Research -
No Matter How
Good Or Important
The Results Are -
Is Not Complete
Until It Is Written
And Published
"A naturalist's life would be a happy one if he only had to observe and never write" -- Charles Darwin.

- Scientists must not only DO science, they must also WRITE about science.

- Scientists become known or remain unknown through their publication.

- Good scientific writing does not lead to the publication of poor science. Poor writing does, however, delay the publication of good science.

- Goal: To prepare manuscripts that have a high probability of being accepted for publication. To be completely understood when they are published.

- To write a scientific paper, we must know WHAT to do and WHY we do it.

- Preparing a scientific paper is not a literary skill, it is ORGANIZATION.
Definition of a "Scientific Paper"

- The first publication of original research results

- in a form whereby peers of the author can repeat the experiments and test the conclusions

- in a journal or other source document readily available within the scientific community
Four questions of Scientific Writing

What was the problem studied?

How did I study it?

What did I find?

What do the findings mean?

The Answers become the

Introduction

Methods

Results

Discussion

The four parts of a scientific paper

Discussion: » answers, questions

Conclusion: » take home message
Organization of a Scientific Article

**Key**

```
general ← particular → general
```

**INTRODUCTION**

1. ______
2. ______
3. ______
4. Objectives (a-d)

**METHODS/PROCEDURES**

Subheading 1
Subheading 2
Subheading 3
Subheading 4

Subheadings i-v

**RESULTS**

**DISCUSSION**

Subheadings i-v

**CONCLUSION**

Objectives (a-d)

("the home message")
Organization of a Scientific Article

INTRODUCTION
4 paragraph

METHODS/PROCEDURES
organize in the order of
I did

RESULTS

DISCUSSION
oxidants react with methamidophos.
oxidation products not activated.
inhibitors. Activation not ruled out as activation process.
other oxidations possible, other conditions.
to favor reactive intermediate

CONCLUSION
not activated by oxidation with MMPP

4. Objectives (a-d)

Subheading 1
Subheading 2
Subheading 3
Subheading 4

Pesticides - Cholinesterase Compounds
Acute nerve poisons, some better than others
Methamidophos
poor in vitro, good in vivo
is it activated? How?

RESULTS

DISCUSSION
oxidants react with methamidophos.
oxidation products not activated.
inhibitors. Activation not ruled out as activation process.
other oxidations possible, other conditions.
to favor reactive intermediate

CONCLUSION
not activated by oxidation with MMPP

4. Objectives (a-d)
Organization of a Scientific Article
*General → Particular → General*

**Introduction**

1. 

2. 

3. 

4. Objectives:
   a. 
   b. 
   c. 
   d. 

**Methods/Procedures**

Subheading 1: 

In order to *(do this)*, I *(did this)*

How did I study it?

Subheading 2: 

Subheading 3: 

Subheading 4:

**Results**

Subheadings:

i. 

ii. 

iii. 

iv. 

v. 

**Discussion**

Subheadings:

i. 

ii. 

iii. 

iv. 

v. 

**Conclusion**

Objectives a.-d.:
Organization of a Scientific Article
General → Particular → General

Introduction

1. PESTICIDES
2. ORGANOPHOSPHATES (OPs)
3. Ethephon an OP
4. Objectives:
   a. Determine Inhibition rates
   b. Species Sensitivity
   c. Mechanism of Inhibition - phosphorylation
   d. All with Butyrylcholinesterase (BuChE)

Methods/Procedures

In order to do this, I (did this)
Subheading 1: Determine Inhibition Rates, I followed Ellman Method
Colorimetric Detection
Subheading 2: Determine Species Sensitivity, I analyzed species plasma
Species Plasma Inhibition
Subheading 3: Determine Inhibition Mechanism, I examined analogs/other compounds
Inhibition by Analogs
Subheading 4:

Results

Subheadings:
   i. Ellman method a simple procedure
   ii. Dog most sensitive, horse least
   iii. 2-Bromo ethyl, a better inhibitor
   iv. Effects of other Analogs
   v.

Discussion

Subheadings:
   i.
   ii.
   iii.
   iv.
   v.

Conclusion

Objectives a–d:
Outline

Butyrylcholinesterase Inhibition by Ethephon and some Analogs

J. Eric Haux, Yoshihisa Tsukamoto, Gary B. Quistad, and John E. Casida

Introduction

Pesticide use is a potential acute and/or chronic toxicity hazard.

Organophosphate (OP) insecticides demonstrate toxicity by inhibiting enzymes through phosphorylation of the active site serine.

The OP Ethephon \([(2\text{-chloroethyl})\text{phosphonic acid, } \text{ClCH}_2\text{CH}_2\text{P(O)}\text{(OH)}_2]\) is used in California in amounts greater than 800,000 pounds annually. Plasma butyrylcholinesterase (BuChE) is inhibited in rats and mice by ethephon at 10-1500 mg/kg (Hennighauser et al., 1977; Hennighauser and Tiefenbach, 1978). Beagle dogs also show plasma BuChE inhibition with daily oral doses of 0.75 mg/kg over two years (Federal Register, 1997). The physiological function of BuChE is poorly understood other than in detoxification of several drugs (e.g., aspirin and succinylcholine) susceptible to ester hydrolysis. BuChE inhibitors are therefore of concern as potential sensitizers to drug toxicity.

The mechanism by which ethephon inhibits BuChE is of particular interest because ethephon is structurally different from organophosphorus (OP) insecticides known to inhibit BuChE. This research seeks to elucidate:

- species sensitivity
- inhibition rates
- mechanism(s) of BuChE inhibition

Methods

Materials

- UVmax kinetic micro plate reader from Molecular Devices from Sigma:
  - plasmas (lyophilized)- human, horse, dog, rabbit, bovine, goat, mouse, chicken, pig
  - 5,5'-Dithio-bis(2-NitroBenzoic acid) (DTNB) CAS#
- Butyrylthiocholine iodide (BuTCh) CAS#
  - from, Fisher:
  - sodium phosphate (dibasic; anhydrous)
    - from Chem Service:
- Ethephon \([(2\text{-Chloroethyl})\text{phosphonic acid}]\) CAS#

Analogs:

- 2-halogenated alkylphosphonic acids (e.g., Br, I analogues of ethephon) were synthesized. (2-Bromoethyl)phosphonic acid was prepared following the method of
Organization of a Scientific Article

Working Title: Caddisfly grazing on stream algae

INTRODUCTION
1. Importance of grazing in all ecosystems
2. In aquatic systems
3. Experimental studies of aquatic grazers
4. Objectives (a-d)

METHODS/PROCEDURES
- Study area
- Study organisms
- Experimental design
- Sampling
- Statistics

RESULTS
- Grazer effects on algal growth
- Algal effects on grazers

DISCUSSION
- Grazer effects on algae: reduced biomass but increased productivity
- Algal effects on grazers: when density of grazers is high, competition and reduced fitness (egg) results

CONCLUSION
- Especially important in aquatic ecosystems: because it makes primary production
II. MATERIALS AND METHODS

A. Study area
B. Biology of caddisfly/algae
C. Experimental design
D. Insect and algal sampling
E. Statistical analysis

III. RESULTS

*A. Grazer effects on algae
B. Algal effects on grazer

IV. DISCUSSION

Same topic outline (A + B) as in Results
Figure Caddisfly effects / grazing on algae
Algadal effects on caddisflies

Chl a

Number of grazers

Week
III. RESULTS

A. Grazer effects on algae

1. Standing crop of algae fluctuated (Fig)
2. Standing crop of grazers fluctuated (Fig)

1a. Chlorophyll α increased (wk 1-2)
1b. Chlorophyll α decreased (wk 3-4)
1c. Chlorophyll α increased (wk 5-7)

2a.
2b.
2c.
Grazer Effects on Algae

The standing crop of algae fluctuated cyclically during the 7-wk pilot study (Fig. 2). Chlorophyll \( \alpha \) increased to 0.8 \( \mu g/cm^2 \) (=8 mg/m\(^2\)) after 2 wk, declined to 0.1 \( \mu g/cm^2 \) during wk 3-4, and then increased to its previously high level during wk 5-7.

* Topic sentence opens *

* each paragraph *

*
IV. DISCUSSION OUTLINE FOLLOWS

RESULTS -- USE SUBHEADINGS

I. INTRODUCTION
   A. Importance of grazing in ecosystems
   B. Grazing in aquatic systems
   C. Experimental studies of grazing aquatic systems
   D. Study Objectives

ABSTRACT

ACKNOWLEDGEMENTS

LITERATURE CITED
**Working Title:** Effects of caddisfly grazing on stream algae

**Words/concepts in Title:**
- caddisfly
- grazing
- (herbivory)
- stream
- algae
- bacteria
- periphyton
- experimental?

**Final Title:** Stream Periphyton and Insect Herbivores: An Experimental Study of Grazing by a Caddisfly Population
Titles

Too short? Rarely

Too long? Avoid “waste words”

“Studies on . . . .”
“Investigations of . . . .”
“Observations on . . . .”

A title is a label, not a sentence

“Thermoregulation in the Tasmanian devil
Sarcophilus harrisii”  50-60 reprint requests

“Does the devil sweat? Thermoregulation in . . . .” > 1000 reprint requests

Colonic titles:
10% more scholarly!
AUTHOR

**Authorship:** Includes only those who actively contribute to the overall design and execution of the experiments. An author takes intellectual responsibility for the research results being reported.

**“Areas” of Research Investigation:**

- Conception and Funding
- Design of Experiments
- Data Collection
- Data Analysis
- Manuscript Preparation
- ? Other
OTHER CONSIDERATIONS

AUTHOR SEQUENCE

AUTHOR ADDRESS

✓ Where you did your research
    met where you are now!

ACKNOWLEDGEMENTS:

   Individuals

   Agencies

PAGE CHARGES
Authorship

First author
alone
of two
of a series

Second author
of two
of a series

Last Author

Alphabetical listing

▲ Establishing sequence of authors in advance

"Bourbaki"

Address

Where research was done

Footnote for current address
Abstract

1-3% of articles length or ≤ specified number of words (~150-250)

second most important part of paper after title

"A summary of the information" that should:

i - state the principal objectives and scope of the study
ii - describe methods used
iii - summarize the results
iv - state the principal conclusion

usually too much detail is included

Abstract must be able to be read without referring to article it summarizes

Avoid references

Avoid words like "discussed, presented, summarized"

Take out all the topic sentences from each paragraph, then put them together!

Say nothing in Abstract
Introduction (4-paragraph structure)

- A description of what you did
- Goes from general to specific
- Presents the nature and scope of the problem
- Indicates how this study fits into the problem
- Reviews pertinent literature
- Present goal/objectives of study and paper.

Materials and Methods

- A description of how you did it
- Add Subheadings for approaches used
- in outlining use: “In order to do/determine _____, I did ______”
- Give copy of methods to colleagues, asking whether they could repeat the experiment based on what is written
Results

- Based on availability
- Prefer New rather than Old if equally important
- A description of what you found in your experiments
- Separate facts from inferences (which is why Results and Discussion are kept separate)
- Present results in a logical sequence that corresponds to objectives
- Best if short
- Difficulties of repetitive data in Tables and figures
- Do not include material that does not relate to objectives

Discussion

- A description of what your experiments mean
- Shows relationships among results observed
- Shows how results agree or disagree with previously published research

Conclusions

- Most often-quoted part of article
- State conclusion summarizing evidence
- Ideas for future research (not a call for more research); questions?
  \[ \Rightarrow \] Don't call for more research,
  Tense \(<\text{present, past, future}\)>
  I/We, one, \\

\[ \Rightarrow \]
  can suggest possible future research
Acknowledgement

- Simple and courteous
- "I thank" not "wish to thank"
- Limited to those who contributed to study (technical, funding, editorial)

Figures or Tables?

- Exact numerical values (Tables)
- Trends (Figures)
- Design tables and figures with format (1 or 2 column) of journal in mind.

Final Thoughts

- "aging" of manuscript helps
- pre-submission reviews
Literature Cited

- references cited should be restricted to significant journal articles, not reports if possible
- format specific to journal
  * name and year
  * number from an alphabetical list
  * number in sequence of citation
- check citations and text for congruence
- check citations against original articles
- use literature cited to determine appropriate journal for submission
- avoid "ghosts"
  150 citations checked (Public Health journals)
  31% had errors
  10% of citations could not be found
- cite literature correctly
  30% of citations differed from original author's statements
  15% of citations do not relate to original author's statements
  \( \checkmark \)

\[ \text{Did read it actually.} \]
Considerations in Choice of Journals

(1) Are aims and scope of journal similar to those in article to be submitted?

Is journal cited extensively in bibliography?

(2) How often is journal published (weekly, monthly, annually), and what is the lag time (date submitted to date journal published)?

Expect 1 year from date submitted to date published

(3) What type of articles are published (reviews, primary research)?

Many journals will not publish reviews; many journals that do publish reviews are by invitation only

(4) Are there special requirements for submitting articles (membership in a society, page charges)?

Page charges
- $25-$100/pg ($~50)
- Most journals in U.S. and Canada have page charges; European-based journals do not have page charges
- Provide government support of journals, result in lower subscription rates (~25%), and preclude many authors from publishing in US journals.
- Waivers sometimes occur

(5) Do you require special features?

Less important with Internet availability
Color photographs >$1,000 for each page
(6) How good is your article and how good is journal?

Pre-reviewer input
Even if not accepted, manuscript improves because of critical reviews

(7) Prestige of journals

Impact Factors
Types of Articles Appearing in Journals

1. research paper (8-10 pp.)
2. review articles (20-30 pp.)
3. commentaries (1-2 pp.)
4. reviews [individual books or software (<1-2 pp.); comparative reviews (2-3 pp.)]
5. working papers (1-2 pp.)
Author

↓

Editor
(Associate editor/Editorial Board)

↓

Reviewers
(Editorial Board)

↓

Editor
(preliminary decision)

↓

Author

↓

Editor (final decision)
RESPONSIBILITIES OF THE EDITOR

Goal: To publish good science in understandable language.

Functions:

- To serve as the connection between author and reviewers.
- To fulfill responsibilities to the journal, the author, and the reader.

Ethical Considerations:

- To maintain objectivity in dealing with “antagonism”.
- To choose appropriate reviewers of research papers.
- To discount the RARE (0.1%) unfair or blatantly biased review.
RESPONSIBILITIES OF REVIEWERS

1) **No Exploitation:** To use the information that the manuscript contains for advancement of reviewer's own research or in discussions with colleagues.

2) **No Bias:** Failure to adopt a positive, impartial attitude toward manuscript under review. (If cannot be done - return ms.)

3) **No Unnecessary Delays:** Failure to return review (at all) or within editor's deadline. (If cannot be done - return ms.)

4) **No Violations of Confidentiality:**
   Discussing recommendation (to publish/reject) directly with author. (This responsibility lies with the editor.)
RESPONSIBILITIES OF THE AUTHOR

1) No Double Publishing

The same "body of data" is used to produce two articles that are published in two different places.

2) No Multiple Submissions

The same article is submitted to more than one journal at a time.

3) No Copyright Violations

Any repeat use of material after copyright has been transferred to the publisher.
**AVOIDING "Double Publishing" SAME BODY OF RESEARCH**

<table>
<thead>
<tr>
<th>Proceedings of a Conference</th>
<th>International Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Publish entire paper</td>
<td>Publish no paper</td>
</tr>
<tr>
<td>(2) Publish extended abstract (500-1000 words); no figures or tables</td>
<td>Publish entire article</td>
</tr>
<tr>
<td>(3) Publish methods or management implications, described in detail</td>
<td>Publish research described in detail</td>
</tr>
<tr>
<td>(4) Publish no paper (except short-150-word abstract)</td>
<td>Publish entire paper</td>
</tr>
</tbody>
</table>
SCIENTIFIC MISCONDUCT

"Fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research. It does not include honest error or honest differences in interpretations or judgments of data". (Code of U.S. Federal Regulations 50.102, 42 CFR Part 50)
Proofreader's Marks

In general, indicate within the text line where a correction is to be made; indicate in the right margin what the correction is. Where possible, use the proofreader's marks below; otherwise please describe the change to be made. The example at the bottom shows how to mark multiple corrections in a single line.

<table>
<thead>
<tr>
<th>Mark the text</th>
<th>In the margin</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now is the time</td>
<td>~</td>
<td>Delete; take out</td>
</tr>
<tr>
<td>Now is the time</td>
<td>(</td>
<td>Close up</td>
</tr>
<tr>
<td>Now is the time</td>
<td>#</td>
<td>Insert space</td>
</tr>
<tr>
<td>Now is the time</td>
<td>O</td>
<td>Insert word(s)</td>
</tr>
<tr>
<td>It is time</td>
<td>$</td>
<td>Insert period</td>
</tr>
<tr>
<td>It is time</td>
<td>}</td>
<td>Insert comma</td>
</tr>
<tr>
<td>It is time</td>
<td>$</td>
<td>Insert semicolon</td>
</tr>
<tr>
<td>The high-energy pump</td>
<td>/</td>
<td>Insert hyphen</td>
</tr>
<tr>
<td>Smith (1977) stated</td>
<td>c/b</td>
<td>Insert parentheses</td>
</tr>
<tr>
<td>Evaluation of E</td>
<td>$</td>
<td>Insert as superscript</td>
</tr>
<tr>
<td>The value of E</td>
<td>max</td>
<td>Make subscript</td>
</tr>
<tr>
<td>The value of</td>
<td>$</td>
<td>Straighten line(s)</td>
</tr>
<tr>
<td>all cases</td>
<td>$</td>
<td>Make new paragraph</td>
</tr>
<tr>
<td>The value of</td>
<td>$</td>
<td>No paragraph, run in</td>
</tr>
<tr>
<td>most times</td>
<td>$</td>
<td>Transpose</td>
</tr>
<tr>
<td>E max</td>
<td>$</td>
<td>Move left as indicated</td>
</tr>
<tr>
<td>Now is the time</td>
<td>(</td>
<td>Move right as indicated</td>
</tr>
<tr>
<td>now is the time</td>
<td>(</td>
<td>Roman type</td>
</tr>
<tr>
<td>Smith (1977) said</td>
<td>e/c</td>
<td>Capital</td>
</tr>
<tr>
<td>Now is the time</td>
<td>italic</td>
<td>Small capitals</td>
</tr>
<tr>
<td>Now is the time</td>
<td>italic</td>
<td>Lower case</td>
</tr>
<tr>
<td>Now is the time</td>
<td>skok</td>
<td>Italic</td>
</tr>
<tr>
<td>Now is the time</td>
<td>skok</td>
<td>Capital italic</td>
</tr>
<tr>
<td>Now is the time</td>
<td>skok</td>
<td>Boldface type</td>
</tr>
<tr>
<td>Let stand as is</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example

<table>
<thead>
<tr>
<th>Mark the text</th>
<th>In the margin</th>
<th>To read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now is the time for all good men to the aid, said Smith (1977) of their country.</td>
<td>/[ ]/</td>
<td>“Now is the time for all good men to come to the aid,” said SMITH (1977), “of their country.”</td>
</tr>
</tbody>
</table>
Become a More Successful Author

The “Suggestions for Contributors” pages that appear in this journal from time to time give the bare essentials of preparing a paper for submission. This new section will also appear from time to time with suggestions that go beyond the basics and help authors prepare their papers with finesse.

Scientific journals have but one purpose, to transmit information from writers to readers. If a paper already conveys the facts of the research, why should its author be concerned about finesse? There are basically two reasons.

First, because a well-written paper will be more readily understood by the reviewers. This means the paper will stand a better chance of being accepted and will be published in less time with fewer revisions.

Second, because the readers of the journal are more likely to read and understand a well-written paper than they will a murky and poorly written one.

The reviewers and readers of this (and every other) journal are busy people. They probably want to read your paper, but they also have their own research to conduct and their own papers to write. On top of that, they have other demands on their professional and personal time. When faced with a murky piece of writing, these reviewers and readers will make an honest effort to read it. If they cannot decipher the paper immediately they probably will set it aside until they have more time to devote to it. But after a couple more tries at reading the article they are likely to decide that the benefit is not worth the effort.

The author and his or her closest colleagues will be the only people who read a truly murky piece of writing. If the paper is written somewhat better a few more scientists in the field, and perhaps a few more in a closely related field, will read it. A truly outstanding piece of writing will be widely read, widely quoted and cited, and will bring great rewards to its author. In short, the time spent on producing a truly outstanding paper will be rewarded by higher acceptance percentages from journals and by greater recognition and acclaim from one’s peers.

The secret of producing an outstanding piece of writing is to always keep the reader in mind. Authors who keep readers in mind convey their information more lucidly than authors who write only for themselves. The scientific who has the attitude, “Why should I worry about how this is presented; everybody knows what I mean,” is incorrect; everybody does not know. The person whose native language is not English may not know; the student who is only beginning to approach the author’s level of expertise in the subject area may not know; and other scientists in similar but separate fields may not know. The thoughtful scientist-writer keeps these people in mind.

Title

A good title will attract readers who might not otherwise read the paper; a poor title will hide the paper’s contents from even the most interested. That’s why the specifications call for six to 12 words, no abbreviations—even, and no Latin names if an English name is available. Begin with the key words, not with a low-impact phrase such as “Effect of . . .” or “Influence of . . .” Eliminate ambiguous words.

Abstract

The abstract should be meaningful by itself, not a teaser. It will be read by 50 to 500 times more people than the full paper. Therefore, the abstract should convey information itself, not just promise it. Never use such phrases as “. . . are described” or “. . . will be presented” in an abstract. Instead, describe them, present them. Always begin the abstract with rationale and objective statements; never jump directly into the materials and methods. When a person reads an abstract that begins, “The effect of chemical A on plant B was studied . . .” that person has the perfect right to ask, “Why was it studied?”

General Suggestions

Adhere to the style spelled out for ASA-CSSA-SSSA journals. If you don’t, reviewers might think you wrote the paper for another journal and sent it to us after it was rejected there. This is not the best attitude for a reviewer to have as he or she begins to read your paper.

An irritated reviewer is no better than a negatively disposed reviewer. What irritates reviewers? Unnecessary errors. Edit your paper carefully to eliminate spelling, punctuation, and grammatical errors. Even after you are finished and you know the paper is perfect, lay it aside for a few days and then read it again.

Check the accuracy of your references scrupulously. You wouldn’t believe how many papers arrive at a reviewer’s desk with incorrect dates, titles, and author names in reference lists; or one year of publication or spelling of the author’s name in the reference list and another in the text citation.

Scientific editors and Headquarters editors are not supposed to rewrite a poorly written or sloppy manuscript; that responsibility rests solely with the author. If you have difficulty writing scientific English, consult a colleague who you know writes well, or seek the services of a professional editor who will help you for a fee. We can provide names and addresses of Tri-Society members who have volunteered to help authors whose first language is not English.

Writing the Paper

Organize your paper so that it answers four basic questions:

3. What did I learn? Results.
4. What does it mean and how does it relate to what else is known? Discussion and Conclusions (and Summary also, if the paper warrants one).

In the introduction, discuss only work that is directly related to the work you are describing. Don’t cite every paper written on the subject; cite only the most important ones or key review papers. Three or four citations (never more than six) are plenty to corroborate a statement.

Avoid repetition; don’t repeat the abstract in the introduction or the synonym the introduction. If you give a botanical name, chemical name, or a soil description in the abstract, don’t repeat it in the text. It is necessary to repeat some of the information from the text in the captions for the tables and figures, because readers generally study the tables and figures before they read the text. In the text, refer to tables and figures, but don’t repeat them.

Don’t mix fact and opinion; when you include opinion or speculation, clearly label it as such.

Be concise, don’t ramble. Short, concise papers are more likely to be accepted than long, rambling papers (and will cost less to publish).
Constructing the Sentence

Scientific writing contains far too much use of passive voice; let's start moving away from it, as we tried to do in this piece. Regardless of what anybody tells you, it's okay to use first person in scientific literature. You don't have to say "the research was conducted," you may say "we conducted the research."

With very few exceptions, don't write sentences that require use of the word "respectively"; they are extremely difficult to read. Too many sentences in our journals are constructed in this manner: "Water contents were 92, 128, and 280 g kg⁻¹ for samples 5, 6, and 18, respectively." It is much easier to read and decipher, "Water contents were 92 kg ha⁻¹ for Sample 5, 128 for Sample 6, and 280 for Sample 18." Believe it or not, we actually received a manuscript with the following sentence: "Planting was done on 20, 25, 28, and 3 of May, May, May, and June in 1983, 1986, 1987, and 1988, respectively."

Word Use

You can eliminate some words without changing the meaning of a sentence. The word "located" is a good example; it can be eliminated from almost every sentence without any loss in meaning. "The plots were located near Ames, IA." is better as, "The plots were near Ames, IA." Both sentences convey exactly the same meaning; the word "located" adds nothing. Similarly, the word "that" is unnecessary in many sentences. Here are three other words that can be deleted:

prior history (all history is prior)
careful examination, careful study (would you do it any other way?)
very (the only time this word contributes anything is in certain negative sentences, "It isn't very effective.")

The following four phrases, which frequently appear in scientific literature, could be eliminated and never missed:

it is shown that
it is a fact that
it is emphasized that
it is known that

And have you ever noticed, there is no such thing as rain in our journals? Whenever it rains it is always a "rainfall event" or even a "precipitation event."

Other words are used to mean things they never were supposed to mean. A good example is the word "over"; it means "above," but authors use it incorrectly to mean such things as:

Correct word(s)

Incorrect use of "over"
during
growth over time, happened over the weekend
onto
fertilizer was spread over the field
more than
took over 70 samples, yield increased by over 10%
from, across
pooled over three locations
of
changes in concentration over time
to
traffic applied over 100% of the soil

Sampling was stratified over soil taxonomic groups, drove over the field through accumulated over the years here came over after work

Such words as "parameter," "following," "facility," and many more are grossly misused in scientific literature. Time does not have points, so there can be no such thing as a "point in time." Instead of saying "at this point in time," simply say, "at this time."

Here is a list of long words and phrases and a comparable shorter way to say the same thing:

Instead of
appears to be
in the absence of
higher in comparison to
was found to be
in the event that
small number of
was variable
additional
approximately
at the present time
establish
identify
in a timely manner
necessitate
operate

Use
seems
without
more than
was
if
few
varied
added, more, other
about, =
now
set up, prove, show
find, name, show
promptly
cause, need
run, work

Conclusion

Scientific writing is not difficult, but it also is not nearly as easy as some would think. Practically any scientist can write well enough to get by and be understood by a few. If you want to do more than this, take time for additional input, study, and practice. You could find a far higher percentage of your papers being accepted, or at least have your papers accepted more quickly, than they have been until now. Who knows, you might even become one of those rare scientists who write well enough to have an impact far outside your field of study, regardless of how narrow that field might be.

(Inspired by a paper in the journal Neurology, and developed for the Tri-Societies by an ad-hoc committee of all the editors-in-chief and editors, plus Headquarters staff editors. Contributors included G.H. Heichel, D.E. Kissel, C.W. Stuber, G.A. Peterson, J.L. Hatfield, R.G. Hoeft, R.J. Wagener, T.J. Logan, W.A. Anderson, and W.R. Luellen.)

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No study is ever complete. . . . Deciding when to write up a study is an arbitrary and personal decision. A paper is written when an investigator decides that a story can be told that hangs together, that makes sense and that others will want to read and build on. The scientific literature is a conversation among scientists. . . . It is crucial to remember, and often forgotten, that a paper does not claim to be an absolute assurance of truth, only a moment’s best guess by one group of investigators. Because all of these judgments are less than wholly objective, another investigator might have come to a different conclusion using the same data. In a real sense, a scientific paper is a subjective product.54

THE BALTIMORE CASE

A Trial of Politics, Science, and Character

DANIEL J. KEVLES

Further readings about Baltimore case:
https://en.wikipedia.org/wiki/Thereza_Imanishi-Kari
https://en.wikipedia.org/wiki/Luk_Van_Parijs
Science on Trial: The Baltimore Case, With Articles From the Archives of The New York Times