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

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649290833

Contributions to the study of maize deterioration: Biochemical and toxicological investigations of penicillium puberulum and penicillium stoloniferum by Otis F. Black & Carl L. Alsberg

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd. Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

# OTIS F. BLACK & CARL L. ALSBERG

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

Trieste



Laued March 11, 1918,

## U. S. DEPARTMENT OF AGRICULTURE. BUREAU OF PLANT INDUSTRY-BULLETIN NO. 270. B. T. GALLOWAY, Chief of Bureau.

## CONTRIBUTIONS TO THE STUDY OF MAIZE DETERIORATION.

BIOCHEMICAL AND TOXICOLOGICAL INVESTIGATIONS OF PENICILLIUM PUBERULUM AND PENI-CILLIUM STOLONIFEBUM.

CARL L. ALSBERG AND OTIS F. BLACK, Chemical Biologists, Drug-Plant, Poisonous-Plant, Physiological, and Fermentation Investigations.

BY



WASHINGTON: , GOVERNMENT PRINTING OFFICE. 1913.

A. 11214 c 1 Letter store

354

----

\_\_\_\_

.

÷3

4

### BURRAU OF PLANT INDUSTRY.

Chiq' of Burnus, BEVERLY T. GALLOWAY. Assistant Chiq' of Burnus, William A. TATLOR. Billoy, J. E. ROCKWELS, Chiq' Clerk, JAMER E. JORES.

DEUG-PLANT, POISOBOOD-PLANT, PHYSIOLOGICAL, AND FERMENTATION INVESTIGATIONS.

#### BORDETTING STAFF.

- 40

Rodney H. True, Physiologist in Charge.

A. B. Clawson, Heinrich Hasselbring, C. Dwight Marsh, W. W. Stockberger, and Watter Van Floot, Physiologists. Carl L. Alsberg, H. H. Bartlett, Otis F. Black, H. H. Bunsel, Frank Rabak, and A. F. Sjevers, Caesaical

Carl L. Alberty, and A. Andrew M. Sciencist.
W. W. Eggication, Assistant Botanist.
S. C. Hood, G. F. Mitchell, James Thompson, and T. B. Young, Scientific Assistants.
Hadleigh Marsh, Assistant.
G. A. Russell, Special Agent.

.

270

-	
ADD	TTIONAL COPTES of this publication
A	TTIONAL COFIES of this publication may be produced from the SUFRAMYIAN or DOCUMENTS, Government Frinting , Weshington, D. C., at 10 cents per copy
INT :	or Documents, Government Printing
OTHES	Washington, D. C., at 10 sents per copy

## LETTER OF TRANSMITTAL.

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

SIE: 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,

Preseboar

B. T. GALLOWAY, Chief of Bureau.

Hon. JAMES WILSON, Secretary of Agriculture. 270

8-2 <sup>52</sup> X 17

λ. ₩

\* •

## CONTENTS.

18

30

Pressboard

	Page.
Introduction	7
Penicillium puberulum	
Penicillic acid from Penicillium puberulum	13
Conditions of penicillic-acid formation	20
Toxicity of penicillic scid	22
Physiological studies of Penicillium puberulum	30
General considerations.	
Penicillium stoloniferum	42
Summary	47

# ILLUSTRATION.

ċ

•

PLATE I. Flack showing twelve days' growth of Penicillium puberulum on	Page.
Raulin's medium.	12
270 5	

•

۵

а**.** 

5 5

.

## CONTRIBUTIONS TO THE STUDY OF MAIZE DETERIORATION.

Pressbo

## BIOCHEMICAL AND TOXICOLOGICAL INVESTIGATIONS OF PENI-CILLIUM 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

<sup>&</sup>lt;sup>1</sup> Lombroso, Cesare, and Dupré, Francesco. Indagini chimiche, fisiologiche e terapeutiche sul mais guasto. Reale Istituto Lombardo di Science e Lettere, Readiconti, s. 2, v. 5, p. 882-884, 1872. - and Erbs, Carlo. Sulle sostanzo stricniche e narootiche del mais guasto. Idem, s. 2, v. 9, p.

<sup>133-147, 1876.</sup> 

Sull'aicaicide del mais guasto. Idem, s. 2, v. 9, p. 433-436, 1878. I veleni del mais e la pellagra. Idem, s. 2, v. 9, p. 182-186, 1876.

I valení del mais e la loro applicazione all' igiene ed alla terapia. Rivista Clinica di Bologna, s. 2, ann. 7, p. 109-112, 1877.

Brugnatelli, T., and Zenoni, E. Di un alcaloide che si trova nella melles guasta e nel pane di mais ammuffito. Reale istituto Lombardo di Scienze e Lettere, Rendicanii, s. 2, v. 9, p. 233-237, 1375. Pelloggio, Pistro. Materia reagente quale alcaloide, trovata nell'estratto dei mair guasto preparato dall'

srbs. Idem, s. 2, v. 9, p. 118-121, 1876.

Selmi, Antonio. Delle alterazioni alle quali soggiace il granturco (Zea mais) e specialmente di quello che ingenera la pollagra. Atti della R. Accademia del Lincel, s. 3, Memoria della Classe di Scienzo Fisiche, Matematiche e Naturali, v. 1, dispense 2, p. 1099-1141, 1877.

Husemann, Th. Ueber einige Producte des gehalten Mais. Ein Beitrag zur Leifte von den Fäulnissgifte. Nach Versuchen von Dr. Roberto Cortes aus Tumaco in Columbien. Archiv für Experimentalle Pathologie und Pharmakologie, Bd. 9, p. 225-228, 1878.

Monselise, G. Ricerche chimico-tossicologiche interno ad alcuni campioni di mais per lo studio della pellagra, Mondovi, 1881, 58 p. (Cited by Goslo.)