

**RADIATION AND HEAT EFFECTS ON
THE SENSITIVITY OF SOME
PATHOGENIC BACTERIA**

THESIS

Submitted in Partial Fulfilment For The M.Sc. Degree
in

MICROBIOLOGY

Faculty of Science, Botany Department



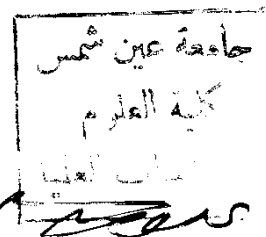
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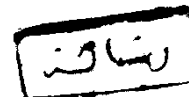
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا أُوْنِمُّ مِنَ الْعِلْمِ إِلَّا قَلِيلًا

مَدَقَ اللَّهِ الْعَظِيمِ



ACKNOWLEDGEMENT

The author offers her thanks and gratitude to Prof. Dr. Youssef A. Youssef, Professor of Mycology, Botany Department Faculty of Science, Ain Shams University, and to Dr. Yehia A. El-Zawahry Assistant Professor of Microbiology, Botany Department, Faculty of Science, Zagazig University, for suggesting and supervising the progress of this work, for their helpful advice, constant guidance, constructive criticism and facilities offered through the course of this work .

Many thanks are also due to Professor, Dr. Hamid Roushdy El-Kadi, Chairman of the National Center for Radiation Research and Technology (NCRRT) for his encouragement, constructive criticism and unfailing help .

I wish to express my sincere thanks to Dr. Yehia A. El-Zawahry, Assistant Professor of Microbiology, Botany Department, Faculty of Science Zagazig University and Dr. Nadia M. Awany, Lecturer of Microbiology in(NCRET) for their help in presenting this thesis in its present form and giving the general discussion of the results.

Thanks are also due to Prof.Dr. Abbas Abed El-Aziz, Professor of Microbiology, Faculty of Medicine, Cairo University , for his encouragement, constructive criticism and his kind providence by the local clinical strains of Yersinia enterocolitica used in the present investigation .

Many thanks are also due to my colleagues in Microbiology Unit, and to all staff members of the (NCRRT) for their keen help and co-operation . My sincere appreciation to Mr.Tarek. M. El-Mongy , Assistant Lecturer of Microbiology in (NCRRT) is due to his co-operation and great help .

I am also grateful to my family members for their great support and co-operation . I wish to express my thanks to Eng. Salah M. Saeed for his kind support and devoting much of his time in proof reading and typing this thesis .

At last but not least , I wish to express my thanks to my hasband Reda Gaafer , for his endless and very kind support and for his encouragement through the course of this work .

This thesis has not been previously submitted
for any degree at this or any other university.

TO MY FATHER AND MOTHER WITH MY LOVE .

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GENERAL PREFACE

The gram-negative enteropathogenic food borne Yersinia enterocolitica and Yersinia enterocolitica-like organisms (atypical strains) have been isolated from a variety of environmental sources e.g. food, humans and animals. Recently in Egypt, Yersinia enterocolitica has been isolated from both blood and stool of human , and pig from animals .

In human Yersinia enterocolitica produce a variety of clinical symptoms particularly gastroenteritis and mesenteric lymphadenitis in childhood or adolescence, acute abdominal disorders, diarrhoea and arthritis among adults, and erythema nodosum in higher age classes .

Yersinia enterocolitica, a food-borne enteric pathogen capable of growth at refrigeration temperature low as 0 to 4° C. Therefore, if not eliminated by thermal treatment or low doses of irradiation, Yersinia enterocolitica could be multiplied during refrigeration and present a health hazard.

The purpose of this study is to demonstrate the effect of various potential processing on the radiation resistance of Yersinia enterocolitica . The inactivation and injury of Yersinia enterocolitica cells by thermal treatment, and storage at subzero temperatures will also be investigated in this thesis.

INTRODUCTION

INTRODUCTION

The enteric organisms are a large group of gram negative , nonsporeforming rods naturally found in the intestinal tract of man and animals , other groups are regularly pathogenic for man (Review of Medical Microbiology , 11 ed , 1974) .

The family Enterobacteriaceae includes a large group of food-borne pathogenic bacteria such as Salmonella , Shigella , Klebsiella , as well as Yersinia enterocolitica which presents a worldwide public health hazard . The most dangerous nature of Yersinia enterocolitica is its ability to survive and multiply in refrigerated food at 0 to 4 °C (Grecz and El-Zawahry , 1984) .

The term yersiniosis is accepted for organisms under genus Yersinia enterocolitica except the "pestis" species (Zinsser Microbiology , 1976) .On the other hand , yersiniosis has been often described as a food-borne disease (Morris and Feely , 1976 ; Lee et.al. , 1981) .

In humans Yersinia enterocolitica produces a variety of clinical symptoms particularly :-

gastroenteritis and mesenteric lymphadenitis in childhood or adolescence, acute abdominal disorders, diarrhoea and arthritis among adults , and erythema nodosum in higher age classes (Winblad, 1973).

Yersinia enterocolitica and Yersinia enterocolitica -like organisms (atypical strains) have been commonly isolated from a variety of environmental sources, food , humans , and animals (Restaino et.al., 1980). Recently, in Egypt Yersinia enterocolitica has been isolated from both human blood and stool, and from animals " pig " (Labib , 1982).

Yersinia enterocolitica , a food-borne pathogen to human, is among the few enteric pathogens capable of growth at refrigeration temperature at 0 to 4°C (Paterson and Gook , 1963 ; Lee , 1977 ; El-Zawahry and Rowley , 1979 ; Lee et.al., 1980 ; El-Zawahry and Grecz , 1981 ; Grecz and El-Zawahry, 1984). Therefore, if not eliminated by thermal treatment or low doses of

irradiation, Yersinia enterocolitica could multiply during refrigeration and present a health hazard (El-Zawahry and Rowley, 1979) .

Accordingly, the literature review of the present work will include the following topics:

- Radiation resistance and radiation injury of bacteria.
- Thermal sensitivity and thermal injury of bacteria.
- Inactivation and injury of bacteria by freezing.