

Contents

Preface *vii*

Acknowledgements *ix*

Safety in the Microbiology Lab *xi*

Microbiology Lab Procedures *xiii*

Experiment 1: *An Introduction to Microscopy* 1

Experiment 2: *Calibrating an Ocular Micrometer* 11

Experiment 3: *The Ubiquity of Microorganisms* 13

Experiment 4: *Preparation of Broth and Agar Media* 15

Experiment 5: *Transfer Techniques* 19

Experiment 6: *Smear Preparation and Simple Staining* 25

Experiment 7: *Gram Stain* 29

Experiment 8: *Negative Staining* 33

Experiment 9: *Spore Stain: Schaeffer-Fulton and Dorner Methods* 37

Experiment 10: *Acid Fast Stain—Kinyoun Method*
Ziehl-Neelsen Method (hot stain) 43

Experiment 11: *Capsule Stain (Hiss Method)* 47

Experiment 12: *Determining Motility* 51

Experiment 13: *Streak Plate Technique for Isolating Pure Cultures* 55

Experiment 14: *Microbial Cultural Characteristics* 59

Experiment 15: *Serial Dilution/Agar Plating to Quantitate Viable Cells* 63

Experiment 16: *Nutritional Requirements* 67

Experiment 17: *Use of Differential and Selective Media* 69

Experiment 18: *Effect of Temperature* 73

Experiment 19: *Effect of pH* 77

Experiment 20: *Anaerobic Cultivation Techniques* 79

Experiment 21: *Lethal Effects of Heat: Thermal Death Point*
& Thermal Death Time 83

Experiment 22: *Effect of Osmotic Pressure (Tonicity)* 85

Experiment 23: *Effect of Ultraviolet Radiation* 89

Experiment 24: *Testing Susceptibility to Antimicrobial Chemotherapeutic Agents*
Kirby-Bauer Disk Diffusion Method 93

Experiment 25: *Evaluating the Effectiveness of Disinfectants and Antiseptics* 99

Experiment 26: *Kingdom Fungi: Yeasts* 103

Experiment 27: *Kingdom Fungi: Cultivation and Morphology of Molds* 105

Experiment 28: Kingdom Protista: Free-Living Protozoa	111
Experiment 29: Kingdom Protista: Protozoans of Medical Importance	115
Biochemical Activities of Microorganisms	119
Experiment 30: Exoenzyme Production by Microorganisms	121
Experiment 31: Carbohydrate Fermentation	125
Experiment 32: Triple Sugar-Iron Agar Test (TSI)	127
Experiment 33: IMViC Tests	131
Experiment 34: Testing for Hydrogen Sulfide Production	137
Experiment 35: Testing for the Reduction of Nitrate	139
Experiment 36: Oxidase Test	141
Experiment 37: Testing for Urease Production	143
Experiment 38: Testing for the Presence of Catalase	145
Experiment 39: Identification of Streptococci	147
Experiment 40: Identification of Staphylococci	151
Experiment 41: Genus Identification of an Unknown: Pure Culture	155
Experiment 42: Diversity of Oral Microbes	163
Experiment 43: Normal Flora of the Skin and Throat	165
Experiment 44: Species Identification of Mixed Unknown Bacterial Culture	169
Experiment 45: Decarboxylase Test	175
Experiment 46: Isolation of Antibiotic-Producing Bacteria from Soil	177
Experiment 47: Selection of Streptomycin Resistant <i>Escherichia coli</i>	181
Experiment 48: Testing for Caries Susceptibility	183
Experiment 49: Identification of Enteric Microorganisms Using the Enterotube Multitest System	185

ORGANISMS USED IN LAB EXPERIMENTS 189

PREPARED SLIDES OF MICROORGANISMS 195

HUMAN PATHOGENS PROJECT 201

APPENDICES

Appendix 1: Microbiological Media 225

Appendix 2: Biochemical Test Reagents 231

Appendix 3: Staining Reagents 233

PHOTOS