



Aspects of the abstract in systematic palaeontology

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Abstract

The most important section of most research papers, which will be read by the widest audience, is the abstract. But abstracts are often written in a hurry after the paper is finished, when the author is in a rush to get it submitted. In consequence, they may fail to communicate the paper's true content. Herein, I look at the abstract in systematic palaeontology and make suggestions as to how it can be improved. Do not refer to the year of publication of a taxon in the abstract, as the abstract itself may likely be reprinted without a supporting reference list, in an abstracting journal or elsewhere, but do refer to the author by name, such as *Agenus aspecies* Smith. Be sure that your abstract is logically structured and all-inclusive, comprehensively covering the major points of your paper. Write the abstract from scratch; do not just cut-and-paste sentences from the text. Do not repeat words from the title in the keywords; rather, derive them from that other major source of the other principal words in the paper, that is, the abstract. Formerly, abstracts sensu lato appeared at the end of a paper and were called conclusions; a modern research paper does not require both an abstract and conclusions, as they say essentially the same.

Keywords Publications · Structured abstracts · Authorship · Keywords · Conclusions

Introduction

“Arguably, [the abstract] is ... the most important part of a paper, but it is frequently given inadequate care by writers” (Connah 2010, p. 148).

The word ‘abstract’ covers at least two forms of scientific communication (Donovan 2017, pp. 39–41, 55–57). One abstract is a condensate of the chief features of a conference talk or poster. When the talk or poster is presented at the conference it will succeed the abstract, but then only temporarily. Unless the presentation is subsequently posted on the web, the abstract will remain the only published record of the event to subsequently persist. Of necessity, such an abstract is a stand-alone document.

This is not the same as an abstract that precedes a published research paper; this is both a summary of the content and a hook to tempt potential readers to look

further. If the title is enticing, you will read the abstract (and look at the figures); if the abstract is interesting, you may be lured into reading the paper. An abstract of a paper needs to summarise the content; unfocussed platitudes are likely to turn the potential reader away (Landes 1951, 1966; Lowman 1988; Donovan 2012). Yet, and like the conference abstract, the abstract of a published paper needs to be able to stand alone as it may be quoted in full elsewhere, such as in the abstracting literature.

It is this requirement to stand alone that is poorly appreciated by at least some authors. The present comments are based on my observations as a reader, writer, reviewer and editor during 35 + years since the early 1980s. They are aimed at those authors who may be tempted to knock-off an abstract in quick-time just before submission and with too little thought. This study is based on my opinions and lacks any sort of tabulated analysis; this is simply because published abstracts have been improved by editors and reviewers, whereas my comments are aimed at the writer before their paper is finished and submitted.

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Authorship and year of publication

“Do not quote references to other work—or if you do, insert full bibliographical details in the abstract itself” (O’Connor and Woodford 1975, p. 49).

I recently corrected proofs of a paper in which I quoted a taxon in the abstract in the form *Agenus aspecies* Smith. When the proofs arrived, the editor had ‘corrected’ this taxon to read *Agenus aspecies* Smith, 1954. I deleted ‘1954’ and explained why I had done so on the proof.

I freely acknowledge that the editor had imparted an improved scientific accuracy to my abstract and changed the quotation of the authorship of this species in line with the common form of the scientific literature (Donovan and Van den Hoek Ostende 2009). However, leaving the year of publication out of my abstract was intentional as I, too, aimed to improve scientific accuracy. Abstracts and (perhaps even more so) titles are parts of a research paper that are likely to be quoted elsewhere. An abstract within a paper has a reference list; *Agenus aspecies* Smith, 1954, can be found therein in this context. Yet, if the abstract is to appear in the abstracting literature, it cannot stand alone.

I realise some may accuse me of sophistry, but it is surely not pedantic to insist on scientific accuracy in all formats. What appears as *Agenus aspecies* Smith in the abstract will still be found as *Agenus aspecies* Smith, 1954, within the body of the paper. I thus endorse a requirement that the abstract to a research paper must be a self-contained document, in a similar way to the conference abstract, without the necessity to refer to a reference list.

Structure

“It is easier to write an abstract if you remember that all abstracts have a basic structure” (Hartley 2008, p. 31).

Quite rightly, advice about writing research papers commonly recommends that the abstract is written only after the text of the paper is completed, at least in draft (see, for example, Goldbort 2006, p. 248; Hartley 2008, p. 31; Silvia 2014, p. 168). This advice is sound, but there is then the danger that the abstract will be rushed on the way to completion. Indeed, the laziest of authors will make an abstract by cut-and-pasting sentences from their text—do not do this. Your abstract should be a fresh summary of your paper, not the same old, same old (A. L. Allcock, written comm., 22 July 2019).

Instead, take your time; your abstract needs to be carefully constructed as you pack the essential parts of the paper into it (Day 1998, pp. 29–30). Complete the paper

and at least sleep on it before writing the abstract; give the essential points a chance to percolate through and become logically ordered in your mind before writing them down. In particular, in systematic palaeontology, care needs to be taken to ensure that the abstract is more than just a list of species. Your abstract needs to be as comprehensive and structured as possible in the limited space available. That is, it “... needs to be both informative and compelling, a research paper in miniature” (Silvia 2014, p. 168).

One aid to writing that is used effectively by some journals, more commonly in medicine and social sciences, is the structured abstract (Hartley and Benjamin 1998; Bayley and Eldredge 2003; Hartley 2004, 2008, pp. 31–36; Nakayama et al. 2005; Hartley and Betts 2007). The structured abstract has a set form in any given journal, as defined by the ‘Instructions for authors’ and commonly comprising of an ordered set of five to eight subheadings. A common form might include five subheadings, such as ‘Background’, ‘Aims’, ‘Method’, ‘Results’ and ‘Conclusions’ (Hartley 2008, fig. 2.3.1a). I have taken the (unstructured) abstract of a recent taxonomic paper of my own to test its comprehensiveness and flexibility if presented in structured form. I believe it demonstrates that an abstract can be structured even without subheadings; this structure is a responsibility of the author.

“Well-preserved specimens, such as complete individuals, crowns and cups, are the common focus for crinoid systematic research. Yet the majority of specimens are disarticulated ossicles which are essentially ignored. The incompleteness of the fossil record is even more so when we ignore potential sources of data. A new species of crinoid comes from a monospecific assemblage from the Pennsylvanian (Upper Carboniferous) of western Ireland. All specimens are from a float block of the Clare Shale Formation (Bashkirian stage) at Fisherstreet Bay, Doolin, County Clare, western Ireland. *Heloambocolumnus* (col.) *harperi* gen. et sp. nov. has a pentagonocyclic, heteromorphic column; the small, central lumen is in a shallow, circular claustrum; the articulation is radial symplectial; the crenulae are slightly swollen and peg-like close to the circumference; nodals have rounded, unsculptured epifacets; nodal articular facets are sunken and in which narrow internodals are situated; and circlets of tubercles on epifacet surround priminternodals. These columnals are associated with robust, uniserial brachial ossicles. This crinoid is most likely a cladid” (after Donovan and Doyle 2019).

Without addition or rewriting, this abstract fits into a structured abstract format, as below. I admit that the fit of the structured abstract could be improved with some

rewriting, but nonetheless illustrates how the sense of an abstract on a topic in systematics follows that of a structured abstract. Rather than ‘Methods’, as mentioned above, I have chosen a subheading ‘What we did’ (suggested by A. L. Allcock, written comm., 22 July 2019) which may fit abstracts in systematic palaeontology rather better.

Background. Well-preserved specimens, such as complete individuals, crowns and cups, are the common focus for crinoid systematic research. Yet the majority of specimens are disarticulated ossicles which are essentially ignored.

Aims. The incompleteness of the fossil record is even more so when we ignore potential sources of data.

What we did. A new species of crinoid comes from a monospecific assemblage from the Pennsylvanian (Upper Carboniferous) of western Ireland. All specimens are from a float block of the Clare Shale Formation (Bashkirian stage) at Fisherstreet Bay, Doolin, County Clare, western Ireland.

Results. *Heloambocolumnus* (col.) *harperi* gen. et sp. nov. has a pentagonocyclic, heteromorphic column; the small, central lumen is in a shallow, circular claustrum; the articulation is radial symplectial; the crenulae are slightly swollen and peg-like close to the circumference; nodals have rounded, unsculptured epifacets; nodal articular facets are sunken and in which narrow internodals are situated; and circlets of tubercles on epifacet surround priminternodals. These columnals are associated with robust, uniserial brachial ossicles.

Conclusions. This crinoid is most likely a cladid (Donovan, new).

The fit is good in parts, such as ‘Background’ and ‘Results’; poor in others, particularly ‘Aims’; and the remainder are worthy, at least. Yet even this imperfect structured abstract is instructive, informing me, as the author, where it might be improved. ‘Aims’ might have been stronger if it simply stated that it was intended to describe a new species of crinoid, but is this even necessary? Perhaps a slightly different suite of subheadings tailored to suit systematic palaeontology, as I have tentatively used above, would be better than the more general set that are already widely used and needs to evolve.

Keywords

“After you have written the abstract, pull out some key words” (Albert 2009, p. 83).

I lump keywords (or key words or key-words, depending upon the journal) with the abstract, the two occurring in

close association in most journal articles. Perhaps the clearest indication of what is wanted is given by journals such as the *Biological Journal of the Linnean Society* which requires “ADDITIONAL KEYWORDS”, thus emphasizing that they are something more than what has gone before—and in capital letters, too!

If some authors use little deliberation when writing their abstract, even less thought is applied to keywords. I firmly believe that few authors truly understand what is expected of their keywords. They are simply search terms—more hooks—for the search engine, as is the title. So, to ensure the highest possible profile on-line, keywords should not repeat words from the title (Rajpurohit 2017; Anon undated a, b), although there are those who advocate the opposite (Mack 2012). In almost every paper that I review, there is some, often a lot of repetition, but through ignorance rather than following Mack’s recommendations, I am sure.

I present one published example (amongst many thousands) that I recently read – admittedly a rather extreme one and not systematic per se—but relevant to my own research interests. The first author is a valued colleague who will forgive me this trespass, I trust. Consider the Nebelsick et al. (2011), “Cryptic relicts from the past: Palaeoecology and taphonomy of encrusting thecideid brachiopods from Paleogene carbonates” as our example. The keywords are Cenozoic, Paleogene, Carbonates, Brachiopods, Thecideida, Palaeoecology and Micofacies. That is, out of seven keywords, five are essentially repeated from the title (71%). Yet it is a quick job to pull a more constructive suite of words from the abstract—communities, circumalpine, Austria, Slovenia, Italy, corals and coralline algae, for example. Write the paper; write the abstract by reference to the paper; and write the keywords by reference to the abstract, avoiding any and all repetitions from the title.

Conclusions and abstracts

“Originally [the abstract] was the final paragraph [= conclusion] of the scientific paper” (Albert 2009, p. 81).

If an abstract is provided, is it also necessary to include a conclusion to the paper (Donovan 2017, p. 73)? During the 1920s and 1930s, for example, before abstracts became de rigueur at the start of a research paper, the conclusion must have served a similar purpose; it was a hook to inform and attract potential readers. Now, examine a recent paper with both an abstract and conclusion. I do not need to give a cited example; I am confident that they will both say much the same thing. I declare that the ‘conclusions’ section of a scientific research paper is a hold-over from earlier times

and only acts as padding in any publication that is preceded by a well-written abstract. It is time that the conclusion section of the research paper became extinct.

Discussion

“The abstract is a recent addition to the canonical structure ... their inclusion did not become routine until the 1950s” (Heard 2016, p. 82).

Papers on systematic palaeontology should end with a detailed discussion, but not this essay, which is concerned with something rather different, writing. As such, any discussion will sound more like a conclusion, which I railed against above!

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