Editing Into the Nineties

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For many scientists, the editing and peer review processes are as much a black box as printing and typesetting. All know that it is a process that must be endured in order to have their work published, but many do not realize the importance of the process, nor how it can be made considerably simpler, or more difficult, by the actions of the author(s).

The editing process was itself under the spotlight recently at a four-day-long meeting held September 10-14, 1989, at the Westin Hotel in Ottawa. Roughly 400 members of three major societies, namely the American Association of Earth Science Editors (AESE), the Council of Biology Editors (CBE) and the European Association of Science Editors (EASE), got together for only the second time in their history to discuss how technology, increased costs, and the rapid increase in the scientific literature will affect scientific editors into the 1990s. Despite the fact that editors from a variety of scientific disciplines were present (*e.g.*, earth sciences, botany, pharmacology, medicine, chemistry, engineering), most of the matters discussed were of relevance to all, although some problems were more common in some fields than in others.

The organization of the meeting was different from the typical geological conference. Most concurrent technical sessions were 1½ hours in length, with a panel of two to four speakers who spoke on various aspects of the topic under consideration. This was followed by 30-45 minutes of discussion involving the audience and the speakers. A few posters and general interest talks were also presented.

The meeting started, on Monday morning, with a plenary session that began with John Manley, Member of Parliament for Ottawa South (Liberal) and Opposition Critic for Science and Technology, outlining how the political process deals with issues, scientific and otherwise. He also took issue with the track record of the federal government with respect to science issues since the Conservatives came to power in 1984. Two points are worth mentioning. First, politicians are not any less informed on science-related issues than on other major issues; and, second, scientists have a role to play in educating politicians and the public about science, and in making concerns about science-related issues known to politicians. For example, when did you last let your MP know that you object to cutting NRC's budget any further? The full text of Mr. Manley's address was published in GEOLOG (1989, Volume 18, Part 5, p. 31-38).

John Manley was followed by the presidents of the three sponsoring societies who each gave their views on some of the problems facing editors in the nineties. In their presentations, the three presidents summarized the status of scientific editing as it is today, much more than making predictions of the future.

Tom Dutro (AESE) noted that the number of earth science editors is increasing rapidly, a trend that does not appear to be abating. The biggest problem that he thought editors face is the problem of illiterate authors — those who do not know how to construct a paper, and those who rely on editors and reviewers to turn a poorly organized and prepared effort into a a good paper. John Glen (EASE) discussed the problem of performance indicators, and the fact that they are not ideal indicators of journal performance, as once the indicator is established, authors change their behaviour in response to the perceptions generated by the indicator. A major problem facing editors into the nineties, as far as Glen was concerned, is the issue of fraud. Peer review is designed to find errors or incompetence, not fraud. Many legislators in the United States, for example, do not see the difference between legitimate scientific errors and fraud, hence much of the on-going debate regarding how to deal with fraudulent papers in that country. Arly Allen (CBE) reported on CBE's certification program for editors, which is producing a standardized test that can be used to assess copy-editing performance. Important issues facing editors in the nineties from his perspective are: (i) the need to improve the marketing of scientific organizations and their products if they are to stay successful, (ii) increased price resistance from librarians and other purchasers regarding high journal costs from commercial publishers, (iii) the introduction of new types of products such as CD-ROM systems and ON-LINE journals that reduce the need for paper copies, and (iv) the role editors can play in public education. The presidents' addresses set the theme for much of the meeting, and many sessions dealt specifically with the points they had raised.

The session on "Electronic Publishing" on Monday afternoon brought together several individuals active in applying new computer technologies to journal production. Electronic publishing was, for this session, defined as the use of new technologies to improve production to paper copy, rather than the publication of scientific information in solely electronic form. Monica Easton, managing editor of *Geoscience Canada*, presented a case study of how the Geological Association of Canada utilizes electronic publishing. She reported on the steps involved in the decision to bring typesetting in-house with the purchase of a microcomputer software system and the acceptance of manuscripts accompanied by diskettes containing the manuscript in digital form. The savings in time, typesetting charges, and flexibility in making last-minute changes in layout, *etc.*, to the journal have more than paid for the capital costs involved in acquiring the necessary hardware and software. John Farley, from the Electronic Publishing Information Centre, Canadian Government Printing Services, spoke on the variety of "desk-top publishing" systems available on the market, and their suitability for a variety of situations. The key point here is that anticipated results may not be realized if research and planning prior to purchase are inadequate. Jamie Johnson of Up and Running, a computer consulting firm, spoke about some of the drawing and scanning systems available for incorporating graphics in digital form. The goal here was to inform the audience of the possibilities, rather than to advocate a particular approach or system. From the extensive questioning from the audience that followed the three presentations, it was clear that many editors have yet to make use of these new technologies. Many publications are still not receiving material from authors on diskette!

The second plenary session was held on Tuesday morning, and dealt with the "Editor's Role in Coping with Environmental Change and Natural Hazards". Three presentations, by W.S. Fyfe, A.G. Davenport and A. Rosemarin, formed the first part of this session. The second part was an open discussion with questions from audience directed to a panel of scientists: M.R. Dence, W.S. Fyfe, A.G. Davenport, A. Rosemarin, E.R.W. Neale and J.J. Clague. Background information on Global Change was presented by Bill Fyfe (U Western Ontario), Treasurer of the International Geosphere–Biosphere Programme (IGBP). Global Change is becoming a major area of scientific research that overlaps many disciplines. Scientists are not yet prepared for "inter-trans-disciplinary" science, and editors and journals are even less prepared. There will be a flood of data emerging from IGBP projects, and a problem facing editors is where this research can best be published, particularly because it is so inter-

disciplinary. New journals are likely to be born to handle research papers on Global Change, and existing journals may evolve as a result of this new and developing field.

Some of the problems of where IGBP research will be published were addressed by Arno Rosemarin, Editor-in-Chief of *AMBIO "The International Journal of the Human Environment"*. AMBIO is published by the Royal Swedish Academy of Sciences and contains reports on IGBP progress. One problem is the *current* information glut and superspecialization of scientists. To quote one of the participants in the round-table discussion, "Information, not science, is the fuel for the hierarchy of superspecialization, and editors compound the problem." Another new area of specialization and yet another new journal are developed. [Ed. note: for a further opinion on this subject, see the "Pyroclasts" column in this issue (p. 38-39).]

The topic of natural hazards and its place in this forum was addressed by A.G. Davenport (U of Western Ontario). In 1987, the United Nations passed a resolution to designate the 1990s as the International Decade for Natural Hazard Reduction. In general terms, IDNHR will study "how humans affect the environment, how the environment affects population" with emphasis on what aspects prevent or reduce the ability of developing countries to develop. How the environment affects population is usually expressed in natural disasters. Dr. Davenport spoke about natural hazard reduction in terms of disaster mitigation strategy: (i) hazard prediction, (ii) risk assessment, (iii) disaster preparation, and (iv) disaster management. He illustrated his talk using the example of Hurricane Gilbert's path of destruction through the Caribbean in 1988. Many volcanologists are involved with the IDNHR in developing disaster mitigation plans for many active, or too-long dormant, volcanoes around the world. Research produced as a result of work in the IDNHR programme will also need a place to publish.

After a short break, the floor was opened for questions. Topics discussed included population control, popularization of science, journalism and media coverage (or non-coverage) of science, what journals should or should not be publishing, scientists in politics, AIDS, and science education in the schools. Perhaps the most thought-provoking comment in the whole discussion was related to this last issue. A member of the audience commented that scientists going into the classrooms works well, but will not accomplish the goal [of science education] fast enough. The scientist-to-class approach will only work for that class of students, and what is really needed is to reach the teachers. The reply from a panel member was that society is upside-down — we don't need our best people teaching graduate students, we really need Ph.D.s teaching the children from kindergarten to grade 10.

Two sessions on Tuesday afternoon dealt with peer review. The first session, "Reviewing the Review Process", with speakers L. Gidez, W.G.E. Caldwell, E. Knoll and K. Case, dealt with the "mechanics" of peer review. Several questions raised and, to some extent, answered were:

— Does the length of time for review affect the time for publication? (not appreciably);

— Do accountability and competitiveness affect peer review? (probably; scientists (especially those in universities) need time for doing research, writing up results, obtaining funds, teaching, *etc.*);

— Does peer review need to be changed? (needs to be adapted to area of science, *i.e.*, different process for social sciences than for physical sciences);

— What are the costs of peer review (mostly time: editorial office, reviewers', mail)?

The panelists for the second session — A.S. Relman (*New England Journal of Medicine*, USA), B. Waltby (CSIRO, Australia), B. Dancik (*Canadian Journal of Forest Research*, Canada) and D. Rennie (*Journal of the American Medical Association*, USA) — were mostly from the medical sciences, but this was not intended as a comment on the recent scientific fraud cases in the United States. They addressed various aspects of "Ethics in Reviewing", illustrating their talks with examples of poor ethics from their own files. There are many aspects of ethics in scientific publishing to be considered: confidentiality among editors, authors and reviewers, responsibility of **all** authors for contents in co-authored papers, fairness, thoroughness and timeliness by reviewers; declaration of conflicts of interest, and declaration of economic interests in companies (especially applicable in the medical sciences, *i.e.*, pharmaceuticals). Authors, especially, must avoid ethical transgressions: the premature release of results, concurrent submission, duplicate publication, and repetitive publication (*i.e.*, "salami" publication — the publication of small slices of research in multiple papers, rather than one paper summarizing the whole of the research). On the subject of scientific fraud, editors cannot be expected to act as investigative journalists on all manuscripts which pass their desks. Editors and reviewers expect authors to be honest: errors can be made and, when found, are generally interpreted as accidental errors, not deliberate fraud.

The session on "Copyright Law and Publishing" on Wednesday morning dealt mainly with the problems that will be faced by electronic publishing services, in existence or being proposed, that allow access to data bases or electronic journals. The copyrighting of databases was also discussed, particularly as databases need to be easily accessed if they are to be worth developing, yet are expensive to develop and hence the creators need copyright protection. At present, much of this discussion is not relevant to Canadians, as there is only half a copyright law at present, and it is not certain when the federal government will introduce the other half.

This session was followed by one dealing with increased subscription costs for journals, particularly those published by commercial publishers, and how libraries are reacting to these costs. Charlotte Derksen (Stanford U) and Claren Kidd (U of Oklahoma) presented the perspective of librarians who have seen dramatic increases in the cost of some journals (up to 142% over a two-year period for some earth science journals) published by commercial publishers, while, in the same period, the largest increase for society-published journals was 23%. In the case of Stanford, only five journals accounted for 31% of the earth sciences periodicals budget. In order to keep pace, librarians either have to drop other journals (particularly those which have not been used by an active researcher on staff), buy fewer books, or try to get budget increases substantially greater than inflation. The trend is toward more specialization in library holdings based on faculty research efforts, thus making it difficult for researchers to change research directions and have adequate library materials. In addition, as fewer libraries hold certain materials, and certain journals become more expensive and harder to get, the incentive for illegal copying and distribution increases.

Brian Scanlan of Elsevier presented the other side of the coin. The most expensive journals ($500+ a year) are those that reach specialty groups (*i.e.*, conodont researchers) with circulations of 500-1000 and that consequently have little advertising. The next price/circulation range ($100-200) is that of those journals appealing to researchers actively involved in a particular field (*i.e.*, geologists), with circulation of 2500-7500. Larger journals such as Science have very large circulations (over 100,000) and consequently higher advertising revenues and thus lower costs (on a per-page basis). In the end, it appeared that there were two solitudes at the meeting. Librarians in general do not have a complete understanding of the intricacies of publishing (*i.e.*, society journals rely on a lot of volunteer efforts in editing, *etc.*; commercial publishers pay for these services, have better marketing, are more profit/surplus oriented), and publishers do not realize that higher subscription costs will result in decreased subscriptions, more illegal copying, and, over the long term, reduced access to research results and increased business for society journals and publications. One problem in this whole discussion was that there was no breakdown done on the part of either group as to what was causing most of these increases. Foreign exchange was a factor (low dollar on world markets causes increased prices that do not drop when the dollar rises), but no

others were discussed. The dramatic increases seen in many countries in postage costs in recent years was not discussed, nor was the increased trend toward differential postage rates. Any Canadian who subscribes to a US journal is well aware of the postage surcharges that are now common, and which are sometimes as high as or higher than the cost of the journal. Until such information is known, the true culprits behind these price increases might not be fully known, and it could be that the commercial publishers may not be the beasts they are sometimes portrayed to be.

In the end, many of the problems discussed at the meeting relate to how scientists are taught about the editorial and publication process. Currently, there is no formal training in the process. In graduate school, hopefully, students will learn how to write during the course of completing their theses. However, how good or bad they will be as future authors depends on how good or bad their advisor and committee are. As to learning about the peer review process, it is simply a matter of trial and error. Most readers will probably remember receiving their first detailed manuscript review. With luck, they will have a reviewer or a colleague on hand who can explain to them the nature of the comments and why they were made, and remind them that the ultimate goal of the exercise is to improve the published manuscript and ensure that the scientific methodology, the data, and the conclusions are sound. If not, they may give up in frustration.

Many of the problems discussed at the meeting, as outlined above, could be addressed through education. If scientists were able to take a course before graduation that at least outlined the rudiments of the peer-review process, the role and responsibilities of editors, reviewers, and authors, and the basic elements of a scientific paper, it would make the editor's task much simpler. Whether or not this is something that should be done at the graduate level, or perhaps at the senior undergraduate level, is open to question, but as competition for research funds increases and the need to "publish or perish" grows, the need for such instruction becomes even more acute.

A number of activities were associated with the meeting, some of a tourist nature (boat tour of the Ottawa River), others of more business nature (tour of CISTI), and a field trip (half-day AESE field trip around the Ottawa area).

There was no abstract volume published for the meeting, nor is there any plan to publish any of the proceedings of the meeting. After all, what editor would want the unenviable task of editing another editor's work?

Accepted 2 March 1990.

Digging for the Past Beneath the Stones of Zimbabwe: A Field Meeting on the Archean - Proterozoic Transition

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A field meeting (APT-89) on the Archean-Proterozoic transition (APT) was held in Zimbabwe, September 11-22, 1989, as part of International Geological Correlation Program (IGCP) project # 217. The meeting was convened by Jan Kramers (University of Zimbabwe) on behalf of the Geological Society of Zimbabwe, and was organized around two field excursions to the Archean Zimbabwe Craton and adjacent mobile belts. As most readers are probably unfamiliar with African geology, this report incorporates a brief geological overview and a summary map (Figure 1).

The Precambrian Geological Framework of Zimbabwe

The Zimbabwe Craton.

This classic low-grade granite-greenstone complex ranges in age from >3500 Ma to *ca.* 2600 Ma (Wilson, 1981). Ultramafic to mafic metavolcanic (*i.e.*, greenstone) belts are divided into Sebakwian (≥ 3500 Ma), Bulawayan (2900-2700 Ma) and Shamvaian (≤2700 Ma) Groups, of which the Bulawayan is most extensive. The surrounding granitoid rocks and gneisses mostly represent sodic plutonism associated with the Sebakwian and Bulawayan cycles. Late potassic granites were emplaced *ca.* 2600-2500 Ma ago.

Voluminous greenstone-belt formation in Zimbabwe, *ca.* 2900 Ma ago, was contemporaneous with deposition of the oldest known cratonic cover sequence, the Pongola Group of the nearby Kaapvaal Craton in South Africa. "Cratonization" at the end of the Archean was diachronous within southern Africa, and is also diachronous on a worldwide scale.

The Limpopo Mobile Belt.

The Zimbabwe Craton is flanked to the south by the Limpopo Mobile Belt, an Archean crustal segment with very unusual characteristics. The belt evolved contemporaneously with the granite-greenstone complex of the Zimbabwe Craton, but has a closer resemblance to the curvilinear mobile belts typical of Proterozoic and Phanerozoic provinces. In contrast to other Archean high-grade regions (*e.g.*, Labrador), the belt contains abundant metasedimentary rocks of "miogeoclinal" affinity, and numerous low-angle thrust zones (*e.g.*, Barton, 1983). Some of these features are also shown by the English River and Quetico belts of the Superior Province in Canada.

The ENE-trending Northern Marginal Zone (NMZ) consists of granulites that are probably high-grade equivalents of the rocks of the Zimbabwe Craton. A very similar zone in South Africa, adjacent to the Kaapvaal Craton, is termed the Southern Marginal Zone (SMZ). The enigmatic Central Zone (CZ) has N-S structural trends, and is dominated by granulite-facies pelites, quartzites and carbonates, with remnants of *ca.* 3800 Ma basement gneisses. Both components were intruded by layered mafic to anorthositic plutons *ca.* 3200 Ma ago. High-grade metamorphism throughout the belt *ca.* 2900-2700 Ma ago has obscured many details of its long and undoubtedly complex early evolution.

Major ductile shear zones are important features of the belt (*e.g.*, Coward, 1980; McCourt and Vearncombe, 1987). The boundary between the NMZ and the Zimbabwe Craton is defined by gently south-dipping thrust zones that exhume granulite facies rocks. The NMZ and CZ are separated by the Tuli-Sabi shear zone (termed Triangle shear zone in Zimbabwe), a 20 km-wide mylonitic belt with a predominantly dextral sense of movement. The attitude of this structure changes from near-vertical in Botswana to gently south-dipping in Zimbabwe. The CZ and SMZ are separated by the Palala shear zone in South Africa, which has a sinistral sense of motion. Both are long-lived structures that were also reactivated during the Proterozoic; sense-of-motion inferences may thus reflect only the latest episodes of movement. Barton (1983) notes that evidence for dextral, sinistral, normal and reverse motions can often be observed at a single locality.

Tectonic models for the Limpopo Belt resemble those developed for the Grenville Province in North America, and there are many parallels between these two belts, as noted previously by Condie (1976) and Windley (1984), amongst others. Models include a periodically squeezed and sheared aulaco-