

TENTH EDITION

A Short Guide to  
Writing About

# Biology

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## CONTENTS

*Preface* . . . . . ix

*Acknowledgements* . . . . . xii

### PART I General Advice About Writing and Reading Biology . . . . 1

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction and General Rules . . . . .</b>                                    | <b>3</b>  |
|          | WHAT DO BIOLOGISTS WRITE ABOUT, AND WHY? . . . . .                                 | 4         |
|          | THE KEYS TO SUCCESS . . . . .  | 6         |
|          | Putting Artificial Intelligence to Good Use  | 6         |
|          | Eleven Major Rules for Preparing a First Draft                                     | 7         |
|          | Six Major Rules for Developing Your Final Draft                                    | 11        |
|          | Nine Finer Points: The Easy Stuff  | 13        |
|          | The Annoying but Essential Last Pass   | 15        |
|          | AVOIDING PLAGIARISM . . . . .  | 15        |
|          | ON USING COMPUTERS IN WRITING . . . . .  | 18        |
|          | ON USING COMPUTERS FOR DATA STORAGE,<br>ANALYSIS, AND PRESENTATION . . . . .       | 20        |
| <b>2</b> | <b>Locating Useful Sources . . . . .</b>   | <b>23</b> |
|          | EASY WAYS TO ACCESS THE PRIMARY LITERATURE . . . . .                               | 24        |
|          | USING INDEXES . . . . .  | 25        |
|          | USING SCIENCE CITATION INDEX EXPANDED . . . . .                                    | 26        |
|          | USING CURRENT CONTENTS CONNECT . . . . .   | 26        |
|          | USING MEDLINE AND OTHER DATABASES . . . . .  | 27        |
|          | PROWLING THE INTERNET . . . . .  | 28        |
|          | CONDUCTING WEB SEARCHES:<br>DEVELOPING PRODUCTIVE SEARCH STRATEGIES . . . . .      | 30        |
|          | FINAL THOUGHTS ABOUT EFFICIENT SEARCHING:<br>TECHNOLOGY ISN'T EVERYTHING . . . . . | 32        |
|          | CLOSING THOUGHTS . . . . .   | 33        |

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|          |  |           |
|----------|--|-----------|
| <b>3</b> | <b>General Advice on Reading, Note-Taking, and Avoiding Plagiarism . . . . .</b> | <b>35</b> |
|          | WHY READ AND WHAT TO READ . . . . .  | 36        |
|          | EFFECTIVE READING . . . . .  | 36        |
|          | READING DATA: PLUMBING THE DEPTHS OF FIGURES AND TABLES . . . . .                | 38        |
|          | Reading Text: Summarize As You Go . . . . .                                      | 43        |
|          | TAKE NOTES IN YOUR OWN WORDS . . . . .   | 44        |
|          | Split-Page Note-Taking: A Can't-Fail System . . . . .                            | 48        |
|          | FINAL THOUGHTS ON NOTE-TAKING:<br>DOCUMENT YOUR SOURCES . . . . .                | 49        |
| <b>4</b> | <b>Reading and Writing About Statistical Analyses . . . . .</b>                  | <b>51</b> |
|          | STATISTICAL ESSENTIALS . . . . .   | 51        |
|          | Variability and Its Representation . . . . .                                     | 51        |
|          | USING STATISTICS TO TEST HYPOTHESES, SUMMARIZED . . . . .                        | 62        |
|          | MOVING BEYOND P-VALUES . . . . .   | 63        |
|          | Statistical Power . . . . .  | 63        |
|          | READING ABOUT STATISTICS . . . . .   | 65        |
|          | WRITING ABOUT STATISTICS . . . . .   | 65        |
| <b>5</b> | <b>Citing Sources and Listing References . . . . .</b>                           | <b>71</b> |
|          | CITING SOURCES . . . . .   | 72        |
|          | General Rules . . . . .  | 72        |
|          | Citation Format Rules . . . . .  | 75        |
|          | PREPARING THE LITERATURE CITED SECTION . . . . .                                 | 76        |
|          | General Rules for Reference Citations . . . . .                                  | 76        |
|          | General Rules for Formatting References . . . . .                                | 77        |
|          | A Sample Literature Cited Section . . . . .                                      | 80        |
| <b>6</b> | <b>Revising . . . . .</b>  | <b>83</b> |
|          | PREPARING THE DRAFT FOR SURGERY:   |           |
|          | PLOTTING IDEA MAPS . . . . .   | 85        |
|          | REVISING FOR CONTENT . . . . .   | 90        |
|          | REVISING FOR CLARITY . . . . .   | 92        |
|          | Taming Disobedient Sentences . . . . .   | 92        |
|          | The Dangers of "It" . . . . .  | 95        |
|          | Problems with "And" . . . . .  | 97        |
|          | Headache by Acronym . . . . .  | 97        |
|          | REVISING FOR COMPLETENESS . . . . .  | 98        |
|          | REVISING FOR CONCISENESS . . . . .   | 99        |
|          | First Commandment:<br>Eliminate Unnecessary Prepositions . . . . .               | 101       |
|          | Second Commandment:<br>Avoid Weak Verbs . . . . .                                | 102       |

|   |     |
|---|-----|
| Third Commandment:<br>Do Not Overuse the Passive Voice . . . . .            | 103 |
| Fourth Commandment:<br>Make the Organism the Agent of the Action . . . . .  | 104 |
| Fifth Commandment:<br>Incorporate Definitions into Your Sentences . . . . . | 105 |
| REVISING FOR FLOW . . . . .   | 105 |
| A Short Exercise in Establishing Coherence . . . . .                        | 107 |
| Improving Flow Using Punctuation . . . . .                                  | 108 |
| ADDITIONAL REVISIONS . . . . .  | 108 |
| Revising for Teleology and Anthropomorphism . . . . .                       | 108 |
| Revising for Spelling Errors . . . . .                                      | 109 |
| REVISING FOR GRAMMAR AND PROPER WORD USAGE . . . . .                        | 110 |
| A Grammatical Aside:<br>Rules that Are Not Rules . . . . .                  | 115 |
| A Strategy for Revising:<br>Pass by Pass by Pass . . . . .                  | 116 |
| BECOMING A GOOD REVIEWER . . . . .  | 117 |
| Receiving Criticism . . . . .   | 119 |
| Fine-Tuning . . . . .   | 120 |

## PART II GUIDELINES FOR SPECIFIC TASKS . . . . . 125

|          |  |            |
|----------|--|------------|
| <b>7</b> | <b>Writing Summaries, Critiques, Essays, and Review Papers . . . . .</b> | <b>127</b> |
|          | WRITING SUMMARIES AND CRITIQUES . . . . .                                | 128        |
|          | Writing the First Draft . . . . .  | 128        |
|          | Writing the Summary . . . . .  | 129        |
|          | Writing the Critique . . . . .   | 131        |
|          | WRITING ESSAYS AND REVIEW PAPERS . . . . .                               | 134        |
|          | Getting Started . . . . .  | 134        |
|          | Researching Your Topic . . . . .   | 135        |
|          | Developing a Thesis Statement . . . . .                                  | 135        |
|          | Writing the Paper . . . . .  | 137        |

|          |  |            |
|----------|--|------------|
| <b>8</b> | <b>Answering Essay Questions . . . . .</b>                     | <b>143</b> |
|          | BASIC PRINCIPLES . . . . .                                     | 143        |
|          | APPLYING THE PRINCIPLES . . . . .                              | 147        |
| <b>9</b> | <b>Writing Laboratory and Other Research Reports . . . . .</b> | <b>151</b> |
|          | WHY ARE YOU DOING THIS? . . . . .                              | 152        |
|          | The Purpose of Laboratory and Field Notebooks                  | 152        |
|          | Taking Notes   | 153        |
|          | Making Drawings  | 156        |
|          | RESEARCH REPORT COMPONENTS AND SEQUENCING . . . . .            | 156        |
|          | WHERE TO START . . . . .                                       | 159        |
|          | WHEN TO START . . . . .  | 159        |
|          | WRITING THE MATERIALS AND METHODS SECTION . . . . .            | 160        |
|          | Determining the Correct Level of Detail                        | 160        |
|          | Giving Rationales  | 162        |
|          | Describing Data Analysis                                       | 163        |
|          | Use of Subheadings   | 163        |
|          | A Model Materials and Methods Section                          | 164        |
|          | WRITING THE RESULTS SECTION . . . . .                          | 165        |
|          | What Is a "Figure"? . . . . .                                  | 166        |
|          | Summarizing Data Using Tables and Graphs                       | 166        |
|          | Constructing a Summary Table                                   | 167        |
|          | To Graph or Not to Graph                                       | 169        |
|          | Preparing Graphs   | 174        |
|          | (Not) Falsifying Data  | 176        |
|          | The Question: To Connect or Not to Connect the Dots? . . . . . | 177        |
|          | Making Bar Graphs and Histograms                               | 180        |
|          | Learning to Love Logarithms                                    | 182        |
|          | Preparing Tables   | 185        |
|          | Making Your Figures and Tables Self-Sufficient                 | 187        |
|          | Putting Your Figures and Tables in Order                       | 188        |
|          | Incorporating Figures and Tables into Your Report (or Not)     | 188        |
|          | Verbalizing Results: General Principles                        | 188        |
|          | Verbalizing Results:   |            |
|          | Turning Principles into Action                                 | 191        |
|          | Writing About Negative Results                                 | 192        |
|          | Writing About Numbers  | 192        |
|          | In Anticipation—Preparing in Advance for Data Collection       | 193        |

|   |   |            |
|---|---|------------|
| <b>WRITING THE DISCUSSION SECTION . . . . .</b>   | <b>195</b>                                    |            |
| Expectations                                      | 196   |            |
| Explaining Unexpected Results                     | 196   |            |
| Analysis of Specific Examples                     | 198   |            |
| <b>WRITING THE INTRODUCTION SECTION . . . . .</b> | <b>202</b>                                    |            |
| Stating the Question                              | 202   |            |
| An Aside: Studies versus Experiments              | 203   |            |
| Providing the Background                          | 204   |            |
| A Sample Introduction                             | 206   |            |
| Talking about Your Study Organism or Field Site   | 207   |            |
| DECIDING ON A TITLE . . . . .                     | 208   |            |
| WRITING AN ABSTRACT . . . . .                     | 209   |            |
| ADDITIONAL PREPARATIONS . . . . .                 | 210   |            |
| Preparing Acknowledgements                        | 210   |            |
| Preparing the Literature Cited Section            | 210   |            |
| Preparing a Paper for Formal Publication          | 210   |            |
| A Note about Coauthorship                         | 211   |            |
| CHECKLIST FOR THE FINAL DRAFT . . . . .           | 212   |            |
| <b>10</b>   | <b>Writing Research Proposals . . . . .</b>   | <b>217</b> |
| WHAT ARE REVIEWERS LOOKING FOR? . . . . .         | 218   |            |
| RESEARCHING YOUR TOPIC . . . . .                  | 219   |            |
| WHAT MAKES A GOOD RESEARCH QUESTION? . . . . .    | 220   |            |
| WRITING THE PROPOSAL . . . . .                    | 221   |            |
| Introduction                                      | 221   |            |
| Background  | 222   |            |
| Proposed Research                                 | 224   |            |
| Tightening the Logic                              | 225   |            |
| THE LIFE OF A REAL RESEARCH PROPOSAL . . . . .    | 226   |            |
| <b>11</b>   | <b>Presenting Research Findings . . . . .</b> | <b>229</b> |
| ORAL PRESENTATIONS . . . . .                      | 230   |            |
| WRITING THE TALK . . . . .                        | 230   |            |
| GIVING THE TALK . . . . .                         | 232   |            |
| Dos and Don'ts for Oral Presentations             | 233   |            |
| Talking About Original Research                   | 234   |            |
| Talking About Proposed Research                   | 234   |            |
| The Listener's Responsibility                     | 235   |            |
| Preparing Effective Visuals                       | 235   |            |
| Using PowerPoint                                  | 236   |            |
| Common PowerPoint Errors                          | 237   |            |
| Checklist for Being Judged                        | 238   |            |
| POSTER PRESENTATIONS . . . . .                    | 239   |            |
| Layout of the Poster                              | 241   |            |
| Making the Poster                                 | 244   |            |

|           |   |            |
|-----------|---|------------|
| <b>12</b> | <b>Writing Letters of Application . . . . .</b>       | <b>247</b> |
|           | BEFORE YOU START . . . . .                            | 248        |
|           | PREPARING THE CV . . . . .                            | 248        |
|           | PREPARING THE COVER LETTER . . . . .                  | 251        |
|           | GETTING EFFECTIVE LETTERS OF RECOMMENDATION . . . . . | 258        |
|           | <b>Literature Cited . . . . .</b>                     | <b>261</b> |
|           | <b>Index . . . . .</b>                                | <b>263</b> |

## Preface

Careful thinking cannot be separated from effective writing. Being a biologist is not just about memorizing facts and terminology or about mastering an increasing array of computer software and molecular techniques. Biology is a way of thinking about the world; it's about making careful observations, asking specific questions, designing ways to address those questions, manipulating data thoughtfully and thoroughly, interpreting those data and related observations, reevaluating past work, asking new questions, and redefining older ones. It is also about communicating information—accurately, logically, clearly, honestly, and concisely. The hard work of thinking about biology is at least as important as the work of doing it. Writing provides a way to examine, to evaluate, to refine, and to share that thinking. Writing is both a product and a process.

Biology instructors have been increasingly concerned about their students' writing for two reasons. First, bad writing often reflects fuzzy thinking, so questioning the writing generally guides students toward a clearer understanding of biology. Second, effective communication is such a key part of the biologist's trade that students really must learn to do it well. This book will help students learn to think more clearly and logically and to design meaningful and convincing statements. The difficulty, of course, is finding the time to teach both biology and presentation skills when there is barely enough time in the semester to cover the biology. This book allows instructors to guide their students' writing without taking up valuable class time.

Although this book covers every sort of writing assignment that biologists face—both as students and professionals—it is brief enough to be read along with other, more standard assignments and straightforward enough to be understood without additional instruction. The book is intended especially for undergraduate use in typical lecture and laboratory courses at all levels, but it is also widely used in undergraduate and graduate seminars. Many colleagues tell me they have found much in the book that was new and helpful in their own writing and in their teaching.

I have included examples from all fields of biology. However, because the book is intended for use even at introductory levels, I have avoided examples that assume substantial specialized knowledge or terminology. Instructors in advanced courses may wish to amplify basic principles with examples chosen from papers published in their own fields.

## CHANGES MADE FOR THE TENTH EDITION

For the tenth edition of *The Short Guide*, I have retained the narrative style that has made previous editions so successful with students. We can't expect students to become better writers if we reduce everything to bullets and summaries for them. Students can learn a great deal by writing their own summaries but little of lasting value by reading or memorizing mine. For this edition, I have updated the material in most of the chapters and have added important information about the benefits and downsides of using artificial intelligence in the writing process.

## Organization

The first 6 chapters cover general issues that apply to all types of writing (and reading) in biology. In the first chapter, I emphasize the benefits of learning to write well in biology, describe the sorts of writing that professional biologists do, and review some key principles that characterize all sound scientific writing. I also mention some of the dangers and potential benefits of using artificial intelligence (e.g., ChatGPT) in the writing process. Chapter 2 describes how to locate useful sources using computerized indexing services, online journals, and the Internet. Chapter 3 emphasizes the struggle for understanding that must precede any concern with how something is said. I explain how to read formal scientific literature, including graphs and tables; how to take useful notes; and how to take notes in ways that prevent unintentional plagiarism. Chapter 4 talks about the use and interpretation of statistical analyses. Chapter 5 explains how to cite references and prepare a literature-cited section. Chapter 6 focuses on the process of revision—for content, organization, clarity, conciseness, grammar, word use, and spelling. It emphasizes the benefits of peer review, and it explains both how to be an effective reviewer of other people's writing and how to interpret criticism. Many readers have found Chapter 6 to be one of the most important chapters in the book. Most students learn little in preparing the first draft of anything. However, they can learn much—both about biology and about communicating their thoughts—through properly guided revision.

The rest of the book covers all of the specific writing tasks encountered in biology coursework and in professional life: writing summaries, critiques, essays, and review papers (Chapter 7); answering essay

questions on exams (Chapter 8); writing laboratory and other research reports (Chapter 9); writing research proposals (Chapter 10); preparing oral and poster presentations (Chapter 11); and writing letters of application for jobs or for graduate school (Chapter 12). I encourage instructors to incorporate short oral presentations into their course design. Writing typically improves when students are first asked to give a short oral presentation on some aspect of what they are planning to write about: Writing, thinking, and speaking are all interconnected. Requiring brief oral presentations (based, for example, on a single figure from a published research paper) is a particularly good way to get students started on larger projects early in the semester.

My discussion of writing summaries and critiques is an especially important part of the book because most students seem not to have had much practice summarizing information accurately and concisely and in their own words. An inability to summarize effectively is a serious obstacle to both synthesis and evaluation. Writing summaries is also a particularly effective way for students to self-test their understanding and to prepare for examinations.

The chapter on writing research reports (Chapter 9) emphasizes that the results obtained in a study are often less important than the ability to discuss and interpret those results convincingly in the context of basic biological knowledge and to demonstrate a clear understanding of the purpose and value of the study. Students learn about the variability inherent in biological systems and how to deal with that variability in presenting, interpreting, and discussing data. Chapter 9 is also useful to anyone preparing papers for publication.

The checklists found at the ends of most chapters allow students to evaluate their own work and that of their peers. Instructors can easily turn these checklists into grading rubrics, which should be shared with students well before the assignments are due. "Technology Tips" are scattered throughout the book, helping students take better advantage of the computer technology available to them for finding sources, writing, graphing, and giving oral presentations.

