Suggestions for the Preparation of Biological Manuscripts for Publication

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Charles Darwin once said, "A naturalist's life would be a happy one if he had only to observe and never to write." Indeed, it is true that there are only a few persons who really enjoy writing – but there are fewer still who can write easily and well. Because good writing is a mark of the professional scientist, it behooves us to cultivate the art of clear writing as we do that of clear thinking. A piece of writing almost invariably reflects directly the amount of effort put into it.

Experience in reviewing and approving manuscripts sent to the Communicable Disease Center has indicated that in many instances authors are not following, or are not cognizant of, the fundamental principals of manuscript preparation. For this reason the following suggestions have been compiled to assist authors in preparing articles for publication.

GENERAL ORGANIZATION

The first essential is to organize your paper in such a manner that the main ideas will flow in logical and orderly sequence. The following outline will serve as a typical example of over-all organization.

I. Introduction
- A. Present problem and state objectives
- B. Give historical resume of literature
- C. Indicate range and limitation of work

II. Methods. special techniques, and equipment used.

III. Results (presentation of data)

IV. Discussion (analysis of data)

V. Conclusions

VI. Summary (Except for a very short paper, every article should contain a summary.)

VII. Bibliography or literature cited

Make the title short but informative. When generic or specific names appear in the title of a paper, always cite the higher categories, e.g.. *Anopheles crucians* Wiedemann (Diptera, Culicidae), so that a general reader or indexer will know immediately the systematic position of the genus or species under discussion. Always give an address after your name under the title, or as a footnote on the first page, so that you may be reached concerning inquiries for reprints or other information.

Acknowledgments may be given in a footnote on the first page, at the end of the introduction, or at the end of the paper just preceding the summary.

The introduction and summary of a paper are usually the most difficult to prepare. The writer will do well to put considerable effort and thought into these two sections. There should be no doubt left in the reader's mind as to the purpose for which the paper was written or as to the conclusions reached. A summary should be so written that it is complete in itself without the necessity for reference to the body of the article. Remember that many persons, especially abstracters, will read only the summary.

Be certain that all citations to literature made in the text are included in the bibliography or literature cited. In the preparation of bibliographic references, great care should be taken to give the correct year, volume, and page number. Use acceptable abbreviations for the names of the journals cited and check punctuation. Do not mix bibliographic styles. Follow the bibliographic style used in the journal of publication.

RHETORIC AND GRAMMAR

Ordinarily a paragraph should begin with a topic sentence which introduces an idea, and each subsequent sentence within the paragraph should add to the development of that same idea.

Throughout the paper it should be the author's aim to attract and hold the reader's attention and to lead him logically from one step to the next. This may be accomplished best by (a) making the paper as easy as possible for the reader to comprehend; (b) including illustrative material whereever it is appropriate for clearness; (c) using transitional words, phrases, or sentences; (d)

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omitting insignificant details and superfluous words; (e) using variation of sentence form; (f) using descriptive words and phrases; and (g) drawing comparisons.

Long and involved sentences should be avoided. The sequence of thought in sentences over 30 words in length is often difficult to follow. Variety may be obtained by changing the type of sentence structure, by using short sentences interspersed among longer sentences, and by using transitional words and phrases to connect ideas.

In order to write effectively, it will be necessary for the average author to study and refer frequently to some standard, college-level textbook (8, 9) of English composition and grammar. Given below are a few points which every writer should observe.

1. Be consistent in the use of verb tenses and voices. Maintain parallel construction within sentences and paragraphs.

2. Check your manuscript carefully for agreement in number of subjects and verbs.

3. Avoid the use of *this* or *these* as substantives.

4. Be certain that a pronoun agrees with its antecedent in person, gender, and number. The antecedent of a pronoun should be clearly apparent to the reader.

5. To avoid ambiguity always use a comma before the *and* in a series. Become thoroughly familiar with the rules of punctuation.

6. Avoid too frequent use of the same word. Use a dictionary of synonyms (6, 7).

7. Avoid using words in a restricted or colloquial sense. Colloquial usage is often confusing to the foreign reader.

8. Do not use abbreviations unnecessarily. The abbreviations for metric and English units of measurement have the same form in both singular and plural.

9. Cultivate the dictionary habit, especially for spelling and exact meaning of words. Do not capitalize unnecessarily. Study rules of capitalization.

10. Check carefully the spelling of all scientific names. It is a standard practice to cite both the complete generic name and the author of a species where the species name appears for the first time in a paper. Thereafter, the author's name may be omitted and the generic name may be abbreviated. Except in purely taxonomic papers, it is recommended that the genus name or its abbreviation always be given. Underscore scientific names of genera (including generic abbreviations) and species, but do not underscore the name of the author of a species. Capitalize, but do not underscore, names of taxonomic categories above genus.

11. When preparing a taxonomic paper, use the abbreviated style of writing for generic and specific descriptions. Reference to any good taxonomic work will furnish an example in this style.

12. No two authorities will be found who are in complete agreement on all points of grammar and rhetoric. Language is dynamic; rules of form, style, and usage are changing constantly as the language changes. For those instances where the writer finds points of difference among the authorities, he should select the best authority under the circumstances and should follow that authority consistently. Very often such questions can be resolved by following examples set forth in the journal of publication.

ILLUSTRATIVE MATERIAL

Every table or figure should be completely explicit in itself apart from the text. Therefore, each table or figure must bear a heading or legend which states clearly and concisely the significant information contained in the table or figure. As stated by Raymond Pearl (15):

"It has been emphasized earlier in this book that every statistical table should have a heading, or legend, that clearly indicates what the table is about and what categories of information it contains. The same principle applies with equal force to statistical diagrams. The labelling and legend of every diagram or chart should be comprehensively clear, so that the reader will not be compelled to study the text to find out things about the diagram that should be implicit in its own structure and labelling."

Remember, the purpose of a table is to summarize data; too much detail in a table is confusing to the reader. All illustrative material such as tables, graphs, and figures must be referred to in the text. Moreover, all essential information contained in the illustrative matter should be included in the text. The reader should not be required to interrupt his thought in order to refer to a table or figure. Tables and figures are given to furnish the reader with details for further study.

When presenting statistical data, do not carry figures beyond the point of significance. Such a practice may lead the critical reader to question the ability of the author to use a statistical approach in the analysis of data.

MECHANICAL DETAILS OF PREPARATION

Manuscripts should be typewritten double-spaced

on only one side of the sheet, leaving a margin of no less that 1 in. at the top, bottom, and both sides of the page. Never submit a carbon copy for publication. The author should always retain a carbon copy of the manuscript as submitted for publication. Such a copy is necessary for proofreading galley or page proof. Do not fold a manuscript for mailing.

Number all pages consecutively, including pages of tables and figures. Tables should be placed on separate sheets; only leader work should be interspersed with the text. All illustrative material such as tables, graphs, figures, charts, and maps should be numbered consecutively (separately from pagination) and inserted near the place of reference in the text. Tables and figures require a separate series of numbers. Be consistent in the use of Arabic or Roman numerals for tables and figures.

When illustrations larger than standard typewritten pages are included with the manuscript, a separate page should be inserted in the appropriate place in the manuscript giving the figure number and legend. When preparing a large drawing which later will be reduced to printable size, the width of the lines should be exaggerated. This practice will assure the legibility of the drawing after reduction. Lettering, especially, should be bold and sufficiently large and well-spaced so that the letters will not run together when reduced. One value of size reduction in plain-line drawings is that slightly ragged lines or letters usually emerge with clear-cut, sharp edges. A scale indicating actual size should always be given for drawings. As insurance against loss or misplacement, it is a good practice to have the figure number, the author's name, and the title of the manuscript on the reverse side of all drawings submitted as part of the manuscript. Submit drawings in suitable form for publication; do not expect the editor of a journal to remake your drawings.

Number footnotes consecutively throughout the text. Footnotes of tables should be indicated by means of symbols or letters rather than by numbers. Footnotes[2/] should be placed immediately after the full line of the text in which the reference mark occurs and should be separated from the text by two horizontal lines – one above and one below the footnote.

[2/] A footnote should appear in this manner.

If the foregoing suggestions as to organization, rhetoric and grammar, illustrations, and mechanical details are followed, a good manuscript should result; and relatively little revision should be required to bring it into conformity with the editorial style of the journal of publication.

Most journals give certain specific directions to authors for the preparation of manuscripts. To facilitate editorial work the author should prepare his manuscript according to the practices of the journal to which it is to be submitted for publication. Special attention should be given to the methods used by that particular journal for citation of literature in the text, form and numbering of footnotes, form and style of bibliography, and form of tables and figures.

ANNOTATED LIST OF USEFUL REFERENCES

1. U. S. Government Printing Office style manual (revised edition) 1945.

   An excellent reference containing rules for capitalization, punctuation, abbreviation, compounding of words, use of numbers, spelling, tabular work, and other usage. This worthwhile manual in abridged form is available for 35 cents from the Superintendent of Documents, Washington, D. C.
2. A manual of style (revised tenth edition). University of Chicago Press, Chicago, Ill., 394 pp. (1943).

   A useful reference.
3. Webster's collegiate dictionary. G. & C. Merriam Co., Springfield, Mass.

   An abridgment of Webster's new international dictionary (second edition). This handy desk copy of the larger, standard work is considered one of the best of the smaller dictionaries. It contains a summary of the rules for punctuation, compounds, capitals, and other usage, as well as a list of proofreader's marks. Use a recent edition.
4. Webster's new international dictionary (second edition). G. & C. Merriam Co., Springfield, Mass.

   This unabridged work is the outstanding authority among American dictionaries.
5. Dorland's American illustrated medical dictionary. W. B. Saunders Co., Philadelphia, Pa.

   An excellent and well-known medical dictionary. Use a recent edition.
6. Webster's dictionary of synonyms. G. & C. Merriam Co., Springfield, Mass.

   A standard work which explains by means of examples the finer usage of words.

7. Roget's thesaurus of the English language. Garden City Publishing Co., New York, N. Y.
The dictionary form of this work is probably the most easily used.
8. Wooley, E. C., Scott, F. W., and Berdahl, E. T.: College handbook of composition (fourth edition). D. C. Heath and Co., Boston, Mass., 452 pp. (1944).
9. Foerster, Norman, and Steadman, J. M., Jr.: Writing and thinking (revised edition). Houghton Mifflin Co., New York, N. Y., 448 pp. (1941).
10. Howell, A. C.: A handbook of English in engineering usage (second edition). John Wiley and Sons, New York, N. Y., 433 pp. (1946).
11. Jordon, R. C., and Edwards, M. J.: Aids to technical writing. University of Minnesota Engineering Experiment Station Bulletin No. 21; 47(24): 117 pp. (1944).
12. Trelease, S. F.: The scientific paper. The Williams and Wilkins Co., Baltimore, Md., 152 pp. (1947).
An excellent general handbook.
13. Ridway, J. L.: Scientific illustration. Stanford University Press, Stanford, Calif., 173 pp. (1938).
14. Ferris, G. F.: The principles of systematic entomology. Stanford University Publication. University Series. Biol. Sciences, 5(3): 169 pp. (1928).
15. Pearl, Raymond: Introduction to medical biometry and statistics (third edition). W. B. Saunders Co., Philadelphia, Pa., 537 pp. (1941).

Conference of State Epidemiologists on National Morbidity Reporting *

The Conference of State Epidemiologists on National Morbidity Reporting was held at the Communicable Disease Center, Atlanta, Ga.**, April 18-20, 1951, for the purpose of revising the procedures and the lists of specific diseases to be reported by the States and Territories to the National Office of Vital Statistics***. The conference was attended by 174 persons representing 37 States, the District of Columbia, and Puerto Rico.

A Subcommittee on Morbidity Reporting was appointed by Dr. Roy L. Cleere, president of the Association of State and Territorial Health Officers, to receive the recommendations of the conference and prepare a report for presentation to the Infectious Disease Committee of the Association at its 1951 meeting. Dr. Wilton L. Halverson, chairman of the Committee on Administrative Practice of the American Public Health Association, designated the same subcommittee to present its report to this committee at the 1951 meeting of the APHA in San Francisco, Calif. This subcommittee is composed of Dr. A. C. Hollister, Jr., Chief, Acute Communicable Disease Service, California, chairman; Dr. C. R. Freeble, Jr., Chief, Division of Communicable Diseases, Ohio; Dr. A. L. Gray, Director, Preventable Disease Control, Mississippi; Dr. Robert F. Korns, Director, Bureau of Epidemiology and Communicable Disease Control, New York; and Dr. Albert S. McCown, Director, Communicable Disease Control, Virginia.

Consultants for this subcommittee include Dr. C. C. Dauer, National Office of Vital Statistics; Miss Vivian Holland, chairman, Working Group on Morbidity Statistics of Public Health Conference on Records and Statistics; and Dr. Alexander D. Langmuir, Communicable Disease Center.

The work of the conference fell into two categories: decision with respect to (1) the manner in

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**The meetings were conducted at the Fulton County Academy of Medicine.
***See "Plan for Revising Morbidity Reporting by States," CDC Bulletin X(2): 4-12, February 1951.