

ENTERO- BACTERIACEAE

Collected Studies

ON

SALMONELLA, ARIZONA, ESCHERICHIA
(INCLUDING ALKALESCENS-DISPAR AND BETHESDA-
BALLERUP), KLEBSIELLA, CLOACA,
HAFNIA, SHIGELLA, PROTEUS
AND PROVIDENCIA

By

F. KAUFFMANN, M.D.

Chief, International Salmonella and Escherichia Centre,
Statens Seruminstitut, Copenhagen

SECOND EDITION



EJNAR MUNKSGAARD PUBLISHER
COPENHAGEN 1954

Copyright 1954 by
Ejnar Munksgaard . Copenhagen

—
Printed in Denmark
by
Vald. Pedersens Bogtrykkeri

CONTENTS

	Page
<i>Preface</i>	7
<i>Enterobacteriaceae</i>	13
I. <i>Salmonella</i>	19
II. <i>Arizona</i>	147
III. <i>Escherichia</i>	157
A. <i>Escherichia coli</i> (including <i>Alkaescens-Dispar</i>)	161
B. <i>Escherichia freundii</i> (including <i>Bethesda-Ballerup</i>)	210
IV. <i>Klebsiella</i>	223
V. <i>Cloaca</i>	249
VI. <i>Hafnia</i>	255
VII. <i>Shigella</i>	261
VIII. <i>Proteus</i>	285
IX. <i>Providencia</i>	317
X. <i>Antigenic Relationships between the Genera</i>	329
XI. <i>Media</i>	351
XII. <i>References</i>	362
<i>List of Tables</i>	375
<i>Index</i>	379

ENTEROBACTERIACEAE

ENTERO- BACTERIACEAE

Collected Studies

ON

SALMONELLA, ARIZONA, ESCHERICHIA
(INCLUDING ALKALESCENS-DISPAR AND BETHESDA-
BALLERUP), KLEBSIELLA, CLOACA,
HAFNIA, SHIGELLA, PROTEUS
AND PROVIDENCIA

By

F. KAUFFMANN, M.D.

Chief, International Salmonella and Escherichia Centre,
Statens Seruminstitut, Copenhagen

SECOND EDITION



EJNAR MUNKSGAARD PUBLISHER
COPENHAGEN 1954

Copyright 1954 by
Ejnar Munksgaard . Copenhagen

—
Printed in Denmark
by
Vald. Pedersens Bogtrykkeri

To
P. R. EDWARDS

PREFACE TO THE SECOND EDITION

This book contains collected studies on *Enterobacteriaceae*, of interest to both medical and veterinary bacteriologists working in Public Health Laboratories and other Institutes.

The chapters of the second edition are revised and brought up to date, with special reference to the Report of the *Enterobacteriaceae* Subcommittee of the Nomenclature Committee of the International Association of Microbiologists to the International Congress of Microbiology in Rome (1953).

I wish to thank J. Ørskov, M.D., director of Statens Seruminstitut, Copenhagen, for his interest in this work. Further, I thank A. Fjelde, Ph.D., and Miss A. Petersen for their assistance in preparing the manuscript.

Copenhagen, February 17th 1954.

F. KAUFFMANN

CONTENTS

	Page
<i>Preface</i>	7
<i>Enterobacteriaceae</i>	13
I. <i>Salmonella</i>	19
II. <i>Arizona</i>	147
III. <i>Escherichia</i>	157
A. <i>Escherichia coli</i> (including <i>Alkaescens-Dispar</i>)	161
B. <i>Escherichia freundii</i> (including <i>Bethesda-Ballerup</i>)	210
IV. <i>Klebsiella</i>	223
V. <i>Cloaca</i>	249
VI. <i>Hafnia</i>	255
VII. <i>Shigella</i>	261
VIII. <i>Proteus</i>	285
IX. <i>Providencia</i>	317
X. <i>Antigenic Relationships between the Genera</i>	329
XI. <i>Media</i>	351
XII. <i>References</i>	362
<i>List of Tables</i>	375
<i>Index</i>	379

ENTEROBACTERIACEAE

ENTEROBACTERIACEAE

By the term *Enterobacteriaceae* we mean a large family of Gram-negative, non-sporing rods, either motile with peritrichous flagella or non-motile. They grow on ordinary media and ferment glucose rapidly with or without gas production. They reduce nitrates to nitrites.

The *Enterobacteriaceae* are made up of a series of interrelated bacterial types which do not lend themselves to sharp division into tribes or into genera. The transition from genus to genus is gradual, and intermediate strains are found in all cases. Nevertheless, the family is so large and unwieldy that it is desirable to divide it into genera for purposes of practical classification (see Tables 1 and 2). Within the family are found dense centers composed of biochemically homogeneous strains, which are serologically related. These centers of biochemically related strains constitute the genera which are divided biochemically into species.

The genera and species are divided by serological methods into serological sub-groups and/or sero-types characterized by O, K and H antigens. This principle of classification to establish biochemical groups (genera and species) and then to sub-divide these groups serologically has proved to be very practical and ought to be carried through generally. The sero-types can be sub-divided further into biochemical sub-types or into phage-types.

In some groups the types are designated by specific names, in others, they are designated only by the antigens which characterize them. From this it should not be assumed that we wish to place emphasis on those types designated by specific epithets. The retention of these names is a matter of convenience and tradition. Such names as *Salmonella typhi* and *Shigella dysenteriae* are so well known and so universally used that it seems unwise to abandon them.