,4-*benzoxazine* (0·5 g.) was obtained and crystallised from light petroleum as rhombs, m. p. 117° (Found: N, 5·6. $C_{13}H_{15}NO_4$ requires N, 5·6%).

The diacetyl compound formed a 2,4-*dinitrophenylhydrazone* which crystallised from acetic acid as red needles, m. p. 303—304° (Found: C, 52·8; H, 4·2. $C_{19}H_{19}N_5O_7$ requires C, 53·1; H, 4·5%).

4-*Acetyl*-5-*hydroxy*-2-*nitrophenoxyacetone* (VI; R = Ac, R′ = H).—5-Nitroresacetophenone (5 g.), chloroacetone (1·95 ml.), anhydrous potassium carbonate (1·75 g.), potassium iodide (1 g.), and acetone (100 ml.), were heated under reflux, with stirring, during 6·5 hr. The mixture was filtered and the solid residue was treated with dilute hydrochloric acid to recover 5-nitroresacetophenone (1·5 g.), m. p. 143—145°. Evaporation of the filtrate yielded a solid which, after two crystallisations from methanol, afforded 4-*acetyl*-5-*hydroxy*-2-*nitrophenoxyacetone* (1·1 g.). Further crystallisation from methanol gave needles, m. p. 145° (Found: C, 52·1; H, 4·4. $C_{11}H_{11}NO_6$ requires C, 52·2; H, 4·4%).

The phenoxyacetone formed a *benzoate* which crystallised from ethanol as needles, m. p. 173° (Found: C, 60·6; H, 4·3. $C_{18}H_{15}NO_7$ requires C, 60·5; H, 4·2%).

2-*Chloroacetylamino*-5-*methoxyphenol* (V; R = NH·CO·CH_2Cl).—2-Amino-5-methoxyphenol (1·5 g.) was heated under reflux during 2 hr. with chloroacetyl chloride (0·82 ml.) and dry benzene (25 ml.). On cooling the mixture, 2-*chloroacetylamino*-5-*methoxyphenol* (1·2 g.) was obtained as a solid which crystallised from water as plates, m. p. 166° (Found: C, 50·2; H, 4·6. $C_9H_{10}ClNO_3$ requires C, 50·1; H, 4·7%).

3,4-*Dihydro*-7-*methoxy*-3-*oxo*-2H-1,4-*benzoxazine* (IX).—2-Chloroacetylamino-5-methoxyphenol (0·54 g.) in ethanol (4 ml.) was heated under reflux during 1 hr. with anhydrous potassium acetate (0·5 g.). The mixture was heated with water (10 ml.) (charcoal) and the resulting solution filtered. 3,4-*Dihydro*-7-*methoxy*-3-*oxo*-2H-1,4-*benzoxazine* (0·28 g.) separated and after crystallisation from aqueous ethanol, formed needles, m. p. 163° (Found: C, 60·1; H, 5·1. $C_9H_9NO_3$ requires C, 60·3; H, 5·1%).

Reduction of 3,4-*Dihydro*-7-*methoxy*-3-*oxo*-2H-1,4-*benzoxazine*.—3,4-Dihydro-7-methoxy-3-oxo-2*H*-1,4-benzoxazine (0·64 g.) was heated under reflux during 3 hr. in dry ether (15 ml.) with lithium aluminium hydride (0·2 g.). The resulting mixture was treated with dilute sodium hydroxide, extracted with ether and the dried ethereal solution was evaporated to give a light brown oil. The product was characterised by treatment with benzoyl chloride and pyridine and gave 4-*benzoyl*-3,4-*dihydro*-7-*methoxy*-2H-1,4-*benzoxazine* which crystallised from ethanol as needles, m. p. 126° (Found: C, 71·4; H, 5·5. $C_{16}H_{15}NO_3$ requires C, 71·4; H, 5·6%).

The *picrate* of 3,4-*dihydro*-7-*methoxy*-2H-1,4-*benzoxazine* crystallised from ethanol as yellow needles, m. p. 179° (Found: C, 45·9; H, 3·5. $C_{15}H_{14}N_4O_9$ requires C, 45·7; H, 3·6%).

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