Preparing for the American Board of Pathology (ABPath) Examination of Fundamental Knowledge and Skills

Medical Microbiology

Content Specifications

Overview:

Medical Microbiology Content Specifications

This guide outlines the content that may appear on the American Board of Pathology's Medical Microbiology Subspecialty exam. It provides a framework based on the knowledge and skills typically covered in Fellow-level training, along with applicable Core and Advanced Resident topics from residency training that the trainee is expected to know or be able to perform.

Key to Designations:

C = Core/Foundational Knowledge

AR = Advanced Resident Knowledge

F = Fellow/Advanced Practitioner Knowledge

The exam assesses the knowledge, judgment, skills, and abilities necessary to identify specific entities, properly process specimens, and diagnose and monitor diseases using methods common in the practice of Medical Microbiology. The specific diseases, tests, and concepts listed in this document are important for candidates to know, but it is not possible to create a fully comprehensive list of all the material needed for certification and effective practice. Candidates should use this guide as a reference when preparing for certification and professional practice.

Table of Contents

Contents

1. Bacteria, including Mycobacteria, *Nocardia,* and other Aerobic Actinomycetes

a. Optimal Collection Methods

i.	Lower Respiratory Tract Cultures	AR
ii.	Sinus Cultures	AR
iii.	Urine Cultures	AR
iv.	Superficial Wound Cultures	AR
v.	Deep Wound Cultures	AR

- vi. Stool Cultures AR
- vii. Blood Cultures AR
- viii. Tissue Cultures AR
- ix. Cerebrospinal Fluid Cultures AR
- x. Normally Sterile Fluid Cultures AR
- xi. Genital Cultures AR
- xii. Anaerobic Cultures AR

b. Principles of Specimen Collection, Transport and Processing
- i. Principles Regarding the Appropriate Use of Swabs for Bacterial Culture AR
- ii. Principles Regarding the Amount of Specimen Required AR
- iii. Principles Regarding the Use of Broth Enrichment AR
- iv. Principles Regarding the Cultivation of Fastidious Microorganisms AR
- v. Principles Regarding the Maintenance of the Specimen during Transport AR

c. Safety Issues Regarding the Processing of Specimens for Bacteria AR

d. Specimen Rejection Criteria
- i. Specimen Rejection Criteria for Respiratory Tract Specimens AR
- ii. Specimen Rejection Criteria for Stool Specimens AR
- iii. Specimen Rejection Criteria on the basis of Transportation Delay and Specimen Integrity Issues AR

e. Media
- i. *Campylobacter* Selective Agar AR
- ii. Cefsulodin-Irgasan Novobiocin (CIN) Agar AR
- iii. Charcoal Yeast Extract (CYE) Agar AR
- iv. Chocolate Agar AR
- v. Colistin-Nalidixic Acid (CNA) Blood Agar AR
- vi. Hektoen-Enteric (HE) Agar AR
- vii. MacConkey Agar AR
- viii. Sheep Blood Agar AR
- ix. Thayer Martin Agar AR
- x. Media Selection for:
  1. Lower Respiratory Tract Cultures AR
  2. Sinus Cultures AR
  3. Urine Cultures AR
  4. Superficial Wound Culture AR
  5. Deep Wound Cultures AR
  6. Stool Cultures AR
  7. Tissue Cultures AR
  8. Cerebrospinal Fluid Cultures AR
  9. Normally Sterile Fluid Cultures AR
  10. Genital Cultures AR
- xi. Regan-Lowe Agar F
- xii. Anaerobic Media F

xiii.	Other Bacteriologic Media		F
f.	Stains and Direct Examination		
i.	Gram stain		AR
ii.	Artifacts (e.g., crystals)		AR
iii.	Darkfield Examination		F
g.	Identification Methods and Instrumentation		
i.	Culture		AR
ii.	Automated Blood Culture Instrumentation		AR
iii.	Automated Bacterial Identification Systems		AR
iv.	Manual and Automated Bacterial Susceptibility Testing		AR
v.	Mass Spectrometry (MALDI TOF)		AR
vi.	Targeted Molecular Assays (e.g., PCR)		AR
vii.	Sequence-Based Identification		AR
h.	Key Tests in Bacteriology		
i.	Beta-lactamase Test		AR
ii.	Bile Solubility		AR
iii.	Catalase Test		AR
iv.	CLO/Urea Breath Test		AR
v.	Coagulase Test		AR
vi.	Optochin Susceptibility		AR
vii.	Oxidase Test		AR
viii.	PYR Test		AR
ix.	Urease Test		AR
x.	Motility		AR
xi.	Indole		AR
xii.	Bacitracin Susceptibility		F
xiii.	Beta-galactosidase Test		F
xiv.	Bile-Esculin Test		F
xv.	CAMP Test		F
xvi.	Esculin Hydrolysis Test		F
xvii.	Hippurate Hydrolysis Test		F
xviii.	Nitrate/Nitrate Reduction Test		F
xix.	Salt Tolerance		F
xx.	TSI/KIA Slant		F
xxi.	Other Key Tests in Bacteriology		F
i.	Antibacterial Susceptibility Testing (AST)		
i.	CLSI Standards		AR
ii.	Broth Microdilution		AR
iii.	Kirby-Bauer		AR
iv.	Agar gradient diffusion (e.g., E-Test)		AR
v.	Molecular AST	AR	
vi.	Interpretation/Reporting AST		AR
j.	Mechanisms of Antimicrobial Resistance		
i.	Beta-Lactamases		AR

ii.	Carbapenemases	AR
iii.	Extended-Spectrum Beta Lactamases	AR
iv.	Inducible Clindamycin Resistance	AR
v.	*mecA* Associated Resistance	AR
vi.	*vanA* and *vanB* Associated Resistance	AR
vii.	Amp Resistance	AR
viii.	Membrane changes (e.g., porin mutation and efflux upregulation)	F
k.	Serologic and Antigenic Tests for Bacteria	AR
l.	Molecular Diagnostics for Bacteria	AR
m.	Quality Control and Infection Prevention Regarding Bacteria	AR
n.	Aerobic Bacteria	
i.	Gram Positive Aerobic Bacteria	
1.	*Abiotrophia* spp.	AR
2.	*Aerococcus* spp.	AR
3.	*Arcanobacterium* spp.	AR
4.	*Bacillus anthracis*	AR
5.	*Bacillus cereus*	AR
6.	*Corynebacterium diphtheriae*	AR
7.	*Enterococcus faecium*	AR
8.	*Enterococcus faecalis*	AR
9.	*Erysipelothrix rhusiopathiae*	AR
10.	*Gardnerella vaginalis*	AR
11.	*Granulicatella* spp.	AR
12.	*Lactobacillus* spp.	AR
13.	*Leuconostoc* spp.	AR
14.	*Listeria monocytogenes*	AR
15.	*Pediococcus* spp.	AR
16.	*Staphylococcus aureus* complex	AR
17.	*Staphylococcus epidermidis*	AR
18.	*Staphylococcus saprophyticus*	AR
19.	*Staphylococcus lugdunensis*	AR
20.	*Streptococcus pneumoniae*	AR
21.	*Streptococcus pyogenes*	AR
22.	*Streptococcus agalactiae*	AR
23.	*Streptococcus bovis* Group	AR
24.	*Streptococcus anginosus* Group	AR
25.	*Actinomadura* spp.	F
26.	Other *Bacillus* spp.	F
27.	Other *Corynebacterium* spp.	F
28.	Other *Enterococcus* spp.	F
29.	*Facklamia* spp.	F
30.	*Gemella* spp.	F
31.	*Kocuria* spp.	F
32.	*Lactococcus* spp.	F

33. *Microbacterium* spp. F
34. *Micrococcus* spp. F
35. *Paracoccus* spp. F
36. *Rothia* spp. F
37. Other *Staphylococcus* spp. F
38. *Stomatococcus* spp. F
39. *Streptococcus mitis* Group F
40. *Streptococcus mutans* Group F
41. *Streptococcus salivarius* Group F
42. Other *Streptococcus* spp. F

ii. Gram Negative Aerobic Bacteria

1. *Acinetobacter baumannii* complex AR
2. *Aeromonas* spp. AR
3. *Aggregatibacter* spp. AR
4. *Bartonella* spp. AR
5. *Bordetella pertussis* AR
6. *Brucella* spp. AR
7. *Burkholderia pseudomallei* AR
8. *Burkholderia cepacia* complex AR
9. *Campylobacter jejuni* AR
10. *Capnocytophaga* spp. AR
11. *Cardiobacterium* spp. AR
12. *Citrobacter* spp. AR
13. *Eikenella* spp. AR
14. *Elizabethkingia* spp. AR
15. *Enterobacter* spp. AR
16. *Escherichia coli* AR
17. *Francisella tularensis* AR
18. *Haemophilus influenzae* AR
19. *Haemophilus parainfluenzae* AR
20. *Haemophilus ducreyi* AR
21. *Helicobacter pylori* AR
22. *Kingella kingae* AR
23. *Klebsiella* spp. AR
24. *Legionella pneumophila* AR
25. *Moraxella catarrhalis* AR
26. *Neisseria meningitidis* AR
27. *Neisseria gonorrhoeae* AR
28. *Pasteurella multocida* AR
29. *Proteus* spp. ` AR
30. *Providencia* spp. AR
31. *Pseudomonas aeruginosa* AR
32. *Salmonella* Non-Typhi AR
33. *Salmonella* Typhi and ParaTyphi AR

34. *Serratia marcescens* AR
35. *Shigella* spp. AR
36. *Stenotrophomonas maltophilia* AR
37. *Streptobacillus moniliformis* AR
38. *Vibrio cholerae* AR
39. *Vibrio vulnificus* AR
40. *Vibrio parahaemolyticus* AR
41. *Yersinia pestis* AR
42. *Yersinia enterocolitica* AR
43. *Achromobacter* spp. F
44. Other *Acinetobacter* spp. F
45. *Actinobacillus* spp. F
46. *Alcaligenes* spp. F
47. *Bordetella parapertussis* F
48. *Bordetella bronchiseptica* F
49. Other *Bordetella* spp. F
50. *Burkholderia mallei* F
51. Other *Burkholderia* spp. F
52. *Campylobacter coli* F
53. *Campylobacter fetus* F
54. Other *Campylobacter* spp. F
55. *Chryseobacterium* spp. F
56. *Comamonas* spp. F
57. *Cronobacter* spp. F
58. *Edwardsiella* spp. F
59. Other *Haemophilus* spp. F
60. Other *Legionella* spp. F
61. *Methylobacterium* spp. F
62. Other *Moraxella* spp. F
63. *Morganella* spp. F
64. Other *Neisseria* spp. F
65. *Pantoea* spp. F
66. *Plesiomonas* spp. F
67. Other *Pseudomonas* spp. F
68. *Roseomonas* spp. F
69. *Sphingomonas* spp. F
70. Other *Vibrio* spp. F
71. Other *Yersinia* spp. F

o. Procedures for the Isolation and Cultivation of Anaerobic Bacteria AR

p. Anaerobic Bacteria
   i. *Actinomyces* and Related Taxa AR
   ii. *Bacteroides fragilis* Group AR
   iii. *Clostridium botulinum* AR
   iv. *Clostridium perfringens* AR

v.	*Clostridium septicum*	AR
vi.	*Clostridium tetani*	AR
vii.	*Clostridioides difficile*	AR
viii.	*Cutibacterium acnes*	AR
ix.	*Fusobacterium nucleatum*	AR
x.	*Fusobacterium necrophorum*	AR
xi.	*Anaerococcus* spp.	F
xii.	Other *Bacteroides* spp.	F
xiii.	*Bifidobacterium* spp.	F
xiv.	Other *Clostridium* spp.	F
xv.	*Desulfovibrio* spp.	F
xvi.	*Eubacterium* spp.	F
xvii.	*Eggerthella* spp.	F
xviii.	*Fingoldia magna*	F
xix.	Other *Fusobacterium* spp.	F
xx.	*Leptotrichia* spp.	F
xxi.	*Mobiluncus* spp.	F
xxii.	*Peptostreptococcus* spp.	F
xxiii.	*Porphyromonas* spp.	F
xxiv.	*Prevotella* spp.	F
xxv.	*Sarcina* spp.	F
xxvi.	*Veillonella* spp.	F
q. Mycoplasma and Ureaplasma		
i.	*Mycoplasma genitalium*	AR
ii.	*Mycoplasma pneumoniae*	AR
iii.	*Mycoplasma hominis*	F
iv.	Other *Mycoplasma* spp.	F
v.	*Ureaplasma* spp.	F
r. Spirochetes		
i.	*Borrelia burgdorferi*	AR
ii.	Leptospira spp.	AR
iii.	*Treponema pallidum*	AR
iv.	Other *Borrelia* and *Borreliella* spp.	F
v.	*Brachyspira* spp.	F
vi.	*Spirillum minus*	F
vii.	Other *Treponema* species	F
s. Intracellular Bacteria		
i.	*Anaplasma phagocytophilum*	AR
ii.	*Chlamydia trachomatis*	AR
iii.	*Chlamydia pneumoniae*	AR
iv.	*Coxiella burnetti*	AR
v.	*Ehrlichia* spp.	AR
vi.	*Rickettsia rickettsii*	AR
vii.	*Chlamydia psittaci*	F

- viii. O*rientia tsutsugamushi* — F
- ix. Other *Rickettsia* spp. — F

t. Mycobacteria, *Nocardia* species, and Other Aerobic Actinomycetes
- i. Structure and Biology — AR
- ii. Taxonomy, Runyon Classification, & Nomenclature — AR
- iii. Specimen Collection, Handling, and Processing
  1. Optimal Methods for Lower Respiratory Tract Specimen Collection for Mycobacteria — AR
  2. Specimens for Mycobacteria — AR
  3. Decontamination — AR
  4. The Use of PANTA — F
- iv. Media
  1. Principles Regarding the Use of Broth and Solid Media — AR
- v. Stains and Direct Examination
  1. Acid Fast Stain & Modified Acid Fast Stain — AR
  2. Ziehl-Neelsen & Kinyoun Methods — AR
  3. Fluorochrome Staining — AR
- vi. Identification Methods and Instrumentation — F
- vii. Empiric Therapy for Mycobacterial Infections — AR
- viii. Antimycobacterial and Nocardial Agents — F
  1. Carbapenems and Related Agents — F
  2. Ethambutol and Related Agents — F
  3. Isoniazid and Related Agents — F
  4. Kanamycin and Related Agents — F
  5. Pyrazinamide and Related Agents — F
  6. Fluoroquinolones and Related Agents — F
  7. Rifampin and Related Agents — F
  8. Streptomycin and Related Agents — F
  9. Trimethoprim-Sulfamethoxazole — F
  10. Clarithromycin and Related Agents — F
- ix. Susceptibility Testing — F
  1. Proportion Method — F
  2. Broth Dilution — F
  3. Molecular Susceptibility Testing — F
- x. Mechanisms of Resistance — F
- xi. Skin, Serologic Assays, & Host Response for Mycobacteria and Related Organisms — AR
- xii. Molecular Diagnostics for Mycobacteria and Related Organisms — AR
- xiii. Miscellaneous Topics & Subjects Regarding Mycobacteria and Related Organisms — F
- xiv. Mycobacteria, *Nocardia* species, and Aerobic Actinomycetes
  1. *Mycobacterium* spp.
     a) *M. tuberculosis* Complex — AR
     b) *M. bovis* — AR

c) *M. bovis* BCG AR
d) *M. avium* complex AR
e) *M. intracellulare* AR
f) *M. gordonae* AR
g) *M. haemophilum* AR
h) *M. marinum* AR
i) *M. xenopi* AR
j) *M. fortuitum* AR
k) *M. abscessus* AR
l) *M. chelonae* AR
m) *M. leprae* AR
n) Other *Mycobacterium* spp. F

2. *Nocardia* and Other Aerobic Actinomycetes
   a) *Nocardia* spp. AR
   b) *Rhodococcus equi* AR
   c) *Tropheryma whipplei* AR
   d) *Gordonia* spp. F
   e) *Streptomyces* and Other Aerobic Actinomycetes F
   f) *Tsukamurella* spp. F

2. Fungi

a. Structure and Biology AR
b. Specimen Collection, Transport, and Processing AR
c. Media AR
d. Stains and Direct Examination
   i. Gram Stain Appearance AR
   ii. KOH AR
   iii. KOH-Calcofluor White AR
   iv. Wet Mount AR
   v. Mucicarmine AR
   vi. Lactophenol Cotton Blue AR
   vii. India Ink F
   viii. Other Fungal Stains F
e. Identification Methods and Instrumentation
   i. Automated Blood Culture Instrumentation for Yeasts AR
   ii. Automated and Manual Identification Systems for Yeasts AR
   iii. Automated Susceptibility Testing for Yeasts AR
   iv. Mass Spectrometry AR
   v. Molecular Identification (e.g., Sequence-Based Identification) AR
f. Antifungal Agents, Susceptibility Testing and Mechanisms of Resistance F
g. Serologic and Antigenic Tests for Fungi AR
h. Molecular Diagnostics for Fungi AR
i. Advanced Topics in Medical Mycology F

j. Specific Fungi

i. Yeast and Yeast-Like Fungi

1.	*Candida albicans*	AR
2.	*Candida dubliniensis*	AR
3.	*Candida auris*	AR
4.	*Candida glabrata* (i.e., *Nakaseomyces glabrata*)	AR
5.	*Candida krusei* (i.e., *Pichia kudriavzevii*)	AR
6.	*Candida tropicalis*	AR
7.	*Candida parapsilosis*	AR
8.	*Candida lusitaniae* (i.e., *Clavispora lusitaniae*)	AR
9.	*Candida guilliermondii* (i.e., Meyerosyma guilliermondii)	AR
10.	*Cryptococcus neoformans*	AR
11.	*Cryptococcus gattii*	AR
12.	*Malassezia furfur*	AR
13.	*Pneumocystis jirovecii*	AR
14.	*Prototheca* spp. (Algae, but covered in mycology)	AR
15.	*Trichosporon asahii*	AR
16.	Other *Candida* spp.	F
17.	Other *Cryptococcus* spp.	F
18.	*Malassezia pachydermatis*	F
19.	*Rhodotorula mucilaginosa*	F
20.	*Rhodotorula glutinis*	F
21.	*Rhodotorula minuta*	F
22.	Other *Rhodotorula* spp.	F
23.	*Saccharomyces cervisiae*	F
24.	Other *Saccharomyces* spp.	F
25.	*Sporobolomyces* spp.	F
26.	*Trichosporon cutaneum*	F
27.	*Trichosporon inkin*	F
28.	Other *Trichosporon* spp.	F
29.	*Ustilago* spp.	F

ii. Hyaline Septate Molds

1.	*Aspergillus fumigatus*	AR
2.	*Aspergillus flavus*	AR
3.	*Aspergillus terreus*	AR
4.	*Aspergillus niger*	AR
5.	*Aspergillus nidulans*	AR
6.	*Epidermophyton* spp.	AR
7.	*Fusarium solani* Complex	AR
8.	*Microsporum canis*	AR
9.	*Microsporum gypseum* (i.e., *Nannizzia gypseum*)	AR
10.	*Paecilomyces* spp.	AR
11.	*Penicillium* spp.	AR
12.	*Scedosporium apiospermum* complex	AR

13. *Scedosporium boydii* complex (i.e., *Pseudallescheria boydii*) AR
14. *Trichophyton rubrum* AR
15. *Trichophyton mentagrophytes* AR
16. *Trichophyton tonsurans* AR
17. *Acremonium* spp. F
18. Other *Aspergillus* spp. F
19. *Beauveria* spp. F
20. *Fusarium* spp. F
21. *Geotrichum candidum* F
22. *Geotrichum capitatum* (i.e., *Magnusiomyces capitatus*) F
23. *Geotrichum clavatum* (i.e., *Magnusiomyces clavtus*) F
24. Other *Geotricum* spp. F
25. *Malbranchea* spp. F
26. *Microsporum audouinii* F
27. Other *Microsporum* spp. F
28. *Scopulariopsis* spp. F
29. *Sepedonium* spp. F
30. *Trichoderma* spp. F
31. Other *Trichophyton* spp. F
32. *Trichophyton verrucosum* F

iii. Dimorphic Fungi

1. *Blastomyces* spp.
   AR
2. *Coccidioides* spp. AR
3. *Histoplasma capsulatum* AR
4. *Talaromyces marneffei* (formerly, *Penicillium marneffei*) AR
5. *Sporothrix schenckii* Complex AR
6. Other *Histoplasma* spp. F

iv. Mucoraceous Fungi

1. *Lichtheimia corymbifera* complex AR
2. *Mucor* spp. AR
3. *Rhizomucor* spp. AR
4. *Rhizopus* spp. AR
5. *Apophysomyces elegans* F
6. *Basidiobolus ranarum* F
7. *Basidiobolus* spp. F
8. *Cokeromyces* spp. F
9. *Conidiobolus coronatus* F
10. *Conidiobolus* spp. F
11. *Cunninghamella* spp. F
12. *Saksenaea* spp. F
13. *Syncephalastrum* spp. F

v. Dematiaceous Fungi

1. *Alternaria* spp. AR

2. *Bipolaris* spp. AR
3. *Cladosporium* spp. AR
4. *Cladophialophora* spp. AR
5. *Curvularia* spp. AR
6. *Fonsecaea* spp. AR
7. *Phialophora* spp. AR
8. *Chaetomium* spp. F
9. *Exophiala* spp. F
10. *Exserohilum* spp. F
11. *Piedra* spp. F
12. *Lomentaspora prolificans* (i.e., *Scedosporium prolificans*) F
13. *Stachybotrys* spp. F

vi. Microsporidia AR
vii. Rhinosporidium AR

3. Viruses and Prions

a. Structure and Biology AR
b. Taxonomy, Classification, and Nomenclature AR
c. Specimen Collection, Transport, and Processing AR
d. Identification Methods and Instrumentation AR
e. Serologic, Immunologic, and Antigenic Assays for Viruses AR
f. Molecular Diagnostics for Viruses AR
g. Prevention and Treatment of Viral Diseases AR
h. Quality Control and Infection Prevention with Respect to Viruses AR
i. Miscellaneous Topics with Respect to Viruses F
j. Specific Viruses
    i. Adenovirus AR
    ii. Hanta Virus (i.e., Sin Nombre) AR
    iii. Seasonal Coronaviruses AR
    iv. SARS-CoV-2 AR
    v. Rhinovirus AR
    vi. Polio Virus AR
    vii. Coxsackieviruses AR
    viii. Enteroviruses, including Enterovirus D-68 AR
    ix. Parechovirus AR
    x. Ebola Virus AR
    xi. Hepatitis C Virus AR
    xii. Yellow Fever Virus AR
    xiii. Dengue Virus AR
    xiv. Zika Virus AR
    xv. West Nile Virus AR
    xvi. Herpesviridae
        1. HSV AR

	2. VZV	AR
	3. EBV	AR
	4. CMV	AR
	5. HHV6	AR
	6. HHV8	AR
	7. HHV7	F
xvii.	Hepatitis B Virus	AR
xviii.	Hepatitis D Virus	AR
xix.	Rabies Virus	AR
xx.	Influenza A Virus, including highly pathogenic variants	AR
xxi.	Influenza B Virus	AR
xxii.	Human Papilloma Viruses	AR
xxiii.	Paramyxoviruses	
	1. Parainfluenza Virus	AR
	2. Mumps	AR
	3. Measles	AR
	4. Respiratory syncytial virus	AR
	5. Human metapneumovirus	AR
	6. Hendra	F
	7. Nipah	F
xxiv.	Parvovirus B19	AR
xxv.	Hepatitis A Virus	AR
xxvi.	Polyoma Viruses	
	1. BK Virus	AR
	2. JC Virus	AR
	3. Merkel Cell Polyoma Virus	F
xxvii.	Variola Viruses	
	1. Variola Major	AR
	2. Mpox Virus	AR
	3. Molluscum Contagiosum	AR
	4. Vaccinia Virus	F
xxviii.	Retroviruses	
	1. HIV	AR
	2. HTLV-1	AR
xxix.	Rhinovirus	AR
xxx.	Rotavirus	AR
xxxi.	Lassa Virus	F
xxxii.	Lymphocytic Choriomeningitis Virus	F
xxxiii.	Astroviruses	F
xxxiv.	Bocavirus	F
xxxv.	Rift Valley Fever Virus	F
xxxvi.	SARS-CoV-1	F
xxxvii.	Middle Eastern Respiratory Syndrome Coronavirus (MERS)	F
xxxviii.	Enterovirus	F

xxxix. Marburg Virus F
xl. St. Louis Virus F
xli. Chikungunya Virus F
xlii. Japanese Encephalitis Virus F
xliii. Powassan Virus F
xliv. Less Common Influenza Variants F
xlv. Hepatitis E Virus F
xlvi. Colorado Tick Fever Virus F
xlvii. Sapovirus F
xlviii. Eastern Equine Encephalitis Virus F
xlix. Western Equine Encephalitis Virus F
l. California Serogroup Viruses F
li. Heartland Virus F

k. Human Prion Diseases AR

4. Parasites

a. Structure and Biology AR
b. Specimen Collection, Transport, and Processing AR
c. Stains and Direct Examination AR
d. Identification Methods and Instrumentation AR
e. Geographic Distribution AR
f. Antiparasitic Agents, Susceptibility Testing, and Mechanisms
i. Albendazole, Thiabendazole, and Related Agents F
ii. Amphotericin B F
iii. Chloroquine and Related Agents F
iv. Clindamycin plus Quinine F
v. Diethylcarbamazine and Related Agents F
vi. Ivermectin and Related Agents F
vii. Nitaxoxanide F
viii. Pentavalent Antimonials and Related Agents F
ix. Primaquine and Related Agents F
x. Praziquantel F
xi. Quinidine and Related Agents F
xii. Trimethoprim-Sulfamethoxazole F

g. Specific Parasites
i. Protozoa
1. Intestinal
a) *Blastocystis hominis* AR
b) *Cryptosporidium* spp. AR
c) *Cyclospora* sp. AR
d) *Cystoisospora* sp. AR
e) *Entamoeba histolytica* AR
f) *Entamoeba dispar* AR
g) *Entamoeba coli* AR

h) *Giardia* spp. AR
i) *Trichomonas vaginalis* AR
j) *Balantioides* (formerly *Balantidium*) *coli* F
k) *Chilomastix* sp. F
l) *Dientamoeba* sp. AR
m) *Endolimax* sp. F
n) Other *Entamoeba* spp. F
o) *Iodamoeba* sp. F
p) *Pentatrichomonas* sp. F

2. Blood and Tissue
a) *Acanthamoeba* spp. AR
b) *Babesia* spp. AR
c) *Leishmania* spp. AR
d) *Naegleria fowleri* AR
e) Plasmodium
i. *Plasmodium falciparum* AR
ii. *Plasmodium vivax* AR
iii. *Plasmodium ovale* AR
iv. *Plasmodium malariae* AR
v. *Plasmodium knowlesi* F
f) *Toxoplasma gondii* AR
g) *Trypanosoma brucei* AR
h) *Trypanosoma cruzi* AR
i) *Balamuthia* sp. F
j) *Sarcocystis* spp. F

ii. Nematodes (Round Worms)
1. *Ascaris* spp. AR
2. *Enterobius* sp. AR
3. Filarial Nematodes F
4. Hookworms and Cutaneous Larva Migrans AR
5. *Strongyloides* spp. AR
6. *Trichuris* spp. AR
7. Anisakids F
8. *Baylisascaris* sp. F
9. *Brugia* spp. F
10. *Capillaria* spp. F
11. *Dracunculus* sp. F
12. *Gnathostoma* spp. F
13. *Parastrongylus* sp. (i.e., *Angiostrongylus*) F
14. *Toxocara* sp. and *Visceral Larva Migrans* F
15. *Trichinella* spp. F
16. *Trichostrongylus* sp. F

iii. Trematodes
1. *Schistosoma* spp. AR

2. *Clonorchis* sp. F
3. *Dirofilaria* spp. F
4. *Echinostoma* sp. F
5. *Fasciola* spp. F
6. *Fasciolopsis* spp. F
7. *Paragonimiasis* spp. F

iv. Cestodes
1. *Dibothriocephalus latus* (i.e., *Diphyllobothrium latum*) AR
2. *Echinococcus* spp. AR
3. *Taenia saginata* AR
4. *Taenix solium* including Cysticercosis AR
5. *Dipylidium* sp. F
6. *Hymenolepsis* spp. F
7. *Spirometra* spp. F

v. Less Common Parasites F
vi. Arthropods F

5. Microbiology Laboratory Management

a. Safety/Biosafety C
b. Microbiology Laboratory Management F
c. Rules and Regulations F
d. Laboratory Inspections F
e. QA/QC Issues F
f. Other Administration/Laboratory Management Issues F