

Perspective

Research communications in the 21st century

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Scientific inquiry thrives only in a society that fosters the free flow of ideas and information. The power of online (internet) publication in democratizing science and incorporating scientists from developing countries into the scientific community is profound. The desired and obvious properties of scientific publishing such as accessibility, economy, quality, innovation, and retrieval can be more readily achieved with electronic methods. Online publication is much cheaper and faster, and that is major reason Africa should embrace the open access model for research communication. An open access African journal (the African Journal of Biotechnology) is evaluated.

Key words: Open access, African Journal of Biotechnology, research communications.

INTRODUCTION

The concept of making the results of primary research freely available to anyone with an internet connection has caused a great stir in the media and science community (Lipman, 2001). The sciences are undergoing a fundamental and difficult transition - from a mode of publication that has reigned for the 335 years since the printing of the first scientific journals to a new mode made possible by computer science and the Internet. This transition is going to occur within the next decade or two, and it is now important for both scientists and publishers to influence its pace and its form. The desired properties of scientific publishing - accessibility, economy, quality, innovation, and retrieval - seem obvious, and it seems equally obvious that most or all of these properties can be more readily achieved with electronic methods (Varmus, 2001).

The aggregation and advancement of knowledge takes place by collective efforts of researchers around the world. In the production of new knowledge, scientists use what is already known (Arunachalam, 2003). Scientists also differ from other sorts of writers, especially when describing the results of their own research efforts because they are not paid for writing these reports. They

simply want the largest possible audience to have the greatest possible access to them. And those who have paid for the costs of our research (the public, foundations, and governments) feel the same way (Varmus, 2001).

CURRENT STATE OF EVENTS

The current methodology of research dissemination and validation is premised on a paper medium that was difficult to produce, difficult to distribute, difficult to archive, and difficult to duplicate - a medium that hence required numerous local redistribution points in the form of research libraries (Odlyzko, 1995). The scientific world now finds itself at the mercy of commercial publishers (Tamber, 2000), but scientific culture must take part of the blame. Within biomedical science it is generally accepted that the quality of research is reflected in the prestige of the journal it is published in. That prestige is based on an impact factor - a value calculated on the basis of the number of times the journal is cited. The drive for quality through prestige is at the heart of the scientific community, and commercial publishers take full

advantage. The cost of journals is increasing by the year, and making up for this increase will come from science's limited budget. With more money being directed towards buying books and journals, less will be available to fund research. In sub-saharan Africa, traditional print journals have not lived up to expectations because these journals mostly survive on grants and few fortunate African universities rely again on grants to buy them. Their subscription record is pathetic at best. Several libraries in sub-Saharan Africa have not subscribed to any journal for years (Arunachalam, 2003). They simply cannot afford it.

THE ROAD AHEAD

Using the internet as a means of publication leads to the democratization of science as well as to the incorporation of disenfranchised investigators, especially those in developing countries, into the scientific community (Varmus, 2001). The establishment of electronic journals, preferably ones carefully edited and designed expressly for dissemination through the internet with open access is needed. The journals should not be too radically different from current print journals.

Journals should be scientist driven (Ginsparg, 2000), and be flexible enough to co-exist with the pre-existing publication system in order to meet researcher needs. The rapid dissemination they provide must also be preceded by peer review. A key point of the electronic communication medium is that it is possible to archive a research article and make it freely available to the entire world in perpetuity. Moreover, this is consistent with public policy goals for what is in large part publicly funded research (Bachrach et al., 1998). The new technology may allow the traditional players from a century ago, namely the professional societies and institutional libraries, to return to their dominant role in support of the research enterprise (Ginsparg, 2000). Open access to scientific research enabled by electronic journals is a great boon to science and a tremendous opportunity to researchers and the societies that represent them. Scientific societies should do everything they can to encourage open access in service to their members (Marincola, 2001). Electronic submission and publication reduces staffing and shipping costs.

AN OPEN ACCESS AFRICAN JOURNAL

The African Journal of Biotechnology (AJB) (ISSN 1684-5315), which was started in November 2002, provides rapid (monthly) publication of papers on biotechnology and applied molecular biology. Manuscripts must meet the general criteria of significance and scientific excellence. The journal is published freely online and everyone with access to a web browser will have free electronic access to the full text (in both HTML and PDF)

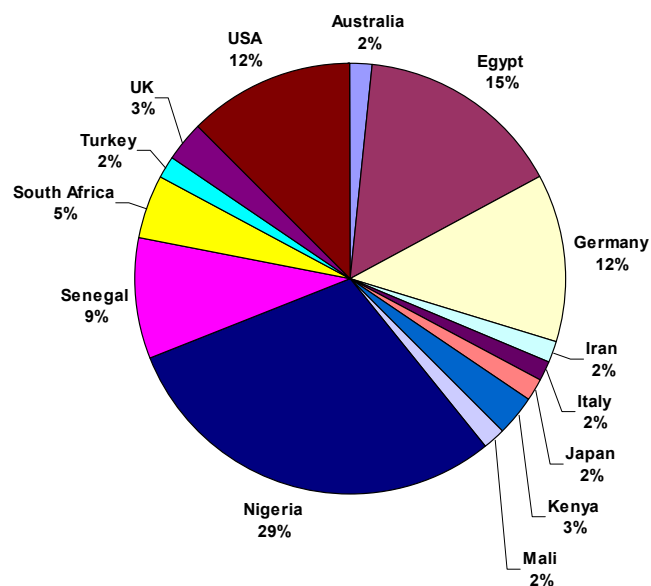


Figure 1. Country origin of articles published in the African Journal of Biotechnology (November 2002 to August 2003). This is the country where the corresponding author is based, and from which the manuscript was sent (in some cases, the research was conducted in the author's previous institution in another country). Does not include rejected articles.

Table 1. Country in which editorial board member resides (as at August 2003).

Country	Number of editorial board member
Australia	1
Cameroon	1
Canada	1
Colombia	1
Egypt	1
Germany	2
Japan	1
Kenya	2
Nigeria	3
Senegal	1
South Africa	1
USA	5

of the articles. No registration or password is required.

The journal, was founded on two key tenets: To publish the most exciting research in all areas of applied biochemistry, industrial microbiology, molecular biology, genomics and proteomics, food and agricultural technologies, and metabolic engineering. Secondly, to provide the most rapid turn-around time possible for reviewing and publishing, and to disseminate the articles freely for teaching and reference purposes. All articles published in AJB are peer-reviewed.

From November 2002 to August 2003, articles (64) published by AJB has come from 14 countries in and outside of Africa (Figure 1). Members of the journal's editorial board comes from 12 countries (Table 1). The

Table 2. Top countries from which the African Journal of Biotechnology website was accessed in July, 2003.

Top 30 of 80 Total Countries							
#	Hits		Files		KBytes		Country
1	8551	43.19%	4654	42.22%	279437	42.64%	Unresolved/Unknown
2	2643	13.35%	1346	12.21%	112488	17.16%	US Commercial
3	1660	8.38%	949	8.61%	42636	6.51%	Network
4	1276	6.44%	728	6.60%	36437	5.56%	US Educational
5	689	3.48%	468	4.25%	23319	3.56%	Kenya
6	497	2.51%	299	2.71%	14674	2.24%	United Kingdom
7	312	1.58%	179	1.62%	9722	1.48%	Germany
8	307	1.55%	212	1.92%	7315	1.12%	Canada
9	299	1.51%	213	1.93%	7443	1.14%	Australia
10	255	1.29%	106	0.96%	14404	2.20%	Thailand
11	206	1.04%	88	0.80%	7038	1.07%	Brazil
12	196	0.99%	108	0.98%	8248	1.26%	South Africa
13	187	0.94%	100	0.91%	3900	0.59%	Netherlands
14	178	0.90%	126	1.14%	4540	0.69%	Spain
15	167	0.84%	105	0.95%	7350	1.12%	Japan
16	165	0.83%	76	0.69%	4333	0.66%	Italy
17	138	0.70%	59	0.54%	2727	0.42%	Non-Profit Organization
18	138	0.70%	59	0.54%	4574	0.70%	India
19	122	0.62%	71	0.64%	5279	0.81%	France
20	116	0.59%	73	0.66%	3509	0.54%	Argentina
21	100	0.51%	73	0.66%	3405	0.52%	Mexico
22	99	0.50%	33	0.30%	2825	0.43%	Taiwan
23	95	0.48%	45	0.41%	2950	0.45%	Poland
24	89	0.45%	50	0.45%	2883	0.44%	Turkey
25	87	0.44%	57	0.52%	3441	0.52%	US Government
26	80	0.40%	33	0.30%	2676	0.41%	Belgium
27	75	0.38%	54	0.49%	1428	0.22%	Colombia
28	73	0.37%	25	0.23%	2578	0.39%	Senegal
29	63	0.32%	51	0.46%	3074	0.47%	Singapore
30	60	0.30%	37	0.34%	3453	0.53%	Israel

journal's website (<http://www.academicjournals.org/AJB>) receive hits from several countries (Table 2). AJB's success so far can also be attributed to two organization; Bioline International and INASP. Bioline International also hosts AJB freely on their website (<http://www.bioline.org.br/jb>) in addition to other journals. INASP provides abstract service for African journals (<http://www.inasp.org.uk/ajol/journals/ajb>). Both organizations provided the initial (and still on-going) promotion of the journal.

If handled imaginatively, the very same technologies can help bridge the information gap between the rich and

the poor countries and help improve research productivity worldwide (Arunachalam, 2003). In the future, all journals (including those only in print now) will be published online for the simple reason that it is the best and fastest way to communicate research findings and subsequently create new knowledge.

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