

## Writing for the Archival Literature

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How should scientists approach the writing of journal articles describing original research and what are the consequences for the scientific community of doing it poorly? The communication of results is an important component in the practice of science and the most enduring element of scientific communication is the peer-reviewed archival publication. With the proliferation of journals, a business model of publish or perish, narrow specialization, and an emphasis on novelty that tends to minimize verification of published results, the quality of published manuscripts depends heavily on reviewers working pro bono and editors under time constraints. Ultimately, however, the quality of the archival literature depends upon the integrity and dedication of the scientific community and is reflected in the careful preparation of submitted manuscripts.

Both Open-Access and traditional journals must be concerned with the quality of published material and each model has its strengths and limitations. Access to traditional journal archives can be hampered by the packages (e.g., journal bundles, and years of archival access) sold and bought, while Open-Access journals such as OMICS with editorial and reviewer oversight are likely to achieve greater respectability. As the practice of science becomes more diffuse and collaborative, the linking of published papers to Social Networking sites found in OMICS Group Special Features will play a larger role in the creative process and the communication of science.

What are the characteristics of a good archival paper? These are often specified in journal instructions to authors and reviewers and include significant scientific results, scholarly presentation, and utility of information. Even in the most prestigious journals, the manuscript that excels in all three categories is rare indeed.

Chemistry is a mature science often serving a supporting role for other sciences or as an enabling technology, which makes judgments of the scientific significance of the chemistry difficult. Significance lies in novelty, practical utility, verification of important questions of theory, as well as in the quality of the experimental data and the conceptualization of the questions asked and the insights gleaned. Significance wanes with multiple publications emanating from the same study that result in excessive fragmentation of the literature and in reports that apply existing art in routine ways.

The lack of scholarly quality is the principal flaw in many manuscripts. Too often the introduction is a sales pitch minimizing prior art, exaggerating present achievements and distorting the perspective by commission and omission. A scholarly introduction will provide a clear description of the current advance in practice or theory, the unsolved difficulties, and an honest assessment of what the communicated work has to offer. Much goes awry in the selection of citations, which should include the most recent review articles and monographs for broad perspective, and recent and older research articles that help establish the importance or lack of importance of the work submitted for publication.

Poor scholarly preparation of the manuscript introduces errors, ambiguities, and spurious conclusions that upon entering the archival record tend to multiply through the citation process. One tactic that can minimize carelessness of presentation is to prepare each unit of the

manuscript (e.g., narrative, tables, schemes, equations) with sufficient content, explanation and information so that the reader can process it independently of the other units. Preparing each unit of the manuscript to stand independently has the added benefit of making it more difficult to hide logical errors, careless arguments, and confusions revolving around interpretation of the data. Finally, scholarly rigor requires specificity in the use of technical language and the capacity to evoke Wittgensteinian pictures, the absence of which renders the descriptive sentences merely nonsense.

From an archival perspective, the most important part of a research paper is the experimental section. This must be sufficiently detailed so that any future researcher can repeat the experiments and or utilize the experimental data. I painfully remember trying to unsuccessfully repeat an experimental procedure reported by a prestigious laboratory that called for ether as the solvent. The reaction failed repeatedly until I substituted THF for Et<sub>2</sub>O and then obtained the product in the reported yield. Similar problems arise in the reporting of NMR data reductions, ubiquitous standard work-up procedures, and conditions of measurement. With the advent of the web-based journal publication, many journals have severely truncated the experimental section and banished it to "Supporting Information". This has the positive effect of minimizing the distinction between full articles and communications since all publications now have the opportunity to provide full experimental details, although reviewers and editors may often scrutinize this section less closely.

Science suffers when scientific publishing is more about career advancement, financial reward, and the business practices of the publishing industry than it is about the science. Consequently, the quality of a journal's editorial and peer review process is important in both Open-Access and traditional journal publications. The scientific community would be well served by fewer publications (i.e., articles and journals) with a renewed focus on scientific and scholarly quality and rigor. Although writing in general should always be honed for the benefit of the reader, this virtue is of paramount importance to the scientific community with regards to the archival literature. As the practice of science becomes more diffuse and collaborative and more results communicated through Open-Access formats the commitment of individual investigators to rigorous scientific and scholarly communication of the science becomes more essential.

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