Editorial

An Electronic Future for OAS?

When I started in science some 45 years ago calculations were made on slide rules. The *Journal of Biological Chemistry* was published monthly. The journals *Biochemistry, Protein Science, Journal of Molecular Biology,* and *Cell* did not exist. The science event of the year was the annual meeting of the Federation of American Societies of Experimental Biology. The double-helical structure of DNA, nucleic acid sequencing, messenger RNA, and ribozymes were unborn concepts. Now a handheld calculator can best the first room-filling computer; the *Journal of Biological Chemistry* published 33,384 pages; *Biochemistry* published 15,566 pages; and *Cell* published 4,672 pages (all 1994 totals). The journals *Protein Science* and *Journal of Molecular* Biology are currently available free on the Internet.

What does the future hold for people entering science now? Today I can sit at my desk, either in room 147A of the Noble Research Center on the OSU campus or at my 1101 North Lincoln Street home, and use Macintosh computers to transmit data from a determined nucleotide sequence of firefly luciferase to the Baylor College of Medicine in Houston or to the European Molecular Biology Laboratories at Heidelberg or Zurich for analysis. While my computer is still connected to those main-frame computers via the Internet, the main-frame computers make the appropriate calculations or searches, sometimes retrieving or using programs resident at other sites. The completed analysis is then returned to my computer. To determine the nucleotide sequence several molecular biology tools and computers were used. A computer analyzed the nucleotides as they were separated by electrophoresis and suggested a potential sequence. Several overlapping DNA fragments were analyzed by another computer program to yield a consensus sequence. The sequence was deposited via the Internet into the GenBank at the National Library of Medicine of the National Institutes of Health as U31240. Within a couple of weeks after submission this sequence was available to other investigators – worldwide – via the Internet.

Connection of computers (some 30 million) via the Internet is changing the way research is done and the way data are recorded and analyzed. Craig Venter and 84 coauthors published a 172-page supplement to the September 28 issue of *Nature* describing 88,000 expressed sequence tags, their assemblies, and some 30,000 of the human genes. This information is available on the Internet at http://www.tigr.org. There is no way to handle this volume of data without computers. Since the information is available via the Internet, the uses of the data will be based on that format rather than on the printed page. The data can be analyzed and treated by other investigators without having to enter it again. A recent paper in *Analytical Chemistry* (**67**, 428A-433A, 1995) describes how data recorded in networked computers can become a shareable resource of data.

How can the Oklahoma Academy of Science utilize the Internet to further science? I report accomplishments, work in progress, and ideas.

First, a Home Page has been established; it describes the organization and serves as an information store for the organization: calendar, programs, announcements, etc. At the March 1995 meeting the Executive Committee approved the purchase of a 1 gigabyte hard drive to be used with the Apple Macintosh 6150 file server known as "bmb-fs1" and located at the Department of Biochemistry and Molecular Biology of Oklahoma State University. A Hawk 2LP 1.2 GB hard drive was purchased for $585 and the OAS Home Page has been established (*1*). An outline of the current contents follows.

OAS Home Page

- Logo: a modern interpretation, drawn for electronic retrieval.
- A statement of the mission of the Oklahoma Academy of Science - an adaptation from the membership recruiting information.
- Membership application form, which can be filled in, printed, and mailed to Ed

Nelson. We hope to have a form that can be electronically transmitted to Ed.

- The Constitution and By-laws.
- Publications are listed. There are instructions for the preparation of abstracts. We plan to have a form for the electronic submission of abstracts.
- Annual meeting

  The Program for the Alva Technical Meeting was entered on October 1, 1995; the material submitted by the section chairpersons was photoelectronically scanned; the resulting file was formatted with a word processor and converted to a pdf file.
- Announcements and registration forms for the fall field meeting were published.
- Submitted Abstracts from the 1994 meeting.
- An experimental "virtual presentation poster".

  This is an electronic version of my paper from *Proc. Okla. Acad. Sci.,* **74**, 31-36 (1994). The poster is in two forms; it is best viewed in the pdf form using "Adobe Acrobat" reader, which is free and available from this web site.

In the near future we hope to add:

+ a history of the OAS adapted from Teague Self's article [*Proc. Okla. Acad. Sci.,* **61**, 90-102 (1981)] with more recent information added by Ed Nelson.
+ appropriate meeting programs as they become available.
+ an on-line form for the submission of abstracts.
+ instructions for authors of papers to be submitted for publication in POAS.
+ an electronic version of the abstracts (done for 1994 meeting).
+ tables of contents for recent volumes of POAS.
+ names and addresses of OAS officers.
+ papers as posters for OAS.

Currently, the AAAS has a Home Page (*2*) that lists various affiliated organizations (*3*) including the many affiliated state academies of science. The only three state academies that have web sites listed are the California Academy of Science (*4*), the Chicago Academy of Science (*5*), and the Kansas Academy of Science (*6*). We have submitted information about our site to the AAAS person who handles the listing of affiliated organizations. A search of the Net showed one other state academy of science that has a page [the Mississippi State Academy of Science (*7*)]. The Kansas Junior Academy of Science (*8*) also has a page.

Your suggestions, contributions, and use of this resource are coveted. Send them by e-mail to the address in the signature block. I believe that the Home Page has a secure future unless use of the Internet becomes prohibitively expensive.

A second way that OAS can use the Internet is in the dissemination of scientific information, i.e., publication. Your journal already uses electronic submission of the final manuscript copy. This has enabled us to hold the line on the cost of publication of the printed version of the journal. A *Chemistry and Engineering News* article (**73** {Mar 271, 42-49, 1995) discussed electronic publication. The Council of Biology Editors has been considering the effect of electronic developments on the publication process (see *CBE Views*, **16**, 73-78, 92-93; and 101-102, 1993; and 18, 27-29, 1995). As stated above there are journals available on-line both free and for a fee. What use of these capabilities should OAS make? Should we electronically publish titles, or titles and abstract of articles to be published in printed form? Should we electronically publish the complete article; if so, then before or after the printed version? Should we develop a poster forum for electronic presentation of research results?

Third, the Internet offers alternative ways for scientists to hold meetings. The potential has been addressed in *Chemical and Engineering News*, **72** (Dec. 12), 29-40, 1994). 1 am not advocating that such meetings replace our annual fall technical meeting. These are two distinct forms of communications that serve distinctive purposes both are required.

As you can see, there are many questions to be answered about how OAS should participate in this electronic revolution.

Authors often receive reviewed manuscripts with reviewer suggestions for improvement. Editors should also have their editorials subjected to the red pencil and peer review. This editorial has been reviewed by Drs. Otis Dermer, Sharon Ford, Ulrich Melcher, and Jerry Merz. I thank

them for their suggestions and help in removal of mistakes.

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