TRANSMITTED FROM ANIMALS - TO MAN- HUIT-

Diseases Transmitted

from

Animals to Man

By

Thomas G. Hull, Ph.D.

Secretary, Council on Scientific Assembly Director, Bureau of Exhibits American Medical Association

Contributors

CHARLES ARMSTRONG, M.D.
CHARLES M. CARPENTER, D.V.M., M.D., PH.D.
C. H. CUNNINGHAM, D.V.M., PH.D.
G. M. DACK, M.D.
GORDON E. DAVIS, SC.D.
R. E. DYER, M.D.
ERNEST C. FAUST, PH.D.
WILLIAM H. FELDMAN, D.V.M., D.SC.
LEE FOSHAY, M.D.
J. H. S. GEAR, M.D.
ROBERT GRAHAM, D.V.M.
WILLIAM A. HAGAN, D.V.M.
WILLIAM A. HAGAN, D.V.M.
WILLIAM MCD. HAMMON, M.D., DR.P.H.

ROBERT P. HANSON, Ph.D.
THOMAS G. HULL, Ph.D.
WILLIAM L. JELLISON, Ph.D.
WILLIAM E. JENNINGS, D.V.M.
R. A. KELSER, D.V.M., Ph.D.
JOSEPH V. KLAUDER, M.D.
KARL F. MEYER, D.V.M., M.D.
KARL REINHARD, D.V.M., Ph.D.
LEON Z. SAUNDERS, D.V.M.
HOWARD J. SHAUGHNESSY, Ph.D.
FRED L. SOPER, M.D.
C. D. STEIN, V.M.D.



CHARLES C THOMAS . PUBLISHER

Springfield • Illinois • U.S.A.

CHARLES C THOMAS • PUBLISHER BANNERSTONE HOUSE 301-327 EAST LAWRENCE AVENUE, SPRINGFIELD, ILLINOIS

Published simultaneously in the British Commonwealth of Nations by Blackwell Scientific Publications, Ltd., Oxford

Published simultaneously in Canada by The Ryerson Press, Toronto

This book is protected by copyright. No part of it may be duplicated or reproduced in any manner without written permission from the publisher.

Copyright, 1930, 1941, by Charles C Thomas
Copyright, 1947 by Charles C Thomas • Publisher
First Edition, January, 1930
Second Edition, February, 1941
Third Edition, March, 1947
Fourth Edition, January, 1955

Library of Congress Catalog Card Number: 54-8131

DISEASES TRANSMITTED FROM ANIMALS TO MAN

LIST OF CONTRIBUTORS

- Armstrong, Charles, M.D.: Medical Director Retired, United States
 Public Health Service.
- Carpenter, Charles M., D.V.M., M.D., Ph.D.: Department of Infectious Diseases, School of Medicine, University of California, Los Angeles, California.
- Cunningham, C. H., B.S., M.S., D.V.M., Ph.D.: Department of Bacteriology and Public Health, School of Veterinary Medicine, Michigan State College, East Lansing, Michigan.
- DACK, G. M., M.D.: Director, Food Research Institute, Professor of Bacteriology, The University of Chicago, Chicago, Illinois.
- Davis, Gordon E., Sc.D.: Rocky Mountain Laboratory, National Microbiological Institute, National Institutes of Health, Public Health Service, Department of Health, Education and Welfare, Hamilton, Montana.
- Dyer, R. E., M.D.: Director of Research, Winship Memorial Clinic, Emory University, Georgia.
- Faust, Ernest Carroll, Ph.D.: Department of Tropical Medicine and Public Health, Tulane University, New Orleans, Louisiana.
- Feldman, William H., M.Sc., D.V.M., D.Sc.: Division of Experimental Medicine, Mayo Foundation, Rochester, Minnesota.
- Foshay, Lee, M.D.: Department of Bacteriology, University of Cincinnati, College of Medicine, Cincinnati, Ohio.
- Gear, J. H. S., M.D.: South African Institute for Medical Research, Johannesburg, South Africa.
- Graham, Robert, B.S., D.V.M.: College of Veterinary Medicine, University of Illinois, Urbana, Illinois.
- HAGAN, WILLIAM A., D.V.M., M.S., Sc.D.: New York State Veterinary College, Cornell University, Ithaca, New York.

- HAMMON, WILLIAM McD., M.D., DR.P.H.: Professor of Epidemiology and Head of the Department of Epidemiology and Microbiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania.
- Hanson, Robert P., Ph.D.: Department of Veterinary Science, University of Wisconsin, Madison, Wisconsin.
- THOMAS G. Hull, Ph.D.: Secretary, Council on Scientific Assembly; Director, Bureau of Exhibits; American Medical Association.
- JELLISON, WILLIAM L., PH.D.: Rocky Mountain Laboratory, National Microbiological Institute, National Institutes of Health, Public Health Service, Department of Health, Education and Welfare, Hamilton, Montana.
- Jennings, William E., Colonel: Veterinary Corps United States Army, Director, Department of Veterinary Service, Medical Field Service School, Fort Sam Houston, Texas.
- Kelser, Raymond A., D.V.M., A.M., Ph.D.: Brigadier General, United States Army Rtd., Dean of Faculty and Professor of Bacteriology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.
- Klauder, Joseph V., M.D.: Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.
- MEYER, K. F., D.V.M., M.D., Ph.D.: Hooper Foundation, University of California, San Francisco, California.
- Reinhard, Karl, D.V.M., Ph.D.: Rocky Mountain Laboratory, National Microbiological Institute, National Institutes of Health, Public Health Service, Department of Health, Education and Welfare, Hamilton, Montana.
- Saunders, Leon Z., D.V.M.: Biology Department, Brookhaven National Laboratory, Upton, Long Island, New York.
- Shaughnessy, Howard J., Ph.D.: Deputy Director, Illinois Department of Public Health and Professor of Public Health, University of Illinois, College of Medicine, Chicago, Illinois.
- Soper, Fred L., M.D., Dr. P.H.: The Pan American Sanitary Bureau, Regional Office of the World Health Organization for the Americas.
- Stein, Clarence D., V.M.D.: Animal Disease and Parasitic Research Branch, Agricultural Research Service, United States Department of Agriculture, Washington, D.C.

PREFACE TO THE FOURTH EDITION

Since the first edition of this book was prepared a quarter of a century ago, more than a score of diseases have appeared which may be transmitted from animals to man, at that time unknown or ignored as a menace. The following are discussed in the fourth edition that were not included in the first edition, listeriosis, the several arthropod-borne encephalitides, Rift Valley fever, contagious ecthyma of sheep, tsutsugamushi disease, lymphocytic choriomeningitis, jungle vellow fever, and coccidioidomycosis. In addition, seven new chapters have been added to the fourth edition, that were not included in the third edition, covering the subjects of vibrio abortion, vesicular stomatitis, Newcastle disease, regional lymphadenitis (cat-scratch fever), pseudotuberculosis, hemorrhagic septicemia and rickettsialpox with a note on epidemic hemorrhagic fever. The chapter on fungous diseases contains new sections on cryptococcosis and nocardia infections. Several chapters in previous editions have been combined. The chapter on foot-and-mouth disease has been omitted.

Twenty-four authors have each contributed one or more chapters to the fourth edition. Considerable freedom was given the different authors in the preparation of their respective subjects, and in the emphasis which they placed upon various factors concerning the transmission of infection from animals to man. This was necessary in a work covering so many diverse fields, and the book has benefited from it because of the intimate knowledge of each author with his subject.

It is hoped that the veterinarian, the physician, the health official and the research worker may find a common meeting ground in the work here presented. While each is engaged in a different phase of the problem and views the subject from a different angle, it will be through their concerted efforts that the number of infections which man contracts from animals will be reduced.

Appreciation is expressed to the various contributors to the fourth edition, as well as to those who have contributed to previous

viii DISEASES TRANSMITTED FROM ANIMALS TO MAN editions and whose work may be carried over to some extent into this edition. Almost all the chapters have been re-written, however, bringing the information as nearly up-to-date as possible.

THOMAS G. HULL

Chicago, Illinois

CONTENTS

List of Co	ONTRIBUTORS	V
PREFACE TO	O THE FOURTH EDITION	vii
	SECTION ONE	
	Diseases of Domestic Animals and Birds and Occasionally of Wild Animals and Rodents	
I.	Tuberculosis	5
II.	Anthrax	65
III.	Brucellosis	109
IV.	Vibriosis	146
V.	Glanders	158
VI.	Swine Erysipelas	183
VII.	Salmonella Food Infections	207
VIII.	Listeriosis	226
IX.	Rabies	250
X.	PSITTACOSIS (ORNITHOSIS)	281
XI.	Vesicular Stomatitis	304
XII.	The Pox Diseases of Man and Animals	315
XIII.	Milker's Nodules	329
XIV.	Contagious Ecthyma of Sheep (Sore Mouth of Sheep)	334
XV.	Newcastle Disease	338
XVI.	REGIONAL LYMPHADENITIS; BENIGN LYMPHORETICULOSIS (CAT FEVER; CAT SCRATCH DISEASE)	354
XVII.	Pseudotuberculosis	358
XVIII.	HEMORRHAGIC SEPTICEMIA; PASTEURELLA MULTOCIDA INFECTION	377
XIX.	ARTHROPOD-BORNE VIRAL ENCEPHALITIDES	381

CONTENTS

XX.	Rift Valley Fever	401
XXI.	MILK SICKNESS	407
XXII.	Infections Produced by Animal Parasites	414
XXIII.	Fungous Diseases	433
	SECTION TWO	
	Diseases of Rodents and Wild Animals and Occasionally of Domestic Animals	
XXIV.	Plague	467
XXV.	Tularemia	509
XXVI.	Leptospirosis	523
XXVII.	Rat-Bite Fever — Sodoku and Haverhill Fever	538
XXVIII.	The Endemic Relapsing Fevers	552
XXIX.	Murine Typhus Fever	566
XXX.	ROCKY MOUNTAIN SPOTTED FEVER	580
XXXI.	Tsutsugamushi Disease	591
XXXII.	Q Fever	597
XXXIII.	RICKETTSIALPOX	603
XXXIV.	JUNGLE YELLOW FEVER	606
XXXV.	Lymphocytic Choriomeningitis	626
	SECTION THREE	
	The Relation of Human and Animal Diseases	
XXXVI.	Human Diseases Spread by Animals	639
XXXVII.	Animals as Passive Carriers of Disease Organisms	660
XXXVIII.	The Role of Different Animals and Birds in Diseases Transmitted to Man	669

LIST OF ILLUSTRATIONS

FIGUE	RE P	AGE
1.	Cultures of three types of Mycobacterium tuberculosis	7
2.	Multiple caseo-calcareous tuberculous nodules in the lung of a bovine	16
3.	Pleural and peritoneal lesions of tuberculosis in cow	17
4.	Tuberculous involvement of udder	18
5.	Chronic nodular tuberculosis of udder	19
6.	Pulmonary involvement of lung of young woman due to bovine type of tubercle bacillus	21
7.	Thorax of man infected with bovine type of tubercle bacillus	28
8.	Lesions of tuberculosis of lungs of an adult dog, due to human type of tubercle bacillus	45
9.	Tuberculosis nodule near periphery of lung in dog	47
10.	Pulmonary tuberculosis of the cat	49
11.	Nodular lesions of tuberculosis of spleen of hog, due to avian type of tubercle bacillus	53
12.	Naturally acquired tuberculosis of abdominal viscera of an adult chicken	57
13.	Anthrax bacilli and spores	67
14.	Anthrax colony, magnified	68
15.	Subacute case of bovine cutaneous anthrax	70
16.	Anthrax outbreaks in livestock, 1952	72
17.	Map showing incidence of anthrax in the United States	74
18.	Anthrax lesion on the finger	84
19.	A case of human anthrax	85
20.	Anthrax in man, acquired by use of an infected shaving brush	91
21.	Human anthrax, 1945–1951	96
22.	Lesions in guinea pigs caused by Brucella abortus	124
23.	38	128

FIGUI	RE	AGE
24.	Horse with fistulous withers from which Brucella abortus was recovered	130
25.	Percentage of cattle in the United States that are positive to the Agglutination Test for Brucellosis (1941–1950)	135
26.	Undulant fever in New York State (exclusive of New York City), 1925–1953	139
27.	Vibrio fetus (Bovine Strain) 2000x	148
28.	Bovine fetus with intact membranes aborted 50 days after breeding	151
29.	Necrotic foci in liver aborted bovine fetus from which V. fetus was isolated	152
30.	Clinical case of glanders	164
31.	Clinical case of glanders, pulmonary and cutaneous forms of the disease	166
32.	Clinical glanders	167
33.	Clinical glanders	168
34.	Proper method for administration of palpebral (intradermic) Mallein test	170
35.	Typical positive reaction to palpebral (intradermic) Mallein test	171
36.	Biopsy of a section of tissue showing granulomatous lesions	172
37.	Human glanders, disease contracted directly from horse	174
38.	Human glanders, disease apparently contracted from horse dying of undetermined cause	176
39.	Human glanders	177
40.	Pustular manifestation on arms of human case of generalized glanders	179
41.	Erysipelothrix rhusiopathiae in smear of heart blood from in- oculated pigeon	184
42.	Swollen turgid purplish red caruncle is the most pathogno- monic symptom of naturally occurring Ery, rhusiopathiae in- fection in turkeys	186
43.	Irregular shaped patches of erythema in the septicemic form of Ery. rhusiopathiae infection	187
44.	Sequestration of skin, tail and part of ear after necrosis following septicemic form of infection	188

LIST OF ILLUSTRATIONS

FIGUE	RE	PAGE
45.	Hematoma-like swelling of the ears in the septicemic form of infection	189
46.	An eruption of "diamond skin" disease	190
47.	Rhomboidal lesion which gives rise to the name "diamond skin" disease	191
48.	Human infection with the organism of swine erysipelas	192
49.	Marginated erythema and vesicles which were hemorrhagic	194
50.	Generalized cutaneous form of infection showing the sharply marginated advancing border	196
51.	Purpuric spots and purplish disciform lesions in the septicemic form of infection	198
52.	Auricular involvement in the septicemic form of infection	199
53.	Causative organism of listeriosis Listeria monocytogenes	231
54.	$\label{lem:culture} \textit{Culture of Listeria from medulla of a cow naturally infected.} \ .$	231
55.	Natural listeriosis in sheep	236
56.	Feeder calf affected with listeriosis	237
57.	Guinea pigs after suprajunctival exposure to Listeria	238
58.	Brain stem from a sheep naturally infected with listeriosis	239
59.	Massive and focal necrosis of the myocardium	240
60.	Proper type of dog muzzle	272
61.	Improper type of dog muzzle	274
62.	Levinthal-Cole-Lillie Bodies of psittacosis in the peritoneal exudate of infected mouse. x3600	286
63.	Stages in the development of viruses of the psittacosis-lymphogranuloma venereum group	287
64.	Spleens of parakeets, showing normal spleen and those infected with psittacosis	294
65.	World distribution of vesicular stomatitis virus	306
66.	Symptoms of vesicular stomatitis infection	311
67.	Pox lesions on the teats of a cow	320
68.	Swinepox	323
69.	Nodules on the hand of dairyman	331
70.	Pasteurella pseudotuberculosis from human source	359
71.	Naturally acquired pseudotuberculosis in guinea pigs	363

I	FIGUE	RE I	PAGE
	72.	$\label{pseudotuberculosis} Experimentally\ induced\ pseudotuberculosis\ in\ a\ guinea\ pig.$	364
	73.	Pseudotuberculosis in liver of woman 73 years of age	369
	74.	Pseudotuberculosis in liver of human being	370
	75.	${\it Pseudotuberculosis~in~abdominal~lymph~node~of~human~being}.$	371
	76.	Cryptococcosis of the udder in a cow	443
	77.	Horse showing favus caused by Microsporum gypseum	456
	78.	$Cow\ with\ {\it Trichophyton\ album}\ infection\ over\ eye\ and\ nose.$.	457
	79.	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	458
	80.	Quarantine decree, Ferrara, Italy, 1625	468
	81.	Copy of a 15th century etching of the plague saint, St. Quirin	473
	82.	Geographic distribution of plague, 1945–1948	478
	83.	Natural plague in the United States, 1902–1950	484
	84.	Rattus rattus alexandrinus, one of the hosts responsible for perpetuating plague	489
	85.	Ground squirrel (Citellus beecheyi), reservoir of plague in the United States	492
	86.	Prairie dogs, sometimes spontaneously infected with plague	493
	87.	Harvest mouse (Microtus sp.), potential plague host	494
	88.	Jack rabbit, common host and transmitter of tularemia west of the Mississippi River	513
	89.	Rabbit's liver in tularemia	514
	90.	Ulcer of right finger with axillary abscess in case of tularemia	518
	91.	Tularemia due to tick bite	520
	92.	Borrelia recurrentis, Texas strain, in blood of white mouse	558
	93.	Argasid tick	559
	94.	Seasonal distribution of murine typhus in United States, compared with epidemic typhus in Europe during the same period.	568
	95.	The louse, transmitting agent of epidemic typhus	570
	96.	Distribution of murine typhus fever in United States, 1945	572
	97.	Rat flea, Xenopsylla cheopis (male)	574
	98.	Rat flea, Xenopsylla cheopis (female)	576

FIGURE		PAGE
99.	Distribution of Rocky Mountain spotted fever in the United States	582
100.	Seasonal distribution of Rocky Mountain spotted fever in the United States	
101.	Dermacentor Andersoni, vector of spotted fever in the Northwestern States	585
102.	Kedani mite, Trombicula akamushi	593
103.	Yellow fever areas of South America	609
104.	Yellow fever areas of Africa	610

TABLES

ABLE	P	AGE
I.	Summary of Some Important Differences Between Avian, Human and Bovine Forms of Tubercle Bacilli	9
II.	Relative Virulence for Laboratory Animals of the Four Types of Mycobacteria Responsible for Tuberculosis of Warm-Blooded Animals	11
III.	The Percentage of Bovine Tuberculosis Among Cases of Human and Bovine Tuberculosis in Man in Different Countries of the World	24
IV.	Percentage in England of the Bovine Type of Infection Among 1,428 Cases of Extrapulmonary Human Tuber- culosis	26
V.	Percentage in Scotland of the Bovine Type of Infection Among 873 Cases of Extrapulmonary Human Tubercu- losis	27
VI.	Incidence in Denmark of the Bovine Type of Infection Among 2,946 Cases of Human Tuberculosis	31
VII.	Percentage of Bovine Tuberculosis in Italy	33
VIII.	Types of Tubercle Bacilli in 182 Cases of Naturally Acquired Tuberculosis in Dogs	46
IX.	The Number of Swine Slaughtered under Federal Supervision, Showing the Percentage in Which Lesions of Tuberculosis Were Found and the Percentages of the Total Number Killed in Different Years That Were Condemned	
X.	or Sterilized	52 76
XI.	Anthrax Cases in Man Reported from 1944 to 1950, Inclusive	77
XII.	Comparative Incidence of Anthrax in Livestock from 1945 to 1950, Inclusive	77
XIII.	Anatomic Distribution of Primary Anthrax Lesion in 937 Cases	83
XIV.	Location of Primary Anthrax Lesion in 640 Cases	84

TABLE		AGE
XV.	Results from Various Methods of Treatment of Anthrax	100
	Cases	102
	Nomenclature of Brucella Organisms	
XVII.	${\it Differentiation of the Species of Brucella.} \ldots$	115
	Results of Agglutination Tests for Brucellosis on Cattle in the United States	118
XIX.	Comparison of Results of Agglutination Tests for Brucellosis on Human and Bovine Sera in New York State	119
XX.	Number of Cases of Undulant Fever Reported in New York State and in the United States	138
XXI.	Source of Infection, or Occupation, of 100 Patients with Erysipeloid	193
XXII.	Salmonella Organisms Which Have Caused Gastro-Enteritis in Man and Which Have Been Isolated from Animals	210
XXIII.	Types of Salmonella Organisms Listed in Order of Frequency Found in Man	212
XXIV.	$\begin{tabular}{ll} Symptoms of Salmonella Food Poisoning Compared with \\ Food Intoxications$	
XXV.	Reports on Spontaneous Listeriosis227-	-230
XXVI.	Losses from Listeriosis in Outbreaks Among Sheep in Illinois	234
XXVII.	$Losses \ from \ Listeriosis \ in \ Outbreaks \ Among \ Cattle \ in \\ Illinois$	234
XXVIII.	Pasteur's Original Schedule of Antirabic Vaccination	258
XXIX.	Human Deaths from Rabies for Period 1920–1952, inclusive	
XXX.	Human Deaths from Rabies in the United States	266
XXXI.	Cases and Deaths from Psittacosis — United States	285
XXXII.	Prevalence of Vesicular Stomatitis Among a Group of 55 Men at Beltsville, Maryland, on the Basis of Complement Fixing Antibodies	
	Some Distinguishing Features of Three Members of the genus pasteurella	374
XXXIV.	Incidence of Trichinosis and Condition of Trichinae by Age at Death in 855 Positive Cases	419