

CONTENTS

Section I. The Origins, Development, and Scope of Microbiology

1. THE ORIGINS OF MICROBIOLOGY.....	3
Historic Theories of Infectious Disease.....	4
The Discovery of Microorganisms.....	5
Additional Reading.....	9
2. THE DEVELOPMENT OF MICROBIOLOGY.....	10
The Germ Theory of Fermentation.....	10
The Doctrine of Spontaneous Generation.....	14
Additional Reading.....	18
3. THE GERM THEORY OF DISEASE.....	19
Historic Significance of Infectious Disease.....	19
Development of the Germ Theory of Disease.....	21
Experimental Foundation of the Germ Theory of Disease.....	26
Additional Reading.....	29
4. THE DEVELOPMENT OF ORAL MICROBIOLOGY.....	30
Additional Reading.....	34
5. THE SCOPE OF MICROBIOLOGY—A PERSPECTIVE.....	35
The First Golden Age of Microbiology.....	35
The Second Golden Age of Microbiology.....	38
Additional Reading.....	41

Section II. Systematic Microbiology

6. THE ISOLATION AND SYSTEMATIC EXAMINATION OF BACTERIA IN PURE CULTURE.....	45
The Concept of Pure Culture and its Implications.....	45
Methods for the Isolation of Pure Cultures.....	46
The Maintenance of Cultures.....	47
The Enumeration of Bacteria.....	50
Selective Methods.....	51
The Systematic Examination of Bacteria.....	54
Additional Reading.....	57
7. TAXONOMY.....	58
Introduction.....	58
General Bacterial Taxonomy.....	59
Outline Classification of the Principal Bacterial Genera of Medical Importance.....	61
Eumycetes (True Fungi).....	65
Additional Reading.....	67
8. BACTERIAL CYTOLOGY.....	68
General Morphology.....	68
Chemical Composition.....	75
Physical Properties.....	78
Staining.....	79
Reproduction of Bacteria.....	84
Additional Reading.....	90

9. THE PHYSIOLOGY OF BACTERIA	91
Introduction	91
The Growth and Multiplication of Bacteria	91
The Nutrition of Bacteria	95
The Osmotic Barrier	97
Physiology of Spores	98
Variation and Adaptation	99
Interactions Between Microorganisms	102
Additional Reading	105
10. BACTERIAL METABOLISM	106
Unity Amid Diversity	106
Enzymology and Energetics	107
Carbohydrate Metabolism	110
Protein Metabolism	114
Nucleic Acid Metabolism	116
Enzyme Inhibition	117
Metabolism and Pathogenicity	118
Additional Reading	118
11. STERILIZATION	119
Introduction	119
Terminology	119
Physical Methods	121
Chemical Methods	128
Practical Aspects	133
Additional Reading	138
12. CHEMOTHERAPY	139
General Principles	139
Sulfonamides	141
Isoniazid	144
Antibiotics	144
Problems and Prospects	149
Additional Reading	153
13. THE GENERAL PRINCIPLES OF VIROLOGY	155
Additional Reading	169

Section III. Infection and Resistance

14. INFECTIOUS DISEASE AS A BY-PRODUCT OF PARASITISM	173
Introduction	173
Multiple Determinants of Health and Disease	173
The Development of Parasitism	178
Additional Reading	182
15. THE NATURE OF VIRULENCE	183
Introduction	183
The Measurement of Virulence	184
Transmissibility and Life Cycles	185
Aggressive Activities of Parasites	187
Assessing the Significance of Microbial Factors	196
Additional Reading	198
16. INNATE OR NONACQUIRED BODILY DEFENSES	199
Introduction	199

The First Lines of Defense.....	199
The Clearing Mechanism of the Deeper Tissues.....	202
Factors that Modify Innate Resistance.....	207
Additional Reading.....	212
17. ACQUIRED BODY DEFENSES—ANTIBODIES AND ANTIGENS.....	213
Introduction.....	213
Basic Reactions of the Antibody-Forming Mechanism.....	217
The Nature of Antigenicity and Antigenic Specificity.....	221
The Nature of Antibodies and Antibody Specificity.....	227
Additional Reading.....	233
18. SEROLOGY.....	234
Introduction.....	234
One Antibody, Multiple Manifestations.....	234
Precipitation.....	235
Agglutination.....	239
Neutralization.....	241
Opsonization.....	242
Complement and its Reactions.....	243
Immunofluorescent Staining.....	246
Antigenic Analysis.....	248
Additional Reading.....	252
19. HYPERSENSITIVITY.....	253
Introduction.....	253
Anaphylaxis.....	256
The Tuberculin Type of Hypersensitivity.....	264
Hypersensitivity to Nonantigenic Substances.....	267
Microbial Hypersensitivity as a Factor in Pathogenesis and Immunity.....	269
Additional Reading.....	270

Section IV. Oral Infections

20. THE MICROBIAL FLORA OF THE ORAL CAVITY.....	273
The Acquisition of an Oral Microbiota.....	273
Problems Attending the Study of the Oral Microbial Flora.....	275
The Nature of the Oral Microbiota.....	276
Functional Groups of Microorganisms in the Oral Cavity.....	303
Regulation of the Oral Microbiota.....	304
The Relationship of Saliva to the Microbiology of the Oral Cavity.....	306
Additional Reading.....	324
21. THE GENERAL NATURE OF DENTAL CARIES.....	328
Introduction.....	328
Dental Caries in Prehistoric and Historic Man.....	328
The Nature of the Tooth.....	330
General Description of the Dental Carious Process.....	332
Factors Mediating Dental Caries.....	340
Additional Reading.....	343
22. HISTORICAL THEORIES OF THE ETIOLOGY OF DENTAL CARIES.....	344
Introduction.....	344
The Morphological Aspects of the Origin of Caries.....	344
Acids as a Cause of Dental Caries.....	344

Parasitic Etiology of Caries.....	345
The Chemico-Parasitic Theory of Miller.....	346
Additional Reading.....	350
23. THE MICROBIOLOGY OF DENTAL CARIES.....	351
The Case for Acidogenic Microorganisms.....	351
Lactobacilli as the Specific Etiological Agents of Dental Caries.....	353
Streptococci and Other Acidogenic and Aciduric Microorganisms in Dental Caries..	359
Proteolytic Bacteria in Dental Caries.....	363
The Microbiota of the Dental Plaque and of Caries in Enamel and Dentin.....	370
Diet in Relation to the Microbiology of Dental Caries.....	375
Recapitulation.....	382
Additional Reading.....	383
24. APPLIED MICROBIOLOGY AND DENTAL CARIES.....	386
The Measurement of Dental Caries Activity by Bacteriological Methods.....	386
The Prevention and Control of Dental Caries.....	391
Additional Reading.....	401
25. PERIODONTAL DISEASE.....	402
Introduction.....	402
The Periodontium.....	402
The Development of the Periodontal Lesion.....	405
Classification and Nomenclature of Periodontal Disease.....	409
Parasitism and Periodontal Disease.....	410
Possible Interactions Between Bacteria and the Periodontium.....	413
Systemic Factors.....	420
General Consideration of Local Factors.....	423
Salivary Calculus.....	424
Gingivitis.....	427
Periodontitis.....	433
Acute Necrotizing Ulcerative Gingivitis (Vincent's Infection).....	433
Herpetic Gingivostomatitis.....	439
The Relationship of Periodontal Disease to Focal Infection.....	439
Investigation of the Role of Bacteria in Periodontal Disease.....	440
Additional Reading.....	441
26. INFECTIONS OF THE TOOTH PULP AND PERIAPICAL TISSUES.....	443
The Tooth Pulp and the Periapical Tissues.....	443
The Clinical Course of Pulpal and Periapical Disturbances.....	445
The Etiology of Pulpal and Periapical Disturbances.....	448
Complications of Pulpal and Periapical Infections.....	455
The Role of Bacteriological Control in the Treatment of Pulpal and Periapical In- fection.....	459
Additional Reading.....	463
27. SYSTEMIC BACTERIAL AND PROTOZOAN DISEASES WITH ORAL MANIFESTATIONS.....	464
Introduction.....	464
Actinomycosis.....	464
Syphilis.....	472
Tuberculosis.....	477
Anthrax.....	480
Tularemia.....	481
Gonococcal Infection.....	484

Diphtheria	485
Leprosy	486
Leishmaniasis (Kala-Azar)	487
Yaws	488
Additional Reading	488
28. VIRAL AND RICKETTSIAL DISEASES WITH ORAL MANIFESTATIONS	490
Herpes Simplex	490
Varicella-Herpes Zoster	497
Mumps	501
Foot and Mouth Disease in Man	505
Lymphogranuloma Venereum	505
Diseases Associated with the Coxsackie Viruses	507
Measles	510
Smallpox	512
Rickettsialpox	514
Additional Reading	515
29. MYCOTIC DISEASES WITH ORAL MANIFESTATIONS	517
Introduction	517
Moniliasis	520
Histoplasmosis	530
Sporotrichosis	537
Geotrichosis	541
South American Blastomycosis	543
Additional Reading	547
Section V. Infectious Diseases	
30. STAPHYLOCOCCI AND STAPHYLOCOCCAL INFECTIONS	551
Introduction	551
Cultivation and Nutrition	554
Biochemical and Physiological Activities	555
Pathogenic Qualities and Diffusible Products of Staphylococci	559
Staphylococcal Infections	565
Systemic Defenses Against Staphylococcal Infection	571
Chemotherapy in Relation to the Staphylococci	573
Gaffkya Tetragena	574
Additional Reading	575
31. STREPTOCOCCI AND STREPTOCOCCAL INFECTIONS	578
Introduction	578
Cultivation and Nutrition	581
Biochemical and Physiological Activities	583
The Antigenic Structure of the Streptococci	587
Streptococcal Infections	598
Additional Reading	613
32. PNEUMOCOCCI AND PNEUMOCOCCAL INFECTIONS	616
Introduction	616
Nutrition and Cultivation	617
Physiological and Biochemical Activities	618
Epidemiology	620

	Pneumococcal Infection.....	621
	Additional Reading.....	624
33.	PATHOGENIC GRAM NEGATIVE COCCI.....	626
	Introduction.....	626
	The Gonococcus.....	626
	Gonococcal Infection.....	628
	The Meningococcus.....	632
	Meningococcal Infection.....	633
	Additional Reading.....	637
34.	CORYNEBACTERIUM AND THE DIPHThERIA BACILLUS.....	641
	Introduction.....	641
	Corynebacterium Diphtheriae.....	641
	Diphtheria and other Diphtheritic Infections.....	646
	Additional Reading.....	658
35.	MYCOBACTERIUM.....	661
	Introduction.....	661
	Mycobacterium Tuberculosis.....	662
	Tuberculosis.....	671
	Mycobacterium Leprae and Leprosy.....	693
	Additional Reading.....	701
36.	PASTEURELLA.....	703
	Introduction.....	703
	Pasteurella Pestis.....	703
	Plague.....	708
	Pasteurella Tularensis and Tularemia.....	712
	Pasteurella Multocida and Pasteurellosis.....	716
	Pasteurella Pseudotuberculosis.....	717
	Additional Reading.....	717
37.	BRUCELLA AND BRUCELLOSIS.....	720
	Introduction.....	720
	Bacteriology of Brucellae.....	721
	Animal Brucellosis.....	724
	Human Brucellosis.....	726
	Additional Reading.....	737
38.	HAEMOPHILUS AND BORDETELLA.....	739
	Introduction.....	739
	Haemophilus Influenzae.....	739
	Haemophilus Ducreyi.....	741
	Bordetella Pertussis.....	743
	Additional Reading.....	745
39.	ENTEROBACTERIACEAE.....	746
	Introduction.....	746
	The Coliform Bacilli.....	749
	The Salmonellae.....	755
	The Shigellae.....	762
	Dysentery.....	764
	Additional Reading.....	767
40.	CLOSTRIDIUM.....	770
	Introduction.....	770

	Clostridium Tetani and Tetanus.....	772
	Gas Gangrene.....	778
	Clostridium Botulinum and Botulism.....	787
	Additional Reading.....	795
41.	THE VIBRIOS.....	796
	Introduction.....	796
	Bacteriological Characteristics of Vibrio Comma.....	796
	Cholera.....	800
	Additional Reading.....	804
42.	SPIROCHETES.....	807
	Introduction.....	807
	Diseases Caused by Treponemata.....	809
	Treponema Pallidum.....	810
	Syphilis.....	815
	Treponema Pertenuae and Yaws.....	830
	Endemic Syphilis or Bejel.....	832
	Treponema Carateum and Pinta.....	832
	The Leptospirae and Leptospirosis.....	834
	Borrelia Recurrentis and other Spirochetes Associated with Relapsing Fever.....	845
	Additional Reading.....	848
43.	TRANSITIONAL GROUPS OF BACTERIA.....	851
	The Pleuropneumonia Group.....	851
	Streptobacillus Moniliformis.....	858
	The Bartonella Group.....	861
	Additional Reading.....	865
44.	VIRAL AND RICKETTSIAL DISEASES.....	867
	General Characteristics of Viral and Rickettsial Diseases.....	867
	The Classification of Viral and Rickettsial Diseases.....	868
	Viral Diseases Involving Integument or Mucous Membranes.....	871
	General Catarrhal and Respiratory Viral Diseases.....	872
	Viral Diseases Characterized by Invasion of the Central Nervous System.....	878
	Viral Diseases Characterized by Being Transferred to Man by Arthropod Vectors.....	884
	Viral Exanthemata.....	889
	Viral Hepatic Diseases.....	890
	Viral Eye Diseases.....	891
	Rickettsial Diseases.....	892
	Additional Reading.....	900
45.	PROTOZOA AND PROTOZOAN INFECTIONS.....	901
	Introduction.....	901
	Classification of Protozoa.....	902
	The Alimentary Canal Amebae and Ciliates.....	903
	Blood and Tissue Flagellates.....	908
	Alimentary Canal and Urogenital Flagellates.....	915
	The Malarial Parasites of Man; Malaria.....	916
	Additional Reading.....	928
46.	MYCOTIC INFECTIONS.....	932
	Introduction.....	932
	The Dermatomycoses.....	932
	North American Blastomycosis.....	948

Coccidioidomycosis	958
Cryptococcosis	961
Aspergillosis	966
Mucormycosis	969
Maduromycosis	974
Rhinosporidiosis	974
Chromoblastomycosis	976
Additional Reading	978
SUBJECT INDEX	981