sive than other methods, such as (1) mechanical (cultivating, hoeing, mowing, etc.), (2) chemical (dusting, spraying), and (3) fire, which generally entails recurring efforts and expense.

The term biological control, taken in its broadest sense, should include control by replacement through plant successions. If its present meaning, which limits it to the action of parasitic and predatory organisms, is to be continued, then replacement control or some term more appropriate for the process involved may become coordinate with biological control. Communications are requested from those interested in this problem of terminology and also from those who know of any instance where a term has already been used for the method of control that makes use of plant successions.

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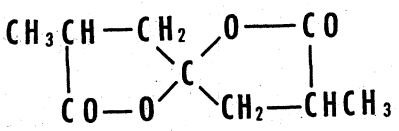
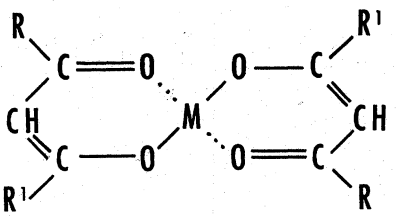
Solution of the Problem of "Internal Compensation" in Meso Compounds as Afforded by Studies on Analogous Coordination Complexes

A controversy concerning the meaning of "internal compensation" in meso compounds—whether meso compounds with staggered configurations are optically active—has occurred in past issues of SCIENCE (Noller, **102**, 508 [1945]; Wright, *Ibid.*, **104**, 190 [1946]). In a recent communication (*Ibid.*, **112**, 26 [1950]), Kurt Mislow proposed an experimental solution of the problem: the resolution of DL-isomers of spirans such as 3,8-dimethyl-1,6-dioxaspiro [4.4]-nonane-2,7-dione (I).



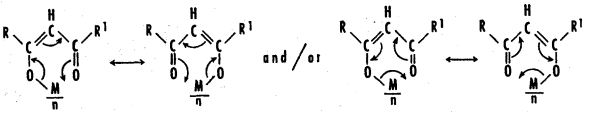
I

Certain 4-coordinate complexes of 1,3-diono-type compounds with divalent and trivalent cations are fully analogous to these spirans (II). As is generally known,



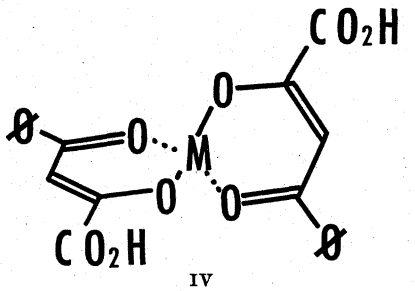
II

such compounds behave as if they consist of two 6-membered rings joined at the metal atom in spiran fashion; e.g., the compounds undergo no reactions that are characteristic of free carbonyl groups (Werner, *Ber.*, **34**, 2584 [1901]). The resonance picture in III explains this behavior.



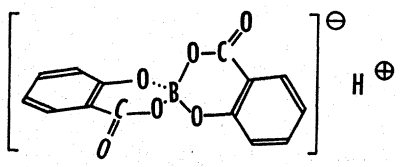
III

Several examples of this type of coordination complex have been successfully shown to possess optical activity: bis(4-phenyl-2,4-dioxobutanoato-2,4-O,O) beryllium (II) and the corresponding zinc compound (IV), by Mills and Gotts (*J. Chem. Soc.*, 3121 [1926]); and hydrogen bis(2-hydroxybenzenecarboxylato)borate (III) (V), by Boëseken (*Proc. Acad. Sci. Amsterdam*, **27**, 174 [1924]). A similar silver compound is also optically active. All these examples have staggered configurations. Those that are meso but not staggered—i.e., "trans planar"—do not possess any optical activity; e.g., the Pt, Pd, Ni, and Cu complexes.



IV

M = Zn or Be; tetrahedral configuration around M



V

tetrahedral configuration

These examples afford direct experimental proof that Noller and Mislow are correct: staggered configurations of meso compounds give rise to optical activity, just as is to be expected on the basis of the symmetry criterion.

It might be mentioned further, in view of Mislow's suggestion to resolve the DL mixture of spirans by chromatography on a lactose column, that, at least in the case of coordination complexes, chromatography on a column of finely powdered, optically active quartz is very likely to succeed. Kobayashi and Nakamura (*J. Chem. Soc. Japan*, **56**, 1339 [1935]; *Bull. Chem. Soc. Japan*, **11**, 38 [1936]), and Kuroya, Arini, and Tsuchida (*J. Chem. Soc. Japan*, **64**, 995 [1943]) found that such quartz, shaken with solutions of certain racemic coordination complexes (similar to the use of decolorizing charcoal), preferentially adsorbed one of the optical antipodes (which one depending on the sign of rotation of the quartz).

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