

Contents

Foreword iii

Preface vii

CHAPTER ONE

Disease development 1

Celia R. Lavilla

How disease develops 2

Disease diagnosis 4

Summary 7

CHAPTER TWO

Viral diseases 9

Gilda D. Lio-Po

Characteristics of virus 9

Major viral infections in fish 11

Major viral infections in penaeid shrimps 16

Prevention of viral infections 21

Summary 22

CHAPTER THREE

Bacterial diseases 25

Eleonor V. Alapide-Tendencia and Leobert D. de la Peña

What are bacteria? 26

Identifying the real cause of a disease; Koch's Postulates 27

Important bacterial diseases of fish 28

Bacterial diseases of crustaceans 35

Summary 39

CHAPTER FOUR 43

Fungal diseases

Eduardo M. Leño

What are fungi? 43

Major fungal diseases of fish 45

Major fungal diseases of crustaceans 49

Summary 52

CHAPTER FIVE

Parasitic diseases and pests 55

Erlinda R. Cruz-Lacierda

Common fish diseases caused by parasites 55

Common crustacean diseases caused by parasites 67

Life cycle patterns of fish parasites 70

Summary 72

CHAPTER SIX

Environmental and other non-infectious diseases 75

Gregoria Erazo-Pagador

Fish diseases associated with physico-chemical
properties of water 75

Shrimp diseases associated with physico-chemical
properties of water 77

Diseases associated with physical factors 80

Diagnosis of environmental and other non-infectious diseases 80

CHAPTER SEVEN

Nutritional diseases 83

Celia R. Lavilla

- Types of feeds 83
- Components of feeds 84
- Determining the nutritional status of fish 87
- Nutritional deficiency diseases of fish 89
- Nutritional diseases of shrimps 90
- Feed quality problems with health implications 93
- Summary 94

CHAPTER EIGHT

Physical, environmental, and chemical methods of disease prevention and control 97

Erlinda R. Cruz-Lacierda and Gregoria E. Erazo-Pagador

- Physical methods 97
- Environmental methods 98
- Chemical methods 102
- Summary 109

CHAPTER NINE

Immunity and biological methods of disease prevention and control 111

Jesus Manolo E. Almendras

- The fish immune system 112
- The crustacean immune system 119
- Immunosuppression 123
- Biological control 124

CHAPTER TEN

Immunological and molecular biology techniques in disease diagnosis 137

Leobert D. de la Peña

- Immunological techniques 137
- Molecular biology techniques 147
- Summary 156

CHAPTER ELEVEN

Harmful and toxic algae 159

Romeo D. Caturao 155

- Conditions that stimulate harmful and toxic algal blooms 160
- Types of harmful and toxic algal blooms 164
- Effects of harmful and toxic algal blooms to fish and marine environment 167
- Strategies in coping with the problem of harmful and toxic algal blooms 170

GLOSSARY 173

Photo and figure credits 179

INDEX 180