Synthetic Metal Chelators Which Replace the Natural Growth-Factor Requirements of *Arthrobacter terregens*

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In a previous study (Antoine, Morrison, and Hanks, J. Bacteriol. 88:1672, 1964), a number of synthetic metal chelators were found to be inactive when substituted for terregens factor. This communication presents evidence that three additional types of synthetic metal chelators not previously tested can replace terregens factor.

The growth-factor activity of terregens factor and the synthetic metal chelators were assayed in a D-glucose, Casamino Acids medium by following the turbidimetric growth responses as described by Antoine, Morrison, and Hanks (J. Bacteriol. 88:1672, 1964). Ethanolic solutions of the active compounds were added aseptically to the autoclaved assay medium.

The results (Fig. 1) show the concentrations of 8-hydroxyquinoline, salicylaldehyde, and acetylacetone which can substitute for terregens factor. On a millimicromolar basis, the concentrations required for half-maximal growth were (per milliliter): 8-hydroxyquinoline, 1; salicylaldehyde, 16; and acetylacetone, 390. The half-maximal values of other synthetic metal chelators found to be active were (mmoles/ml): 8-hydroxyquinoline, 5; acetylacetone, 50.

The various types of active chelators were chosen because of their possession of two properties: (i) the ability to chelate ferrie ions and (ii) the lipophilic character of the metal chelate. These properties appear to be essential to biological activity. In view of the inhibitions caused by the higher than optimal concentrations of each chelator, it appears likely that the metal-ligand ratio is a possible determinant of growth stimulation or inhibition.

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![Fig. 1. Growth response of Arthrobacter terregens to 8-hydroxyquinoline, salicylaldehyde, and acetylacetone in liquid terregens-assay medium.](image-url)