conclusively that "animal hypnosis" due to placing animals in unaccustomed and inconvenient situations is a *tonic recumbency reflex.* Verworn assumed that this inferred that there was no psychological basis for "animal hypnosis." In this belief he was incorrect; however, in his assumption that this was not a true state of hypnosis, he was entirely correct, as was later confirmed by Clark Hull.

Dr. Liberson has produced an interesting paper on tonic recumbency reflexes but is extremely misleading in his terminology.

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Dr. True raises the question of terminology in regard to my note published in the July 9 issue of *Science.* The term "animal hypnosis" which I used has been employed in the past by a great number of scientists, among them Steininger, Babak, Reisinger, Rijland, and Pavlov, without implying the identity of this condition to human hypnosis. The term "tonic recumbency reflex" suggested by Dr. True is not satisfactory, first, because the animals I studied often presented clonic and agitated reactions, and second, because this term does not imply the presence of concomitant psychological phenomena which Dr. True, himself, believes to be a factor associated with immobilization. The suggested term is, furthermore, irrelevant in regard to the phenomena which I described, as they may be observed in an animal in the upright position. His contention that retaining the animal in an uncomfortable position or "placing animals in unaccustomed and inconvenient situations" is the basis for "animal hypnosis" is not supported by my experiments, at least as far as prolonged hypnotic states are concerned. Indeed, I showed that by the mechanisms of conditioning and frustration the prolonged "hypnotic" reactions may be observed when the animal is put on one side and fail to appear when it is put on the opposite side in the same uncomfortable position.

The importance of the training apparently completely escaped the attention of Dr. True. It is the alleged impossibility of forming an hypnotic habit in the animals which was one of the decisive arguments of Hull and others to deny this state the name of hypnosis, while one of the main findings reported in my note dealt precisely with the possibility of training a prolonged animal hypnotic state.

When the same name is applied to a phenomenon described in both man and animals, this term is never equally applicable to both situations. We speak of intelligence in considering simple maze problems for low mammals as well as in discussing the masterpieces of human genius. In the same way, we should not expect the term "animal hypnosis" to have the same characteristics as "human hypnosis." As this term has been equally applied to man and to animals, the purpose of a scientist is to determine the underlying mechanisms of these states in various species and to reveal their similarities and differences. The question of terminology then becomes secondary.

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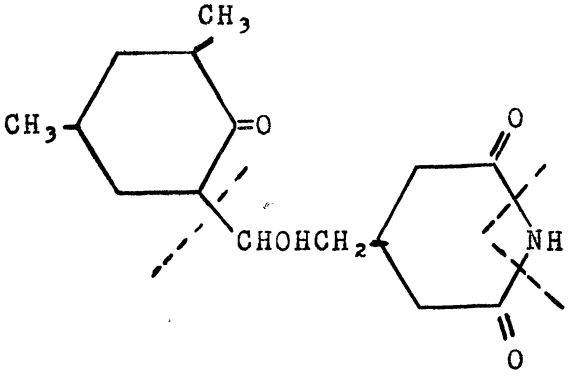
The Structure of Actidione, An Antibiotic From *Streptomyces griseus*

Recently Ford and Leach (*J. Amer. chem. Soc.*, 1947, 69, 474; 1948, 70, 1223), of the Upjohn Research Laboratories, reported the isolation of a new antibiotic substance from *Streptomyces griseus* which they named "Actidione." This interesting material is highly active against almost all yeasts but is relatively innocuous to other microorganisms. Subsequently, Leighty and Fortune, of these laboratories, also isolated this substance from streptomycin residues, and we undertook a study designed to elucidate the chemical structure of the new antibiotic.

Actidione has the empirical formula $C_{15}H_{23}NO_4$. It has one hydroxyl and only *one* ketonic group. Evidence based on various chemical degradations and transformations, together with that derived from physical studies, leads us to propose the structural formula I for Actidione.



I

On alkaline hydrolysis the molecule is split, as indicated by the dotted lines, into three products: (1) ammonia, (2) a fragrant, optically active ketone ($C_8H_{14}O$) which was identified as 2,4-dimethylcyclohexanone, and (3) a 7-carbon acid fragment, presumably 3,3-propionaldehydediacetic acid. This latter substance has not as yet been obtained in a pure condition, but solutions containing it, upon mild oxidation, yield methanetriacetic acid $\left(HOCOCH_2CH\begin{matrix}CH_2COOH\\CH_2COOH\end{matrix}\right)$. Oxidation of Actidione yields a diketone, dehydroactidione ($C_{15}H_{21}NO_4$), which on alkaline hydrolysis is degraded to ammonia, 2,4-dimethylcyclohexanone, and methanetriacetic acid. Electrometric titration of the antibiotic shows the presence of a weakly acidic group with a $pK = 11.2$ (glutarimide likewise has a $pK = 11.2$). Catalytic reduction gives dihydroactidione ($C_{15}H_{25}NO_4$), which reacts with diazo-

methane to give *N*-methyldihydroactidione ($C_{16}H_{27}NO_4$). These facts and other transformations are best interpreted on the basis of the proposed structure I.

A detailed account of the work will be reported in a forthcoming publication.

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Present Distribution of Medical Research Funds by Governmental Agencies

In my former communication on "Distribution of American Research Funds" (*Science*, February 6, pp. 127–130) primary emphasis was laid on the seemingly undue concentration of such research grants in the northeastern section of the country (states bordering the Atlantic Ocean from the District of Columbia northward). The regional and institutional inequalities in distribution were related principally to institutional representation on disbursing or advisory committees. Data presented in that first article dealt mainly with grants made by private and semiprivate foundations, although one U. S. Public Health report showed a fairly equitable geographic distribution of almost $2,000,000. Even there, however, the evils of committee representation were strongly in evidence.

Thomas B. Turner (*Science*, April 16, p. 391) has defended this favoritism shown to institutions of the northeastern coastal states on the basis of their greater research facilities and trained staffs of investigators. However, Prof. Turner frankly restricts his interest to the present ability of such institutions to prosecute research and get things done, stating that the larger problem of scientific development of the country as a whole was beyond the scope of his communication. No thoughtful person would doubt that the states of the northeastern seaboard do possess superior facilities and personnel for research; otherwise, there would exist no justification for all the funds which have been poured into them through past decades.

Scientific development of the country as a whole is of much greater importance through the decades ahead, however, and should transcend petty regional jealousies and rivalries for funds available. Since no National Science Foundation has yet been established by Congressional action, let us look further into the distribution made by certain governmental agencies which are attempting to stimulate and support medical research over the country. Of these agencies, the U. S. Public Health Service is easily the most important, having distributed roughly $10,000,000 in the 20-month period from January 1, 1946, to August 31, 1947 (*Publ. Hlth Reps.*, Suppl. #205, January 1, 1948). Careful analysis of this sum's distribution in the form of some 700 research grants yields the following pertinent data:

Excluding from consideration 17 grants made to national associations or to individuals whose whereabouts could not be determined, we find that 294 grants (or 43% of the total number) went to recipients in the northeastern area, which holds only 30% of the country's population, as against 389 (or 57%) over the remainder of the country. This 43% of the total number of grants brought to this small northeastern area 47% of all funds distributed. There were 67 institutions or individual recipients in the Northeast and 91 elsewhere, grants to the former averaging $15,400 each and those to the latter $13,100.

Johns Hopkins, Harvard, Columbia, and New York Universities and the University of Pennsylvania head the list of recipients, constituting 5 of the 6 highest. These 5, plus Cornell, received 65% of all funds distributed to the northeastern area, while the highest 6 in the remainder of the country (the Universities of Chicago, Utah, Minnesota, Michigan, and California, and Washington University in St. Louis) received 39% of that area's funds. Although the Public Health Service did not this time publish the names of scientists serving on its lists of advisory panels, the similarity in distributional characteristics leads one to suspect the same relationship of committee representation and recipient rating as was set forth in my earlier article.

In grouping the U. S. Public Health Service grants according to institution where the work was to be performed, a number of grants made in the name of an individual were considered as made to the institution when the individual in question was known to be closely associated thereto.

One additional government granting agency for which partial data have been supplied is the Medical Sciences Division of the Office of Naval Research. In its list of universities and nonprofit organizations in which fundamental research is being supported, 39 are found located in the northeastern coastal area and only 38 scattered over the remainder of the country. New York, Massachusetts, and Pennsylvania lead the list in numbers of institutions receiving support, with 12, 8, and 6, respectively. Numbers of different projects supported in each institution were not given, nor were the sizes of grants specified.

It thus seems evident that governmental agencies—probably influenced by the constitution or their advisory panels of scientists—are still reflecting the past dominance of the northeastern seaboard in scientific matters. It also seems evident that there exists serious need of a National Science Foundation, if the scientific potentials *of all areas of the Nation* are to secure equitable chances for development. Any legislation setting up such a Foundation should specifically require its membership to be drawn *from all areas of the Nation* and its benefits to be distributed so as to achieve maximal scientific development *in all areas of the Nation.* To leave selection of Foundation members to presidential or political whims may end in the same disproportionate distribution that has just recently occurred under the Smith-Mundt Bill. Of the 5 members of the Educational Exchange Commission recently appointed under that Bill, four are from the northeastern coastal area and only one from the remainder of the country!

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