

CONTENTS

List of Stylistic Features xi

Foreword xii

Preface xiii

PART 1 Principles and Purposes of Scientific Communication 1

1 Science as a Social Enterprise 3

- 1.1 The Shaping of Knowledge in Science 3
- 1.2 The Social Nature of Science 6
- 1.3 The Centrality of Communication in Science 9
- 1.4 The Role of Persuasion in Scientific Communication 16
- 1.5 Scientific Communication and Convention 18
- 1.6 The Role of Collaboration in Scientific Communication 20
- Activities and Assignments 22

2 Exploring Technology in Scientific Communication 25

- 2.1 Science and Technology 25
- 2.2 Technology and Collaboration in Science 26
- 2.3 Technology and Publication in Science 29
- 2.4 Technology and the Public Audience for Science 33
- 2.5 Technology's Material Advantages 36
- 2.6 Technology and the Visual Dimension of Science 39
- 2.7 Technology and Paradigms 45
- 2.8 Technology and the Rhetorical Challenge of Communicating Science 50
- Activities and Assignments 52

3**Considering Ethics in Scientific Communication**

53

- 3.1 Communication Ethics in Social Contexts 53
- 3.2 Ethical Mechanisms in Science 59
- 3.3 The Ethics of Authorship 62
- 3.4 Scientific Communication as Moral Responsibility 67
- 3.5 Ethical “Costs” of Communication Technology 70
- 3.6 Scientific Communication and Public Communication:
An Ethical Conflict? 75
- 3.7 Scientific Style and Social Responsibility: A Two-Way Channel 79
- 3.8 The Ethics of Style as Socialization 85
- Activities and Assignments 87

PART 2**Exploring Conventions of Scientific Communication 89****4****Reading and Writing Research Reports**

91

- 4.1 Research Journals and Their Readers 91
- 4.2 Argumentation in Science 93
- 4.3 The Logic(s) of Scientific Inquiry 95
- 4.4 Introducing the Research Problem 97
- 4.5 Describing Methods 101
- 4.6 Reporting Results 105
- 4.7 Discussing Trends and Implications 111
- 4.8 The Research Report Abstract 116
- 4.9 Brief Report Genres: Research Letters and Notes 119
- 4.10 How Scientists Write Reports 122
- 4.11 How Scientists Read Reports 123
- 4.12 How Reviewers Evaluate Reports 125
- Activities and Assignments 127

5**Reviewing Prior Research**

130

- 5.1 The Role of Prior Research in Scientific Argument 130
- 5.2 Reviewing as a Genre: The Review Article 132
- 5.3 Locating the Literature 135
- 5.4 Reading Previous Research 138
- 5.5 Identifying Trends and Patterns 138

- 5.6 Organizing the Review 140
- 5.7 Citing Sources in the Text 142
- 5.8 Preparing the List of Works Cited 145
- 5.9 The Research Review Abstract 148
- Activities and Assignments 148

6**Preparing Conference Presentations**

149

- 6.1 The Role of Research Conferences in the Sciences 149
- 6.2 Writing Conference Proposal Abstracts 151
- 6.3 Organizing the Research Talk 155
- 6.4 Methods of Oral Presentation 156
- 6.5 Delivering Conference Presentations 159
- 6.6 The Use of Graphics in Oral Presentations 162
- 6.7 Preparing Research Posters 166
- Activities and Assignments 173

7**Writing Research Proposals**

175

- 7.1 The Role of the Proposal in Science 175
- 7.2 Multiple Audiences of the Proposal 179
- 7.3 Logic and Organization in the Research Proposal 180
- 7.4 Introducing the Research Problem and Objectives 181
- 7.5 Providing Background 185
- 7.6 Describing Proposed Methods 187
- 7.7 The Research Proposal Abstract 188
- 7.8 How Scientists Write Research Proposals 189
- 7.9 How Reviewers Evaluate Research Proposals 191
- 7.10 Accountability in the Research Process 194
- Activities and Assignments 195

8**Communicating with Public Audiences**

198

- 8.1 Why Do Scientists Communicate with Public Audiences? 198
- 8.2 Understanding “General” Audiences 203
- 8.3 Adapting Through Narration 211
- 8.4 Adapting Through Examples 214
- 8.5 Adapting Through Definition 215

- 8.6 Adapting Through Analysis 216
- 8.7 Adapting Through Comparison 216
- 8.8 Adapting Through Graphics 219
- 8.9 Logic and Organization in Writing for Public Audiences 221
- Activities and Assignments 223

PART 3 Sample Research Cases 227

9

Research on the “Ulcer Bug”: From Theory to Clinical Application 229

MARSHALL AND WARREN AND COLLEAGUES

Introduction and Additional Resources 229

Warren JR, Marshall B. 1983. Unidentified curved bacilli on gastric epithelium in active chronic gastritis. *Letters to the Lancet*. 231

Blaser MJ. 1987. Gastric *Campylobacter*-like organisms, gastritis, and peptic ulcer disease. *Gastroenterology*. 234

Graham DY, Lew GM, Klein PD, Evans DG, Evans DJ Jr, Saeed ZA, Malaty HM. 1992. Effect of treatment of *Helicobacter pylori* infection on the long-term recurrence of gastric or duodenal ulcer. *Annals of Internal Medicine*. 247

Chiba N, Veldhuyzen van Zanten SJO, Sinclair P, Ferguson RA, Escobedo S, Grace E. 2002. Treating *Helicobacter pylori* infection in primary care patients with uninvestigated dyspepsia: the Canadian adult dyspepsia empiric treatment—*Helicobacter pylori* positive (CADET-Hp) randomised controlled trial. *British Medical Journal*. 251

Blaser MJ. 2005. An endangered species in the stomach. *Scientific American*. 258

10

Research on Predatory Algae: From Environmental Event to Environmental Policy 266

BURKHOLDER AND COLLEAGUES

Introduction and Additional Resources 266

Burkholder JM, Noga EJ, Hobbs CH, Glasgow HB Jr, Smith SA. 1992. New ‘phantom’ dinoflagellate is the causative agent of major estuarine fish kills. *Nature*. 268

Huyghe P. 1993 Apr. Killer algae. *Discover*. 272

National Sea Grant College Program. 1994. Statement of opportunity for funding: Marine Biotechnology. Raleigh, NC: North Carolina State University, UNC Sea Grant College Program. [Excerpts] 278

Burkholder JM, Rublee PA. 1994. Improved detection of an ichthyotoxic dinoflagellate in estuaries and aquaculture facilities. Proposal submitted to the (US) National Sea Grant College Program. 282

Burkholder JM, Gordon AS, Moeller PD, Law JM, Coyne KJ, Lewitus AJ, Ramsdell JS, Marshall HG, Deamer NJ, Cary SC, Kempton JW, Morton SL, Rublee PA. 2005. Demonstration of toxicity to fish and to mammalian cells by *Pfiesteria* species. *Proceedings of the National Academy of Sciences*. 307

Rublee PA, Remington DL, Schaefer EF, Marshall MM. 2005. Detection of the dinozoans *Pfiesteria piscicida* and *P. shumwayae*: A review of detection methods and geographic distribution. *The Journal of Eukaryotic Microbiology*. 313

Englehaupt E. 2007. New *Pfiesteria* toxin identified. *Environmental Science & Technology Online News*. 320

11

Research on the Oracle at Delphi: From Ancient Myth to Modern Interdisciplinary Science 322

HALE AND DE BOER AND COLLEAGUES

Introduction and Additional Resources 322

De Boer JZ, Hale JR. 1996. Request for permission to take samples of travertine rock from the vicinity of the Apollo temple at Delphi: Proposal to the Greek Ministry of Culture. 324

De Boer JZ, Hale JR, Chanton J. 2001. New evidence for the geological origins of the ancient Delphic oracle (Greece). *Geology*. 326

Spiller HA, Hale JR, De Boer JZ. 2002. The Delphic oracle: A multidisciplinary defense of the gaseous vent theory. *Journal of Toxicology—Clinical Toxicology*. 330

Broad WJ. 2002. For Delphic oracle, fumes and visions. *The New York Times*. 338

Hale JR, De Boer J, Chanton J, Spiller H. 2002. New evidence for the geological origin of the Delphic oracle: Active faults, gaseous emissions, and architectural anomalies in the Temple of Apollo. Conference abstract, Archeological Institute of America. 344

Etiopé G, Papatheodorou G, Christodoulou D, Geraga M, Favali P. 2006. The geological links of the ancient Delphic Oracle (Greece): A reappraisal of natural gas occurrence and origin. *Geology*. 345

12

Research on Kepler's Supernova: From Satellite Image to Public Knowledge Space 349

REYNOLDS AND COLLEAGUES

Introduction and Additional Resources 349

The *Chandra* X-ray Observatory (CXO) Research Program. 2008. Call for proposals. NASA-*Chandra* X-ray Center. [Excerpts] 352

Reynolds SP, Borkowski K, Blondin J, Badenes C, Hughes J, Hwang U, Laming M. 2005. Kepler's supernova remnant: The youngest galactic remnant of a thermonuclear explosion. Proposal submitted to Cycle 07 of the *Chandra* X-ray Observatory (CXO) Research Program. 358

Reynolds SP, Borkowski KJ, Badenes C, Hughes JP, Hwang U, Laming JM, Blondin JM. 2007. A deep *Chandra* observation of Kepler's supernova remnant: A Type Ia supernova with circumstellar interaction. Conference abstract, American Astronomical Society. 366

Roy S, Watzke M. 2007. A star's death comes to light. Online news release, NASA/Marshall Space Flight Center. 367

Cowen, R. 2007. Solving a 400-year-old supernova riddle. *Science News Online*. 369

Naeye R. 2007. Kepler saw a White Dwarf explode. *Sky & Telescope*. 371

Reynolds SP, Borkowski KJ, Hwang U, Hughes JP, Badenes C, Laming JM, Blondin JM. 2007. A deep *Chandra* observation of Kepler's supernova remnant: A Type Ia event with circumstellar interaction. *The Astrophysical Journal*. 372

13

Research on Katrina's Carbon Footprint: From Science to Public Debate

376

CHAMBERS AND HURTT AND COLLEAGUES

Introduction and Additional Resources 376

DOE National Institute for Climatic Change Research. 2008. Request for proposals. [Excerpts] 378

Chambers JQ, Hurtt G. 2006. Hurricane impacts on structure and functioning of Southeastern forests. Proposal abstract submitted to DOE/National Institute for Climatic Change Research. 380

Chambers JQ, Fisher JI, Zeng H, Chapman EL, Baker DB, Hurtt GC. 2007. Hurricane Katrina's carbon footprint on U.S. Gulf Coast forests. *Science*. 381

Cook-Anderson, G. 2007. Forests damaged by Katrina become major carbon source. Online news feature, NASA/Goddard Space Flight Center. 382

Kaufman, M. 2007. Katrina, Rita caused forestry disaster. *The Washington Post*. 384

Knutson TR, Sirutis JJ, Garner ST, Vecchi GA, Held IM. 2008. Simulated reduction in Atlantic hurricane frequency under twenty-first century warming conditions. *Nature Geoscience*. 387

Revkin AC. 2007. A new middle stance emerges in debate over climate. *The New York Times*. 388

References 393

Credits 411

Name Index 413

Subject Index 421