# CONTRIBUTIONS TO THE STUDY OF MAIZE DETERIORATION: BIOCHEMICAL AND TOXICOLOGICAL INVESTIGATIONS OF PENICILLIUM PUBERULUM AND PENICILLIUM STOLONIFERUM

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OTIS F. BLACK & CARL L. ALSBERG

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B. T. GALLOWAY, *Chief of Bureau.*

# CONTRIBUTIONS TO THE STUDY OF MAIZE DETERIORATION.

## BIOCHEMICAL AND TOXICOLOGICAL INVESTIGATIONS OF PENICILLIUM PUBERULUM AND PENICILLIUM STOLONIFERUM.

BY

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# LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
*Washington, D. C., September 25, 1912.*

SIR: I have the honor to transmit herewith and to recommend for publication as Bulletin No. 270 of the series of this Bureau the accompanying manuscript entitled "Contributions to the Study of Maize Deterioration. Biochemical and Toxicological Investigations of Penicillium Puberulum and Penicillium Stoloniferum." The paper was prepared by Dr. Carl L. Alsberg and Mr. Otis F. Black, Chemical Biologists in the Office of Drug-Plant, Poisonous-Plant, Physiological, and Fermentation Investigations, and has been submitted by Dr. R. H. True, Physiologist in Charge, with a view to its publication.

The results of technical laboratory studies of organisms occurring in deteriorated maize, (1) *Penicillium puberulum* Bainier and (2) *Penicillium stoloniferum* Thom, are here presented, demonstrating that these organisms have specific physiological properties. One of these molds is shown to develop toxic substances in maize. Owing to the serious problems now grouping themselves about this important American farm crop, it is believed that the results of this investigation constitute a timely contribution to our information on the subject of the deterioration of maize.

Respectfully,

B. T. GALLOWAY,
*Chief of Bureau.*

Hon. JAMES WILSON,
*Secretary of Agriculture.*

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## BIOCHEMICAL AND TOXICOLOGICAL INVESTIGATIONS OF PENICILLIUM PUBERULUM AND PENICILLIUM STOLONIFERUM.

### INTRODUCTION.

Whether molds or the products of their growth have an injurious effect on animals is a question which has not yet been conclusively settled. The literature contains many records of alleged intoxications due to these fungi. Certain diseases of men and domesticated animals have been attributed to this cause. Though the solution of this problem is obviously urgent, few serious attempts have been made to identify chemically the alleged toxic substances. The present paper is such a chemical study. Incidental observations on the metabolism of molds have been made and have been recorded because they have a general biological interest and because they may prove useful in characterizing different species physiologically.

The difference of opinion concerning the toxicity of Penicillium is probably due not merely to the fact that the earlier investigators studied accidental mixtures of organisms under varying and undefined conditions,[1] but also that complex substrata like corn, wheat, and bread were used for the growth of the organisms. Consequently it is impossible to know whether any of the different substances found were derived from the substratum or were produced by the

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