



The four-eyed tarantula and the barnacle goose: Accurate citation or the perpetuation of hearsay

by Iain Patten

A historian friend of mine recently drew my attention to two interesting stories about scientific communication in 16th-century Europe [1], both centring on the Dutch cartographer and naturalist Abraham Ortelius. In the first account, the London physician Thomas Penny wrote to Ortelius to ask for confirmation of a story he had heard from Ortelius's nephew, James Cole. It was claimed by Cole that Ortelius was in possession of a tarantula specimen with four eyes, but all of the evidence Penny had in the form of zoological drawings from Italy showed tarantulas as having only two eyes. Penny's surprise and curiosity led him to request direct confirmation from Ortelius that the information was indeed accurate and to ask that he have drawings made to illustrate them. In another exchange, the Italian naturalist Niccolò Stelliola asked for any information Ortelius might have on the barnacle goose. It was claimed that the goose hatched from barnacles that grew like fruit on a tree in northern Scotland. The story had prompted naturalists to search for the mythical creature, but, not surprisingly, nobody had ever presented evidence to confirm its bizarre provenance. Stelliola believed that if anybody would be likely to have reliable information on the barnacle goose it would be Ortelius, and he hoped that in going to a reliable source he might be able to move beyond hearsay and see some actual evidence.

What I find striking in these stories is the similarity to modern scientific discourse in the emphasis on direct observation and referral to primary sources. If we adapt the story of the four-eyed tarantula to the 21st century, for instance, we might imagine Thomas Penny reading an article by James Cole in which the claim that tarantulas have four eyes rather than two is supported by a reference to a description of the tarantula specimen published by Ortelius. Penny then need only go to the cited description to, presumably, find pictures of the animal—later descriptions would actually show the spiders as usually having not four but eight eyes. Niccolò Stelliola, on the other hand, might well find citations alluding to the story of the barnacle goose, but he would never be led to any direct observations, since the story had no basis in fact. But before we laugh too much at the expense of those who may have set off on an Elizabethan wild-geese chase, it is worth thinking about the faith we place in the sources of information used in scientific texts.

If Thomas Penny were to write an article about tarantulas, how might he cite the information he had received from



James Cole? If he were to state simply that “some species of tarantula have four eyes (Cole, personal communication, 1580),” the natural assumption of most readers would be that Cole had described a species of tarantula with four eyes and that the original description had been provided in a personal communication from Cole to Penny in 1580. Of course, this would not be accurate, as Cole was a secondary source. The primary source of the description would instead have been Ortelius. However, since Penny had not seen any description from Ortelius, he would not have been in a position to cite him directly. Instead, in order not to mislead the reader, he would have had to provide a more extensive description of his sources; for instance, “It has been claimed that some species of tarantula have four eyes (Abraham Ortelius, quoted in Cole, personal communication, 1580).” or perhaps “James Cole (personal communication, 1580) reports that the naturalist Abraham Ortelius is in possession of a tarantula specimen with four eyes.” By ensuring that the language of the text is consistent with the nature of the citation, readers are left in no doubt about the reliability of the information source. They can infer that the author might not stand by the claim that tarantulas in fact have four eyes but is sufficiently versed in the latest developments of the field to allude to the possibility. In the face of such clarity, the reader's confidence in this author may be increased. In contrast, to state that “some species of tarantula have four eyes (Cole, personal communication, 1580)” would be little different from saying that “barnacle geese hatch from barnacles that grow on trees in the north of Scotland (Stelliola, 1585),” in other words, nothing more than the perpetuation of hearsay with no basis in verifiable observation.

Citing secondary sources in a manner that confounds the natural expectations of the reader is a dangerous path to

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>>> **The four-eyed tarantula and the barnacle goose...**

follow in scientific writing. Its first effect will be to reduce the confidence that at least some readers will have in the author's scholarship. Inevitably, somebody will know the literature well enough to recognise that the cited work is not the source of the information under discussion. Those who are less familiar with the field may instead be at risk of perpetuating the inaccuracy, or taking hearsay as fact, and as such, the disservice to them is even greater. Some writers may be tempted—be it through pressure of time, naivety, or worse—to circumvent the issue by simply providing the references cited in the secondary source they consulted, without going back to the primary sources themselves. However, the consequences of doing so may be more serious, since, in passing off another's scholarship as one's own, it can be reasonably considered plagiarism, and at best risks perpetuating errors that leave the author's laziness apparent [2]. We can avoid falling into the traps pre-

vented by secondary citation, though, if we are vigilant to the clarity of our language and its relationship with the citations used to support it [see Box]. If we accept that the aim of scientific writing is not to create mythical creatures but rather to advance knowledge by building carefully on the work of those who come before us, then we must pay careful attention not only to what we write, but also to what we cite, and ultimately to the close but sometimes overlooked relationship between them.

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1. Harkness DE. *The Jewel House: Elizabethan London and the Scientific Revolution*. First Edition. New Haven and London: Yale University Press, 2007.
2. Rodgers JR. *Plagiarism and the Art of Skillful Citation*. Available from: <http://pdfind.com/48caeb2b16230>. Accessed 30 March 2009.

Secondary sources in medical writing—a question of clarity

Writers often make use of secondary sources such as review articles when developing their ideas, but difficulty may arise when it comes to citing the information obtained. The source of the information *consulted* is clearly the review article, but much of what it contains will have been derived from primary sources, i.e. those articles in which the information was first described. When the intention is to cite specific information and not just direct those who are interested to a source of further reading, the original, primary sources must be provided. However, this does not mean that you can never cite a secondary source. In fact, there are times when it is essential to do so, because in truth it has become the primary source of the information you are referring to, namely, the opinion expressed by the authors.

Imagine if you read the following in a review article:

“Trial X reported that superpill significantly reduced the rate of cardiovascular events in apparently healthy subjects, with no apparent increase in the rate of adverse events.¹ However, the authors failed to recognize that the trial was insufficiently powered to detect small increases in the rate of gastrointestinal disorders.”

The first sentence is specific information that you must go back to the original article and confirm before citing, if nothing else to ensure that it is accurate and to assess whether you may want to highlight other aspects in your own writing. The second sentence is the opinion of the authors of the review article, however, making that article the primary source of the interpretation. If you want to refer to that same interpretation of the data from Trial X in your own article, you must clearly cite the review

as the originator of the opinion. However, you can go further than simply citing it, as shown in the following examples:

“Trial X showed cardiovascular benefit with prophylactic use of superpill and reported no evidence of potential safety issues.¹ However, the statistical power was inadequate to identify predictable increases in the rate gastrointestinal events.”

“Trial X showed cardiovascular benefit with prophylactic use of superpill and reported no evidence of potential safety issues.¹ However, it has been argued that the statistical power was inadequate to determine whether gastrointestinal events were more common in treated individuals.”

In the first example, the provision of a reference after the second sentence does not make it clear that you are referring to another author's opinion rather than presenting your own interpretation or understanding of the information contained in the reference. However, by changing the wording in the second example, readers should be left in no doubt about the source of the opinion. Thus, what is important is not just provision of the correct reference but also appropriate integration of language and citation to achieve true clarity.

Key points:

- Do not cite original data without having referred to the primary source.
- Citing review articles may be reasonable when the purpose is to provide a source of further reading, but not when referring to specific information obtained from primary sources.
- When the purpose is to cite opinion offered in a secondary source, that source in effect becomes the primary source of the information.
- Be careful to ensure that the language you use clearly reflects the source of the opinions expressed.