Table of Contents

How to Use the Book.

PART I METHODS FOR DIAGNOSING FISH DISEASES.

1. Major Cultured Species.

Aquarium (Pet) Fish. Bait Fish. Food Fish. Laboratory Fish.

2. Types of Culture Systems.

Closed Culture Systems: Aquaria. Closed Culture Systems: Ponds. Flow-Through Culture Systems. Semi-Open Culture Systems.

3. The Clinical Workup.

Equipping a Fish Disease Diagnostic Facility. Case Submissions. Water-Quality Analysis. Taking the History. The Physical Exam. Clinical Techniques: Routine Methods. Clinical Techniques: Specialized Methods.

4. Postmortem Techniques.

Euthanasia. Preserving Parasites. Culturing for Bacteria. Sampling for Water Molds and Fungi. Sampling for Viruses. Examining Tissues Postmortem. Zoonotic Diseases and Other Human Pathogens.

5. Guidelines for Interpreting Clinical Findings.

Environment, Stress, and Fish Disease. Acclimation. How to Use Part II, the Problem List. Sample Problem Data Sheet. Clinical Decision Making: Have the Major Problems Been Identifi ed? Prioritizing Problems. Treatment Plans. When to Refer Cases.

6. Health Management.

Biosecurity. Health Promotion and Maintenance. Animal Welfare. Food Safety. Environmental Safety.

PART II PROBLEM LIST.

7. PROBLEMS 1 through 10: Diagnoses made with commercially available water-quality test kits or equipment that should be present in the clinician's clinic.

- 1. Environmental hypoxia.
- 2. Temperature stress.
- 3. Temperature stratifi cation.
- 4. Ammonia poisoning.
- 5. Nitrite poisoning.
- 6. Nitrate poisoning.
- 7. Too low (too acidic) pH.
- 8. Too high (too alkaline) pH.
- 9. Improper hardness.
- 10. Improper salinity.

8. PROBLEMS 11 through 43: Diagnoses made by either gross external examination of fish, wet mounts of skin/gills, or histopathology of skin/gills.

- 11. Gas supersaturation.
- 12. Lamprey infestation.
- 13. Leech infestation.
- 14. Copepod infestation/infection.
- 15. Branchiuran infestation.
- 16. Isopod infestation.
- 17. Monogenean infestation.
- 18. Turbellarian infection.
- 19. Protozoan ectoparasites: general features.
- 20. Ich infection.
- 21. Marine white spot disease.

- 22. Trichodinosis.
- 23. Chilodonella infestation.
- 24. Brooklynella infestation.
- 25. Tetrahymenosis.
- 26. Scuticociliatosis.
- 27. Marine velvet disease.
- 28. Freshwater velvet disease.
- 29. Ichthyobodosis.
- 30. Gill Cryptobia infestation.
- 31. Gill amoebic infestation.
- 32. Sessile, solitary, ectocommensal ciliate infestation.
- 33. Sessile, colonial, ectocommensal ciliate infestation.
- 34. Typical water mold infection.
- 35. Epizootic ulcerative syndrome.
- 36. Branchiomycosis.
- 37. Columnaris infection.
- 38. Bacterial cold water disease.
- 39. Bacterial gill disease.
- 40. Lymphocystis.
- 41. Epitheliocystis.
- 42. Miscellaneous skin and gill diseases.
- 43. Incidental fi ndings.

9. PROBLEM 44: Diagnoses made by examination of a gill clip or a blood smear.

44. Primary hemopathies.

10. PROBLEMS 45 through 57: Diagnoses made by bacterial culture of the kidney or affected organs.

45. Bacterial dermatopathies/systemic bacterial infections: general features.

- 46. Motile aeromonad infection.
- 47. Aeromonas salmonicida infection.
- 48. Enteric septicemia of catfish.
- 49. Edwardsiella tarda infection.
- 50. Vibriosis.
- 51. Pasteurellosis.
- 52. Enteric redmouth disease.
- 53. Streptococcosis.
- 54. Bacterial kidney disease.
- 55. Mycobacteriosis.

- 56. Piscirickettsiosis.
- 57. Miscellaneous systemic bacterial infections.

11. PROBLEMS 58 through 76: Diagnoses made by necropsy of the viscera and examination of wet mounts or histopathology of internal organs.

- 58. Digenean trematode infection: general features.
- 59. Digenean gill infection.
- 60. Nematode infection.
- 61. Cestode infection.
- 62. Acanthocephalan infection.
- 63. Myxozoan infection: general features.
- 64. Proliferative gill disease.
- 65. Ceratomyxa shasta infection.
- 66. Hoferellus carassii infection.
- 67. Proliferative kidney disease.
- 68. Whirling disease.
- 69. Miscellaneous important myxozoan infections.
- 70. Microsporidian infection.
- 71. Ichthyophonosis.
- 72. True fungal infections.
- 73. Diplomonad fl agellate infection.
- 74. Tissue coccidiosis.
- 75. Miscellaneous endoparasitic infections.
- 76. Idiopathic epidermal proliferation/neoplasia.

12. PROBLEMS 77 through 88: Rule-out diagnoses 1 (viral infections): Presumptive diagnosis is based on the absence of other etiologies combined with a diagnostically appropriate history, clinical signs, and/or pathology. Definitive diagnosis is based on presumptive diagnosis combined with confirmation of viral presence (e.g., antibody probe, gene probe).

77. Systemic viral diseases: general features.

- 78. Channel catfi sh virus disease.
- 79. Infectious pancreatic necrosis and other aquatic birnaviruses.
- 80. Infectious hematopoietic necrosis.
- 81. Viral hemorrhagic septicemia.
- 82. Infectious salmon anemia.
- 83. Spring viremia of carp.
- 84. Iridoviral diseases.
- 85. Nodaviral diseases.
- 86. Koi herpesvirus disease.

- 87. Alphavirus diseases.
- 88. Miscellaneous systemic viral diseases and infections.

13. PROBLEMS 89 through 99: Rule-out diagnoses 2:

Presumptive diagnosis is based on the absence of other etiologies combined with a diagnostically appropriate history, clinical signs, and/or pathology. Definitive diagnosis is based on presumptive evidence combined with further, more extensive workup with a specific identifi cation of the problem.

- 89. Nutritional deficiency.
- 90. Hypercarbia.
- 91. Hydrogen sulfide poisoning.
- 92. Chlorine/chloramine poisoning.
- 93. Metal poisoning.
- 94. Cyanide poisoning.
- 95. Miscellaneous water-borne poisonings.
- 96. Harmful algal blooms.
- 97. Acute ulceration response/environmental shock/delayed mortality syndrome.
- 98. Traumatic lesions.
- 99. Genetic anomalies.

14. PROBLEMS 100 through 102: Rule-out diagnoses 3:

Presumptive diagnosis is based on the absence of other etiologies combined with a diagnostically appropriate history, clinical signs, and/or pathology. Definitive diagnosis is not possible since the etiology is unknown (idiopathic).

100. Lateral line depigmentation.

101. Senescence.

102. Miscellaneous important idiopathic diseases.

15. PROBLEM 103: Diagnoses made by examination of eggs. 103. Egg diseases.

PART III METHODS FOR TREATING FISH DISEASES.

16. General Concepts in Therapy.

Treatment Guidelines.

Routes of Drug Administration.

Recommended Treatments in Various Culture Systems.

Which Dosage to Use.

17. Pharmacopoeia.

Acetic Acid. Acrifl avin. Activated Carbon. Agricultural Lime. Alum. Anesthetics. Antibiotics. Amoxycillin Trihydrate. Ampicillin Sodium. Chloramphenicol. Enrofl oxacin. Erythromycin. Florfenicol. Flumequine. Furaltadone. Furazolidone. Kanamycin Sulfate. Nalidixic Acid. Neomycin Sulfate. Nifurpirinol. Nitrofurazone. Oxolinic Acid. Oxytetracycline. Sarafl oxacin. Sulfadiazine-Trimethoprim. Sulfadimethoxine-Ormetoprim. Sulfadimidine-Trimethoprim. Sulfamerazine. Sulfamethoxazole-Trimethoprim. Antiseptics. Bayluscide. Benzocaine. **Biological Control.** Bithionol. Bronopol. Buffers: Freshwater Aquaria. Buffers: Marine Aquaria. Buffers: Ponds. Butorphanol. Calcium.

Carbon Dioxide. Chloramine Neutralizer. Chloramine-T. Chlorhexidine. Chloride. Chlorine. Chlorine Neutralizer. Chloroquine Diphosphate. Chorionic Gonadotropin. Clove Oil. Copper. Chelated Copper. Copper Sulfate. Deionized Water. Difl ubenzuron. Dimetridazole. Diquat. Disinfection. Electroshock. Enamectin Benzoate. Eugenol. Euthanasia. Fenbendazole. Flubendazole. Formalin. Formalin/Malachite Green. Freshwater. Fumagillin. Gonadotropin Releasing Hormone. Hydrogen Peroxide. Hyposalinity. Hypothermia. Immunostimulants. Ivermectin. Ketamine. Ketoprofen. Levamisole Hydrochloride. Lidocaine. Magnesium Sulfate. Malachite Green. Mebendazole.

Methylene Blue. Methyltestosterone. Metomidate. Metronidazole. Monensin Sodium. Nitrifying Bacteria. Organophosphate. Ozone. Peat. 2-Phenoxyethanol. Piperazine Sulfate. Potassium Permanganate. Povidone Iodine. Praziguantel. Pyrethroid. Quaternary Ammonium Compounds. Quinaldine Sulfate. Salt. Secnidazole. Sedatives. Silver Sulfadiazine. Slaked Lime. Sodium Bicarbonate. Sodium Pentobarbital. Sodium Phosphate. Sodium Sulfi te. Tefl ubenzuron. TFM. Toltrazuril. Tonic Immobility. Tricaine. Triclabendazole. Ultraviolet Light. Unslaked Lime. Vaccines. Virkon Aquatic. Water Change. Wound Sealant. Zeolite.

Literature Cited.

Appendix I Fish Disease Diagnosis Form.

Appendix II Suppliers.

Appendix III Scientifi c Names of Fish Mentioned in the Text. Appendix IV Defi nitions of Terms.

Appendix V Example Form for Shipping Fish to a Clinic or Diagnostic Laboratory.

Index.