Scientific Publishing: where do cavers fit?

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Abstract
As a heterogeneous group of people, who are interested in caves and karst, cavers often want to publish material. The range of publications available includes local caving magazines and newsletters, specialist speleological publications and scientific journals. This discussion will explore the main types of such publications and discuss their respective roles and requirements in the Australian context.

Introduction
Cavers are a diverse group of enthusiasts and have many reasons for publication. These include reporting trips for exploration details, social reporting, publishing cave descriptions, cave documentation, scientific descriptions, conservation issues and professional scientific publication. There are possibly other reasons as well each caver will have different reasons for publication.

Types of Publications
As there are many reasons for publication there are also different types of publication. These are not **better or worse** than each other rather than each performing a **different** purpose. For example: a paper of great scientific importance written up to be acceptable for *Nature or Science* is an inappropriate type of writing for *Australian Caver.*

This paper will describe and discuss the various types of publications with examples and include some discussion of their values and the types of writing and editing appropriate. As well as writing for these publications, cavers should be reading them and referring to them. However, we all need to be aware of the level of accuracy implied in each type.

A diversion: Scientific methods
A short diversion about scientific method and issues of fact and interpretation is needed to give some context to the overall discussion.

Science is not merely the collection of facts. Although some facts are clearly not changeable - this grass is green, this mineral has a hardness of 4, this material is composed of these components - most science involves the interpretation of a collection of such facts to present and interpretation on how something formed.
The main **methods of procedure** are

1. The experimental method (used by chemists and physicists) as controlled experiments;
2. The normative method where the researcher observes events and evaluates observed processes with a view to establishing content relationships or norms (used by biologists, microbiologists, and hydrologists). In this case description and analysis are important (dependent variable Y varying proportionately with independent variable X).
3. Where neither control nor evaluation of variables is possible, the researcher records the observations accurately (geologists and geomorphologists use this one extensively) and then gives an interpretation.

Interpretation can be defined as the art of presenting the meaning of scientific facts. As such interpretation explains and elucidates scientific observations. The bare observations are not enough; we need to have the explanations of them in such as way as to give the facts context. In the case of karst the age of a particular speleothem is often of interest. However the raw date has only limited value unless it is interpreted as to its context in terms of climate of that time and the

accuracy and precision of the date. In the future, a more accurate or precise date may become available and a new interpretation then needed.

A constantly changing pattern of hypotheses, theories and facts is the reality of science. These have different degrees of accuracy and permanency. Hypotheses are ideas, which are still to be proved. A hypothesis is usually based on assumptions, and so some knowledge of the subject is useful, and will change as it is proved or not. New ones are developed and are in turn subjected to proof. Not all scientific research will have hypotheses as sometimes so little is known about a particular problem or situation that it is impossible to develop a meaningful hypothesis. Hypotheses are by nature very specific and part of a scientist's work is to develop a pattern that will organise the experimental or observational data into a comprehensible whole. Such a pattern is defined as a theory. However a theory can only take into consideration the data that exist at the time the theory is formed. Making a prediction based on this theory and carrying out further work to see if the prediction holds true can test it. One of the values of a theory is to suggest such new work. If the new data is not consistent with the theory, the theory must be discarded or revised. In all science therefore, a theory is never proved for all time. It must constantly be able to account for all the new evidence that arises.

Interpretation also needs to be appropriate. The presentation of cave and karst information can be in many forms and should be tailored for the audience. For most karst managers it is to the general public; for karst scientists it is to other karst scientists and perhaps to managers, and is thus audience specific. Science and interpretation are therefore closely linked. The balance between scientific interpretation which is appropriate for a particular audience and the accuracy of the science is not easy to maintain but is something we should all aspire to. ACKMA members in particular, are intensely interested in interpreting the understanding of caves and karst. The challenge is to maintain accuracy and the excitement of knowledge when maintaining balance between the karst scientists, managers, cavers and the general public.

In theory there is probably little in the above section not understood or agreed with. However things are never that simple. As the two most common elements in karst are Calcium and Stupidity (Tom Aley, pers comm., 1999), the potential for misinterpretation and inaccuracy is immense.

There are a number of examples of theories and interpretations that have not been modified in the light of new information. This is particularly a problem in the geological and geomorphological aspects of interpretation. For some reason there is a tendency for geological theories to continue in interpretive material long after they have been modified and or disproved by earth scientists. The same level of inaccuracy in the biological sciences is not tolerated and new and updated material is incorporated into interpretive material more readily. e.g. the age of the Grampians still is quoted as Carboniferous when for over 15 years it has been known on the basis of (then) new Fission Track Dating techniques as being older than the Devonian and they were then interpreted as being of Ordovician/Silurian age. New information is showing it as possibly even older. Similar interpretive information on the biology is much more up to date.

An important component of this is that no-one is immune: anyone who thinks they are, is fooling himself or herself. The issue is therefore one where we have to keep working at it; all of us; constantly. I believe it is important that we all accept that we have more to learn and that we should not feel guilty about past mistakes - they are past. We should try to improve. We should not be defensive with regard to improvement. Therefore the case studies/examples used here should be taken as constructive criticism. They are used so that we can learn from our mistakes not just ignore them.

Each of these problems occurs to various degrees. They need to be identified in order that their influence is minimised. It is unlikely that they can be completely eliminated. The most effective way of managing them is to be aware they occur and constantly work against their pernicious

influences! There are six main situations where misinterpretation and inaccuracy enters the karst interpretation scene. These are:

1. Failure to absorb and use new ideas and interpretations of new data and the ongoing use of seriously out of date, and incorrect information and interpretation.

2. Failure of communication by scientists, management, guides, interpreters, cavers and speleologists.

3. Tendencies to blame lack of resources, time, funds, libraries etc., rather than think our way through such problems.

4. A failure to update signage/notes/interpretation/tours and the retention of out of date material when new ones are developed.

5. Myth and misinformation creep.

6. Bioscience/earth science differences and scientific education problems.

I am all sure you can think of case studies on this. There are some classics in Victoria, e.g. The "Petrified Forest" at Cape Bridgewater. We should be aware that quoting something that was an interpretation from known data from the 1960's does not mean that it still holds. One other example could be Joe Jennings' work on the paucity of karst in Australia, which needs a serious look at it. Just because Joe said it does not mean his interpretation continues to hold up in the light of new information and it is a long time since this question was really looked at. It is also not a slight to the memory of a great Australian karst scientist. He reinterpreted data in his work and updated material eg age of landforms and that was one of the things that made his work so good.

I have made this digression because I believe it relates to how we view publications.

Types of publications

The types of publications we should all be using are: club newsletters, club journals, caving journals, speleological scientific journals (some refereed and some not), speleological monographs, unpublished reports, conference preceding/proceedings, refereed scientific journals and books. Each of these has advantages and disadvantages as a place to publish or obtain material. Club Newsletters give information to club members whereas club journals may give more interpretive material. These often republish material from the more scientific or more detailed material e.g. I am periodically asked for permission to republish in club newsletters and journals, material previously published in Helictite. This is good as it spreads the information further.

What sort of articles are the best to publish in each? This depends on the type of article. Detailed and complex discussions of dates of dune limestones and their relation to the formation of karst in southern Australia are not an appropriate article for a club newsletter. It is better published in a refereed scientific journal. On the other hand, an entertaining account of an exploration trip to a karst area is not suitable for the same refereed scientific journal and is entertaining reading in a club publication or Australian Caver. If there is important scientific work coming out of the exploration this should be written up as a separate article for the science publication. In many cases there is useful information and description in the club publications and these then should be referenced in the more scientific work. A good example of this is material published in Nargun on McEacheran's Death Trap Cave in the Lower Glenelg River area. A very interesting article on the palaeontological work in the cave has been published in the Australian Journal of Earth Sciences and the Nargun article is appropriately cited in it.

What is refereeing?

Refereeing is peer review and it has both pluses and minuses. On one hand it means that authors have the benefit of constructive criticism and the work has been subjected to review by people with some understanding of it. On the other hand refereeing can slow down publication and has been used by some unscrupulous people to stifle new ideas and discourage new work . Editors in particular need to be very wary of the last problem. The choice of referees is often one of the hardest tasks of an editor! Nevertheless, refereeing does imply that other workers in the same field agree that the work is worthy of publication. This may stimulate debate and further understanding of the problem.

What role do editors play?

Editors are a most important part of any publishing. They dispense encouragement to writers, give constructive criticism, fix the grammar and spelling and chose the range to articles that make a publication interesting to read. Their role is many faceted and includes seeing if the article fits the type published in this journal (including whether the journal is overdosed with that topic!), organising referees (if that is appropriate) and giving feedback to the author as well as the actual editing. This actual editing means checking that there is nothing in the articles that may be libellous or slanderous, making sure the grammar, spelling, style, and syntax are correct, writing the editorial and liasing with the production and distribution system. In many cases the editor is also the person who chases up new material. This means that the editor makes sure the whole journal fits together. Anyone who has edited the club journal knows that is a fascinating, sometimes exhilarating but also often tedious, time consuming and often frustrating task.

Types of Publication

A short summary of the types of publications follows. This is not exhaustive and I have tended to use the examples best known to me but many other examples exist

Club Newsletters

Club Newsletters are the backbone of written material for many caving clubs and many cavers. They are not refereed but are usually have had their grammar and spelling fixed up if necessary. They include quite a lot of social material and most of the caving articles are descriptive. THIS IS IMPORTANT. Some of the best basic descriptive cave and karst material is found in club publications but cavers need to be careful they distinguish between description and interpretation. An example of such a publication is The *Doline* (Caving Club of Victoria).

Club Journals

These are often similar to the newsletters but include longer articles. They are often more carefully edited but are not refereed. Many of the same issues apply as for the club newsletters. An example is *Nargun* Journal editions (Victorian Speleological Association).

Caving Journals

These are non refereed but edited caving journals. They include news, politics, descriptive articles, expedition reports, techniques, and terminology. They have often more detailed speleological information but because they are not refereed have a different position in the publishing stakes for professionals. In the past, publication in these may have been regarded positively by professionals but with the increasing professional pressures on publications, scientists cannot afford to publish material here Examples include *Australian Caver, Descent, NSS News,* and *ACKMA Journal.*

Speleological scientific journals

These are significantly different from the previous type although some of these are refereed and some not. These are not the most prestigious of scientific journals and many academics want and need to publish in the more discipline based journals eg Earth Surface Processes, Zeitschrift fur Geomorphology, Australian Journal of Earth Sciences, Australian Journal of Botany etc. However the speleological journals are refereed and edited and publish a range of science and social science material. Articles are usually not very long and the journal will usually take articles on any

speleological topic although these must be written up according to the journal's criteria. Examples include *Helictite, Cave and Karst Science,* and *NSS Bulletin* (now called *Journal of Cave and Karst Studies*).

Speleological monographs

These are not always refereed but are very useful. They are often reports for particular areas or expeditions. They are usually edited and sometimes produced with fancy printing and graphics. They are often hard to find after they cease to be very recent. An excellent example is J. Dunkley *Caves of Thailand* (Published by the Speleological Research Council)

Unpublished reports

These are often reports for Government departments and/or grants such as the recent vegetation report for NSW central area done by Peter Dykes and John Dunkley. These are useful but because they are not refereed the information has not been given the imprint of acceptance from the general scientific community. They are not really edited except for spelling and grammar. Many government departments produce these type of reports but unless the material is written up and published in refereed journals or as a fully published book, they have no more scientific status than any other unrefereed material. People producing these should be encouraged to write them up for full publication.

Conference precedings/proceedings

These vary a great deal and can be useful. They are usually not refereed but are edited although this varies from conference to conference. Some international ones are refereed. ASF Conference proceedings are a good example.

Refereed scientific Journals

These include generalist journals such as *Nature* and *Science* but are generally discipline based. The different disciplines use slightly different formats but they are all refereed and tightly edited. It is often difficult to be published in these journals and the lead-time is usually in years rather than months. An example is Australian *Journal of Earth Sciences*.

Books

Books are highly variable. They can be a full book e.g. J.N. Jennings (1985) *Karst Geomorphology* or D. Gillieson (1996) *Caves*; or they can be an edited book of a series of articles/ chapters from different authors eg Klimchouk et al (2000) *Speleogenesis*. The main difference between a book and a monograph is that a book is usually professionally edited and larger. They are very useful for cavers but you need to realise they are usually compiled from a combination of the author's own work in conjunction with other work. They are also often dated by the time they are published and the latest research is always in the journals.

Conclusions

Publishing can be a very satisfying experience. It can be quite a buzz to see your work in print but it is more than just writing something and it will be printed in that format without alteration. People should not get upset if editors want changes or say they need material written in a particular way. Everyone needs to be aware of new research and whether the information been replaced or modified by newer work and whether the material has been refereed. Cavers have a very real stake in publishing accurate and interesting material and it is important to be aware of the variety of publishing formats and their various advantages and limitations. Nothing is every perfect and part of success is being able to build new information on previous material.