The Synthesis of Tetrahydrosclerotiorin and Tetrahydrosclerotoquinone

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Summary Tetrahydrosclerotiorin and tetrahydrosclerotoquinone, two major degradation products of the novel fungal metabolite, sclerotiorin, have been synthesised.

CONTINUING our investigations of the sclerotiorin group of fungal metabolites we have confirmed the structure of tetrahydrosclerotiorin[1] (1) and of tetrahydrosclerotoquinone[2] (2), by total syntheses.

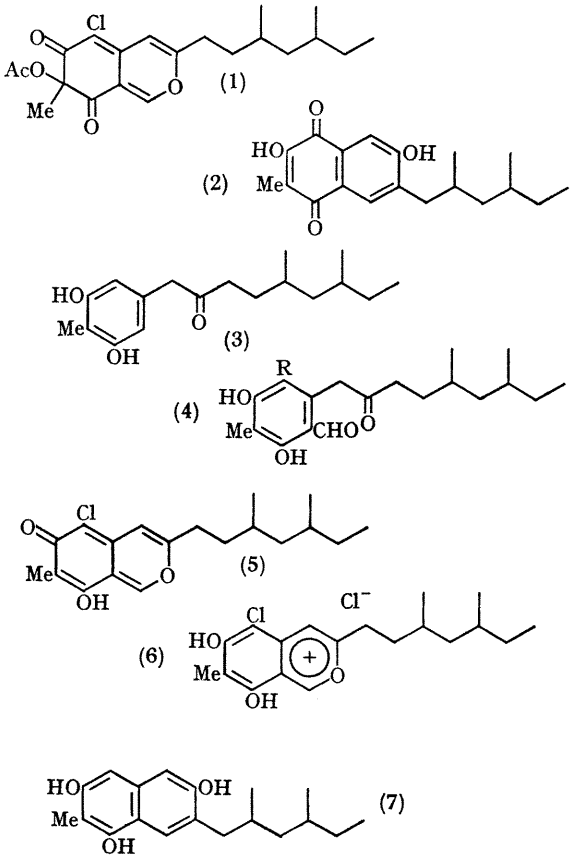
Thus, formylation of the phenolic ketone[3] (3) with triethylorthoformate furnished the aldehyde (4; R = H). This was converted into (4; R = Cl) by sulphuryl chloride and benzoyl peroxide. The derivative pyronoquinone (5) was too unstable to survive isolation but treatment of (4; R = Cl) with hydrogen chloride in ether furnished the oxonium salt (6), which was acetoxylated with lead tetra-acetate in acetic acid to yield a substance having the general properties of tetrahydrosclerotiorin (1). Thus, although acetoxylation at C-7 would be nonspecific the product had the requisite n.m.r. spectrum and was indistinguishable on the basis of t.l.c., i.r., u.v., and mass spectra from authentic tetrahydrosclerotiorin.[1]

Since (+)-4,6(*S*)-dimethyloctanoic acid has been synthesised[4] and since synthetic (1) will contain species of both configurations at C-7, our work constitutes a total synthesis of tetrahydrosclerotiorin, and the first synthesis of the nucleus characteristic of the sclerotiorin group of fungal metabolites.[5]

Treatment of tetrahydrosclerotiorin with zinc and acetic acid, under closely defined conditions gave (4; R = Cl), identical with the synthetic product.

Cyclisation of (4; R = H) with sodium hydroxide in ethanol gave the naphthol (7), which upon liberation from the sodium salt and attempted purification rapidly oxidised to the quinone (2), identical (m.p., mixed m.p., t.l.c., i.r., n.m.r., u.v., and mass spectra) with authentic tetrahydrosclerotoquinone obtained[2] from tetrahydrosclerotiorin.

All new compounds had the requisite spectral and analytical characteristics.



(*Received, March 12th,* 1969; *Com.* 351.)

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